



G KINETIC

**GKinetic CEFA 12kW Tow-Test – Foynes / Shannon
Estuary.**

November 2022

Safety Plan and Method Statement

GKinetic Tow-Test Foynes/ Shannon Estuary

1. Objectives

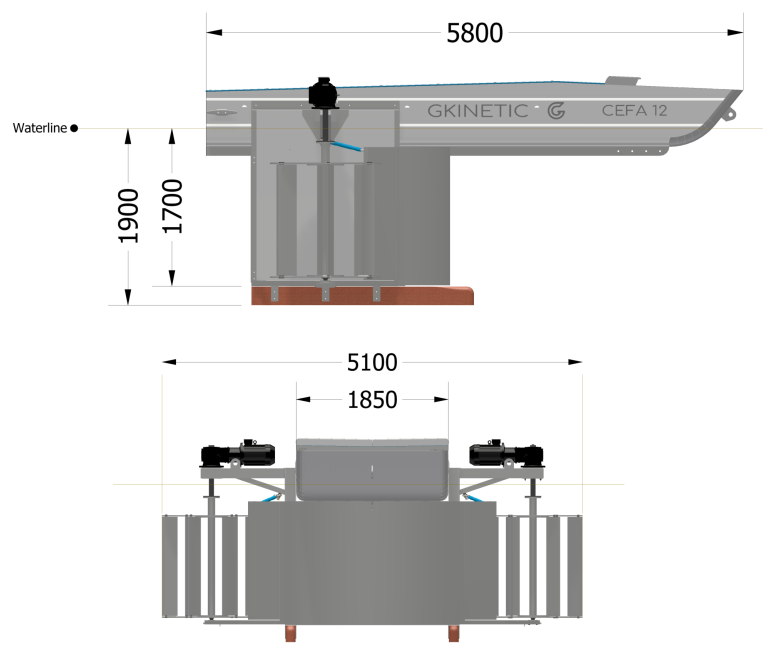
GKinetic Energy has developed a hydrokinetic turbine to be used for the generation of clean zero carbon energy. The device comprises a buoyant platform, an underwater bluff body, and twin turbines. The objective of this project is to (1) certify the device power curve to IEC Standards. (2) define optimum operating parameters (3) carry out acoustic measurements to enable regulatory permitting.

This device was tow tested for three days on Strangford Lough in a similar environment to the Shannon Estuary.. The device was also deployed on a mooring at Strangford in flow speeds of up to 3.1 m/s.. Significant environmental assessment work was also completed and this in collaboration with Queen's University Belfast Marine Research Lab during 2022. Potential risks associated with the proposed testing near Foynes are therefore identified and mitigated against by the work at Strangford.

2. The GKinetic Device

Device Characteristics:

Weight:	Approx 2,200 kg
Buoyancy:	4,100 kg
Freeboard:	0.56 m
Draft:	1.9 m
Beam:	5.1 m
Length:	5.8 m



3. Previous Testing of the GKinetic CEFA12

This device has previously been tow tested and deployed to mooring for stability assessment, environmental impact assessment & power generation performance assessment. This testing was carried out by the same GKinetic personnel who will be present for the operations outlined in this report, in collaboration with Queen's University Belfast's Marine Research Laboratory and a Marine Ops company.



Figure 2 - Tow testing with multicat. Strangford Lough, December 2021

Tow testing has taken place on Strangford Lough, Co. Down on 300m of floating towing line with the aid of a 460HP multicat vessel on several occasions. Stability was maintained and seakeeping demonstrated on open water up to speeds of 2.5m/s over several days of testing in varied weather conditions in 2021/22.



Figure 4 - GKinetic CEFA 12 Tow Testing demonstrating stability @ 2.5m/s

The device has been moored in Strangford Narrows, Co. Down for continuous periods of up to 2 months in tidal flow and deployed/retrieved to mooring numerous times during testing with the aid of GKinetic personnel.



