

Belmullet Wave Energy Test Site



Wave Energy Centre Annual Conference 2011
15 September 2011, Enotel Lido, Madeira Island, Portugal

Context: OE Programme initiated 2009

Objectives: Introduce OE into Energy Portfolio and Create Industry Sector
Range of Actions initiated and ongoing

Undertake Strategic Environmental Assessment and establish new planning system

Intensify resource and site assessment

Establish grid-connected test facilities

Fund industry research, development and demonstration

Enhance 3rd level Research Infrastructure

Promote development of engineering and other supply chain capabilities

Support grid infrastructure development studies

2009

2010

2011

2012

2015

2020

Rationale: Large Marine Renewable Resource

Assessment Area**	Fixed Wind (MW)	Wave: 0 to 100m Water Depth (MW)	Wave: 100m to 200m Water Depth (MW)	Tidal (MW)	Floating Wind (MW)
1: East Coast (North)	1200 to 1500*	No Resource	No Resource	No Resource	0
2: East Coast (South)	3000 to 3300*	No Resource	No Resource	750 to 1500	0
3: South Coast	900 to 1500	No Resource	No Resource	No Resource	6000
4: West Coast (South)	600 to 900	500 to 600	3000 to 3500	No Resource	5000 to 6000
5: West Coast	500	5000	6000 to 7000	No Resource	7000
5a: Shannon Estuary	No Resource	No Resource	No Resource	0	No Resource
6: West Coast (North)	3000 to 4500	7000 to 8000	6000 to 7000	750 to 1500	7000 to 8000
Total	9200 to 12200	12500 to 13600	15000 to 17500	1500 to 3000	25000 to 27000

Figures from Strategic Environmental Assessment 2011

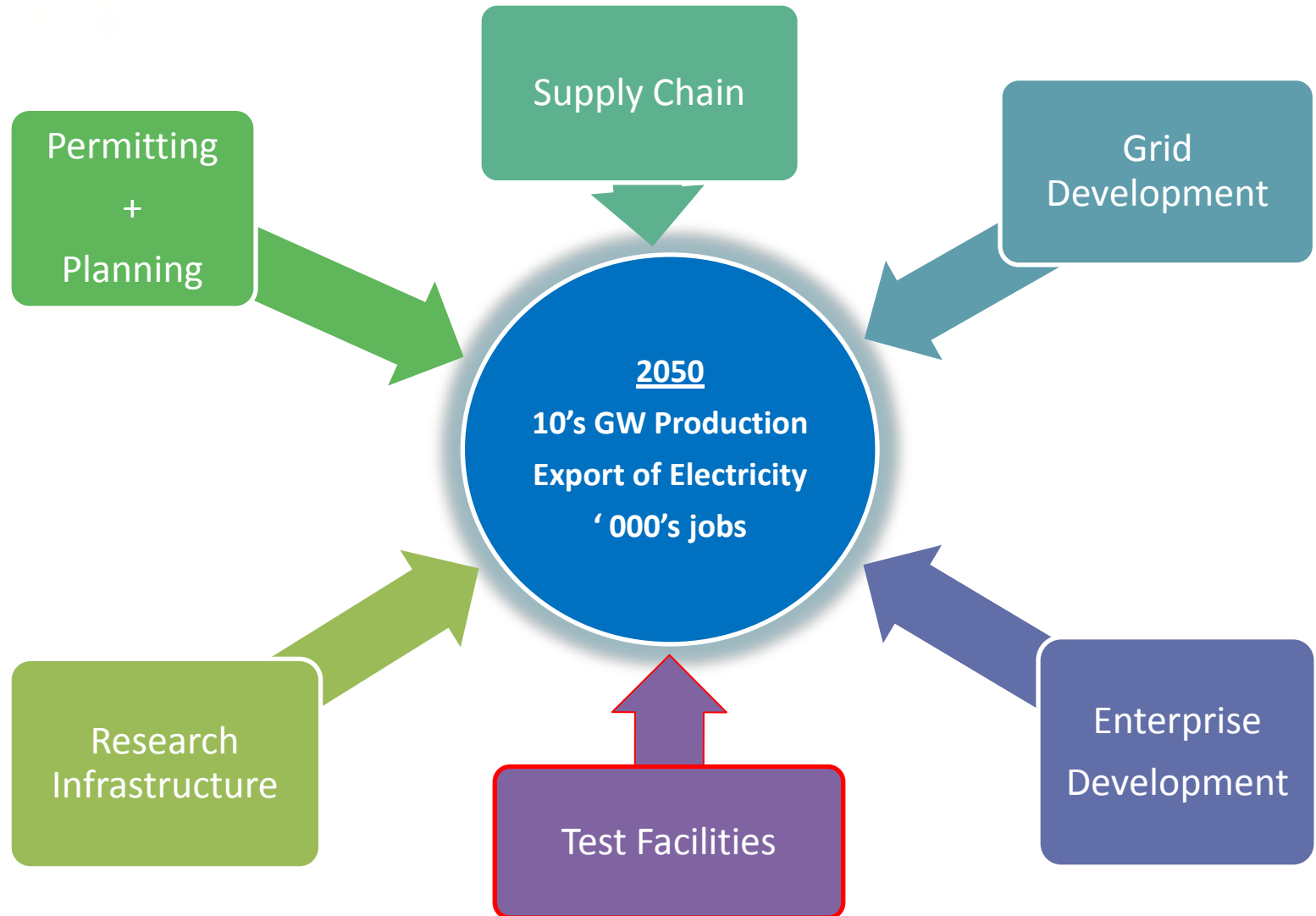
Total development potential (MW) without likely significant adverse effects)

Summary Progress since 2009

- **Ocean Renewable Energy Development Plan being finalised**
- **Interim national co-ordination/collaboration mechanisms developed**
- **Strategic Environmental Assessment completed**
- **New Planning system in the works**
- **Development of fully open-ocean grid-connected wave test facility underway**
- **Upgraded national Wave Tank facility being developed**
- **20+ industry projects supported with high profile for a number of technologies**
- **Effective Industry Association established**
- **Complementary high-profile industry ICT initiatives as part of SmartBay**
- **Reports produced (Economics/Ports and Shipping/Engineering Sector) to create greater awareness of potential value and supply chain opportunities and requirements**
- **Study on the Viability and Cost Benefit Analysis for Ireland Exporting Renewable Electricity (RES-E) using the Co-operation Mechanism in Directive 2009/28/EC underway**

