ConocoPhillips

BAROSSA PIPELAY LIGHT MODELLING

Prepared by

Pendoley Environmental Pty Ltd

For

ConocoPhillips

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PENDOLEY ENVIRONMENTAL

MARINE CONSERVATION ENVIRONMENTAL SERVICES

DOCUMENT CONTROL INFORMATION

TITLE: BAROSSA PIPELAY LIGHT MODELLING

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Cover photo:	Pipelay vessel at dusk (ConocoPhillips)

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ACCRONYMS

ALAN	Artificial Light At Night
EP	Environment Plan
GEP	Gas Export Pipeline
km	Kilometer
m	Meters
NT	Northern Territory
SME	Subject Matter Expert
sr	steradian
W	Watts

1 INTRODUCTION

ConocoPhillips Australia Barossa Pty Ltd (ConocoPhillips) proposes to install the Barossa Gas Export Pipeline. The pipeline is located in Commonwealth waters and extends from the Barossa Gas Field, approximately 227 km north of the Northern Territory (NT) mainland, to the existing Bayu-Undan to Darwin pipeline, approximately 100 km north of the NT mainland. At the closest point, the pipeline passes within 8 km of land; the west coast of Bathurst Island.

To support development of the Barossa Gas Export Pipeline (GEP) Installation Environment Plan (EP), ConocoPhillips engaged Pendoley Environmental to undertake light modelling to estimate light emissions from the proposed pipelay vessel and construction vessel. Accordingly, this memo details light intensity modelling undertaken for three scenarios:

- Pipelay vessel *Audacia*;
- Construction vessel *Oceanic*; and
- Both vessels located side by side in field.

Model results are presented at the closest point to shore (i.e. the worst-case scenario).

2 METHODOLOGY

Light modelling was undertaken for the proposed pipelay and construction vessels to predict the extent of biologically relevant light spill. Specifics of the respective vessel's lighting design and luminaire specifications were applied to the ILLUMINA Artificial Light At Night (ALAN) model (Aube *et al*. 2005). The ILLUMINA model is a three-dimensional model that accounts for both line of sight and atmospheric scattering, allowing the attenuation of light over distance and extent of light glow to be modelled. The reader is directed to Aube *et al*. (2005) for details of equations and model parameterisation.

Unlike a simple line of sight model based on the inverse square law formula, this is a more sophisticated model which allows individual light sources (i.e. individual luminaires) to be placed within the area of interest (as opposed to assuming a single large light point source for the entire vessel). The model input parameters also include project specific details about light type, spectral distribution, height and orientation of individual luminaires, including any shielding, which substantially increases the model precision and accuracy.

2.1 Model Inputs

Information regarding the light inventory was extracted from lighting layout drawings and light manufacturer data sheets provide to Pendoley Environmental by ConocoPhillips for both the *Audacia* pipelay vessel (Appendix 1) and *Oceanic* construction vessel (Appendix 2), and included:

- number of each type of light
- spectral output of light type
- angular distribution of light (shielding)
- lumen output of each type of light
- height of each light

Because the atmospheric conditions over the Timor Sea project site are typically clear, the model simulation presented here assumed no contribution of light from cloud reflectance.

Model outputs are provided in radiance ($W/m^2/sr$, where W = watts, m^2 =meters squared and sr = steradian)

2.2 Interpretation and limitations

In the absence of any published or generally accepted units of measurement, or scale, for measuring the impact of ALAN on marine turtles, moonlight was selected as a proxy and the light model output (radiance, units of $Watts/m^2/sr$) was converted to units of full moon equivalents in an attempt to give the radiance output some biological relevance and to aid interpretation in an environmental impact assessment context. The reasoning used was;

- the range of moon brightness across a whole lunar cycle is a realistic scale representative of the ambient light levels that turtle eyes are adapted to, at the lower end of the scale the radiant output is equivalent to no light in the sky while the upper limit is greater than the radiance from a single full moon and was selected to try to account for the increase in radiance levels that would occur if the light was reflected from clouds (recognizing that cloudy conditions are not the norm for this site). Extending the scale beyond this limit was deemed unnecessary.

- the scale for the units "the proportion of radiance of one full moon" was derived from the logarithmic nature of light decay with distance (a function of the inverse square law), e.g. the scale of <0.01, 0.01 – 0.1, 0.1 – 1, 1 – 10 represents a range of radiant brightness from a minimum of <0.01 full moon (so essentially a new moon) to a maximum radiant brightness of the equivalent to 10 full moons.

- While the behavioural response of marine turtles to light is relatively well understood (see Witherington and Martin (2003) for review), there is currently no agreed upon intensity limits for determining what the impact of a given light might be. A large range of factors influence the visibility and impact of light on hatchlings including light intensity, visibility (a function of lamp orientation and shielding), spectral power distribution (wavelength and colour), atmospheric scattering, cloud reflectance, spatial extent of sky glow, duration of exposure, horizon elevation, lunar phase, hatchling swimming speeds, tide and current speeds and flow direction etc. Using the scale of light radiance derived from the calculated decrease in light intensity with distance (proportion radiance of a full moon) and together with our extensive SME experience observing marine turtles and their response to both onshore and offshore construction light in field settings, we have proposed a potential impact criteria for marine turtles based on radiance thresholds relative to moon radiance, as shown in Table 2-1.

Table 2-1: Artificial light impact potential criteria (marine turtles)

Proportion of radiance of a full moon*	Impact potential to marine turtles
1 - 10	Light or light glow visible and impact likely, represents a very bright light equivalence to up to 10 times the radiance of one moon. This light radiance will override the moderating influence of the ambient full moon at the time of exposure.
0.1 - 1	Light or light glow visible and behavioural impact possible, depending on ambient moon phase at the time of exposure, which will influence the visibility of the artificial light sources, equivalent to the light output. Artificial lights will be more visible to marine turtles under a first quarter moon than under a full moon.
0.01 - 0.1	Light or light glow visible but behavioural impact unlikely (i.e. not biologically relevant). Equivalent to the light output of the first quarter moon.
<0.01	Light or light glow is considered ambient and no impact expected, equivalent to a new moon

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

3 RESULTS

3.1 Pipelay vessel

Results from the ILLUMINA model undertaken for the pipelay vessel are presented in Figure 3-1 and Figure 3-4, and summarised in Table 3-1. Applying the potential impact criteria in Table 2-1, the results show that at ~11 km light levels have reduced to ambient. At ~ 3.3 km from the source, radiance is equivalent to 0.1 radiance of a full moon and, therefore, light will be visible but unlikely to result in a behavioural impact (i.e. biologically relevant). Impacts may occur within ~3.3 km of the pipelay vessel. At the closest point to land (8 km), radiance is less than 0.03 (3%) that of a full moon.

Table 3-1: Distance of equivalent moon radiances for the pipelay vessel

Proportion of radiance of a full moon*	Distance from source (m)
10	332
1	1,050
0.1	3,335
0.01	11,073

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

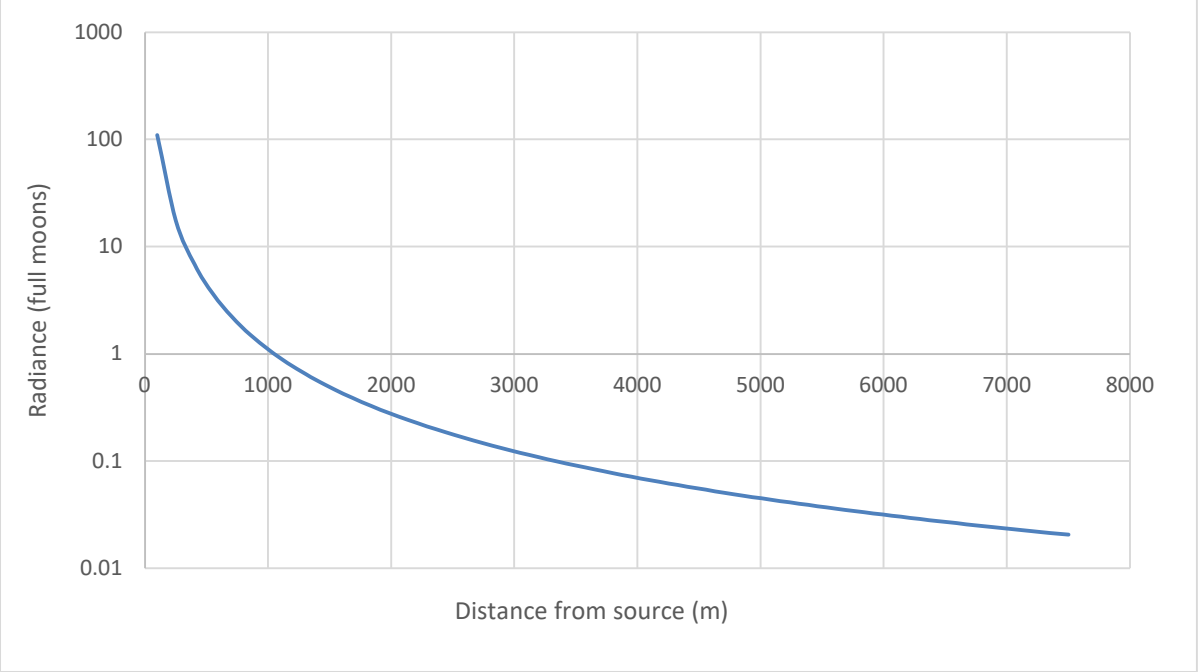


Figure 3-1: Radiance of light sources with distance from the pipelay vessel. Radiance (full moons) of 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

3.2 Construction vessel

Results for the construction vessel are presented in Figure 3-2 and Figure 3-5, and summarised in Table 3-2. At ~1.6 km from the construction vessel light levels have reduced to ambient (0.01 of a full moon). At ~ 0.5 km from the source, radiance is equivalent to 0.1 radiance of a full moon and, therefore, light will be visible but unlikely to result in a behavioural impact (i.e. biologically relevant). Impacts may occur within 0.5 km of the construction vessel. At the closest point to land (8 km), radiance is less than 0.0007 (0.07%) that of a full moon.

Table 3-2: Distance of equivalent moon radiances for the construction vessel (without searchlights) (from Pendoley, 2020).

Proportion of radiance of a full moon*	Distance from source (m)
10	51
1	162
0.1	512
0.01	1,622

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

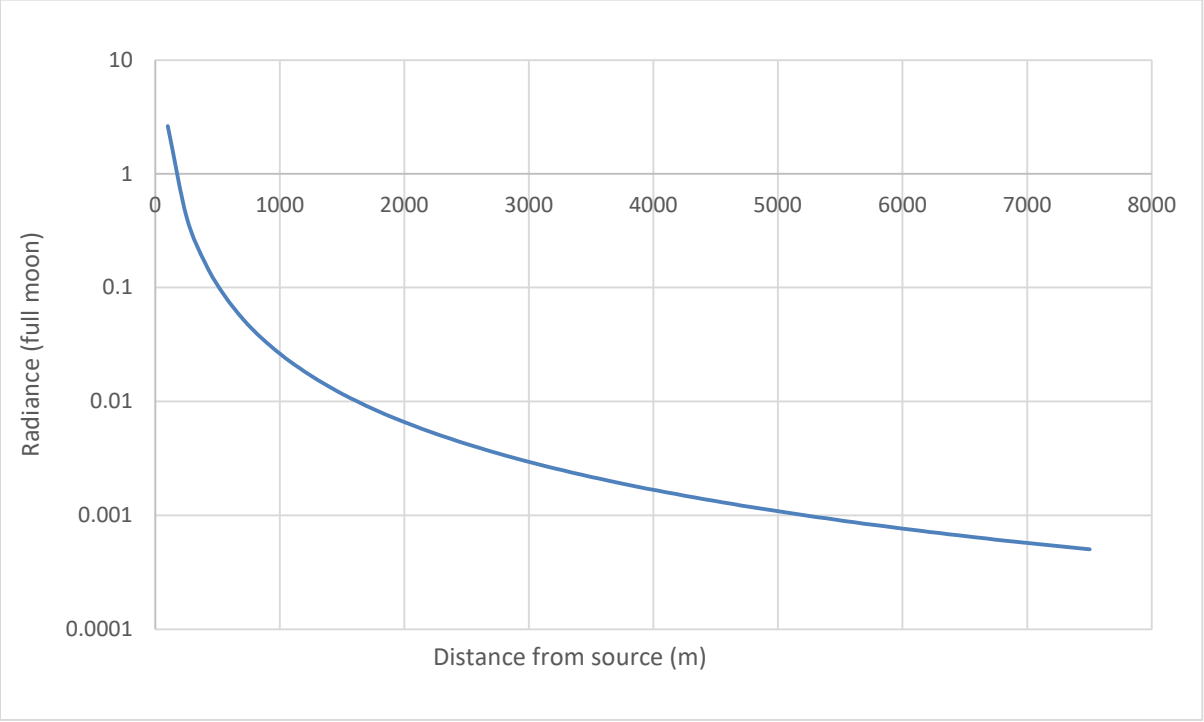


Figure 3-2: Radiance of light sources with distance from the construction vessel. Radiance (full moons) of 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon.

