

Coolnacreena,
Cappoquin,
Co. Waterford,
P51 C6F3

AN COIMISIÚN PLEANÁLA
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ACP- _____
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Time: 11:33 By: [Signature] PLANNING

17th November 2025

The Secretary
An Coimisiún Pleanála
64 Marlborough Street
Dublin 1
D01 V902

Dear Sirs/Madam,

An Coimisiún Pleanála Case Reference: VA93.323791

Strategic Infrastructure Development Application (SID Determination ref: ABP-317824-23)
By TOBIN Consulting Engineers on behalf of **FuturEnergy Scart Mountain Designated Activity Company**
Description: Proposed Development of a 110kV underground Grid Connection from the proposed Scart Mountain Wind Farm development (case ref: PA93.321522, currently awaiting decision) to Dungarvan substation in County Waterford.

The proposed 110kV grid connection and related works are located within the townlands of of Ballykerin Middle, Ballymacmague North, Carrigaun (Hely), Carrowgarriff Beg, Carrowgarriff More, Churchquarter, Colligan More, Colliganmountain, Colliganwood, Coolroe, Glen Lower, Glen Upper, Graigue Beg, Graigue More, Inchindrisla, Inchindrislawood, Killadangan, Lisroe, Newtown, Parkmore, Scart (Hely), Scart (Sergeant), Scartmountain, Staigbraud, and Vicarstown South, Co. Waterford.
(www.scartmountainplanning.ie)

I wish to make the following Observation against the above planning application for the construction of Scart Mountain Grid Connection:

This planning application is for construction of an underground 110kV Grid Connection (and all associated infrastructure) that will connect the proposed Scart Mountain Wind Farm (ACP Ref. 321522) development (approximately 4 km northeast of Cappoquin and approximately 13 km northwest of Dungarvan) to the existing 110kv Dungarvan substation in County Waterford. The cable route will be constructed primarily within public roads within the jurisdiction of Waterford City and County Council.

I would like to submit an objection based on the following points:

As per the Applicants Planning Statement – it states the following:

“The proposed development provides for a 110kV grid connection which will export electricity generated on the proposed Scart Mountain Wind Farm site via an underground cable to the existing Dungarvan 110kV substation. The proposed Scart Mountain Wind Farm is the subject of a separate SID application, submitted to ACP on 19th December 2024 (Ref. 321522). Together the proposed development and the Scart Mountain Wind Farm proposal form a **single project** for the purposes of EIA.”

One of the issues raised by the planning application for Scart Mountain wind farm, is the status of the “Wind Energy Development Guidelines for Planning Authorities” (DoEHLG, 2006), commonly referred to as the “2006 Guidelines”.

For example, section 4.3 on pages 15 and 16 of the applicant’s Non-Technical Summary of the EIAR sets out in some detail the position of these guidelines and their intended replacement:

“A review of the Wind Energy Development Guidelines 2006 began with the issuing of draft proposals in December 2013. Following consultation, a preferred draft approach was announced in 2017. Accordingly, the Minister for Housing, Planning and Local Government, Eoghan Murphy, T.D. and the Minister for Communications, Climate Action and Environment, Richard Bruton, T.D., launched a public consultation on proposed revisions to the Wind Energy Development Guidelines on Thursday 12th December 2019.

*The Draft Revised Wind Energy Development Guidelines were issued for public consultation and primarily focus on addressing a number of key aspects including noise, visual amenity setback, shadow flicker, community consultation obligations, community dividend and **grid connections**. These revised guidelines are still under review (and have been considered within the EIAR) and until such time as the new guidelines are published, the 2006 guidelines remain the statutory policy guide in relation to all wind energy developments”.*

The Wind Energy Development Guidelines were found in a Dáil’s question and answer session on Tuesday, 25 January 2022, when Mr Peter Burke, T.D., Minister of State at the Department of Housing, Local Government and Heritage replied to a question by Mr Denis Naughten, stating that:

*“My Department is currently undertaking a focused review of the 2006 Wind Energy Development Guidelines. The review is addressing a number of key aspects including noise, setback, shadow flicker, community obligation, community dividend and **grid connections**. Guidance on the noise aspect is currently being finalised by my Department in conjunction with the Department of Environment, Climate and Communications (DECC), which has primary responsibility for environmental noise matters. Significant work has been undertaken on the noise elements and the two Departments recently met to discuss new developments in this regard including consideration of the impact of the revised 2030 target to generate up to 80% of our electricity from renewable sources and the need to ensure that proposals*

regarding the measurement and assessment of noise from wind turbines are fit for purpose. These aspects are currently being considered and further engagement between the Departments is expected imminently. Following this inter-departmental engagement, I will be in a better position to provide an update on the expected publication date of the revised Guidelines, the finalisation of which remains a priority.

It should also be noted that the review and finalisation of the Guidelines has been included as a specific action in the recently published Climate Action Plan. When finalised, the revised Guidelines will be issued under section 28 of the Planning and Development Act 2000, as amended.

*Planning authorities and, where applicable, An Coimisiún Pleanála (Formerly, An Bord Pleanála), must have regard to guidelines issued under section 28 in the performance of their functions generally under the Planning Acts. **In the meantime, the current 2006 Wind Energy Development Guidelines remain in force**".*

It is our observation that the Minister's reply ignores two problems which have a bearing on this wind farm planning application, and which must be taken into account by the Board.

Firstly, the original Wind Energy Development Guidelines, issued in 2006, have an "official" status; they are intended to provide planning guidance to the relevant authorities, and we might add that the Government has defended them as an important policy since the time when they were issued. Therefore, there is no doubt that the 2006 Guidelines constitute a "policy" within the meaning given in the EU Directive 2001/24/EC on the assessment of the effects of certain plans and programmes on the environment, otherwise known as the Strategic Environmental Assessment Directive (SEA). It is also clear, and Board will be aware, that the 2006 Wind Energy Development Guidelines have not been subjected to Strategic Environmental Assessment, and their legality must therefore be in doubt. By allowing these guidelines to remain in force, Ireland is in breach of the EU Strategic Environmental Directive 2001/24/EC.

Secondly, while we understand that the "2019 Draft Guidelines" may have been subjected to Strategic Environmental Assessment, (SEA) the Minister's reply has made it very clear that these draft guidelines are not yet in force, and the "2006 Guidelines" must be considered and taken into account by An Coimisiún Pleanála, when assessing the planning application. It is therefore our observation and submission to the Board that:

- When determining the current planning application Grid Connection and for the **Scart Mountain wind farm (Which together are treated as a single project)**, the Board should not have regard to the 2006 Wind Energy Development Guidelines, even if they remain in force simply because of a failure to bring a revised set of guidelines into force;
- The 2006 Wind Energy Development Guidelines are hopelessly out of date, given the increasing size and height of wind turbines, and their environmental impacts, together with the increasing recognition that large scale onshore wind farms are not the optimum way to increase Ireland's share of renewable energy; and,

- Given that the draft Revised Wind Energy Guidelines 2019 have not been formally adopted, and they do not have legal force, the Board should not be bound by them, or use compliance with these guidelines as a basis for granting planning permission for this grid connection for Scartmountain windfarm.

Requirement that the Competent Authorities of a Member State must comply with EU Legislation and Judgements of the CJEU – Case C 24/19

The fact that the 2006 Wind Energy Development Guidelines are considered to be those in force (as stated by the Minister), but which have not been subjected to Strategic Environmental Assessment (SEA), may appear an obscure matter, but in fact there are serious consequences for An Coimisiún Pleanála, if the 2006 Wind Energy Development Guidelines are relied upon by the Board.

These consequences follow from the judgment in case C 24/19, in which the Court of Justice of the European Union, responded to a request for a preliminary ruling on the interpretation of Articles 2(a) and 3(2)(a) of Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment – the Strategic Environmental Assessment (SEA) (OJ 2001 L 197, p. 30) (*Judgment of the Court (Grand Chamber), delivered 25 June 2020, in Case C-24/19, A and Others against Gewestelijke stedenbouwkundige ambtenaar van het departement Ruimte Vlaanderen, afdeling Oost-Vlaanderen*)

The background to this important and relevant case was that, on 30 November 2016, following a procedure that began in 2011, the Flanders Department of Land Planning (Belgium) granted development consent for the installation and operation of five wind turbines. The consent was subject to compliance with certain conditions laid down by: (i) an order of the Flemish Government (the ‘Order’); and, (ii) a circular on the ‘Assessment framework and conditions for the installation of wind turbines’ (the ‘Circular’). It will be immediately obvious that this ‘Circular’ was in some respects similar to Ireland’s Wind Energy Development Guidelines. The applicants in the case, known only as “A and Others”, in their capacity as residents near the site proposed for the wind farm project, brought an action before the Council for Consent Disputes (equivalent to An Coimisiún Pleanála) seeking an annulment of the development consent. In support of their action, they submitted that the Order and the Circular, based on which the consent had been granted, infringed Article 2(a) and Article 3(2)(a) of Directive 2001/42, as neither the Order nor the Circular had been subject to Strategic Environmental Assessment, contrary to the provisions of the Directive. Against this background, the Council for Consent Disputes decided to stay the proceedings and to refer questions for a preliminary ruling to the CJEU. Essentially, the local residents in Belgium challenged a wind farm consisting of five turbines which had been permitted, based on conditions outlined in a regional government Order from 2006 and a Circular on the Assessment framework and conditions for the installation of wind turbines. They argued that the consent granted should be annulled on the basis that the Order and the Circular should have been preceded by a SEA, and were therefore in breach of Article 2(a) and Article 3(2)(a) of Directive 2001/42 on the assessment of the effects of certain plans and programs on the environment (the SEA Directive). At issue was the interpretation of the above Articles. Article 2(a) defines plans and program as: “plans and program ... - which are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government, and - which are required by legislative, regulatory or administrative provisions”

Article 3(2)(a) provides that an environmental assessment shall be carried out for all plans and programmes:

“(a) which are prepared for agriculture, forestry, fisheries, **energy**, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use and which set the framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC”

The Court of Justice of the European Union (CJEU) had to consider whether the Order and the Circular amounted to a plan or programme, and also the implications for a development such as the proposed wind farm, in the event that the Court found that there was a violation of EU law by a Member State.

What are considered to be Plans and Programmes within the Meaning of the Directive

According to established case law (cases C-567/10, C-160/17, and C-321/18), the CJEU considered that, under Article 2(a) of the Directive, the adoption of plans or programmes (in this case the Order and the Circular) does not need to be compulsory. It is sufficient that such plans and programmes are provided for by national legislative or regulatory provisions, which determine which are the competent authorities, and what is the procedure for their adoption.

Therefore, a measure must be regarded as ‘required’ under Article 2(a) of the SEA Directive where the legal basis of the power to adopt the measure is found in a particular national legislative provision, even if the adoption of that measure is not mandatory. Therefore, in the case discussed, the definitions of plans and programmes covers the Order and, subject to verification by the referring court, also covers the Circular.

The CJEU therefore found that the Order and the Circular constituted plans or programmes under the SEA Directive, and it found that a SEA **SHOULD** have been carried out prior to their adoption by the Belgian government in 2006.

The Circumstance in which a Strategic Environmental Assessment (SEA) MUST be carried out:

Firstly, the Order and the Circular concern the energy sector, which is specifically referred to in Article 3(2)(a) of the Directive as one of the sectors for which an environmental assessment is required.

Secondly, as regards the question of whether the Order and the Circular define the framework for future development consent for projects, as set out by Article 3(2)(a) of the Directive, the CJEU stated the following: According to established case law (cases C-671/16 and C-43/18), the environmental assessment is needed if the measure “establishes a significant body of criteria and detailed rules for the grant and implementation of one or more projects that are likely to have significant effects on the environment”.

The Consequences of the CJEU Judgement for the Competent Authorities in a Member State:

The Court of Justice outlined the consequences for a Member State and national competent authorities (such as An Coimisiún Pleanála) of a breach of EU law in the following terms:

- Member States are “required to eliminate the unlawful consequences” of breaches of EU law. Competent national authorities are “under an obligation to take all the necessary measures, within the sphere of their competence, to remedy the failure to carry out an environmental assessment” which can involve “adopting measures to suspend or annul that plan or program”.
- Only the Court of Justice may, in exceptional cases, temporarily suspend the Application of EU law.

In the Belgian case, construction of the wind farm had not yet commenced. The Court of Justice stated that it was clear that the consent must therefore be annulled, as it was granted on the basis of the plan or program which “was itself adopted in breach of the obligation to carry out an environmental assessment”. The Court of Justice also held that where installation of a windfarm project “has commenced, or is even completed”, the consent granted can be annulled (paragraph 89 of the CJEU Judgment).

The Conditions Under Which an Official National Guideline which Breaches EU Law can be provisionally maintained in Force:

The Court also addressed itself to considering those circumstances in which consent granted for projects would not have to be annulled, and these were stated to be limited to the following two situations:

1. Where there is a risk that the annulment “could create a legal vacuum that is incompatible with that Member State’s obligation to adopt measures to transpose another act of EU law concerning the protection of the environment”; (paragraph 90 of the CJEU Judgment); or,
2. If the consequences of such annulment were “a genuine and serious threat of disruption to the electricity supply of the Member State concerned which could not be remedied by any other means or alternatives, particularly in the context of the internal market” (paragraph 92 of the CJEU Judgment).

When considering those particular circumstances where a grant of permission or consent would not have to be annulled, the CJEU cited case C-411/17. In Case C-411/17, the Court stated that it was permissible to continue the operation of a large-scale energy plant (two nuclear reactors), where this was necessary for the security of energy supply of the Member State as a whole.

However, in its consideration of case C 24/19, the Court held that the cessation of activity of a limited number of wind turbines was not likely to have significant implications for the supply of electricity for the whole of Belgium.

It is my submission that the same criteria apply to the proposed grid connection and wind farm at Scart Mountain; if An Coimisiún Pleanála refused planning permission for the proposed wind farm and grid connection, this decision would not be likely to have significant implications for the supply of electricity for the whole of Ireland. It is therefore my concluding observation that the Board cannot grant permission for the proposed Scart Mountain windfarm and grid connection, given the applicant’s reliance on the 2006 Wind Energy Development Guidelines, and given the judgement of the CJEU case C 24/19 cited above, and the implications of that judgement.