Figure 5 - Deploying the GKinetic CEFA12 to mooring



Figure 6 - GKinetic CEFA12 on mooring, Strangford Narrows, February 2022

4. Risk Mitigation

4.1. Device stability

Tow Tests (Strangford 2021/22) have been carried out on this device up to speeds of 2.5m/s and the device was completely stable during the tow. It was exposed to speeds of 3.1m/s while on mooring and was shown to maintain its buoyancy and structural integrity.

4.2. Drag loads

During tow tests of the device, a load cell was used to measure drag loads with a max load of 1500kg at 2.5m/s.

4.3. Device build

The device weighs 2200kg and is manufactured from marine grade aluminium. Towing / lifting points have been designed to withstand forces from towing / lifting and have been validated through testing (Strangford 2021/22). 85% extra reserve buoyancy has been built into the platform.

4.4. Turbine design

The turbines rotate at a tip speed ratio of <0.9 and have been shown to pose no risk to aquatic life. Submerged moving parts of GKinetic turbine comprise of aluminium hydrofoil blades, drive shaft, and hubs. A number of specialised plastic bearings used are designed for 100,000 hours continuous work in the marine environment. No oils or grease are needed for these bearings. No environmental pollution risks exist from submerged parts.

4.5. Electrical Hazard

The DAQ, instruments, comms, electrical load shedding and control system have been lab tested by GKinetic. During tow tests the turbines will generate electrical power. This electrical power is handled in an isolated earth system where no electrical current will pass through the vessel hull. Electrical power is dumped to on board resistors. The electrical design is substantially the same as the setup from the (Strangford '22) tests. During these tests the electrical setup proved to be safe to use.

4.6. Hazardous gases and liquids

No hazardous gases or liquids are produced during the process.

5. Team Experience

GKinetic Energy Ltd. - The GKinetic team has been testing devices in field conditions since 2016. This included six full scale deployments. The largest machine that was tested was a 60kW unit weighing 38 tons. This unit was successfully tow tested at Kirkwall harbour.

The GKinetic team will comprise 4 members (GKinetic project manager, 1 GKinetic Operations manager, 1 small vessel coxswain and 1 crew.

Shannon Estuary Marine – Provide a Charter service of Specialist Landing Craft, work Boats and barges primarily used in the Marine Civil Engineering and Diving sectors with wider uses including Salvage and the Marine renewable energy. They are based in West Clare and have extensive experience working on the Shannon Estuary. The staff are also trained in rescue procedures, first aid, first responder, survival at sea and craft maintenance.

6. Tasks and Responsible Parties

The test process involves a number of disciplines. The tasks involved in the test itself are divided into different categories.

Towing the device to the tow start point using a Tug

This task will be undertaken by Shannon Estuary Marine. Tow speed by the tug will be max 2.2m/s (4knots). Shannon Estuary Marine will be responsible for this task.

Tow Testing

The device will be towed behind the tug vessel by Shannon Estuary Marine along the route shown in Figure 7. A support vessel will also be following the device. Shannon Estuary Marine will be responsible for this task.

SCADA

This is primarily the responsibility of GKinetic Energy Ltd.. The complete PTO, DAQ and ADCP system will be tested and commissioned at their premises prior to use on-site. A technician will be on site during tests to operate the control systems. They will work with support from Queen's University Belfast Marine Research Laboratory.

Support Vessels

This will be provided by GKinetic Energy Ltd.. A work boat (Arvor 20) and RIB will be used as support vessels during testing piloted by experienced personnel from GKinetic.

7. Risk

Insurance.

This is a GKinetic managed project. GKinetic will ensure that all necessary insurances are in place prior to commencement of work at Foynes and on the Shannon estuary. All marine operations are covered by the insurance of Shannon Estuary Marine.

Time/schedule risks.