3.3 Cumulative (both vessels)

Figure 3-3 presents results of the ILLUMINA model when including both the pipelay and construction vessel located side by side. The results are summarized in Table 3-3 and shows that presence of both vessels resulted in negligible increases in the distance at which the same level of radiance was reached, compared to the model results for the pipelay vessel alone. Applying the potential impact criteria in Table 2-1, impacts may occur within ~3.4 km of the pipelay and construction vessel when they are simultaneously positioned adjacent to one another. At the closest point to land (8 km), radiance is less than 0.03 (3%) that of a full moon.

Table 3-3: Distance of equivalent moon radiances for the pipelay and construction vessel (from Pendoley, 2020).

Proportion of radiance of a full moon*	Distance from source (m)	Difference to pipelay vessel alone (m)
10	336	+4
1	1,062	+12
0.1	3,375	+40
0.01	11,226	+153

*Where 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon

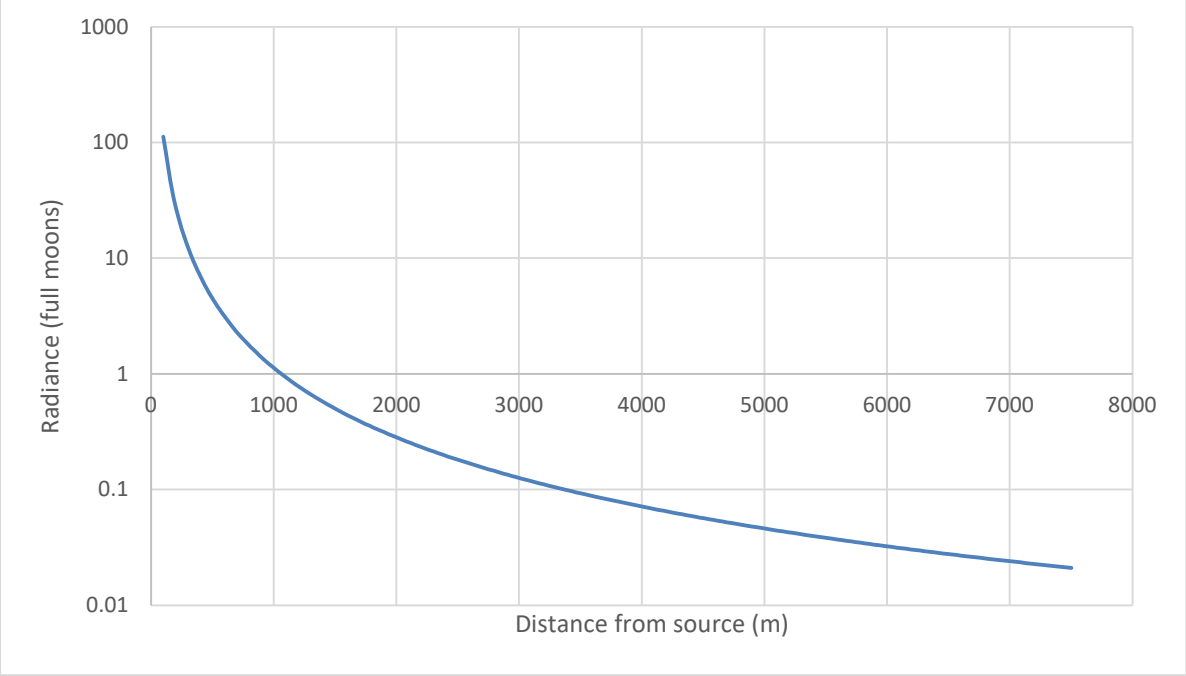


Figure 3-3: Radiance of light sources with distance from the pipelay and construction vessels when side by side in field. Radiance (full moons) of 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon.

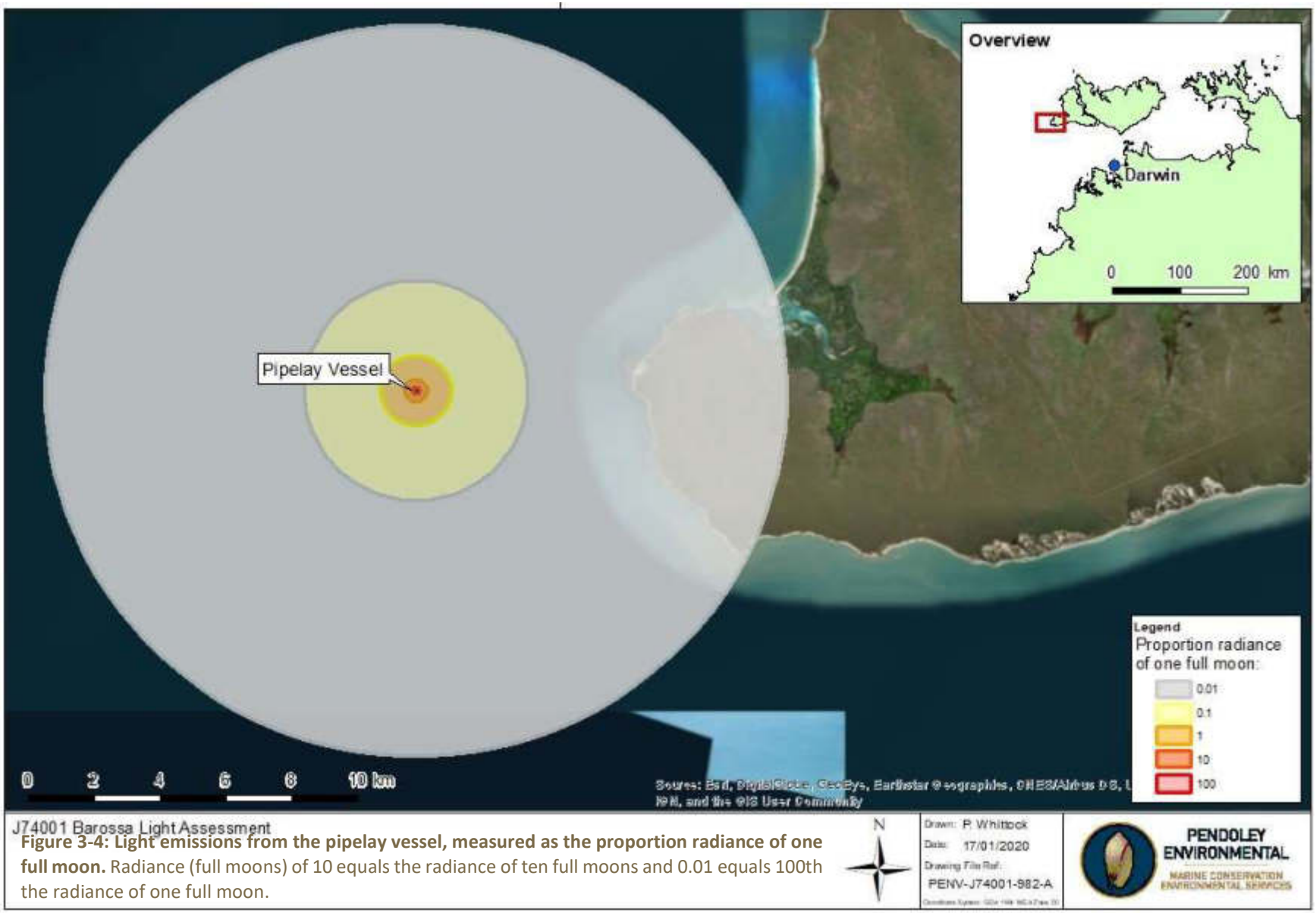


Figure 3-4: Light emissions from the pipelay vessel, measured as the proportion radiance of one full moon. Radiance (full moons) of 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon.

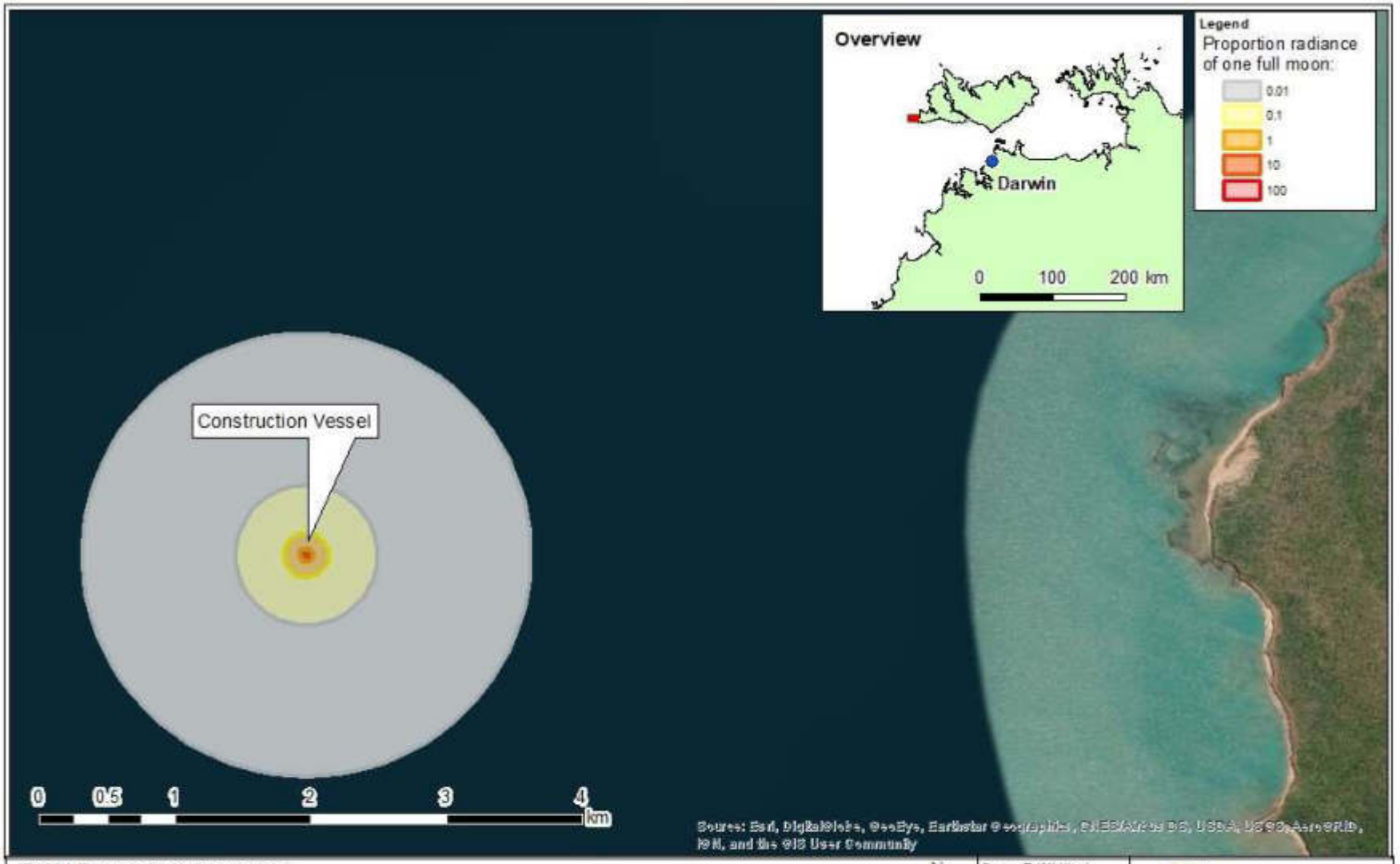


Figure 3-5: Light emissions from the construction vessel measured as the proportion radiance of one full moon. Radiance (full moons) of 10 equals the radiance of ten full moons and 0.01 equals 100th the radiance of one full moon.