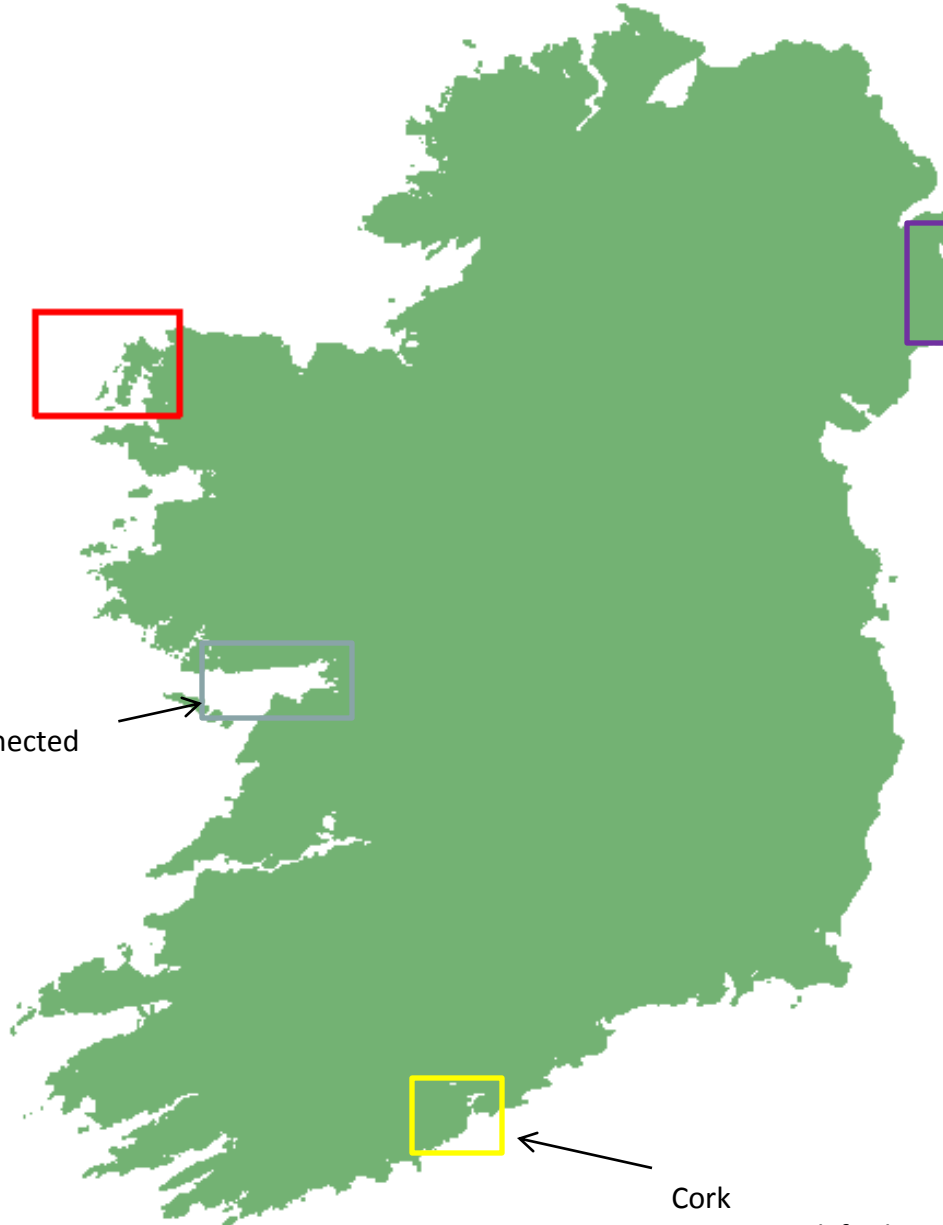
2020 a waypoint on a much longer path

Intensified actions and new mechanisms required, commensurate to the opportunity and challenge





Research Infrastructure and Test Sites



Mayo Wave Test Site
Full-scale grid-connected



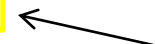
Strangford
QUB Tidal Test facility



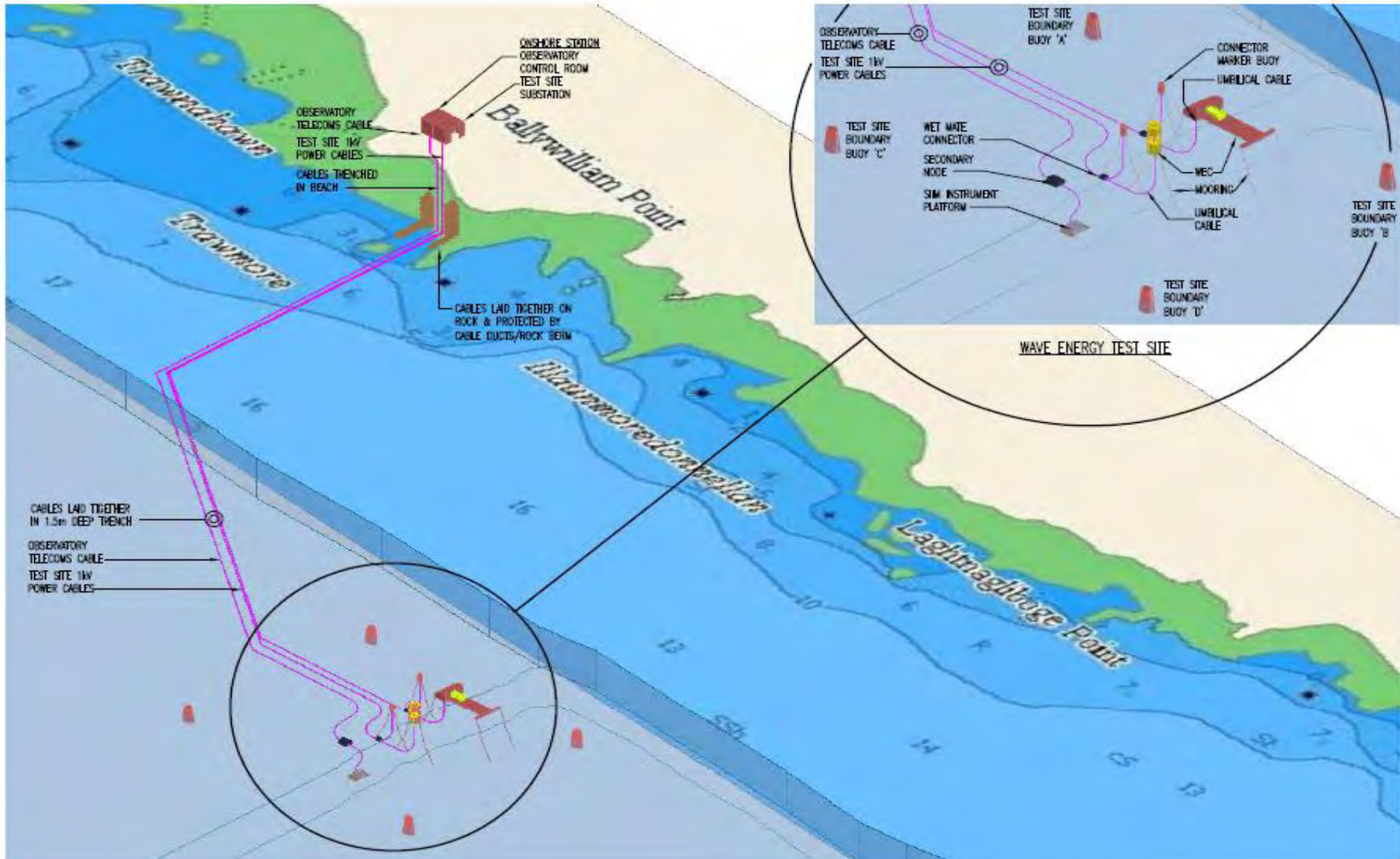
Galway Bay site
¼ scale non-grid connected



