

Submission 1



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Y35 AP90

Letter of Support: Foreshore application by DesignPro Ltd for the testing of a scaled tidal energy device off Canon Island, River Fergus Estuary, Co. Clare - File ref. FS 006821

The Marine Development Team(MDT) has a mandate to support marine business development in Ireland, with a view to delivering the growth as set out in the Government's policy, Harnessing Our Ocean Wealth.

I believe that the Design Pro project is worthy of support on a broad range of parameters:

1. The technology is novel and creates a real possibility to develop a growing thriving business based on our natural resources.
2. The technology is sustainable and is suitable for deployment in a wide range of water bodies with very minimal environmental impact and almost no negative impact in the water bodies in which it will be deployed and a positive impact on the environment in replacing green house gas emissions from Fossil fuel generation of electricity.
3. The successful development of this project will lead to new employment possibilities in Ireland and the generation of wealth in line with the policies in force including the Rural Development Plan and Ireland 2040.

I believe the following key points are pertinent to the location of the test site in the Shannon Estuary:

- The Shannon Estuary is one of Ireland's premier maritime resources that already host several long-established and successful marine enterprises including ports and nationally significant industries and economic centres.
- As mentioned above, the testing of such a tidal energy device within the Shannon-Fergus Estuary fits clearly with Action 25 of HOOW "Support existing and new test-beds/facilities for

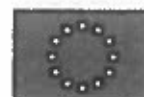


Ireland's European Structural and
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2014-2020

Co-funded by the Irish Government
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Department of
**Agriculture,
Food and the Marine**
in Gaelic
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Bia agus Mara



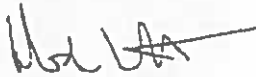
EUROPEAN MARITIME AND
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demonstration and commercialisation purposes that promote Ireland as a test-bed for renewable energy technologies and ICT (SmartOcean) focusing on the development of innovative technologies that support real-time information gathering (e.g. for security, surveillance, environmental monitoring)". The MDT fully supports such testing and sees the merit and value of DesignPro moving from a controlled test environment to a real environment within the Fergus Estuary

- The concept has undergone staged development, with industry best practice. Previous testing has been undertaken at NUI Galway, IFREMER flow tank facility in France, and Limerick Docks. Funding has previously been secured through the EU FP7 MaRINET programme which included scientific evaluation and is an additional sign of technical quality. GKinec has been working with DesignPro since 2014 on the manufacture of the turbine and control system; DesignPro have recently secured €2m funding through the competitive H2020 SME instrument and are using the GKinec IP to develop and qualify market ready DPR (DesignPro Renewables) turbine systems.
- The successful deployment of this tidal device on the Fergus Estuary as opposed to the alternatives of Canada and France will see the securing of this project for Ireland and the expansion of the manufacturing and development facilities of DesignPro in Rathkéale and has the potential to allow for the development of further on shore demonstration and training facilities adjacent to the deployment site.
- DesignPro are looking to deploy a 60kW device in the water for at least 90 days starting from September 2018. This device will then be removed from the water. The device would be similar to a mooring, will have 4 small anchors and does not require a connection to the foreshore. The unique Irish technology is made up of two vertical axis turbines placed on either side of a buoyant deployment vessel, the "bluff body". The shape of the device accelerates the flow of water into the turbines. The combination of this accelerated flow and the "blade Pitch Control System" allows for significant energy to be generated in low flows. The device is designed in such a way so as to exploit flow acceleration, it naturally diverts objects away from the device there by removing the collision risk with marine mammals, fish and other species, it is easy to deploy and recover using floating deployment system and can self-start and generate power as low as 0.5m/s.
- The Shannon Estuary and in particular the Islands at the mouth of the River Fergus Estuary provide the best possible opportunity for testing this device from Design Pro's perspective. The Islands at the mouth of the River Fergus Estuary have several advantages as a demonstration site for tidal energy devices. In particular, they provide sheltered stretches of water with relatively high flow speeds. There is a substantial public pier at Cahircon (3 km) that will allow a shore side office/ monitoring station as well as storage of equipment. Foynes harbour (7 km), a tier one port, has a multi-cat vessel and substantial craneage facilities which are also quite close and this can be used for the launching of turbines.