4 SUMMARY

ILLUMINA light modelling was undertaken using methodology presented in Aube *et al.*, (2005) for three scenarios associated with the Barossa GEP installation activities:

- Pipelay vessel alone;
- Construction vessel alone; and
- Pipelay vessel and construction vessel located side by side in field.

Model outputs were in radiance ($W/m^2/sr$) and presented as a proportion of the radiance of a full moon as a realistic scale representative of the natural conditions experienced by a marine turtle in the field and to provide biological context.

Light emissions were greater for the pipelay vessel compared to the construction vessel. The greatest light emissions are predicted when both vessels were modelled cumulatively, however, were only marginally greater than the pipelay vessel alone.

Light emissions were predicted to reduce to ambient levels (0.01, or 1%, radiance of a full moon) at 1.6 km, 11.1 km and 11.2 km from the construction vessel, pipelay vessel and cumulatively, respectively. There is potential for behavioural impacts to turtles to occur (<0.1, or 10%, radiance of a full moon) within 0.5 km, 3.3 km and 3.4 km of the construction vessel, pipelay vessel and cumulatively, respectively. Behavioural impacts are more likely (≥ radiance of one full moon) within 0.16, 1.1 km and 1.1 km of the construction vessel, pipelay vessel and both vessels cumulatively, respectively.

The radiance received at the closest nesting beach to the source location (at a distance of 8 km) was less than 0.07% of a full moon for the construction vessel, and 3% of a full moon for the pipelay vessel when considered independently and cumulatively with the construction vessel. At the closest nesting beach, light emissions from the pipelay vessel (with or without the construction vessel also present) may be visible, but unlikely to be at a radiance great enough to result in behavioural impacts to turtles at the beach.

5 REFERENCES

AUBÉ, M.; FRANCHOMME-FOSSE, L.; ROBERT-STAEHLER, P.; HOULE, V. (2005) Light pollution modelling and detection in a heterogeneous environment: Toward a night-time aerosol optical depth retreival method. Proc. Spie, 5890, 248–256, DOI:10.1117/12.615405. Available at https://www.researchgate.net/publication/265746292_LIGHT_POLLUTION_MODELING_AND_DETECTION_IN_A_HETEROGENEOUS_ENVIRONMENT

WITHERINGTON, B. AND R.E. MARTIN (2003) Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches. Florida Fish and Wildlife Conservation Commission FMRI Technical Report TR-2: Jensen Beach, Florida. p. 84

Appendix 1: Vessel light inventory details: *Audacia* pipelay vessel

Vigilant® LED High Bay
Technical Specification

Corded Model

Mechanical Information:

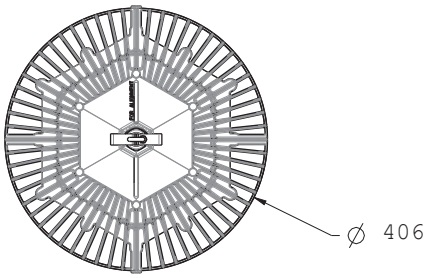
Fixture weight:
8.2 kg (18 lbs)

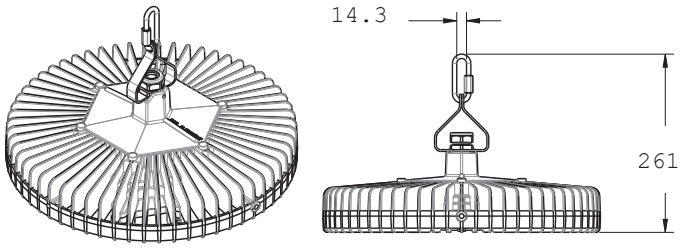
Shipping weight:
10.9 kg (24 lbs)

Mounting:
Stainless Steel Hook
Secondary retention option available

Power Cord:
3 meters, H07RN-F Heavy Duty

Prefix: HEE





Dimensions in mm

Comparison		
	Warranty	**L70**
Dialight LED High Bay	10yr	>150,000
Metal Halide	1	15,000
High Pressure Sodium	1	20,000

Certifications & Ratings:

EN 60598-1:2015
EN 60598-2-1 (ed.1), IEC 60598-2-1 (ed.8)
EN 60598-2-24:2013
EN 62471:2008, EN 62778:2014
EN 62493:2015
IEC60068
Salt spray testing - severity 1

IP66 to EN 60529
IK10 to EN 50102 (Polycarbonate lens)
IK06 to EN 50102 (Acrylic lens)
IK05 to EN 50102 (Glass lens)
D-Marking to EN 60598 2-24
ENEC
L70 >150,000 hours @ 25°C ambient

Variable Dimming as Standard:

Variable Dimming Control: 0-10 VDC

Dimming Range: 10 VDC = 100% light output
0 VDC = <5% light output

Occupancy Sensor:

Mounting Height: Up to 12M
Ingress Protection: IP66

Electrical Specifications:

Operating Voltage: 100-277 VAC
120-250 VDC

Total system power consumption: See table

Operating Temp: -40°C to +65°C

Harmonics: IEC 61000-3-2

Noise requirement /EMC: EN 61547: 2009
Radiated and Conducted Emissions: EN 55015

EMC Immunity: EN 61547: 2009

Transient protection: Protection devices capable of handling up to 10kV. Tested for 10kV/2 ohm combination wave, as per IEEE C62.41, line-line and line ground

THD: < 20%

Power Factor: > 0.9

Construction:

Housing: Copper-free aluminium

Finish: Superior dual coat finish
-Sealed polyester topcoat
-Chemical-resistant epoxy primer

Lens: See table

Photometric Information:

CRI: 80

CCT: 5000K (cool white)
4000K (neutral white)

All values typical unless otherwise stated (tolerance +/- 10%)

Vigilant® LED High Bay

Ordering Information

Standard model with 3 Meter Cable & Hook Mount									
Part Number	Legacy Part Number	Lumens	Watts	lm/W	Voltage	CCT	CRI	Lens	Beam Distribution
HEE7MC2EDHWNGN	HEEGMC4PNHNG	26,250	186	141	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Medium
HEE4MC2EDHWNGN	HEE2MC4PNHNG	25,250	186	136	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Medium
HEELMC2EDHWNGN	HEELMC4PNHNG	24,500	186	132	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Medium
HEE7EC2EDHWNGN	HEEGEC4PNHNG	26,250	186	141	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Oval
HEE4EC2EDHWNGN	HEE2EC4PNHNG	25,250	186	136	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Oval
HEELEC2EDHWNGN	HEELEC4PNHNG	24,500	186	132	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Oval
HEE7MC2CDHWNGN	HEEGMC4KNHNG	19,500	129	151	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Medium
HEE4MC2CDHWNGN	HEE2MC4KNHNG	18,750	129	145	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Medium
HEELMC2CDHWNGN	HEELMC4KNHNG	18,000	129	140	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Medium
HEE7EC2CDHWNGN	HEEGEC4KNHNG	19,500	129	151	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Oval
HEE4EC2CDHWNGN	HEE2EC4KNHNG	18,750	129	145	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Oval
HEELEC2CDHWNGN	HEELEC4KNHNG	18,000	129	140	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Oval
HEE7MC2BDHWNGN	HEEGMC4GNHNG	14,250	102	140	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Medium
HEE4MC2BDHWNGN	HEE2MC4GNHNG	13,750	102	135	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Medium
HEELMC2BDHWNGN	HEELMC4GNHNG	13,250	102	130	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Medium
HEE7EC2BDHWNGN	HEEGEC4GNHNG	14,250	102	140	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Oval
HEE4EC2BDHWNGN	HEE2EC4GNHNG	13,750	102	135	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Oval
HEELEC2BDHWNGN	HEELEC4GNHNG	13,250	102	130	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Oval
HEE7MC2ADHWNGN	HEEGMC4DNHNG	11,250	80	141	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Medium
HEE4MC2ADHWNGN	HEE2MC4DNHNG	10,750	80	134	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Medium
HEELMC2ADHWNGN	HEELMC4DNHNG	10,250	80	128	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Medium
HEE7EC2ADHWNGN	HEEGEC4DNHNG	11,250	80	141	100-277 VAC, 120-250 VDC	5000K	80	Clear Glass	Oval
HEE4EC2ADHWNGN	HEE2EC4DNHNG	10,750	80	134	100-277 VAC, 120-250 VDC	5000K	80	Clear Polycarbonate	Oval
HEELEC2ADHWNGN	HEELEC4DNHNG	10,250	80	128	100-277 VAC, 120-250 VDC	5000K	80	Diffused Domed Polycarbonate	Oval

Notes

Note 1: Models in chart above are 5000K CCT. For 4000K CCT change the 6th character from C to N & deduct 3% from the lumen table.

Note 2: Flat clear acrylic lens available, consult local Dialight sales office for availability.

Vigilant® LED Dual Floodlight

Technical Specifications

Ratings and Certifications
• 10 year warranty
• CE
• IP66
• L70 >150,000 hours @ 25°C ambient
• Glass = IK05
• Polycarbonate = IK10

*All features not available on every model. Please refer to product part number pages for model specifics.

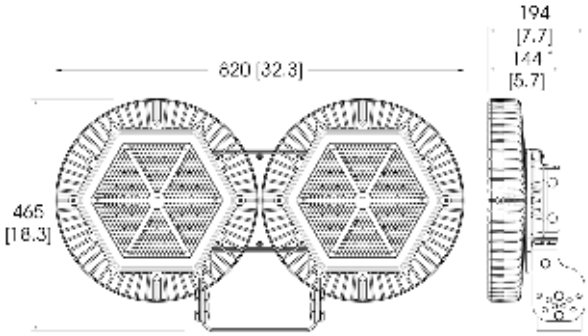
Mechanical Information	
Fixture weight:	25.4 kg (56 lbs)
Shipping weight:	27.2 kg (60 lbs)
EPA (sq.m):	0.25 sq. m (2.69 sq. ft)
Mounting:	304 stainless steel trunnion mounting bracket included
	Secondary retention standard
Entries:	M20 x 2
Terminals:	4mm² x 4

Specifications			
Voltage:	100-277 VAC, 50/60Hz 120-250 VDC	**Housing:**	Copper-free aluminium
Operating temp:	-40°C to +65°C	**Finish:**	Superior dual coat finish - Sealed polyester topcoat - Chemical-resistant epoxy primer
Power factor:	>0.9	**Lens:**	Tempered glass
THD:	<20%	**CRI:**	80
		CCT:	5000K (cool white)

Comparison		
	Warranty	**L70**
Dialight LED Floodlight	10yr	>150,000
Metal Halide	1	15,000
High Pressure Sodium	1	20,000

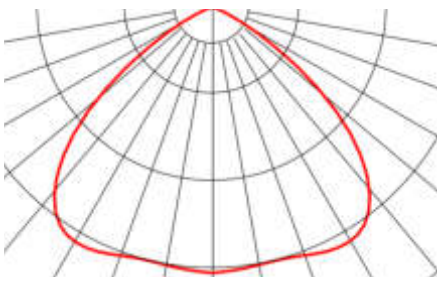
Lumens	Wattage	lm/W	Mounting Heights
56,000	385	145	Up to 25m
54,000	385	140	

Dimensions

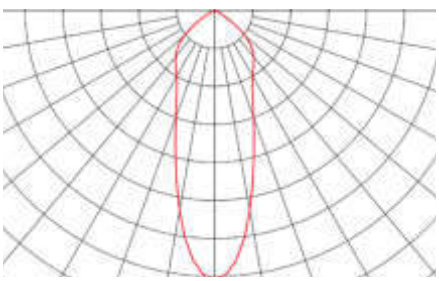


Dimension in mm [inches]

Beam Distribution



92° Beam Angle



35° Beam Angle

WARNING - INSTALLATION & SECONDARY RETENTION. Use of any Dialight products without proper installation (including secondary retention / netting) and periodic inspections could cause severe injury or death. Dialight recommends that all installations should use secondary retention / netting (appropriate to the installation environment) where applicable. It is the exclusive responsibility of the contractor, installer and/or end-user to: (a) determine the suitability of the product for its intended application; and, (b) ensure that the product is safely installed (with secondary retention / netting where appropriate) and in compliance with all applicable laws and regulations. To the extent permissible under applicable laws, Dialight disclaims all liability for personal injury and/or other damage resulting from any dislodgment or other dislocation of its products.