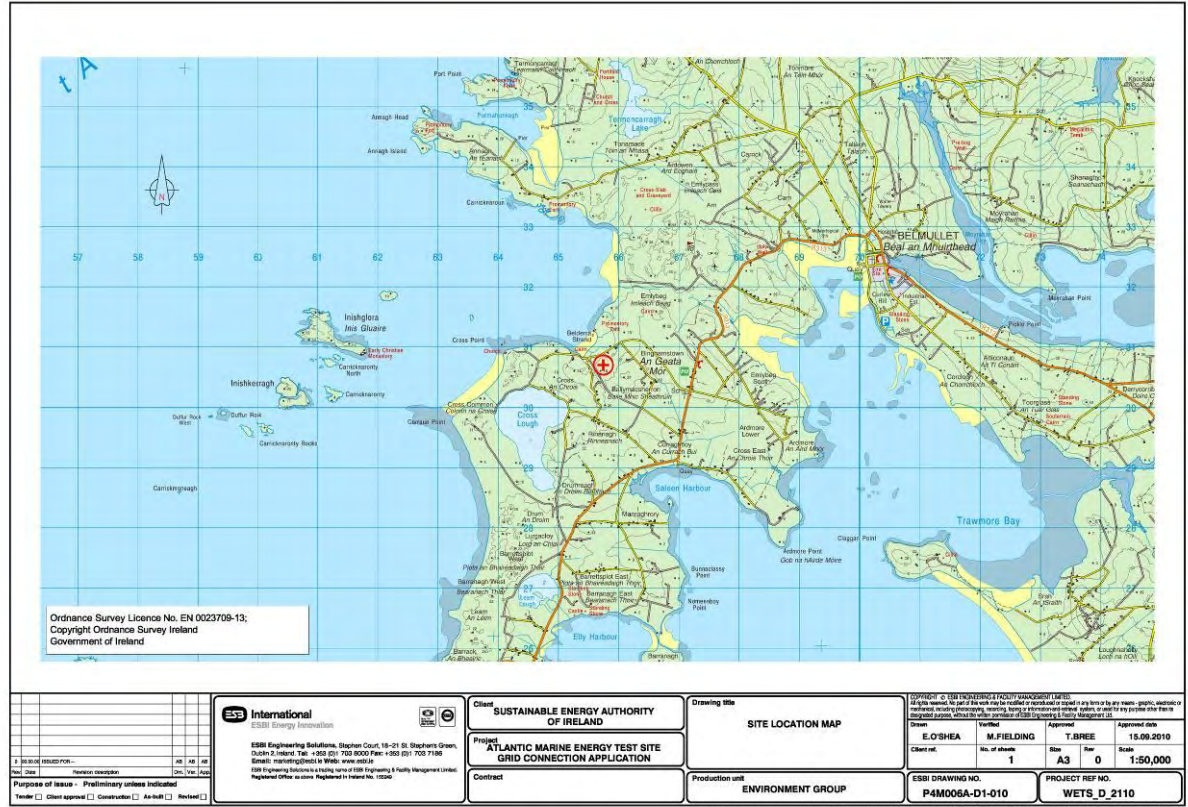
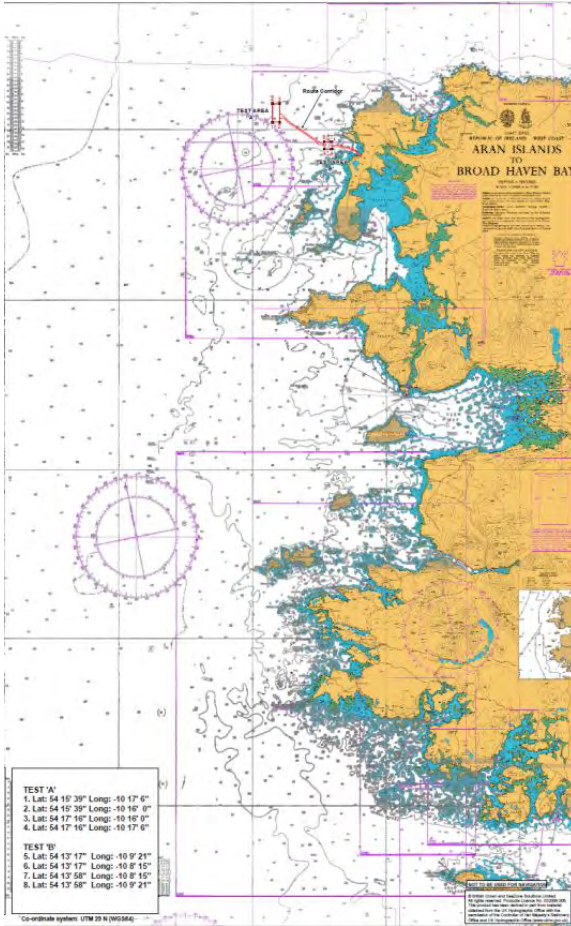
Cork
OE Test tank facility
Maritime and Energy Research Cluster (MERC)



Cable to Galway Test Site/SmartBay



Atlantic Marine Energy Test Site Location





Engineering Services

- Project Feasibility Study
- Project Concept Design
- Project Consenting and Permitting (incl EIS)
- Public Consultation
- Project Detailed Design
- Submarine Cable Design
- Substation Design
- Offshore Test Area Design