SEA Directive

The following section is to reiterate the fact that the 2006 Wind Energy Development Guidelines are considered to be those in force (as stated by the Minister), but which have **not been subjected to Strategic Environmental Assessment (SEA)**. This may appear an obscure matter, but in fact there are serious consequences for , if the 2006 Wind Energy Development Guidelines are relied upon by the Board.

As the Board is aware, a plan or programme which sets the framework for future development consents must be subject to Strategic Environmental Assessment. An SEA is a Strategic Environment Assessment set out in EU Environmental Assessment set out in EU Directive 2001/42/EU.

The concept of “sets the framework” relates to any measure which establishes, by defining rules and procedures for scrutiny applicable to the sector concerned, a significant body of criteria and detailed rules for the grant and implementation of one or more projects that are likely to have significant effects on the environment.

Guidelines **MUST** be subject to SEA, if they are capable of producing compulsory legal effects for third parties, in contrast to measures which contain provisions of a purely indicative value. Guidelines adopted under section 28 of the 2000 Act are binding on planning authorities when making a development plan by virtue of Section 28(1A) and 28(1B).

“The SEA Directive’s objectives are to provide a high level of protection to the environment and contribute to integrating environmental considerations into the preparation, adoption and implementation of plans and programmes to promote sustainable development. To achieve this, an environmental assessment must be carried out according to the Directive’s provisions for plans and programmes identified as likely to have significant effects on the environment”

An SEA must be carried out on all plan and programs listed in the Directive. Energy project being one of the them.

To determine whether a plan and programme falls under the scope of the SEA Directive, the following 4 criteria should all be met:

1. Be subject to preparation and/or adoption by an authority at national, regional or local level.
2. Required by legislative, regulatory or administrative provisions.
3. Prepared by any of the sectors listed in Article 3(2)(a) of the Directive.
4. Sets the framework for future development consent of projects listed in Annex I and II to the EIA It is contrary to the SEA directive to apply a plan or programme which sets the framework for development consents under the EIA Directive which was adopted in breach of the SEA Directive. The 2006 Wind Energy Guidelines were not subject to SEA and are therefore inapplicable. The 2019 Draft Revised Wind Energy Guidelines are irrelevant as a matter of Irish law and in any event the conclusion of the SEA

remains pending. Therefore, these guidelines are also inapplicable. Therefore is SEA IS a legal requirement and must be carried out.

Senator John Cummin, in his ministerial capacity for Local Government and Planning, is currently overseeing the development of new Wind Energy Guidelines. These guidelines are undergoing a comprehensive revision process, which is both lengthy and complex, and will ultimately be made available for public consultation.

Given the importance of ensuring that these guidelines are robust, balanced, and reflective of community and environmental considerations, it is recognized that the revision process will not be completed in the near future. Therefore all onshore windfarm planning and any related planning applications should be paused until the new version of the guidelines is finalized and released. This pause would ensure consistency, fairness, and clarity in the planning system, while also safeguarding communities from uncertainty during the transition period.

The Board should also refer to inspector report (Page 37) – Proposed windfarm in Gougane Barra – Refused (ABP-315656-23)

*“I submit that perhaps it is time to give consideration over to **stalling determinations on applications for wind farm development where no new guidance is in place**. I submit that this would likely be the incentive to ensure an early delivery of new finalised Guidelines. Perhaps approvals for wind farm development could, thus, be determined to be premature pending the delivery of new finalised Guidelines. While there is much emphasis in public policy on promoting renewable energy and the benefits which would accrue from it, there appears to be little urgency in producing critically important up-to-date guidance which would allow for informed decision-making on the delivery of it in the right locations in a sustainable manner. I submit that this lack of up-to-date guidance is likely to continue to result in more court challenges as the Board and planning authorities are left isolated in seeking to deal with matters where the principal Guidelines are almost 20 years old, indeed archaic, when due regard is had to how wind energy development has significantly evolved in form and scale since then”*

Based on inspectors report above, they have clearly highlighted above their position in relation to approving windfarms with lack of clear guidance based on evolving technology and scale of windfarms. This application is in relation to grid connection but as applicant clearly called out in EIAR, windfarm and grid connection is a single project.

CONCLUSION

- **SEA is a legal requirement** for any plan or programme that sets the framework for development consents in the energy sector.
- **Both the 2006 and 2019 guidelines are inapplicable** under Irish and EU law until SEA compliance is achieved.

The Irish Guidelines are therefore unlawful and cannot be used to justify or guide the decision making process in this case. We recommend the application is **REFUSED** based on the reasons outlined above.

This application is premature, the SEA for the plan or programme and new guidelines must be completed first. It is incumbent on you to abide by the law.

Proposed Windfarm is in a WIND EXCLUSION ZONE as per the Waterford City and County Development Plan 2022-2028.

As per the Applicant Planning Statement – Section 3.4 Waterford City and County Development Plan

“The statutory Development Plan pertaining to the subject site is the Waterford City and County Development Plan 2022 – 2028. It came into effect on July 19th 2022 and replaced the 2013 2019 extended County Development Plan (CDP). The CDP sets out the Council’s strategic land use objectives and policies up to 2028.

The vision for County Waterford in the lifetime of the CDP is:

‘By 2028, Waterford City and County will have continued to grow and will be evolving to become an even more attractive, prosperous, resilient, and sustainable place, anchored by Waterford City and Metropolitan area as the Regional Capital, a University and Learning City, and an economic driver for the region. It will be the best City and County in which to live, learn, visit and do business.’

The CDP also sets out key strategic aims over the lifetime of the plan of which the below are of relevance to the proposed development:

- *Take on the urgent challenges of climate change.*

Section 11.0 Zoning and Land Use of the CDP sets forward the landscape designations of the county, and suitable land uses. Provision of utilities (which includes grid connections) is necessary across all land uses and zonings. This is recognised in the Development Plan whereby “utility” is open for consideration for all use types.

***Policy UTL 13** has a stated objective of supporting renewable energy projects in order to, inter alia, reduce dependence on fossil fuels (with corresponding environmental, social, and economic benefits for the City and County). This policy explicitly recognises the need for supporting “onshore cable routing to substations” and confirms support for onshore grid connections.*

Policy UTL 19

- Underground Cables, requires that proposals demonstrate that environmental impacts are minimised. In this regard ACP are referred to the accompanying EIAR and NIS which demonstrate that no unacceptable adverse environmental impacts will arise from the proposed development”

Scartmountain Windfarm development is located along the Knockmealdown mountain range in Co. Waterford on the northern border with County Tipperary (Ref ACP 321522). The proposed development is for the Grid Connection which connects windfarm to substation located in Dungarvan. The development is summarized as follows:

- *All works associated with the connection of the proposed wind farm to the national electricity grid, which will be via a permanent tail fed 110 kV underground cable connection (approximately*

15.5 km cable length of which approximately 13.3 km will be in the public road corridor) to the existing 110 kV Dungarvan Substation in the townland of Killadangan, Co. Waterford.

- 4 no. watercourse crossings on the grid connection route (of which 3 no. are classed as river crossings and 1 no. is a smaller stream crossing);
- • 22 no. joint bays and communication chambers along the route;
- • All associated underground electrical and communications cabling connecting the wind turbines to the proposed wind farm substation;
- • All related site works and ancillary development including berms, landscaping, and soil excavation, and;
- • All other associated site development plant and equipment and other works including surface water and foul wastewater drainage.

A Strategic Objective of Waterford City & County Development Plan (Chapter 10: Landscape, Coast/Marine and Blue Green Infrastructure) is as follows:

“Protect our sensitive landscapes and seascapes which contribute to the distinctiveness of Waterford as a place”.

Source: <https://consult.waterfordcouncil.ie/en/consultation/waterford-city-county-development-plan-2022--2028/chapter/chapter-10-landscape-coast-marine-and-blue-green-infrastructure>

The proposed Scartmountain windfarm (ABP Ref 321522) is located in an Upland area in the Knockmealdown mountain in an area described in the Waterford City & County CDP as **MOST SENSITIVE** (Appendix 8 – Landscape and Seascape Character Assessment (**Waterford City and County Development Plan 2022-2028**)).

Source: <https://consult.waterfordcouncil.ie/en/consultation/waterford-city-county-development-plan-2022-%E2%80%93-2028/chapter/appendix-8-landscape-and-seascape-character-assessment>

Waterford City and County Development Plan has three classifications when it comes to areas of suitability for wind farm development in its Wind Energy Policy. These are: ‘Preferred Areas’, ‘Areas Open to Consideration’ and ‘No Go Areas’³. As per the Waterford City and County Development Plan, the entire site for the Proposed Development is located within a ‘No-Go’ exclusion zone for wind energy.

As stated in the Applicant EIA “Chapter 13 – Landscape and Visual – Figure 13.6 Excerpt from Appendix 2 of the Current Renewal Energy Strategy which shows the wind energy classification of the areas in relation to the proposed development. (Page 13-21)

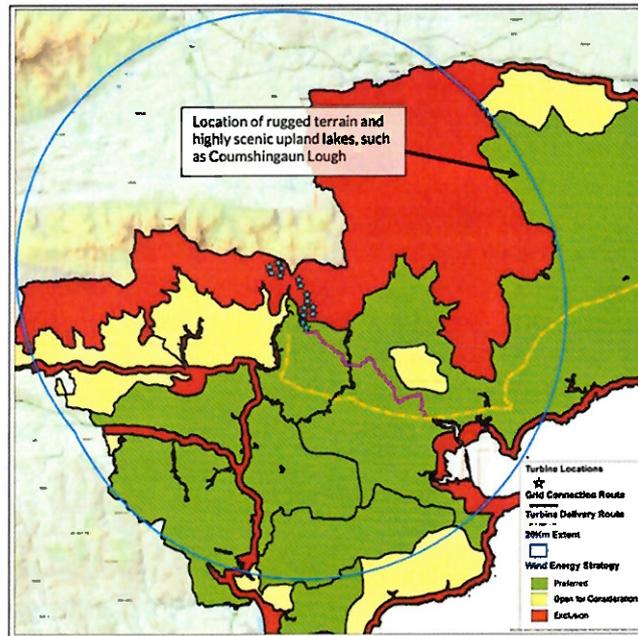


Figure 13.6 Excerpt from Appendix 2 of the current Renewable Energy Strategy showing updated wind energy classification areas in relation to the proposed project.

It is clearly visible from the Wind Energy Designation Map that the majority of the wind turbines for Scartmountain are proposed in a wind exclusion or **NO-GO** area. The applicant was aware at time of deciding location for the windfarm, that the location for the Scartmountain windfarm was a **NO-GO** (Wind Exclusion Zone) and not suitable area for a windfarm. Even though this current application is in relation to the grid connection for this windfarm, I would ask the Board to take into account that applicant completely took no regard for the County Development Plan (CDP) into consideration when initially selecting area for the windfarm.

The Waterford City and County Development Plan (CDP) have an Exclusion Zone for VERY specific and legal reasons, most likely 100% founded on European Law and the resultant Irish Statutory Instruments. The Exclusion Zones in the CDP were mapped using GIS layers for landscape, visual, birds and habitats protection, conservation sites, the Water Framework Directive etc. CDPs are not arbitrary – they use GIS and the legal framework to filter out areas that are just unfeasible.

Waterford County Council submitted a **very strong objection to the proposed Scart Mountain Wind Farm** ([321522 | An Bord Pleanála](#)) and included some of the following concerns;

*"The wind energy designation map contained within the updated Renewable Energy Strategy forming Appendix 7 of the Waterford City and County Development Plan 2022 – 2028 designates the lands which 14 no. turbines are proposed as being a **No-Go Area / Exclusion Area** where wind development is not supported in principle. (T15 is located in a Preferred Area)".....It should be noted that the current Development Plan was prepared with due regard to current national and regional climate action and planning policy and was subject to evaluation by the Office of the Planning Regulator for compliance. **To permit this development would be a material contravention of the policy objectives of the Waterford City and County Development Plan 2022-2028 and would not be "plan led"**.*

"The subject site primarily is located in an area which is designated as "Most Sensitive". As such, it has been determined by the Planning Authority that this area is characterised by very distinctive features with a very low capacity to absorb new development without significant alterations of existing character over an extended area. Two of the proposed turbines (T15 & T12) are bordering the "Most Sensitive" designation but located within the "Low Sensitive Designation".

*"Construction Impacts: The Planning Authority has **very serious concerns** regarding the carrying capacity and **safety** of the local road network serving the proposed development and the adequacy of the local road network to accommodate heavy construction traffic associated with the proposed development. **Further concerns exist regarding the undergrounding of the grid connection with both direct impacts on the construction of the road network and long terms maintenance and upgrades to the road network.** It is considered that the turbine haul route and the grid connection to the Dungarvan 110kv substation would impact the strategic national road network".*

Pre-Planning Meeting (FutureEnergy – Waterford City and County Council)

On Friday 7th July 2023 a pre-planning meeting was held with Waterford City and County Council district planner and Tobin Consulting Engineering company. Tobin Consulting Engineers prepared the EIAR on behalf of FutureEnergy Scartmountain wind farm.

In the Pre-Planning meeting minutes, the District Planner for Waterford City and County Council noted that 16no of 17no of turbines proposed fall with an area designed as a **NO-Go Area** under the wind designation maps adopted as part of the Waterford City and County Development Plan 2022-2028. The District Planner stated as previously advised Waterford City and County Council are therefore **not supportive** of the application and would be recommending refusal if it were received at local level or indeed recommending refusal should it proceed to Strategic Infrastructure Development Application with An Bord Pleanala. The District Planner also asked Tobin Engineering to note Natura 200 sites in your area, functional connections to the same and location of the site within Blue Dot River Basin. The land area is also designated Most Sensitive in the Landscape Character Assessment.

The District Planner referred to "UTL 14 Energy Development & Human Health" – Proposal for energy development should demonstrate that human health has been considered, including those relating to the topic of Noise, Shadow Flicker, Ground Conditions, Geology, Air Quality, Water Quality.

The District Planner made it very clear in the meeting that they do not support the proposed Wind Farm Development.

