Appendix 6.2 Natura Impact Statement

Laois Kilkenny Reinforcement Project
Environmental Reports

Natura Impact Statement

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Executive Summary

This Natura Impact Statement has been prepared to assess the potential impacts of the Laois - Kilkenny Reinforcement Project on the River Barrow and River Nore cSAC, a designated European site as required under Article 6 of the EU Habitats Directive.

Stage 1 Appropriate Assessment Screening previously concluded that the proposed development has the potential to adversely impact the River Barrow and River Nore cSAC during the construction phase (See Appendix 1 of this report).

The potential impacts that were identified during the screening stage relate to possible deterioration in water quality within the cSAC due to sediment run-off from construction sites, and a risk posed by other harmful substances (such as fuel and cement).

Potential significant adverse impacts on the cSAC that have been identified relate the works associated with the following elements of the project:

- Coolnabacky substation site – construction phase
- Ballyragget substation site – construction phase
- Transmission structure (Poleset and Angle Mast) locations in close proximity to watercourses which feed into the River Barrow and River Nore cSAC – construction phase
- Conifer plantations that require felling along the new Ballyragget to Coolnabacky 110 kV line route – construction phase

A series of detailed mitigation measures have been developed to address the potential impacts that have been identified. Proposals are also made with regards monitoring the effectiveness of these measures.

The correct implementation of all mitigation measures detailed in this report will ensure that the conservation objectives for the cSAC will not be compromised by the proposed development, nor by any cumulative effects and no significant impact is anticipated on any of the species and habitats for which the site is designated.

In conclusion, through the process of Appropriate Assessment, it is the considered view of the author that the proposed development will have no adverse impact on the integrity of the designated site as a whole or on any other designated site.

1 Introduction

Appropriate Assessment screening that was undertaken on the proposed Laois - Kilkenny Reinforcement project concluded that the proposed development has the potential to adversely impact the River Barrow and River Nore cSAC during the construction phase (See Appendix 1 of this report).

This report further describes and assesses the potential impacts of the proposed work on the conservation objectives of the European site. Mitigation measures are proposed to address any identified impacts and the likely effectiveness of the mitigation and any potential residual impacts are reported.

1.1 Statutory Context

This Natura Impact Statement has been prepared in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (European Commission 2002), the European Commission Guidance 'Managing Natura 2000 Sites' (European Commission 2000) and with reference to the Department of the Environment and Heritage and Local Government guidance on 'Appropriate Assessment of plans and projects in Ireland' (DEHLG 2009).

The EU Habitats Directive (92/43/EEC) provides the framework for legal protection for habitats and species of European importance. The directive provides the legislative means to establish a network of sites (known as the Natura 2000 network) throughout the EU with the objective of conserving habitats and species deemed to be of Community interest. These sites include candidate Special Areas of Conservation (cSACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Birds Directive (formally known as the Conservation of Wild Birds Directive 79/409/EEC). Both directives have been transposed into Irish law by the recently enacted European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/11).

Article 6 (3) and 6(4) of the habitats directive lays down the procedure to be followed when planning new developments that might affect a European site. This stepwise procedure requires that a plan or project having a likely significant negative effect on a European site undergoes an Appropriate Assessment of its implications for the site in view of that site's conservation objectives.

Depending on the findings of the Appropriate Assessment the competent authority shall agree to the proposed development only if the competent authority has ascertained that the proposed development will not adversely affect the integrity of the site concerned.

However, should this assessment have ascertained that there will be an adverse effect it may require one or more of the following, depending on the degree of impact:

- specific mitigation measures are introduced to remove the negative effects;
- certain conditions are respected during the construction, operational or decommissioning phases of the project, again to remove the likelihood of negative effects or to reduce them to an insignificant level where they no longer affect the integrity of the site;
- feasible alternatives are explored instead.

In exceptional circumstances, a plan or project may still be allowed to go ahead under certain conditions, in spite of being assessed as having negative effects on the site provided the procedural safeguards laid down in the Habitats Directive are followed (Article 6(4)). This may be possible, for instance, if the plan or project is considered to be of overriding public interest and there are no less damaging alternatives available. In such cases, compensation measures will need to be implemented to ensure that the overall coherence of Natura 2000 is protected.

2 Methodology

There are up to four successive stages involved in the Appropriate Assessment process (European Commission 2002). The outcome at each stage determines whether the next stage in the process is required. Stage 1 Screening is the first stage in the process and is carried out to determine the necessity for a more detailed Stage 2 Appropriate Assessment where potential impacts are deemed to be of significance.

The outcome of screening for the Laois - Kilkenny Reinforcement project is presented in a standalone Appropriate Assessment Screening Statement presented as Appendix 1 to this report. Screening concluded that Appropriate Assessment of the potential impacts on the River Barrow and River Nore cSAC was necessary.

Stage 2 Appropriate Assessment which is presented in this report involves the following steps:

- Description of Natura site where significant impacts are foreseen
- Description of impacts on conservation objectives of the site
- Mitigation and recommendations
- Conclusion

A number of ecological surveys and reports have been carried out on the project in order to inform the ecological impact assessment. These have been primarily concerned with the 'new build' elements of the project, for example the proposed

new overhead line from Ballyragget to Coolnabacky and the Coolnabacky substation. These reports, which have helped inform the assessment, include the following:

- Ecological constraints report October 2010 (Stage 1 Report Appendices, D1-D6)[1]
- Coolnabacky substation site selection report (Stage 1 Appendix G)[1]
- Winter bird surveys undertaken over two seasons (March – April 2010 and October 2010 - April 2011) (Stage 1 Report Appendices D7, D8 and D9; and Stage 2 Report Appendix D)[1, 2]
- Ecological assessment of potential route corridors and route corridor selection March 2011 (Stage 1 Report, Appendices I1-I6)[1]
- Ecological assessment of proposed project which included multidisciplinary walkover surveys (to inform Chapter 6 of the Environmental Report)

A precautionary approach was taken throughout the route and site selection process with the aim of avoiding, where possible, potential impacts on the ecological constraints identified. The main ecological constraints (including European sites in the surroundings) were identified at the earliest stage in the project. Consultation was undertaken with both National Parks and Wildlife Service (NPWS) of the Department of Arts Heritage and Local Government and Inland Fisheries Ireland (IFI) during the preparation of this report.

3 Description of European Site

The single European site identified for Stage 2 Appropriate Assessment is the River Barrow and River Nore cSAC (NPWS Site Code: 2162). Maps showing the location of the proposed development in relation to the European site is presented in **Figure 1** (northern part Coolnabacky to Ballyragget) and **Figure 2** (southern part, Ballyragget to Kilkenny).

3.1 River Barrow and Nore cSAC (NPWS Site Code: 2162)

The qualifying interests of the River Barrow and River Nore cSAC include those species and habitats presented in **Table 1**. The conservation objectives for the site have recently been published together with the attributes and targets which define the favourable conservation condition for each qualifying species and habitat for which the site is designated (NPWS 2011)[3]. In summary the Conservation objectives for the River Nore and Barrow cSAC are to maintain or restore the favourable

[1] Phase 1 Lead Consultants Report May 2011 – and detailed in the planning application documents
[2] Phase 2 Lead Consultants Report March 2012 – and detailed in the planning application documents

[3] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO002162.pdf

conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected as presented in **Table 1** below (NPWS 2011). The distribution of Annex I habitats and Annex II species throughout the cSAC is reviewed in the Conservation Objectives report for the site (NPWS 2011).

There are two types of freshwater pearl mussels in Ireland, one called *Margaritifera margaritifera* and the other is the very rare *Margaritifera durrovensis*, which is only known from the Nore Catchment. Populations of the Nore Freshwater Pearl-mussel (*Margaritifera durrovensis*) were only ever known from the Barrow, Nore and Suir main channels. It is now thought to be restricted to a short section of approximately 10km of the main Nore channel with most of the population found between Poorman's Bridge and the Avonmore Creamery above Ballyragget (S 440 722). The species is in very serious decline and is listed as critically endangered in Ireland as outlined in the *Freshwater Pearl Mussel Nore Sub-Basin Management Plan* (North South 2 Project 2010). The known distribution of the Nore freshwater Pearl-mussel in relation to the proposed development is shown in Appendix 2.

A number of the Annex II aquatic species of the cSAC occur in watercourses in proximity to the proposed development including River and Brook Lamprey, Atlantic Salmon, Freshwater White-clawed Crayfish (NPWS 2011). These species would all be sensitive to deterioration in water quality or habitat alteration due to the effects of siltation.

Table 1: Qualifying interests of River Barrow and River Nore cSAC (source: www.npws.ie).

	Habitat / Species code	**Habitat / Species Type**
Habitats	91A0	Old sessile oak woods with Ilex and Blechnum in British Isles
	91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
	3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
	1310	Salicornia and other annuals colonizing mud and sand
	1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
	1410	Mediterranean salt meadows (Juncetalia maritimi)
	4030	European dry heaths
	7220	Petrifying springs with tufa formation (Cratoneurion)
	6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
	1320	Spartina swards (Spartinion maritimae)
	1140	Mudflats and sandflats not covered by seawater at low tide
	1130	Estuaries
Species	1095	Sea Lamprey (*Petromyzon marinus*)
	1096	Brook Lamprey (*Lampetra planeri*)
	1099	River Lamprey (*Lampetra fluviatilis*)
	1103	Twaite Shad (*Alosa fallax*)
	1106	Atlantic Salmon (*Salmo salar*)

	Habitat / Species code	Habitat / Species Type
	1102	Allis Shad (*Alosa alosa*)
	1355	Otter (*Lutra lutra*)
	1092	Freshwater White-clawed Crayfish (*Austropotamobius pallipes*)
	1029	Freshwater Pearl-mussel (*Margaritifera margaritifera*)[1]
	1990	Nore Freshwater Pearl-mussel (*Margaritifera durrovensis*)
	1016	Whorl Snail (*Vertigo moulinsiana*)
	1421	Killarney Fern (*Trichomanes speciosum*)

[1]The status of the Freshwater Pearl-mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore cSAC is currently under review (NPWS 2011).

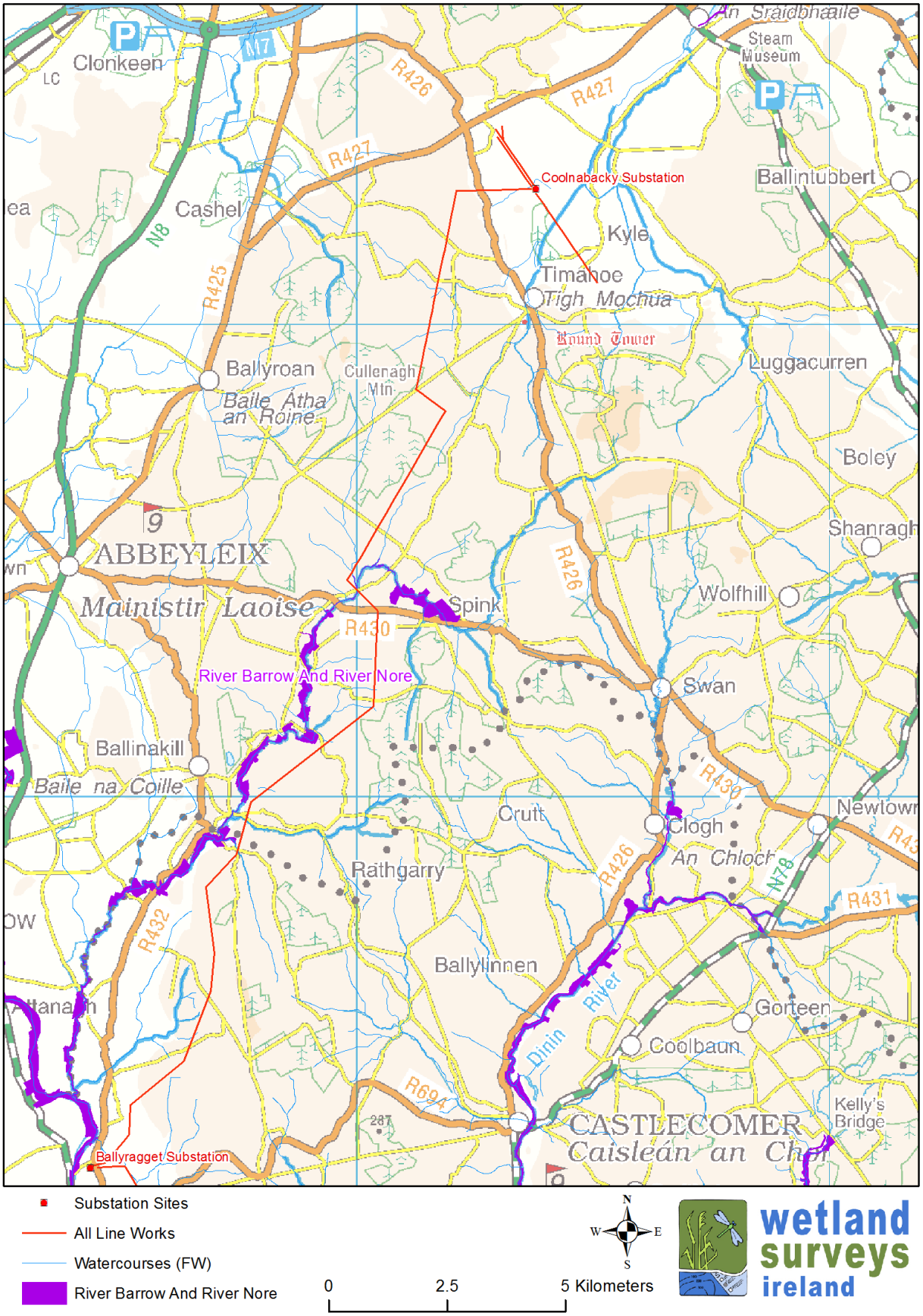

Figure 1: Map showing the location of the proposed development (northern part) in relation to the River Barrow and River Nore cSAC.

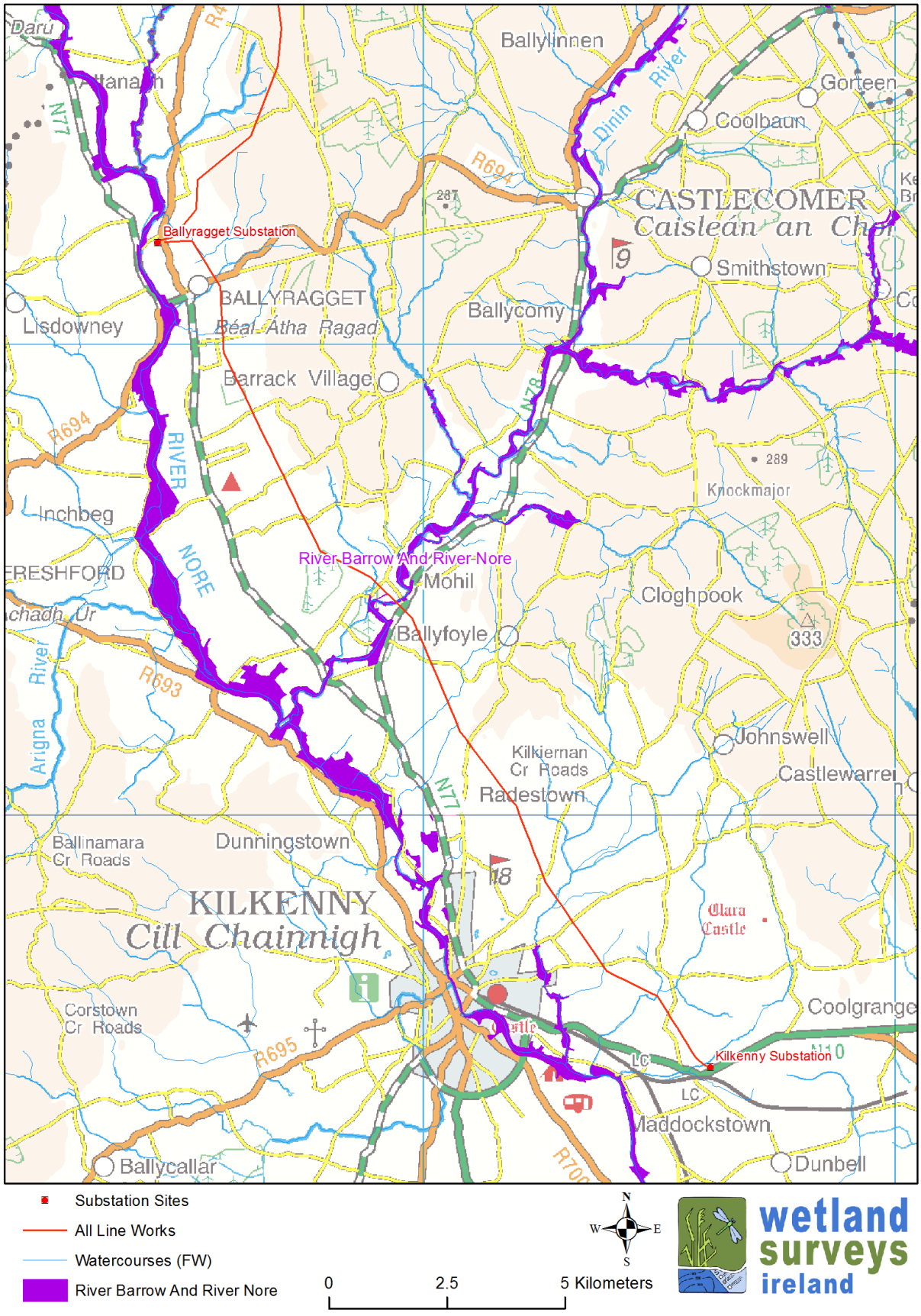

Figure 2: Map showing the location of the proposed development (southern part) in relation to the River Barrow and River Nore cSAC.

4 Potential Impacts

In summary the main impacts identified during the Appropriate Assessment Screening relate to possible temporary deterioration in water quality within watercourses of the cSAC during the construction phase of the project. There are a number of qualifying species of the cSAC that are sensitive to any deterioration in water quality including: Salmon, Freshwater White-clawed Crayfish, and the Nore Freshwater Pearl-mussel. Any significant deterioration in water quality could negatively impact on populations of these species within the site.

During the construction phase of the project there is potential for sediment run-off (due to excavations and works associated with tree felling) via the surface water drainage system into the River Barrow and River Nore cSAC. In addition, potential impacts due to contamination of surface water by concrete, fuel or other harmful substances are possible. Best practice construction techniques that will be adhered to during the construction of the project should minimise the potential for these impacts to occur. However, additional mitigation will be required at a number of especially sensitive locations where significant works are being proposed. The following locations where construction works are being undertaken have been identified as possible sources of impacts during the construction phase:

- Coolnabacky substation site
- Ballyragget substation site
- Transmission structure (Poleset and Angle Mast) locations in close proximity to watercourses which feed into the River Barrow and River Nore cSAC
- Conifer plantations that require felling along the new Ballyragget to Coolnabacky 110 kV line route

The potential impacts of the proposed development at these locations are described in more detail in the following paragraphs along with the requirements of mitigation measures to prevent such impacts from occurring.

4.1.1 Coolnabacky substation site

A summary of potential adverse impacts of works during the construction and operation phase of the development at the Coolnabacky substation site are presented in **Table 2.**

The main sensitive ecological receptor in proximity to the substation site constitutes a spring fed watercourse which occurs along the north-western boundary of the site. This watercourse provides suitable habitat to Annex II species and feeds into the cSAC ca 4.5 km downstream to the north-east. Drainage ditches that occur along both the western and north-eastern boundary of the substation site also feed into this watercourse.

Works that are to be undertaken during the construction of the substation that could give rise to impacts on the watercourse and the downstream cSAC include:

- The excavation and subsequent management of top-soil and subsoil. It is estimated that ca 8000m^3 of material will be excavated during the construction phase of the project. Following excavation, it is proposed to store the material in berms at pre-determined locations within the site. Should significant quantities of excavated material become entrained by rain water and transported to surrounding watercourses then this could impact on the habitat of Annex II species downstream of the substation site.
- The use of concrete and fuels during the construction phase of the project. Should any of this concrete enter the surrounding watercourses then it could potentially impact on habitat of Annex II species downstream.

It is considered that the impacts above are unlikely to occur based on best practice construction methods being adopted. However, additional measures specific to the substation site are presented in **4.3.1 below** to further reduce the likelihood of these impacts occurring.

Table 2. Summary of potential adverse impacts on River Barrow and River Nore cSAC identified at proposed Coolnabacky substation sites.

Location	Possible source of impact identified	Requirements of mitigation
Proposed Coolnabacky substation site	Requirement for considerable ground works and operation of machinery during construction phase. Any possible release of sediment or other harmful substances to watercourses surrounding the substation site. The watercourse that borders the site provides habitat for aquatic Annex II species and feeds into the cSAC downstream.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC downstream.

4.1.2 Ballyragget Substation Site

Potential adverse impacts of works during the construction and operation phase of the development at the Ballyragget substation site are presented in **Table 3**.

The Ballyragget substation site is located approximately 300 metres East of the main channel of the River Nore. The main channel in this area supports a population of the Nore Freshwater Pearl-mussel which would be highly sensitive to any deterioration in water quality. There are no watercourses in close proximity to the proposed works area at the Ballyragget substation site that could provide a direct pathway to the main channel of the River Nore. Drainage at the substation site has been shown to go directly to ground water, which may in turn discharge to the main channel of the River Nore (see Hydrology Chapter of the Environmental Report) providing a potential pathway for adverse impacts should contaminated water discharge from the proposed development site.

Table 3. Summary of potential adverse impacts on River Barrow and River Nore cSAC identified at proposed Ballyragget substation sites.

Location	Possible source of impact identified	Requirements of mitigation
Proposed Ballyragget substation site	Possible pollution of groundwater at Ballyragget substations site. Site investigations have shown that drainage at the site is to ground water which may discharge into River Nore.	Reduce / eliminate any risk to groundwater during construction / operation.

4.1.3 Transmission structure (Poleset and Angle Mast) locations in close proximity to watercourses which feed into the River Barrow and River Nore cSAC

Potential adverse impacts of works during the construction phase of the development at particularly sensitive structure locations are presented in **Table 4**. These locations have been determined owing to the close proximity of watercourses (which discharge into the cSAC) to the proposed structure location. No potential impacts are foreseen throughout the operation phase at these locations.

Works that could give rise to impacts would be associated with sediment release during the erection of polesets and angle masts or potential contamination of surface water from concrete and / or fuels used during construction.

The erection of pole sets generally requires minimal disturbance to the ground. A foundation hole will be excavated, the pole erected and backfilled and with good construction practice there should be little risk of sediment loss. Duration on site is expected to be no more than a single day for each pole set. No concrete is required during the erection of polesets.

The construction of Angle Masts requires larger excavations and involves the construction concrete foundations. The duration of works at each Angle Mast location is ca 2.5 weeks, with the majority of this time due to concrete setting time.

Those structures along the Ballyragget to Coolnabacky section of line (labeled BC) are new structures whereas those located along the Ballyragget to Kilkenny line are replacement structures.

Table 4. Summary of potential adverse impacts on River Barrow and River Nore cSAC identified at particular structure locations.

Location	Possible source of impact identified	Requirements of mitigation
BC 149 (New Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BC 124 (New Poleset)	Watercourse at structure location. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BC 91 (New Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BC 72 (New Angle Mast)	Adjacent watercourse within ca 20 metres of angle mast. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BC 21 (New Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BK 4 (Replacement Angle Mast)	Adjacent watercourse within 10 metres of new angle mast structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BK 5 (Replacement Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BK 16 (Replacement Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BK 49 (Replacement Poleset)	Structure located on boundary of cSAC. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and designated cSAC.
BK 67 (Replacement Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BK 81 (Replacement Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BK 82 (Replacement Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BK94 (Replacement Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.

Location	Possible source of impact identified	Requirements of mitigation
	could impact on cSAC.	
BK 103 (Replacement Poleset)	Adjacent watercourse within 10 metres of structure. Any release of sediment or harmful substances during construction could impact on cSAC.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.

4.1.4 Conifer plantations that require felling along the new Ballyragget to Coolnabacky 110 kV line route.

Potential for adverse impacts arises for the requirement to fell a corridor of 61.5 m width where the line passes through conifer plantation. The proposed Ballyragget to Coolnabacky line passes through two areas of Conifer plantation within the Nore catchment (see **Table 5**), upstream of the Owenbeg River at Knockardagur (corridor of ca 890m length to be felled between Structures BC77-82) and at Garryglass (corridor of 930m length to be felled between Structures BC103-109).

At Knockardagar, the proposed line route is located ca 80 m to the East (upstream) of the nearest mapped (un-named) watercourse which discharges to the designated section of the Owenbeg River ca 1.5 km downstream. Drainage from the forested area is likely to be via a network of forestry drains towards this unnamed watercourse.

At Garryglass, the proposed line route is located ca 130 m to the West (upstream) of the nearest mapped (un-named) watercourse which discharges to the designated section of the Owenbeg River ca 1.5 km downstream. Drainage from the forested area is via a network of forestry drains towards this un-named watercourse.

Potential impacts at forest locations can arise from the following activities:

- Clear felling of the forest corridor: Clearfelling of the forest corridor can give rise to both siltation risk from ground disturbance and nutrient enrichment from the release of phosphorous and nitrogen from brash decay. The main sources of siltation risk during forestry operations (such as clear felling) arise from disruption of the soil surface, which can cause soils to be exposed to erosion and the transportation of finer particles by overland flow, and the transportation of looser decaying organic particles. Decaying brash resulting from the clearfell can generate nutrients which could potentially lead to nutrient enrichment of the small first order streams entering the Owenbeg River.

- Removal of tree stumps to facilitate overhead line construction: Construction of the overhead line in clear felled forest areas can also give rise to sediment

release. Wooden poles (weighing approximately 3 tonnes each) will be transported to the construction location by wide tracked machinery generating low ground pressure. In general tree stumps along the immediate line route would be removed in a 10m wide corridor to allow machinery tracking and avoid tracks coming off the vehicle. Uprooting of tree stumps can contribute significantly to ground disturbance and sediment release.

- Construction of pole sets: The erection of pole sets generally requires minimal disturbance to the ground. A foundation hole will be excavated, the pole erected and backfilled and with good construction practice there should be little risk of sediment loss. Construction activity is also spread out along the line route with a small footprint at each location. Duration on site is expected to be no more than half a day for each pole set.

- Potential windthrow arising from exposed forest edges post corridor clearance: The felling of a linear corridor will leave exposed forest stand edges devoid of foliage along the corridor. There is some risk of wind throw when these tress reach maturity (an additional 20 years) however this is very limited at present given the age and height of trees.

The main potential effects from ground disturbance are the risk of silt generation with silt entering the Owenbeg River via its tributaries. The potential adverse impacts on freshwater ecology due to release of silt include:

- Sedimentation - impacts include smothering of gravel beds with consequent loss of fish habitat and spawning and potential juvenile Freshwater Pearl Mussel habitat.
- Sediment deposition can also provide a base for growth of filamentous algae on gravel beds leading to a build up of sediment and loss of both fish spawning areas area and potential freshwater pearl mussel areas.
- Sedimentation impacts include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish.
- Sedimentation impacts also include smothering of macroinvertebrates.
- Loss of water quality of surface and groundwater along the line route by silt.

Nutrient enrichment of the receiving waters can also occur due to decay of brash left through the tree harvesting process. However the forest stands are located on mineral soils and adsorption of phosphorous on this material is likely to occur reducing the risk of nutrient phosphorous loss to the small streams running to the Owenbeg River. Should nutrients reach the small first order streams this could give rise to the following:

- Increased algal growth in the rivers leading to increased potential for sediment entrapment and build up with de-oxygenation of the river during the nocturnal cycle.
- Increased algal growth will lead to reduced habitat for fish spawning, macroinvertebrates and reduced potential habitat for freshwater pearl mussel.

Accidental leakage of oil and fuels from construction vehicles can have a direct impact on fish, fish food and fish habitats and other aquatic species.

Table 5. Potential adverse impacts on River Barrow and River Nore cSAC identified at areas where felling of conifer plantation is required to facilitate the development.

Location	Possible source of impact identified	Requirements of mitigation
BC 103 - 106 (Poleset)	Conifer plantation - likely to be direct drainage to tributary stream of Owenbeg River to South. Possibility of impacting on surrounding surface water quality during and post-felling of conifers.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.
BC 77 - 82 (Poleset)	Conifer plantation - likely to be direct drainage to tributary stream to East. Possibility of impacting on surrounding surface water quality during and post-felling of conifers.	Protection of surrounding surface waters which are likely to support Annex II species and feed into cSAC.

4.2 Cumulative Impacts

It is a requirement of Appropriate Assessment that the combined effects of the proposed development together with other plans or projects be assessed. To the best knowledge of the author, there are no other major infrastructural projects proposed in close proximity to the proposed development that could potentially contribute to significant cumulative or in-combination impacts. The existing electricity network within the study area has been considered in this assessment. Other activities within the study area that could contribute to cumulative impacts include active quarries, farming and forestry operations. These operations have been identified as sources of potential adverse impacts on the conservation status of the cSAC (Nore Freshwater Pearl Mussel Catchment Management Plan, North South Project 2)[4].

Based on the nature and scale of the potential impacts associated with the proposed Laois-Kilkenny Reinforcement Project in isolation and the known impacts caused by

[4] http://www.wfdireland.ie/docs/5_FreshwaterPearlMusselPlans/Freshwater%20Pearl%20Mussel%20Plans%20March%202010/Second%20Draft%20of%20Nore%20Sub-Plan%20March.2010.pdf

the above operations, significant cumulative impacts on the conservation interest of the River Barrow and Nore cSAC are possible.

The proposed development extends over a considerable area within the catchment of the River Barrow and Nore cSAC and the potential impacts associated with the different elements as described in **Section 4 above** could in the absence of appropriate mitigation each contribute to a significant adverse cumulative impact on the conservation interest of the cSAC.