Vigilant® LED Dual Floodlight

Ordering Information & Mounting Accessories

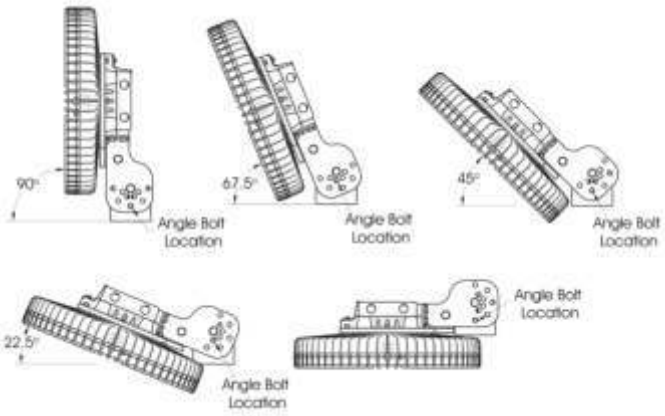
Part Number	Fixture Lumens	Wattage	lm/W	Voltage	Colour Temperature (CCT)	Lens	Beam Angle	Field Angle
FLEB66MC2NG	56,000	385	145	100-277 VAC, 120-250 VDC	5000K (cool white)	Tempered Glass	35°	108°
FLEBM0MC2NG	54,000	385	140	100-277 VAC, 120-250 VDC	5000K (cool white)	Tempered Glass	92°	120°

All values typical unless otherwise stated (tolerance +/- 10%).

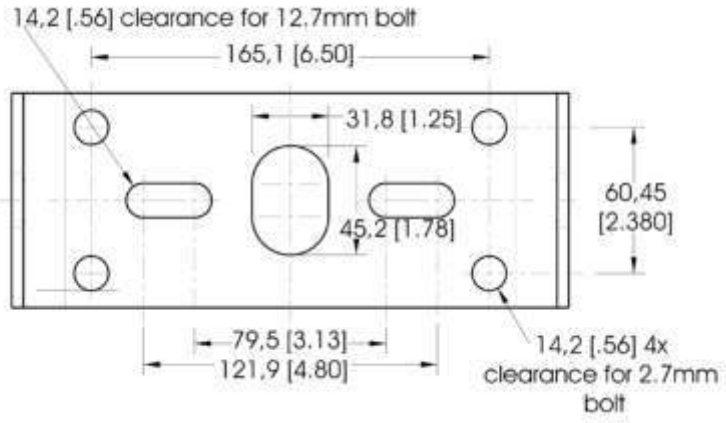
HZXCBL2

- Stainless steel safety cable kit

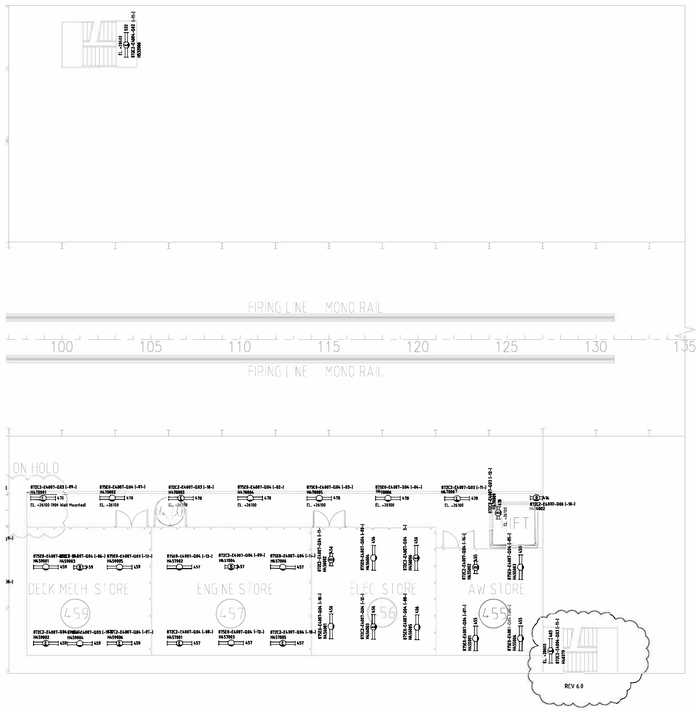
Dual Floodlight Mounting Options



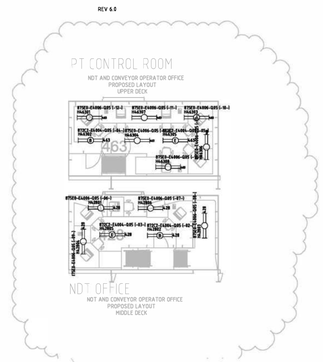
Factory-Installed Mounting Bracket Dimensions

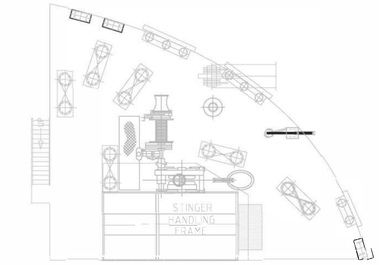


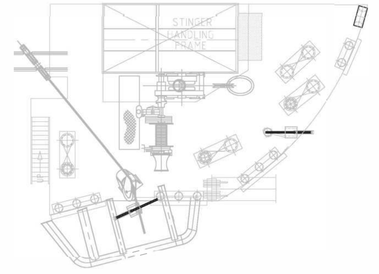
Dimension in mm [inches]



PLAN VIEW B-DECK 23800 A.B.

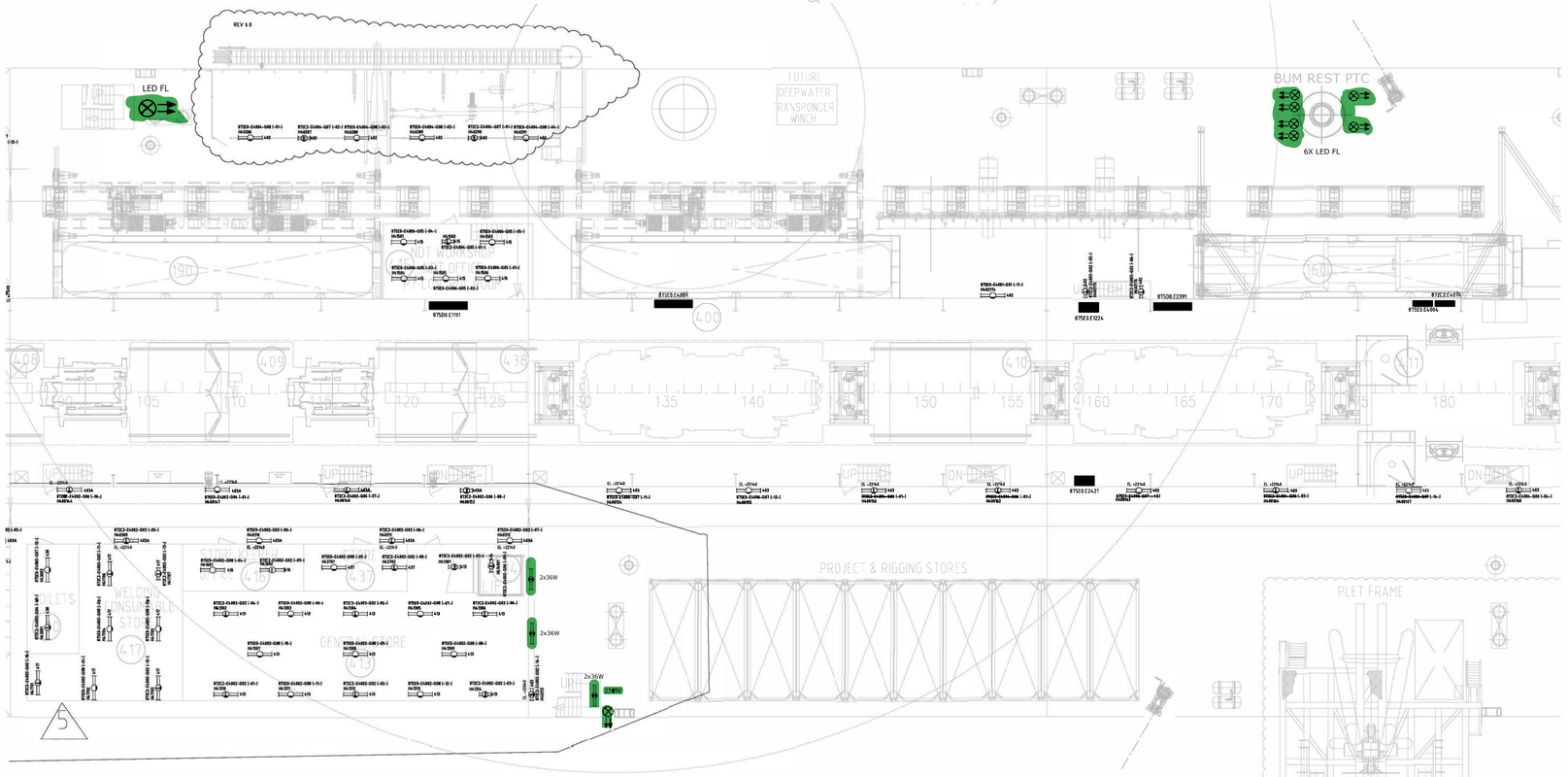






PLAN VIEW FORECASTLE DECK

PLAN VIEW FORECASTLE DECK



PLAN VIEW A-DECK 19200 A.B.