SEE APPENDIX ATTACHED

Department of Transport Scoping Response.

I would also like to refer the Board to the Department of Transport scoping response for the proposed Scartmountain WindFarm (ACP Ref 321522) – Appendix 1-4 EIAR Scoping Consultee Responses:

<https://www.pleanala.ie/publicaccess/EIAR-NIS/321522/Vol%203%20-%20Appendices/Appendix%201-4%20EIAR%20Scoping%20Consultee%20Responses.pdf?r=042907455268489199>

“The department consider it important that the examination of the proposal should include consideration of the following:

- **Examination of options other than the routing of cable along the public roads**
- Examination of options for connections to the national grid network at a point closer to the wind farm in order to reduce the adverse impact on public roads.
- Details of where within the road cross section cables are to be placed so as to minimise the effect on the Roads Authority in its role of construction and maintenance.
- Examination of details of any chambers proposed within the public road cross section so as to minimise the effect on the Roads Authority in its roles of construction and maintenance.
- Rationalisation of the number of cables involved (including existing electric or possible future cables) and their diversion into one trench, in order to minimise the impacts on the roads network and the environment along the road boundary.

The applicant states in its Planning Statement for the Grid Connection – Section 2.2. Site location:

“The cable route will be **constructed primarily within public roads** within the jurisdiction of Waterford City and County Council with a 2.2km section within privately owned lands (letters of consent included in the application submission)”.

As per the Applicants - Appendix 2-5 Grid Connection Construction Methodology – section 2.2. Grid Route Summary:

Table 2.1 below gives a summary of the grid connection route’s location regarding public road network road types and private land ownership.

Description	Route Length
National Roads	0.2 km
Regional Roads	2.2 km
Local Primary Roads	1.2 km
Local Secondary Roads	9.7 km
Total Road Network	13.3 km
Coillte Lands	1.7 km
Private Lands	0.5 km
Total Off Road Network	2.2 km
Total Route Length	15.5 km

Table 2.1: Grid Connection Route Summary

The majority of the proposed grid connection (13.3 km) is along national/regional, primary and secondary public roads despite the Department of Transport requesting the applicant to **examine options other than the routing of cable along the public roads**. The applicant disregarded the department of transports feedback and still went ahead with it GCR along public roads.

Conclusion

Scartmountain windfarm and grid connection should be **REFUSED** on the same grounds as the proposed Dyrick windfarm based on that the subject site is located within and adjacent to an upland area designated 'Most Sensitive' which is not suited to wind farm development. Also proposed site would be located in a Wind Exclusion Zone (NO GO area). The Board must be satisfied beyond reasonable doubt that the proposed development would not have significantly adverse effects on the landscape and environment and to the proper planning and sustainable development of the area. Precedent has already been set with the rejection of the wind farm in the Knockmealdown mountains in 2001 and the refusal of Dyrick Windfarm in October 2024 (ABP 317265)

Source: <https://www.irishtimes.com/news/wind-farm-plans-approved-by-waterford-council-rejected-by-planning-board-1.318671>

Horizontal Directional Drilling (HDD)

As per the Applicant – Appendix 2.5 Grid Connection Construction Methodology – Section 8.10 - Horizontal Directional Drilling (HDD) is described as follows:

“Horizontal Direction Drilling (HDD) is a method of drilling under obstacles such as bridges, railways or watercourses in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible. There are several bridges and culverts on both UGC route options which will require HDD due to there being insufficient cover and depth in the bridge to cross within the bridge deck”.

As per the Applicant’s Chapter 2 Description of project – Section 2.8.5.2 Stream Crossing

“The proposed grid connection contains four stream/river crossings”

Table 3-3: Watercourse crossing details

Watercourse Crossing No.	Crossing details	Proposed crossing methodology	In Stream works required?
1	Stream	Directional Drilling	No
2	River	Directional Drilling	No
3	River	Directional Drilling	No
4	River	Directional Drilling	No

“A specialised directional drill machine will be anchored to the ground and will drill at a suitable shallow angle to allow it to achieve the required depth for the bore. If ground conditions are unfavourable, the drilling process will need to be repeated using progressively larger drill heads until the required size is achieved. The drilling process involves pumping a drilling fluid through the drill head which is inert, natural and biodegradable (e.g. Clear Bore)”

As per the Applicant – Planning Statement – Section 2.6 Environmental Assessment : - “With respect to the proposed development (i.e. grid connection), horizontal directional drilling will be necessary when installing the cable across watercourses..... The grid connection works are also hydrologically linked to the Dungarvan Harbour SPA.

Horizontal Directional Drilling (HDD) can cause significant environmental and technical issues, including inadvertent returns (frac-outs), groundwater contamination, borehole instability, and high costs if not properly managed.

Potential Environmental Issues with HDD:

- **Inadvertent Returns (Frac-Outs):** Drilling fluid (usually bentonite-based) can escape through fractures in the subsurface and surface in unintended areas, including wetlands, rivers, or protected habitats. This can smother vegetation and aquatic life.
- **Groundwater Contamination:** If drilling intersects aquifers or poorly sealed boreholes, it can introduce contaminants or allow cross-contamination between water-bearing layers.
- **Habitat Disruption:** Even though HDD is considered less invasive than open-cut trenching, it can still disturb sensitive ecosystems, i.e. Dungarvan Harbour (SPA), if not carefully planned

Technical and Operational Challenges

- **Borehole Instability:** Unstable soils or incorrect drilling parameters can lead to bore collapse, requiring re-drilling.
- **Steering and Alignment Issues:** Maintaining the correct bore path is difficult in heterogeneous geology, increasing the risk of deviation or failed installations.
- **Tool Wear and Damage:** HDD equipment is subject to high wear, especially in rocky or abrasive soils.

Horizontal directional drilling (HDD) across watercourses near a Special Protection Area (SPA – Dungarvan Harbour) poses environmental risks, particularly if drilling fluid escapes or if subsurface conditions are poorly understood. This can lead to groundwater contamination (drinking water sources and aquatic life).

Even though HDD avoids surface trenching, the entry and exit pits, fluid containment areas, and access routes can disturb SPA habitats. Noise and vibration from drilling may also affect bird behaviour, especially during breeding or wintering seasons.

As per the applicant Natura Impact Statement – Section 4.1.2.1 Habitats Degradation due to Water Quality Impacts

“Horizontal directional drilling (HDD) will be required when installing the grid connection cable across the watercourses. Where HDD is required under watercourses, there is a risk of structural fracturing or collapse of rivers/streams. Furthermore, during trenchless construction there is the potential for the frac out drilling lubricant (e.g. bentonite). This is, in effect, very fine suspended solids which can lead to water quality impacts and habitat degradation downstream. Horizontal directional drilling will be employed at six watercourse crossings along the proposed GCR. All of the proposed HDD sites are either within or hydrologically connected to a European site, a summary of these crossings is outlined in Table 4-1 below.

Table 4-1: Locations of Proposed HDD

WFD River Waterbody	WFD Code	EPA Name	EPA Code	Links to European Designated Sites
Finisk_020	IE_SW_18F020300	Finisk River	18F02	0 m - within the Blackwater River (Cork/Waterford) SAC
Finisk_020	IE_SW_18F020300	Scart 18 Stream	18S06	950 m upstream of Blackwater River (Cork/Waterford) SAC
Finisk_030	IE_SW_18F020500	Boherawillin Stream	18B35	7.5 km upstream of Blackwater River (Cork/Waterford) SAC
Finisk_030	IE_SW_18F020500	Moneygorm East Stream	18M05	7.5 km upstream of Blackwater River (Cork/Waterford) SAC
Finisk_030	IE_SW_18F020500	Ballykerin Middle Stream	18B32	2.6 km upstream of Blackwater River (Cork/Waterford) SAC
Colligan_040	IE_SE_17C010300	River Colligan	17C01	4 km upstream of Dungarvan Harbour SPA

The four (not six as stated above) watercourses along the GCR are: Finisk River, Scart 18 stream, Ballykerin Middle Stream and Colligan River.

In the Applicants – Natura Impact Assessment – Section 6.2.1.2.3 Horizontal Drilling Measures, the following is a mitigation measure which will be implemented during HDD works:

“The Contractor will prescribe **silt fencing** around the reception pits if **deemed necessary**”.

SILT FENCING

A silt fence is a temporary sediment control device used on a construction site to protect water quality in nearby streams, rivers, lakes and seas from sediment (loose soil) runoff. However their effectiveness in controlling sediment can be limited, due to problems with poor installation, proper placement and/or inadequate maintenance.

The Applicant’s Planning Statement, Section 2.4 **Cable Works**

“The 110kV underground cable required to facilitate the grid connection will be laid beneath the ground surface and/or public road using the following methodology: The area where excavations are planned will be the subject of a confirmatory survey prior to the commencement of works, with a cable locating tool and all existing underground services will be identified.....

.....Silt fences will be installed alongside the road/works areas as required near streams”

Also in the Applicant's Appendix 2.5 – Grid Connection – Chapter 8.12 Replacement of Existing Culverts

“ 7. The road edge adjacent to the watercourse will be lined with sandbags and silt fences (multiple fences recommended) as appropriate to prevent runoff from the trenching works reaching the stream. The design of these multiple features shall also allow for the safe removal of accumulated silt away from the channel, particularly through staged removal of the most contaminated upper fence before the lower ones, and the removal of the final fence only when it is clear of any silt”.

There a number of risks associated with Silt Fencing as a Sediment Control Measure

1. **Improper Installation:** If not trenched and secured correctly, water can flow underneath or around the fence, reducing effectiveness. Posts maybe spaced too far apart or not driven deep enough, causing the fence to collapse under pressure.
2. **Failure Under Heavy Flow:** Designed for low-velocity sheet flow, silt fences can fail under concentrated or high-velocity runoff.
3. **Maintenance Requirements:** Regular sediment removal is necessary; otherwise fences can collapse or overflow
4. **Limited Lifespan** – Fabric deterioration, UV exposure, or physical damage (i.e. from wind, animal or construction activity) can reduce effectiveness.
5. **Potential for Secondary Erosion:** Improper placement may cause water to form a pond behind the fence, leading to soil saturation an increased erosion risk.
6. **Environmental Impact** – If not removed after use, degraded fencing materials can contribute to plastic pollution.
7. **Regulatory Non-Compliance** – Poor installation or maintenance may result in violation of environmental regulations (i.e. Clean Water Act, Local Stormwater ordinances).

In addition to the above risks, there are several problems associated with cleaning out silt fences. Once the fabric is clogged with sediment it can no longer drain slowly and function as originally designed. The result is normally a low volume sediment basin because the cleaning process doesn't unclog the fabric. The soil is normally very wet behind a silt fence, inhibiting the use of equipment needed to move it.

As per the Applicant- Appendix 2-5 Grid Connection Construction Methodology

The below diagram displays the location of grid connection in relation to the proposed location of the Scartmountain Windfarm.

2.1 Grid Route Overall Location

The overall location of the grid connection route, the Scart Mountain Wind Farm boundary and Dungarvan 110 kV Substation are shown in Figure 2.1 below.

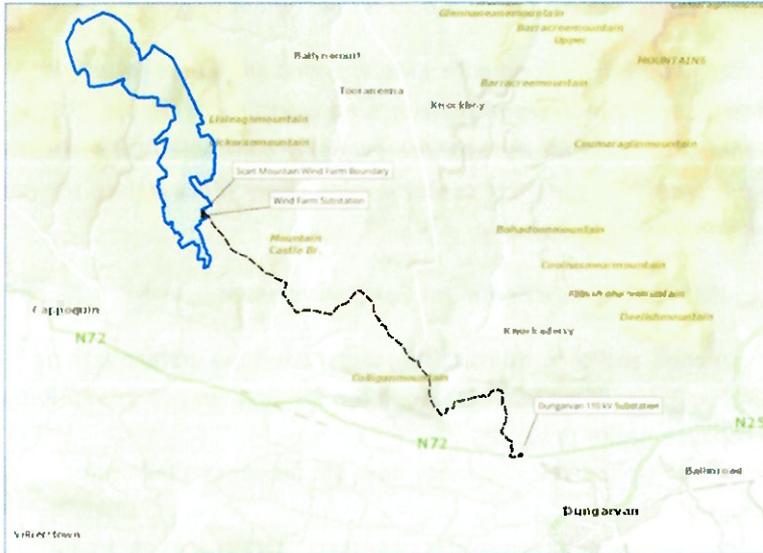


Figure 2.1: Map indicating overall location of Scart Mountain Wind Farm and Grid Connection Route

A pump house (Groundwater Borehole) is located in Newtown. This pump house is located in Section 1 of Proposed Grid Connection route. See below for details

2.3 Section-by-Section Summary

As an aid to understanding, the grid route has been broken into nine shorter sections as shown Table 2.2 below. Each of these route sections is described in further detail in the Sections 2.3.1 to 2.3.8 below.

Ref	Section Description	Route Length
Section 1	Wind Farm Substation joining to L-5056 from Newtown to Scart (Hely) junction with R-671	3.2 km
Section 2	Short section of R-671 from junctions of L-5056 and L-1032	0.3 km
Section 3	L-1032 and L-5056 through Modeligo to junction with L-5067 in Lisroe	2.8 km
Section 4	L-5056 from Lisroe to junction with R-672 at Colliganmountain	2.8 km
Section 5	R-672 from Colliganmountain to junction with L-5103	1.9 km
Section 6	From L-5103 junction entering Coillte lands to undercross Colligan River into private lands	0.6 km
Section 7	Coillte lands in Inchindrislawood to entrance on L-3003	1.2 km
Section 8	From Coillte entrance on L-3003, continuing on L-7001 to Killadangan and joining short section of N72 to entrance of Dungarvan 110 kV Substation	2.7 km
Total		15.5 km

Table 2.2: Grid Connection Route Section Summary

A pump house (Groundwater Borehole) supplies water to residents in vicinity is located within 200m to substation. There are 188 residents and 13 commercial customer within the Modeligo locality, who receive water supplies from this pump house. Construction of the proposed Scartmountain wind farm and grid connection, especially in a sensitive area, can pose a high risk of water contamination and we as a community are gravely concerned that the mitigation measures in place for silt fencing are not

sufficient to protect our water supplies. In the locality, a lot of residents in the vicinity have their own private well and groundwater boreholes, both of which are vulnerable to surface-level disturbance and pollutants

While silt fencing is a standard erosion control measure, it may not be sufficient in areas with high water table levels or permeable soils. The community's concern that these measures are inadequate is supported by environmental best practices, which recommend more robust protections in sensitive zones.