4.3 Mitigation Measures

Following the identification of potential adverse impacts at particular locations within the study area on the River Barrow and River Nore cSAC, a report was prepared to devise measures that could be implemented to mitigate against the possible impacts at each location. The report, which is presented as Appendix 3, was prepared by ESB International with input from a Civil Engineer, a Hydrologist and the project Ecologist.

The proposed mitigation measures were forwarded to both Inland Fisheries Ireland (IFI) and National Parks and Wildlife Service (NPWS) for comment. Correspondence received from IFI indicated their agreement with the mitigation measures being proposed. No subsequent correspondence was received from NPWS in relation to this.

It is intended that the client will issue this report as part of the tender and construction package of specifications to prompt the contractor to act on the mitigation measures contained therein and to make these mitigation measures contractually enforceable. The measures proposed are in-line with environmental best practice and should augment any statutory responsibilities on either the contractor or operator of the elements singled out for their location in, or close to, environmentally sensitive areas or water bodies.

Those mitigation measures proposed in Appendix 3 are presented under the four elements of the project where potential impacts have been identified:

- Coolnabacky substation site.
- Ballyragget substation site.
- Structure (Poleset and Angle Mast) locations in close proximity to watercourses which feed into the River Barrow and River Nore cSAC.
- Conifer plantations that require felling along the new Ballyragget to Coolnabacky 110 kV line route.

4.3.1 Coolnabacky substation site

4.3.1.1 Surface Water Protection

Drainage and runoff controls will be installed prior to starting site clearance and earthworks.

Erosion Control

Erosion control (preventing runoff) is much more effective than sediment control in preventing water pollution. Erosion control is less subject to failure from high rainfall and requires less maintenance.

Erosion control measures to prevent runoff flowing across exposed or excavated ground and becoming polluted with sediments are provided for in the design. This is primarily the use of existing site drains to channel runoff from up slope portions of a catchment around any construction areas or areas disturbed as a result of construction works.

Other inherent erosion control measures in the design include the design of roadways with minimum falls which do not exceed 15%.

Additional erosion control measures will be provided for in the construction management proposals. These measures will include the following:

- Minimise the area of exposed ground. Backfilling and construction will occur in conjunction with excavation and excavation will not proceed faster than the rate of construction. Re-vegetating of disturbed area to take place as soon as possible.
- Monitoring of the weather forecast prior to planning excavation works.
- Providing impermeable mats (plastic sheeting) as covers to mounded excavated material and open excavations during periods of heavy rainfall.

Silt fences to be provided at the toe of any significant areas where excavated material is stored.

Sediment Control

The Settlement Ponds are an integral part of the sediment control and containment measures on site and the protection of watercourses. Settlement ponds will be provided adjacent to the areas of the site where the most excavation or earthworks are planned.

The settlement ponds on the site have been sized to provide an adequate treatment volume for the first flush from the developed station and the ponds will ultimately have an attenuation volume so that surface water runoff can be limited to Greenfield runoff rates. This attenuation volume can be utilised as additional treatment volume in the construction phase when sediment generation is greatest.

The stone check dams which divide the pond into primary, secondary and final settlement compartments will further reduce turbulence which will aid settlement and provide filtering of water.

Surface water from the site will be discharged to existing vegetated drainage ditches within the site where further settlement of solids and filtering of surface water will occur prior to ultimate discharge to the adjacent watercourse.

Risk Management

The best way to manage pollution incidents is to prevent them. The contractor will identify and quantify risks associated with erosion and sediment for each work practice. Risks such as an unplanned bank collapse, mud slide and unforeseen rainfall event can be constantly assessed through geotechnical risk management and monitoring of weather forecasts.

Emergency Plans and Procedures

The contractor will prepare an emergency response plan and set of procedures for events likely to cause pollution including the pollution of watercourses with silt or sediment. There will be a contingency plan in place during construction and displayed at appropriate locations.

Equipment, Training and Corrective Action

Equipment required in responding to an emergency event with the capability of generating additional erosion and sediment laden runoff will be stored on site. Staff will be trained in the use and application of these temporary emergency measures which may involve the following:

- Impermeable matting (plastic sheeting);
- Silt fences (posts & geotextile material);
- Mulching capability (organic materials, straw, wood chip, bark or other wood fibres and gravel) to stabilise or protect cleared areas;
- Settlement Tanks (portable propriety settlement tanks that can be transported to required areas).

Staff will be trained and made aware of procedures for notification of emergency events with the potential for pollution of watercourses.

Monitoring

Ongoing water monitoring at the discharge points and the receiving waters will be a key indicator of the effectiveness of the erosion and settlement control measures and the requirement for corrective action or the deployment of additional measures as outlined above. Methods, frequency and parameters to be monitored will be

discussed and agreement sought with Inland Fisheries Ireland and National Parks and Wildlife Service prior to construction commencing.

4.3.1.2 Water Table and Groundwater Water Protection

Dewatering and Groundwater Level

Deep excavations below the water table encountered in the Site Investigation will be kept to a minimum in the foundation design. It is not envisaged that there will be extensive deep excavations requiring dewatering or for any extended period of time to cause a material difference in the local groundwater table level.

It is envisaged that there will, therefore be no impact on the spring fed watercourses in the area.

Continuous monitoring or the local water table will be employed where the contractor proposes any dewatering during the construction phase and proposals for dewatering and monitoring will be approved by the designers and ecologist for the project.

Groundwater Quality Protection

The contractor will store all chemicals, hydrocarbon based fuels and oil filled equipment when not in use in bunded areas of the site.

The contractor will have emergency spill kits comprising oil absorbent materials on site and staff trained in the use of these. Emergency response measures to oil/ fuel leaks will be displayed prominently on the site.

Sustainable Drainage Systems (SuDS) in the drainage network design will be put in place early in the construction phase to filter and biodegrade hydrocarbons in the unlikely event that any enter the water on the site.

In the operational phase, all oil filled equipment will be stored in impermeable concrete bunds. Surface water generated in the bunded areas will be pumped out of the bunds by an oil sensitive pump. There will also be an oil separator on the drainage network. Surface water will be routed through ponds and vegetated drainage ditches before discharge to the watercourse.

There will be no large scale batching of concrete on the site. All concrete will come from a licensed supplier with environmental certification. No washing out of concrete supply trucks will be allowed on the site. No cementitious material will be allowed enter the water or groundwater on the site. Monitoring and emergency response measures for any escape of cementitious material will be put in place by the contractor.

Any foul waste generated in the construction and operational phase of the project will be collected and disposed off site by a licensed contractor. No contamination of groundwater will occur from foul waste.

4.3.2 Ballyragget substation site

4.3.2.1 Groundwater Quality Protection

The contractor will store all chemicals, hydrocarbon based fuels and oil filled equipment when not in use in bunded areas of the site.

The contractor will have emergency spill kits comprising oil absorbent materials on site and staff trained in the use of these. Emergency response measures to oil/ fuel leaks will be displayed prominently on the site.

In the operational phase, all oil filled equipment will be stored in impermeable concrete bunds. Surface water generated in the bunded areas will be pumped out of the bunds by an oil sensitive pump. There will also be an oil separator on the drainage network. Only after these measures will surface water then be recharged to groundwater through source control techniques (soakaways) in line with SuDS best management practices.

There will be no large scale batching of concrete on the site. All concrete will come from a licensed supplier with environmental certification. No washing out of concrete supply trucks will be allowed on the site. No cementitious material will be allowed enter the water or groundwater on the site. Monitoring and emergency response measures for any escape of cementitious material will be put in place by the contractor.

Foul waste generated in the construction of the project will be collected and disposed off site by a licensed contractor. Foul Waste generated in the unmanned station during the operational phase will be treated on site before being further treated and disposed of to ground water in a designed percolation area. A suitably qualified professional has carried out a site assessment and designed the percolation area in accordance with EPA guidelines.

4.3.3 Structure locations in close proximity to watercourses

4.3.3.1 Poleset Construction - Erosion & Sedimentation Control

Polesets are constructed over the short duration of 1 day per poleset. The main mitigation measure in this case will be to not carry out construction on days when there is rain or rain forecast (for the sensitive polesets noted above which are in the proximity of a watercourse). The contractor will monitor the weather forecast as part of the construction planning for the polesets.

It should be noted that, should groundwater seepage be encountered in excavations for the polesets, there is no requirement for de-watering. The top vegetated layer will be excavated carefully to keep the vegetation and root system intact. This layer will be placed carefully to one side and protected for the short duration of the construction. This layer will be reinstated following backfill around the polesets which will limit the potential for sediment runoff immediately after the construction of each poleset.

Excavated material will be stored safely so that the distance from the watercourse is maximised within the confines of the construction area and to ensure that there is a natural filter strip of vegetation between the excavated material and any water course. It should be noted that the entire volume of spoil per poleset will not exceed $40m^3$ and the associated spoil heap will not occupy an area exceeding $20m^2$. Sediment laden runoff from this small area during predominantly dry conditions is unlikely.

In the unlikely event of significant non forecasted rainfall the contractor will have access to emergency sediment control measures in a site compound that can be transported to the poleset construction location within a short time period. These measures would include the following:

- Impermeable matting (plastic sheeting);
- Silt fences (posts & geotextile material);
- Mulching capability (organic materials, straw, wood chip, bark or other wood
- fibres and gravel) to stabilise or protect cleared areas;
- Settlement Tanks (portable propriety settlement tanks that can be transported to required areas).

4.3.3.2 Polesets Construction - Pollution Control

The risk of non sediment related pollution during the construction for the polesets is minimal and may only be associated with oil leaks from the plant and machinery used in the construction. The following measures will be in place to mitigate the risk of and to respond in the event of an oil leak:

- All vehicles will be regularly serviced and kept in good condition;
- Vehicles will be checked daily for indications of leaking oil;
- No refuelling operations will take place at the construction site of the polesets;
- Spill kits will be readily available to drivers/ operators of plant and machinery; and
- Drivers/ operators of plant and machinery will be trained in the use of spill kits and aware of the contractor's emergency procedures for dealing with and reporting oil and fuel spills.

4.3.3.3 Angle Mast Construction - Erosion & Sedimentation Control

Angle Masts foundations are constructed over a period of less than 2.5 weeks per Angle Mast with the majority of this time required due to concrete setting time. Once the foundation is constructed and backfilled, the foundation is generally left for approximately 28 days before the mast is assembled. The mast assembly will cause no ground disturbance and takes place over a very short duration of time. The major mitigation measure in this case will be to not carry out construction at sensitive Angle Mast locations noted above which are in the proximity of a watercourse when there is a significant amount of rainfall forecast. The contractor will monitor the weather forecast as part of the construction planning for these Angle Masts.

Should the excavations for the Angle Mast foundations require dewatering due to groundwater seepage this water will be pumped through a portable settlement tank before discharge to the nearest drainage ditch. Existing vegetation as a filter strip prior to discharge to the drainage ditch will also be utilised where conditions allow.

The top vegetated layer will be excavated carefully to keep the vegetation and root system intact. This layer will be placed carefully to one side and protected for the short duration of the construction. This layer will be reinstated over the foundations following backfill around the Angle Mast foundations which will limit the potential for sediment runoff immediately after the construction of each Angle Mast foundation.

Excavated material will be stored safely so that the distance from the watercourse is maximised within the confines of the construction area and to ensure that there is a natural filter strip of vegetation between the excavated material and any water course. It should be noted that the entire volume of spoil per Angle Mast will not exceed 140 m^3. Much of this excavated material will be removed from site immediately as it will not be required for backfilling and landscaping around the Angle Mast foundations. The excavated material stored adjacent to the Angle Mast construction area for the short duration of the works is therefore unlikely to exceed 50-66 m^3. The associated spoil heap will not occupy an area exceeding 36-46m^2. Sediment laden runoff from this small area during predominantly dry conditions is unlikely.

In the unlikely event of significant non forecasted rainfall during the construction period, the contractor will have access to emergency sediment control measures in a site compound that can be transported to the Angle Mast construction location within a short time period. These measures would include the following:

- Impermeable matting (plastic sheeting);
- Silt fences (posts & geotextile material);
- Mulching capability (organic materials, straw, wood chip, bark or other wood fibres and gravel) to stabilise or protect cleared areas;

- Settlement Tanks (portable propriety settlement tanks that can be transported to required areas).

4.3.3.4 Angle Mast Construction - Pollution Control

The risk of non sediment related pollution during the construction for the Angle Masts is minimal and may only be associated with oil leaks from the plant and machinery used in the construction or from the escape of cementitious material during the foundation construction. No chemicals will be stored at the construction site.

The following measures will be in place to mitigate the risk of and to respond in the event of an oil leak:

- There will be no fuel or oil stored at the Angle Mast construction location;
- All vehicles will be regularly serviced and kept in good condition;
- Vehicles will be checked daily for indications of leaking oil or fuel;
- No refuelling operations will take place at the construction site of the Angle Masts;
- Spill kits will be readily available to drivers/ operators of plant and machinery; and
- Drivers/ operators of plant and machinery will be trained in the use of spill kits and aware of the contractor's emergency procedures for dealing with and reporting oil and fuel spills.

The following measures will be in place to mitigate the risk of and to respond to the escape of cementitious material during foundation construction for Angle Masts:

- There will be no on site batching of concrete, grout or cement mortar at the Angle Mast construction locations;
- No washing out of concrete delivery vehicles or dumping of excess concrete will be permitted at the Angle Mast construction sites;
- Concrete skips, concrete pumps and machine buckets will be positioned so as not to allow slewing over water while placing concrete (the use of skips and pumps not envisaged);
- Freshly placed Concrete is to be covered to avoid surface washing away in heavy rain; and
- Clean up any spillages of cementitious materials immediately and disposed of correctly.

If temporary welfare facilities are required at the sensitive Angle Mast construction locations following investigation of alternative arrangements, these will be self contained units and foul waste generated will be collected and disposed of by an approved licensed contractor.

4.3.4 Conifer plantations that require felling along the new Ballyragget to Coolnabacky 110 kV line route.

The following mitigation measures will be implemented.

4.3.4.1 General Mitigation Measures

- Forestry Operations within the Freshwater Pearl Mussel Catchment areas, including at the forest stands within the Owenbeg river catchment will be carried out strictly in accordance with the Forestry and Freshwater Pearl Mussel Requirements Site Assessment and Mitigation Measures published by the Forest Service.
- The Forestry and Freshwater Pearl Mussel Site Assessment Forms A and B which have been revised by Coillte and NPWS shall be used for all forestry operations within the Freshwater Pearl Mussel Catchments associated with the overhead line construction.
- The contractor appointed to harvest the timber will be fully briefed on the ecological sensitivity of the site and will work in collaboration with an ecologist to set out the proposed method and delineate working areas.
- Construction will adhere to the guidance document issued by Inland Fisheries Ireland South-eastern River Basin District Maintenance and Protection of the Inland Fisheries resource during road construction and improvement works published by the South-eastern Regional Fisheries Board. (Note that a new Guidance document is expected to be published shortly by Inland Fisheries Ireland entitled "Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters". Construction will adhere to this guidance once published).
- Should the need for any in stream crossings by construction vehicles be identified the Inland Fisheries Ireland shall be consulted and the approach to the crossing agreed with them. Any and all watercourses which have to be traversed during site development and associated track/road construction works should be effectively bridged prior to commencement.
- Work method statements should be developed and implemented by construction contractors for pole set construction.
- Access to construction areas should utilise existing field tracks to the extent possible to minimise the need for additional track construction.
- Proposed access tracks should be assessed by a qualified geotechnical engineer and ecologist to ensure the route minimises surface disturbance and silt generation.
- Re-fuelling of vehicles should not take place on site but in a secure bunded area well away from any watercourse.
- All oils and fuels should be stored in secure bunded areas, and particular care and attention should be taken during refuelling and maintenance operations on plant and equipment

4.3.4.2 Sediment Impact Mitigation

- Brash from the clearfell should be utilised as roading material for pole construction tracked vehicles to reduce impact on ground thereby minimising ground disturbance
- Existing forest drainage shall be reinstated where damaged to allow use to be made of vegetated ground areas to reduce the flow of silt overland.
- Silt traps and silt fences, such as geotextile membrane and straw bales, should be placed in the forest drainage network to minimise silt loss. These should be inspected and cleaned regularly. A series of stepped silt traps fences to trap any silt/debris will be installed. Their purpose will be to slow water flow and allow settlement of solids to occur. These will be regularly inspected and cleared out to ensure they are functioning properly.
- Traps should not be constructed immediately adjacent to natural water courses. A buffer zone should remain between the silt trap and the watercourse with natural vegetation left intact so as to assist in silt interception. They should be installed on forest drains.
- Pesticide if used for suppression of growth beneath the established overhead line should be minimised and used strictly in accordance with Forest Service Guidelines. Any plants used for the re-establishment of the site should be pre-dipped if required.
- Brash arising from forest felling should be used as roading for poling contractor tracked vehicles to the extent possible to avoid ground disturbance.

4.3.4.3 Nutrient Impact Mitigation

Potential nutrient release, particularly phosphorous will be limited by the fact that the trees are not at maturity and the quantities of brash generated will be relatively small compared to mature forest felling hence nutrient generation from brash decay will be low. In addition the forest stands are located on mineral soil types which generally adsorb phosphorous further reducing potential release to the aquatic environment. To further reduce the potential from nutrient impact:

- Brash should be windrowed at a distance of 20m from any main drain identified on site when the corridors through the forest stands have been clearfelled.

4.3.4.4 Monitoring

An ecologist will be present during the construction phase to ensure that all mitigation measures are adhered to, and to monitor the effectiveness of mitigation.

5 Residual Impacts

By taking into account of the mitigation measures outlined above the potential significant adverse indirect and cumulative impacts identified during the Screening

stage are reduced from being possible albeit unlikely significant to becoming extremely unlikely short term imperceptible negative impacts. No long term impacts are foreseen. A summary of the residual impacts foreseen as a result of the proposed development on the cSAC are summarised in **Table 6**.

Table 6: Predicted residual impacts after mitigation measures are adopted.

Impact source	**Sensitive receptor**	**Potential impact (absence of mitigation)**	**Predicted residual impact (assuming mitigation measures are successfully employed)**
Coolnabacky substation – construction phase	Watercourse that occurs along north-western boundary of site and receiving waters of cSAC downstream. Populations and habitat of aquatic Annex II species: Otter; Salmon; River Lamprey; White-clawed Crayfish.	Unlikely significant impact on Annex II species due to siltation and risk of contaminants entering the surrounding surface waters. Could contribute to significant cumulative impact due to other potential impacts associated with proposed works elsewhere in the catchment of the cSAC.	Extremely unlikely imperceptible negative impact in short term No long term impacts foreseen
Ballyragget substation – construction phase	Receiving waters of cSAC. Populations and habitat of aquatic Annex II species: Otter; Salmon; River Lamprey; White-clawed Crayfish; Nore Freshwater Pearl-mussel.	Possible deterioration of water quality in main River Nore channel due to transport of contaminated substances (e.g. fuel / concrete) via groundwater. Extremely unlikely significant adverse impact. Could contribute to significant cumulative impact due to other potential impacts associated with proposed works elsewhere in the catchment of the cSAC.	Unlikely imperceptible negative impact in short term No long term impacts foreseen
Structures at sensitive locations – construction	Receiving waters of cSAC. Populations and habitat of aquatic Annex II species: Otter; Salmon; River	Short term siltation of watercourses and possibility of other contaminents (fuel and concrete) entering	Unlikely imperceptible negative impact in

Impact source	Sensitive receptor	Potential impact (absence of mitigation)	Predicted residual impact (assuming mitigation measures are successfully employed)
phase	Lamprey; White-clawed Crayfish; Nore Freshwater Pearl-mussel.	watercourses. Unlikely significant adverse impact. Could contribute to significant cumulative impact due to other potential impacts associated with proposed works elsewhere in the catchment of the cSAC.	short term No long term impacts foreseen
Felling of conifer plantations	Receiving waters of cSAC. Populations and habitat of aquatic Annex II species: Otter; Salmon; River Lamprey; White-clawed Crayfish; Nore Freshwater Pearl-mussel.	Siltation of watercourses due to works associated with clearfelling conifer plantations and erecting structures. Unlikely significant impact. Could contribute to significant cumulative impact due to other potential impacts associated with proposed works elsewhere in the catchment of the cSAC.	Unlikely imperceptible negative impact in short term No long term impacts foreseen

6 Conclusion

In order to determine the potential impacts of the proposed development on the River Barrow and Nore cSAC, this Natural Impact Statement (Statement of Appropriate Assessment) was prepared.

Measures to mitigate potential adverse impacts on the conservation interest of the European site are presented in **4.3 above**. The correct implementation of all mitigation measures detailed in this report will ensure that the conservation objectives for the cSAC will not be compromised by the proposed development, nor by any cumulative effects and no significant impact is anticipated on any of the species and habitats for which the site is designated.

In conclusion, through the process of Appropriate Assessment, it is the considered view of the author that the proposed development will have no adverse impact on the integrity of the designated site as a whole or on any other designated site.

7 References

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APPENDIX 1

Laois Kilkenny Reinforcement Project: Appropriate Assessment Screening Report

Laois Kilkenny Reinforcement Project
Environmental Reports

Appendix 1

Appropriate Assessment Screening Statement

Submission to: EirGrid

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November 2012

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Executive Summary

This Appropriate Assessment Screening Statement has been prepared to identify the potential impacts of the Laois Kilkenny Reinforcement Project on sites designated as European conservation areas known as European sites as required under Article 6 of the EU Habitats Directive.

There are up to four successive stages involved in the Appropriate Assessment process, the first stage of which is known as the Screening Stage. Screening is carried out to determine the necessity for a more detailed Stage 2 Appropriate Assessment where potential impacts are deemed to be of significance.

Four European sites were identified as occurring within five kilometres of the various elements of the project. It was determined that three of these sites (River Nore SPA, Lisbigney Bog cSAC and Ballyprior Grassland cSAC) will not be impacted upon either directly or indirectly as a result of the proposed development and therefore can be excluded from appropriate assessment.

Based on the precautionary approach adopted during the assessment it was shown that the proposed development has the potential to adversely impact the River Barrow and River Nore cSAC during the construction phase.

A Natura Impact Statement for stage 2 appropriate assessment will therefore be prepared to further examine the risk posed by the proposed project on the conservation interests of this European site.

1 Introduction

This report has been prepared by Dr Patrick Crushell on behalf of AOS Planning to determine the potential impacts of the Laois-Kilkenny Reinforcement Project on sites designated as Natura 2000 conservation areas known as European sites.

In brief, the main elements to the proposed new transmission infrastructure include:

- A new 400/110 kV substation, 'Coolnabacky', near Portlaoise, Co. Laois. The existing Athy-Portlaoise 110 kV and Moneypoint-Dunstown 400 kV overhead lines will connect to this new substation.
- A new 110 kV / 38 kV / MV substation at Ballyragget, Co.Kilkenny. This will replace the existing 38 kV / MV substation.
- A new 110 kV overhead line between Coolnabacky and Ballyragget
- An uprate to the existing Ballyragget-Kilkenny 110 kV overhead line with associated works in Kilkenny substation

The aim of this assessment is to determine the potential direct, indirect and cumulative impacts of the proposed development on the conservation status of European sites in the surroundings.

1.1 Statutory Context

This Appropriate Assessment Screening Statement has been prepared in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (European Commission 2002), the European Commission Guidance 'Managing Natura 2000 Sites' (European Commission 2000) and with reference to the Department of the Environment and Heritage and Local Government guidance on 'Appropriate Assessment of plans and projects in Ireland' (DEHLG 2009).

The EU Habitats Directive (92/43/EEC) provides the framework for legal protection for habitats and species of European importance. The directive provides the legislative means to establish a network of sites (known as the Natura 2000 network) throughout the EU with the objective of conserving habitats and species deemed to be of Community interest. These sites include candidate Special Areas of Conservation (cSACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Birds Directive (formally known as the Conservation of Wild Birds Directive 79/409/EEC). Both directives have been transposed into Irish law by the recently enacted European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/11).

Article 6 (3) and 6(4) of the habitats directive lays down the procedure to be followed when planning new developments that might affect a European site. This

stepwise procedure requires that a plan or project having a likely significant negative effect on a European site undergoes an Appropriate Assessment of its implications for the site in view of that site's conservation objectives.

Depending on the findings of the Appropriate Assessment the competent authority shall agree to the proposed development only if the competent authority has ascertained that the proposed development will not adversely affect the integrity of the site concerned.

However, should this assessment have ascertained that there will be an adverse effect it may require one or more of the following, depending on the degree of impact:

- specific mitigation measures are introduced to remove the negative effects;
- certain conditions are respected during the construction, operational or decommissioning phases of the project, again to remove the likelihood of negative effects or to reduce them to an insignificant level where they no longer affect the integrity of the site;
- feasible alternatives are explored instead.

In exceptional circumstances, a plan or project may still be allowed to go ahead under certain conditions, in spite of being assessed as having negative effects on the site provided the procedural safeguards laid down in the Habitats Directive are followed (Article 6(4)). This may be possible, for instance, if the plan or project is considered to be of overriding public interest and there are no less damaging alternatives available. In such cases, compensation measures will need to be implemented to ensure that the overall coherence of Natura 2000 is protected.

1.2 Methodology

There are up to four successive stages involved in the Appropriate Assessment process (European Commission 2002). The outcome at each stage determines whether the next stage in the process is required. Stage 1 Screening is the first stage in the process and is carried out to determine the necessity for a more detailed Stage 2 Appropriate Assessment where potential impacts are deemed to be of significance. The steps involved in the screening stage are outlined below:

Stage 1: Screening

- Description of the project and site characteristics (existing environment)
- Identification and description of European sites that could potentially be affected
- Identification and description of potential impacts
- Assessment of potential impacts
- Exclusion of sites where no significant impacts are foreseen

A number of ecological surveys and reports have been carried out on the project. These have been primarily concerned with the 'new build' elements of the project, for example the proposed new overhead line from Ballyragget to Coolnabacky and the Coolnabacky substation. These reports, which have helped inform the assessment, include the following:

- Ecological constraints report October 2010 (Stage 1 Report Appendices, D1-D6)[1]
- Coolnabacky substation site selection report (Stage 1 Appendix G)[1]
- Winter bird surveys undertaken over two seasons (March – April 2010 and October 2010 - April 2011) (Stage 1 Report Appendices D7, D8 and D9; and Stage 2 Report Appendix D)[1, 2]
- Ecological assessment of potential route corridors and route corridor selection March 2011 (Stage 1 Report, Appendices I1-I6)[1]
- Ecological assessment of proposed project which included multidisciplinary walkover surveys (to inform Chapter 6 of the Environmental Report)

A precautionary approach was taken throughout the route and site selection process with the aim of avoiding, where possible, potential impacts on the ecological constraints identified. The main ecological constraints (including European sites in the surroundings) were identified at the earliest stage in the project. The content of this report has been revised from earlier versions (Jan 2012, June 2012 and October 2012) to take account of small changes to the design of the project and to consider more details of the design as they have emerged. Consultation was undertaken with both National Parks and Wildlife Service of the Department of Arts Heritage and Local Government and Inland Fisheries Ireland during the preparation of this report.

2 Screening

2.1 Project Description

EirGrid is proposing to reinforce the electricity network in the general Laois-Kilkenny region. The new transmission infrastructure will include the following eight distinct units:

No.	Description	Detail	Comment
1	New 400/110 kV GIS substation, 'Coolnabacky' near Portlaoise Co. Laois.		
2	New connection to	This connection will be made by	Approximately

[1] http://www.eirgridprojects.com/projects/laoiskilkenny/phaseonereports/

[2] http://www.eirgridprojects.com/projects/laoiskilkenny/stagetworeports/

No.	Description	Detail	Comment
	Coolnabacky from the existing Moneypoint-Dunstown 400 kV line.	approximately 1.4km of 400 kV overhead line which will be mostly supported by 5 double circuit structures, with two single circuit structures required under the existing line.	150 m of the existing 400 kV overhead line will also be removed to facilitate this connection
3	New connection to Coolnabacky from the existing Athy-Portlaoise 110 kV line	The proposed Coolnabacky substation is situated beside the Athy – Portlaoise 110 kV line. It is proposed to replace intermediate polesets AP98 and AP99 with lattice steel line/cable interface masts approximately 21.5m in height (both these structures contained on the Coolnabacky site). Short lengths of cable will connect the new line/cable interface masts AP98 (100m) and AP99 (190m) into the 110 kV building within the Coolnabacky compound.	Approximately 140 m of the existing 110 kV overhead line will be removed to facilitate this connection.
4	A new 110 kV / 38 kV / MV substation in Ballyragget, Kilkenny adjacent to the existing 38 kV /MV substation. The existing 38 kV / MV Ballyragget substation will then be decommissioned and replaced.	The existing 38 kV / MV substation will be decommissioned following completion of the replacement substation.	
5	A new 110 kV overhead line between Ballyragget and Coolnabacky	This line will be approximately 26km long with the connections at each station end being made by short lengths (exact lengths to be determined but could be in the region of 100-200m) of underground cable. A new line cable interface mast will be required at either end to facilitate these connections.	

No.	Description	Detail	Comment
6	An uprate to the existing Ballyragget-Kilkenny 110 kV overhead line	This existing line is approximately 22km long and the existing structures all need to be replaced. The connections at either end will be made by short lengths of underground cables (exact lengths to be determined but could be in the region of 100m).	Earthwire structures will be installed on this line for the first c. 1.7km from Ballyragget station
7	A new bay in Kilkenny 110 kV station		
8	Modifications to existing Athy-Portlaoise 110 kV line	Earthwire structures will be installed on this line for a distance of 2.32 km towards from Coolnabacky towards Athy and for a distance of 1.29 km from Coolnabacky towards Portlaoise.minimum of 2km in either direction from Coolnabacky station.	