VIEW ON MAIN DECK

LEGEND

TYPE	SYMBOL	DESIGNATION
AQU 14441		Watertight multipurpose luminaire, surface 2x18W battery backup
AQU 10441		Watertight multipurpose luminaire, surface 2x18W
AQU 10441		Watertight multipurpose luminaire, surface 2x18W emergency
AQU 10444		Watertight multipurpose luminaire, surface 2x26W
AQU 10444		Watertight multipurpose luminaire, surface 2x26W emergency
AQU 10760801H	nw	Floodlight for HPS lamp 1x70W
AQU 10761011H	zaw	Floodlight for HPS lamp 1x250W
AQU 10761011M	wzw	Floodlight for MH lamp 1x400W
AQU 10761011H	wzw	Floodlight for HPS lamp 1x400W
AQU 10760801M	wzw	Floodlight for MH lamp 1x1000W
AQU 50700028		Ceiling luminaire, 2x36W
AQU 5070		Ceiling luminaire, 2x36W battery backup
AQU 50700028		Ceiling luminaire, 2x36W emergency

REV.	DATE	REV. DESCRIPTION
6.0	01-12-2006	LIGHTING GANGWAY , OFFICE'S AND STAIRS
5.0	31-10-2006	UPDATE LIGHTING GROUPS A-DECK 53
4.0	05-10-2006	LIGHTING GROUP AND FIXTURES CHANGED
3.0	07-07-2006	APPROVED FOR CONSTRUCTION BY ALLSEAS
2.0	09-06-2006	APPROVED COMP
1.0	04-01-2006	BASIC ENGINEERING

Customer : Soc d' Exploitation Audacia SA	Drawn	TLEEUWEN	04-01-2006
	Revised	TLEEUWEN	01-12-2006
Latest revision description : Approved For Construction by Allseas	Checked		Par. :
	Prod. no.:		11-12-2006
Doc. type : Installation drawing	Scale : -/-	Size : A0	

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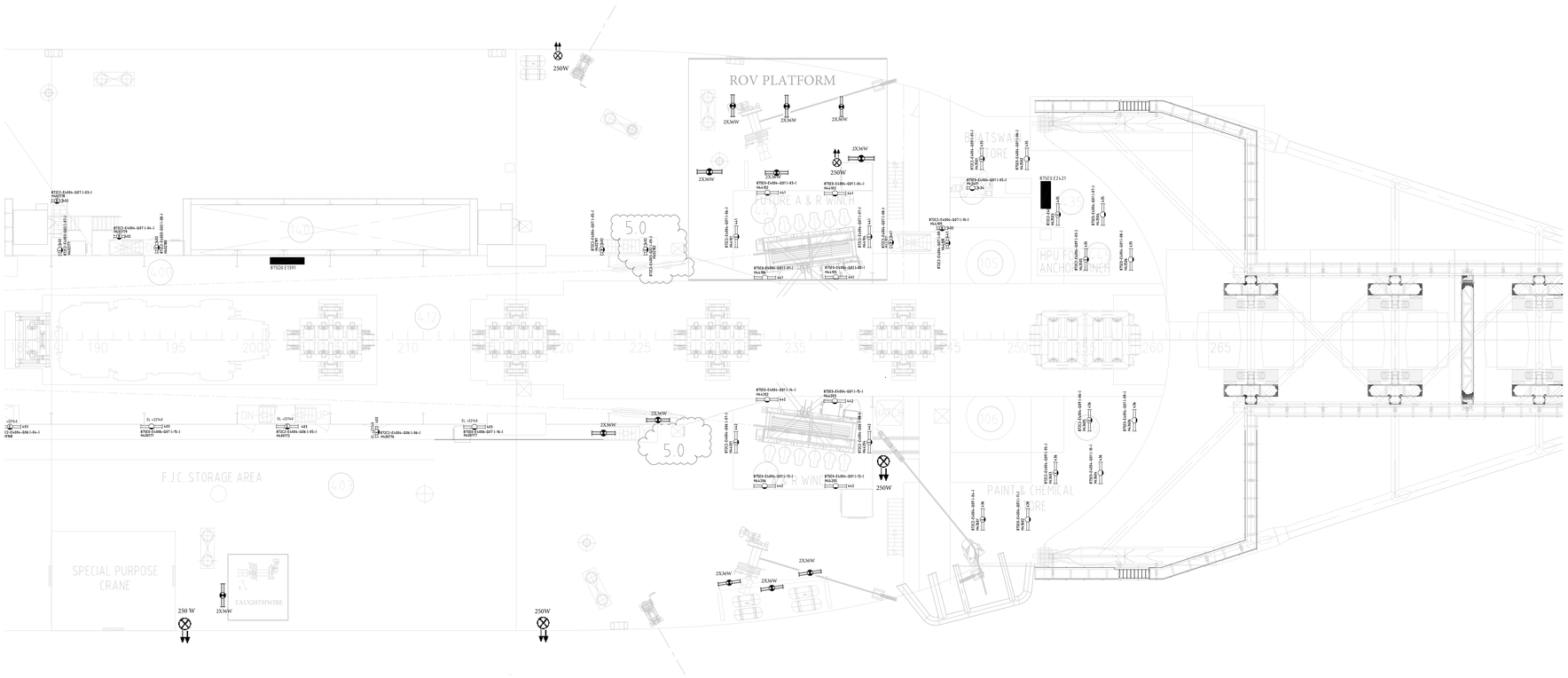
Phone : +31-10-487 19 11
Fax : +31-10-487 11 02

Imtech Marine & Offshore

Project : D.P. PIPELAY VESSEL "AUDACIA"
Product : Lighting Systems
Part : General, A-deck 19200 A.B. / B-Deck 23800 A.B. Frame 97 up to 185

Doc. no. 290103-890UD-IST	Sheet	Rev.
File code : 290103-890UD-IST-200.DWG	202	6.0



PLAN VIEW A-DECK 19200 A.B.

LEGEND

TYPE	SYMBOL	DESIGNATION
AQU 14441		Watertight multipurpose luminaire, surface 2x18W battery backup
AQU 10441		Watertight multipurpose luminaire, surface 2x18W
AQU 10441		Watertight multipurpose luminaire, surface 2x18W emergency
AQU 10444		Watertight multipurpose luminaire, surface 2x36W
AQU 10444		Watertight multipurpose luminaire, surface 2x36W emergency
AQU 1076080H	HW	Floodlight for HPS lamp 1x70W
AQU 1076010H	HW	Floodlight for HPS lamp 1x250W
AQU 1076011M	HW	Floodlight for MH lamp 1x400W
AQU 1076011H	HW	Floodlight for HPS lamp 1x400W
AQU 1076080M	HW	Floodlight for MH lamp 1x100W
AQU 50700028		Ceiling luminaire, 2x36W

REV.	DATE	REV. DESCRIPTION
6.0	23-02-2007	REVISION CLOUDS 4.0 REMOVED + REVISION CLOUDS REV.5.0 MARKED
5.0	08-01-2007	HL0220 HL0221 HL0344 and HL03345 deleted
4.0	07-12-2006	GROUP CHANGED GANGWAY SB
3.0	07-07-2006	APPROVED FOR CONSTRUCTION BY ALLSEAS
2.0	12-06-2006	APPROVED COMP
1.0	04-01-2006	BASIC ENGINEERING

Customer : Soc d' Exploitation Audacia SA	Drawn	TLEEUWEN	16-12-2005	Imtech Marine & Offshore B.V. P.O. Box 5054 3008 AB Rotterdam The Netherlands Phone +31-10-487 19 11 Fax +31-10-487 17 02
	Revised	EDRENTH	23-02-2007	
Latest revision description : Approved For Construction by A	Checked		Par. :	
	Prod. no. :			
Doc. type : Installation drawing	Scale : -/-		Size : A0	

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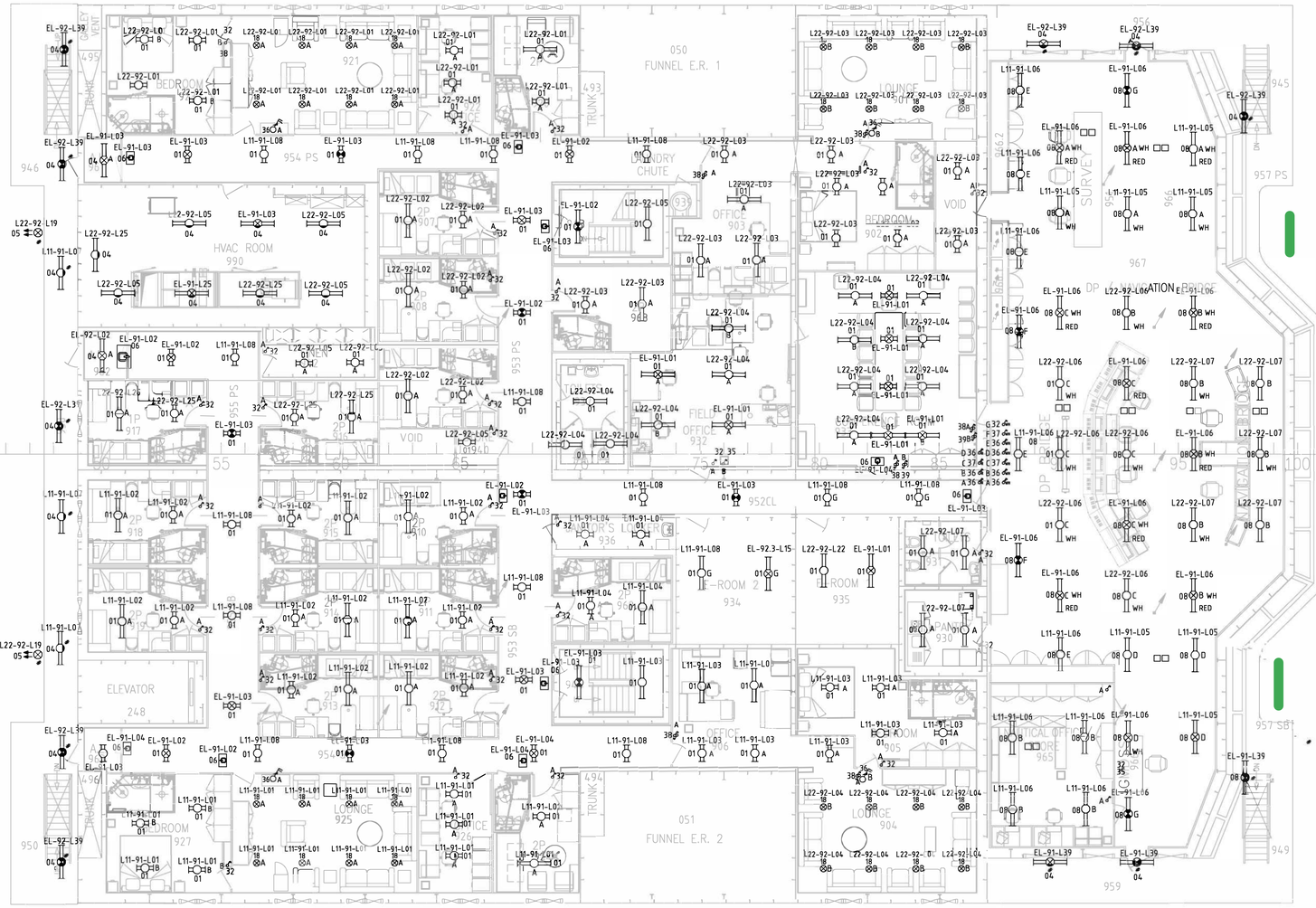
Project : D.P. PIPELAY VESSEL 'AUDACIA'
Product : Lighting Systems
Part : General, A-deck 19200 A.B. Frame 185 up to 265

Doc. no. 290103-890U0-IST	Sheet	Rev.
File code : 290103-890U0-IST-200.DWG	203	6.0

DRAWING No.
AU-890UO-51-009-1



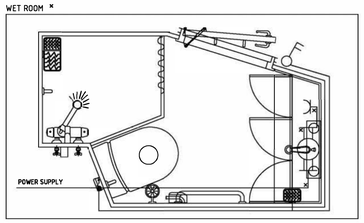
PLAN VIEW NAVIGATION BRIDGE DECK

REVISION B d.d. 19.12.2006

SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
	01	2X18W/2X36W OPAL DIFFUSER -0667
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY+BATTERY
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771 EMERGENCY
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE -1961
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE-1961 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY+BATTERY
	05	HPS 400W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	06	1x7W EXIT LIGHT + BATTERY -0631
	07	HPS 250W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	08	2X18W/2X36W CEILING LUMINAIRE -1227
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY+BATTERY
	11	15W MIRROR LIGHT - 1166 WITHOUT SWITCH
	12	15W DESK LIGHT - 1166 WITH SWITCH
	13	WALL LIGHT - 1380 COLOURED 9W 2P SWITCH
	15	M2 - SMALL OT-LIGHT (CEILING)
	16	8W BED LIGHT - 1156

SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
	17	60W TABLE LAMP -0075
	18	50W HALOGEN DOWNLIGHT -1460
	21	SOCKET OUTLET, MAKE: JUNG
	22	SOCKET OUTLET DOUBLE, MAKE: JUNG
	24	SOCKET OUTLET WATERTIGHT, MAKE: NIKO
	23	SOCKET OUTLET; CEE FORM 2P+PE, MAKE: BALS
	25	HAND DRYER, DELIVERY BY VENDOR
	26	POWER SUPPLY WET ROOM
	27	WALL CHANNEL WITH 3 DOUBLE SOCKET OUTLETS
	28	FREEZER, DOOR LOCK HEATER
	29	SOCKET OUTLET; CEE FORM 3P+PE, MAKE: BALS
	32	2-POLE SWITCH, MAKE: JUNG
	33	2-POLE SWITCH WATER TIGHT, MAKE: NIKO
	35	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
	36	2-POLE SWITCH WITH DIMMER, MAKE: JUNG
	37	2-POLE SWITCH WITH DIMMER + SIGNAL LIGHT, MAKE: JUNG
	38	2-POLE SWITCH, MAKE: JUNG
	39	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
	-	A = SWITCH CODE
	-	SWITCHED BY OUTSIDE LIGHTING CONTROL BOX
	-	JUNCTIONBOX