I support this application and hope that appropriate support can be given to allow this highly valuable project to be licenced.

Yours Sincerely,



Dr. Mark White

Manager



Ireland's European Structural and Investment Funds Programmes 2014-2020

Co-funded by the Irish Government and the European Union



Department of Agriculture, Food and the Marine

Talmhalochta, B'a agus Mara



EUROPEAN MARITIME AND FISHERIES FUND

Submission 2



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Marine Planning and Foreshore Section
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01 May 2018

Re: Foreshore application by DesignPro Ltd for the testing of a scaled tidal energy device off Canon Island, River Fergus Estuary, Co. Clare - File ref. FS 006821

A Chara,

I wish to submit the support of the Limerick Clare Energy Agency (LCEA) for the foreshore application ref. FS 006821; scaled tidal energy device off Canon Island, River Fergus, County Clare.

The LCEA is a promoter and supporter of low carbon development in County Clare, particularly through the provision of renewable energy. The LCEA has also been fortunate to work closely with Clare County Council in the development of the Clare Renewable Energy Strategy and the Shannon Integrated Framework Plan. Both strategies have been recognised internationally as being important in terms of their contribution to providing clear road maps for economic, social and environmental development at county and regional levels.

The LCEA hosted a tidal energy workshop at the University of Limerick in 2017. The workshop was attended by stakeholders from all of the key agencies nationally and regionally. A consensus emerged on the importance of Ireland establishing a capacity to test tidal energy devices, and that the Shannon Estuary would be an ideal location to conduct such tests.

The provision of renewable energy from tidal resources is predictable and substantial. The development of this technology could make a significant contribution to our carbon reduction and renewable energy targets, while also developing the provision of manufacturing and service skills locally for sale to markets around the world.

I respectfully urge the Marine Planning and Foreshore Section to give this application for the testing of a scaled tidal energy device your positive consideration at your earliest convenience.

Yours Sincerely

Patrick Stephens
Manager

Submission 3

Submission to foreshore licence application off Canon Island by Design Pro.

Reference no. FS 006821

Submission is on behalf of

Submission is compiled by

6/05/18

My submission is in good faith, open and transparent. It is motivated by my need and indeed my constitutional right to defend my enjoyment of my property, by my respect for the truth of science and by my interest in the importance of renewables and conservation. Decisions on this type of proposal are broadly decided on the balance of sometimes competing rights of the individual and the rights of the greater good. I ask only that that the promoters' proposal and this submission be objectively and closely examined in all their aspects and that their merits or otherwise be thus determined. I respect the integrity of all actors and expect reciprocity.

In broad outline the proposal is that Design Pro will place a device in the tidal stream adjacent to our property. Design Pro are awarded €2,700,000 funding under grant agreement reference number 766499 associated with this project. I quote from their application form, "This phase 2 funding will be used to commercialise their small scale river devices using G Kinetic technology." This is the stated purpose for this funding and the reason that Design Pro propose to use this site. This submission is intended to question the science of the proposal and question the implications of the proposal for me and for my property. Where the decision falls, informed by my questions on the one hand and the proposal put forward by Design Pro on the other, will of course influence the balance of competing rights. This application is for a project of scientific endeavour and commercial viability and assessment and should be judged on that basis together of course with the numerous inputs and requirements from other actors.

I will address the various documents associated with this application where they are relevant to my submission, in the order in which they are filed. By its nature there will be some repetition due to topics already addressed, reappearing, perhaps in different context.

Ref. Application form signed by Paul Collins.

- 1.1 I question the claim of the ability to generate power in low flows and the claim of power extraction gain from accelerated flow. The bedrock of G Kinetics claim is that the design gives them flow acceleration and thus power extraction gain. I quote "The device is designed in such a way so as to exploit flow acceleration, it naturally diverts objects away from the device there by removing the collision risk with marine mammals or fish..." I question the claim for benefit from flow acceleration when examining the device design drawing and the associated graphic representation. The turbines in fact rotate away from the front of the flotation device and obviously retreat toward the latter part of the flotation device, the flotation device orientation is bluff end opposing tidal stream flow direction.