2.1.1 Characteristics of each phase of the project

The proposed development is characterised by the following activities that could potentially impact on the ecology of European sites in the surroundings:

Construction phase

- Unit 1: New 400/110 kV substation at Coolnabacky
    - Site clearance and construction of substation at Coolnabacky.
    - Realignment and upgrading of site access road.
- Unit 2: New connection to Coolnabacky from the existing Moneypoint-Dunstown 400 kV line.
    - Site clearance at areas where Towers are to be constructed.
    - The construction of two Single and five Double circuit towers at predetermined locations to support the lines.
    - Stringing of overhead lines between structures.
- Unit 3: New connection to Coolnabacky from the existing Athy-Portlaoise 110 kV line
    - This connection will be made by the installation of short lengths of underground cable adjacent to the substation.
    - Construction of two new line cable interface masts adjacent to substation.
    - Decommissioning of ca 140 m of existing 110kV line.

- Unit 4: A new 110 kV / 38 kV / MV substation in Ballyragget, Kilkenny adjacent to the existing 38 kV /MV substation. The existing 38 kV / MV Ballyragget substation will then be decommissioned and replaced.
    - Site clearance and Construction of new 110 kV / 38 kV / MV substation adjacent to existing 38 kV substation at Ballyragget
    - Decommissioning of 38 kV / MV Ballyragget substation
- Unit 5: A new 110 kV overhead line between Ballyragget and Coolnabacky
    - Site clearance at areas where angle towers are to be constructed. Felling of forestry / woodland stands where required at certain along the line route.
    - Construction of angle masts at pre-determined locations along the line route.
    - Erection of double wooden polesets to support the 110 kV overhead line at pre-determined locations between angle masts.
    - Stringing of overhead lines between structures.
    - Connection to substations will be made by the installation of very short lengths of underground cable adjacent to the substations.
- Unit 6: An uprate to the existing Ballyragget-Kilkenny 110 kV overhead line.
    - Replacement of existing structures along the length (22km) of the line.
    - The first 1.7km out of Ballyragget station will be changed to earthwire structures.
    - Replacement of existing conductors with new conductor.
    - Connection to substations will be made by the installation of very short lengths of underground cable adjacent to the substations.
- Unit 7: A new bay in Kilkenny 110 kV station.
    - Construction works within the substation site will include concrete plinths and steelwork
    - Dismantling and decommissioning of equipment will be undertaken
- Unit 8: Modifications to existing Athy-Portlaoise 110 kV line.

Existing structures will be replaced with earthwire structures on this line for a distance of 2.32 km from Coolnabacky towards Athy and for a distance of 1.29 km from Coolnabacky towards Portlaoise.

Operational phase

- It is foreseen that routine maintenance works will be carried out during the operational phase of the project to ensure the substations and overhead lines continue to function properly throughout their operational life.

Decommissioning phase

- At the end of its operational phase, the various components of the reinforcement project will be dismantled and removed off site.

Further more detailed information on the proposed project will be presented in the relevant chapters of the Environmental Assessment Report.

2.1.2 Drainage design of substation sites

Detailed drainage designs have been drafted for each of the newly proposed substation sites in consultation with the local authorities and in compliance with SuDS (Sustainable Drainage Systems) guidelines (CIRIA 697, The SUDS Manual, 2007. This design has taken into consideration the hydro-geological characteristics of each site and the sensitivity of surface and ground water resources in the surroundings. The final drainage designs will be submitted as part of the planning application.

2.2 Identification and description of European sites

There are four European sites within 5 km of the proposed development as listed in Table 1 below and illustrated in Figure 1. The qualifying interests and conservation objectives of these sites are presented below while further more detailed descriptions of these four sites prepared by National Parks and Wildlife Service (NPWS) are presented in Appendix 1.1 – 1.4. It is considered that the proposed development will not have an effect on sites located further than 5 km. This evaluation is made taking into consideration the scale and characteristics of the proposed project as described in section 2.1 above.

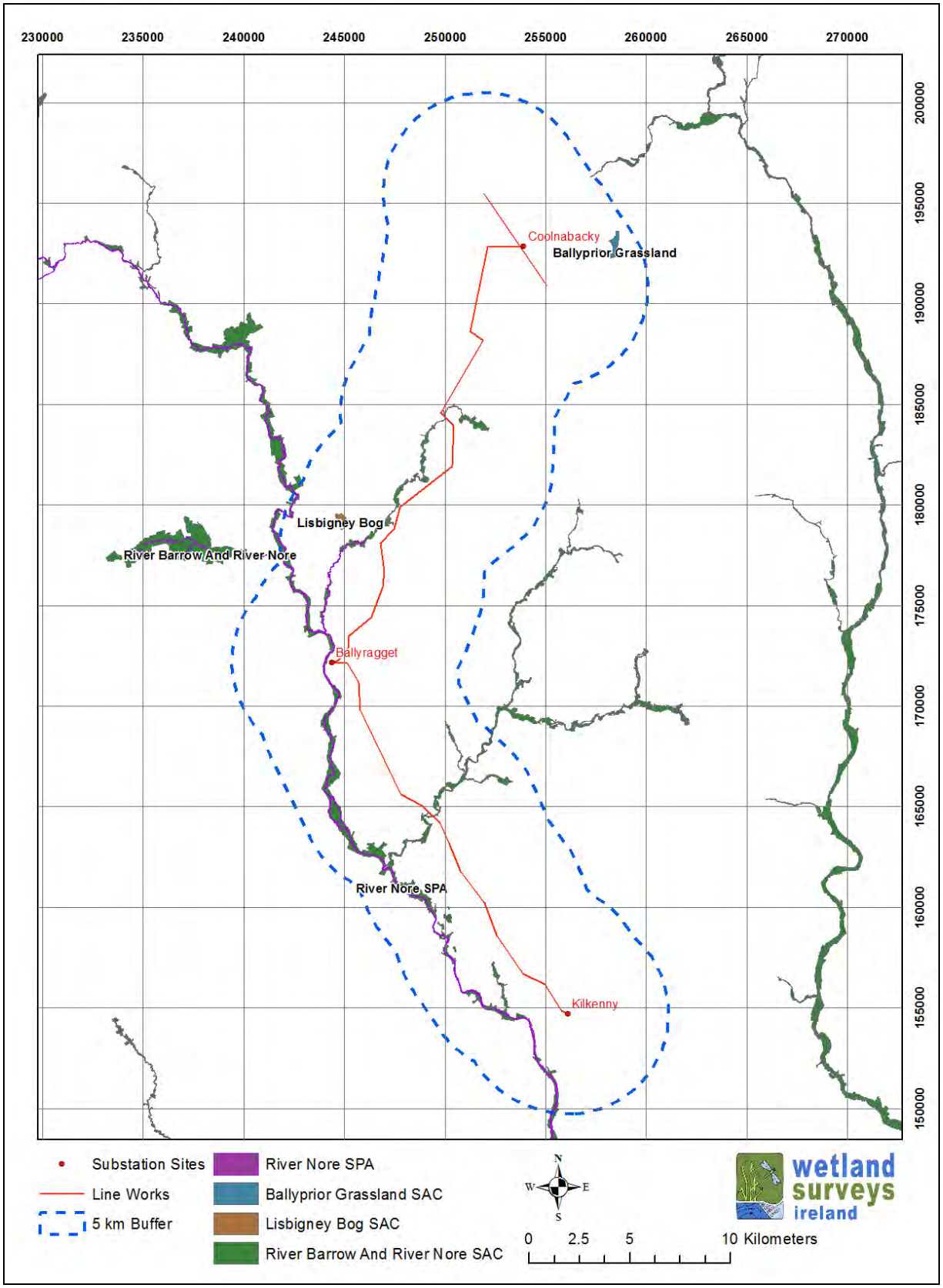

Figure 1: European sites that occur within 5 km of the proposed development.

Table 1: Designated European sites within 5km of Laois – Kilkenny Reinforcement Project (Source: GIS section, National Parks and Wildlife Service).

Name	Site Code	Distance from proposed Laois - Kilkenny Reinforcement Project
River Barrow and River Nore cSAC	2162	Coolnabacky – Ballyragget 110 kV Line crosses cSAC at Boleybeg Existing Ballyragget – Kilkenny 110 kV Line crosses cSAC at Jenkinstown (just upstream of New Dinin Bridge) Entire project is located within the catchment of the cSAC
River Nore SPA	4233	0.6 km West of Coolnabacky – Ballyragget 110 kV line at Moatpark
Lisbigney Bog cSAC	0869	1.7 km West of Coolnabacky – Ballyragget 110 kV line at Loughill
Ballyprior Grassland cSAC	2256	4 km East of proposed Coolnabacky Sub-station site

2.2.1 River Barrow and Nore cSAC (NPWS Site Code: 2162)

The qualifying interests of the River Barrow and Nore cSAC include those species and habitats presented in Table 2. The conservation objectives for the site have recently been published together with the attributes and targets which define the favourable conservation condition for each qualifying species and habitat for which the site is designated (NPWS 2011a)[3]. In summary the Conservation objectives for the River Nore and Barrow cSAC are to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected as presented in Table 2 below (NPWS 2011a). The distribution of Annex I habitats and Annex II species throughout the cSAC is reviewed in the Conservation Objectives report for the site (NPWS 2011a).

There are two types of freshwater pearl mussels in Ireland, one called *Margaritifera margaritifera* and the other is the very rare *Margaritifera durrovensis*, which is only known from the Nore Catchment. Populations of the Nore Freshwater Pearl-mussel (*Margaritifera durrovensis*) were only ever known from the Barrow, Nore and Suir main channels. It is now thought to be restricted to a short section of approximately 10km of the main Nore channel with most of the population found between Poorman's Bridge and the Avonmore Creamery above Ballyragget (S 440 722). The species is in very serious decline and is listed as critically endangered in Ireland as outlined in the *Freshwater Pearl Mussel Nore Sub-Basin Management Plan* (North South 2 Project 2010). The known distribution of the Nore freshwater Pearl-mussel in relation to the proposed development is shown in Appendix 1.5.

[3] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO002162.pdf

A number of the Annex II aquatic species of the cSAC occur in watercourses in proximity to the proposed development including River and Brook Lamprey, Atlantic Salmon, Freshwater White-clawed Crayfish (NPWS 2011a). These species would all be sensitive to deterioration in water quality or habitat alteration due the effects of siltation.

Table 2: Qualifying interests of River Barrow and River Nore cSAC (source: www.npws.ie).

	Habitat / Species code	**Habitat / Species Type**
Habitats	91A0	Old sessile oak woods with Ilex and Blechnum in British Isles
	91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
	3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
	1310	Salicornia and other annuals colonizing mud and sand
	1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
	1410	Mediterranean salt meadows (Juncetalia maritimi)
	4030	European dry heaths
	7220	Petrifying springs with tufa formation (Cratoneurion)
	6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
	1320	Spartina swards (Spartinion maritimae)
	1140	Mudflats and sandflats not covered by seawater at low tide
	1130	Estuaries
Species	1095	Sea Lamprey (*Petromyzon marinus*)
	1096	Brook Lamprey (*Lampetra planeri*)
	1099	River Lamprey (*Lampetra fluviatilis*)
	1103	Twaite Shad (*Alosa fallax*)
	1106	Atlantic Salmon (*Salmo salar*)
	1102	Allis Shad (*Alosa alosa*)
	1355	Otter (*Lutra lutra*)
	1092	Freshwater White-clawed Crayfish (*Austropotamobius pallipes*)
	1029	Freshwater Pearl-mussel (*Margaritifera margaritifera*)[1]
	1990	Nore Freshwater Pearl-mussel (*Margaritifera durrovensis*)
	1016	Whorl Snail (*Vertigo moulinsiana*)
	1421	Killarney Fern (*Trichomanes speciosum*)

[1]The status of the Freshwater Pearl-mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore cSAC is currently under review (NPWS 2011a).

2.2.2 River Nore SPA (NPWS Site Code: 4233)

Conservation Objective (NPWS 2011b): To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [breeding] Kingfisher (*Alcedo atthis*)

2.2.3 Lisbigney Bog cSAC (NPWS Site Code: 0869)

Conservation Objective (NPWS 2011c): To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1016] Vertigo moulinsiana
- [7210] * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*

2.2.4 Ballyprior Grassland cSAC (NPWS Site Code: 2162)

Conservation Objective (NPWS 2011d): To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(* important orchid sites)

2.3 Identification and Description of Potential Impacts

Taking into consideration the ecological characteristics of the European sites together with the nature of the proposed development, the following potential impacts have been identified:

Habitat loss and disturbance (construction phase): Both the Coolnabacky and the Ballyragget substations are located outside of designated sites and therefore there is no potential for direct habitat loss within European sites due to their construction.
The construction of overhead lines would cause local disturbance and short term loss of habitat in the immediate vicinity of towers and polesets. This habitat loss and disturbance would in most cases be expected to be short term as following re-instatement and natural regeneration, vegetation would re-establish around the structure bases.

With reference to the proposed project, the Coolnabacky to Ballyragget 110 kV line traverses the River Barrow and Nore cSAC at Boleybeg. However all structures are located in improved agricultural grassland habitat outside of the designated site (see Section 2.4 and Figure 3). There are two existing structures on the Ballyragget to Kilkenny 110kV line due for replacement that are located within or adjacent to the River Barrow and Nore cSAC (see Section 2.4 and Figure 4). Both these structures are located within improved grassland habitat that is of low ecological importance. All other structures associated with the proposed development are located outside of and removed from designated European sites.

Pollution of watercourses with consequent impacts on aquatic species and ecosystems (construction phase): There is potential risk to water quality during the construction phase should concrete or other harmful substances become entrained in surface water run-off and enter watercourses. Deteriorating water quality resulting

from contamination events could have negative impacts on the qualifying aquatic Annex II species of the River Barrow and Nore cSAC.

In addition, mobilization and transport of sediment due to excavation of soil could potentially impact on freshwater ecology of water-courses downstream of construction works. The proposed development will also require felling of conifer plantations along parts of the Coolnabacky to Ballyragget 110 kV line route. Such tree felling may pose a risk to water quality in downstream watercourses by releasing sediment and nutrients. The risk to water quality varies according to soil type and topography.

The release of sediment may result in a buildup of silt in the river system leading to reduction in available, suitable freshwater pearl mussel habitat, crayfish habitat and spawning habitat for lamprey and salmon (a species that is intrinsically linked to the complex lifecycle of the Freshwater Pearl-mussel).

The proposed 400 / 110 kV Coolnabacky substation, the section of the Athy to Portlaoise line and the northern part of the Coolnabacky to Ballyragget 110kV line route is situated within the catchment of the River Barrow (see Figure 2). The Ballyragget Substation, the Southern part of the Coolnabacky to Ballyragget 110kV line route and the Ballyragget to Kilkenny line are located within the River Nore catchment (see Figure 2). The main watercourses within both catchments, and downstream of the proposed development areas, are designated within the extensive River Barrow and Nore cSAC (see Figure 1). The main population of the rare Nore Freshwater Pearl-mussel occurs within the main channel of the Nore from Ballyragget to Poorman's Bridge (See Appendix 1.5) (North South 2 Project 2010)[4].

Water quality (operation phase)

Adverse impacts on water quality during the operational phase of the project are not predicted due to standard best practice measures being employed during any maintenance operations. Furthermore, the drainage design for each of the new substation sites has been developed to ensure that there is no risk to surrounding surface waters (see Section 2.1.2; the substation drainage designs are to be submitted with the planning application). In addition, based on the characteristics of the operational phase of the project, few sources of potential impact on water quality have been identified.

[4] http://www.wfdireland.ie/docs/5_FreshwaterPearlMusselPlans/Freshwater%20Pearl%20Mussel%20Plans%20March%202010/Second%20Draft%20of%20Nore%20Sub-Plan%20March.2010.pdf

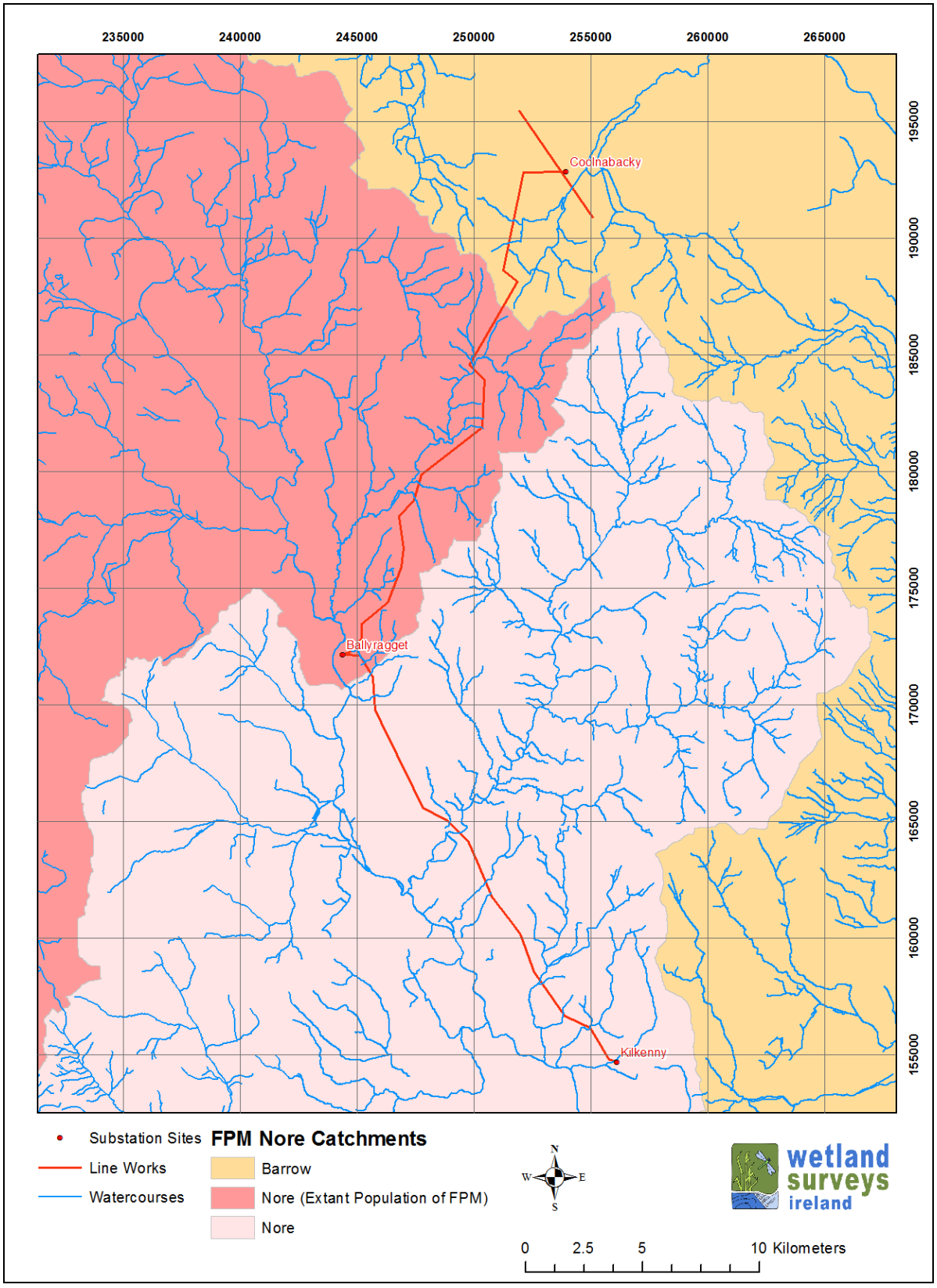

Figure 2: Proposed development in relation to sub-catchments of the River Barrow and River Nore cSAC and the main watercourses.

Changes in flow regime of watercourses: Any significant changes in the flow regime of watercourses within the River Barrow and Nore cSAC due to the proposed development could have adverse effects on qualifying habitats and species of the cSAC.

The creation of hard surface areas within the sub-station sites have potential to alter the hydrological conditions of the particular sites and may have a knock-on effect on the flow rates of surrounding watercourses. However, the drainage design for each of the substation sites has taken account of this by providing sufficient on-site attenuation (the ESBI substation drainage infrastructure report that is in preparation will provide information and calculations to show that the substation sites will be designed to green-field runoff rates as agreed with both Laois and Kilkenny Councils in the pre planning meetings).

Temporary changes in the hydrology at the substation sites could also occur during the construction phase. This may transpire in situations where there is a high water table and de-watering is necessary to facilitate the construction of foundations, installation of underground cables and associated works. In the case of the Ballyragget Substation no potential for such impacts are foreseen as the water table is sufficiently low. On-site trial pit results have shown that ground water was not encountered at 3m below ground level. The foundations will not exceed 2m and therefore no dewatering will be required here (Chapter 8, Environmental Report).

Based on field observations it appears that the watercourses surrounding the Coolnabacky substation site are fed by a constant supply of calcium carbonate rich groundwater. These spring-fed watercourses are the headwaters of the Bauteogue River which flows into the River Barrow and Nore cSAC ca 4.5 km to the North-east. Borehole and trial pit results from this site indicate a high water table (< 2 metres below ground level), therefore temporary dewatering may be required at this site. In relation to the potential impact on the groundwater-fed water courses in the surroundings, a hydrogeological review of the site that was undertaken (presented as Appendix 1.6 to this report) concluded that there would be limited dewatering required during excavation. This is based on site investigations which indicated that the sand and gravel deposits at the site are not saturated and ground water inflow is not significant. Any dewatering can therefore be confined to the areas immediately surrounding the excavation and will not impact on springs or watercourses in the surroundings (see Appendix 1.6).

Disturbance to birds and mammals: During construction works there is potential for direct short term disturbance to birds and mammals in the vicinity of the proposed works. Such disturbance would be caused by increased human activity and noise from construction machinery. These impacts could be of significance if they were to cause disturbance to mammal and bird species listed as qualifying species of the

relevant European sites (Otter in the case of the River Barrow and Nore cSAC and Kingfisher in the case of the River Nore SPA).

Bird collision (operational phase): New overhead lines may adversely impact on sensitive bird species. During the operational phase there is a potential risk of collision with birds of conservation concern. However, there are no European sites in the surroundings that have been designated for the protection of bird species that would be prone to collision. Furthermore recent surveys of winter bird populations and their movements within the wider study area indicate that there is low collision risk to any bird species of conservation interest (see winter bird reports submitted as part of *Phase I Lead Consultants Report*). This impact is therefore not considered further.

2.4 Assessment of Significance

The potential impacts on the conservation interest of each European site identified in Section 2.3 above are dealt with in the following sections:

River Barrow and Nore cSAC: The site is designated for a range of habitats and species listed on Annex I and Annex II of the EU Habitats Directive respectively (see Section 2.3 above).

There is potential for small scale direct habitat disturbance where the proposed Coolnabacky to Ballyragget 110 kV line crosses the cSAC at Boleybeg. The design of the project has avoided placing structures within the cSAC (see Figure 3). Some tree topping may be required at the river crossing. Improved Agricultural Grassland (GA1) surrounds the narrow riparian zone at this location. The river banks are defined by non-continuous lines of trees and shrubs that include Alder (*Alnus glutinosa*) and Ash (*Fraxinus excelsior*). The terrestrial habitats present at this location do not correspond with qualifying habitats for which the cSAC is designated. Based on the habitats recorded in the vicinity of the cSAC, it is concluded that this potential impact will not adversely affect the conservation interest of the cSAC.

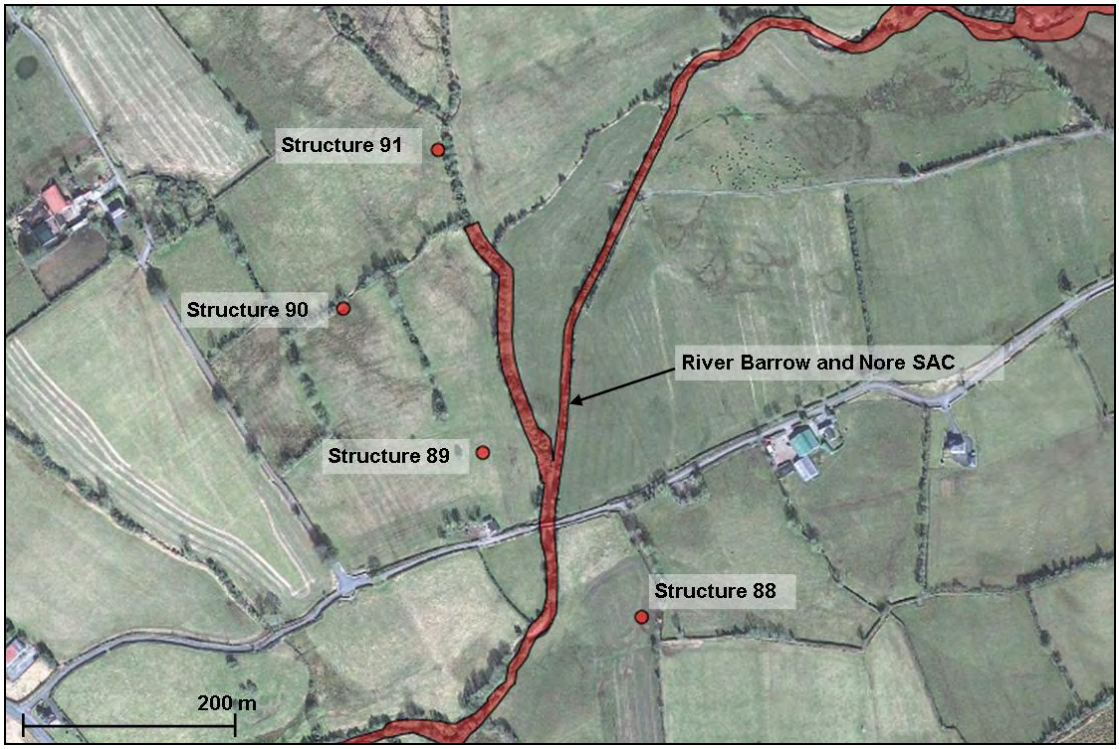

Figure 3: Ballyragget to Coolnabacky 110 kV line structures in the vicinity of River Barrow and Nore cSAC at Boleybeg (Structure BC88 and BC89 are both proposed polesets).

Similarly, the existing Ballyragget to Kilkenny line crosses the cSAC at two locations at Jenkinstown, just upstream of New Dinin Bridge (see Figure 4). A single poleset (Structure BK49) that requires replacement is located within the cSAC at this location, while a second poleset (Structure BK48) is located adjacent to the cSAC (see Figure 4). The design of the project has allowed for the replacement polesets to be constructed further South (Structure BK49) and North (Structure BK48) respectively and therefore increases the distance between the structures and the semi-natural habitats of the cSAC (see Figure 4).

Works in this area may cause local disturbance and loss of improved grassland habitat. Based on the terrestrial habitats recorded in the vicinity of the cSAC, it is concluded that this potential impact will not adversely affect the conservation interest of the cSAC.

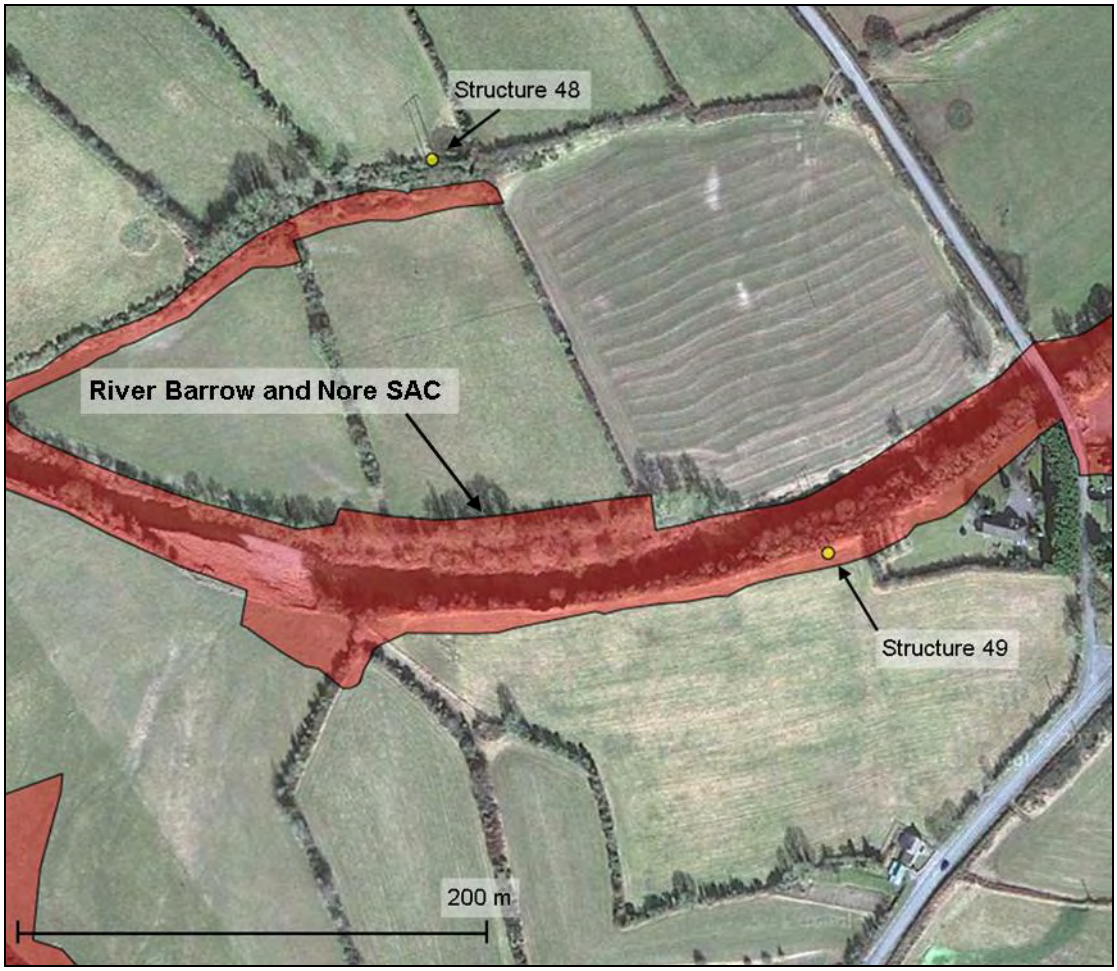

Figure 4: Existing Ballyragget to Kilkenny 110 kV line structures (polesets) in the vicinity of River Barrow and Nore cSAC at Jenkinstown.