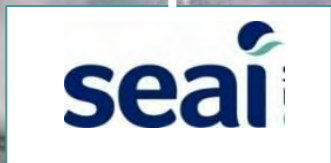
Developer Input

- Site Operating Plan
- Environmental Surveys



Marine Data Collection

- Offshore Surveys
- Wave Monitoring Buoys
- Data Collection



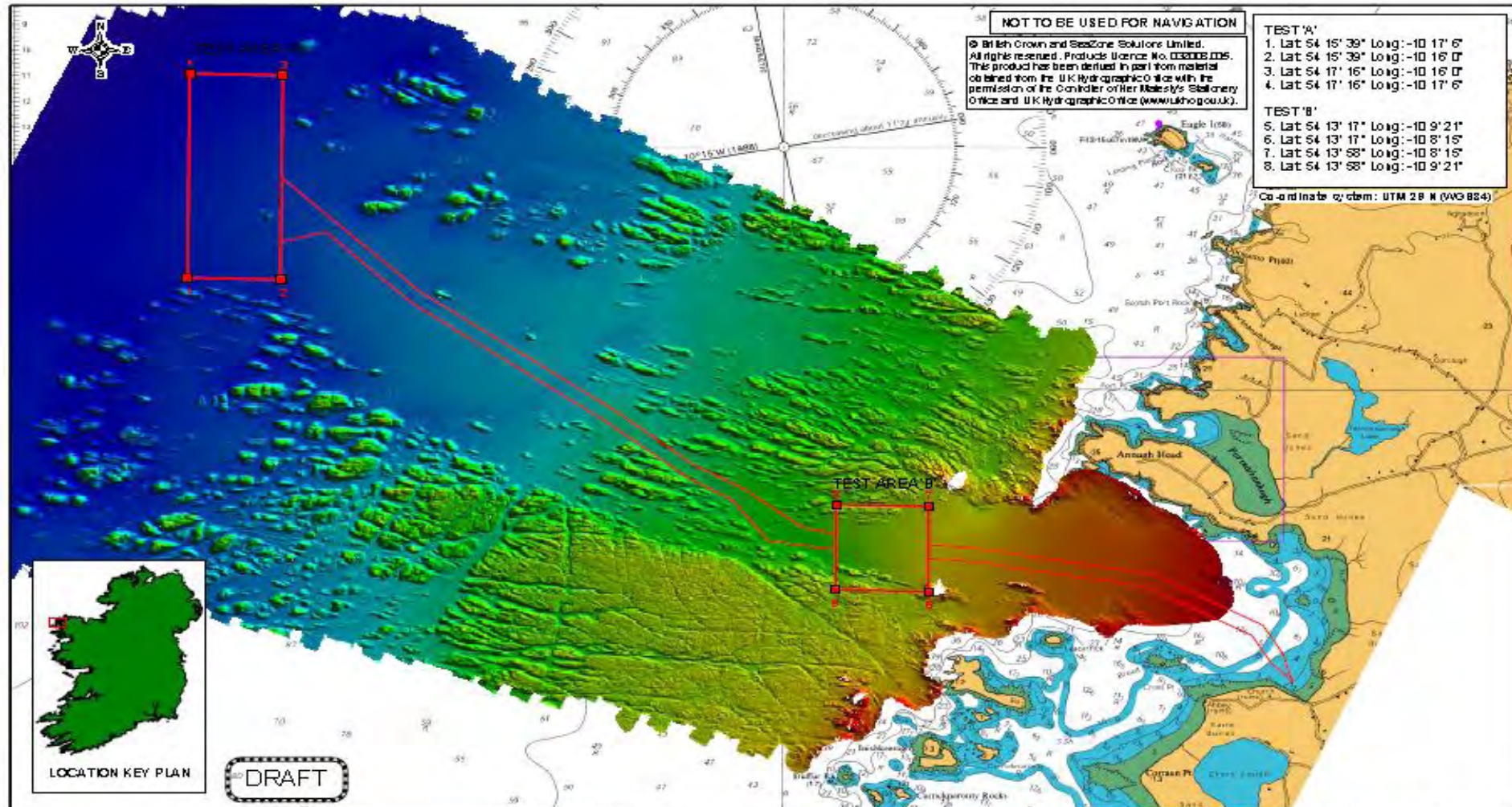
Local & Developer Liaison

- Developer Contact
- Belmullet Office
- Local liaison



Project Management

- Navigation Studies
- Slipway Design
- Subsea Electrical connection options



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© Stephen Court,
18/21 St Stephen's Green,
Dublin 2, Ireland.
Telephone: +353-1-7036000
Fax: +353-1-451-6359/62-3359
Web site: www.esbi.ie

CURRENT REVISION DESCRIPTION:

Rev.	Drawn	Entered	Description	Em.	Iss.	App.

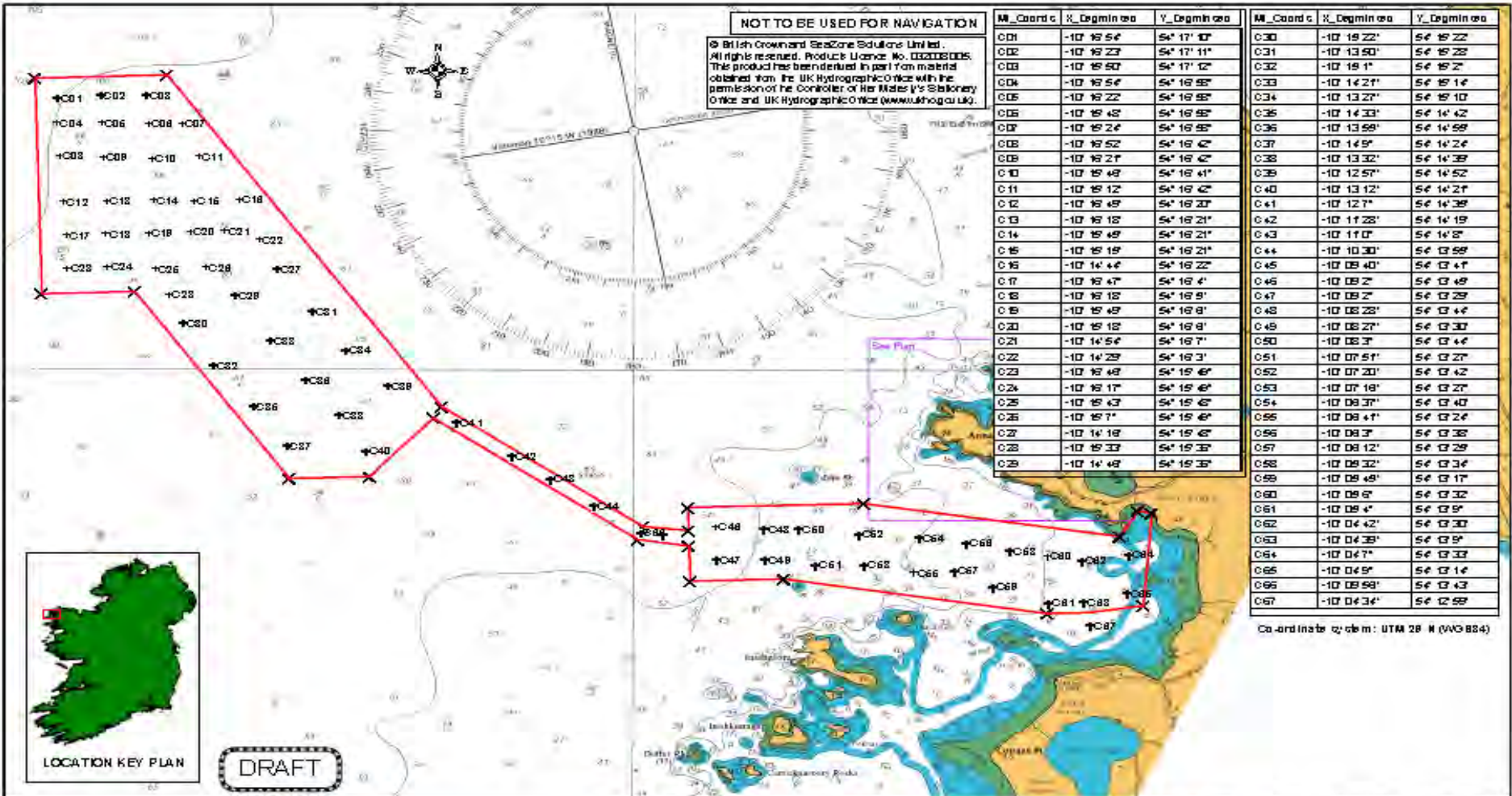
CLIENT:
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PROJECT:
ATLANTIC MARINE ENERGY TEST SITE

DRAWING TITLE:
TEST AREA MAX AND CABLE ROUTE
CORRIDOR LAYOUT - BATHYMETRY

DRAWN EO'S HEA	CHECKED M. FIELDING	APPROVED T. BREE	APPD DATE 10.03.2010
CLIENT REF		No. of SHEETS 1	SCALE A2 1:60,000
ESBI DRAWING NO. PMB08A-D1-002		PROJECT REF NO. AMET_B_D_2-002	

Vibrocoring locations



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C03	-10 16 50	54 17 12	C32	-10 16 1	54 16 2
C04	-10 16 54	54 16 58	C33	-10 14 21	54 16 14
C05	-10 16 22	54 16 58	C34	-10 13 27	54 16 10
C06	-10 16 45	54 16 58	C35	-10 14 33	54 16 42
C07	-10 16 24	54 16 58	C36	-10 13 58	54 16 58
C08	-10 16 52	54 16 42	C37	-10 14 5	54 16 24
C09	-10 16 21	54 16 42	C38	-10 13 32	54 16 38
C10	-10 16 48	54 16 41	C39	-10 12 57	54 16 52
C11	-10 16 12	54 16 42	C40	-10 13 12	54 16 21
C12	-10 16 49	54 16 37	C41	-10 12 7	54 16 38
C13	-10 16 18	54 16 21	C42	-10 11 28	54 16 19
C14	-10 16 49	54 16 21	C43	-10 11 0	54 16 8
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Co-ordinate system: UTM 29 N (WGS84)

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Stephen Court,
 18/21 St Stephen's Green,
 Dublin 2, Ireland.
 Telephone: +353-1-7036000
 Fax: +353-1-651-5355/652-3355
 Website: www.esa.ie

CURRENT REVISION DESCRIPTION:

Rev	Date	Author/Description	En.	App.