Given that the turbine is in fact rotating against the accelerated flow, graphically depicted as greatest nearest the bluff body it appears counter intuitive that the rotating blades should rotate against it in this way? This would indicate that the blade pitch adjustment parameters are designed to optimally minimise the drag in this area so that the actual power extraction occurs on the outside of the turbine where the flow rate is less and the blades are presumably optimally controlled to produce the greatest drag. It is legitimate to ask why if accelerated flow is the Holy Grail, that the greater is abandoned for the lesser? Whatever flow acceleration occurs may reduce pressure in the area nearest to the flotation device, in the path of the blades advancing against the flow, and thus somewhat mitigate the negatives of such inherent occurrence?

- 1.2 The claim of naturally diverts objects away from the device is valid for inanimate objects but not for mammals and fish. Such curious animals do not hold station in a liquid flow, swimming with the flow, but rather the opposite. They hold station by swimming against the flow and will congregate to the rear of the turbines, in the danger area in the path of the retreating blades toward the flotation device. The centuries old teardrop shape is the default for any such application so can it claimed as innovative? Immediately following is this sentence "...can self start and generate power in flows as low as 0.5 m/s". I question the validity of this claim. Apart from great inefficiency, the greatest drawback of vertical axis turbines is their inability to self-start in flows that are even much greater than 0.5 m/s. The device project leader, Vincent McCormack, has stated to me that turbine starting is achieved in such circumstances by back feeding stored electricity from battery banks on board the device to the generators, driving them as motors and thus driving the turbines. They are now in fact users of electricity rather than generators of electricity. The generators are in any case electric motors but when driven at asynchronous speed become generators. This configuration of electrical design inherently requires grid connection in order to create the flux necessary to facilitate electricity generation. Because this proposed device is not to be grid connected it requires battery storage of electricity for this purpose additional to the requirement for turbine starting. Design Pro has chosen the proposed deployment area with flows of 3 m/s. The statement describing the choosing of the deployment site as ..."stretches of water with relatively high flow speeds "is at the best, an understatement. 3 m/s tidal stream is very high on average for the Globe, remarkable exceptions being, Bay of Fundy, Ungava Bay, Canada and Severn Bore, Britain, in excess of 5 m/s. At the Kildysart information meeting, David Higgins of Design Pro stated that "this site was the only suitable place in Ireland for the device". I ask is this not a serious indictment of the overall viability of the design concept? I think what is required is a device capable of operation in flows that are common around the globe in the order of 0.5 m/s. This is a very reasonable requirement. To put it in context it is the equivalent of expecting wind generation from wind speeds of 5 m/s. Wind turbines in fact generate from 3 m/s.

- 1.2 The dimensional size, mass and required foreshore area for what is a very low output electricity generator is massively off the scale of what would be deemed by objective standards as reasonable. Is it not accurate to describe it as using a sledge-hammer to crack a nut?

The swinging mooring design of this device subjects it to several challenges. Like any moored floating vessel it will be subject to Yaw, Pitch and Roll, all of which negatively impact on the necessary orientation of the turbine blades to the tidal stream in order to achieve effective power

extraction. Theoretical extraction figures are modelled in laminar flow conditions in computer fluid dynamics (CFD). A power extraction device placed in the tidal stream changes it to turbulent flow and this is the case with this device, so laminar calculations go out the window. We are now losing extractable power. I will briefly outline my understanding of the design and of the claims made for the device. It is claimed that flow acceleration is achieved and thus increased power extraction is achieved. Specifically, at the Kildysart information meeting, Vincent McCormack stated that the flow rate was increased 2 fold; he then went on to state that the power extraction was thereby increased by 8 fold and ultimately spoke the dreaded "in fact exponential increase". If this were the case the turbines would be screaming like a jet engine after 5 minutes! In physics as in life there is no such thing as a free lunch. Does accelerated flow mean increased useful water volume x increased flow rate to and over the turbines? What relevance do Bernoulli's Principle, the Continuity Equation, The law of Conservation of Mechanical Energy, etc. have in this area? Gain can certainly be achieved by creating massive infrastructure such as raising the water level, ie. a dam, thus storing potential energy which can be released to become increased kinetic energy. Gain can be achieved without a dam but still requiring massive infrastructure of channels or pipes or combinations endeavouring to create a situation whereby flow rate x volume is increased but at what complexity? Indeed at what cost and to what end? Can this bluff body design do so? The fundamental science is relatively simple. The nuanced science related to the fundamental science is really complicated – mind hurting! I find! - . Fortunately we do not need to go to the nuances because in them the implications for power extraction differences are negligible. In fact even with powerful computer modelling, shortcuts and assumptions are made in order to limit number crunching demand. Calculation techniques on turbine characteristics are still developing today. All is not claimed to be known!