The proposed Ballyragget to Coolnabacky line route passes within 200 metres of the cSAC at two locations, at Boleybawn and at an area East of Ballinakill, County Laois. Structures at both these locations are located ca 150 metres from the boundary of the cSAC.

At Boleybawn, Structure BC65 is located in an area of improved grassland adjacent to scrub and woodland associated with a small river watercourse which discharges to the cSAC to the North (see Figure 5). Any habitat loss or disturbance at this location will be restricted to the improved grassland habitat and possibly some minor trimming of vegetation to allow for adequate clearance. No impacts are foreseen on terrestrial habitats within the cSAC at this location.

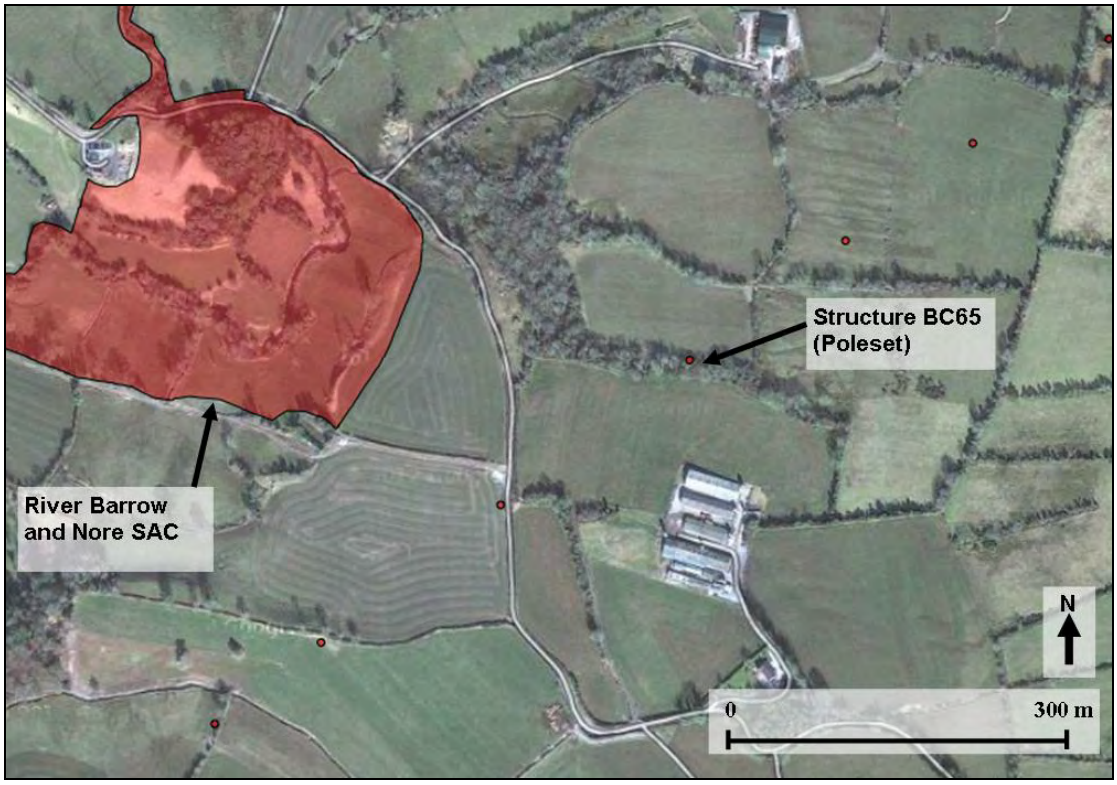

Figure 5: Ballyragget to Coolnabacky 110 kV line structures in the vicinity of River Barrow and Nore cSAC at Boleybawn.

East of Ballinakill, Structure BC53 (Angle Mast) is located in an area of improved grassland (see Figure 6). Any habitat loss or disturbance at this location will be restricted to the improved grassland habitat. Laois County Council, have listed a woodland area in the vicinity of this location as a 'Significant Tree Group'. Following consultation with Laois County Council, this tree group is understood to refer to a mature demesne plantation woodland in the vicinity of Mass Lough (see Figure 6). The woodland has been surveyed as part of the National Survey of Native Woodland (Perrin *et al.* 2008) and at that time was deemed to be of low ecological importance being dominated by mostly non-native plantation woodland. The cSAC which occurs between the proposed line route and the plantation woodland at this location comprises the main Owenbeg River channel and associated semi-natural habitats which include scrub and ash – alder dominated woodland (see Figure 6). The terrestrial habitats within the cSAC at this location do not correspond with Annex I habitats for which the site is designated (see Table 2). It is concluded that no impacts are foreseen on the significant tree group as listed by Laois County Council (2011) or on terrestrial habitats within the cSAC at this location.

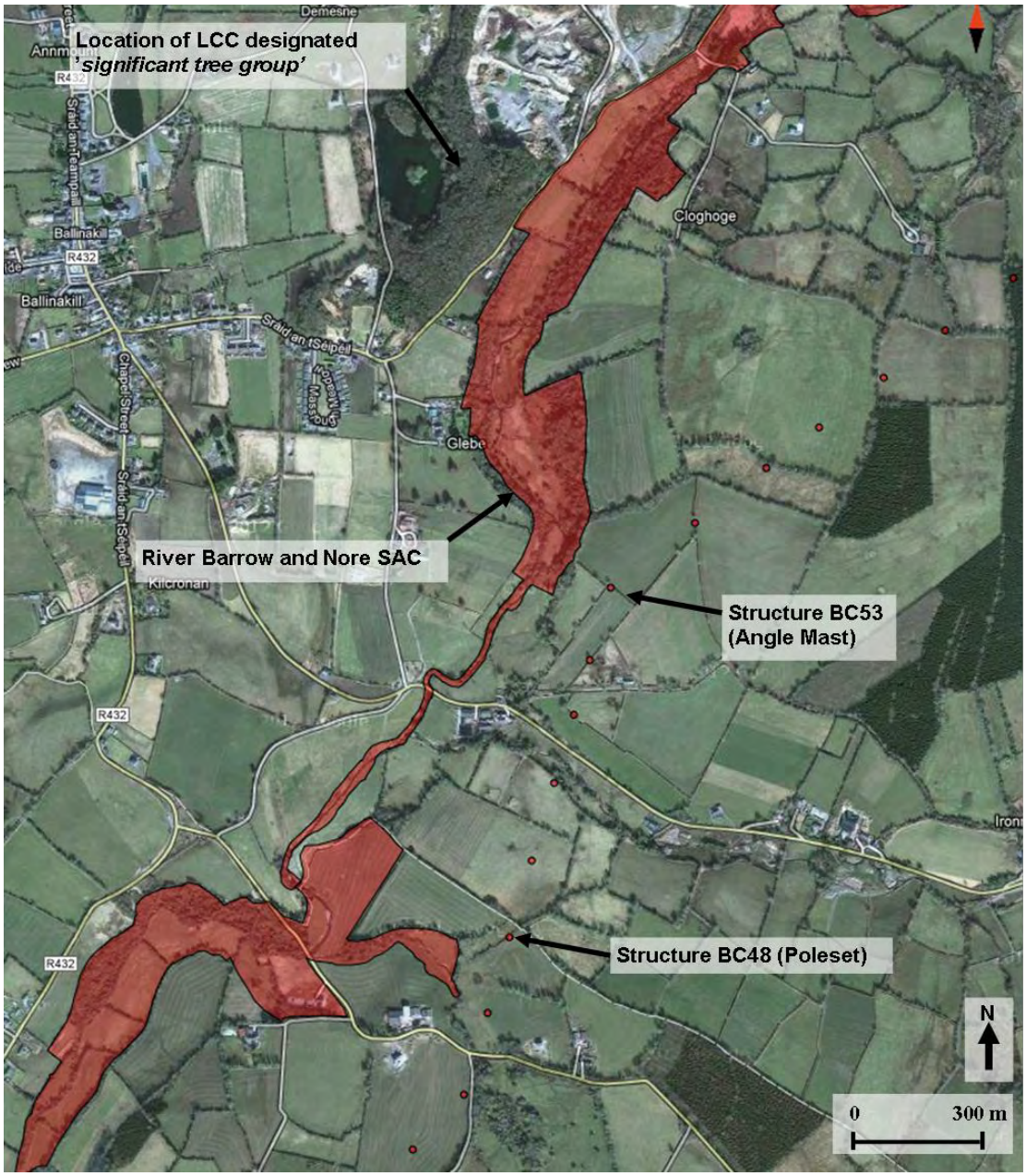

Figure 6: Ballyragget to Coolnabacky 110 kV line structures in the vicinity of River Barrow and Nore cSAC West of Ballinakill.

Following a review of the location and scale of the proposed development works together with the distribution and extent of qualifying terrestrial habitats (e.g. sessile oak woods; alluvial forests and dry heath) within the cSAC (NPWS 2011a)[5], potential impacts on terrestrial habitats elsewhere within the cSAC have not been identified.

During the construction phase there is potential for disturbance to Otters should they be present within the cSAC in the vicinity of the line crossings. Territories of Otters

[5] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO002162.pdf

that occur within the cSAC may also include undesignated sections of rivers further upstream. Based on the small scale of construction works proposed in the vicinity of the cSAC (see Figure 3 and 4) and the fact that all construction works will take place in areas outside of the riparian habitats of the cSAC this impact is unlikely to be of significance. Otters are afforded protection throughout the wider countryside by their inclusion on Annex IV of the EU Habitats Directive, making it an offence to deliberately disturb the species or damage or destroy its breeding or resting place wherever it occurs. Measures are proposed in the Environmental Report to ensure that Otters are not impacted upon during the construction phase of the project.

As outlined above, the proposed development occurs within the catchment of the River Barrow and River Nore cSAC. A number of aquatic species and their habitats would be sensitive to any deterioration in surface water quality within the cSAC, including Floating river vegetation, Salmon, White-clawed Crayfish and most notably the Nore Freshwater Pearl-mussel (NPWS 2011a).

During the construction phase of the project there is potential for sediment run-off (due to excavations and works associated with tree felling) via the surface water drainage system into the River Barrow and River Nore cSAC. In addition, potential impacts due to contamination of surface water by concrete, fuel or other harmful substances are possible. Best practice construction techniques that will be adhered to during the construction of the project should minimise the potential for these impacts to occur. However, additional mitigation will be required at a number of especially sensitive locations where significant works are being proposed.

In the case of the Coolnabacky substation site, a hydrogeological review of the site has concluded that there is no risk to the flow regime in surrounding watercourses that feed into the River Barrow and Nore cSAC (see Appendix 1.6).

Based on the scale and location of the proposed development there is potential for significant adverse impacts on the conservation interest of the River Barrow and River Nore cSAC. These potential impacts require further evaluation by way of Appropriate Assessment.

River Nore SPA: This site has been recently designated for the protection of Kingfisher which is listed on Annex I of the EU Birds Directive. The SPA is designated due to the presence of a nationally significant population of Kingfishers (twenty two pairs recorded during a recent survey of the site (Cummins *et al.* 2010)). Kingfishers are restricted in their distribution to riparian habitats; they nest in burrows along sandy river banks and feed on small fish. They tend to partake in low flight and spend most of the time within the river corridor.

The proposed development avoids traversing the SPA. No direct impacts on the conservation interest (the Kingfisher population) of the site are foreseen during the construction phase. Indirect impacts could result from any major deterioration in water quality and subsequent effects on the bird's food source (aquatic fauna species), however, considering the nearest works associated with the proposed development occur ca 0.6 km upstream of the SPA, and that no in-stream works are proposed, this potential impact is considered extremely un-likely. The use of best practice construction management techniques should prevent any deterioration of water quality within the SPA and therefore it is concluded that no significant adverse impacts on the SPA are foreseen.

Based on the flight behaviour and habitat preferences of kingfisher and the location of the proposed Coolnabacky to Ballyragget line route in relation to the SPA it is considered that the proposed overhead line would not pose any significant collision risk during the operation phase.

Lisbigney Bog cSAC: This site is designated for the protection of the EU priority habitat 'Calcareous Fen with *Cladium mariscus*' and the snail '*Vertigo moulinsiana*', which are listed on Annex I and Annex II respectively. The proposed Coolnabacky to Ballyragget overhead line route corridor is located a minimum of 1.7 km from this European site. The works associated with the construction of the line route in this area will be of such a local scale that any hydrological impacts will be temporary and restricted to those areas immediately surrounding the structure locations. It is concluded that based on the local hydrology and topography of the area, the conservation interest of the cSAC, the characteristics of the proposed development and its distance removed from the cSAC, no potential adverse impacts on the conservation interest of the site are foreseen.

Ballyprior Grassland cSAC: This site is designated for the protection of the EU priority habitat 'Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*) (*important orchid sites)'. The proposed development is located ca 4 km from this European site. The habitat requirements of the grassland habitat for which the cSAC is designated are such that it would not be sensitive to any potential indirect impacts of the proposed development. Therefore based on the conservation interest of the cSAC, the characteristics of the proposed development and its distance removed from the cSAC no potential adverse impacts on the site are foreseen.

2.5 Conclusion

In order to determine the potential impacts of the proposed Laois – Kilkenny reinforcement project on nearby European sites, appropriate assessment screening was undertaken. Four European sites were identified as occurring within 5 km of the proposed development.

It has been determined that three of these sites (River Nore SPA, Lisbigney Bog cSAC and Ballyprior Grassland cSAC) will not be impacted upon either directly or indirectly as a result of the proposed development and therefore are excluded from appropriate assessment.

Based on the precautionary approach adopted it has been shown that the proposed development has the potential to adversely impact the River Barrow and River Nore cSAC during the construction phase and significant impacts on water quality cannot be ruled out. It should be noted that mitigation measures have not been considered in the screening process presented above.

A stage 2 appropriate assessment is therefore required to be carried out by An Bord Pleanála in order to assess the significance of the potential impacts.

2.6 Screening Matrix

A screening matrix (EU Commission 2002) is presented below for the River Barrow and Nore cSAC:

Screening Matrix	
Brief description of the project or the plan	The following are the main elements of the project: • A new 400/110 kV substation, 'Coolnabacky', near Portlaoise, Co. Laois. The existing Athy-Portlaoise 110 kV and Moneypoint-Dunstown 400 kV overhead lines will connect to this new substation. • A new 110 kV / 38 kV / MV substation at Ballyragget, Co.Kilkenny. This will replace the existing 38 kV / MV substation. • A new 110 kV overhead line between Coolnabacky and Ballyragget • An uprate to the existing Ballyragget-Kilkenny 110 kV overhead line with associated works in Kilkenny substation
Brief description of the European site	River Barrow and River Nore cSAC – see section 2.3.1 of this report for the qualifying features of the cSAC
Describe the individual elements of the plan or project (either alone or in-combination with other plans or projects) likely to give rise to impacts on the European site	1. Works associated with the construction of the substation at Coolnabacky 2. Works associated with the construction of the substation at Ballyragget 3. Works associated with the construction of the new 110 kV line from Coolnabacky to Ballyragget including: • The felling of forestry within the sensitive Nore catchment • Construction works at structure locations in especially sensitive areas 4. Construction work associated with the uprating of the existing Ballyragget to Kilkenny at particularly sensitive locations
Describe any likely direct, indirect or	A possible indirect impact of the project on the European site

Screening Matrix	
secondary impacts of the project (either alone or in-combination with other plans or projects) on the European site by virtue of: • Size and scale; • Land-take; • Distance from the European site or key features of the site; • Resource requirements (water abstraction etc.); • Emissions (disposal to land, water or air); • Excavation requirements • Transportation requirements • Duration of construction, operation, decommissioning etc.; • Other	is temporary deterioration in water quality during the construction phase. This is based on the extent of works taking place throughout the catchment of the cSAC and at particularly sensitive locations. No other impacts are foreseen.
Describe any likely changes to the site arising as a result of: • Reduction of habitat area; • Disturbance to key species; • Habitat or species fragmentation; • Reduction in species density; • Changes in key indicators of conservation value (water quality etc.); • Climate change.	Without adequate mitigation there may be changes in water quality. There are a number of qualifying species of the cSAC that are sensitive to any deterioration in water quality including: Salmon, White-clawed Crayfish and the Nore Freshwater Pearl-mussel. Any deterioration in water quality could negatively impact on populations of these species within the site.
Describe any likely impacts on the European site as a whole in terms of: • Interference with the key relationships that define the structure of the site; • Interference with key relationships that define the function of the site.	Possible impacts during the construction phase could adversely affect water quality within the watercourses of the cSAC and in turn have negative effects on populations of the aquatic species for which the site is designated. The association between the qualifying aquatic species and habitats and the water quality in the river is the key relationship that defines the function of the site.
Provide indicators of significance as a result of the identification of effects set out above in terms of: • Loss; • Fragmentation; • Disruption; • Disturbance; • Change to key elements of the site (eg. water quality etc.).	Any increase in sediment or nutrient load of watercourses within the cSAC due to activities associated with construction. Presence of any harmful substances (such as fuel, concrete etc) in watercourses originating from construction activities.
Describe from above those elements of the	In conclusion, significant impacts on water quality within the

Screening Matrix	
project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	River Barrow and Nore cSAC due to the construction of the proposed development cannot be ruled out. Therefore a Stage 2 Appropriate Assessment (AA) is required to determine the significance of the potential impacts. Mitigation measures have not been considered in the screening process and can only be taken into account in the Stage 2 AA. It is anticipated that suitable construction site management plans, method statements and mitigation can eliminate the impacts identified.

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APPENDIX 1.1

River Barrow and Nore SAC - NPWS Site Description

River Barrow & Nore SAC

NPWS site code 0002162

This site consists of the freshwater stretches of the Barrow/Nore River catchments as far upstream as the Slieve Bloom Mountains and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Major towns along the edge of the site include Mountmellick, Portarlington, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore. Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains before passing through a band of Carboniferous shales and sandstones. The Nore, for a large part of its course, traverses limestone plains and then Old Red Sandstone for a short stretch below Thomastown. Before joining the Barrow it runs over intrusive rocks poor in silica. The upper reaches of the Barrow also runs through limestone. The middle reaches and many of the eastern tributaries, sourced in the Blackstairs Mountains, run through Leinster Granite. The southern end, like the Nore runs over intrusive rocks poor in silica. Waterford Harbour is a deep valley excavated by glacial floodwaters when the sea level was lower than today. The coast shelves quite rapidly along much of the shore.

The site is a candidate SAC selected for alluvial wet woodlands and petrifying springs, priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for old oak woodlands, floating river vegetation, estuary, tidal mudflats, *Salicornia* mudflats, Atlantic salt meadows, Mediterranean salt meadows, dry heath and eutrophic tall herbs, all 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 - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Nore Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon, Otter, *Vertigo moulinsiana* and the plant Killarney Fern.

Good examples of Alluvial Forest are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include Almond Willow (*Salix triandra*),

White Willow (*S. alba*), Grey Willow (*S. cinerea*), Crack Willow (*S. fragilis*), Osier (*S. viminalis*), with Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Angelica (*Angelica sylvestris*), Thin-spiked Wood-sedge (*Carex strigosa*), Pendulous Sedge (*C. pendula*), Meadowsweet (*Filipendula ulmaria*), Valerian (*Valeriana officinalis*) and the Red Data Book species Nettle-leaved Bellflower (*Campanula trachelium*). Three rare invertebrates have been recorded in this habitat at Murphy's of the River. These are: *Neoascia obliqua* (Diptera: Syrphidae), *Tetanocera freyi* (Diptera: Sciomyzidae) and *Dictya umbrarum* (Diptera: Sciomyzidae).

A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland and one listed with priority status on Annex I of the EU Habitats Directive. These hard water springs are characterised by lime encrustations, often associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Cratoneuron commutatum* var*. commutatum* and *Eucladium verticillatum*, have been recorded.

The best examples of old Oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site. Abbeyleix Woods is a large tract of mixed deciduous woodland which is one of the only remaining true ancient woodlands in Ireland. Historical records show that Park Hill has been continuously wooded since the sixteenth century and has the most complete written record of any woodland in the country. It supports a variety of woodland habitats and an exceptional diversity of species including 22 native trees, 44 bryophytes and 92 lichens. It also contains eight indicator species of ancient woodlands. Park Hill is also the site of two rare plants, Nettle-leaved Bellflower and the moss *Leucodon sciuroides.* It has a typical bird fauna including Jay, Long-eared Owl and Raven. A rare invertebrate, *Mitostoma chrysomelas,* occurs in Abbeyleix and only two other sites in the country. Two flies *Chrysogaster virescens* and *Hybomitra muhlfeldi* also occur. The rare Myxomycete fungus, *Licea minima* has been recorded from woodland at Abbeyleix.

Oak woodland covers parts of the valley side south of Woodstock and is well developed at Brownsford where the Nore takes several sharp bends. The steep valley side is covered by Oak (*Quercus* spp.), Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*) and Birch (*Betula pubescens*) with some Beech (*Fagus sylvatica*) and Ash (*Fraxinus excelsior*). All the trees are regenerating through a cover of Bramble (*Rubus fruticosus* agg.), Foxglove (*Digitalis purpurea*) Wood Rush (*Luzula sylvatica*) and Broad Buckler-fern (*Dryopteris dilatata*).

On the steeply sloping banks of the River Nore about 5 km west of New Ross, in County Kilkenny, Kylecorragh Woods form a prominent feature in the landscape.

This is an excellent example of a relatively undisturbed, relict Oak woodland with a very good tree canopy. The wood is quite damp and there is a rich and varied ground flora. At Brownstown a small, mature Oak-dominant woodland occurs on a steep slope. There is younger woodland to the north and east of it. Regeneration throughout is evident. The understorey is similar to the woods at Brownsford. The ground flora of this woodland is developed on acidic, brown earth type soil and comprises a thick carpet of Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*), Hard Fern (*Blechnum spicant*), Cow-wheat (*Melampyrum* spp.) and Bracken (*Pteridium aquilinum*).

Borris Demesne contains a very good example of a semi-natural broad-leaved woodland in very good condition. There is quite a high degree of natural re-generation of Oak and Ash through the woodland. At the northern end of the estate Oak species predominate. Drummond Wood, also on the Barrow, consists of three blocks of deciduous woods situated on steep slopes above the river. The deciduous trees are mostly Oak species. The woods have a well established understorey of Holly (*Ilex aquifolium*), and the herb layer is varied, with Brambles abundant. Whitebeam (*Sorbus devoniensis*) has also been recorded.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the flood-plain of the river is intact. Characteristic species of the habitat include Meadowsweet (*Filipendula ulmaria*), Purple Loosestrife (*Lythrum salicaria*), Marsh Ragwort (*Senecio aquaticus*), Ground Ivy (*Glechoma hederacea*) and Hedge Bindweed (*Calystegia sepium*). Indian Balsam (*Impatiens glandulifera*), an introduced and invasive species, is abundant in places.

Floating River Vegetation is well represented in the Barrow and in the many tributaries of the site. In the Barrow the species found include Water Starworts (*Callitriche* spp.), Canadian Pondweed (*Elodea canadensis*), Bulbous Rush (*Juncus bulbosus*), Milfoil (*Myriophyllum* spp.), *Potamogeton* x *nitens,* Broad-leaved Pondweed (*P. natans*), Fennel Pondweed (*P. pectinatus*), Perfoliated Pondweed (*P. perfoliatus*) and Crowfoots (*Ranunculus* spp.). The water quality of the Barrow has improved since the vegetation survey was carried out (EPA, 1996).

Dry Heath at the site occurs in pockets along the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. The dry heath vegetation along the slopes of the river bank consists of Bracken (*Pteridium aquilinum*) and Gorse (*Ulex europaeus*) species with patches of acidic grassland vegetation. Additional typical species include Heath Bedstraw (*Galium saxatile*), Foxglove (*Digitalis purpurea*), Common Sorrel (*Rumex acetosa*) and Bent Grass (*Agrostis stolonifera*). On the steep slopes above New Ross the Red Data Book species Greater Broomrape (*Orobanche rapum-genistae*) has been recorded. Where rocky outcrops are shown

on the maps Bilberry (*Vaccinium myrtillus*) and Wood Rush (*Luzula sylvatica*) are present. At Ballyhack a small area of dry heath is interspersed with patches of lowland dry grassland. These support a number of Clover species including the legally protected Clustered Clover (*Trifolium glomeratum*) - a species known from only one other site in Ireland. This grassland community is especially well developed on the west side of the mud-capped walls by the road. On the east of the cliffs a group of rock-dwelling species occur, i.e. English Stonecrop (*Sedum anglicum*), Sheep's-bit (*Jasione montana*) and Wild Madder (*Rubia peregrina*). These rocks also support good lichen and moss assemblages with *Ramalina subfarinacea* and *Hedwigia ciliata*.

Dry Heath at the site generally grades into wet woodland or wet swamp vegetation lower down the slopes on the river bank. Close to the Blackstairs Mountains, in the foothills associated with the Aughnabrisky, Aughavaud and Mountain Rivers there are small patches of wet heath dominated by Purple Moor-grass (*Molinia caerulea*) with Heather (*Calluna vulgaris*), Tormentil (*Potentilla erecta*), Carnation Sedge (*Carex panicea*) and Bell Heather (*Erica cinerea*).

Saltmeadows occur at the southern section of the site in old meadows where the embankment has been breached, along the tidal stretches of in-flowing rivers below Stokestown House, in a narrow band on the channel side of Common Reed (*Phragmites*) beds and in narrow fragmented strips along the open shoreline. In the larger areas of salt meadow, notably at Carrickcloney, Ballinlaw Ferry and Rochestown on the west bank; Fisherstown, Alderton and Great Island to Dunbrody on the east bank, the Atlantic and Mediterranean sub types are generally intermixed. At the upper edge of the salt meadow in the narrow ecotonal areas bordering the grasslands where there is significant percolation of salt water, the legally protected species Borrer's Saltmarsh-grass (*Puccinellia fasciculata*) and Meadow Barley (*Hordeum secalinum*) (Flora Protection Order, 1987) are found. The very rare Divided Sedge (*Carex divisa*) is also found. Sea Rush (*Juncus maritimus*) is also present. Other plants recorded and associated with salt meadows include Sea Aster (*Aster tripolium*), Sea Thrift (*Armeria maritima*), Sea Couch (*Elymus pycnanthus*), Spear-leaved Orache (*Atriplex prostrata*), Lesser Sea-spurrey (*Spergularia marina*), Sea Arrowgrass (*Triglochin maritima*) and Sea Plantain (*Plantago maritima*).

Salicornia and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The habitat also occurs in small amounts on some stretches of the shore free of stones.

The estuary and the other Habitats Directive Annex I habitats within it form a large component of the site. Extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. Good quality intertidal sand and mudflats have developed on a linear shelf on the western

side of Waterford Harbour, extending for over 6 km from north to south between Passage East and Creadaun Head, and in places are over 1 km wide. The sediments are mostly firm sands, though grade into muddy sands towards the upper shore. They have a typical macro-invertebrate fauna, characterised by polychaetes and bivalves. Common species include *Arenicola marina*, *Nephtys hombergii*, *Scoloplos armiger*, *Lanice conchilega* and *Cerastoderma edule*.

The western shore of the harbour is generally stony and backed by low cliffs of glacial drift. At Woodstown there is a sandy beach, now much influenced by recreation pressure and erosion. Behind it a lagoonal marsh has been impounded which runs westwards from Gaultiere Lodge along the course of a slow stream. An extensive reedbed occurs here. At the edges is a tall fen dominated by sedges (*Carex* spp.), Meadowsweet, Willowherb (*Epilobium* spp.) and rushes (*Juncus* spp.). Wet woodland also occurs. This area supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail.

The dunes which fringe the strand at Duncannon are dominated by Marram grass (*Ammophila arenaria*) towards the sea. Other species present include Wild Sage (*Salvia verbenaca*), a rare Red Data Book species. The rocks around Duncannon ford have a rich flora of seaweeds typical of a moderately exposed shore and the cliffs themselves support a number of coastal species on ledges, including Thrift (*Armeria maritima*), Rock Samphire (*Crithmum maritimum*) and Buck's-horn Plantain (*Plantago coronopus*).

Other habitats which occur throughout the site include wet grassland, marsh, reed swamp, improved grassland, arable land, quarries, coniferous plantations, deciduous woodland, scrub and ponds.

Seventeen Red Data Book plant species have been recorded within the site, most in the recent past. These are Killarney Fern (*Trichomanes speciosum*), Divided Sedge (*Carex divisa*), Clustered Clover (*Trifolium glomeratum*), Basil Thyme (*Acinos arvensis*), Hemp nettle (*Galeopsis angustifolia*), Borrer's Saltmarsh Grass (*Puccinellia fasiculata*), Meadow Barley (*Hordeum secalinum*), Opposite-leaved Pondweed (*Groenlandia densa*), Autumn Crocus (*Colchicum autumnale*), Wild Sage (*Salvia verbenaca*), Nettle-leaved Bellflower (*Campanula trachelium*), Saw-wort (*Serratula tinctoria*), Bird Cherry (*Prunus padus*), Blue Fleabane (*Erigeron acer*), Fly Orchid (*Ophrys insectifera*), Broomrape (*Orobanche hederae*) and Greater Broomrape (*Orobanche rapum-genistae*). Of these the first nine are protected under the Flora Protection Order 1999. Divided Sedge (*Carex divisa*) was thought to be extinct but has been found in a few locations in the site since 1990. In addition plants which do not have a very wide distribution in the country are found in the site including Thin-spiked Wood-sedge (*Carex strigosa*), Field Garlic (*Allium oleraceum*) and Summer Snowflake (*Leucojum aestivum*). Six rare lichens, indicators of ancient woodland, are

found including *Lobaria laetevirens* and *L. pulmonaria.* The rare moss *Leucodon sciuroides* also occurs.