In section 6 of Grid connection route (From L-5013 junction entering Coillte lands to under cross Colligan River into Private land (0.6km) - The proposed grid connection route crosses the Colligan River which is hydrologically connected to the Dungarvan Harbour SPA(Special Protection Area) [site code 004032] approximately 4.7km downstream. Dungarvan Harbour (SPA) is part of the Natura 2000 network designated under the EU Birds Directive for the protection of important bird populations – especially overwintering and migratory waterbirds, such as wigeon, teal, dunlin, black-tailed godwit, curlew and others that rely on intertidal mudflats, sandflats and saltmarsh habitats.

The grid connection (e.g. underground cable) is hydrologically connected to the SPA – meaning drainage or surface water from the construction area can reach the harbour – resulting in potential indirect impacts on the SPAs habitats and bird species.

The board needs to be satisfied that no pollution reaches rivers designated as high class rivers in which the grid connection works are hydrologically linked and flow into Dungarvan Harbour (SPA),

Faulty silt fencing near Dungarvan Harbour (SPA)could lead to sediment runoff, which threatens the site's protected bird species and sensitive wetland habitats. This can degrade water quality, disrupt feeding grounds, and reduce biodiversity.

Impact of Faulty Silt Fencing from construction sites entering nearby water bodies. If it fail, the following impacts may occur:

- **Sediment Pollution:** Excess sediment can cloud the water, reducing light penetration and affecting aquatic plant growth, which in turn impacts invertebrates and bird feeding.
- **Habitat Degradation:** Mudflats and saltmarshes may become smothered, altering the physical structure and reducing their suitability for foraging birds.
- **Disturbance to species:** Increased turbidity and habitat alteration can reduce prey availability for waders and waterfowl, potentially displacing them from key feeding areas.
- **Nutrient loading:** Sediment may carry nutrients or contaminants that lead to eutrophication, affecting the ecological balance of the SPA

Silt Fencing Ineffective Studies

However there is no certainty that these measures can, and will, work. Please see the attached review from the *Journal of Environmental Management: On the apparent failure of silt fences to protect freshwater ecosystems from sedimentation. A call for improvements in science, technology, training and compliance monitoring* S.J. Cooke , J.M. Chapman , J.C. Vermaire, which states:

“Excessive sedimentation derived from anthropogenic activities is a main factor in habitat and biodiversity loss in freshwater ecosystems. To prevent offsite movement of soil particles, many environmental regulatory agencies mandate the use of perimeter silt fences. However, research regarding the efficiency of these devices in applied settings is lacking, and fences are often ineffective due to poor installation and maintenance”.

(Appendix: Silt fencing paper Canada.pdf).

We also refer the Board to the EPA document on Silt Fencing, in which it states.

“Most construction sites today do have silt fences. But many do not work effectively because they are not well designed, installed, or maintained”.

(Appendix: Silt Fences EPA.pdf)

The applicant needs to be more specific by clarifying who determines necessity and under what conditions? The implication of pollution runoff into rivers can be detrimental leading to water contamination of high-status blue dot rivers, harm to aquatic life and disruption of ecosystems. Suspended sediments can reduce oxygen levels and smother aquatic habitats. Compliance with local, state and federal water quality regulations, such as the Clean Water Act, is essential to mitigate these impacts. Zero tolerance for pollution is required due to the sensitivity of nearby rivers. A strict multi-layer environmental protection strategy must be implemented. Contractors needs to be proactive and take caution and ensure silt fencing is erected and it should be a standard part of control measures in place, to protect water quality and surrounding ecosystems.

Excessive sedimentation is a main factor in habitat and biodiversity loss in freshwater ecosystems.

High-status “Blue Dot” rivers are extremely sensitive; even small amounts of suspended sediment can

- Reduce dissolved oxygen level
- Smother spawning grounds and aquatic habitats
- Disrupt ecosystem and biodiversity

EU Water Framework Directive (WFD) in Ireland/EU both require strict protection of water bodies. Zero tolerance for pollution should be the standard in sensitive catchments. Any exceedance of turbidity or sediment discharge would constitute a breach in compliance. Mitigation measure posed by the applicant do not demonstrate sufficient proactive measures.

The board should take into consideration all qualifying feature of interest for the overall project not just those relating to the grid connection application. As the applicant stated above that the proposed development of grid connection and windfarm form a single project. Qualifying features of interest of the Blackwater River SAC [Site Code 002170], Blackwater Callows SPA [004094], **Dungarvan Harbour SPA [004032] – hydrologically connected to grid connection**, Blackwater Estuary SPA [004028] have been identified as occurring within the zone of influence of the proposed development. In the Applicant’s NIS (Table 5-1 below) displays the Qualifying Interests for the following:

- Blackwater SAC [002170] – Distance 0km (overlap with the proposed project site).

- Blackwater Callows SPA [004094] – Distance 5.2km south west of site.
- **Dungarvan Harbour SPA [004032] – Distance 13km south east of site.**
- Blackwater Estuary SPA [004028] – Distance 16km south of site.

Table 5-1: Identification of European sites within the Zone of Influence of the Proposed Project

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
<p>Blackwater River (Cork/Waterford) SAC (002170)</p> <p>Distance: 0 km (overlaps with the proposed project site)</p>	<ul style="list-style-type: none"> • [1029] Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>) • [1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) • [1095] Sea Lamprey (<i>Petromyzon marinus</i>) • [1096] Brook Lamprey (<i>Lampetra planeri</i>) • [1099] River Lamprey (<i>Lampetra fluviatilis</i>) • [1103] Twaite Shad (<i>Alosa fallax</i>) • [1106] Atlantic Salmon (<i>Salmo salar</i>) (only in fresh water) • [1130] Estuaries • [1140] Mudflats and sandflats not covered by seawater at low tide • [1220] Perennial vegetation of stony banks • [1310] <i>Salicornia</i> and other annuals colonizing mud and sand • [1330] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) • [1355] Otter (<i>Lutra lutra</i>) • [1410] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) • [1421] Killarney Fern (<i>Trichomanes speciosum</i>) • [3260] Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation • [91A0] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles • [91E0] * Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion, Alnion incanae, Salicion albae</i>) • [91J0] * <i>Taxus baccata</i> woods of the British Isles 	<p>Physical: The proposed project overlaps with the boundary of this SAC, and as such physical connectivity exists between the proposed project site and this SAC. Works associated with the bridge installation will occur within the boundary of this SAC, therefore there is potential for direct impacts.</p> <p>Hydrological: This SAC is hydrologically connected to the proposed project. In the absence of mitigation, the proposed project has the potential to result in a degradation of water quality of these hydrologically connected rivers during the construction and decommissioning phases of the proposed project. The SAC is designated for qualifying interests which are sensitive to changes in water quality.</p> <p>Ecological: the proposed project site occurs within the foraging/commuting range of qualifying interests (Atlantic salmon, otter and lamprey species [refer to Section 4.1.3]).</p>	Yes

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
<p>Blackwater Callows SPA (004094)</p> <p>Distance: The SPA is located 5.2km south-west</p>	<ul style="list-style-type: none"> • [A038] Whooper Swan (<i>Cygnus cygnus</i>) • [A050] Wigeon (<i>Anas penelope</i>) • [A052] Teal (<i>Anas crecca</i>) • [A156] Black-tailed Godwit (<i>Limosa limosa</i>) 	<p>Physical: Considering the distance between this SPA and the proposed project site (ca. 5.2km) there is no potential for direct impacts as the site occurs outside the ZoI for impacts associated with habitat loss and the generation of dust. There is no physical pathway for effects.</p> <p>Hydrological: Both this SPA and the proposed project occur within the same surface water catchment (Blackwater {Munster}). There is, however, no downstream connectivity between the proposed project and this SPA. There is no hydrological pathway for effect.</p> <p>Ecological: The proposed project site does not contain suitable habitat to support the designated SCI species. Furthermore, none of the SCI species (with the exception of whooper swan) were recorded utilising or flying over the proposed project site during bird surveys (refer to Section 4.1.2).</p>	No

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
		Whooper swan were recorded very infrequently and were not recorded flying within the potential collision height of the proposed wind farm. No source-pathway-receptor link exists between the proposed project site and this SPA.	
Dungarvan Harbour SPA (004032) Distance: The SAC is located 13km south-east	<ul style="list-style-type: none"> [A005] Great Crested Grebe (<i>Podiceps cristatus</i>) (wintering) [A046] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) (wintering) [A048] Shelduck (<i>Tadorna tadorna</i>) (wintering) [A069] Red-breasted Merganser (<i>Mergus serrator</i>) (wintering) [A130] Oystercatcher (<i>Haematopus ostralegus</i>) (wintering) [A140] Golden Plover (<i>Pluvialis apricaria</i>) (wintering) [A141] Grey Plover (<i>Pluvialis squatarola</i>) (wintering) [A142] Lapwing (<i>Vanellus vanellus</i>) (wintering) [A143] Knot (<i>Calidris canutus</i>) (wintering) [A149] Dunlin (<i>Calidris alpina</i>) (wintering) [A156] Black-tailed Godwit (<i>Limosa limosa</i>) (wintering) [A157] Bar-tailed Godwit (<i>Limosa lapponica</i>) (wintering) [A160] Curlew (<i>Numerius arquata</i>) (wintering) [A162] Redshank (<i>Tringa tetanus</i>) (wintering) [A169] Turnstone (<i>Arenaria interpres</i>) [A999] Wetlands 	<p>Physical: Considering the distance between this SPA and the proposed project site (ca. 13km) there is no potential for direct impacts, as the site occurs outside the ZoI for impacts associated with habitat loss and the generation of dust. There is no physical pathway for effects.</p> <p>Hydrological: - This SPA is hydrologically connected to the proposed project site via the grid connection works which cross the Colligan River (Colligan_040). Horizontal Directional Drilling (HDD) will be used to install the cable under the Colligan River</p>	Yes

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
		<p>which has the potential to result in water quality impacts in the event that frac out occurs (i.e. release of drilling fluid). There is therefore potential for water quality impacts on this SPA. This SPA is designated for wintering bird species which may be indirectly impacted by a degradation of water quality.</p> <p>Ecological: The proposed project site does not contain suitable habitat to support the SCI species of this SPA. Furthermore, none of the SCI species (with the exception of golden plover, lapwing and curlew) were recorded utilising or flying over the proposed project site during bird surveys (refer to Section 4.1.2).</p> <p>The population of golden plover using the proposed project site are not connected with the population designated within the Dungarvan Harbour SPA (refer to Section 4.1.2). Additionally, the recordings of</p>	

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
		<p>which has the potential to result in water quality impacts in the event that frac out occurs (i.e. release of drilling fluid). There is therefore potential for water quality impacts on this SPA. This SPA is designated for wintering bird species which may be indirectly impacted by a degradation of water quality.</p> <p>Ecological: The proposed project site does not contain suitable habitat to support the SCI species of this SPA. Furthermore, none of the SCI species (with the exception of golden plover, lapwing and curlew) were recorded utilising or flying over the proposed project site during bird surveys (refer to Section 4.1.2).</p> <p>The population of golden plover using the proposed project site are not connected with the population designated within the Dungarvan Harbour SPA (refer to Section 4.1.2). Additionally, the recordings of</p>	

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
		lapwing and curlew were infrequent and were not recorded flying within the potential collision height of the proposed wind farm.	
<p>Blackwater Estuary SPA (004028)</p> <p>Distance: The SPA is located 16km south</p>	<ul style="list-style-type: none"> • [A050] Wigeon (<i>Anas penelope</i>) (wintering) • [A140] Golden Plover (<i>Pluvialis apricaria</i>) (wintering) • [A142] Lapwing (<i>Vanellus vanellus</i>) (wintering) • [A149] Dunlin (<i>Calidris alpina</i>) (wintering) • [A156] Black-tailed Godwit (<i>Limosa limosa</i>) (wintering) • [A157] Bar-tailed Godwit (<i>Limosa lapponica</i>) (wintering) • [A160] Curlew (<i>Numenius arquata</i>) (wintering) • [A162] Redshank (<i>Tringa totanus</i>) (wintering) 	<p>Physical: Considering the distance between this SPA and the proposed project site (ca. 16km) there is no potential for direct impacts. There is no physical connectivity between this SPA and the proposed project site</p> <p>Hydrological: This SPA is hydrologically connected to the proposed project via the Blackwater River (hydrological route ca. 30km). There is therefore potential for water quality impacts on this SPA. This SPA is designated for wintering bird species which may be indirectly impacted by a degradation of water quality.</p> <p>Ecological: The proposed project site does not contain suitable habitat to support the SCI species of this SPA. Furthermore, none</p>	Yes

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
		<p>of the SCI species were recorded utilising or flying over the proposed project site during bird surveys, with the exception of lapwing and curlew (refer to Section 4.1.2).</p> <p>The recordings of lapwing and curlew however were infrequent and were not recorded flying within the potential collision height of the proposed wind farm.</p>	

The measures outlined in this submission to deal with protection of the aquatic environment rely heavily on the use of silt fencing.

What inspection frequency, performance triggers and independent verification will be required during construction, I would ask the board if they are satisfied without any reasonable doubt that silt fencing is a suitable mitigation measure to avoid pollution to our vast ecosystem that surround the proposed Scartmountain windfarm and grid connection?

CONCLUSION

The mitigation measures throughout the Applicant’s application and Natura Impact Statement (NIS) include the use of silt fencing. The Board must be satisfied **beyond any reasonable and scientific doubt** that the proposed development would not have significant effects on the water quality in nearby streams, rivers (Grid connection is hydrologically connected to Dungarvan Harbour SPA), lakes and seas, which would be caused by the failure of the silt fencing proposed throughout the application.

