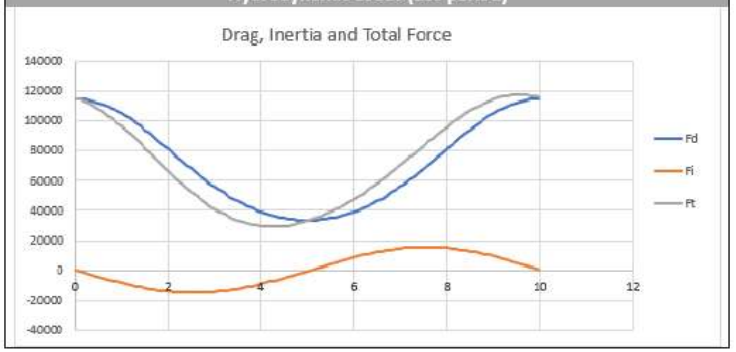
INPUTS

DEVICE SPECIFICATIONS										
Power	Device width	Blade Length	Swept Area Power	Rotor Diameter	Drag Area	Mass	Draft	Device Length	Weight	Volume
60kW	9.5m	2.4m	22.8 m^2	2.2m	33.25 m^2	20 T	4.467	11.44m	20t	20m^3

Environmental Loading Inputs				
	Current Loads	*Wind Loads*	*Unit*	*Note*
rho	1025	1.225	*kg/m^3*	*Density of Water*
Ct	1	1.5		*Coeff. Thrust*
A	33.25	22.7772	*m^2*	*Area*
u	2.6	20	*m/s*	*assume includes 3-sigma turbulence*
Ca	1			*Added mass (inertia coef)*
Cm	2			*Morrisons Co-eff*
V	20		*m^3*	*Volume*
TI	10		*%*	
TI	5		*deg*	
*X*TI*	3			*3 equates to 1 event per 5 minutes*
Tp	10		*s*	
LF	1.4175			*DNV Standard Load Factors 1.35 x 1.05*

LOAD CALCULATIONS

Hydrodynamic Loads (10s period)

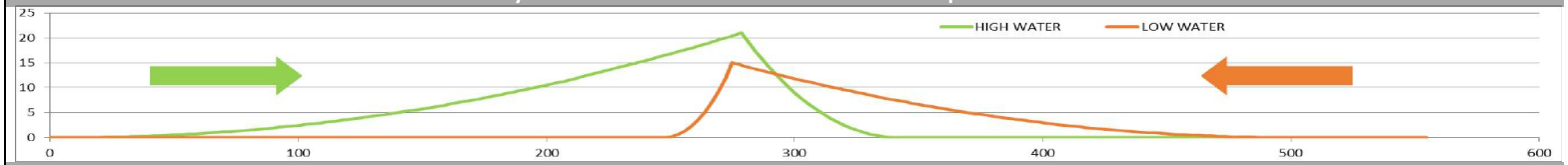


Environmental Loading Results			
Fwind	8370.621	N	$Fwind = \frac{1}{2}\rho A u^2 C_t$
Ft Max	117842.0418	N	$FTotal = \rho C_m V \dot{u} + \frac{1}{2}\rho C_d A u \lvert u \rvert$
Total (Ft + Fwind)	126212.6628	N	
Total (Ft + Fwind *LF)	178906.4495	N	

MOORING LAYOUT

Inputs		Unit	Notes
w	215.82	N/m	weight per unit length of chain
depth	19	m (LAT)	
depth of mooring point	-4	m	
tidal range	6	m	
h_low - h_high	15 - 21	m	water depth to connection point
FTotal	179.8	kN	See environmental loading hand calculation

Results of analysis based on OM Faltinsen Sea Loads on Ships and Offshore Structures



	HW upstream	HW downstream	LW downstream	LW upstream	Units	Notes
Th	378.9064495	21.09355049	5.9	363.7064495	kN	horizontal load on mooring
a	1755.659575	97.73677365	27.30771239	1685.230514		ratio of hozizontal load v weight per meter
T_{max}	383,438.67	25625.77049	9130.850488	366943.7495	N	
l_{min}	272.35	67.42	32.31	225.34	m	minimum mooring line length to touch down point.
X	278.9	275.6	275.1	279.3	m	horizontal distance from anchor to moored vessel
x	271.3	63.0	27.5	224.7	m	
	7.6	212.6	247.7	54.7	m	excess flat on seabed
	6.0	1.5	0.7	5.0	t	weight of catenary acting on device
			554.5		m	Total Length of Spread
			2.5		m	Device drift between LW & HW **(NB: must be less than 10m)**

Notes:

A. *Calculations assume only axial load*
B. *Environmental loading calculations assume drag and inertial coefficients*
C. *If drag coefficients are available from CFD analysis or tank testing this analysis should be updated*
D. *It is assumed the design velocity includes 30% turbulence*
E. *Loading assumes 10s period for turbulence*
F. *Load factor of 1.35, (uncertainty) x 1.05 (DNV Tidal-uncertainty in methods) is included in the analysis*
G. *It is estimated from literature that turbulence in the flow will act in the transverse direction also with 1 std dev approx equal to 5 degrees.*
H. *Assumed that the device is supported at 4m below SWL.*
I. *It is recommended that the stability of the device under axial load is analysed to determine the best tie off point.*
J. *Consideration of the downward force generated by the catenary must be considered for the device stability.*
K. *Chain drag is ignored on the basis that the drag is relatively very low in comparison with the device.*
L. *This drawing is intended to supplement "DPR60 – Preliminary Marine Installation Manual" report and is a deliverable under proposal PR-TMOS-001 which has been awarded to Daretech by DesignPro Ltd. The purpose of the study is to develop a preliminary marine operations plan in order to support the Foreshore application to Clare County Council. All engineering and calculations notes are therefore preliminary, and not for construction at this point.*

DO NOT SCALE DRAWING | REVISION

DARE TECHNOLOGY

TITLE: Preliminary Mooring Calculations

DWG NO. DTE - 2402 | A4

SCALE: Not to Scale | SHEET 1 OF 1

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:

	NAME	SIGNATURE	DATE
DRAWN			14/03/18
CHK'D			
APPV'D			
Q.A			
MFG			

WEIGHT: Approx 20T | MATERIAL: Misc