The site is very important for the presence of a number of EU Habitats Directive Annex II animal species including Freshwater Pearl Mussel (*Margaritifera margaritifera* and *M. m. durrovensis*), Freshwater Crayfish (*Austropotamobius pallipes*), Salmon (*Salmo salar*), Twaite Shad (*Alosa fallax fallax*), three Lamprey species - Sea (*Petromyzon marinus*), Brook (*Lampetra planeri*) and River (*Lampetra fluviatilis*), the marsh snail *Vertigo moulinsiana* and Otter (*Lutra lutra*). This is the only site in the world for the hard water form of the Pearl Mussel *M. m. durrovensis* and one of only a handful of spawning grounds in the country for Twaite Shad. The freshwater stretches of the River Nore main channel is a designated salmonid river. The Barrow/Nore is mainly a grilse fishery though spring salmon fishing is good in the vicinity of Thomastown and Inistioge on the Nore. The upper stretches of the Barrow and Nore, particularly the Owenass River, are very important for spawning.

The site supports many other important animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat (*Myotis daubentoni*), Badger (*Meles meles*), Irish Hare (*Lepus timidus hibernicus*) and Frog (*Rana temporaria*). The rare Red Data Book fish species Smelt (*Osmerus eperlanus*) occurs in estuarine stretches of the site. In addition to the Freshwater Pearl Mussel, the site also supports two other freshwater Mussel species, *Anodonta anatina* and *A. cygnea*.

The site is of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by Swallows before they leave the country.

Landuse at the site consists mainly of agricultural activities – many intensive, principally grazing and silage production. Slurry is spread over much of this area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of the salmonid river and to the populations of Habitats Directive Annex II animal species within the site. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the main rivers and their tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. There is net fishing in the estuary and a mussel bed also. Other recreational activities such as boating, golfing

and walking, particularly along the Barrow towpath are also popular. There is a golf course on the banks of the Nore at Mount Juliet and GAA pitches on the banks at Inistioge and Thomastown. There are active and disused sand and gravel pits throughout the site. Several industrial developments, which discharge into the river, border the site. New Ross is an important shipping port. Shipping to and from Waterford and Belview ports also passes through the estuary.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, overgrazing within the woodland areas, and invasion by non-native species, for example Cherry Laurel and Rhododendron (*Rhododendron ponticum*). The water quality of the site remains vulnerable. Good quality water is necessary to maintain the populations of the Annex II animal species listed above. Good quality is dependent on controlling fertilisation of the grasslands, particularly along the Nore. It also requires that sewage be properly treated before discharge. Drainage activities in the catchment can lead to flash floods which can damage the many Annex II species present. Capital and maintenance dredging within the lower reaches of the system pose a threat to migrating fish species such as lamprey and shad. Land reclamation also poses a threat to the salt meadows and the populations of legally protected species therein.

Overall, the site is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively. Furthermore it is of high conservation value for the populations of bird species that use it. The occurrence of several Red Data Book plant species including three rare plants in the salt meadows and the population of the hard water form of the Pearl Mussel which is limited to a 10 km stretch of the Nore, add further interest to this site.

APPENDIX 1.2

River Nore SPA - NPWS Site Description

River Nore SPA

NPWS Site Code: 004233

The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation. For a large part of its course the River Nore traverses Carboniferous limestone plains; it passes over a narrow band of Old Red Sandstone rocks below Thomastown. The site is a Special Protection Area (SPA) under the E.U. Birds Directive of special conservation interest for the following species: Kingfisher.

A survey in 2010 recorded 22 pairs of Kingfisher (based on 16 probable and 6 possible territories) within the SPA. Other species which occur within the site include Mute Swan (35), Mallard (267), Cormorant (14), Grey Heron (45), Moorhen (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.

25.11.2010

APPENDIX 1.3

Lisbigney Bog SAC - NPWS Site Description

Lisbigney Bog SAC

NPWS site code 000869

This former lake basin, now criss-crossed by streams, is situated about 5 km north-east of Durrow.

Although referred to as a bog, this site is in reality a wetland dominated by fen vegetation. Areas of sedge-dominated communities with Meadowsweet (*Filipendula ulmaria*), Lesser Spearwort (*Ranunculus flammula*) and Bog-myrtle (*Myrica gale*) divide dense stands of Common Reed (*Phragmites australis*) in the south-west from areas of Great Fen-sedge (*Cladium mariscus*) towards the north-east. In the centre of the stand of reeds is a small area of standing water with an abundance of Marsh Cinquefoil (*Potentilla palustris*), accompanied by a variety of bryophyte species, including *Marchantia polymorpha*, *Calliergon giganteum* and *Bryum pseudotriquetrum.* Scrub and areas of grassland dominated by Purple Moor-grass (*Molinia caerulea*) surround the fen.

The rare snail *Vertigo moulinsiana* was recorded at the site in 1998. This species is a glacial relict with a disjunct European population that is considered to be vulnerable due to loss of habitat, in particular, drainage to wetlands. For this reason it is listed on Annex II of the E.U. Habitats Directive. In Ireland, the species is sparsely distributed in the central lowlands, where it mostly occurs in calcareous wetlands/fens.

Birdlife recorded at the site includes Jays, Blackcaps and Snipe.

Lisbigney Bog is of considerable conservation significance for the good example of Cladium fen, a priority habitat that is listed on Annex I of the E.U. Habitats Directive, and for the population of *Vertigo moulinsiana* that it supports.

APPENDIX 1.4

Ballyprior Grassland - NPWS Site Description

Ballyprior Grassland SAC

NPWS site code: 0002256
Ballyprior Grassland, 4 km south of the village of Stradbally in Co. Laois, is located at the north end of the Castlecomer Plateau on largely limestone bedrock. The soils of the area are generally thin and well drained, varying from a deeper sandy loam in lower places (10-20 cm depth), to thin or stony soil over local drift (5-10 cm depth) on the elevated plateau.

The site contains orchid-rich calcareous grassland, a priority habitat listed on Annex I of the EU Habitats Directive. The old grassland habitat is of high quality and the site is important due to the loss of similar habitat in surrounding areas. The site has an exceptionally rich mycoflora which is a good indication of grassland quality (in terms of continuity, lack of disturbance and low nutrient status).

There is abundant cover of grasses and herbs with a high level of species diversity, but low bryophyte cover. Quaking-grass (*Briza media*) is an abundant species, reflecting the calcareous conditions, in association with abundant Sheep's-fescue (*Festuca ovina*), Sweet Vernal-grass (*Anthoxanthun odoratum*), Crested Dog's-tail (*Cynosurus cristatus*) and Common Bent (*Agrostis capillaris*). Other grass, sedge and rush species present include *Danthonia decumbens*, *Carex caryophyllea, C. flacca*, *C. pulicaris* and *Luzula campestris*. The herb-rich, calcicole flora is characterised by Early-purple Orchid (*Orchis mascula*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Yarrow (*Achillea millefolium*), Lady's Bedstraw (*Galium verum*), Mouse-ear Hawkweed (*Hieracium pilosella*), Thyme (*Thymus praecox*), Fairy Flax (*Linum catharticum*), Oxeye Daisy (*Leucanthemum vulgare*), Rough Hawkbit (*Leontodon hispidus*), Carline Thistle (*Carlina vulgaris*) and Autumn Gentian (*Gentianella amarella*), with Heath Dog-violet (*Viola canina*), Mountain Everlasting (*Antennaria dioica*) and Maidenhair Spleenwort (*Asplenium trichomanes*) prevalent around rock out-crops. On deeper soils, Wild Carrot (*Daucus carota*) and Pignut (*Conopodium majus*) are frequent.

The presence in certain places of species such as Carnation Sedge (*Carex panicea*), Devil's-bit Scabious (*Succisa pratensis*), Tormentil (*Potentilla erecta*) and Heath Bedstraw (*Galium saxatile*) indicates variation in conditions with paucity of minerals, and adds to the species diversity. Hazel (*Corylus avellana*) scrub, with a well developed ground flora, occurs on the extreme west margins of the grassland. There are also several ponds within the site adding further habitat diversity.

The Irish Hare (*Lepus timidus hibernicus*) occurs in the site. This endemic sub-species is listed in the Red Data Book and is legally protected under the Wildlife Act (1976).

Ballyprior Grassland was traditionally managed as a commonage for grazing of cattle and horses. But the recent division of the lands into private holdings has led to a drive to improve the agricultural quality and output of these lands. Much of the farmland in surrounding areas is improved. Recent damage has occurred to parts of the site and some damaged habitat has been excluded. Semi-improved grassland has developed from enrichment and fertilising in the west of the site, with persistent Common Sorrel (*Rumex acetosa*) in places. South of the site, recent afforestation has resulted in loss of contiguous grassland habitat.

In conclusion, Ballyprior Grassland is an important example of orchid-rich calcareous grassland, a habitat listed on Annex I of the EU Habitats Directive. The site contains a diverse flora and an exceptionally rich mycoflora.

APPENDIX 1.5

Map showing the known distribution of the Nore Freshwater Pearl Mussel in relation to the proposed development.

241000 242000 243000 244000 245000 246000 247000 248000 249000 250000 251000 252000

178000 177000 176000 175000 174000 173000 172000 171000

Legend

- Substation Sites
- Dunstown-Moneypoint-Coolnabacky 400kV Structures
- Ballyragget-Kilkenny 110kV Structures
- Ballyragget Coolnabacky 110kV Structures
- Athy Portlaoise 110 kV Structures
- AllLines
- Substation Site
- 50 m Buffer
- Freshwater Pearl Mussel Distribution 2011

N W E S

Scale: 1:30,000

0 500 1,000 Meters

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Date: 23 August 2012

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APPENDIX 1.6

Desktop Hydrogeological Assessment, Proposed Coolnabacky 400 / 110 kV GIS Substation, Co Laois

Prepared by Awn Consulting

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DESKTOP HYDROGEOLOGICAL ASSESSMENT, PROPOSED COOLNABACKY 400/110 kV GIS SUBSTATION, CO. LAOIS

Technical Report Prepared For

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Technical Report Prepared By

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Senior Hydrogeologist

Our Reference

DB/09/4848HR01

Date Of Issue

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EXECUTIVE SUMMARY

AWN Consulting was requested by AOS Planning to prepare an assessment of the hydrogeology at the proposed 400/110 kV substation in the town land of Coolnabacky' near Portlaoise Co. Laois.

A number of tufa deposits and springs on historical maps have been identified in the vicinity of the site. The tufa deposits identified are associated with field drains and based on field observations it appears the deposits are fed by a constant supply of calcium carbonate rich groundwater. These spring-fed watercourses are the headwaters of the Timahoe River which flows into the River Barrow and Nore Special Areas of Conservation (SAC) ca 4.5 km to the South-West. The Timahoe River is designated as part of the SAC.

The proposed works consists of a 400110 kV substation and compound area (98m x 117m). Building foundations will be at between 1-2m.

The bedrock geology underlying the site consists of the Ballyadams Formation of crinoidal wackestone/packstone limestone and is classified as a Regionally Important Aquifer (RKd). Gravel deposits are also present in the area which will also act as an aquifer when sufficiently thick, permeable, saturated and extensive. The site is located on the boundary of a defined Locally Important sand and gravel aquifer. The aquifers beneath the proposed Coolnabacky substation are classified as having a moderate vulnerability, indicating the presence of 5-10m of clayey subsoil beneath the site.

Site investigations show that Sand and Gravel deposits were encountered to between 0.9m to 1.9m bgl. Clay deposits were encountered from 0.9m bgl and proved to a maximum depth of 8.5m bgl. Where groundwater was encountered, the strikes were recorded at depths of between 0.8m bgl and 5.2m bgl. Groundwater was encountered in the Sand and Gravel deposits at one borehole location only, indicating that the Sand and Gravel is not saturated.

The Water Environment receptors include groundwater beneath the site, tufa deposits, field drains and watercourses and the Timahoe River. The potential impact from any dewatering required during excavation is expected to be limited. This is because the site investigation results indicate that the Sand and Gravel deposits are not saturated and groundwater inflow is not significant. Any dewatering can therefore be confined to the area immediately surrounding the excavation and will not impact on the tufa deposits or springs. Additionally, the sand and gravel deposits at the site are not expected to be in hydraulic continuity with the bedrock aquifer due to the presence of low permeability clay.

Mitigation measures recommended include isolating any groundwater in the more permeable Sand and Gravel deposits during dewatering if necessary, provision of a 25m buffer zone around the tufa deposits and ensuring that mitigation measures from the final environmental report are implemented.

Report Prepared By: **Report Checked By:**

Dominica Baird **Brian Tiernan**
Senior Hydrogeologist Senior Environmental Consultant

CONTENTS

List of Figures

List of Tables

1.0 INTRODUCTION

AWN Consulting was requested by AOS Planning to prepare an assessment of the underlying hydrogeology at the proposed 400/110 kV GIS substation in the townland of Coolnabacky' near Portlaoise Co. Laois.

The following list of maps and publications, together with databases, were reviewed as part of the assessment:

- Geological Survey of Ireland (GSI)/Teagasc Soils Map, Online Map Database[1]
- GSI, Geology of Kildare-Wicklow, Sheet 16[2]
- Karst Database, GSI[1]
- Quaternary (Subsoils) Database, GSI[1]
- Groundwater Well Database, GSI[1]
- Draft Ground Investigation Report, Coolnabacky 400kV Substation[3]
- GSI, Bagnelstown Groundwater Body Characterisation[4].

1.1 Site Description

The proposed Coolnabacky substation is situated approximately 2.5km north of Timahoe, Co. Laois. The site consists of a large roughly rectangular field where the proposed substation is planned and another field through which the proposed site access route is planned. The site area is level and is presently being used as agricultural land. The access route rises towards the south west over its length by circa 15m.

The field where the substation is planned was short grass while the proposed access route was through a newly ploughed arable field. The fields were separated by deep ditches containing water and mature trees. A number of tufa deposits and springs on historical maps have been identified in the vicinity of the site. The tufa deposits identified are associated with field drains.

Based on field observations it appears that the watercourses and field drains surrounding the Coolnabacky substation site are fed by a constant supply of calcium carbonate rich groundwater. These spring-fed watercourses are the headwaters of the Timahoe River which flows into the River Barrow and Nore SAC ca 4.5 km to the South-West. The Timahoe River is designated as part of the SAC.

1.2 Surrounding Land Uses

The site is bordered by a disused quarry to the south and agricultural land in all other directions.

1.3 Proposed Works

The proposed works consists of a 400kV substation and compound area (98m x 117m). Building foundations will be at between 1-2m. The footprint size of the proposed buildings will be:

- 400 kV Building - 15.5m x 63.5m
- 110 kV Building - 11.3m x 50m
- Trafo bunds - 10.7m x 79m

The proposed development will also seek modifications to the existing access road approximately (1.2km), connection to 400 kV line via overhead line to gantry in

compound to double circuit end mast and connection of 110 kV lines via cable from the 110 kV building in compound to the line/cable interface masts.

1.4 Disclaimer

The findings and opinions expressed in this report are based on the information available at the time the report was prepared and interpretation is based on design details available such as foundation depths. If additional information becomes available, which might alter AWN's conclusions, we reserve the right to review such information, reassess potential concerns and modify our opinions, if warranted. Please note that where we refer to information in reports from others, it must be recognised that AWN has no responsibility for the accuracy of the information contained therein.

This report has been prepared by AWN for AOS Planning on behalf of ESBi. Any third party using this Report does so entirely at their own risk. AWN makes no warranty or representation whatsoever, express or implied, with respect to the use by a third party of any information contained in this Report or its suitability for any purpose. AWN assumes no responsibility for any costs, claims, damages or expenses (including any consequential damages) resulting from the use of this Report or any information contained in this Report by a third party.

2.0 RECEIVING ENVIRONMENT

A summary of the receiving environment is provided in the following sections.

2.1 Soils

The soil and subsoil underneath the proposed substation consists of undifferentiated alluvium (see Figures 2.1 and 2.2).

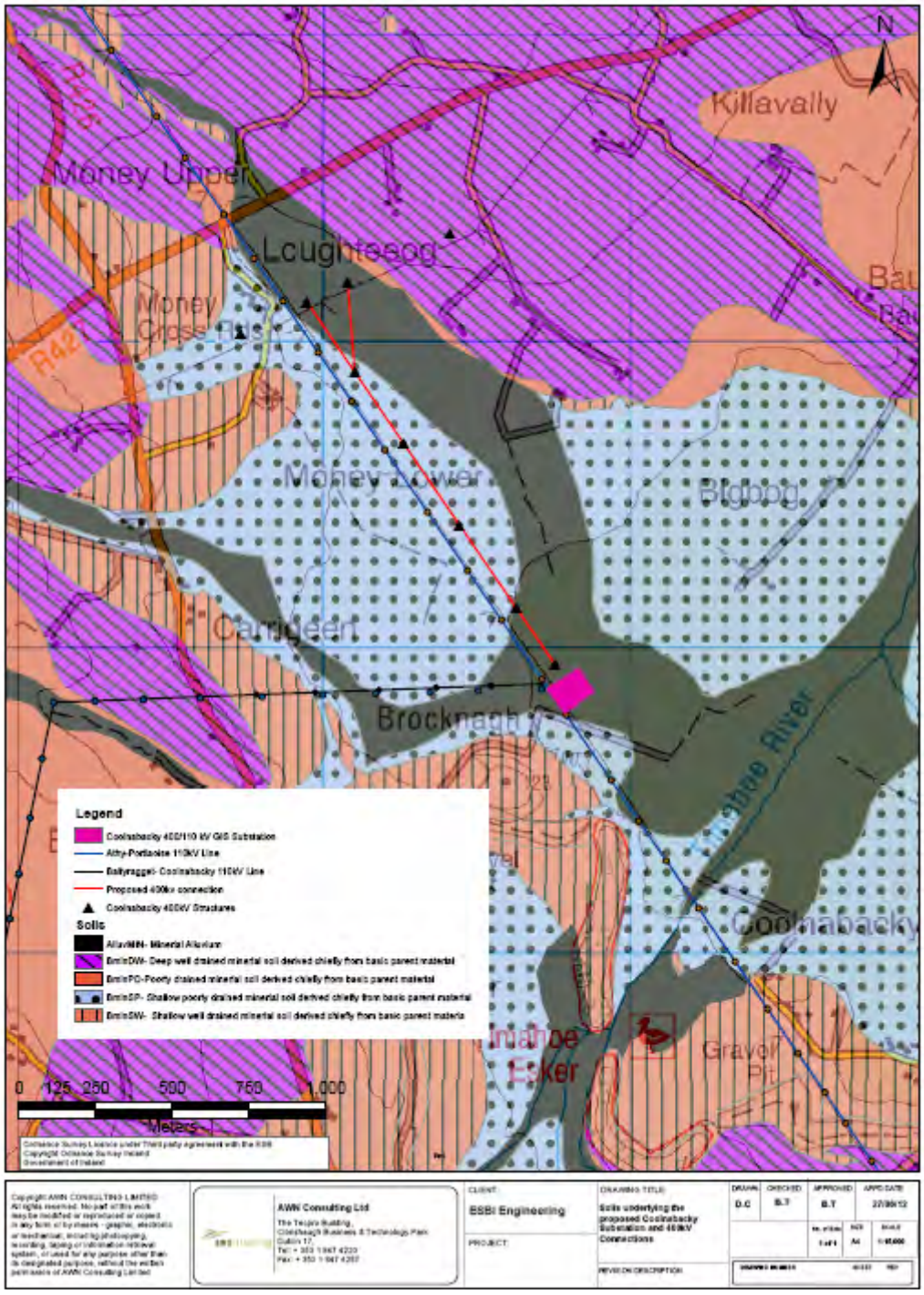


Figure 2.1 *Soils underlying the proposed Coolnabacky Substation*

Alluvial subsoil consists of gravel, sand, silt or clay in a variety of mixes and usually consists of a fairly high percentage of organic carbon (10%-30%). Alluvium is mapped only on modern day river floodplains. The alluvial deposits are usually

bedded, consisting of many complex strata of waterlain material left both by the flooding of rivers over their floodplains and the meandering of rivers across their valleys.

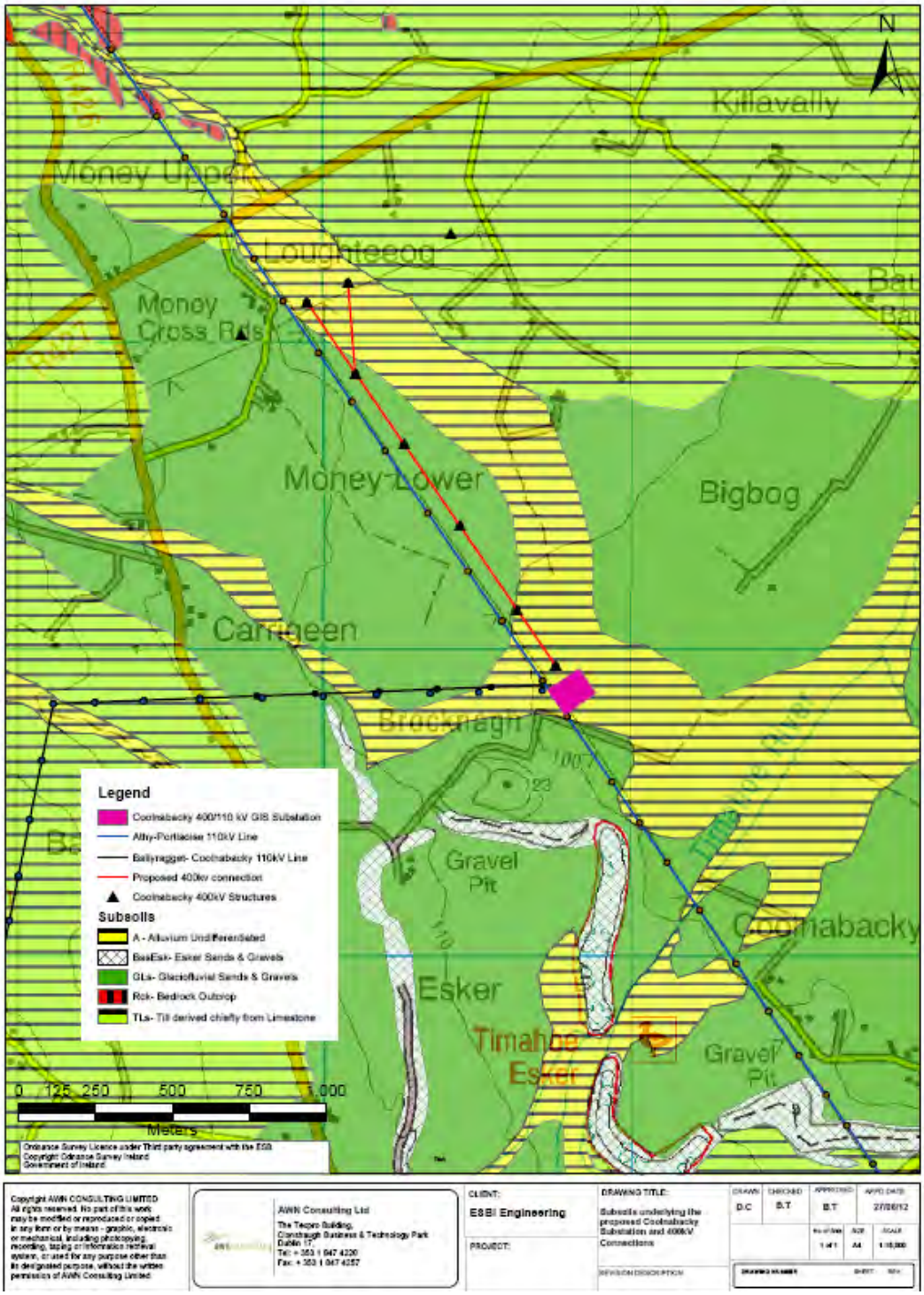


Figure 2.2 *Subsoils underlying the proposed Coolnabacky Substation*

2.2 Bedrock Geology

The bedrock geology underlying the site consists of the Ballyadams Formation of crinoidal wackestone/packstone limestone (see Figure 2.3).

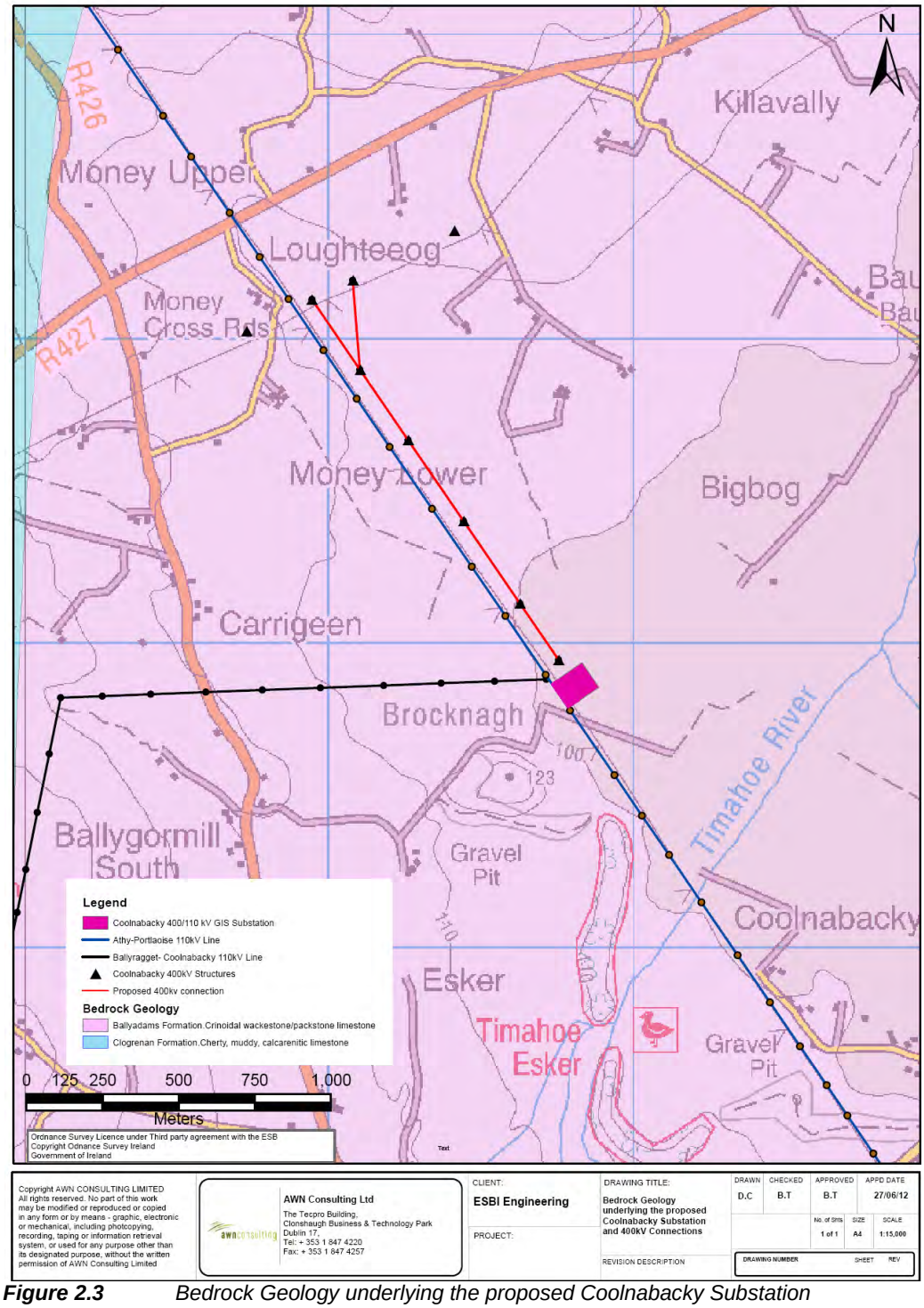


Figure 2.3 *Bedrock Geology underlying the proposed Coolnabacky Substation*

The Ballyadams Formation consists of pale-grey thick-bedded pure fossiliferous limestone. It comprises water-bearing units of pure limestone and dolomitised limestone and Calp. The dolomitisation is not complete and therefore there may be areas of undolomitized limestone that act as aquitards.

2.3 GSI Boreholes

The closest GSI boreholes are approximately 1.5km and 1.8km north east of the site. The wells are both shallow (5.5m bgl and 7m bgl) and the yield is classified as poor.

2.4 Aquifer Classification

The bedrock aquifer is classified as a Regionally Important Aquifer (RKd), referring to the Ballyadams Formation (see Figure 2.4).

Figure 2.4 *Bedrock Aquifers underlying the proposed Coolnabacky Substation*

Gravel deposits are also present in the area which will also act as an aquifer when sufficiently thick, permeable, saturated and extensive. The proposed Coolnabacky substation is located on the boundary of a defined Locally Important sand and gravel aquifer (see Figure 2.5). The tufa deposits to the east of the substation are also on the boundary of the gravel aquifer. The gravel aquifer is shown to extend to the south west of the site, where eskers and gravel pits are noted.