The failure of silt fencing during grid connection works should not be a minor oversight. If silt fences are not properly constructed, maintained, or monitored, it can potentially represent a serious lapse in environmental protection. Such failures can result in uncontrolled sediment runoff, leading to habitat degradation, water pollution, and potential breaches of environmental regulations — **particularly when works are adjacent to sensitive ecological areas such as Dungarvan Harbour - Special Protection Areas (SPAs).**

We refer the Board to [EUR-Lex - 62021CJ0444 - EN - EUR-Lex \(europa.eu\)](#) – Judgement of the Court of 29 June 2023 (European Commission Vs Ireland) – **Failure of a Member State to fulfil obligations – Environment – Directive 92/43/EEC – Conservation of natural habitats and of wild fauna and flora – Special areas of conservation – Atlantic biogeographical region – Article 4(4) and Article 6(1) – Failure to designate special areas of conservation and to set conservation objectives – Absence or insufficiency of conservation measures. Case C-444/21.**

Under Article 6 of the EU Habitats Directive 92/43/EEC

“Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive”.

FRESH WATER PEARL MUSSEL

The legal basis on which SACs are selected and designated is the EU Habitats Directive, transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulation 2011 (S.I. No. 477 of 2011) as amended. The Directive lists certain habitats and species that must be protected within SACs. The river Blackwater SAC (site code 0002170) includes as its qualifying interest the Freshwater Pearl Mussel (*Margaritifera margaritifera*)

Freshwater Pearl Mussels are protected by the following legal instruments:

- Habitats Directive [92/42/EEC] Annex II, Annex IV
- Wildlife
- European Communities Environmental Objectives (Freshwater Pearl Mussel)
- Wildlife (N.I) Order (1985)
- Environment (N.I) Order (2002)

The lifecycle of the freshwater pearl mussel is very complex and also very unusual. The male pearl mussels release sperm into the water, which is then filtered by the females. The eggs are fertilised, and develop in the female's breeding pouch before being released as larvae. Each female mussel can release up to 4 million larval mussels. These larvae (also known as glochidia) are then washed downstream by the flow of the river, and if they are lucky, they attach themselves to the gills of young salmon (**protected species**) or trout. The young mussels live as a parasite on the gills of the fish for approximately nine months, before dropping off the fish and settling into the river gravels. They then grow in the river bed and develop into juvenile pearl mussels. The juvenile mussels take about 15 years to mature, and during this time they are very sensitive to pollution and sedimentation.

Margaritifera populations are found in relatively fast flowing water with a high oxygen content, low nutrient and low calcium content, mainly over non-calcareous rock. Substrate is ideally gravel or gravel and coarse sand with no silt and free of extensive filamentous algae coverage.

Watercourses with high water quality (Q value) are strongly associated with Freshwater Pearl Mussel populations and especially those populations where there is juvenile recruitment. In Ireland rivers with high Q values are generally at higher elevations with lower stream order.

Populations comprised solely of adults, where juveniles cannot be recruited due to siltation of stream-bed interstitial spaces, still exist in lowland rivers due to the great age achievable by the species. These populations would have been extant before the threats currently faced by the species became prevalent.

Sources: Moorkens, E. A., 2000; Moorkens, E., 2011.

Habitats are;

- Eroding / upland rivers (FW1)
- Depositing / lowland rivers (FW2)

Source: Moorkens, E. A., 2000; Fossitt, J.A. 2001.

According to NPWS the “Overall Trend in Conservation Status” is Declining. 90% of all freshwater pearl mussels died out across Europe during the twentieth century.

On the western boundary of the proposed wind farm site, the Knocknasheega stream (EPA code 18K43) is hydrologically linked to the proposed wind farm site, converging directly into the Glenshelane River. Adjacent to the Knocknasheega stream, also along the western boundary, the Coolagortboy stream (EPA code 18C31) is located to the west of the proposed wind farm and flows into the Glenshelane River.

To the east of the proposed wind farm site, the Toor 18 stream (EPA code 18T06) flows into the Farnane_18 stream, which extends along approximately 2.6 kilometres of the eastern site boundary. Finally, the Farnane_18 stream joins the Finisk River (EPA code 18F02), located roughly 3 kilometres downstream of the proposed wind farm site.

The proposed windfarm site has streams mentioned above that flow into the Finisk River and Glenshelane River which has functional connections to the Blackwater SAC. The site is located in a Blue dot subcatchment of the Glenshelane River.

It is our submission, that the applicant has not assessed correctly the consequences of the pearl mussel when making the planning application for Scartmountain windfarm and the associated grid connection. It has not determined to the necessary degree of accuracy whether there would be adverse effects on the fresh water pearl mussel as defined by the conservation objectives and status of the nearby Blackwater SAC. The applicant must provide beyond reasonable doubt that the lifecycle of the pearl mussel is not affected in any way from i.e. water source/tributaries getting polluted as a result of windfarm construction, operational or decommissioning stages of the project.

The Board will be aware that Mr. Peter Sweetman brought proceedings aimed at preventing any legislation or administrative act from removing the freshwater pearl mussel as a ‘qualifying interest’ from any part of the Munster Blackwater SAC. Mr. Sweetman claimed the State’s decision related to the population of freshwater pearl mussel in the main river channel of the Blackwater, which flows through counties Waterford and Cork, and is a designated site of European importance.

The entire Blackwater river is mapped as having qualifying interests and the pearl mussel is one of them. The applicant stating that no fresh pearl mussel habitats are recorded with or downstream of proposed project is irrelevant. The Qualifying Interface of the Blackwater river (SAC) includes freshwater pearl mussel and nature restoration laws say restore habitats!

European Site – Qualifying Interests

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directive and Special Areas of Conservation (SAC) and Special Protection Areas (SPA) are designated to afford protection of the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site. Favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable. The favourable conservation status of a species is achieved when:
 - Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats and
 - The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
 - There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

As per the applicant's EIAR (Chapter 6 – Biodiversity) – Section 6.5.1.2 European Sites:

“European sites with a pathway linking to the proposed project were considered in this assessment. These European sites are illustrated on Figure 6.2”

carrying capacity of the SAC and SPAs to support the qualifying interests. Therefore, a degradation in water quality within the European sites would result in likely adverse effects on the qualifying interests/special conservation interests in view of their conservation objectives.

I would like to bring to the Board attention that “**Knocknamona Wind Farm Ltd**” which was granted permission with conditions in 2022 (ABP Planning Ref 309412), is located 10.9KM south of the scartmountain windfarm site. The boards decision is currently being challenged through the courts (**Power & Anor v An Bord Pleanala & Ors**) with regards to Whooper Swan Cygnus [A038]. Whooper Swans from the Blackwater Callows SPA (which is located 5.2km from proposed Scartmountain windfarm) are the largest flock on the Blackwater. **Any movement of swans between the Blackwater Callows SPA and Dungarvan Harbour** could potentially result in conflict at the proposed development site. The Callows supporting protected species, are a water dependent habitat. Given that the proposed development area at Scartmountain is the headwaters and that there are other indefensible proposal in the Planning system IT IS THE CUMULATIVE IMPACT THAT IS not even possible to fully calculate at this stage. If the Irish government truly believed that their wind targets were to be achieved they could have setup a Strategic Department to ensure correct development proposal. They know that their targets are not actually spatially possible, given the nature of housing development and ecological constraints.

The EIA Directive requires Cumulative Impact Assessment and the **Lackeragh Refusal** by Clare County Council hits it on the head as to why cumulative impact is not properly assessed (**Ref No P24-60411 – Clare County Council**).

*“In the absence of a strategic level cumulative assessment of the impact of the construction of a large number of turbines within one geographical area, the planning authority cannot satisfactorily determine that the proposed development will not give rise to, or contribute to significant or adverse effects on either **the Special Area of Conservation Interests of the Special Protected Areas** in the zone of influence of the proposed development”.*

Under the habitats Directive, planning applications for sites within 15km of any of Irelands 430 EU-designated protected nature sites must undergo screening and potentially a full details appropriate assessment for potential environmental impacts.

The Dungarvan Harbour SPA and Blackwater Estuary SPA are 13km and 16km respectively from the closest point of the proposed development and grid connection is hydrologically linked to the Dungarvan Harbour SPA. The outcome of the above case (**Power & Anor v An Bord Pleanala & Ors**) will have implications on the decision for Scartmountain windfarm and grid connection.

Extract from Applicant NIS (Table 5.1)

Designated Site	QIs/ SCIs	Connectivity	Within Zone of Influence Y/N
<p>Blackwater Callows SPA (004094)</p> <p>Distance: The SPA is located 5.2km south-west</p>	<ul style="list-style-type: none"> • [A038] Whooper Swan (<i>Cygnus cygnus</i>) • [A050] Wigeon (<i>Anas Penelope</i>) • [A052] Teal (<i>Anas crecca</i>) • [A156] Black-tailed Godwit (<i>Limosa limosa</i>) 	<p>Physical: Considering the distance between this SPA and the proposed project site (ca. 5.2km) there is no potential for direct impacts as the site occurs outside the Zol for impacts associated with habitat loss and the generation of dust. There is no physical pathway for effects.</p> <p>Hydrological: Both this SPA and the proposed project occur within the same surface water catchment (Blackwater [Munster]). There is, however, no downstream connectivity between the proposed project and this SPA. There is no hydrological pathway for effect.</p> <p>Ecological: The proposed project site does not contain suitable habitat to support the designated SCI species. Furthermore, none of the SCI species (with the exception of whooper swan) were recorded utilising or flying over the proposed project site during bird surveys (refer to Section 4.1.2).</p>	No

Another important point, I would like to raise is with regard to the two separate applications submitted for Scartmountain Windfarm (ACP 321522) and this application for the grid connection (ACP 323791). This is a ridiculous process and should NOT be permitted

As per the Applicants Planning Statement:

“The proposed development provides for a 110kV grid connection which will export electricity generated on the proposed Scart Mountain Wind Farm site via an underground cable to the existing Dungarvan 110kV substation. The proposed Scart Mountain Wind Farm is the subject of a separate SID application, submitted to ACP on 19th December 2024 (Ref. 321522). Together the proposed development and the Scart Mountain Wind Farm proposal form a **single project** for the purposes of EIA”.

This is an unfair and unjust planning system. How can an Applicant submit the same entire application document for windfarm that they do for the grid connection with minor tweaks here and there. The grid connection EIAR, NIS etc contain minimum information and lack sufficient information for the board to make a informed decision based on the information provided. In particular there is a lack of detailed cumulative assessment for both the windfarms and grid connections proposed.

I wish to raise serious concerns regarding the manner in which applications for windfarms and their associated grid connections are being submitted and assessed (2 x separate applications).

- **Duplicated documentation:** Applicants are submitting essentially the same application documents for both windfarms and grid connections, with only minor alterations. This practice undermines the integrity of the planning process, as grid connections require their own detailed and independent assessment.
- **Insufficient information:** The Environmental Impact Assessment Reports (EIARs) and Natura Impact Statements (NIS) provided for grid connections contain only minimal information. They fail to provide the level of detail necessary for the Board to make a fully informed decision.
- **Lack of cumulative assessment:** Critically, there is no robust cumulative assessment of the combined impact of multiple windfarms and grid connections in the same area. This omission is particularly concerning given the scale of development proposed.
- **Scale of development:** At present, there are a number of either operational or pending planning approval within close proximity of each other. Without a comprehensive cumulative impact assessment, the Board cannot properly evaluate the environmental, social, and landscape consequences of this concentration of turbines and associated infrastructure.

I would like to draw the boards attention that there are currently 89 turbines – some operational and other pending planning approval all proposed within close proximity of each other.

Operational Windfarms

- Ballycureen Windfarm – Ring – 2 turbines (120M)
- Woodhouse Windfarm – Aglish – 8 turbines (125M)
- Beallough Windfarm Portlaw – 2 turbines (120M)
- Barranafaddock Windfarm – Ballyduff – 11 turbines (130M)

In Planning Process

- Knocknamona Windfarm –9km West of Dungarvan – 8 turbines (155M)
- Scartmountain Windfarm – 13km north of Dungarvan – 15 turbines (185M)
- Lyrenacariga Windfarm – Tallow – 17 turbines (150M)
- Moanbrack Energy – Ring – 2 turbines (120M) (2 already existing)
- Slievegrine Windfarm – 5km south west of dungarvan – 24 turbines (185M)
- Dyrick Windfarm –Bording Scartmountain windfarm – 12 turbines (185M) – Refused by ACP 03-Oct-2025 (This windfarm is not included in the above figures).

Even though some are of the above proposed/operational turbines are outside the 20km Study area for cumulative effect – a number of new applications have been submitted to pre-planning which have not been assessed for cumulative impact. The applicants documentation was created specifically for scartmountain windfarm are now out of date and should not be considered acceptable when making an informed decision for the GCR for Scartmountain windfarm.

The magnitude of cumulative effect of the potential future baseline scenario in relation to existing, permitted, in-planning and proposed wind farms within the 20km Study Area is deemed High (prior to

new pre-planning windfarm proposal in past year), which is heavily influenced by the cumulative effects generated the proposed Dyrick Hill development (Refused but current going through JR Process), which is the nearest proposed wind farm to the proposed project.

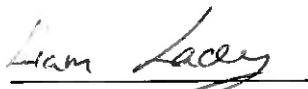
CONCLUSION

Having examined in detail, the planning application for the Scartmountain Wind Farm AND grid connection and the supporting documentation, there is very little doubt that the location proposed is unsuitable for many reasons outlined above.

Therefore, I urge An Bord Pleanála to Refuse planning permission for this proposed windfarm and grid connection. This proposed development lies adjacent to the proposed Dyrick Windfarm (ABP 317265) which was refused permission in October 2024. The same ground for refusal should apply to Scartmountain windfarm and grid connection (SINGLE PROJECT)

I respectfully urge the Board to require applicants to provide full, independent, and detailed EIARs and NIS for grid connections, and to ensure that cumulative assessments are carried out across all related projects. Only then can the Board make decisions that are fair, transparent, and in the public interest.

Yours Sincerely,


LIAM LACEY

APPENDIX

From: Aidan Walsh <aidanwalsh@waterfordcouncil.ie>
Sent: Friday, July 7, 2023 12:37 PM
To: John Staunton <john.staunton@tobin.ie>
Cc: Lee-Ann McGrath <lmcgrath@waterfordcouncil.ie>
Subject: PQ2023/81 Proposal for 17no. Turbines at Scart Mountain

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe. Forward unusual emails to spam@tobin.ie for verification.