It is my understanding from the limited information available to me that the design proposed here is essentially a drag turbine, vertical axis orientation. Eminent scientists of past generations, Betz, Lanchester, Joukowski and others all concur on the theoretical maximum limit of power extraction from a fluid flow. Water and air where air is at subsonic speed are treated as comparable. It is 17% for a drag turbine. A lift turbine such as was in service in Strangford Lough, Sea Gen, essentially similar to a typical wind turbine has a theoretical limit of 59%. So if this is a drag turbine we start out at 17% theoretical before losses. Its efficiency is dependent on correct orientation to the tidal stream, which is now a turbulent tidal stream and so there are immediate losses from this. The effective tidal stream has to flow to and over each turbine blade at optimum vector orientation in order to approach max efficiency. This will not occur. It is dependent on an orientation which is compromised by Yaw which is also likely to lead to torque induced oscillation between competing turbines. Its orientation is compromised by Pitch and it is compromised by Roll. It is possibly compromised by torque variation along the vertical axis of the turbine blades given the variation of flow rate relative to immersion depth. It is likely to be to spend some time using energy self-adjusting. These last losses due to Yaw, Roll and Pitch are due to the swinging mooring design. The designers have incorporated a blade pitch adjustment system; I understand it to be electro/mechanical in sensing/adjusting. The engineering solution employed results in a very large circular disc on each end of each turbine, ie top and bottom of each turbine, all wetted surfaces. These will create drag and even though the turbine is a drag turbine these discs introduce negative drag and thus losses. A word on the principle of the drag turbine is useful here. Again given the limited documentation and information available to me, this is my opinion on the basic construction of the turbine. Taking just one turbine, it is constructed from a number of individual vertical blades

arranged around a central vertical shaft supported by circular discs top and bottom, such blades angle of attack and/or retreat, adjustable by proprietary means, all the foregoing wetted in the tidal stream. The blades are chosen for their efficiency/cost/robustness ratio from standard NACA/NASA profiles? This chosen profile, essentially aerofoil in section is what extracts power from the fluid flow over the aerofoil and each contribute torque to the turbine as a whole resulting in rotation which is transmitted to the generator. This is the positive drag but this extracted power also has to drive the discs and associated mechanisms through the water, overcoming their negative drag. The proposers may have in their possession computed figures from comparable previous empirical data but I do not have access to any such data. Sea Gen previously mentioned was likely to have been many times more efficient and it was not deemed viable.