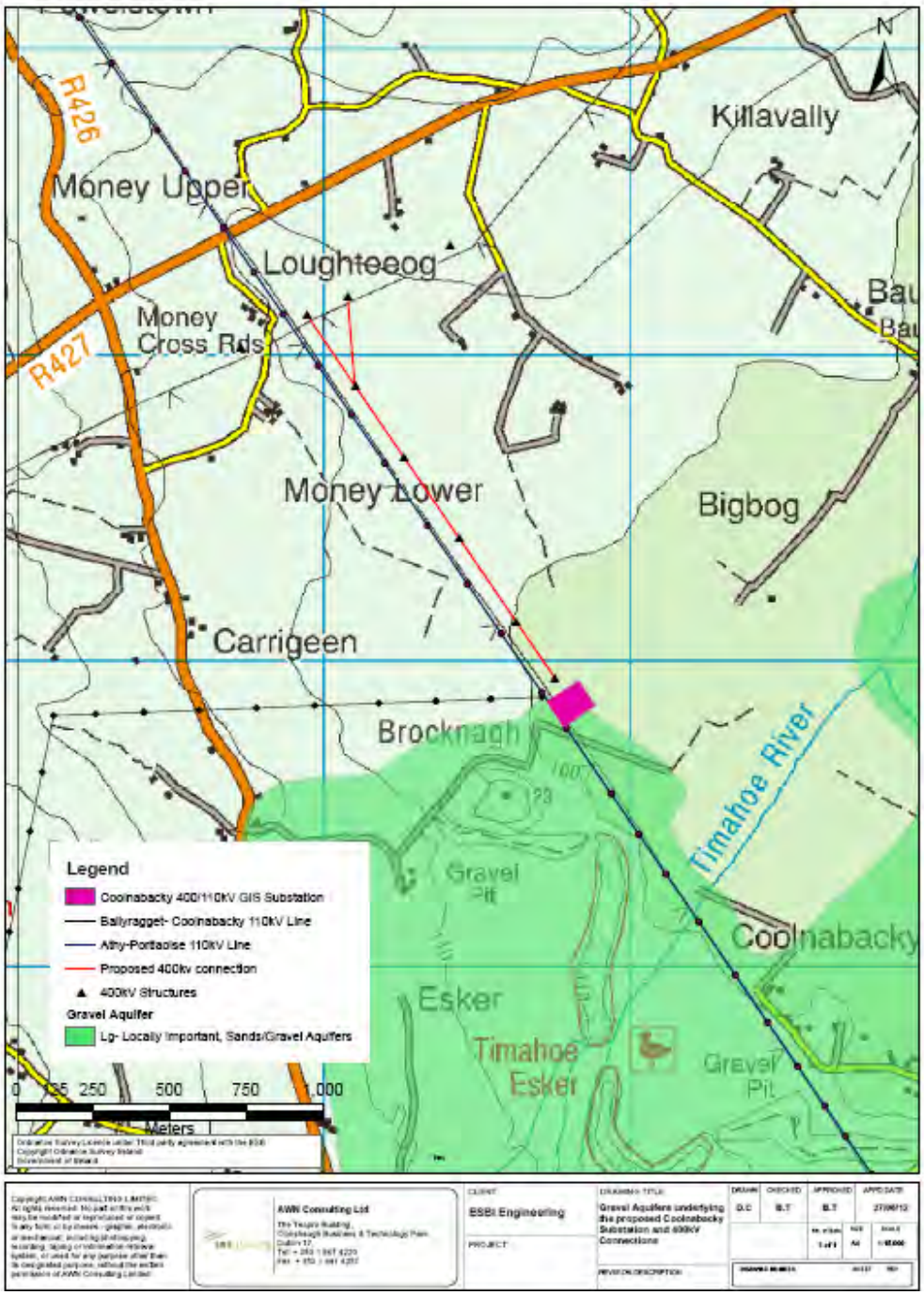


Figure 2.5 *Gravel Aquifers underlying the proposed Coolnabacky Substation*

2.5 Groundwater Vulnerability

The aquifers beneath the proposed Coolnabacky substation are classified as having a moderate vulnerability (see Figure 2.6), indicating the presence of 5-10m of clayey subsoil beneath the site, as shown in the GSI's vulnerability mapping guidelines shown in Table 2.1.

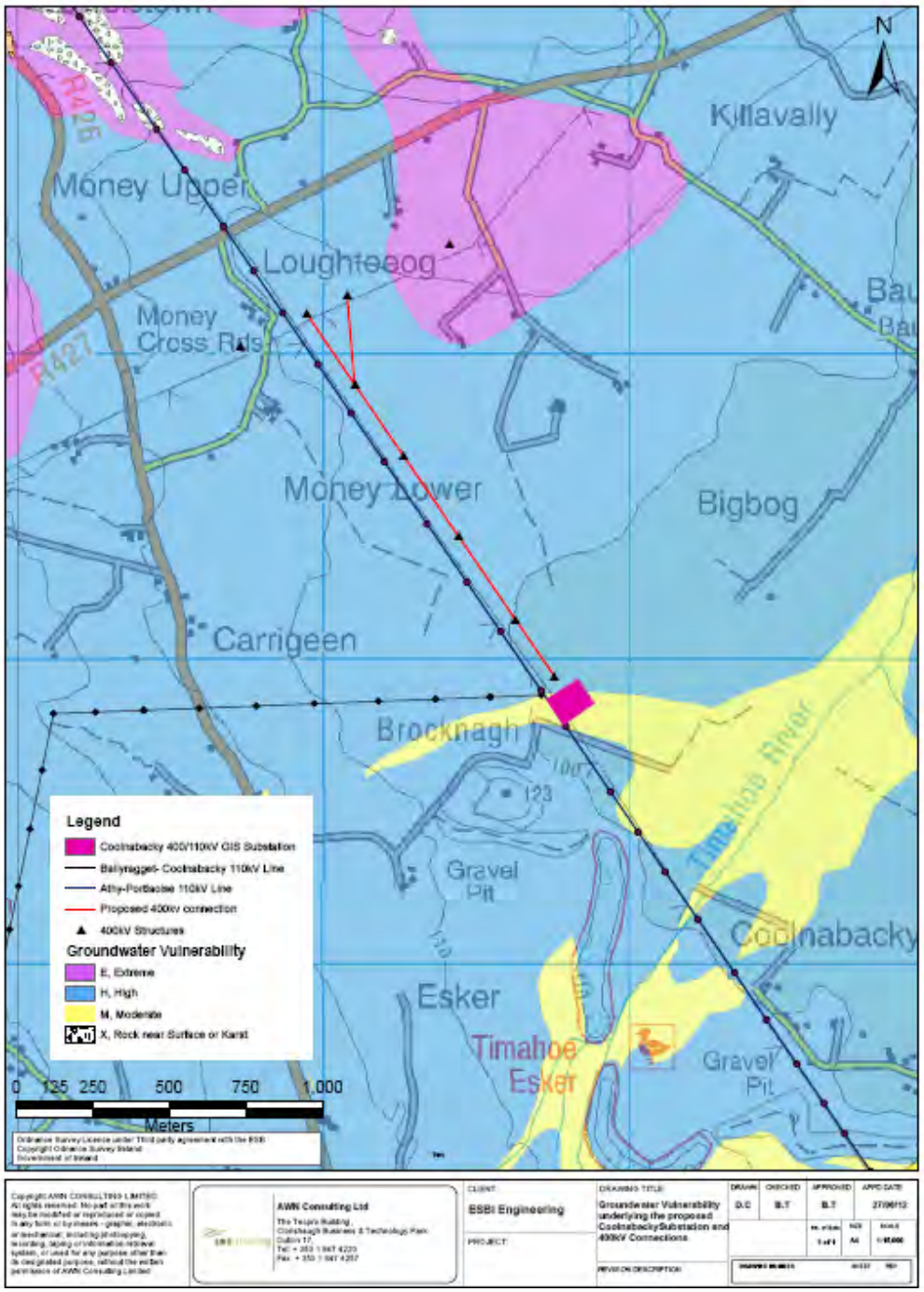


Figure 2.6 *Groundwater Vulnerability underlying the proposed Coolnabacky Substation*

The substation is surrounded by areas of high vulnerability (see Figure 2.6).

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Table 2.1 *Vulnerability Mapping Guidelines*

2.6 Groundwater Flow Direction

The nearest large river is the Timahoe river, approximately 600m to the south east of the site (see Figure 4.1). The groundwater flow direction is assumed to also be to the south east.

2.7 Groundwater Body

The site is underlain by the Bagenalstown Groundwater Body (GWB). The GSI has issued a Summary of Initial Characterisation for the Bagenalstown GWB[4].

Sands and gravels overlie significant areas of this groundwater body and are themselves discrete groundwater bodies. The sands and gravels are very coarse and poorly sorted and are similar to those seen in the Nore Basin. Clay layers often separate individual layers of the sands and gravels. In other areas, Till derived from limestone is the dominant overlying material.

The dolomite aquifer is presumed to be of "replacement" origin and hence may contain some primary permeability. The dominant secondary permeability of the dolomite results from the development of fissures by the solution of bedding planes and joints. In the undolomitised pure limestones only secondary permeability exists. The transmissivity of the dolomites can range from 20-200m^2/d, with a specific yield less than 2% (storage coefficient 10^{-4}).

There is hydraulic continuity between the Barrow Valley sands and gravels and the underlying aquifer. Under natural non-pumping conditions the flow regime in the aquifer is severely restricted, as there is no natural discharge down-dip. Hence the aquifer will be full of water and circulation will be limited to the near surface zone. Under pumping conditions leakage will occur from the sands and gravels into the aquifer.

3.0 SITE INVESTIGATIONS

Site investigations carried out at the site include a series of boreholes (BH1 – BH8) located at the substation compound area[3].

The following ground conditions were encountered:

3.1 Topsoil

Topsoil was encountered from ground level to a maximum depth of 0.3m below ground level (bgl). Topsoil was encountered at all locations.

3.2 Sand and Gravel Deposits

Sand and Gravel deposits were encountered beneath the topsoil to between 0.9m to 1.9m bgl. The sand and gravel deposits are typically described as brown to orange brown with sub rounded cobbles of limestone. Sand and Gravel deposits were encountered at all locations.

3.3 Clay Deposits

Clay deposits were encountered from 0.9m bgl and proved to a maximum depth of 8.5m bgl (BH2). Between 2.7m to 6.8m of clay was proved in the boreholes. The clay consisted of grey to brown grey firm to stiff clay with sub rounded gravel and cobbles of limestone. The clay became very stiff in some locations with depth. Clay deposits were encountered at all locations.

Bedrock was not encountered at the site.

3.4 Groundwater

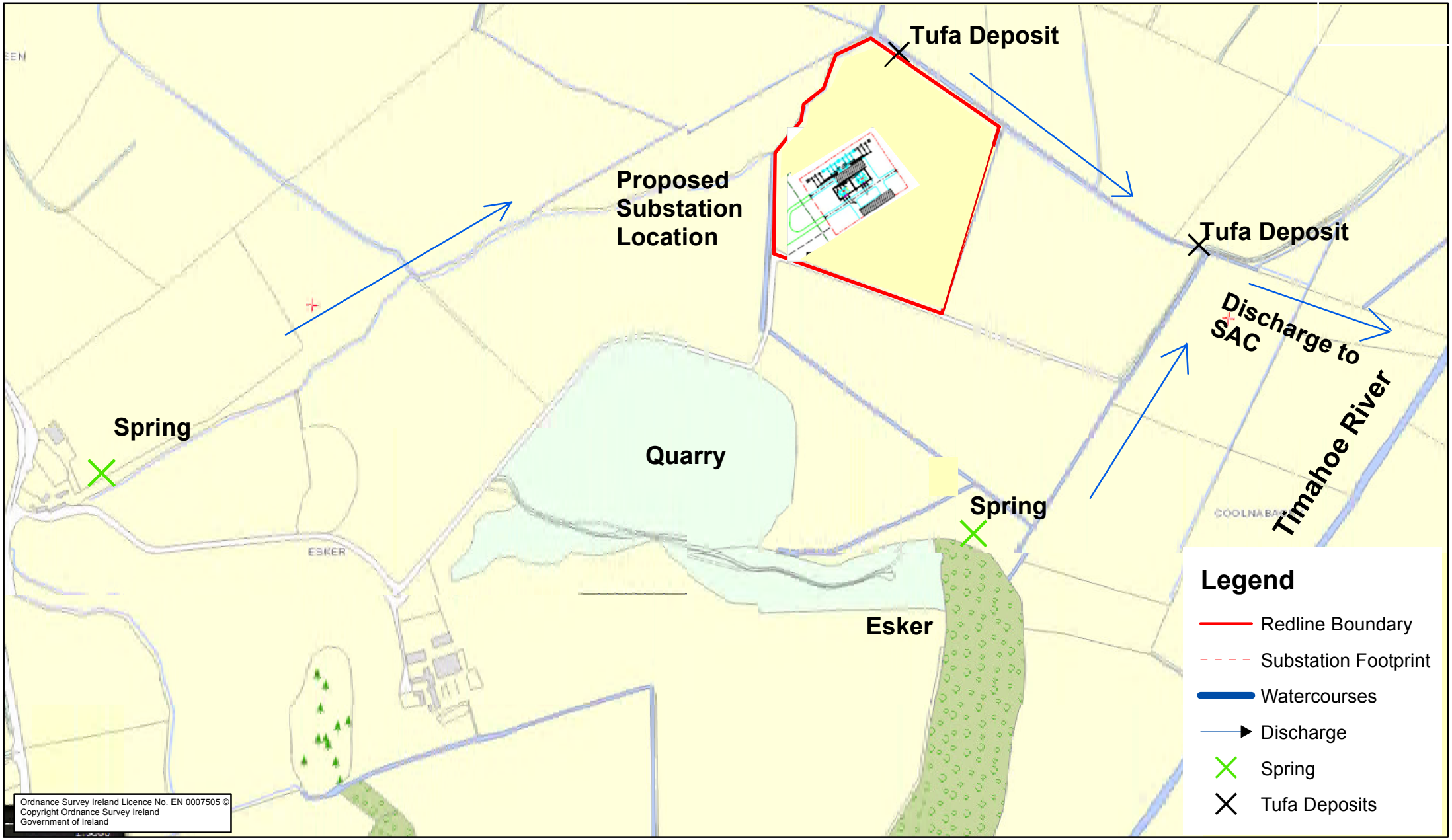
Groundwater strikes were encountered in all boreholes other than BH1 and BH10. The groundwater strikes were encountered in both the Sand and Gravel and Clay deposits. Where groundwater was encountered, the strikes were recorded at depths of between 0.8m bgl (BH3) and 5.2m bgl (BH7). No groundwater inflows were noted in BH2, BH3 and BH5.

It is noted that groundwater was encountered in the Sand and Gravel deposits at boreholes BH3 only, indicating that the Sand and Gravel is not saturated.

4.0 IDENTIFICATION OF WATER ENVIRONMENT RECEPTORS

The following Water Environment receptors have been identified in the vicinity of the site, and are shown in Figures 4.1 and 4.2. The Water Environment receptors are:

- Groundwater in the gravel aquifer beneath the site;
- Groundwater in the underlying bedrock aquifer beneath the site;
- Tufa deposits along northern boundary of site;
- Tufa deposits to the north east of the site;
- Field drains along the site boundary which are part of the main headwaters of the Timahoe River;
- Timahoe River to the south east of the site;
- Spring associated with an esker to the south of the site;
- Spring at the head of the watercourse to west of site, and;
- Spring on head of watercourse to south of site.



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CLIENT: ESBI Engineering

PROJECT:

DRAWING TITLE: Receiving Environment Receptors (vicinity of site)

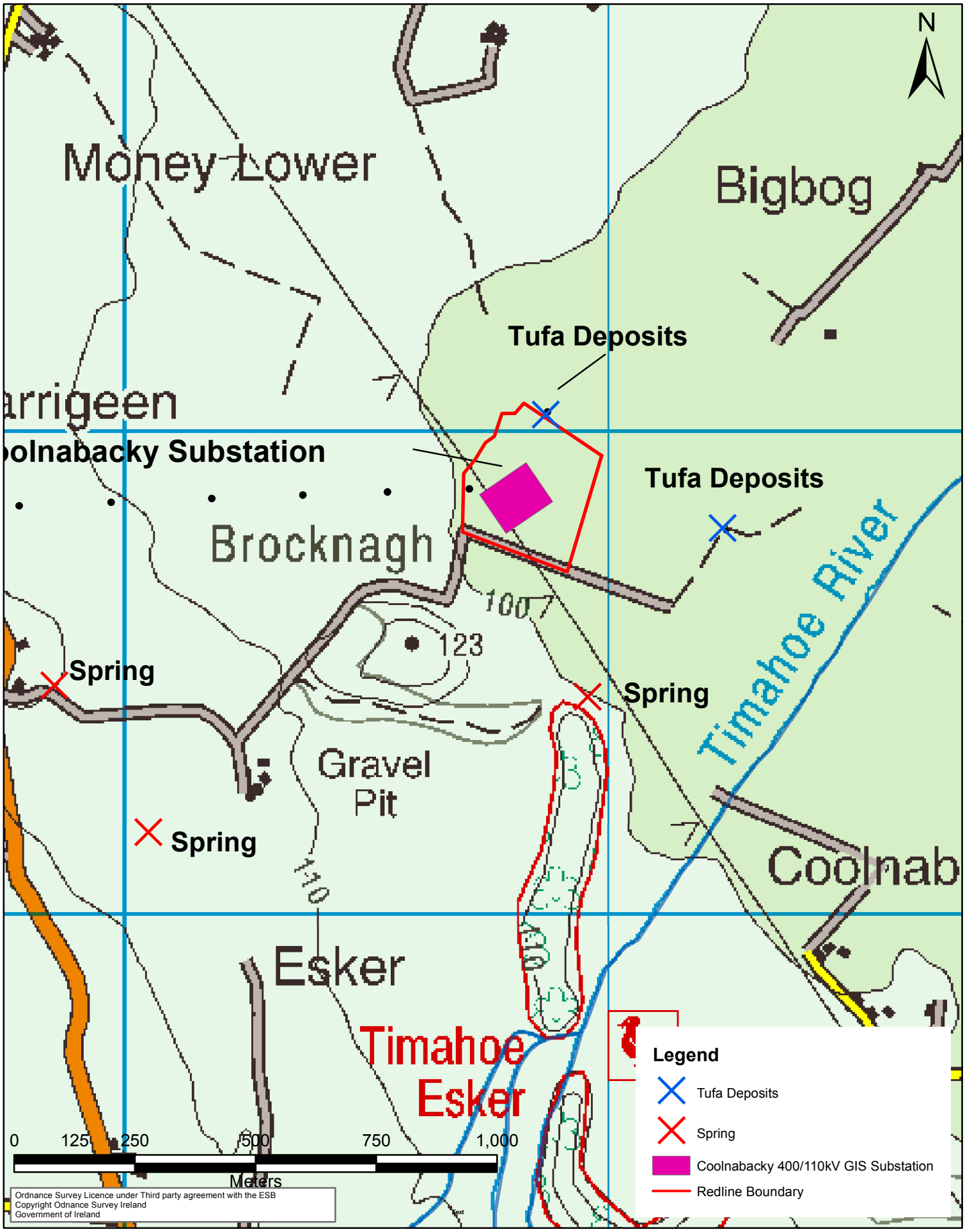
DRAWN	CHECKED	APPROVED	APPD DATE
D.C	D.B	D.B	02/07/2012

Figure 4.1

No. of Shts	SIZE	SCALE
1	A4	

DRAWING NUMBER SHEET REV

REVISION DESCRIPTION



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CLIENT: **ESBI Engineering**

PROJECT:

DRAWING TITLE: Water Environment Receptors (Wider area)

REVISION DESCRIPTION

DRAWN	CHECKED	APPROVED	APPD DATE
D.C	D.B	D.B	02/07/12

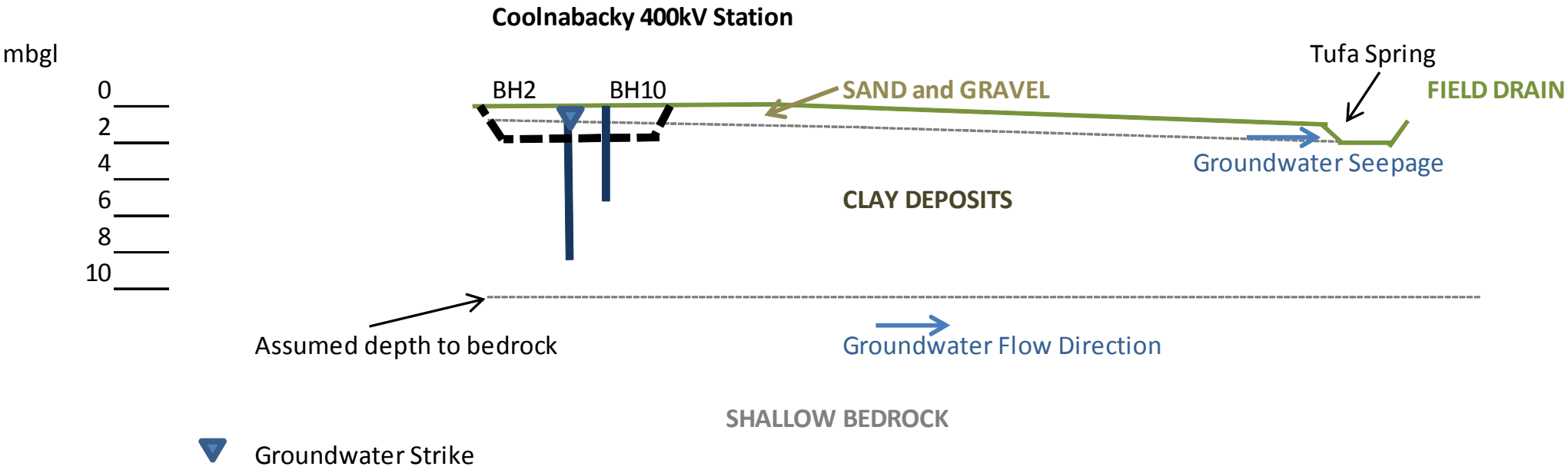
Figure 4.2

No. of Shts	SIZE	SCALE
1 of 1	A4	1:10,000

DRAWING NUMBER SHEET REV

4.1 Conceptual Site Model

The Conceptual Site Model (CSM) (Figure 4.3) is presented as a schematic cross section between the site of the proposed Coolnabacky 400Kv substation and the tufa deposits closest to the site shown in Figures 4.1 and 4.2.



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CLIENT: ESBI Engineering

PROJECT:

DRAWING TITLE: Conceptual Site Model

REVISION DESCRIPTION

DRAWN	CHECKED	APPROVED	APPD DATE
D.C	D.B	D.B	02/07/2012

No. of Shts	SIZE	SCALE
1	A4	

DRAWING NUMBER SHEET REV

The closest tufa deposit to the site is located over 100m from the boundary of the proposed excavation. Given the ground conditions at the site, the tufa deposits are expected to be fed from seepages from the gravel aquifer. The thickness of the sand and gravel deposits is variable, and across the site ranges from 0.9 to 1.9m.

The gravel aquifer is shown to extend to the south west of the site. The presence of eskers and gravel pits to the south west of the site further indicates that a greater thickness of Sand and Gravel deposits is expected in this area. Both tufa deposits are located at or near the boundary of the gravel aquifer and are thus associated with discharge zones at the gravel aquifer boundary.

However, the sand and gravel deposits at the site were not found to be saturated during the site investigation. In most cases, groundwater strikes were not recorded in the Sand and Gravel deposits. It is noted that, due to the presence of low permeability Clay deposits beneath the sand and gravel, the inflow volumes of groundwater encountered during drilling was minimal. As the sand and gravel was not saturated, this indicates that the quantities of groundwater present are not significant.

Although for the wider groundwater body hydraulic continuity exists between the Sand and Gravel deposits and the bedrock aquifer, within the localised site area any groundwater in the sand and gravel deposits is not expected to be in hydraulic continuity with the bedrock aquifer underlying the site. This is due to the presence of a proved significant thickness of low permeability Clay deposits, with between 2.7m to 6.8m of clay proved beneath the Sand and Gravel deposits. The clay encountered during the site investigations is described as stiff to very stiff at depth, and this stiff clay will impede any vertical groundwater flow.

The groundwater flow direction in the Sand and Gravel deposits is expected to be in the direction of the closest watercourse, i.e. to the south east. The CSM assumes that the tufa deposits are directly down gradient of the site.

4.2 Impact of Proposed Works on Hydrogeology

The proposed works include excavations of 1-2m bgl at the building locations. An excavation of 2m is shown on the CSM and is located over 100m from the closest tufa deposit.

The excavations will extend through the sand and gravel deposits into the underlying clay deposits. However, as discussed above the borehole logs indicate that the sand and gravel deposits are not saturated. Therefore, groundwater inflow from the sand and gravel deposits is expected to be limited.

Groundwater was encountered in the underlying clay deposits. As the permeability of these deposits is low, this will also impede the groundwater flow into the excavations. Due to the presence of low permeability clay at the base of the excavations, any groundwater in the more permeable Sand and Gravel deposits can be isolated during dewatering if necessary.

As the groundwater flow into the excavations is expected to be limited, extensive dewatering is not anticipated during excavation and any impact on the Water Environment receptors is expected to be minimal. Isolation of any groundwater in the sand and gravels can be undertaken to ensure that the impact of dewatering is localised to the area immediately surrounding the excavation.

5.0 CONCLUSIONS AND RECOMMENDATIONS

A number of Water Environment receptors have been identified in the vicinity of the site, including tufa deposits located at field drains on the boundary of the site and associated with the boundary of the gravel aquifer.

The proposed excavation works at the Coolnabacky substation will extend for a maximum of 2m bgl and will intercept the Sand and Gravel deposits into the underlying Clay deposits.

The impact on the Water Environment from any dewatering required during excavation is expected to be limited due to the following:

- Site investigation results indicate that the Sand and Gravel deposits are not saturated;
- Most groundwater strikes were in the underlying low permeability clay deposits and during dewatering the inflow is expected to be limited;
- As the excavations extend into the low permeability clay, any groundwater in the more permeable Sand and Gravel deposits can be isolated during dewatering if necessary;
- Any dewatering can therefore be confined to the area immediately surrounding the excavation and will not impact on the tufa deposits or springs;
- The Sand and Gravel deposits at the site are not expected to be in hydraulic continuity with the bedrock aquifer.

5.1 Mitigation Measures

The following mitigation measures are recommended to protect Water Environment receptors during construction:

Isolation of Groundwater Seepages

Borehole logs indicate that the Sand and Gravel deposits are not saturated and groundwater flow into the excavation during construction is expected to be limited. However, should on-going dewatering be required during excavations it is recommended that a low-permeability barrier be installed around the excavation walls. This will ensure that any potential for drawdown that could affect the Water Environment including the watercourses and tufa deposits will be minimised.

Protection of Water Environment Receptors

The mitigation measures outlined in the final environmental report accompanying the planning application will ensure that no sediment contamination, contaminated runoff or untreated wastewater will enter any watercourses during the construction of the proposed line route. Given the presence of sensitive Water Environment receptors at the site, it is imperative that these mitigation measures are adhered to.

Provision of Buffer Zone

It is recommended that a 25m buffer zone is applied around the tufa deposits to ensure protection of the deposits. No works during construction and operation will occur within this area, including re-fuelling, batching of concrete or storage of fuels and soil stockpiles.

REFERENCES

1. Geological Survey of Ireland (2012) Databases in relation to karst, quaternary (subsoils), groundwater wells, bedrock geology – www.gsi.ie

2. B.McConnell, M.E. Philcox, (1994), Geology of Kildare-Wicklow, Sheet 16. Geological Survey of Ireland.

3. Soil Mechanics, (2012), Laois – Kilkenny Reinforcement Project, Coolnabacky 400kV Substation – DRAFT Factual Report on Ground Investigation

4. GSI, Bagnelstown Groundwater Body – Summary of Initial Characterisation

APPENDIX 2

Map showing the known distribution of the Nore Freshwater Pearl Mussel in relation to the proposed development.

241000 242000 243000 244000 245000 246000 247000 248000 249000 250000 251000 252000

178000 177000 176000 175000 174000 173000 172000 171000

Legend

- Substation Sites
- Dunstown-Moneypoint-Coolnabacky 400kV Structures
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- Substation Site
- 50 m Buffer
- Freshwater Pearl Mussel Distribution 2011

N W E S

Scale: 1:30,000

0 500 1,000 Meters

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Date: 23 August 2012

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APPENDIX 3

Report on Ecological Mitigation Measures at Specified Sensitive Locations prepared by ESB International.

ESB International
ESBI Energy Innovation

Report on Ecological Mitigation Measures at Specified Sensitive Locations

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Laois - Kilkenny Reinforcement Project

PE687-F0261-R261-020

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August 2012

ESB International
ESBI Energy Innovation

Report on Ecological Mitigation Measures at Specified Sensitive Locations

File Reference:	PE687-F0261-R261-020
Client / Recipient:	EirGrid
Project Title:	Laois - Kilkenny Reinforcement Project
Report Title:	Report on Ecological Mitigation Measures at Specified Sensitive Locations
Report No.:	001
Rev. No.:	000
***Volume** 1 **of** 1*	
Prepared by:	John MacCarthy BE CEng
Title	Civil Engineer

APPROVED: Paddy Kavanagh ***TITLE:*** ***CBE Team Leader***	***DATE: 15/08/12***

Latest Revision Summary:

Template Used: bf-rep-001-002-003

Executive Summary

This report has been prepared in response to queries submitted by the Ecologist in relation to the following:

- Protection of surface water and ground water for elements of the Laois Kilkenny Reinforcement Project; and
- Ecological mitigation measures at specific forestry locations subject to works as part of the Laois Kilkenny Reinforcement Project.

The report looks at the construction and operational phases at particular locations as set out by the Ecologist. The queries raised by the Ecologist are set out at the start of each section, in the tabular format they were received in, for clarity and the mitigation measures included in the design or to be employed by the contractor are set out under the section sub headings.