John,

As previously discussed the subject development (16no. of 17no. turbines proposed) falls within an area designated as a **No Go Area** under the wind designation maps adopted as part of the Waterford City and County Development Plan 2022 - 2028. As previously advised Waterford City and County Council are therefore not supportive of the application and would be recommending refusal if it were received at local level or indeed recommending refusal should it proceed to Strategic Infrastructure Development Application with An Bord Pleanála. The following are the relevant policies of the Development Plan and while the advice of WCCC would be not to proceed to application stage you should also note Natura 2000 sites in your area, functional connections to same and the location of the site within a Blue Dot River Basin. The lands area also designated as High Sensitivity or Most Sensitive in the Landscape Character Assessment.

Policy UTL 13 relates to Renewable Energy and states It is the policy of Waterford City and County Council to promote and facilitate a culture of adopting energy efficiency/renewable energy technologies and energy conservation and seek to reduce dependency on fossil fuels thereby enhancing the environmental, social and economic benefits to Waterford City and County. It must also be recognised that other sources of electricity generation such as natural gas, particularly renewable and indigenous gas, will continue to have a role to play in the transition to a low carbon economy. As such, renewable energy developments may require support from such sources in times of high energy demand. This will be achieved by:

- Supporting the delivery of renewable energy to achieve the targets identified in Table 6.3 of the Development Plan.
- Facilitating and encouraging, where appropriate, proposals for renewable energy generation, transmission and distribution and ancillary support infrastructure facilities including the necessary infrastructure required for the development of offshore renewable energy developments developed fully in accordance with the Waterford Renewable Energy Strategy, **the wind energy designation map (Appendix 2 of the RES)**, the Waterford Landscape and Seascape Character Assessment undertaken to inform this Development Plan, and the National Wind Energy Guidelines, or any subsequent update/ review of these
- The Council recognizes and supports the role that the County can play in facilitating the onshore infrastructure required for the construction, operation and maintenance of offshore wind farm developments. This infrastructure includes but is not limited to: construction facilities, storage and lay-down areas, cable landfalls, onshore cable routing to substations, port and harbour infrastructure and coastal operations and maintenance bases, as well as use, reuse or repowering of existing infrastructure where appropriate.
- The Wind Energy Designation Map and the Landscape and Seascape Character Assessment Map identify different landscape character areas and associated landscape sensitivities. These designations encompass the concept of buffers between areas of sensitivity which vary across the different landscape character types and their different locations. These buffers allow for a gradual

change between contrasting landscape sensitivities and associated wind energy designations to be considered, as necessary, when determining any development proposal.

- Promote and encourage the use of renewable energy, and low carbon resources, namely solar photovoltaic, geothermal, heat pumps, district heating, solar thermal, hydro, tidal power, offshore and onshore wind, biomass as well as micro-generation among business, agriculture, education, health, and other sectors.
- Promoting, encouraging, ensuring, and facilitating community engagement, participation and implementation of/ in renewable energy projects.
- Implementing, including in the Council's own activities and in the provision of services/ works, the use and integration of low carbon, renewable energy infrastructure and technologies.
- Supporting appropriate options for, and provision of, low carbon and renewable energy technologies and facilities, including the development and provision of district heating (and/ or other low carbon heating technologies); anaerobic digestion and the extraction of energy and other resources from sewerage sludge.
- The preparation and implementation of a Climate Action Plan (including adaptation and mitigation measures) for Waterford.
- To support in conjunction with other relevant agencies, wind energy initiatives, both onshore and offshore, and wave energy, and onshore grid connections and reinforcements to facilitate offshore renewable energy development when these are undertaken in an environmentally acceptable manner.

At initial design stage full consideration should be to reasonable alternatives and existing infrastructural assets. In this regard environmental assessments should address reasonable alternatives for the location of new energy developments, and where existing infrastructural assets such as sub-stations, power lines and roads already exist within proposed development areas, then such assets should be considered for sustainable use by the proposed development where the assets have capacity to absorb the new development.

All planning applications for Renewable Energy Projects such as wind farms and solar farms shall be accompanied by a Decommissioning and Restoration Plan (DRP) consistent with the Wind Energy Guidelines 2006 or any update thereof. Issues to be addressed shall include details of proposed restorative measures, the removal of above ground structures and equipment, the restoration of habitats, landscaping and/or reseeding roads etc.

UTL 14 Energy Developments & Human Health - Proposals for energy development should demonstrate that human health has been considered, including those relating to the topics of:

- Noise (including consistency with the World Health Organisation's 2018 Environmental Noise Guidelines for the European Region developments must comply with the Wind Energy Development Guidelines (2006), or any subsequent update/ review of these),
- Shadow Flicker (for wind turbine developments, including detailed Shadow Flicker Study),
- Ground Conditions/Geology (including landslide and slope stability risk assessment),
- Air Quality; and,
- Water Quality.

Waterford City and County Council considers it is not appropriate to advise further on the content of your application or EIAR as this could suggest WCCC are open to supporting the application.

However, as you are aware staff details have previously been provided should you require clarity on specific aspects of the development as opposed to a view on the overall development which WCCC considers contrary to the provisions of the Development Plan.

Regards,

Aidan

Aidan Walsh
District Planner
Dungarvan & Lismore MDs

Minimum Measure

Construction Site Stormwater Runoff Control

Subcategory

Sediment Control

Purpose and Description

The purpose of a silt fence is to retain the soil on disturbed land (Figure 1), such as a construction site, until the activities disturbing the land are sufficiently completed to allow revegetation and permanent soil stabilization to begin. Keeping the



Figure 1. Silt fence retaining sediment

soil on a construction site, rather than letting it be washed off into natural water bodies (e.g., streams, rivers, ponds, lakes, estuaries) prevents the degradation of aquatic habitats and siltation of harbor channels. And not letting soil wash off onto roads, which readily transport it to storm sewers, avoids having sewers clogged with sediment. The cost of installing silt fences on a watershed's construction sites is considerably less than the costs associated with losing aquatic species, dredging navigation channels, and cleaning sediment out of municipal storm sewers.

A silt fence is a temporary sediment barrier made of porous fabric. It's held up by wooden or metal posts driven into the ground, so it's inexpensive and relatively easy to remove. The fabric ponds sediment-laden stormwater runoff, causing sediment to be retained by the settling processes. A single 100 foot (ft) run of silt fence may hold 50 tons of sediment in place. Most construction sites today do have silt fences. But many do not work effectively because they are not well designed, installed, or maintained. The focus of this fact sheet is—how to make silt fences work.

Design

The three principal aspects of silt fence design are: proper placement of fencing, adequate amount of fencing, and appropriate materials.

Proper Placement of Fencing

Placement is important because where a fence starts, runs, and ends is critical to its effectiveness. Improper placement can make the fence a complete waste of money. Analyze the construction site's contours to determine the proper placement. Segment the site into manageable sediment

storage areas for using multiple silt fence runs. The drainage area above any fence should usually not exceed a quarter of an acre. Water flowing over the top of a fence during a normal rainfall indicates the drainage area is too large. An equation for calculating the maximum drainage area length above a silt fence, measured perpendicular to the fence, is given in Fifield, 2011. Avoid long runs of silt fence because they concentrate the water in a small area where it will easily overflow the fence. The lowest point of the fence in Figure 4 is indicated by a red arrow. Water is directed to this low point by both long runs of fence on either side of the arrow. Most of the water overflows the fence at this low point and little sediment is trapped for such a long fence.



Figure 2. Create manageable sediment storage areas



Figure 3. Water should not flow over the filter fabric during a normal rainfall



Figure 4. Avoid long runs of silt fence

Stormwater Best Management Practice: Silt Fences

Use J-hooks as shown in Figures 5 and 6, which have ends turning up the slope to break up long fence runs and provide multiple storage areas that work like mini-retention areas. If the fence doesn't create a ponding condition, it will not work well. The silt fence in Figure 7 doesn't pond water or retain sediment. Stormwater will run around the fence carrying sediment to the street, which will transport the water and its sediment load to the storm sewer inlet.



Figure 5. Use J-hook fences to break up long fence runs

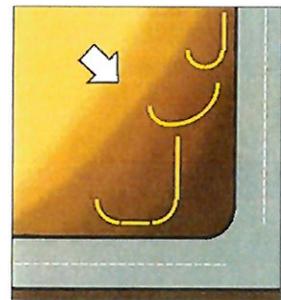


Figure 6. J-hook silt fences provide multiple storage areas

Figure 7. This silt fence doesn't work

Water flowing around the ends of a silt fence will cause additional erosion and defeat its purpose. The bottom of each end of the fence should be higher than the top of the middle of the fence (Figure 8). This insures that during an unusually heavy rain, water will flow over the top rather than around either end of the fence. Only fine suspended material will spill over the top, which is not as harmful as having erosion at the ends. When there is a long steep slope, install one fence near the head of the slope to reduce the volume and velocity of water flowing down the slope, and another fence 6–10 ft from the toe of the slope to create a sediment storage area near the bottom. A common misconception is that you only have to worry about water running off steep slopes. However, steep slopes may have a relatively small water collection area. The total drainage area



Figure 8. Proper installation, bottom of both ends are above the top of the middle



Figure 9. Poor installation, water can flow around the ends causing additional erosion

of a gentle slope, if large (Figure 10), can be more important than its slope in determining sediment loss. A silt fence should not be placed in a channel with continuous flow (channels in Figures 8 and 9 don't have a continuous flow), nor across a narrow or steep-sided channel. But when necessary a silt fence can be placed parallel to the channel to retain sediment before it enters the watercourse.



Figure 10. Gentle slopes may require a silt fence

Paved streets are major conduits of stormwater and silt, and they drain to storm sewer inlets. The best solution is to retain as much sediment as possible before it reaches paved surfaces. Install a silt fence at the inlet side of a storm sewer or culvert, rather than at the discharge where there is greater velocity and less storage area. Streets cut in the grade, but not yet paved, are also prime erosion conduits. If the streets are not going to be paved right away, they need a containment barrier such as a silt fence. Finally as a construction site's dynamics change, the silt fence layout should be adjusted when necessary to maintain its effectiveness.

Designers and contractors should also consider diverting sediment-laden runoff water to a sediment detention pond. If the site can provide a large enough area, this is usually the most effective and economical best management practice for retaining sediments. Silt fences are needed when there is insufficient space for a detention pond or when roads and other structures are in the way.

Adequate Amount of Fencing

The amount of fencing means the total linear length of the silt fencing runs on the construction site. A reasonable rule-of-thumb for the proper amount of silt fence is—100 ft of silt fence per 10,000 square foot (sq ft) of disturbed area. Soil type, slope, slope length, rainfall, and site configuration are all important elements in determining the adequate silt fence protection for a site, and to what extent it fits the 100 ft per 10,000 sq ft rule-of-thumb. If the amount of fencing provides the volume of runoff storage needed, then over-flowing the silt fence runs will be minimized. This is the basic test; if fences are over-flowing after a moderate rainfall event, the amount of fencing probably needs to be increased to avoid undercutting, washouts, and fence failures.

Stormwater Best Management Practice: Silt Fences

Appropriate Materials

There are different types of porous fabrics available, e.g., woven, non-woven, mono-filament, but all types tend to clog rapidly and don't provide lasting filtration. The support posts and installation method are more important than the fabric type for overall sediment retention. However, a lightweight fabric tends to tear where it is attached to the posts. Posts must hold the fabric up and support the horizontal load of retained water and sediment. Hardwood posts (2" x 2") are potentially strong enough to support the loads, but are difficult to drive into the ground more than 6–8". To hold 2 ft of sediment and water, the posts should be driven 2 ft into the ground. Steel posts are best because they can be driven into compacted soil to a depth of 2 ft. The support posts should be spaced 3–4 ft apart where water may run over the top of the fence, 5 ft in most other areas, and 6–7 ft where there isn't a considerable horizontal load. Improper post depth and spacing is often the cause of sagging fabric and falling posts. Some authorities believe a more robust wire or chain link supported silt fence is needed to withstand heavy rain events. However, this may double the cost of a silt fence installation and entails disposing of more material in a landfill when the fence is removed. Installing silt fencing having five interacting features: (1) proper placement based on the site's contours, (2) adequate amount of fencing without long runs, (3) heavy porous filter fabric, (4) metal posts with proper depth and spacing, and (5) tight soil compaction on both sides of the silt fence will usually obviate the need for wire or chain link reinforced fencing. Prefabricated silt fences, e.g., fabric attached to wooden posts in a 100 ft package, doesn't provide for posting after the ground is compacted or allow variable post spacing.



Figure 11. Chain link supported silt fence

Silt Fence Installation

Two commonly used approaches for installing silt fences are the static slicing method and the trenching method.

Static Slicing Method

The static slicing machine pulls a narrow blade through the ground to create a slit 12" deep, and simultaneously inserts the silt fence fabric into this slit behind the blade. The blade is

designed to slightly disrupt soil upward next to the slit and to minimize horizontal compaction, thereby creating an optimum condition for compacting the soil vertically on both sides of the fabric. Compaction is achieved by rolling a tractor wheel along both sides of the slit in the ground 2 to 4 times to achieve nearly the same or greater compaction as the original undisturbed soil. This vertical compaction reduces the air spaces between soil particles, which minimizes infiltration. Without this compaction infiltration can saturate the soil, and water may find a pathway under the fence. When a silt fence is holding back several tons of accumulated water and sediment, it needs to be supported by posts that are driven 2 ft into well-compacted soil. Driving in the posts and attaching the fabric to them completes the installation.