Confirmation will be sought from SFPC on the scheduling of shipping travel and plans will be made to not interfere with shipping traffic. Confirmation will also be sought immediately prior to any transit on shipping lanes. Winds of force 5 and upwards are the most likely event to stop operations.

Should inclement weather be encountered the device will be recovered to a safe location.

Test Plan & Routes

Towing will take place over 5 days during the month of November. Commencement of towing will be conditional on (1) No shipping movements, and (2) Favourable weather conditions.

Mooring

The device will be moored to the Foynes Yacht Club pontoon for SCADA preparation. Following tow testing each day the device will be returned to the Foynes Yacht Club pontoon

Towing to the test site

The device will be towed from the Foynes Yacht Club pontoon to the tow testing area. There are two towing areas "East of Mount Trenchard point" and "East of Sturamus Island". Both areas are well clear of Shipping. Towing area will be selected based on weather and tidal conditions.

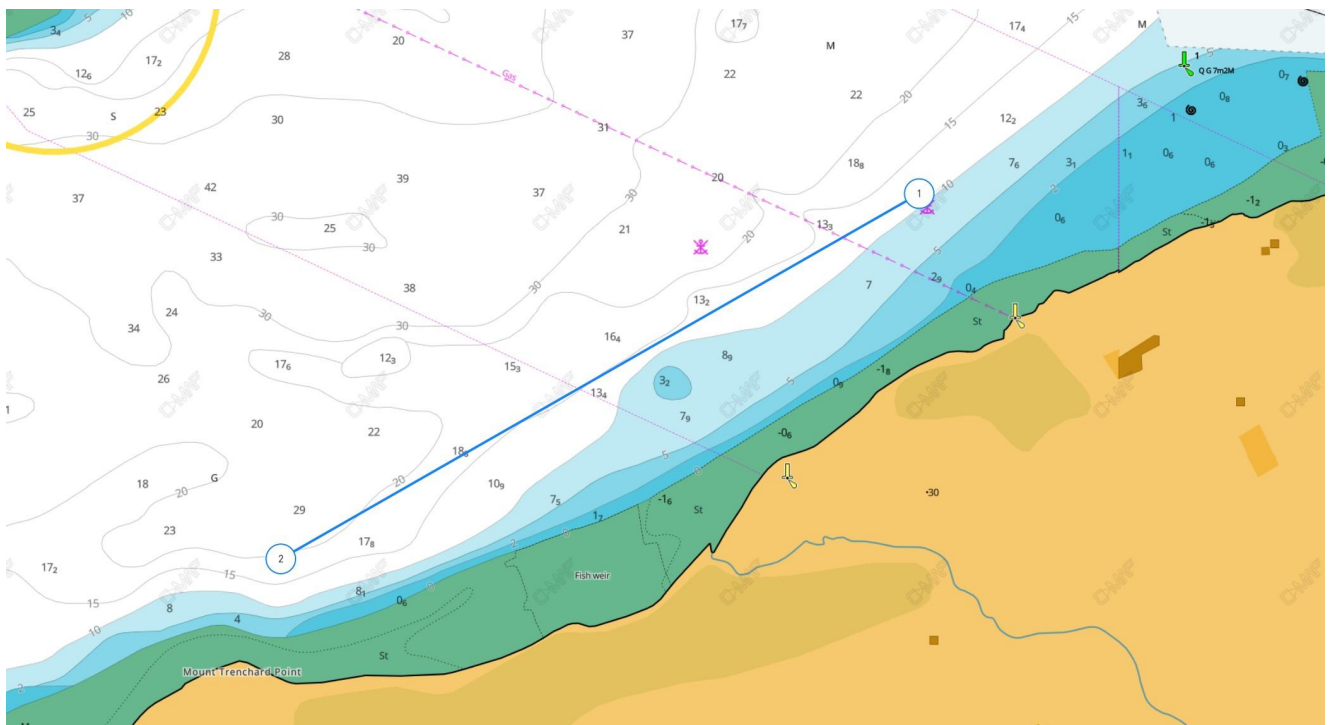


Figure 7 - Transit 1 & Tow testing

Tow testing

Tow testing will take place between near Mount Trenchard point from point 1 to point 2 as shown in Figure 7. Or near Sturamus Island from point 1 to point 2 as shown in Figure 8. This transit will be repeated until testing is completed. Testing will take place at various speeds to optimise the device for each flow velocity. A 300m towing line will be used to tow the device.