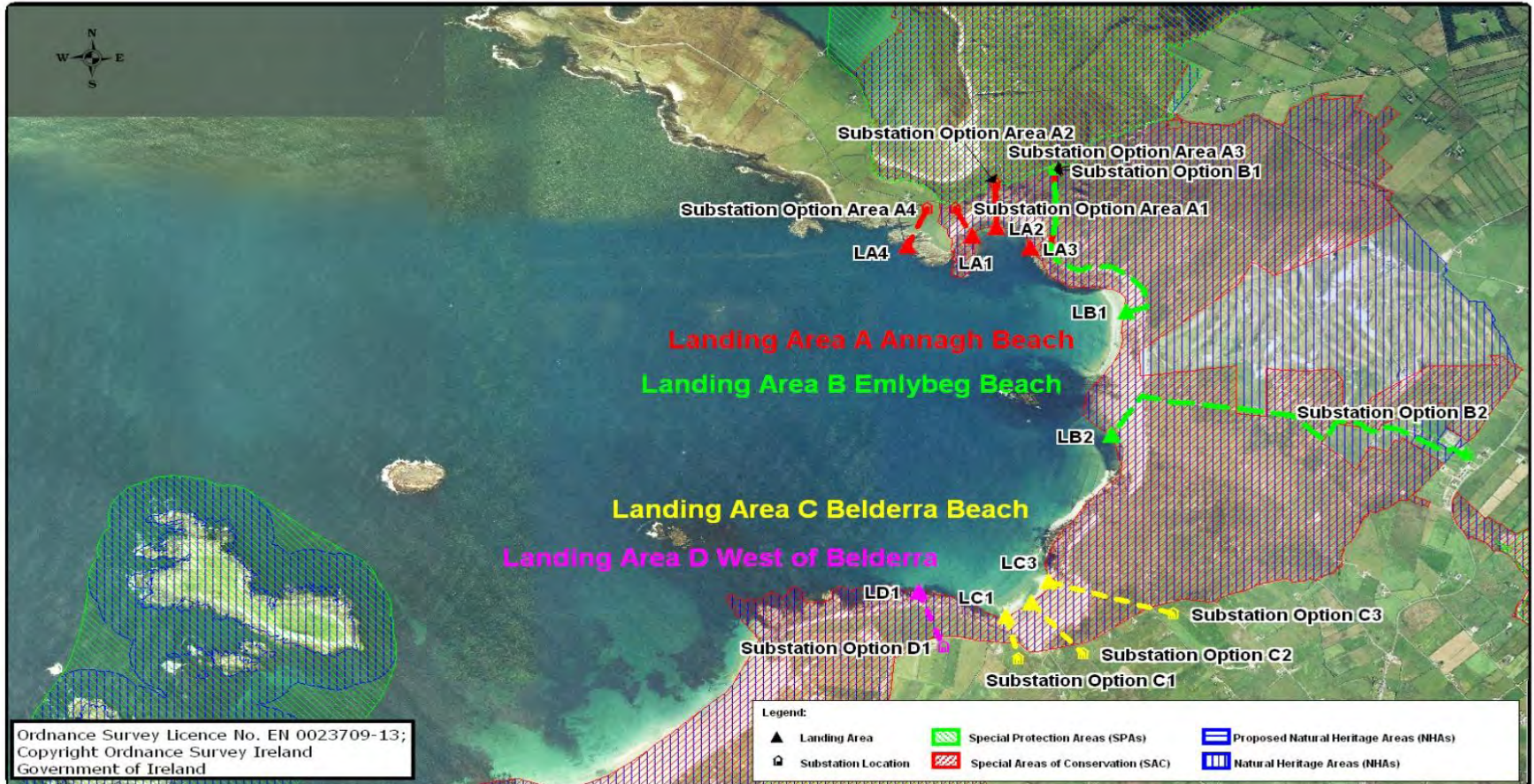
CLIENT:
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PROJECT:
 ATLANTIC MARINE ENERGY TEST SITE

DRAWING TITLE:
 SURVEY AREA EXTENT WITH FULL LIST OF CORE SAMPLE LOCATIONS

DRAWN	CHECKED	APPROVED	APPD DATE
EOY'S HEA	M. FIELDING	T. BR EEE	10/03/2010
CLIENT REF	No. of SHE	SHEET	SCALE
	1	AS	1:60,000
ESBI DRAWING NO.		PROJECT REF. NO.	
RMD08A-D1-003		AMET_E_D_003	

Alternative submarine cable landing locations examined



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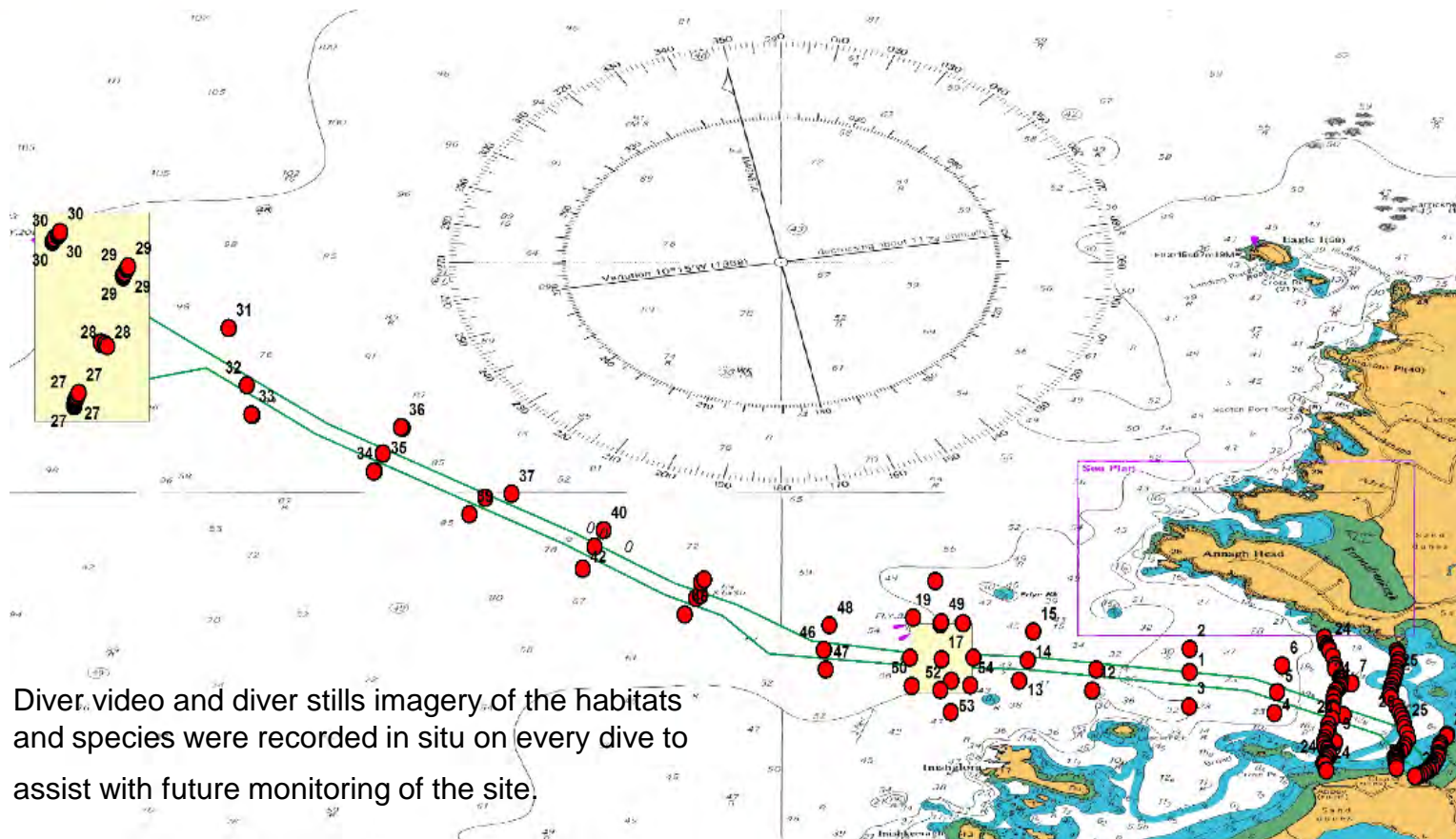
CLIENT:
Sustainable Energy Ireland