Trenching Method

Trenching machines have been used for over twenty-five years to dig a trench for burying part of the filter fabric underground. Usually the trench is about 6" wide with a 6" excavation. Its walls are often more curved than vertical, so they don't provide as much support for the posts and fabric. Turning the trencher is necessary to maneuver around obstacles, follow terrain contours or property lines, and install upturns or J-hooks. But trenchers



Figure 12. Static slicing machine



Figure 13. Tractor wheel compacting the soil

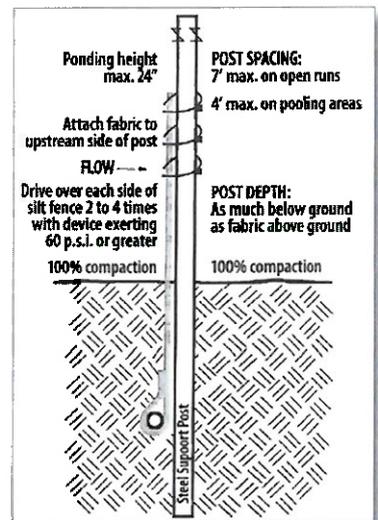


Figure 14. Silt fence installation using the static slicing method



Figure 15. Trenchers make a wider excavation at turns

Stormwater Best Management Practice: Silt Fences



Figure 16. Poor compaction has resulted in infiltration and water flowing under this silt fence causing retained sediment washout

can't turn without making a wider excavation, and this results in poorer soil compaction, which allows infiltration along the underground portion of the fence. This infiltration leads to water seeking pathways under the fence, which causes subsequent soil

erosion and retained sediment washout under the fence. The white line on the fence in Figure 16 and red arrow both mark the previous sediment level before the washout. Post setting and fabric installation often precede compaction, which make effective compaction more difficult to achieve. EPA supported an independent technology evaluation (ASCE 2001), which compared three progressively better variations of the trenching method with the static slicing method. The static slicing method performed better than the two lower performance levels of the trenching method, and was as good or better than the trenching method's highest performance level. The best trenching method typically required nearly triple the time and effort to achieve results comparable to the static slicing method.

Proper Attachment

Regardless of the installation method, proper attachment of the fabric to the posts is critical to combining the strength of the fabric and support posts into a unified structure. It must be able to support 24" of sediment and water. For steel posts use three plastic ties per post (50 lb test strength), located in the top 8" of the fabric, with each tie hung on a post nipple, placed diagonally to attach as many vertical and horizontal threads as possible. For wooden posts use several staples per post, with a wood lath to overlay the fabric.

Perimeter Silt Fences

When silt fences are placed around the perimeter of a stock pile or a construction site, the conventional silt fence design and materials discussed previously may not be sufficient.

Stock pile example. A stock pile of dirt and large rocks is shown in Figures 17 and 18 with a silt fence protecting a portion of its perimeter. Rocks that roll down the pile would likely



Figure 17. Back of silt fence on part of the stock pile's perimeter

damage a conventional silt fence. The bottom of the porous fabric is held firmly against both the ground and base of precast concrete, highway, barriers by light-colored stones. An alternative installation would be having the concrete barriers rest directly on the bottom edge of the filter fabric, which would extend under the barriers about 10", so the barriers' weight will press the fabric against the ground to prevent washout. Water passing through the silt fence (red arrow in Figure 18) flows to a storm sewer culvert inlet, which is surrounded by a fabric silt fence (yellow arrows in Figures 17 and 18) that reduces the runoff's velocity and allows settling before the water is discharged to a creek.



Figure 18. Front of silt fence on part of stock pile's perimeter

Bridge abutment example. During the construction of a bridge over a river between two lakes, an excavation on the river bank was needed to pour footings for the bridge abutment. The silt fence along the excavation's perimeter, composed of concrete highway barriers with orange filter fabric, was designed to prevent stormwater from washing excavated spoil into the river and to fend off the river during high flows. A portion of the orange filter fabric that has blown away from the concrete barriers shows the need to overlap and reinforce the joints where two sections of filter fabric are attached.



Figure 19. Silt fence for bridge abutment excavation

Highway example. Because of the proximity of a construction site to a highway, a concrete barrier was required by Minnesota's DOT to protect the highway and an underground fiber optic cable next to the highway from construction activities. The concrete barrier was used to support a silt fence along the perimeter of a large amount of dirt that was stock piled before being used for fill at a different location.



Figure 20. Silt fence protecting a highway and underground fiber optics cable

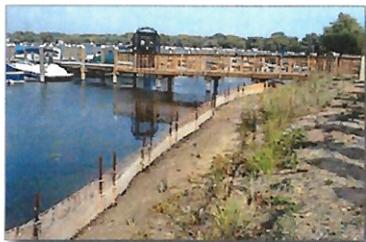


Figure 21. Silt fence protecting a lake shore

Lake shore example.

The lake's shoreline is being restored with plant plugs and seeded with native plant species. A plywood, perimeter, silt fence is used to trap sediment from a construction site on the right-side of the picture, protect the lake shore from

boat-wake erosion, and to prevent geese from eating the seeds and young plants. This fencing will be removed when 70% vegetative cover is achieved.

Inspection and Maintenance



Figure 22. A silt fence full of sediment that needs maintenance

Silt fences should be inspected routinely and after runoff events to determine whether they need maintenance because they are full (Figure 22) or damaged by construction equipment. The ASTM silt fence specification

(ASTM 2003) recommends removing sediment deposits from behind the fence when they reach half the height of the fence or installing a second fence. However, there are several problems associated with cleaning out silt fences. Once the fabric is clogged with sediment, it can no longer drain slowly and function as originally designed. The result is normally a low volume sediment basin because the cleaning process doesn't unclog the fabric. The soil is normally very wet behind a silt fence, inhibiting the use of equipment needed to move it. A back hoe is commonly used, but, if the sediment is removed, what is to be done with it during construction? Another solution is to leave the sediment in place where it is stable and build a new silt fence above or below it to collect additional sediment as shown in Figure 23. The proper maintenance may be site specific, e.g. small construction sites might not have sufficient space for another silt fence. Adequate access to the sediment control devices should be provided so inspections and maintenance can be performed.



Figure 23. New silt fence below the old fence

Permanent Soil Stabilization

When the land disturbing activities are sufficiently completed to allow permanent soil stabilization on the site, the silt fences and sediment basins are removed. The fabric and damaged posts go to the landfill. Steel posts and some of the wooden posts can be reused. Then the sediment is spread over the site to provide fertile soil, and the area can be seeded and mulched to support revegetation.

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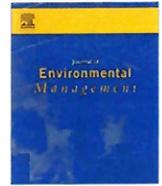
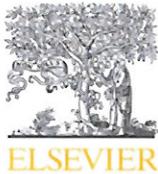
Figures 1–10, 12-16, 22, 23. Thomas Carpenter, CPESC, *Carpenter Erosion Control*

Figure 11. Pete Schumann, Fairfax County, Virginia, *Department of Public Works and Environmental Services*

Figure 17–21. Dwayne Stenlund, CPESC, *Minnesota Department of Transportation*

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Review

On the apparent failure of silt fences to protect freshwater ecosystems from sedimentation: A call for improvements in science, technology, training and compliance monitoring

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ABSTRACT

Excessive sedimentation derived from anthropogenic activities is a main factor in habitat and biodiversity loss in freshwater ecosystems. To prevent offsite movement of soil particles, many environmental regulatory agencies mandate the use of perimeter silt fences. However, research regarding the efficiency of these devices in applied settings is lacking, and fences are often ineffective due to poor installation and maintenance. Here, we provide an overview of the current state of research regarding silt fences, address the current culture surrounding silt fence installation and maintenance, and provide several recommendations for improving the knowledge base related to silt fence effectiveness. It is clear that there is a need for integrated long-term (i.e., extending from prior to fence installation to well after fence removal) multi-disciplinary research with appropriate controls that evaluates the effectiveness of silt control fences. Through laboratory experiments, *in silico* modelling and field studies there are many factors that can be experimentally manipulated such as soil types (and sediment feed rate), precipitation regimes (and flow rate), season, slope, level of site disturbance, fence installation method, type of fence material, depth of toe, type and spacing of support structures, time since installation, level of inspection and maintenance, among others, that all require systematic evaluation. Doing so will inform the practice, as well as identify specific technical research needs, related to silt fence design and use. Moreover, what constitutes “proper” installation and maintenance is unclear, especially given regional- and site-level variation in precipitation, slope, and soil characteristics. Educating and empowering construction crews to be proactive in maintenance of silt fencing is needed given an apparent lack of compliance monitoring by regulatory agencies and the realities that the damage is almost instantaneous when silt fences fail. Our goal is not to dismiss silt fences as a potentially useful tool. Instead, we question the way they are currently being used and call for better science to determine what factors (in terms of fence design, installation and site-characteristics) influence effectiveness as well as better training for those that install, maintain and inspect such devices. We also encourage efforts to “look beyond the fence” to consider how silt fences can be combined with other sediment control strategies as part of an integrated sediment control program.

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1. Context

As a result of human activities freshwater biodiversity around the globe is in crisis (Dudgeon et al., 2006; Strayer and Dudgeon, 2010). Although there are many factors that contribute to the degradation of freshwater ecosystems, landscape alteration is regarded as one of the most insidious (Allan, 2004; Dudgeon et al., 2006). Human-driven landscape alterations (e.g., development, agriculture, mining) leads to dramatic changes in hydrology, water quality, and habitat configuration even when activities occur in the terrestrial realm away from water sources (Schlosser, 1991; DeFries and Eshleman, 2004; Allan, 2004). Changes to physicochemical characteristics of the environment (such as water temperature, flows, silt, and nutrients) alter biotic elements, including population abundance and community structure in aquatic systems (Paul and Meyer, 2001; Allan, 2004; Dudgeon et al., 2006). Of particular concern is the introduction of fine sediment from terrestrial sources that run off into lotic and lentic systems and have the potential to cause direct and indirect negative effects on aquatic biodiversity.

In aquatic systems, excessive sedimentation – herein inclusive of suspended sediment, siltation, and turbidity – has been named the most detrimental form of aquatic habitat degradation and its effects on aquatic wildlife is the subject of numerous comprehensive reviews (e.g. Newcombe and Macdonald, 1991; Waters, 1995; Henley et al., 2000; Robertson et al., 2006; Kemp et al., 2011). Land-use alterations change natural sedimentation processes, increasing fine sediment suspension and deposition (Waters, 1995), and the effects on aquatic ecosystems are extensively documented and generally undisputed. Increased inorganic sediment loading changes the physical habitat of aquatic ecosystems by altering water pH (Lemly, 1982), water clarity, and decreasing oxygen flow through substrate by in-filling of interstitial space between larger substrate materials (Beschta and Jackson, 1979). Such changes to the abiotic aspects of aquatic ecosystems have great implication for the biotic: suspended sediment decreases photosynthetic activity by blocking light (Newcombe and Macdonald, 1991; Madsen et al., 2001), limiting primary production, and can limit feeding at higher trophic levels (Zamor and Grossman, 2007), increase foraging demands (Gregory and Northcote, 1993; Utne-Palm, 2004), physically harm sensitive oxygen exchange tissue (Redding et al., 1987; Lake and Hinch, 1999) and alter filter feeding behaviour (Rundle and Hellenthal, 2000) in aquatic organisms, potentially increasing metabolic demands (du Preez et al., 1996). Once settled, deposited sediments can cause substrate to be unsuitable for spawning (Chapman, 1988), directly smother eggs (Greig et al., 2007), prevent emergence of fry (Jennings et al., 2010), and bury food sources for invertebrate species (Suren, 2005; Kent and Stelzer, 2008).

The amount of sediment transport increases dramatically during construction compared to pre- and post-construction levels (Cleveland and Fashokun, 2006). To minimize the movement of sediment off site, regulatory agencies require the use of sediment mitigation techniques during construction activities (Kerr, 1995;

Harbor, 1999). Although there are a variety of sediment control measures and tools, silt fences are among the most commonly used. These geotextile systems consist of semi-permeable fabrics and/or composites that filter sediment. Silt fences are widely used because of their low cost, versatile application, and ease of installation and removal (Robichaud et al., 2001). Fences can also be easily customized in design and installation to best suit the conditions of the site, such as changes in type and placement of support stakes and type of geotextile used (Kouwen, 1990; USEPA, 2012). For any sediment control devices deployed, proper design, installation, and maintenance is key to their efficiency (Kouwen, 1990; Barrett et al., 1998; Gogo-Abide and Chopra, 2013).

Here we argue that silt control fences, despite being widely adopted, have failed to prevent silt from entering aquatic ecosystems. We submit that the science behind silt control fences is limited and that there are few rigorous assessments to identify the extent to which such controls actually reduce aquatic sediment mobilization. We also discuss the role of improper use and maintenance of silt control fences and limited compliance monitoring on silt mobilization. Given the manifold negative effects of silt on aquatic systems and our ability to pinpoint the source (i.e., largely point source – or at least identifiable), it would seem that we should be better able to address this pressing issue contributing to the degradation of aquatic ecosystems around the globe. To that end, we identify a number of improvements needed to advance the science, technology and practice of silt control.

2. The science of silt control

As new materials and designs emerge, studies on the performance efficiencies of silt fence installation design and fabrics are crucial. Generally, laboratory testing consists of a flume in which a portion of geotextile is drawn across tightly and secured (e.g. Barrett et al., 1998; Keener et al., 2007) and samples are collected pre- and post-material to assess efficiency of sediment concentration removal and changes in turbidity. Flow through-rate – the amount of time for sediment-laden water to pass through the material – is also measured: prolonged retention leaves silt fences vulnerable to failure due to overtopping, undermining or sediment diversion (Harbor, 1999; Keener et al., 2007). Under laboratory conditions, studies often report high removal efficiencies compared to field studies (Crebbin, 1988; Kouwen, 1990; Chapman et al., 2014). For example, Barrett et al. (1998) found that flow through was two orders of magnitude less than values reported by manufacturers due to clogging of pores in the materials. The way geotextiles are installed in test flumes prevents any overtopping or undermining of the material, meaning that any efficiency results are only applicable when fences are perfectly installed and maintained. Indeed discrepancies between laboratory and field tests have been indicated by paired study designs (Barrett et al., 1998).