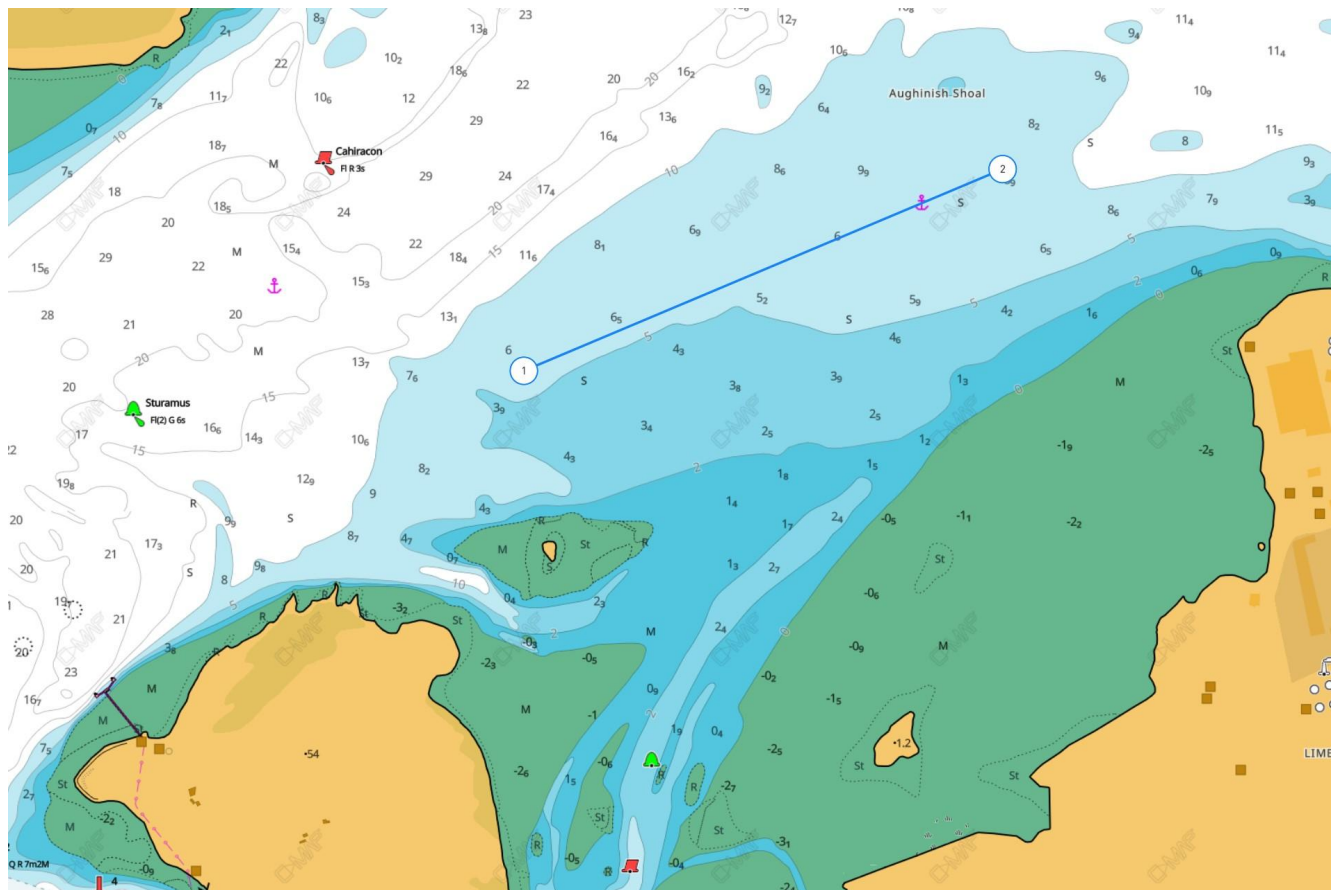


Figure 8 - Transit 1 & Tow testing

Acoustic Measurements at Cahiracon Pier

Acoustic measurements are required for environmental assessment. It is necessary to take these measurements in a quiet location with no engine running. To complete this task GKinetic plan to anchor the tug in the channel at Cahiracon pier. The turbine will be on secured to the tug on a 50 meter line. Acoustic measurements will be taken from a small vessel that will drift past the device.

The device will be towed from waypoint 1 shown in Figure 9, Foynes Yacht Club pontoon, to the site at waypoint 13 located between Inishmurray Island and the pier, following the route shown. The tug will be anchored at waypoint 13 with the device secured to its stern cleats on a 100m line. The device will be in a position downstream of the tug for a period of approximately 4 hours during an ebb tide during which time acoustic measurements will be taken out with the aid of a support vessel..