It is intended that the client will issue this report as part of the tender and construction package of specifications to prompt the contractor to act on the mitigation measures contained herein and to make these mitigation measures contractually enforceable.

The measures proposed are inline with environmental best practice and should augment any statutory responsibilities on either the contractor or operator of the elements singled out for their location in, or close to, environmentally sensitive areas or water bodies.

It is the conclusion of this report that if the proposals of this report are adhered to, there will be minimal negative environmental impact on surface water, ground water, Special Area of Conservation or habitat arising from the proposed development.

Contents

1 Coolnabacky Surface Water & Groundwater

Location	Issues
Proposed Coolnabacky substation site	Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
Proposed Coolnabacky substation site	Possible effects on surrounding spring fed watercourses by any drawdown in water table.
Proposed Coolnabacky substation site	Reduce / eliminate any risk to groundwater during construction / operation.

1.1 Surface Water Protection Mitigation Measures

Drainage and runoff controls will be installed prior to starting site clearance and earthworks.

1.1.1 Erosion Control

Erosion control (preventing runoff) is much more effective than sediment control in preventing water pollution. Erosion control is less subject to failure from high rainfall and requires less maintenance.

Erosion control measures to prevent runoff flowing across exposed or excavated ground and becoming polluted with sediments are provided for in the design. This is primarily the use of existing site drains to channel runoff from up slope portions of a catchment around any construction areas or areas disturbed as a result of construction works.

Other inherent erosion control measures in the design include the design of roadways with minimum falls which do not exceed 15%.

Additional erosion control measures will be provided for in the construction management proposals. These measures will include the following:

- Minimise the area of exposed ground. Backfilling and construction will occur in conjunction with excavation and excavation will not proceed faster than

rate of construction. Re-vegetating of disturbed area to take place as soon as possible.

- Monitoring of the weather forecast prior to planning excavation works.
- Providing impermeable mats (plastic sheeting) as covers to mounded excavated material and open excavations during periods of heavy rainfall.

Silt fences to be provided at the toe of any significant areas where excavated material is stored.

1.1.2 Sediment Control:

The Settlement Ponds are an integral part of the sediment control and containment measures on site and the protection of watercourses. Settlement ponds will be provided adjacent to the areas of the site where the most excavation or earthworks are planned.

The settlement ponds on the site have been sized to provide an adequate treatment volume for the first flush from the developed station and the ponds will ultimately have an attenuation volume so that surface water runoff can be limited to Greenfield runoff rates. This attenuation volume can be utilised as additional treatment volume in the construction phase when sediment generation is greatest.

The stone check dams which divide the pond into primary, secondary and final settlement compartments will further reduce turbulence which will aid settlement and provide filtering of water.

Surface water from the site will be discharged to existing vegetated drainage ditches within the site where further settlement of solids and filtering of surface water will occur prior to ultimate discharge to the adjacent watercourse.

1.1.3 Risk Management

The best way to manage pollution incidents is to prevent them. The contractor will identify and quantify risks associated with erosion and sediment for each work practice. Risks such as an unplanned bank collapse, mud slide and unforeseen rainfall event can be constantly assessed through geotechnical risk management and monitoring of weather forecasts.

1.1.4 Emergency Plans and Procedures

The contractor will prepare an emergency response plan and set of procedures for events likely to cause pollution including the pollution of watercourses with silt or sediment. There will be a contingency plan in place during construction and displayed at appropriate locations.

1.1.5 Equipment, Training & Corrective Action

Equipment required in responding to an emergency event with the capability of generating additional erosion and sediment laden runoff will be stored on site. Staff will be trained in the use and application of these temporary emergency measures which may involve the following:

- Impermeable matting (plastic sheeting);
- Silt fences (posts & geotextile material);
- Mulching capability (organic materials, straw, wood chip, bark or other wood fibres and gravel) to stabilise or protect cleared areas;
- Settlement Tanks (portable propriety settlement tanks that can be transported to required areas).

Staff will be trained and made aware of procedures for notification of emergency events with the potential for pollution of watercourses.

1.1.6 Monitoring

Ongoing water monitoring at the discharge points and the receiving waters will be a key indicator of the effectiveness of the erosion and settlement control measures and the requirement for corrective action or the deployment of additional measures as outlined above.

1.2 Water Table & Groundwater Protection Mitigation Measures

1.2.1 Dewatering and Groundwater level

Deep excavations below the water table encountered in the Site Investigation will be kept to a minimum in the foundation design. It is not envisaged that there will be extensive deep excavations requiring dewatering or for any extended period of time to cause a material difference in the local groundwater table level.

It is envisaged that there will, therefore be no impact on the spring fed watercourses in the area.

Continuous monitoring will be employed where the contractor proposes any dewatering during the construction phase and proposals for dewatering and monitoring will be approved by the designers and ecologist for the project.

1.2.2 Groundwater Quality Protection

The contractor will store all chemicals, hydrocarbon based fuels and oil filled equipment when not in use in bunded areas of the site.

The contractor will have emergency spill kits comprising oil absorbent materials on site and staff trained in the use of these. Emergency response measures to oil/ fuel leaks will be displayed prominently on the site.

Sustainable Drainage Systems (SuDS) in the drainage network design will be put in place early in the construction phase to filter and biodegrade hydrocarbons in the unlikely event that any enter the water on the site.

In the operational phase, all oil filled equipment will be stored in impermeable concrete bunds. Surface water generated in the bunded areas will be pumped out of the bunds by an oil sensitive pump. There will also be an oil separator on the drainage network. Surface water will be routed through ponds and vegetated drainage ditches before discharge to the watercourse.

There will be no large scale batching of concrete on the site. All concrete will come from a licensed supplier with environmental certification. No washing out of concrete supply trucks will be allowed on the site. No cementitious material will be allowed enter the water or groundwater on the site. Monitoring and emergency response measures for any escape of cementitious material will be put in place by the contractor.

Any foul waste generated in the construction and operational phase of the project will be collected and disposed off site by a licensed contractor. No contamination of groundwater will occur from foul waste.

2 Ballyragget Groundwater

Proposed Ballyragget substation site	Reduce / eliminate any risk to groundwater during construction / operation.

2.1 Groundwater Quality Protection

The contractor will store all chemicals, hydrocarbon based fuels and oil filled equipment when not in use in bunded areas of the site.

The contractor will have emergency spill kits comprising oil absorbent materials on site and staff trained in the use of these. Emergency response measures to oil/ fuel leaks will be displayed prominently on the site.

In the operational phase, all oil filled equipment will be stored in impermeable concrete bunds. Surface water generated in the bunded areas will be pumped out of the bunds by an oil sensitive pump. There will also be an oil separator on the drainage network. Only after these measures will surface water then be recharged to groundwater through source control techniques (soakaways) in line with SuDS best management practices.

There will be no large scale batching of concrete on the site. All concrete will come from a licensed supplier with environmental certification. No washing out of concrete supply trucks will be allowed on the site. No cementitious material will be allowed enter the water or groundwater on the site. Monitoring and emergency response measures for any escape of cementitious material will be put in place by the contractor.

Foul waste generated in the construction of the project will be collected and disposed off site by a licensed contractor. Foul Waste generated in the unmanned station during the operational phase will be treated on site before being further treated and disposed of to ground water in a designed percolation area. A suitably qualified professional has carried out a site assessment and designed the percolation area in accordance with EPA guidelines.

3 Polesets & Angle Masts Surface Water & Watercourse Protection

BC 149 (Poleset)	Adjacent watercourse within 10 metres of structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BC 124 (Poleset)	Watercourse at structure location. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BC 91 (Poleset)	Adjacent watercourse within 10 metres of structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BC 72 (Angle mast)	Adjacent watercourse within ca 20 metres of angle mast. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BC 21 (Poleset)	Adjacent watercourse within 10 metres of structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BK 4 (Angle Mast)	Adjacent watercourse within 10 metres of new angle mast structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BK 5 (Poleset)	Adjacent watercourse within 10 metres of structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BK 16 (Poleset)	Adjacent watercourse within 10 metres of structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BK 49 (Poleset)	Structure located on boundary of SAC. Minimise extent of felling of adjacent hedgerow. Protection of surrounding surface waters which are likley to support Annex II species and designated SAC.
BK 82 (Poleset)	Adjacent watercourse within 10 metres of structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.
BK 103 (Poleset)	Adjacent watercourse within 10 metres of structure. Protection of surrounding surface waters which are likley to support Annex II species and feed into SAC.

3.1 Surface Water Protection

3.1.1 Polesets Construction - Erosion & Sedimentation Control

Polesets are constructed over the short duration of 1 day per poleset. The major mitigation measure in this case will be to not carry out construction for the sensitive polesets noted above which are in the proximity of a watercourse on days when there is rain or rain forecast. The contractor will monitor the weather forecast as part of the construction planning for the polesets.

The excavations for the polesets will not require any access into the excavation so no dewatering of the excavations is required if groundwater seepage encountered.

The top vegetated layer will be excavated carefully to keep the vegetation and root system intact. This layer will be placed carefully to one side and protected for the short duration of the construction. This layer will be reinstated following backfill around the polesets which will limit the potential for sediment runoff immediately after the construction of each poleset.

Excavated material will be stored safely so that the distance from the watercourse is maximised within the confines of the construction area and to ensure that there is a natural filter strip of vegetation between the excavated material and any water course. It should be noted that the entire volume of spoil per poleset will not exceed $40m^3$ and the associated spoil heap will not occupy an area exceeding $20m^2$. Sediment laden runoff from this small area during predominantly dry conditions is unlikely.

In the unlikely event of significant non forecasted rainfall the contractor will have access to emergency sediment control measures in a site compound that can be transported to the poleset construction location within a short time period. These measures would include the following:

- Impermeable matting (plastic sheeting);
- Silt fences (posts & geotextile material);
- Mulching capability (organic materials, straw, wood chip, bark or other wood fibres and gravel) to stabilise or protect cleared areas;

- Settlement Tanks (portable propriety settlement tanks that can be transported to required areas).

3.1.2 Polesets Construction - Pollution Control

The risk of non sediment related pollution during the construction for the polesets is minimal and may only be associated with oil leaks from the plant and machinery used in the construction. The following measures will be in place to mitigate the risk of and to respond in the event of an oil leak:

- All vehicles will be regularly serviced and kept in good condition;
- Vehicles will be checked daily for indications of leaking oil;
- No refuelling operations will take place at the construction site of the polesets;
- Spill kits will be readily available to drivers/ operators of plant and machinery; and
- Drivers/ operators of plant and machinery will be trained in the use of spill kits and aware of the contractor's emergency procedures for dealing with and reporting oil and fuel spills.

3.1.3 Angle Mast Construction - Erosion & Sedimentation Control

Angle Masts foundations are constructed over the short duration of less than 2.5 weeks per Angle Mast with the majority of this time required due to concrete setting time. Once the foundation is constructed and backfilled, the foundation is generally left for approximately 28 days before the mast is assembled. The mast assembly will cause no ground disturbance and takes place over a very short duration of time. The major mitigation measure in this case will be to not carry out construction at sensitive Angle Mast locations noted above which are in the proximity of a watercourse when there is a significant amount of rainfall forecast. The contractor will monitor the weather forecast as part of the construction planning for these Angle Masts.

Should the excavations for the Angle Mast foundations require dewatering due to groundwater seepage this water will be pumped through a portable settlement tank before discharge to the nearest drainage ditch. Existing vegetation as a filter strip prior to discharge to the drainage ditch will also be utilised where conditions allow.

The top vegetated layer will be excavated carefully to keep the vegetation and root system intact. This layer will be placed carefully to one side and protected for the short duration of the construction. This layer will be reinstated over the foundations following backfill around the Angle Mast foundations which will limit the potential for sediment runoff immediately after the construction of each Angle Mast foundation.

Excavated material will be stored safely so that the distance from the watercourse is maximised within the confines of the construction area and to ensure that there is a natural filter strip of vegetation between the excavated material and any water course. It should be noted that the entire volume of spoil per Angle Mast will not exceed 140m^3. Much of this excavated material will be removed from site immediately as it will not be required for backfilling and landscaping around the Angle Mast foundations. The excavated material stored adjacent to the Angle Mast construction area for the short duration of the works is therefore unlikely to exceed 50-66m^3. The associated spoil heap will not occupy an area exceeding 36-46m^2. Sediment laden runoff from this small area during predominantly dry conditions is unlikely.

In the unlikely event of significant non forecasted rainfall during the construction period, the contractor will have access to emergency sediment control measures in a site compound that can be transported to the Angle Mast construction location within a short time period. These measures would include the following:

- Impermeable matting (plastic sheeting);
- Silt fences (posts & geotextile material);
- Mulching capability (organic materials, straw, wood chip, bark or other wood fibres and gravel) to stabilise or protect cleared areas;
- Settlement Tanks (portable propriety settlement tanks that can be transported to required areas).

3.1.4 Angle Mast Construction - Erosion & Sedimentation Control

The risk of non sediment related pollution during the construction for the Angle Masts is minimal and may only be associated with oil leaks from the plant and machinery used in the construction or from the escape of cementitious material during the foundation construction. No chemicals will be stored at the construction site.

The following measures will be in place to mitigate the risk of and to respond in the event of an oil leak:

- There will be no fuel or oil stored at the Angle Mast construction location;
- All vehicles will be regularly serviced and kept in good condition;
- Vehicles will be checked daily for indications of leaking oil or fuel;
- No refuelling operations will take place at the construction site of the Angle Masts;
- Spill kits will be readily available to drivers/ operators of plant and machinery; and
- Drivers/ operators of plant and machinery will be trained in the use of spill kits and aware of the contractor's emergency procedures for dealing with and reporting oil and fuel spills.

The following measures will be in place to mitigate the risk of and to respond to the escape of cementitious material during foundation construction for Angle Masts:

- There will be no on site batching of concrete, grout or cement mortar at the Angle Mast construction locations;
- No washing out of concrete delivery vehicles or dumping of excess concrete will be permitted at the Angle Mast construction sites;
- Concrete skips, concrete pumps and machine buckets will be positioned so as not to allow slewing over water while placing concrete (the use of skips and pumps not envisaged);
- Freshly placed Concrete is to be covered to avoid surface washing away in heavy rain; and
- Clean up any spillages of cementitious materials immediately and dispose of correctly.

If temporary welfare facilities are required at the sensitive Angle Mast construction locations following investigation of alternative arrangements, these will be self contained units and foul waste generated will be collected and disposed of by an approved licensed contractor.

4 Specific Forest Locations Surface Water Quality Protection

Two areas where a forest corridor will be clear felled along the proposed 110 kV line have been identified as having direct potential to impact on surface water quality and hence on the ecology of the River Barrow and River Nore Special Area of Conservation. These are set out in Table 1 below and also in **Figure 1** and **Figure 2** in **Appendix A** of this report.

Table 1: Specific Forest locations with impact potential

BC 77 - 82 (Polesets)	Conifer plantation - likely to be direct drainage to tributary stream to East. Possibility of impacting on surrounding surface water quality during and post-felling of conifers.
BC 103 - 106 (Polesets)	Conifer plantation - likely to be direct drainage to tributary stream of Owenbeg River to South. Possibility of impacting on surrounding surface water quality during and post-felling of conifers.

The potential for impact arises as the overhead line route will require clearance of a forest corridor of 61.5 m through the forest stands as follows:

BC 77 – 82: A linear corridor of 750 m x 61.5m will be cleared felled along the line route. This block consists of private forest stands comprising Japanese Larch and Sitka Spruce planted around 1998. Drainage from this area is to a first order tributary stream of the Owenbeg River. Drainage from this area is to a first order tributary stream (EPA River Code IE-SE_15_373) of the Owenbeg River at a location approximately 1.4 km above the River Barrow and River Nore SAC. The forest stand is situated on both well drained and poorly drained acid mineral soil.

BC 103 – 107: A linear corridor of some 746m x 61.5m will require to be clear felled along this section of the proposed line. The forest stands in this area are young and of mixed age (see **Figure 2**). The main forest type is Japanese Larch and Sitka Spruce. The area around pole set 106 has been recently replanted (approximately 380 m of very young forest stand between pole set 104 and 107). Drainage from this area is to a first order tributary stream (EPA River Code IE-SE_15_279) of the

Owenbeg River at a location approximately 1.6 km above the River Barrow and River Nore SAC. The forest stand is situated on poorly drained acid mineral soil.

4.1 Potential Impacts from Specific Forest Locations

Potential impacts at these forest locations can arise from the following activities:

- **Clear felling of the forest corridor:** Clearfelling of the forest corridor can give rise to both siltation risk from ground disturbance and nutrient enrichment from the release of phosphorous and nitrogen from brash decay. The main sources of siltation risk during forestry operations (such as clear felling) arise from disruption of the soil surface, which can cause soils to be exposed to erosion and the transportation of finer particles by overland flow, and the transportation of looser decaying organic particles. Decaying brash resulting from the clearfell can generate nutrients which could potentially lead to nutrient enrichment of the small first order streams entering the Owenbeg River.

- **Removal of tree stumps to facilitate overhead line construction**: Construction of the overhead line in clear felled forest areas can also give rise to sediment release. Wooden poles (weighing approximately 3 tonnes each) will be transported to the construction location by wide tracked machinery generating low ground pressure. In general tree stumps along the immediate line route would be removed in a 10m wide corridor to allow machinery tracking and avoid tracks coming off the vehicle. Uprooting of tree stumps can contribute significantly to ground disturbance and sediment release.

- **Construction of pole sets:** The erection of pole sets generally requires minimal disturbance to the ground. A foundation hole will be excavated, the pole erected and backfilled and with good construction practice there should be little risk of sediment loss. Construction activity is also spread out along the line route with a small footprint at each location. Duration on site is expected to be no more than half a day for each pole set.

- **Potential windthrow arising from exposed forest edges post corridor clearance**: The felling of a linear corridor will leave exposed forest stand edges devoid of foliage along the corridor. There is some risk of wind throw when these tress reach maturity (an additional 20 years) however this is very limited at present given the age and height of trees.

The main potential effects from ground disturbance are the risk of silt generation with silt entering the Owenbeg River via its tributaries. The potential impacts are:

- Sedimentation - impacts include smothering of gravel beds with consequent loss of fish habitat and spawning and potential juvenile Freshwater Pearl Mussel habitat.
- Sediment deposition can also provide a base for growth of filamentous algae on gravel beds leading to a build up of sediment and loss of both fish spawning areas area and potential freshwater pearl mussel areas
- Sedimentation impacts include smothering fish eggs and causing mortalities in fish of all ages, reducing abundance of food and impeding movement of fish.
- Sedimentation impacts also include smothering of macroinvertebrates
- Loss of water quality of surface and groundwater along the line route by silt.

Nutrient enrichment of the receiving waters can also occur due to decay of brash left through the tree harvesting process. However the forest stands are located on mineral soils and adsorption of phosphorous on this material is likely to occur reducing the risk of nutrient phosphorous loss to the small streams running to the Owenbeg River. Should nutrients reach the small first order streams this could give rise to the following:

- Increased algal growth in the rivers leading to increased potential for sediment entrapment and build up with de-oxygenation of the river during the nocturnal cycle.
- Increased algal growth will lead to reduced habitat for fish spawning. macroinvertebrates and reduced potential habitat for freshwater pearl mussel

Accidental leakage of oil and fuels from construction vehicles can have a direct impact on fish, fish food and fish habitats and other aquatic species.

4.2 Mitigation Measures

The following mitigation measures will be implemented.

4.2.1 General Mitigation Measures

- Forestry Operations within the Freshwater Pearl Mussel Catchment areas, including at the forest stands within the Owenbeg river will be carried out strictly in accordance with the Forestry and Freshwater Pearl Mussel Requirements Site Assessment and Mitigation Measures published by the Forest Service.
- The Forestry and Freshwater Pearl Mussel Site Assessment Forms A and B which have been revised by Coillte and NPWS shall be used for all forestry operations within the Freshwater Pearl Mussel Catchments associated with the overhead line construction. (Appendix 1 Nore Catchment).
- The contractor appointed to harvest the timber will be fully briefed on the ecological sensitivity of the site and will work in collaboration with an ecologist to set out the proposed method and delineate working areas.
- Construction will adhere to the guidance document issued by Inland Fisheries Ireland South-eastern River Basin District (Maintenance and Protection of the Inland Fisheries resource during road construction and improvement works published by the South-eastern Regional Fisheries Board. (Note that a new Guidance document is expected to be published shortly by Inland Fisheries Ireland entitled “Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters”. Construction will adhere to this guidance once published).
- Should the need for any in stream crossings by construction vehicles be identified the Inland Fisheries Ireland shall be consulted and the approach to the crossing agreed with them. Any and all watercourses which have to be traversed during site development and associated track/road construction works should be effectively bridged prior to commencement.
- Work method statements should be developed and implemented by construction contractors for pole set construction.
- Access to construction areas should utilise existing field tracks to the extent possible to minimise the need for additional track construction.

- Proposed access tracks should be assessed by a qualified geotechnical engineer and ecologist to ensure the route minimises surface disturbance and silt generation.
- Re-fuelling of vehicles should not take place on site but in a secure bunded area well away from any watercourse.
- All oils and fuels should be stored in secure bunded areas, and particular care and attention should be taken during refuelling and maintenance operations on plant and equipment

4.2.2 Sediment Impact Mitigation

- Brash from the clearfell should be utilised as roading material for pole construction tracked vehicles to reduce impact on ground thereby minimising ground disturbance
- Existing forest drainage shall be reinstated where damaged to allow use to be made of vegetated ground areas to reduce the flow of silt overland.
- Silt traps and silt fences, such as geotextile membrane and straw bales, should be placed in the forest drainage network to minimise silt loss. These should be inspected and cleaned regularly. A series of stepped silt traps fences to trap any silt/debris will be installed. Their purpose will be to slow water flow and allow settlement of solids to occur. These will be regularly inspected and cleared out to ensure they are functioning properly.
- Traps should not be constructed immediately adjacent to natural water courses. A buffer zone should remain between the silt trap and the watercourse with natural vegetation left intact so as to assist in silt interception. They should be installed on forest drains.
- Pesticide if used for suppression of growth beneath the established overhead line should be minimised and used strictly in accordance with Forest Service Guidelines. Any plants used for the re-establishment of the site should be pre-dipped if required.
- Brash arising from forest felling should be used as roading for poling contractor tracked vehicles to the extent possible to avoid ground disturbance.

4.2.3 Nutrient Impact Mitigation

Potential nutrient release, particularly phosphorous will be limited by the fact that the trees are not at maturity and the quantities of brash generated will be relatively small compared to mature forest felling hence nutrient generation from brash decay will be low. In addition the forest stands are located on mineral soil types which generally adsorb phosphorous further reducing potential release to the aquatic environment. To further reduce the potential from nutrient impact:

- Brash should be windrowed at a distance of 20m from any main drain identified on site when the corridors through the forest stands have been clearfelled.

4.3 Conclusion on Forestry Impacts

The key threat to the aquatic ecology, fish, fish habitat, macroinvertebrates and potential freshwater pearl mussel habitat will arise from ground disturbance giving rise to potential silt generation leading to sedimentation in streams. This would primarily impact on the small first order streams of the Owenbeg river which are important spawning and nursery streams for the Nore system. The implementation of good construction practice based on good work method statements which incorporate the mitigation measures described above will minimise the potential for impact on water and hence on the aquatic ecology also. Although some nutrient is expected to be generated through brash decay arising from the corridor felling operations the level of brash and hence nutrient will be low. Nutrient is also likely to be adsorbed by the mineral soil in the area and hence there will be little potential to impact on water quality and aquatic ecology.

The anticipated resulting impact from the clearfelling of the forest stands and the overhead line construction will be very low.

Appendix A
Figures - Forestry Drawings

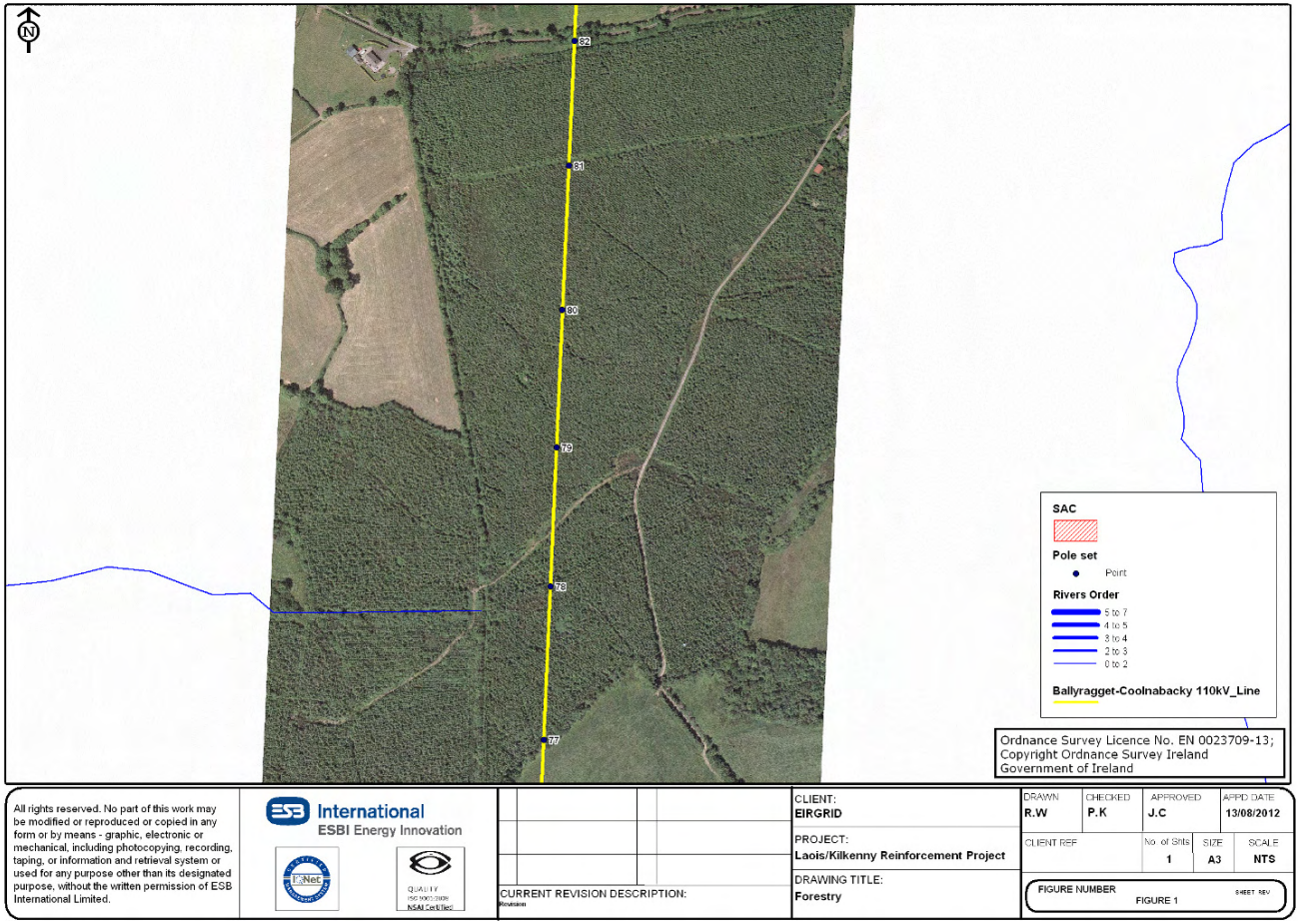

Figure 1: Forest stands at Pole sets 77 – 82

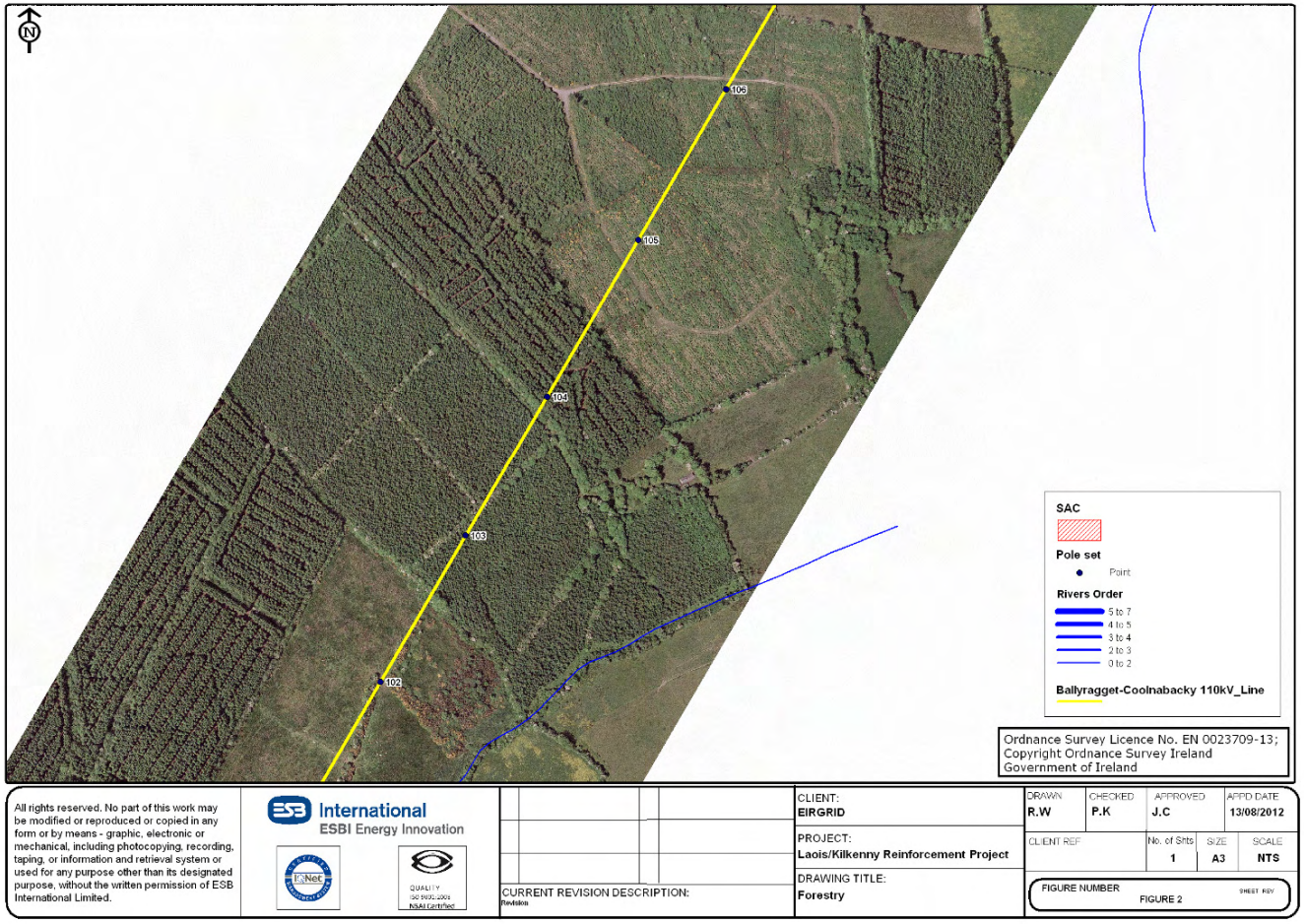

Figure 2: Forest Stands at Pole sets 103 - 106

Appendix B

Forestry and Freshwater Pearl Mussel Requirements Site Assessment Procedure

Forestry and Freshwater Pearl Mussel Requirements Site Assessment Procedure

The Forestry and Freshwater Pearl Mussel Requirements Forms A and B have been revised and the new forms are operation based. The Table below identifies what form must be filled out for each operation.