WET ROOM ×



NOTE:

21 CM HIGH ARE THE SWITCHES FOR THE CEILING LIGHTING

× = NO DELIVERY ALEWIJNSE

×× = TO HULL

REV	DATE	DRAWN	DESCRIPTION	CHECKED	APPR. PROJ.	APPR. A.E.	APPR. L.R.S.
E	24 07 2007	JMA	AS BUILT				
D	01 08 2006	MOP	FOR APPROVAL UPDATE				
C	19 05 2006	MOP	CLIENTS FOR COMMENTS INCORP.				
B	12 05 2006	MR	FOR APPROVAL				
A	26 04 2006	MR	FOR COMMENTS				

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PROJECT
ACCOMODATION UNIT PLV AUDACIA

SUBJECT
ACCOMODATION BRIDGE-DECK
LIGHTING CEILING

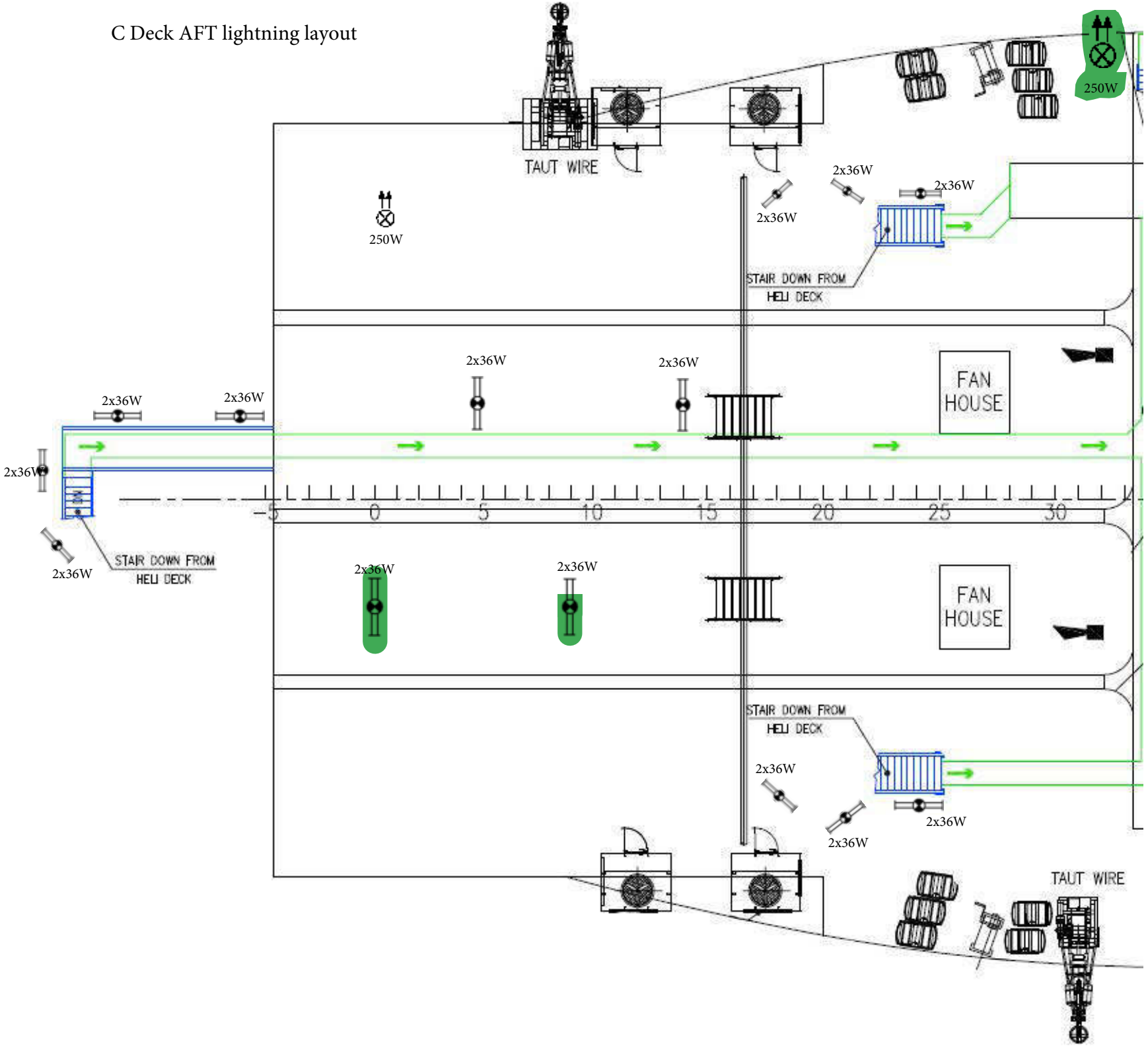
Allseas

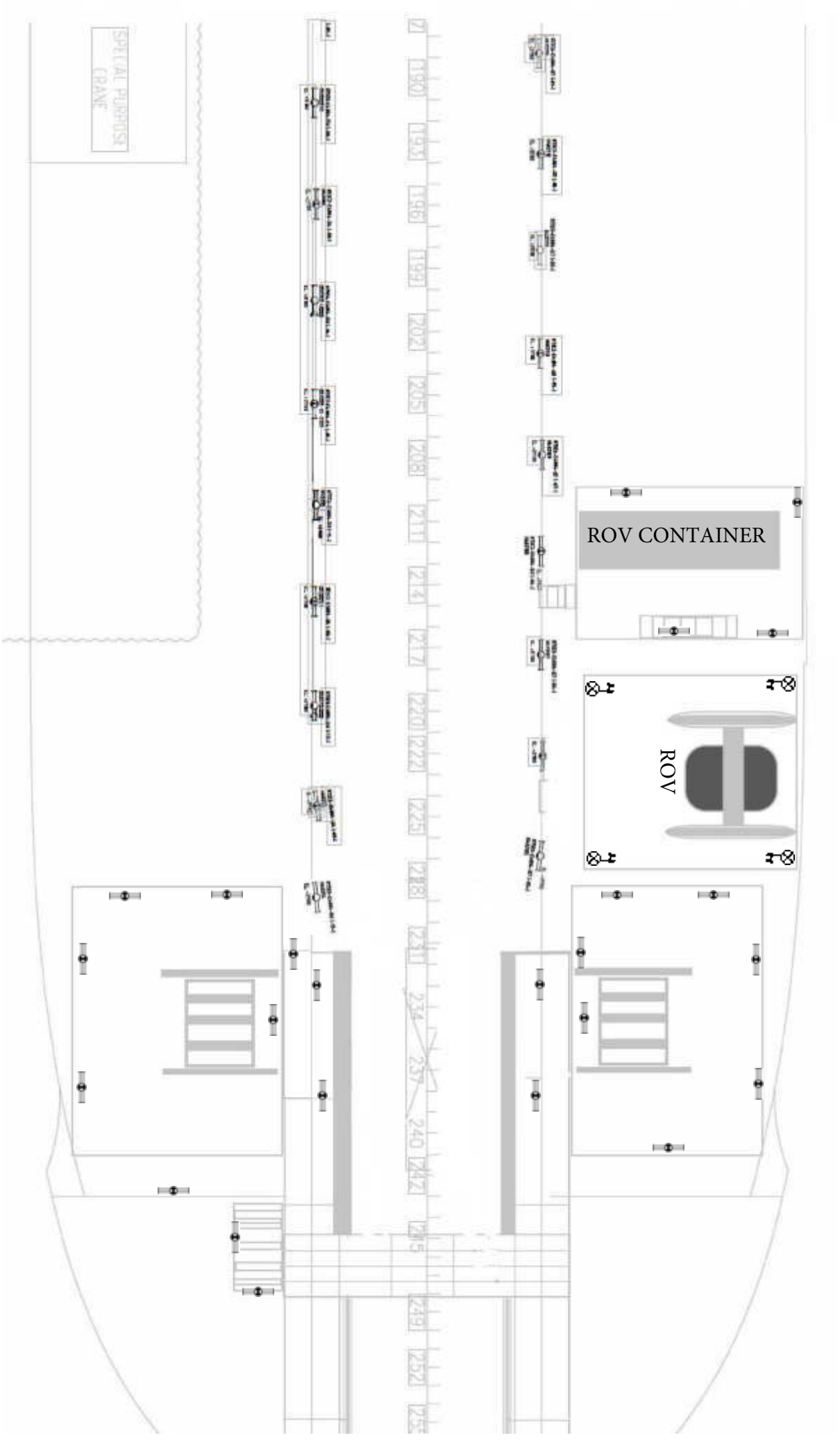
DRAWING				PROJECTION
ORIGINATOR	SIZE	UNITS	SCALE	
KR	A1	mm	1:100	

CLIENTS DRAWING No.
320000-890UO/872C2-009-1

JOB No.	ALLSEAS DRAWING No.			
	discipline	ident. no.	subject no.	sheet no.	revision
570001	AU-	890UO-	51-	009-1	E