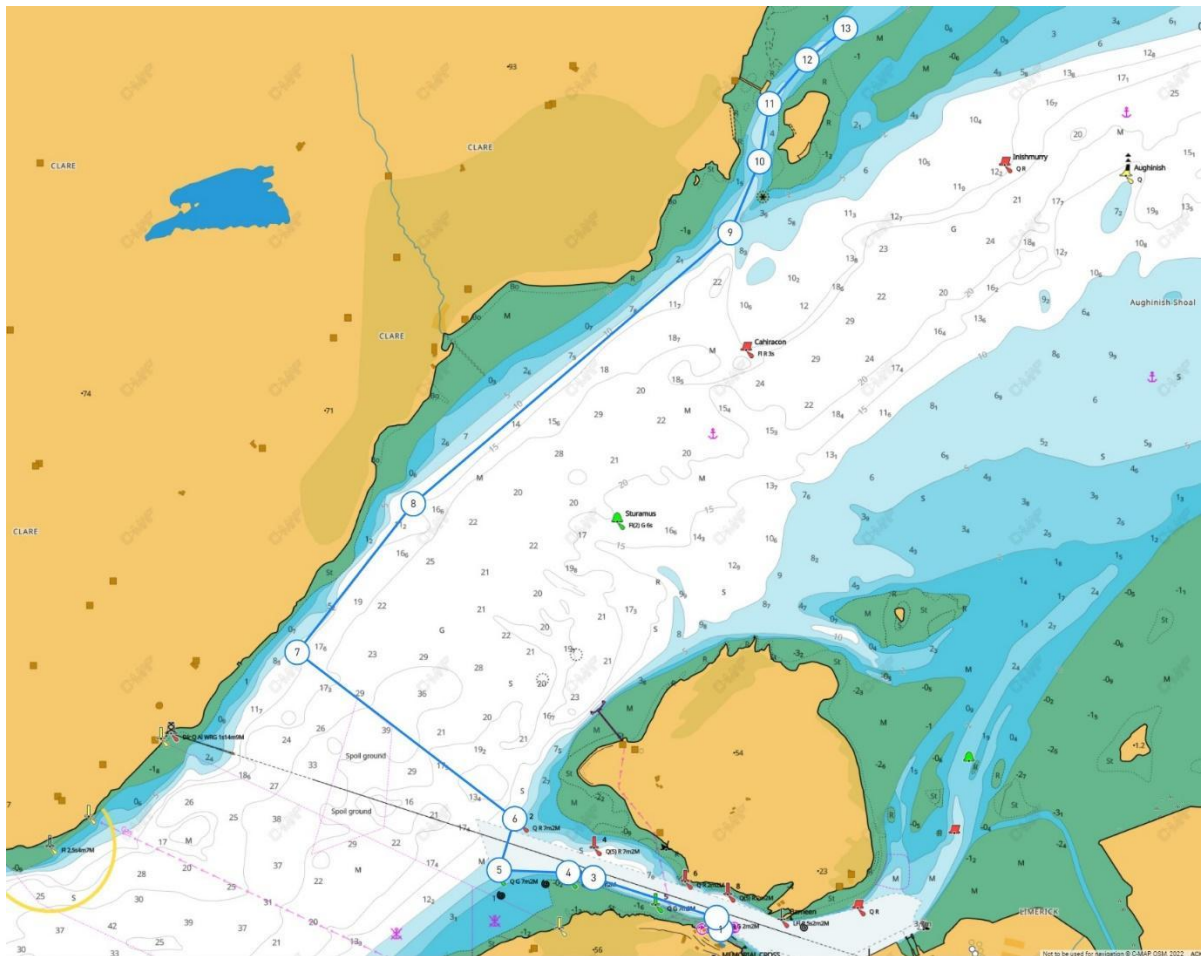


Figure 9 - Towing to anchored test site

Towing from Cahiracon site to FYC pontoon

The device will be towed from Cahiracon shown below in Figure 9 as waypoint 1 to Foynes Yacht Club pontoon, shown as waypoint 11.