I note throughout the documentation accompanying the application in relation to electrical cabling that it is stated "simulated testing" of cabling will be undertaken. It hardly seems satisfactory that a device the subject of enormous funding from the European taxpayer, such funding expressly to bring the device to commercialisation should not have its cabling functionally tested. This is a generator of electricity for consumers. To supply electricity to consumers the device has to have an export cable to distribute to the consumers. I believe that I understand why the promoters are reluctant to provide this and I will detail my thoughts on it. The device is on a swinging mooring. The generated electricity is channelled to power conditioning equipment and ultimate commercially useful electricity is available at terminals somewhere on board the device. It is not a simple matter of connecting up a cable to this however. The device and thus the electrical terminals move on a swinging mooring. It goes up and down it moves toward the nearby Shore of Canon Island and away from it. It moves toward Lord's rock and opposite, toward Orlin Point. It is free to move to all Cardinal Points and all points in between of the compass. It rotates, sometimes clockwise sometimes anticlockwise, randomly, all within a freedom of movement radius, stated by the promoters to be of 10 metres from nominal location point and all tethered to 4 anchoring cables each 150 metres long! This is the design the promoters have chosen for commercialisation. How does one connect a cable to this? It is of course possible but extremely difficult and costly. Electrical slip-ring, pantograph arrangement plus other equipment can be brought together but to get safety and reliability to the solution would be enormously difficult and expensive, but again I reiterate that this is their product design! I believe that they should be required to provide for and achieve a satisfactory export cable arrangement which can in turn feed to a loadbank by whatever arrangement is necessary. It has to be understood that the design of this device should be fully integrated so that it performs its task all the way through and not avoid the last or indeed any hurdle. Is generating power but not being able to supply it to useful load but rather to dissipate it on an on-board loadbank acceptable? One can understand why the promoters would wish to avoid it. I believe that it is necessary that they are held to functional testing in the licence application and that they fully document how it can be safely achieved. This essential function is central to the viability of the device and without viability the balance of rights equation is distorted and the greater good is not served. If it proceeds with this or any dysfunction, most especially when I am publicly flagging my concerns, my rights will have been needlessly infringed. I am questioning and offering opinion on what is proposed, and endeavouring to bring balance to the competing rights equation.

In looking at renewables it is common that people claim that wind energy or tidal energy is free. They are not. In this case the energy source, ie the tidal stream can be considered free, if one ignores environment, amenity, conservation etc, but the extraction of power from it and its

conversion to a useable commodity, electricity, is not free. Vincent Mc Cormack has indicated that the device may be priced at circa €600,000. It can only be viable if the total cost is acceptable. This cost is universally measured as the Levelised Cost Of electricity, (LCOE), again not considering the aforementioned costs. What would the levelised cost of electricity be for a 60Kw device at this level of capital cost? The chosen site did not merit an iota of scientific research in its choosing. In the words of Vincent McCormack at the public meeting, he sailed there, liked it because he considered it sheltered and the current seemed fast. At our meeting I provided him with tidal rose charts of data obtained in the Shannon Estuary albeit in slightly lesser tidal stream velocity but none the less comparable and instructive. The implications were that effective tidal stream flow rates in that location would mean that the device as then described by him would not be making power for large parts of the 24 hr cycle. The situation in the proposed location would be somewhat better but will it be acceptable? The potential for extracting kinetic energy from the Estuary is after all in megawatts so if the turbine is big enough 60Kw can easily be achieved. Will it be by this means that it will be achieved?

1.3 The statement issued in this section by Paul Collins, "The decision on where to test the 60Kw device needs to be made by the end of May 2018 for Design Pro to meet Horizon 2020 deadlines. If Design Pro are unsuccessful in securing a Foreshore Licence for testing of their device in the Shannon Estuary then testing will be moved to another test site at the Canadian Hydrokinetic Testing Centre (CHTTS)." in my opinion this is unwarranted. How can it be reasonable for Design Pro to demand confirmation of permission by the end of May when submissions on the application close only on May 28th? In correspondence which I will later reference, Dr. David Lyons clearly states that the time-line of deployment of the device for Sept. 2018 is unrealistic. Others I have consulted with in my research for this submission have also confirmed that the time-line is not realistic. There is also a contradiction in stated time-lines; in 1.1 he states that testing will conclude in Sept. 2019 whereas in 1.3 he states it will conclude in June 2019.

1.4 I question that this is a demonstration project only. I believe that it is an industrial/commercial project with the aim as stated by Design Pro of developing, testing, modifying, bringing to commercialisation and demonstrating their product.

1.5 I question the accuracy of the statement that this is for private use.

1.6 I contend that this project should it proceed will restrict my use and enjoyment of the foreshore. It specifically extends over and precludes me from a landing place which I showed to Vincent McCormack at our meeting, on my personal Admiralty navigation chart together with my tracks and waypoints.