C Deck AFT lightning layout

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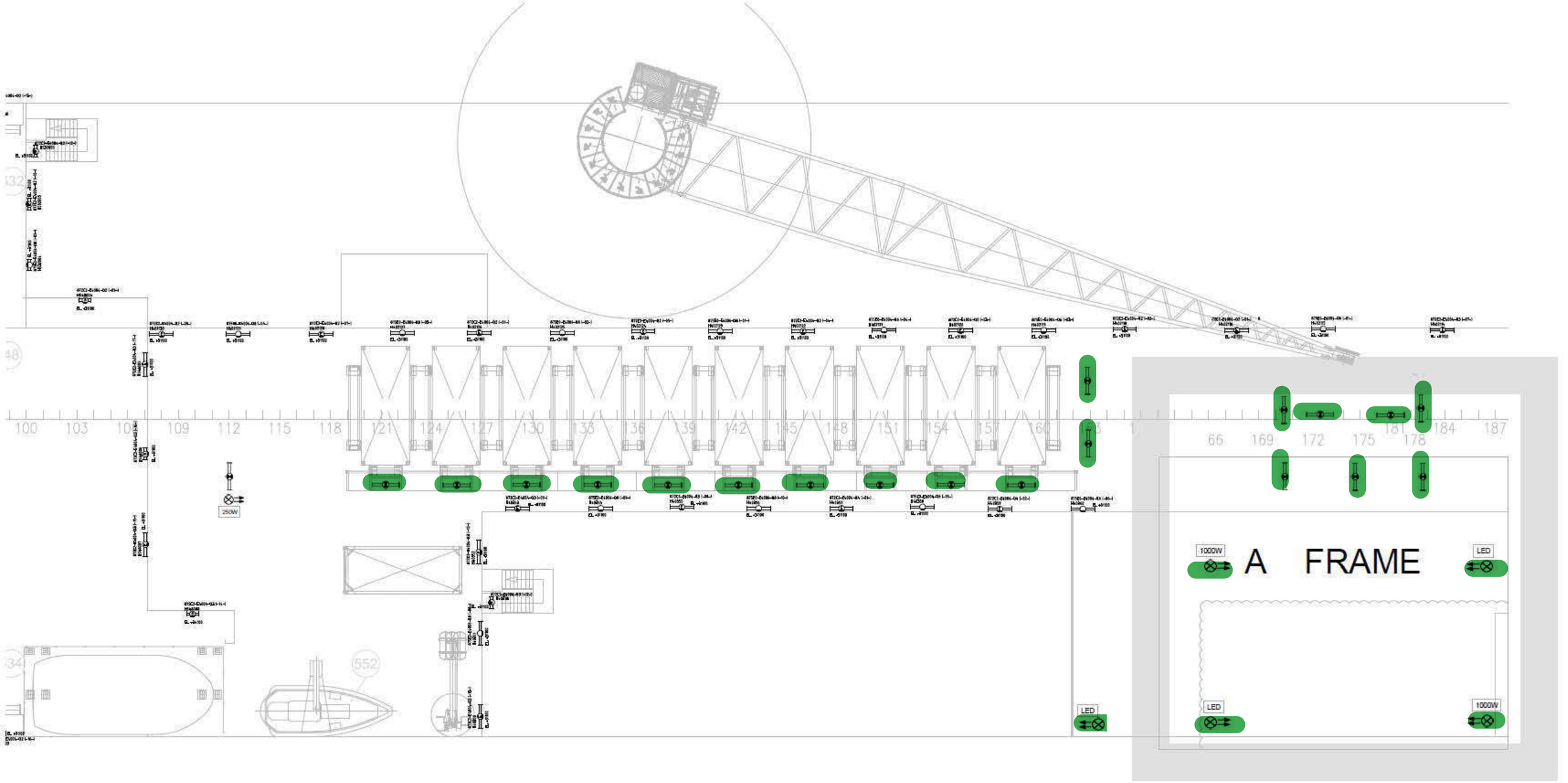
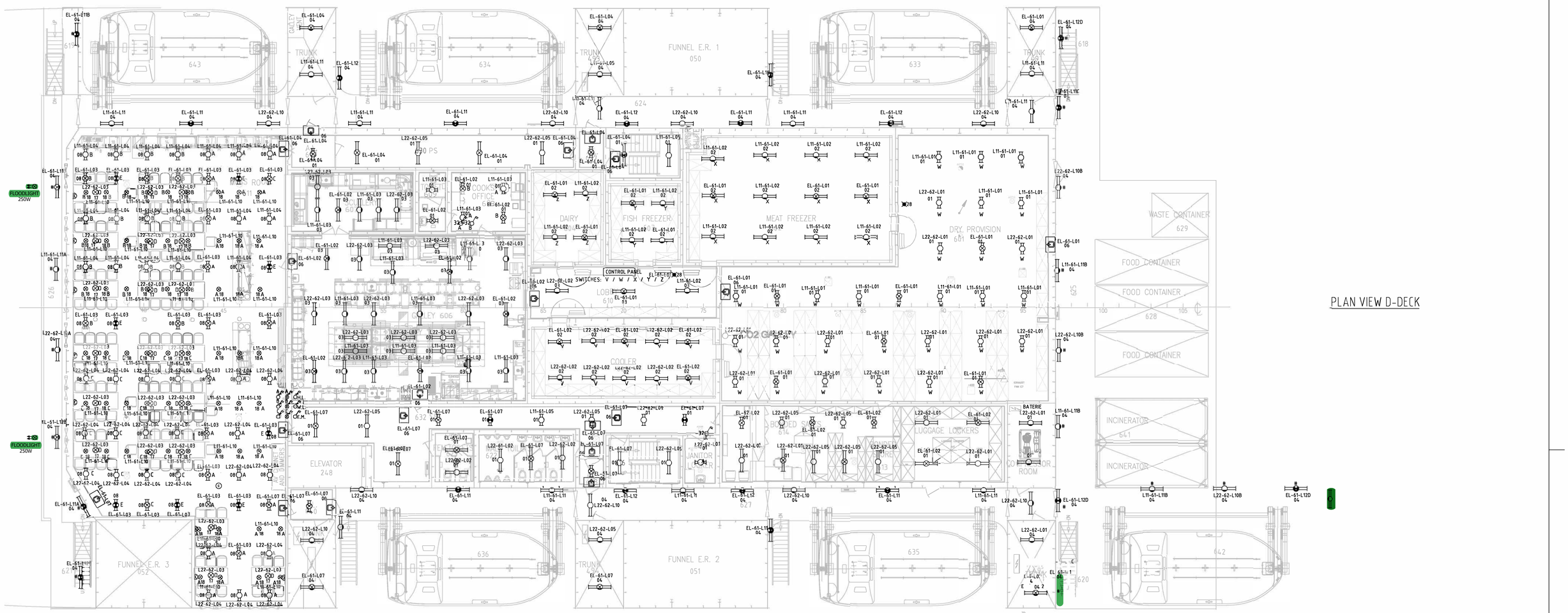
ROV CONTAINER
ROV


250W
LED
1000W
A FRAME
LED
LED
1000W

DRAWING No.
AU-890UO-51-006-1

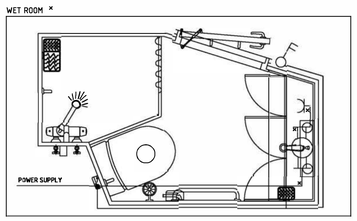


PLAN VIEW D-DECK

SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
	01	2X18W/2X36W OPAL DIFFUSER -0667
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY+BATTERY
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771 EMERGENCY
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE -1961
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE-1961 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY+BATTERY
	05	HPS 400W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	06	1x7W EXIT LIGHT + BATTERY -0631
	07	HPS 250W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	08	2X18W/2X36W CEILING LUMINAIRE -1227
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY+BATTERY
	11	15W MIRROR LIGHT - 1166 WITHOUT SWITCH
	12	15W DESK LIGHT - 1166 WITH SWITCH
	13	WALL LIGHT - 1380 COLOURED 9W 2P SWITCH
	15	M2 - SMALL OT-LIGHT (CEILING)
	16	8W BED LIGHT - 1156

SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
	17	60W TABLE LAMP -0075
	18	50W HALOGEN DOWNLIGHT -1460
	21	SOCKET OUTLET, MAKE: JUNG
	22	SOCKET OUTLET DOUBLE, MAKE: JUNG
	24	SOCKET OUTLET WATERTIGHT, MAKE: NIKO
	23	SOCKET OUTLET; CEE FORM 2P+PE, MAKE: BALS
	25	HAND DRYER, DELIVERY BY VENDOR
	26	POWER SUPPLY WET ROOM
	27	WALL CHANNEL WITH 3 DOUBLE SOCKET OUTLETS
	28	FREEZER, DOOR LOCK HEATER
	29	SOCKET OUTLET; CEE FORM 3P+PE, MAKE: BALS
	32	2-POLE SWITCH, MAKE: JUNG
	33	2-POLE SWITCH WATER TIGHT, MAKE: NIKO
	35	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
	36	2-POLE SWITCH WITH DIMMER, MAKE: JUNG
	37	2-POLE SWITCH WITH DIMMER + SIGNAL LIGHT, MAKE: JUNG
	38	2-POLE SWITCH, MAKE: JUNG
	39	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
	-	A = SWITCH CODE
	-	SWITCHED BY OUTSIDE LIGHTING CONTROL BOX
	-	JUNCTIONBOX

WET ROOM ×



NOTE:

21 CM HIGH ARE THE SWITCHES FOR THE CEILING LIGHTING

× = NO DELIVERY ALEWIJNSE

×× = TO HULL

REVISION B d.d. 28.11.2006

REV	DATE	DRAWN	DESCRIPTION	CHECKED	APPR. PROJ.	APPR. A.E.	APPR. L.R.S.
E	02 10 2006	MOP	FOR CONSTRUCTION				
D	20 07 2006	MOP	FOR APPROVAL UPDATED				
C	04 05 2006	MR	FOR APPROVAL UPDATED				
G	24 07 2007	JMA	AS BUILT				
F	9 10 2006	MOP	FOR CONSTRUCTION UPDATED				

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PROJECT
ACCOMODATION UNIT PLV AUDACIA

SUBJECT
ACCOMODATION D-DECK
LIGHTING CEILING

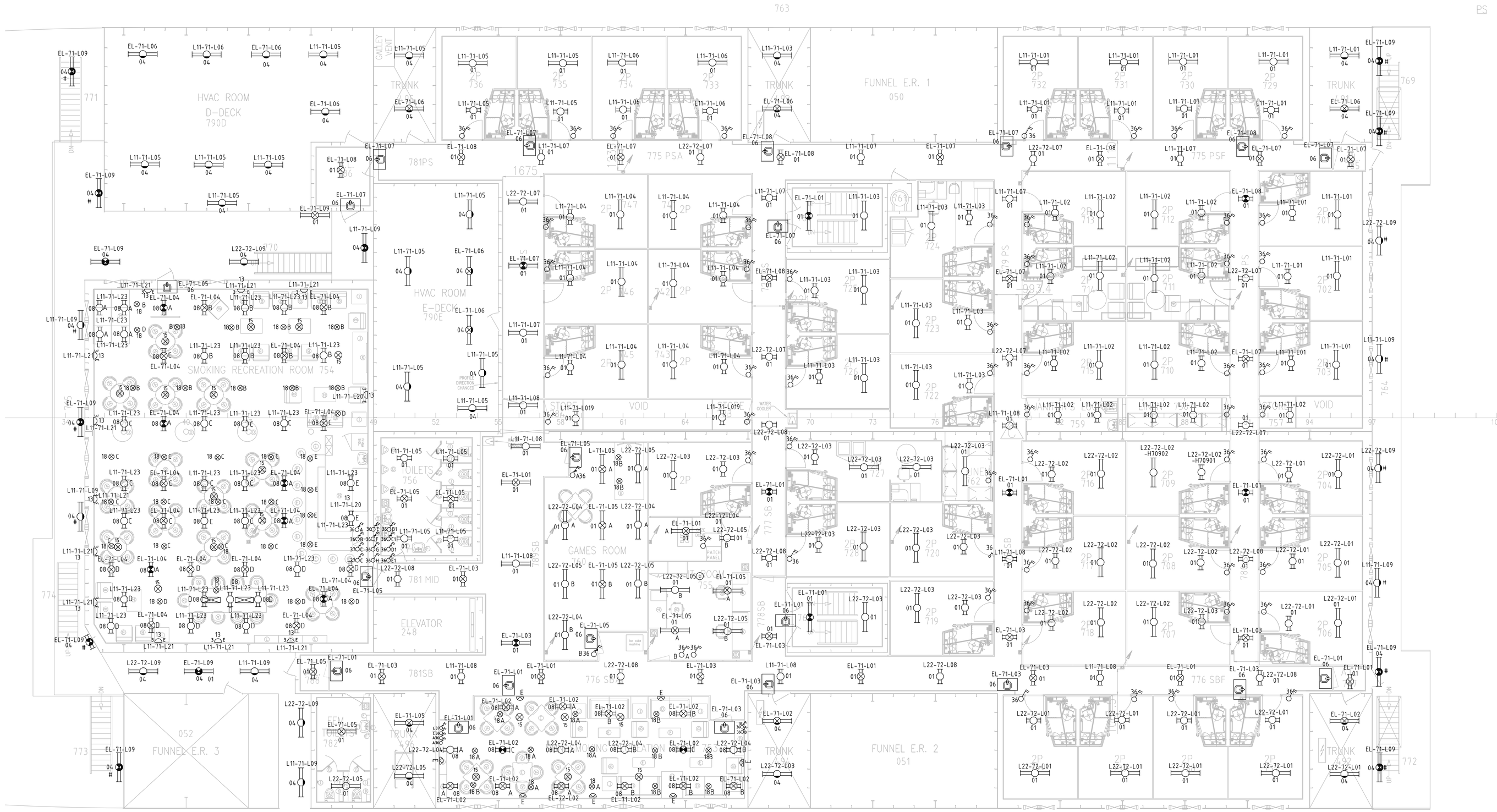
Allseas

DRAWING				PROJECTION
ORIGINATOR	SIZE	UNITS	SCALE	
KR	A1	mm	1:100	

CLIENTS DRAWING No.
320000-890UO/872C2-006-1

JOB No.	ALLSEAS DRAWING No.	
	discipline | ident. no. |sub|ect no.|sheet no.	revision
570001	AU-890UO-51-006-1	G