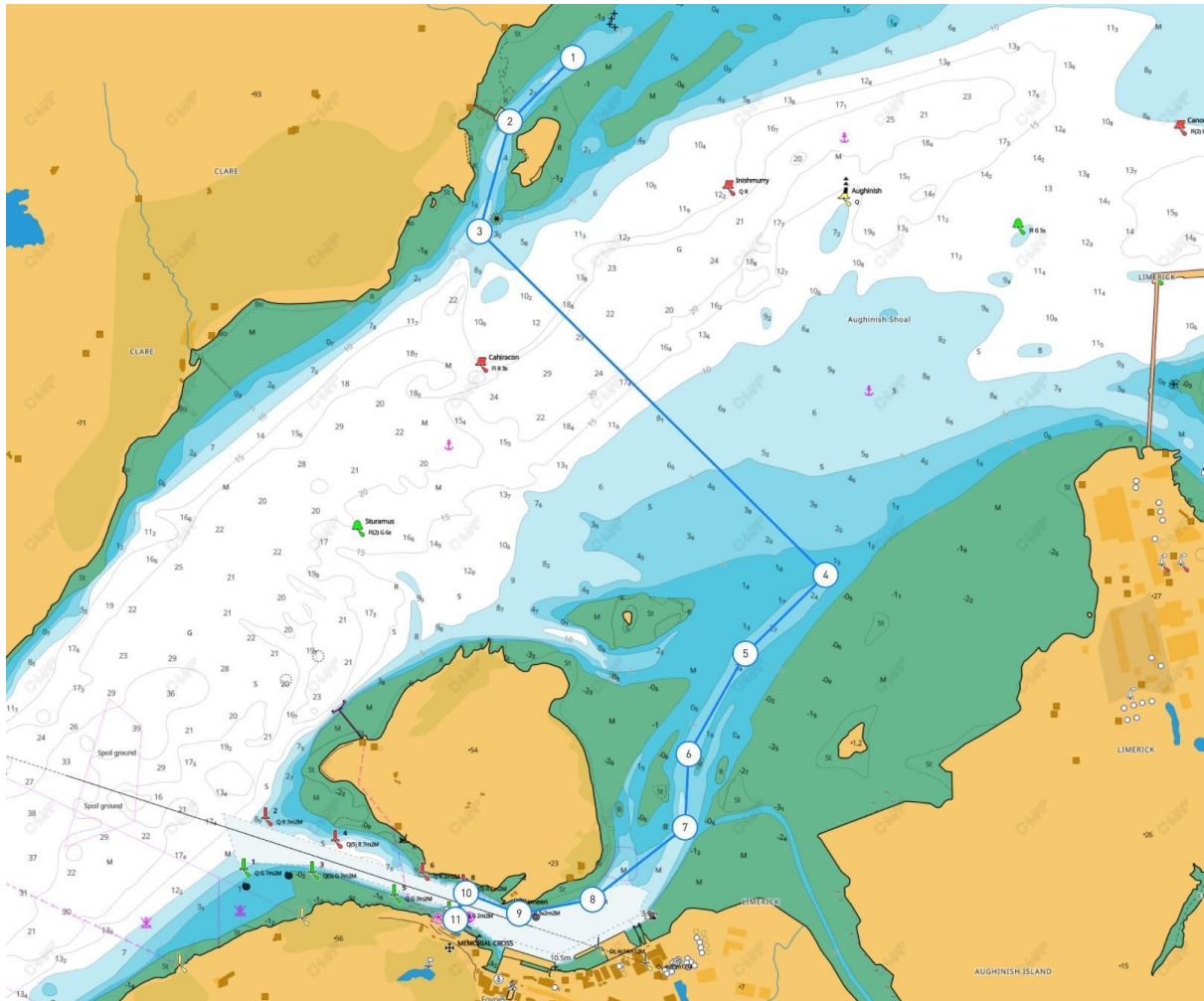



Figure 9 - Tow from anchored test site to Foynes Yacht Club pontoon

Method Statement for:

Title Of Project	GKinetic Energy CEFA 12kW tow testing and anchored testing 2022
Date of Issue	25 th November 2022

Issued To	Shannon Foynes Port Company.
Issued By	GKinetic Energy Limited
Approved by:	Print Name: Vincent Mc Cormack.
	Signature: 

Section 1	GKinetic Energy CEFA 12kW hydrokinetic energy device testing on Shannon Estuary
Section 2	Parties involved in project: GKinetic Energy Ltd Project Manager: Vincent Mc Cormack. GKinetic Energy Ltd. 38 Killeline Heights. Newcastle West, Co Limerick. Tel 086 2324709 Operations manager John Mc Cormack 086 8416600 Shannon Estuary Marine Marine Ops Contact Gerry Culligan. 0868153022
Section 3	Location & Operations of Project: Shannon Estuary, environs of Foynes Island, environs of Inishmurry
Section 4	Location & Security of onsite equipment (if different from above): Foynes Yacht Club Pontoons
Section 5	Project Management Details: Project Manager: Vincent Mc Cormack Site Supervisor/s for: Site set up/preparation: - Vincent Mc Cormack, John Mc Cormack Site activity: - Vincent Mc Cormack, John Mc Cormack Decommissioning/leaving site: - Vincent Mc Cormack, John Mc Cormack First aiders: - Vincent Mc Cormack Safety officer or safety point of contact: - Vincent Mc Cormack, John Mc Cormack
Section 6	Health & Safety Information: On site First aid arrangements: First aid equipment and location: Firefighting arrangements: A separate document may be used to address safety and health plans for the site
Section 7	Proposed duration of Project: 2 weeks