1.11 I question the accuracy of the figure provided here. A price of circa€600,000 has been quoted for the device cost alone.

2.4 The requirement for 11.47 hectares of foreshore for a 60Kw. Device, I regard as over burdensome.

4.1 Within this section Design Pro acknowledge that Shannon Dolphin and Whale foundation/Irish Whale and Dolphin Group recommend Static Acoustic Monitoring, (SAM), pre, during and post deployment. However Design Pro only agrees to this if they are successful in

obtaining a Foreshore Licence. Design Pro in imposing such a condition are at odds with the requirement for pre-monitoring, an essential component for correct study and which requires sufficient lead time, certainly longer than would be afforded by the quick decision that Design Pro are demanding.

National Parks and Wildlife Service (NPWS) highlight the very specific anomaly that arises in relation to the chosen site in that in the SIFP there is a nearby area specifically designated for this type of enterprise. There is no satisfactory explanation as to why the deployment is not within that area. Dr. David Lyons of NPWS has raised numerous queries in relation to other areas of concern and I cannot find in the documentation filed that they have been addressed.

4.4 I attended a meeting in Kildysart Community Centre on 13/03/2018. Design Pro describe this as a "community consultation meeting". I describe it as a community information evening. We were told what Design Pro would be doing and also what they might be doing. The claims for their technology and product, success in building partnerships, receiving awards and securing grants etc., current on their websites, associated media, press and broadcast were expounded. Vague promises for jobs in the technology area, tourism, services etc. were made. The area would be promoted in the media etc. as progressive, forward thinking! The area would be a test site and demonstration area. David Higgins was quoted in the local press some days earlier as stating that they would be inclined toward a megawatt commercial deployment connected to the grid. Questions were invited and although I had only heard of the project some days prior and had only a limited time to look at the technology and claims, it did not seem to me to stand up to scrutiny. The assembled members of the community generally welcomed promises of jobs, progress and publicity. It is difficult in one's own community to be a dissenter but mine was the only property adversely impacted. I asked what was in it for the community. I asked questions about the promised jobs. The technology jobs, development, assembly etc. would be in Rathkeale. Training jobs for operation of such devices could be local in Cahiracon when the devices were finally in production, but in the same breath it was confirmed that by then that the Canon Island device would not be there as it was to be decommissioned and removed. It was hinted by one that there might be a device permanently in place but this was countermanded by another. This promise of these jobs porpoised between training with a device in place, training without a device etc. to the extent that I believe that most attendees were sceptical about the probability of any such materialising. I asked technical questions about the design of the turbines and the basis for the claim for accelerated flow and consequent claim for enhanced power extraction. When I attempted to pursue this and specifics on electrical design, export of electricity, levelised cost, etc I was told that they were not engineers and that they would endeavour to have Design Pro address my concerns at a later time. I proffered a handshake to Vincent McCormack after the meeting and we had a cordial exchange where he reiterated that he would try having my questions answered. I emailed him the following morning confirming my reservations and giving him my contact details. A telephone conversation some days later resulted in arranging a meeting where I would meet with him, his electrical engineer and his fluid dynamics/mechanical engineer. Because 3 of Design Pro staff would be involved I volunteered that it would be fair that I go to Rathkeale rather than have they come to me. The meeting was confirmed for a date and time, in a meeting room in Design Pro building for 20/03/18. Prior to the meeting the time was changed because they did not have a meeting room available. I arrived at the newly

appointed time; there was still no meeting room available and only Vincent McCormack available to meet me. Discussion was on the hoof and in the reception area. Despite this I persevered and used the time to elaborate on my analysis of the philosophy, design and claim anomalies, elaborated on my reasons why I felt such a project would be to my detriment and have virtual injurious affection consequences for my property. He did not demur from my mechanical/fluid dynamics/electrical observations, expressed surprise at my prescience on anticipated problems and indeed confirmed that they had encountered difficulties that I was predicting. I asked him to urgently investigate the legitimacy of my reasoning and to recognise, acknowledge and mitigate the material injury to me. Also to consider that we would together, with my IP resolve issues and help advance the project. Our parting was again cordial and I expected that we could come to resolution. This was not to be. There followed without urgency an email which I consider did not reflect the substance of our meeting. My reply to it only solicited what I regard as an unsatisfactory reply from another Design Pro person and my reply to that and cc to Vincent McCormack remains unanswered 1 month later. On this Friday 25th I courtesy emailed him that I was making a submission on the Design Pro Foreshore Licence application.