PROJECT:
Wave Energy Network Test Site

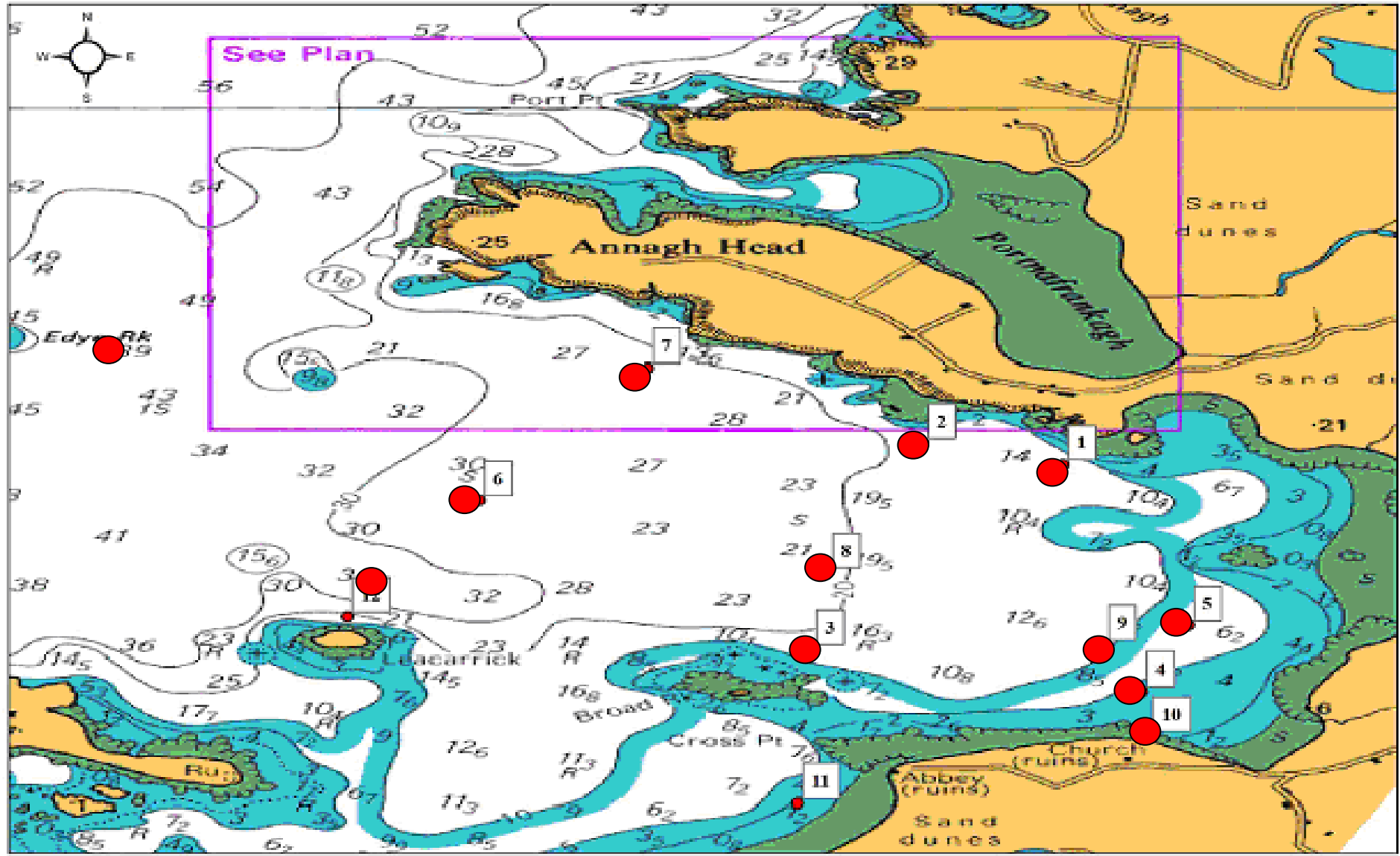
DRAWING TITLE:
Cable Landfall Options and Proposed Substation Location

DRAWN E.O.S	CHECKED M.F	APPROVED P.K	APPD DATE 18/06/2010
CLIENT REF		No. of Shts 1	SIZE A4
DRAWING NUMBER		SCALE 1:30000	
Figure 7			