Section 8	Expected start date: 9 th November 2022		
Section 9	Expected Completion Date: 15 th November 2022		
Section 10	<p>Method Associated with Activity The device will be towed to the tow test site with a 50 meter floating dyneema towline.</p> <p>Tow Testing : At the tow testing location, the tow line will be extended to 300m. Tow testing will then take place along one of the routes outlined previously (Figures 7/8). Support vessel 1 will be attached to the device during tow testing. A support vessel will monitor the tow zone to prevent other small craft entering the tow zone and monitor device performance.</p> <p>Anchored Testing: During anchored testing the tug will be anchored at the position shown in Figure 9. The tow line distance will be reduced to 100m. Support vessel 1 will be attached to the device during anchored testing. Support vessel 2 will deploy an acoustic measurement drift-buoy device upstream of the device and recover same downstream of the device. This process will be repeated a number of times until sufficient data is collected.</p> <p>Transiting the Estuary: During all movement of the device not covered by Tow Testing and Anchored Testing, the device will be attached to the tug with a maximum 50m tow line rated to 10,000kg.</p> <p>Communications between the tug, support vessel 1 and the support vessel 2 will be by VHF radio Channel 72</p>		
Section 11	Identity of Hazards & Risks		
Hazard	Inherent Risk	Control	Residual Risk
Failure of towing line	H/M/L M	All towing equipment to be certified tested for the relevant loads being handled	H/M/L L
Personnel entanglement with device	H/M/L M	No personnel will be close to moving parts of the device during testing. Device turbine rotation speeds are very low and unlikely to pose a risk. An emergency stop is fitted to the device which can be activated by personnel on support vessel 1	H/M/L L
Personnel contact with live electrical cables	H/M/L H	Shutdown of all electrical equipment is carried out from support vessel 1. All power cables and connectors will be fully insulated.	H/M/L L
Small craft collision with device	H/M/L L	Small craft, other than the vessels involved in the GKinetic operations, shall be monitored during towing periods.	H/M/L L
Large vessel collision with device	H/M/L M	Confirmation will be sought from SFPC on the scheduling of shipping travel and plans will be made to not interfere with shipping traffic.	H/M/L L

		Confirmation will also be sought immediately prior to any transit on shipping lanes.	
Sinking of the device causing a navigation hazard	H/M/L H	The device is fitted with 86% excess solid buoyancy which prevents water ingress to the hull.	H/M/L L
Section 12	Training and Competency: <ul style="list-style-type: none"> • Details of competency for the following: • First aid / emergency planning: - Vincent Mc Cormack Project Manager and safety officer. First Aid training. John Mc Cormack Safety coordinator. First aid training. • Supervision of test setup / preparation: Vincent Mc Cormack, John Mc Cormack • Plant and equipment operators (where applicable). Tug operator: - Gerry Culligan. Support vessel 1: - Vincent Mc Cormack, Support vessel 2: - John Mc Cormack. • Supervision of activity itself. John Mc Cormack - Operations Manager. • Coordination of support vessels. (where applicable) Vincent Mc Cormack. Power Boat cert, safety boat cert. Yachtmaster Ocean. • Supervision during decommissioning/ leaving site. John Mc Cormack 		
Section 12	Equipment and machinery to be used: Tug, Ard-Ri MV "Ard Ri" a multipurpose Landing craft/Workboat specifically designed for: Marine Civil Eng., commercial diving and associated works, towage, pollution response, passenger services, livestock transportation, and machinery transportation etc. Support Vessel 1 - Arvor 22, Support Vessel 2 - Small craft (Rib) with 45 hp outboard. GKinetic CEFA12kW turbine device		
Section 13	PPE to be used: Overalls. Safety Footwear. Hi Visibility Jackets. Lifejackets. Safety Helmets Hearing Protection as required		
Section 14	Impact to Port Services: There will be no impact on the movement of large vessels. The movement of small vessels will be supervised with restrictions during towing operations.		
Section 15	Permits / licences associated with the Project (where required): No REGULATORY Permits needed.		
Section 16	Method Statement written by: Title: Project Manager. Vincent Mc Cormack		

Section 17	Project Team acknowledgement sheet: All those involved or associated with the project must be communicated the content of this document and where applicable associated documents. Document/s must be signed to acknowledge an understanding of the agreements and controls associated with the project. On signing the document/s participants are deemed to understand and accept the conditions associated with the project If any person is unsure or unclear, <u>they must</u> seek clarification before work commences.		
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