Table 1. Forms that must be completed for submission with application/licence.

Operation	**Forms Required**
Afforestation	Form 1
	Form 2
	Form
Aerial fertilisation	Form 1
	Form
Thinning	Form 1
	Form
Clearfell	Form 1
	Form 2
	Form 3
Replanting	Form 1
	Form 2
	Form 4
Roading	Form 1
	Form 2
	Form

Clearfelling

The following outlines the steps required to complete Forms 2, 3 and 4.

1. Walk site boundary
2. Determine if any watercourses are exiting the site. A watercourse is either:

a. an aquatic zone (permanent or seasonal river, stream or lake shown on an OS 6 inch map) or

b. a relevant watercourse (any channel/drain that can potentially carry water in extreme rain events).

3. Classify the relevant watercourses into Type A, B, C or D. Use Figure 2 and Table 2.

4. Walk up along and map the channel of **Type B and C** watercourses.

5. Assess each watercourse and adjoining land either side (unless one side is outside application area). Fill in Table 6 (Form 2) taking into account:

   a. 25 m either side of aquatic zones and

   b. 10m either side of Type B and C relevant watercourses.

6. Using the information in Note 3, rank the watercourses according to the highest potential risk.

7. Identify and map any hotspots present on the site. Fill in Table 7 (Form 2).

8. Identify appropriate mitigation measures (Form 3).

9. Identify the restock option and mitigation measures, if required (Form 4).

Figure 1. Site Assessment Procedure

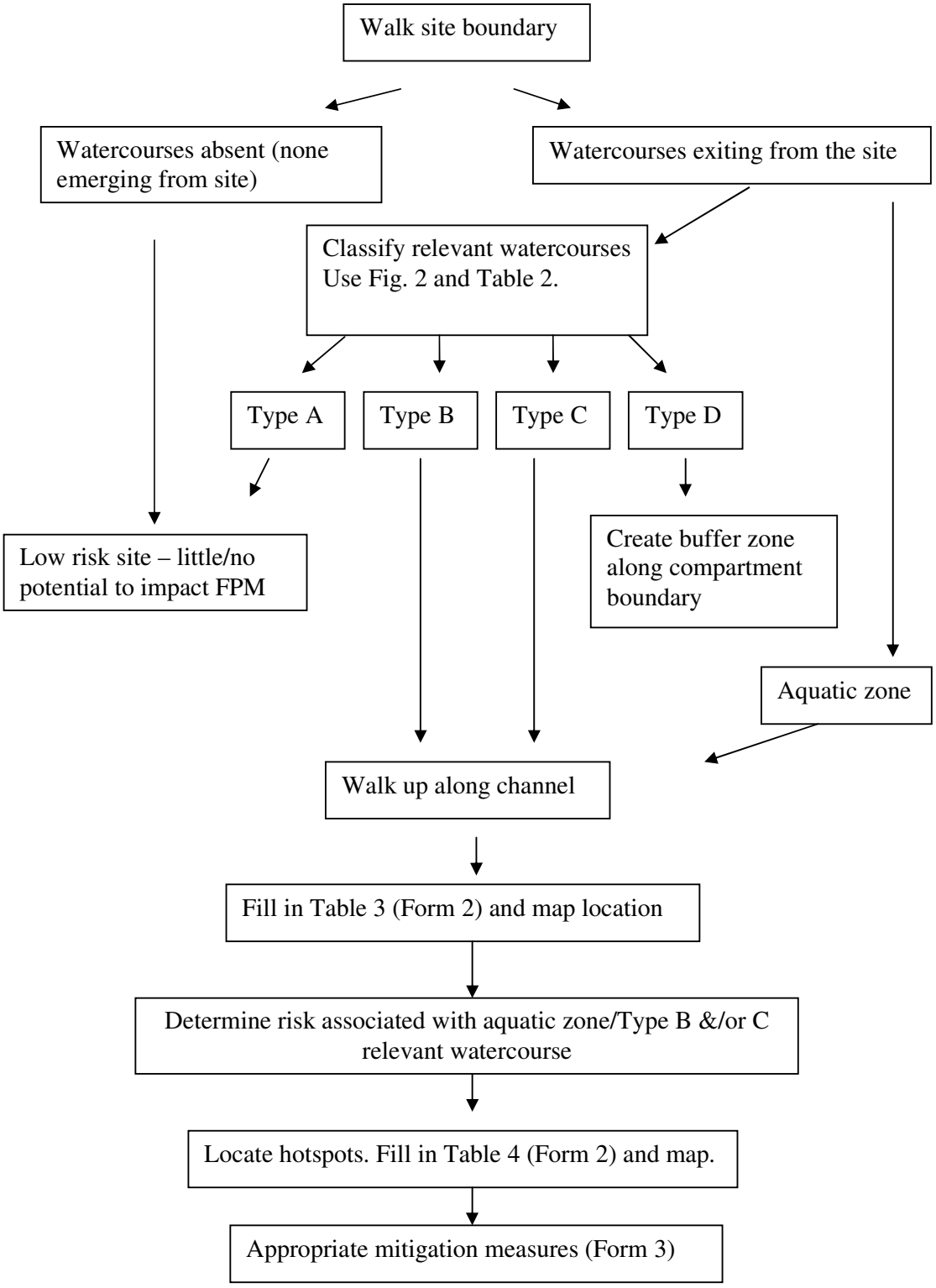

Figure 2: Decision tree for identification of watercourse types

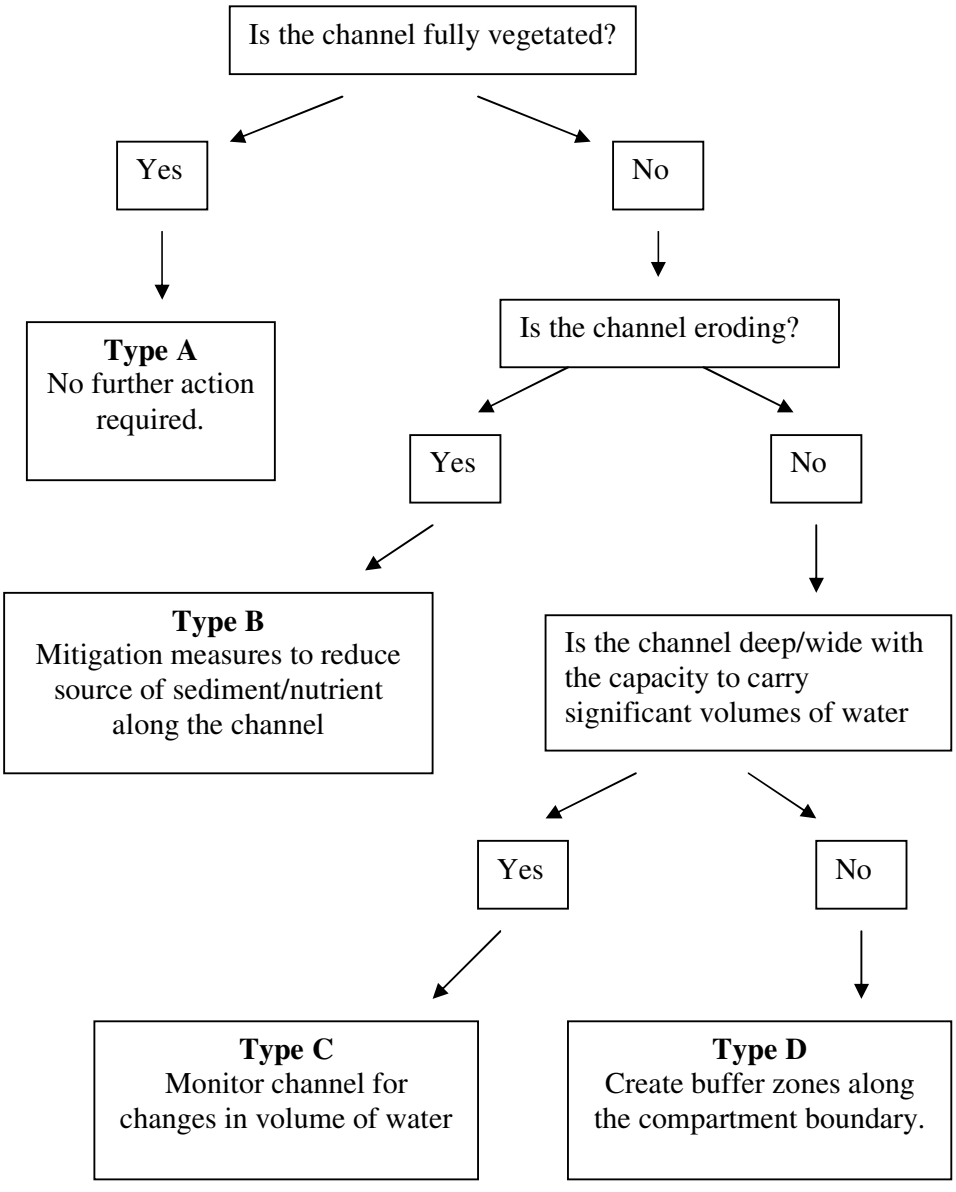

Table 2: Watercourse type and description

Type A	**Type B**	**Type C**	**Type D**
Vegetated	Non-vegetated	Non-vegetated	Non-vegetated
Non-eroding	Eroding	Non-eroding	Non- eroding
No channel disturbance	No channel disturbance	Deep/wide natural or manmade channel	Possible build up of sediment
Some sediment build up	Scouring of either bed or banks	This channel is likely to have carried significant volumes of water previously and may be re-activated following harvesting	No channel disturbance
No scouring	Vertical or collapsing banks	No scouring	No scouring of bed/banks
No distortion of emergent vegetation	Deep/wide (natural or manmade channel)	No channel disturbance	Stable banks
Low risk watercourse	High risk watercourse	High risk watercourse if water present	Low risk watercourse

Note: Watercourses have not been separated into the Aquatic zones or Relevant Watercourses for the identification of watercourse types.

Table 3: Soil erodability and nutrient loss risk categories for major soil groupings.

Soil Group	**Erodability**	**Nutrient Loss Risk**
Well drained mineral	Moderate	Low
Gleys (mineral)	Low	Moderate
Peaty gleys	High	Moderate*
Podzol (mineral)	Moderate	Moderate
Podzol (peaty	High	Moderate*
Lithosol	Moderate	High
Peat	High	High

Note: Slope, cultivation (e.g. drainage) and rainfall have not been incorporated into the risk categories for the above soil groups.

Forestry and Freshwater Pearl Mussel Requirements Form 1

(Revised Form A and B)

Form 1. Generic Site and Catchment Description

Section 1. Generic Site Description

1	FS CN/ID or MU No (List all MUs included within SP area being assessed).	
2	Applicant Name	
3	Location (Townland)	
4	FPM catchment	Owenea River - see Section 2.
5	Waterbody ID	
6	Application size (Ha). List coupe size if operation occurring in adjacent MUs in the same year.	
7	Indicate relevant operations	Afforestation ☐ Aerial fertilisation ☐ Thinning ☐ Clearfell ☐ Replanting ☐ Roading ☐
8	Hydrological distance (meters) to the nearest downstream recorded FPM	

Section 1. Generic Site Description

population?

9 Overall slope

- Moderate (Even to 1 in 7/<15%) ☐
- Steep (1 in 7 to 1 in 3/15-30%) ☐
- Very Steep (1 in 3 or greater/>30%) ☐

10 Overall soil type

- Well drained mineral ☐
- Gleys (mineral) ☐
- Peaty gleys ☐
- Podzol (mineral) ☐
- Podzol (peat) ☐
- Lithosol ☐
- Peat ☐

11 Risk of sediment loss (see Table 4)

- High ☐
- Medium ☐
- Low ☐

Risk of nutrient loss (Table 5)

- High ☐
- Medium ☐
- Low ☐

Table 4. Risk of sediment loss

Soil type	Slope Class		
	Even to 1 in 7 (<15%)	**1 in 7 to 1 in 3 (15–30%)**	**1 in 3 or greater (>30%)**
Well drained mineral	Moderate	Moderate	Moderate
Gleys (mineral)	Low	Low	Low
Peaty gley	High	High	High
Podzol (mineral)	Moderate	Moderate to High	Moderate
Podzol (peaty))	High	High	High
Lithosol	Moderate	Moderate	Moderate
Peat	High	High	High

Table 5: Soil erodability and nutrient loss risk categories for major soil groupings.

Soil Group	**Nutrient Loss Risk**
Well drained mineral	Low
Gleys (mineral)	Moderate
Peaty gleys	Moderate*
Podzol (mineral)	Moderate
Podzol (peaty	Moderate*
Lithosol	High
Peat	High

Note: Slope, cultivation (e.g. drainage) and rainfall have not been incorporated into the risk categories for the above soil groups.

Section 2.Nore River FPM Catchment

Physical Description and Overview of land use in catchment

The Nore catchment is located in the south east of the country crossing counties, North Tipperary, Laois, Kilkenny and Offaly in the South Eastern River Basin District. At 1058.90 km2 the Nore catchment is the second largest pearl mussel catchment, after the Munster Blackwater. The River Nore rises on the eastern slopes of the Devil's Bit Mountain in Co Tipperary and, at first, flows east through Borris in Ossory and then turns south passing through Durrow, and Ballyragget in Co Carlow, and then Kilkenny City, Bennettsbridge, and Thomastown in Co. Kilkenny before meeting the tide at the village of Inistioge. It is 87 miles long and drains a total catchment of 977 square miles. It rises on a sandstone base but the catchment soon turns to limestone and remains so to the sea. The countryside is one of mixed farming, with some tillage, quite a bit of pasture and dairying and some bloodstock. The river has a fairly steep gradient but the flow is checked by innumerable weirs and it is probably true to say that shallow glides are the predominant feature. The catchment incorporates parts of the Slieve Bloom Mountains, River Barrow and River Nore, Coolrain, Knockacoller, Galmoy Fen, Cullahill Mountain, Spahill and Clomantagh Hill and The Loughans SACs. The most common Corine land use type within the Nore catchment is "pastures" (70.51%). "Coniferous forests account for (7.12%) and "peat bogs" (5.04%).

Overview of pearl mussel in catchment

The Nore pearl mussel Margaritifera durrovensis has a relatively short history, being known to science for less than 100 years. In 1926, B.B. Woodward found an unusual shell in the P.B. Mason collection, which was labelled from the river Nore at Durrow (Phillips 1928). He wrote to R.A. Phillips, who went to look for further specimens in the river. In October 1926, Phillips, along with A.W. Stelfox, R.J. Welch and C. Oldham found the population and was subsequently followed by Phillips naming M. durrovensis as a species new to science. The taxonomic status of M. durrovensis remains inconclusive but is probably best described as a rare ecophenotype of M. margaritifera. M. durrovensis was known from the Barrow and Nore main channels, but living specimens have not been found outside the Nore since 1993. During 1993 one living specimen was found in the River Barrow. Surveys of the River Suir from 1991-1993 led to the discovery of dead shells only (Moorkens 1996).

The unique feature of the Nore pearl mussel Margaritifera durrovensis is that it does not live in acid waters like M. margaritifera. It is living in a section of river that is highly calcareous, with over 330 mg/l CaCO3. Although there are parts of the main channel and tributaries that have much lower levels of calcium, the mussel has never been found within levels areas of the catchment that would seem much better suited to it, and it is currently only known from the most lime-rich waters of the River Nore.

The Nore pearl mussel has not reproduced successfully in the River Nore since 1970. Evidence for the decline of reproduction of *M. durrovensis* comes from Ross (1984) and from the detailed survey work carried out from 1991 to 2009. Ross found mussels aged from 12 to 80 years, and a wide range of age classes suggesting that mussels successfully bred almost every year between 1905 and 1971. Detailed surveys have failed to find evidence of successful recruitment thereafter. The population continues to age, and as older mussels die, they are not replaced. Based on the dead shells collected, the size profile is very aged and close to death for this shorter lived species

Forestry overview in catchment

Forest stands in the Nore Catchment are located principally in the upper catchment in the tributary rivers of the Delour (Gorteen, Kileen) on the Tonet and Mountrath rivers (**Figure 3.14**). Forest stands comprise

both State and private forest stands. The main forest areas are located well above the pearl mussel populations.

Proposed forestry operation in the catchment (insert short description of operations to be carried out, why operation need to be carried out and where possible relate to other forest activities within the catchment).

A line corridor is required to clearfelled through 2 sections of forest stands between pole sets 77 – 82, (750M X 61.5M) and pole sets 102 – 107 (746M X 61.5M) .

GIS Table listing all the waterbodies in the FPM catchment plus operations within the same year (i.e. within proposed fell year).

Year	**Waterbody ID**	**Waterbody Area (ha)**	**MU ID**	**MU Area (as % of waterbody area)**	**Clearfell or Thinning**

Forestry and Freshwater Pearl Mussel Requirements Form 2

(Revised Form A and B)

Table 6. This form is to be completed for aquatic zones (**AZ**) and for Types B and C relevant watercourses (**RW**) exiting the site. Assess 25m either side of aquatic zones and 10m either side of Types B or C relevant watercourse. **This form should be accompanied by a site map**.

Watercourse Assessment						**Bank Side Zone Assessment**							Effective buffer Note 4	Risk Note 5
ID	**Water-course**	**Slope** Note 1	**Dimensions of channel** Note 2	**Vegetation in watercourse**	**Risk**	**Slope** Note 1	**Soil**	**Planted with conifers**	**Width unplanted (m)**	**Dominant ground vegetation**	**Feeder channels (into AX or ERW)**	**Risk** Note 3		
1	AZ □	Moderate	Small	None	High	Moderate	Peat □	Yes □		Bare soil / litterfall /	Yes □	High □	Yes □	High
	RW □	□	□	□	□	□	Mineral □	No □		mosses □	No □	Moderate	No □	□
		Steep	Medium	Filamentous algae	Moderate	Steep	Gley □			Grass/herb cover □		□		Low
		□	□	□	□	□	Podzol □					Low □		□
		Very steep	Large	Macrophytes	Low	Very steep	Lithosol □			Scrub □				
		□	□	□	□	□								
2	AZ □	Moderate□	Small □	None	High □	Moderate□	Peat □	Yes □		Bare soil / litterfall /	Yes □	High □	Yes □	High
	RW □	Steep □	Medium □	□	Moderate	Steep □	Mineral □	No □		mosses □	No □	Moderate	No □	□
				Filamentous algae	□					Grass/herb		□		Low

		Very steep□	Large □	□	Low □	Very steep□	Gley □		cover □		Low □		□	
				Macrophytes □			Podzol □		Scrub □					
							Lithosol □							
3	AZ □	Moderate□	Small □	None □	High □	Moderate□	Peat □	Yes □	Bare soil / litterfall /	Yes □	High □	Yes □	High □	
	RW □	Steep □	Medium □	Filamentous algae □	Moderate □	Steep □	Mineral □	No □	mosses □	No □	Moderate □	No □	Low □	
		Very steep□	Large □		Low □	Very steep□	Gley □		Grass/herb cover □		Low □			
				Macrophytes □			Podzol □		Scrub □					
							Lithosol □							

Note 1. Slope categories

Slope category	Slope
Moderate	Even to 1 in 7 (<15%)
Steep	1 in 7 to 1 in 3 (15-30%)
Very steep	1 in 3 or greater (>30%)

Note 2. Dimensions of channel

Channel Category	Approximate Dimensions
Small	$\leq$ 0.3m
Medium	> 0.3m but $\leq$ 1m
Large	> 1m

Note 3. Soil erodibility and nutrient loss risk categories for major soil groupings.

Soil Group	Erodability (Sediment Loss Risk	Nutrient Loss Risk
Well drained mineral	Moderate	Low
Gleys (mineral)	Low	Moderate
Peaty gleys	High	Moderate*
Podzol (mineral)	Moderate	Moderate
Podzol (peaty)	High	Moderate*
Lithosol	Moderate	High
Peat	High	High

Slope, cultivation (e.g. drainage) and rainfall have not been incorporated into the risk categories for the above soil groups.

Note 4. Characteristics of effective and non-effective buffer.

Effective Buffer	Non-effective buffer
No feeder channels crossing the buffer zone and flowing into the water course.	Feeder channels crossing the buffer zone
Unplanted buffer zone or buffer zone with scrub/broadleaf species (to be retained during operation) or vegetated with grasses/ground flora.	Planted with conifers or bare of vegetation
Slope moderate or steep	Very steep slope
Mineral soil or if peat must be unplanted vegetated buffer zone present.	

Note 5. Assessment of risk associated with aquatic zones and eroding relevant watercourses.

Description	Associated Risk	Mitigation
Aquatic zone with effective buffer between it and the operation	Low	Not Required
Aquatic zone with no effective buffer between it and the operation	High	Required
Type B or C relevant watercourse with effective buffer between it and the operation	Low	Not Required
Type B or C relevant watercourse with no effective buffer between it and the operation	High	Required

Table 7. Assessment of hotspots i.e. potential source areas for sediment/nutrient loss within the proposed forest operations site. Mark all 'hotspots' on site map and on the ground.

ID	Hotspot Type (use Note 6)	Hydrological pathway	Risk
HS1		Yes ☐	High ☐
		No ☐	Low ☐
HS2		Yes ☐	High ☐
		No ☐	Low ☐
HS3		Yes ☐	High ☐
		No ☐	Low ☐
HS4		Yes ☐	High ☐
		No ☐	Low ☐
HS5		Yes ☐	High ☐
		No ☐	Low ☐

Note 6. Classification of Hotspots

Type	Description
A	Soft wet ground (including wet, deep peat)
B	Flushes and springs
C	Wind-blown areas/stands
D	Areas where ground traffic access is difficult due to slope or ground bearing capacity
E	Area likely to be intensively trafficked
F	Floodplains – floodprone areas
G	Portions of site with complex matrix of drainage channels
H	Other (specify)

Forestry and Freshwater Pearl Mussel Requirements Form 4

Form 4. Restock option and mitigation measures.

Mitigation Measures	**Options**	**Option to be used** (tick where appropriate)	**Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods**
Site management (Refer to Table 8)	Not be replanted		
	Replanted commercially		
	Replanted non-commercially		
Buffer zone management options:	Native scrub/woodland establishment		
	No planting		
	Expand existing buffer zones		
Site preparation – handling of extraction racks post-felling	Leave extraction racks in place post-felling and plant in between.		
	If windrowing, use least impacting machinery e.g. brash grabs.		
	Standard windrowing of extraction racks.		
Cultivation and planting methods to be used.	Conventional mounding		
	Inverted/scrap mounding		
	Pit planting		
	Natural regeneration		
	Buffer zones wider than guidelines		
Machinery and equipment selection	Manual planting		
	If machinery required (e.g. stump removal) use least		

Mitigation Measures	Options	Option to be used (tick where appropriate)	Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods
	impacting machine.		
Fertiliser	No fertiliser during lifetime of crop		
	At planting		
	During life time of crop		
Chemicals (herbicides, insecticides, urea)	Minimise use and specify.		
	In cases where herbicide and insecticide are required, specify what will be applied, where and when including the buffer zone.		
	No urea applied to stumps in buffer zones.		

Table 8. Indicators of sites that should not be replanted.

Indicators that sites should not be replanted

- Site on regularly flooded flood plain
- Site has clear potential for restoration to be semi-natural habitat, e.g. blanket bog or wet woodland.
- Site has a complex drainage pattern
- Site requires a complex drainage pattern in order to sustain a commercial timber crop.
- High risk site based on soil type and slope – e.g. peat on steep slopes
- Sites where fertiliser is required but will not be permitted
- Tree species – limited selection
- Sites where it is not possible to install successful mitigation measures e.g. sediment control management

Forestry and Freshwater Pearl Mussel Requirements Form 3 Mitigation Clearfelling

(Revised Form A and B)

Form 3. Indicate Mitigation Measures to be taken from the options presented below

Mitigation Measures	**Options**	**Option to be used** (tick where appropriate)	**Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods** e.g. % of area to be harvested in this way, timber extracted using a selected option. **Specify aquatic zones, relevant watercourses and hotspots to which mitigation measures apply.**
OPERATIONAL			
Harvesting machinery and equipment selection – use least impacting option	Harvesting head and forwarder (as per recommended guidelines)		
	Other		
	Cable system, roadside processing		
	Chainsaw felling		
	Skidder		
	Horse extraction		
	Mini forwarder, quads, tractor trailer		

Mitigation Measures	Options	Option to be used (tick where appropriate)	Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods e.g. % of area to be harvested in this way, timber extracted using a selected option. **Specify aquatic zones, relevant watercourses and hotspots to which mitigation measures apply.**
Brash management	Use sufficient brash to adequately reduce ground disturbance.		
	Concentrate maximum available lop-&-top and brash under the harvesting machines before extraction to minimise ground disturbance		
	Maximise swath width via full face felling where necessary.		
	Minimise brash fall along watercourses (aquatic zones and relevant watercourses)		
	Remove brash from buffer zone.		
	Supply extra brash on areas where traffic will be heaviest, e.g. access points onto site, stacking area or localised soft spots.		
	Import brash to cover access routes to get to felling area or other exposed tracks.		

Mitigation Measures	Options	Option to be used (tick where appropriate)	Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods e.g. % of area to be harvested in this way, timber extracted using a selected option. **Specify aquatic zones, relevant watercourses and hotspots to which mitigation measures apply.**
Timber stacking, location & duration	Aim for shortest route from timber felled to stacking area taking note on availability of suitable stacking areas, road design and road density.		
	Avoid locating stacking areas near drains or on wet ground.		
	Place silt traps below stacking area where necessary (e.g. if close to a drain).		
	Prompt extraction of felled timber		
Fuel/materials storage area	Comply with FS Guidelines		
Timber extraction	Where ground conditions are soft, reduce load sizes being extracted.		
	On gentler slopes it may be desirable to		

Mitigation Measures	Options	Option to be used (tick where appropriate)	Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods e.g. % of area to be harvested in this way, timber extracted using a selected option. Specify aquatic zones, relevant watercourses and hotspots to which mitigation measures apply.
	plan harvesting racks along contour lines		
	.		
Roading – is a road in place?	Build new road or road extension a year in advance of harvesting operations.		
WATERCOURSES AND HOTSPOTS			
Felling in buffer zones	Directional felling by harvester to prevent trees falling into watercourse.		
	Directional felling manually to prevent trees falling into watercourse.		
	Fell trees manually and remove by machine.		
	Fell and remove whole trees from buffer zone for processing.		

Mitigation Measures	Options	Option to be used (tick where appropriate)	Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods e.g. % of area to be harvested in this way, timber extracted using a selected option. **Specify aquatic zones, relevant watercourses and hotspots to which mitigation measures apply.**
Protection of existing buffer zones/strips	Avoid all operations in existing buffer zones/strips		
	Use heavy brash mat and remove immediately after operation is complete		
Creation of sediment traps	Identify which relevant watercourses will have silt traps and show on map.		
	Install silt traps as deemed necessary on roadside drains and indicate on a map.		
Creation of other sediment control measures	Block feeder drains		
	Block or divert existing drains to create temporary surface ponding or to filter through vegetated overland flow areas.		
	Geotextile (teram) dams.		
	Corrugated plastic dams.		

Mitigation Measures	Options	Option to be used (tick where appropriate)	Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods e.g. % of area to be harvested in this way, timber extracted using a selected option. Specify aquatic zones, relevant watercourses and hotspots to which mitigation measures apply.
	Straw bales.		
	Other (specify)		
Minimise stream/drain crossings	Use routes with minimum stream/drain crossings, where possible		
	Mark locations of water crossings on map		
Water Crossings	Mark locations of water crossings on map.		
Construction of temporary water crossings	Logs		
	Pipes		
	Frames		

Mitigation Measures	**Options**	**Option to be used** (tick where appropriate)	**Mandatory Comments – describe briefly actions to be taken, especially where there's a combination of methods** e.g. % of area to be harvested in this way, timber extracted using a selected option. **Specify aquatic zones, relevant watercourses and hotspots to which mitigation measures apply.**
Temporary water crossings removal	Timing		
Permanent water crossings	Install bridge		
Creation of effective buffer strip			
OTHER			