Drop down video locations



Location of Dive Stations



Marine Mammals Surveys

Shore based and transect based observations
Towed hydrophones
CPODs

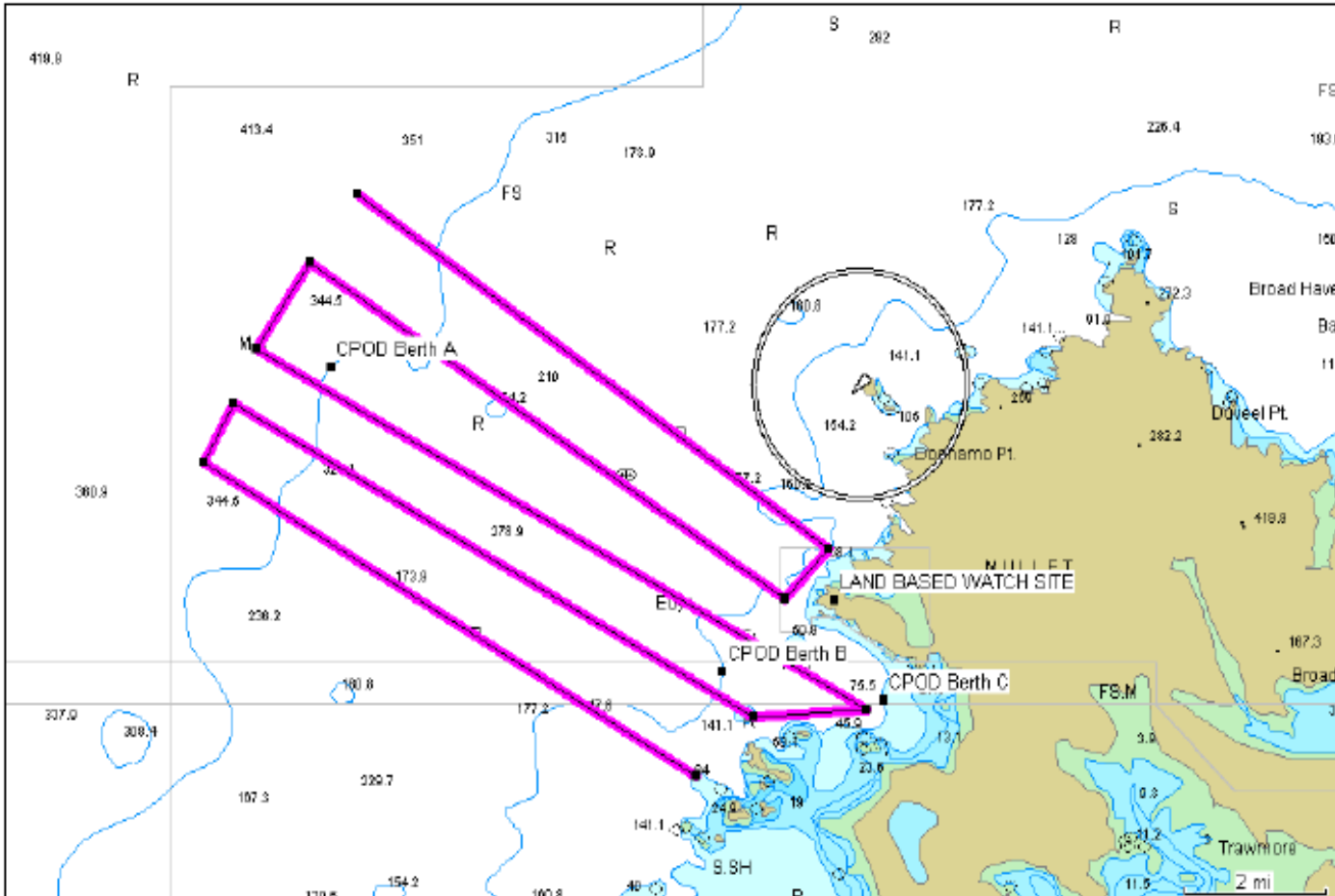
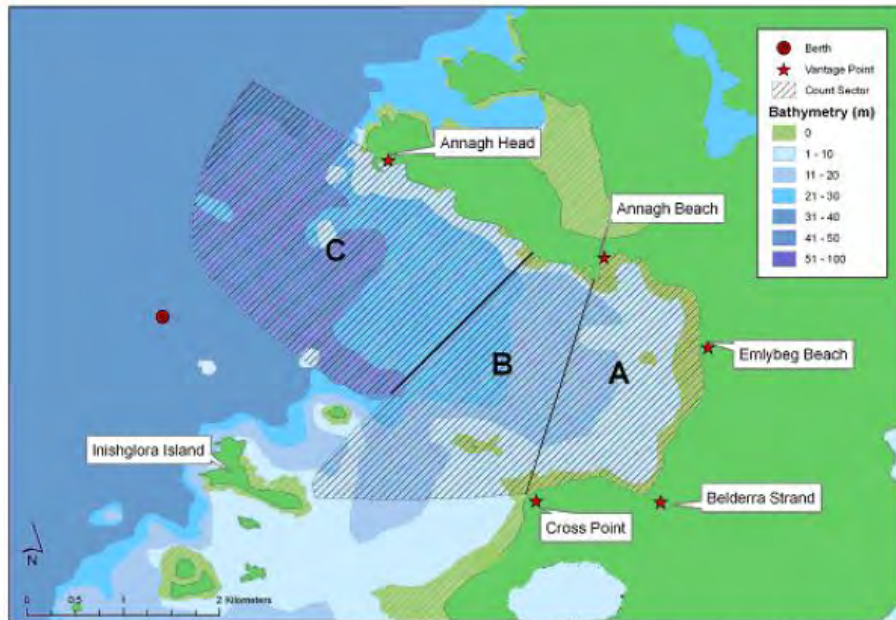
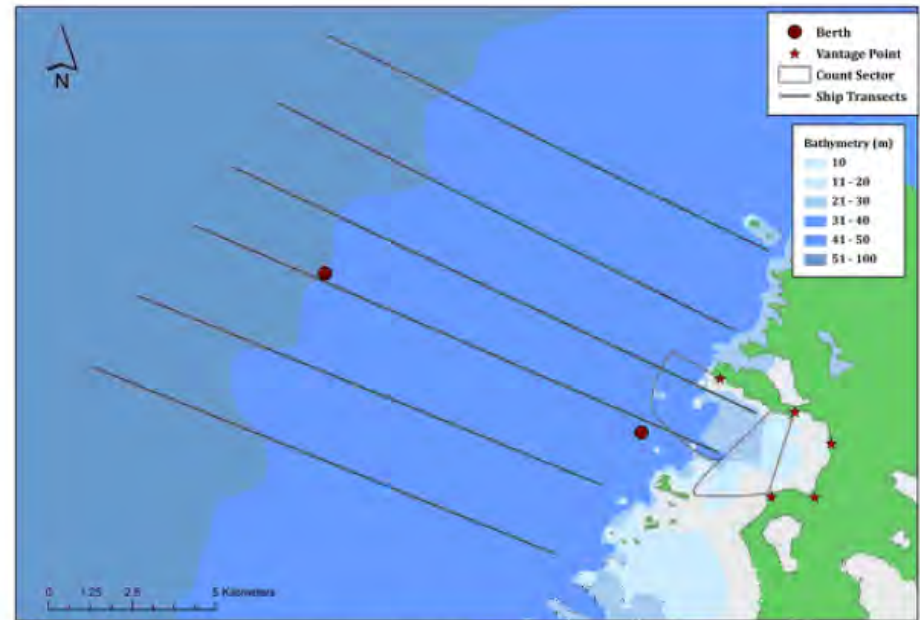


Figure 2. Example of vessel based transect lines and the location of CPODs and Land-based watch site

Shore based and sea based bird surveys



















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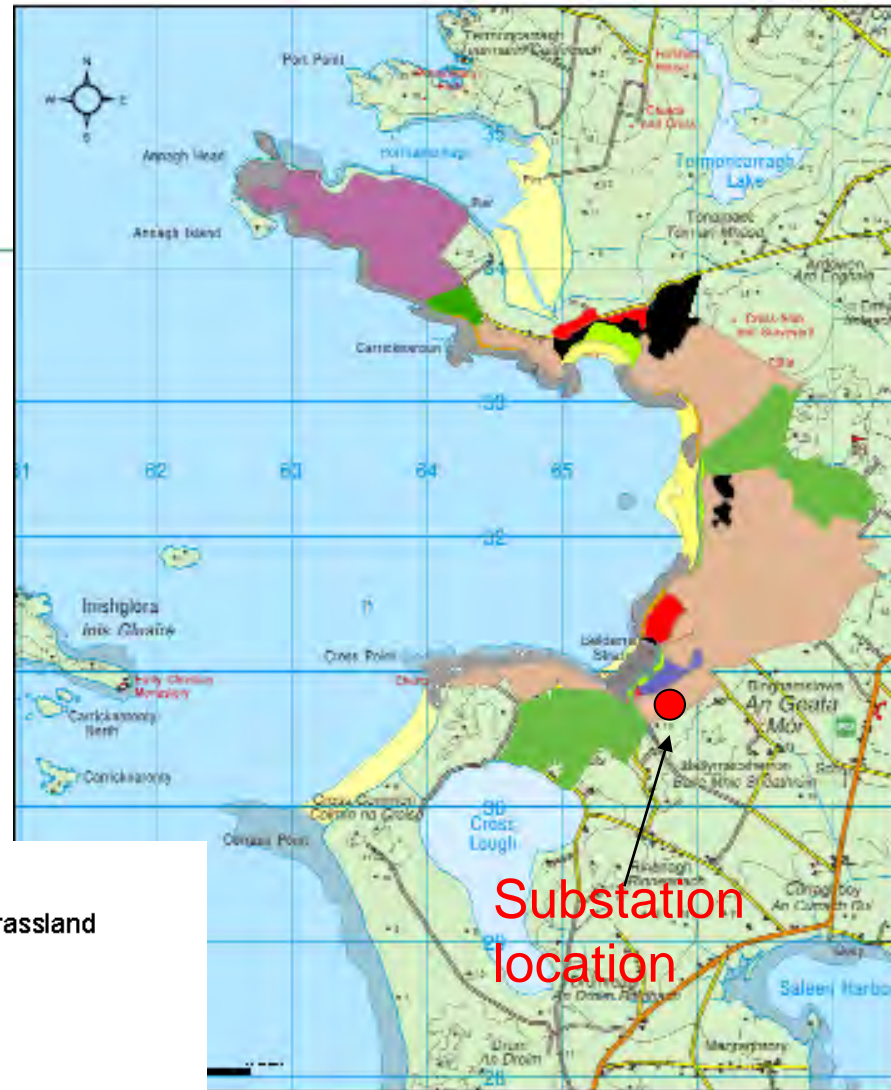