More testing of silt fence sedimentation rates in field settings is vital to assess realized efficiencies of this widely applied mitigation

device. In applied settings, a number of contributing factors (soil type, particle size, precipitation, slope, vegetation type, etc.) results in data gathered at a particular site that must be extrapolated to other locations (Strecker et al., 2001). Further, studies may not report data vital for interpretation such as rainfall (Barrett et al., 1998) or have controls (Horner et al., 1990). Both sedimentation rates and silt fence integrity are directly affected by soil consistency (Sansone and Koerner, 1992), precipitation rates (Gogo-Abite and Chopra, 2013), UV exposure (Suits and Hsuan, 2003), and other environmental qualities that vary regionally and seasonally (Harbor, 1999; USEPA, 2012). Consequently, long-term field studies (i.e., prior to fence installation to long-after fence removal) of installed fences are critical. Further, inconsistent reporting of variables leaves interpretation difficult; studies may report changes in total suspended solids, turbidity, or total mass of sediments using a variety of measurement techniques. Overall, while perhaps present within industry, systematic testing of sediment fences in applied field studies has not been made available through peer review.

3. The practice of silt control

Sustainable development is the stated goal of many development projects and the construction phase is one of the most important phases to target to reduce human impacts and work towards sustainability (Hostetler, 2010). *In silico*, laboratory, and controlled field tests of silt fences may clearly demonstrate the ability of these materials to reduce sediment input into aquatic systems. In practice, however, scaling up from the computer or lab bench to large-scale, onsite applications of technology are rarely straight forward and few studies exist on the efficacy of silt fencing in real-world applications (Chapman et al., 2014). The goal of silt fencing is to limit erosion and prevent fine-sediment on human-disturbed land (e.g. construction sites) from entering lakes and rivers, until the land is re-vegetated and naturally stabilised. In order for sediment fencing to work there must be sufficient fencing, constructed of appropriate material, and properly installed. The United States Environmental Protection Agency lays out five criteria for effective silt fencing installation including: 1) proper placement of the fencing based on site contours; 2) sufficient amount of fencing without long runs that may cause excessive water pooling and overflow; 3) use of a heavy porous fabric; 4) metal posts driven to at least 0.6 m depth and spaced at appropriate intervals to support the fabric; and 5) tight soil compaction on both sides of the fence (USEPA, 2012). Although the majority of construction sites today employ some form of sediment fencing, at many sites the fencing is not effective due to improper design installation, or maintenance (USEPA, 2012).

Unfortunately, it does not take long when visiting most construction sites to note multiple failure points in silt fence installation and maintenance. Typical problems observed with silt fence installations include tearing, broken or bent support poles, insufficient fencing, uncompacted soil near the base, material piled on or against fencing, and vandalism (Fig. 1). These failures in the silt retention strategy likely reflect a lack of training on the importance, maintenance, and upkeep of silt fencing, and a lack of resources dedicated to the proper installation and continued maintenance of the fencing. It often appears that regular inspection and maintenance of silt fencing is not a high priority. This is most evident at sites where active construction has ceased but the ground remains susceptible to erosion and perimeter controls such as silt fencing are still required to prevent off-site movement of sediment and consequent damage to aquatic ecosystems. All too often it would appear that the practice of silt fencing is to “set it and forget it”. In order to limit the impact of human activities on aquatic ecosystems and make best use of the time and money invested into erosion

control by industry it is important that we have effective sediment control based on sound scientific research. Silt fencing needs to be more than window dressing.

4. Opportunities for improvement

To address what we regard as long-standing and persistent failure of sediment fences to control sediment inputs in freshwater ecosystems, we outline opportunities for improvement related to the science and practice of sediment control with a focus on sediment fences.

4.1. Generate credible science

As noted above, there is relatively little research that has been published on the science of silt fences and the work that has been done suffers from a number of issues. There is a dire need for credible science (Kaufman, 2000). We don't presume that we can identify all the necessary opportunities, but we do identify a number of priority questions and approaches. For example, a key research priority is to determine the factors that influence the ability of silt fences to effectively trap silt while enabling filtered water to pass. That research priority is superficially simple yet there are so many factors that can be manipulated such as soil types (and sediment feed rate), precipitation regimes (and flow rate), season, slope, level of site disturbance, fence installation method, type of fence material, depth of toe, type and spacing of support structures, time since installation, level of inspection and maintenance, among others. Also important is research on different strategies for removing fences (when their use is no longer required) and the sediment that they have captured and remediating the site (i.e., does one simply yank the fence and drive away?). From a conceptual perspective, there is a need for research that spans the laboratory (Barrett et al., 1998; Zech et al., 2009), field (both real construction sites and test plots; Faucette et al., 2005; Zech et al., 2009; Gogo-Abite and Champa, 2013) and *in silico* (modelling; Britton et al., 2001) realms to provide a comprehensive understanding.

Moreover, engineers, soil scientists, geographers, and biologists need to collaborate to conduct holistic, integrated research with a variety of relevant endpoints. When studies occur in the field they should extend beyond being observational where researchers simply travel from site to site to examine silt fence performance. Instead, experiments should be designed making use of a before-after-control-impact approach with adequate replication (see Conquest, 2000). Variables such as soil conditions, installation methods, fence materials, among others, should be systematically manipulated (or selected) to design experiments with the ability to identify causal relationships. Indeed, much of the existing literature is based on correlations (e.g., Paterson, 1994). We also call for researchers around the globe to collaborate to evaluate regional differences in silt fence performance. We recognize that the characteristics of a given stream and landscape as well as its biota will dictate the level of silt control needed. Clearly not all silt fence materials are created equal so replication in the face of different soil characteristics and water flows seems prudent. The advent of various sensors, automated water samplers and digital cameras (video or still) provide great opportunities to document fence performance through time and thus across various precipitation events, seasons (including winter) and time since fence installation. To improve understanding of maintenance regimes and the culture surrounding sediment control within industry, there is a need for social science studies directed towards inspectors and those that install silt fences. Use of non-obtrusive cameras (Struthers et al. *in press*; notwithstanding privacy issues) could provide fascinating



Fig. 1. Common problems with silt fence installation and maintenance observed in Ottawa, Ontario, Canada. All of these problems can lead to unnecessary silt deposition into aquatic ecosystems. a) Fencing that has fallen over with broken wooden support poles, b) Sediment piled upon and over silt fencing, c) Wooden support poles removed causing fence to collapse, d) Insufficient fencing, e and f) Loose and ripped fencing.

insight into silt fence monitoring and maintenance.

4.2. Train, educate, and empower site crews

As noted above, silt fences often fail entirely due to improper installation or maintenance. There are clearly a number of opportunities for improvement in this regard. For example, there is a need for the development of training courses for developers and contractors (i.e., those that hold the shovels) to learn about proper installation and maintenance. There are training courses available but they tend to be focused on environmental consultant and compliance monitoring staff (e.g., Florida Stormwater, Erosion, and

Sediment Control Inspector Training and Certification Program; <http://www.dep.state.fl.us/water/nonpoint/erosion.htm>) rather than crews that are on-site daily and would be doing the physical installation and maintenance. It can be effective to show examples (with photographs) of both proper installation as well as failed examples with reasons for their failures rather than only showing technical engineering diagrams or line drawings. Video footage showing silt fence performance during precipitation events could also help site crews to understand the forces that act on the silt fences. Given differences in soil/site conditions, slope and precipitation among sites and regions, generic training materials should be coupled with regionally-relevant content. We found some

examples of “guidelines” or “best management practices” developed by natural resource management agencies but they tended to be written as legal edicts rather than providing meaningful “how to” advice (e.g., Manitoba, https://www.gov.mb.ca/mit/mateng/apl/152_1.pdf; Bellevue, Washington, http://www.ci.bellevue.wa.us/pdf/Development%20Services/CG_DevStds2010_BMPC233.pdf). There is also an attempt to generate a global “standard” for silt fence installation (see <http://www.astm.org/Standards/D6462.htm>) but it lacks regional context. We did identify some progressive training courses (e.g., Nova Scotia Transport Ministry; http://novascotia.ca/tran/works/enviroservices/ESCCourseMaterial/2_ESC%20Principles%202013.pdf) where there was emphasis not only on silt control but on minimizing erosion. Included in training should be educational materials that emphasize the negative consequences of silt on aquatic systems in an attempt to empower site crews to actively monitor silt fences and fix them when needed – a concept known to change learner behaviour (Hungerford and Volk, 1990; Steg and Vlek, 2009). Such empowerment should lead to more consistent silt fence function rather than only fixing fences when problems are identified during compliance monitoring (if such monitoring occurs).

4.3. Conduct meaningful compliance monitoring

In contemporary society where regulations and policy are enacted to protect the environment, compliance monitoring is essential (Shimshack and Ward, 2008; Gray and Shimshack, 2011). There is little research or information on the extent to which compliance monitoring related to silt control occurs. Burby and Paterson (1993) revealed that in one study developers failed to install 27% of the control measures specified in the approved plans while in another (Loew et al., 2004) approved silt fences at construction sites were commonly missing or installed improperly. Clearly compliance monitoring is needed for silt fences. Moreover, if compliance monitoring is to occur it is worthwhile to do so during precipitation events to determine if the silt fences are performing as intended. Compliance monitoring does not necessarily have to be punitive. Rather, it should be viewed as an opportunity for inspectors to educate site staff and empower them to conduct their own monitoring. Indeed, in the long-term it would be desirable if such compliance monitoring efforts were somewhat redundant with monitoring conducted by trained and empowered on-site workers that deal with the installation and management of the silt fences.

4.4. Build the evidence base

There is a growing movement towards evidence-based conservation and environmental management (Sutherland et al., 2004). Rather than relying on “gut feelings” or “experience” to determine the best conservation intervention (which is common in environmental management; Pullin et al., 2004), an evidence-based approach relies on rigorous evaluation of diverse evidence sources and synthesis (in the form of a systematic review; Pullin and Stewart, 2006) to determine the best evidence-based course of action. From meta-analyses it is clear that keeping sediment out of aquatic systems should be a priority (e.g., Chapman et al., 2014). However, the evidence-base supporting the best means of achieving that target is limited. Silt fences remain a core (if not the primary) tool in silt control despite the fact that scientific evaluations of their effectiveness or the factors that influence effectiveness are limited. There is a paucity of peer reviewed literature on the topic – so much so that a recent meta-analysis (i.e., Chapman et al., 2014) was unable to amass sufficient data from the literature to evaluate effectiveness of silt fences. There is a need to

publish research in credible and accessible outlets rather than obscure technical reports that are difficult to obtain and are not subject to peer review. We also suspect that practitioners serve as a rich source of knowledge if their experiences and perspectives could be extracted and synthesized. Social science studies could be used to identify research priorities (e.g., Brown et al., 2010) for silt controls as well as identifying aspects of silt fences that are regarded as particularly effective, which would help address the science-policy gap related to sediment and erosion control (Kaufman, 2000). There is also room for case reports from practitioners that summarize successes and failures. In this context, failures are particularly important as there is likely a “file drawer” effect (Rosenthal, 1979) whereby there is a tendency to not publish failures which could leave the impression that silt fences are more effective than they are. Perhaps the paucity of peer reviewed literature on silt fences (whether success story or failures) is a reflection of the broad failure of silt fences? We submit at this point the evidence-base is sufficiently shallow to know whether silt fences are of any benefit in real world applications. We hope that this paper will stimulate research (with appropriate controls and replication) that will enable proper meta-analysis in the context of a systematic review in the coming years.

4.5. Beyond the fence

Here we have focused on silt fences given that they are arguably the most common approach to sediment control, which is not surprising given that they are a relatively simple and inexpensive technology. Nonetheless, they represent just one of the possible sediment mitigation tools available. There is relatively little work on the comparative effectiveness of different sediment mitigation strategies so it is not possible to provide specific direction here other than to note the need for comparative studies. There are a growing range of materials (i.e., geotextiles) that can be used for fencing that have been tested (e.g., Barrett et al., 1998; Risse et al., 2008; Gogo-Abite and Chopra, 2013), however, equally important may be new means of installation that will require less maintenance. There would also seem to be a need for more direct interaction between practitioners that install and maintain silt fences and those that design such tools. It is unclear the extent to which the various industry partners seek input from practitioners to refine and enhance the effectiveness of sediment controls. It is difficult to know exactly where the industry stands in terms of new innovations but a search of patents reveals developments related to installation (Whitener, 2000; Wheeler et al., 2000; Vreeland, 2004). We also encourage efforts to develop more combined approaches that use multiple strategies simultaneously to minimize sediment mobilization. Some of the other strategies that appear to be equally “simple” in design and low in cost are compost filter berms (Tyler, 2001) and erosion control rolls (Allard, 2003). What is clear is that current fences, partly due to improper installation and insufficient maintenance, do not appear to be overly effective at preventing sediment from entering freshwater systems so the status quo must change. Looking “beyond the fence” would seem prudent should the challenges identified here not be surmountable without combining tools.

5. Conclusion

In the face of development activities, regulatory bodies have enacted policies (see Mertes, 1989; Alsharif, 2010) in an attempt to reduce the input of sediment into aquatic systems given that it has been long (see Ellis, 1936) and widely accepted that such inputs are deleterious to environmental quality and aquatic biodiversity (e.g., Ryan, 1991; Wood and Armitage, 1997; Bilotta and Brazier, 2008;

Chapman et al., 2014). Accompanying such policies is a suite of tools (or best practices) that are available to practitioners known as silt or sediment controls. By far the most common and visible is the silt fence (Kouwen, 1990). One doesn't have to venture far in developed countries to see them deployed adjacent to most construction activities that have the potential to mobilize sediment. Although presumably used with good intentions, there is surprisingly little research that evaluates the effectiveness of silt fences and the factors that modulate success when properly installed and maintained. What constitutes "proper" installation and maintenance is unclear, especially given regional- and site-level variation in precipitation, slope, soil characteristics, etc. We presented a candid critique of silt fences. Our goal was not to dismiss silt fences as a potentially useful tool. Instead, we question how they are being used and call for better science as well as better training for those that install, maintain and inspect such devices, as well as more rigorous compliance monitoring. From our perspective, the jury is still out regarding the effectiveness of silt fences with many opportunities (as we outlined here) to improve the science and practice of sediment control via silt fences. Quite simply, with insufficient literature/data to conduct a systematic review and meta-analysis on the utility of silt fences for protecting aquatic ecosystems from sedimentation, their widespread use is not consistent with an evidence-based approach to environmental management (Sutherland et al., 2004).

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