4.5 I am the adjacent landowners and Design Pro will not engage with me.

5.5 I question the correctness of answering no to this question.

5.6 In my consultation with CCC on this issue of the proposed use of biocide/antifouling coating on this device they were of the view that biocide would not be used. Design Pro state in this section that biocide will be used. This is of concern in that the site is appurtenant to a confirmed breeding/haul-out site for seals on rocks inside Lord's Rock. I have regularly witnessed otter activity also. Islanders do not use biocides. Use on this device is worrying in that it is planned that it will be moored all year round. It is particularly worrying that the biocide will be used on the turbine blades. Rotating blades, propellers etc. are subject to cavitation. Predicting conditions in which this may occur is difficult. Cavitation which is essentially micro-implosions of micro-vapour bubbles are very powerful and can erode stainless steel, bronze aluminium etc. The phenomenon is commercially exploited for industrial cleaning of surfaces, metal erosion etc. Occurrence on biocide surfaces on this device would rapidly release large quantities of toxins with unknown consequences.

5.9 From the limited information available to me I believe that the potential for noise pollution from this device is high. The mechanical principle involved, ie. the conversion of a low speed high torque rotation to a high speed rotation – required so that the electric motors can be driven at asynchronous speed and thus behave as generators – requires a very high ratio and a very heavy duty conversion gearbox probably dictating that straight cut gears are incorporated which tend to be very noisy.

Part 6. I believe that there is considerable risk of dangerous incidents concerning navigation and general safety. The proposed location is sheltered only in some limited conditions. It is very vulnerable to Westerly storm conditions which are the prevailing conditions. My landing place has an extended robust stone seawall precisely to defend against this. The site is vulnerable to wind against tide situations, storm surge etc. I have witnessed extraordinarily rough and dangerous sea states here. Channel marker Buoys around the world, all highly conservatively rated for holding,

regularly shift and indeed fail. In the case of this device anchor cable knitting/fouling/chafing are a constant threat. Anchor device drag and failure are also a real risk. The scale, mass and wetted area of the device as well as a large superstructure will mean huge hydrodynamic drag and aerodynamic drag. Unlike most moored devices like ships, boats buoys and indeed sea platforms which all mitigate drag by virtue of their shape, a moored extraction turbine is designed for the exactly opposite purpose, ie to create drag for torque and power extraction. All these factors can easily lead to either partial or total mooring failure with disastrous consequences. Additionally, the channel because of its width and depth carries a large volume of detritus from both the Fergus and the Shannon with potential for negative consequences.

Consultation Responses;

PDF3 of 18 Letter by Dr. Caroline Roche of Aquafact to Development Application Unit ref. JN1468, refers to test site area of 20.59 Ha located in Fergus Estuary. Also in this letter she is clearly aware of the distinction between the Shannon Estuary and the Fergus Estuary. The device is proposed for the Fergus Estuary yet reference is made to data from the Shannon Estuary for her report and again in the subsequent "revised Natura Impact Statement". The inclusion of the word "revised" in this NIS I take to mean that there was a previous NIS, however no such document is filled in the submission? The cross usage of Shannon Estuary and Fergus Estuary is a recurring theme in the documents making up this application. The promoter, Paul Collins uses both in his application form. They are not one and the same and separation out of data etc. one from the other and careful reappraisal is necessary to aid decision on this application. Ms. Julie Fossitt in correspondence with Aquafact on 14/02/2018 drew attention to the fact that the proposed project came within the remit of the SIFP, by virtue of its location, type of activity and the involvement of CCC and that "the location however is not an area of opportunity site for tidal energy within the SIFP". This fundamental anomaly remains unaddressed. I cannot find an explanation for it in any of the filed documents available to me for inspection.