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Six SPAs lie within 5 km of the study site, two lie within 15km of study site and a further two lie 20-30 km from the study site.

Fossit Habitat Classification

-  CB1-Shingle and Gravel Banks
-  CD2-Marram Dunes
-  CD3-Fixed Dunes
-  CD5-Dune Slacks
-  CD6-Machair
-  ED1-Exposed Gravel, Sand or Till
-  FW2-Depositing Lowland Rivers
-  FW4-Drainage Ditches
-  GA1
-  GS1-Dry Calcareous Neutral Grassland
-  GS1-Dry Calcareous Neutral Grassland/GA1-Improved Agricultural Grassland
-  Golf_links/CD3-Fixed Dunes
-  LR1-Exposed Rocky Shores
-  LR2-Moderately Exposed Rocky Shores
-  LS1-Shingle and Gravel Shores
-  LS2-Sand Shores
-  PB4-Cutover Bog/PB3-Lowland Blanket Bog/GS1-Dry Calcareous Neutral Grassland



No rare or conservation species

Predicted impacts



- Reef and Benthos- Likely that the impacts of the development will lie within the natural variability of the area. No significant negative impacts are predicted to arise.
- Marine mammals – Low given the location in the open ocean
- Birds – Potential risk of collision/disturbance/displacement
- Intertidal – low impact
- Terrestrial – low impact

Some Mitigation considered

- Minimise footprint.
- Efficient and short time frame for construction
- Suitable for deployment in the local environment.
- Ploughing preferred method of cable laying in terms of impacts on subtidal benthos
- Burial of submarine cables at a suitable depth
- Use of antifoulant on WECs should be minimized.
- Marine Mammal Observers (MMO).
- Minimise working corridor on Belderra strand.
- Disturbance impacts to avifauna should be minimised by limiting construction activities to the summer months,
- Ongoing monitoring (noise monitoring technology development).

Wider role for AMETS



Project motivation and objectives

Ireland and the world face regulatory compliance and permitting challenges for OE

- ❖ These hurdles must be overcome for the industry to progress: both for development and production deployment

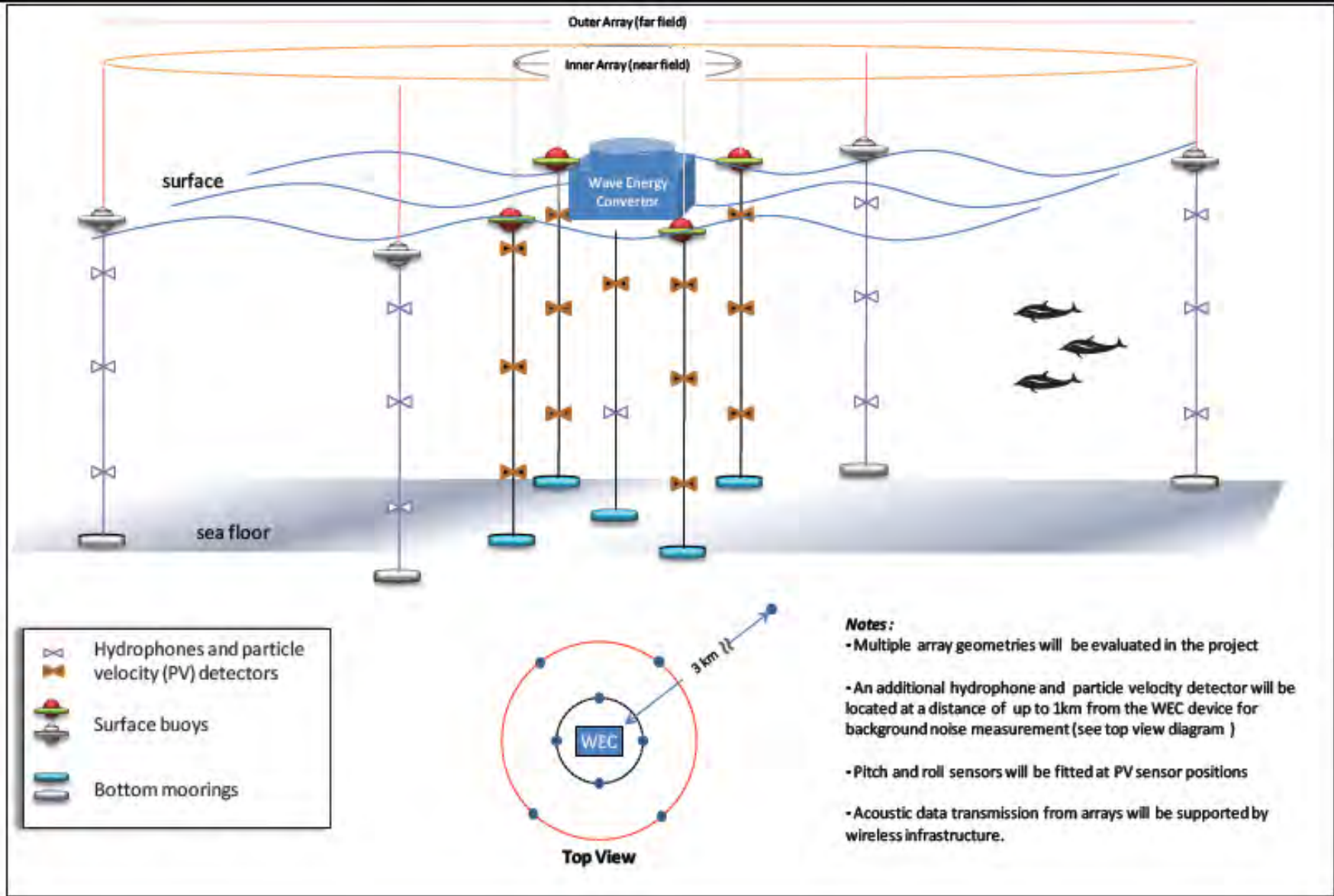
Environmental impact assessment (EIA) requires both the proper technology as well as a proven and consistent methodology

- ❖ Additional benefits to the Irish ecosystem and knowledge economy



EIA affects all participants

WEC noise measurement technology and methodology



- **Foreshore Licence application (including EIS) will be made in October 2011**
- **Planning Application for onshore substation October 2011**
- **Grid Offer - September 2011**
- **Consenting – Quarter 1, 2012**
- **Construction 2013**
- **Operation 2014**