PDF16 of 18 This document is of particular importance. It is a communication from Dr. Caroline Roche of Aquafact to Dr. David Lyons, NPWS, cc to Ms Shelia Downes and is Dr. Roche's record of an earlier meeting. The salient points of this letter is that Dr. Lyons was concerned about otters and dolphins, suggesting SAM throughout the Summer months and into the Autumn prior to submitting the application. He further indicated that it would be up to the applicants to prove that there were no adverse impacts within the area, this proof to be part of the application documentation. I cannot find any such documentation. Dr. Lyons expressed the view that having a time-line of having a device in the water for Sept. 2018 was not realistic having regard to the time required for MVLC and Foreshore Unit decisions.

Farming implications;

My farm is impacted by numerous designations, regulations and plans; pNHA, SAC, SPA, SIFP and the various DAFM regulations in EU and Irish Law. The farm comes under GLAS regulation and geese & swans provision. Qualifying livestock units are not allowed on the entire holding from Oct. 15th to

Mar. 15th. All mechanised activity is prohibited during the same period and it is good practice to limit human activity to a minimum. This proposed deployment with its noise and associated activity and intrusion would be in contravention of this resulting in detrimental contractual implications between me and DAFM.

EIA screening report

2.1.1 PDF4 of 22, paragraph 5; contained in this paragraph are references which have been a recurring feature of coverage and comment regarding this project. Much is made of "the islands at the mouth of the River Fergus" ... "several advantages" ... "sheltered stretches of water with relatively high flow rates" ... "these locations are close to land and therefore close to electricity grid infrastructure". My real fear is that this is not just a once off temporary test site. This site is viewed long-term as a permanent full scale installation site or why else would reference be made to "...and therefore close to electricity grid infrastructure". I fear it is the thin end of the wedge.

PDF13 of 22 In relation to scenic views to answer no is incorrect. It will have detrimental impact on the views from Canon Island onto the Fergus Estuary.

PDF16 of 22 Cultural Heritage; Industrial installations of this type are far removed from the cultural heritage of the islands and in particular the monastic settlement of 12th century on Canon Island and comparable heritage on other islands.

3.3 Mandatory EIA, pdf7 of 22. It is incorrectly stated that this is not a hydroelectric device. It is and derives its motive power from a hydrokinetic turbine.

Population and Human Health; Under this section it is stated that there are no noise impacts. I contend that this is not known and that verifiable evidence of the noise output levels to both atmosphere and under-water should be provided.

Biodiversity; It is undisputed that seals breed and haul out on the rocks between Canon Island Western shore and Lord's Rock. This area is just metres from the proposed deployment area. The promoters state that they will use a biocide on the device. Islanders do not use biocide.

Noise and Vibration; It is stated " there will be no noise or vibration created through the proposed launch, deployment, testing or decommissioning of the device." This is plainly incorrect. If the device succeeds in outputting power in Kw it is Horse Power and work output and it will not be silent. Noise there will be and this requires further study.

Landscape; I contend that this is an industrial installation in the Fergus Estuary. Again I draw attention to the distinction between the Fergus Estuary and the Shannon Estuary. As previously detailed using data from one and applying it to the other is not correct procedure. Aquafact describe the location as a noisy place, mean decibel level of 101 decibels +- 7. They do not state where in the estuary, whether it is in the atmosphere or under-water, what does mean signify, where were the readings taken. The reference is misleading. The proposed location is not noisy. 110 decibels is the average human pain threshold and 16 times as loud as 70 decibels. What is going on here? Views from Canon Island on the Shannon Estuary side are severely impacted by Rusal/Aughinish. I disagree

that Foynes Port has a negative visual impact. It cannot be disputed however that the views from any part of Canon Island onto the Fergus Estuary and onto the mainland are currently idyllic and unspoiled. The argument that a location when it is impacted in one part by denkmalschutz/eyesore, that it gives licence to pile additional burden on another part is not right headed and surely not in the spirit of the SIFP.

Critical appraisal is the interest of all; promoter, partners and opposition. I will welcome critical appraisal of my questions and opinions and will accept deserved rebuttal.

Signed,