DRAWING No.
AU-890UO-51-007-1



PLAN VIEW E-DECK

NOTE: 754 RECREATION ROOM SMOKING
⊗ SPOTS (18) ALL ON: L22-72-L06
B WALL LIGHT (13) ALL ON: L22-72-L21
⊗ DECK LIGHT (15) ALL ON: L22-72-L21
LAMP ALL ON: L22-72-L21

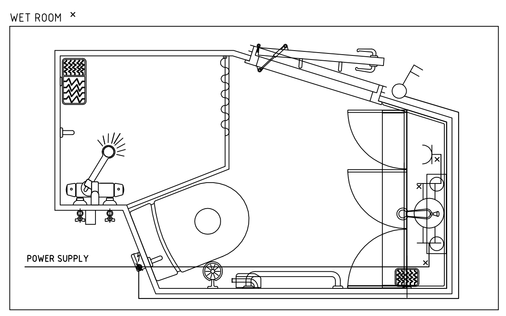
NOTE: 753 RECREATION ROOM SMOKING
⊗ SPOTS (18) ALL ON: L22-72-L06
B WALL LIGHT (13) ALL ON: L22-72-L21
⊗ DECK LIGHT ALL ON: L22-72-L21

REVISION B d.d. 09-11-2006

SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
	01	2X18W/2X36W OPAL DIFFUSER -0667
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY+BATTERY
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771 EMERGENCY
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE -1961
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE-1961 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY+BATTERY
	05	HPS 400W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	06	1x7W EXIT LIGHT + BATTERY -0631
	07	HPS 250W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	08	2X18W/2X36W CEILING LUMINAIRE -1227
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY+BATTERY
2	11	15W MIRROR LIGHT - 1166 WITHOUT SWITCH
1	12	15W DESK LIGHT - 1166 WITH SWITCH
3	13	WALL LIGHT - 1380 COLOURED 9W 2P SWITCH
	15	M2 - SMALL OT-LIGHT (CEILING)
	16	8W BED LIGHT - 1156

SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
⊗	17	60W TABLE LAMP -0075
⊗	18	50W HALOGEN DOWNLIGHT -1460
	21	SOCKET OUTLET, MAKE: JUNG
	22	SOCKET OUTLET DOUBLE, MAKE: JUNG
	24	SOCKET OUTLET WATERTIGHT, MAKE: NIKO
	23	SOCKET OUTLET; CEE FORM 2P+PE, MAKE: BALS
	25	HAND DRYER, DELIVERY BY VENDOR
	26	POWER SUPPLY WET ROOM
	27	WALL CHANNEL WITH 3 DOUBLE SOCKET OUTLETS
	28	FREEZER, DOOR LOCK HEATER
	29	SOCKET OUTLET; CEE FORM 3P+PE, MAKE: BALS
	32	2-POLE SWITCH, MAKE: JUNG
	33	2-POLE SWITCH WATER TIGHT, MAKE: NIKO
	35	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
	36	2-POLE SWITCH WITH DIMMER, MAKE: JUNG
	37	2-POLE SWITCH WITH DIMMER + SIGNAL LIGHT, MAKE: JUNG
	38	2-POLE SWITCH, MAKE: JUNG
	39	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
x x	-	A = SWITCH CODE
#	-	SWITCHED BY OUTSIDE LIGHTING CONTROL BOX
	-	JUNCTIONBOX

WET ROOM ×



NOTE:
21 CM HIGH ARE THE SWITCHES FOR THE CEILING LIGHTING
× = NO DELIVERY ALEWIJNSE
×× = TO HULL

REV	DATE	DRAWN	DESCRIPTION	CHECKED	APPR. PROJ.	APPR. A.E.	APPR. L.R.S.
G	02 10 2007	MOP	AS BUILT				
D	20 07 2006	JVD	FOR APPROVAL UPDATED				
C	04 05 2006	MR	FOR APPROVAL UPDATED				
B	24 04 2006	MR	FOR APPROVAL				
A	24 03 2006	MR	FOR COMMENTS				

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Van der Giessenweg 51
2921 LP Krimpen a/d IJssel

PROJECT
ACCOMODATION UNIT PLV AUDACIA

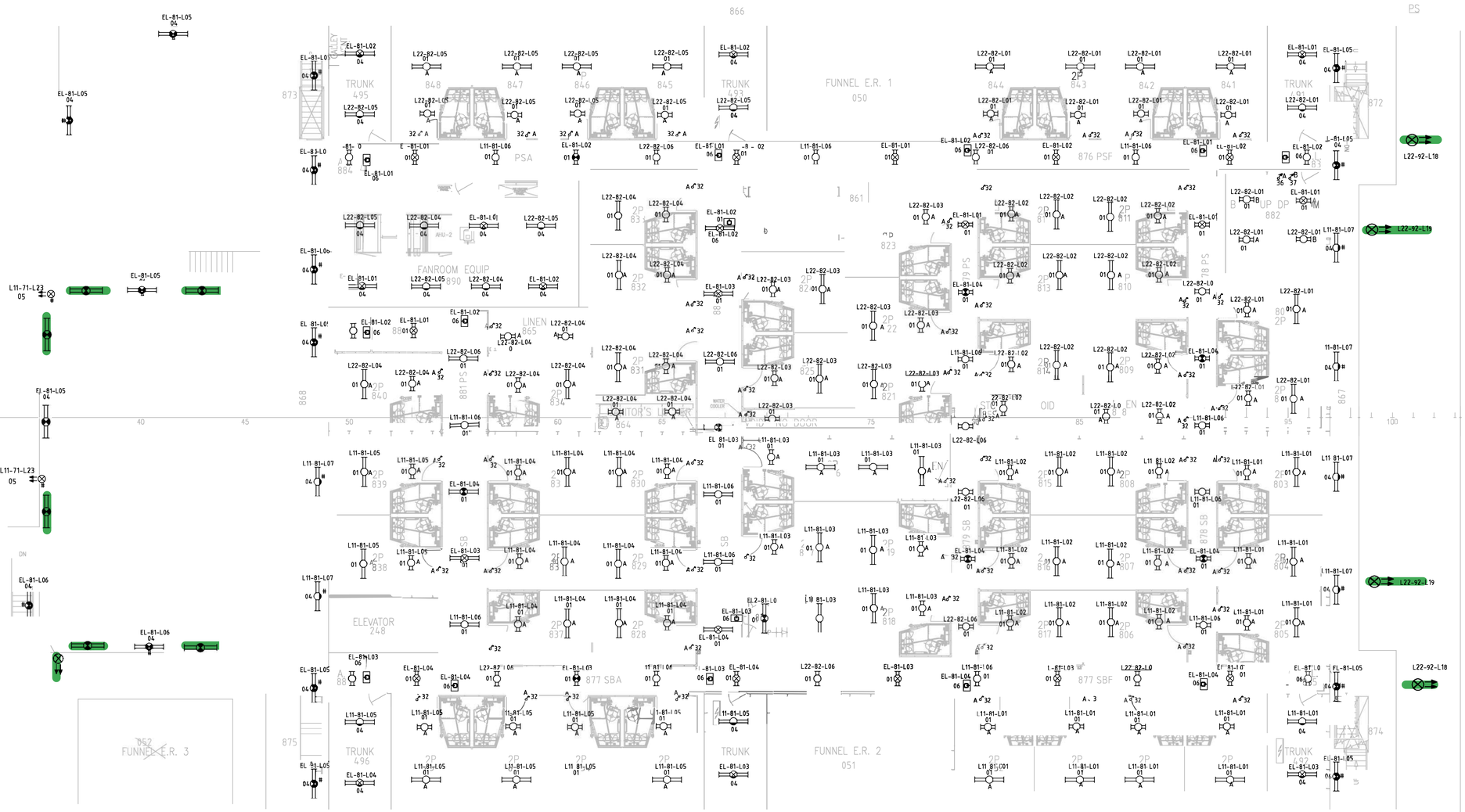
SUBJECT
ACCOMODATION E-DECK
LIGHTING CEILING

DRAWING				PROJECTION
ORIGINATOR	SIZE	UNITS	SCALE	
KR	A1	mm	1:100	

CLIENTS DRAWING No.
320000-890UO/872C2-007-1

JOB No.	ALLSEAS DRAWING No.		
	discipline | ident. no. |subject no.|sheet no.		revision
570001	AU-890UO-51-007-1		G

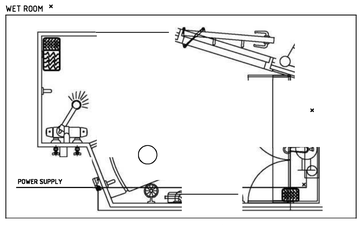
RAMING No.
AU-890UO-51-008-1



SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
	01	2X18W/2X36W OPAL DIFFUSER -0667
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY
	01	2X18W/2X36W OPAL DIFFUSER -0667 EMERGENCY+BATTERY
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771
	02	2X40W IP67 CLEAR DIFFUSER FREEZE TYPE -1771 EMERGENCY
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE -1961
	03	2X36W IP67 CLEAR DIFFUSSER GALLEY TYPE-1961 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY
	04	2X18W/2X36W IP 67 CLEAR DIFFUSER -1044 EMERGENCY+BATTERY
	05	HPS 400W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	06	1x7W EXIT LIGHT + BATTERY -0631
	07	HPS 250W IP67 FLOOD LIGHT - 1076 WITH BALLAST 1507
	08	2X18W/2X36W CEILING LUMINAIRE -1227
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY
	08	2X18W/2X36W CEILING LUMINAIRE -1227 EMERGENCY+BATTERY
	11	15W MIRROR LIGHT - 1166 WITHOUT SWITCH
	12	15W DESK LIGHT - 1166 WITH SWITCH
	13	WALL LIGHT - 1380 COLOURED 9W 2P SWITCH
	15	M2 - SMALL OT-LIGHT (CEILING)
	16	8W BED LIGHT - 1156

SYMBOL	DESCRIPTION NUMBER	DESCRIPTION
	17	60W TABLE LAMP -0075
	18	50W HALOGEN DOWNLIGHT -1460
	21	SOCKET OUTLET, MAKE: JUNG
	22	SOCKET OUTLET DOUBLE, MAKE: JUNG
	24	SOCKET OUTLET WATERTIGHT, MAKE: NIKO
	23	SOCKET OUTLET; CEE FORM 2P+PE, MAKE: BALS
	25	HAND DRYER, DELIVERY BY VENDOR
	26	POWER SUPPLY WET ROOM
	27	WALL CHANNEL WITH 3 DOUBLE SOCKET OUTLETS
	28	FREEZER, DOOR LOCK HEATER
	29	SOCKET OUTLET; CEE FORM 3P+PE, MAKE: BALS
	32	2-POLE SWITCH, MAKE: JUNG
	33	2-POLE SWITCH WATER TIGHT, MAKE: NIKO
	35	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
	36	2-POLE SWITCH WITH DIMMER, MAKE: JUNG
	37	2-POLE SWITCH WITH DIMMER + SIGNAL LIGHT, MAKE: JUNG
	38	2-POLE SWITCH, MAKE: JUNG
	39	2-POLE SWITCH + SIGNAL LIGHT, MAKE: JUNG
	-	A = SWITCH CODE
	-	SWITCHED BY OUTSIDE LIGHTING CONTROL BOX
	-	JUNCTIONBOX

WET ROOM ×



NOTE:
21 CM HIGH ARE THE SWITCHES FOR THE CEILING LIGHTING
× = NO DELIVERY ALEWIJNSE
×× - TO HULL

REVISION B d.d. 02.11.2006

REV	DATE	DRAWN	DESCRIPTION	CHECKED	APPR. PROJ.	APPR. A.E.	APPR. L.R.S.
E	24 07 2007	JMA	AS BUILT				
D	01 08 2006	MOP	FOR APPROVAL UPDATE				
C	10 05 2006	MR	FOR APPROVAL UPDATE				
B	25 04 2006	MR	FOR APPROVAL				
A	20 04 2006	MR	FOR COMMENTS				

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3016 JW Rotterdam
The Netherlands
+(31) 10 432 40 55
+(31) 10 432 25 98

Alewijnse Marine B.V.
Van der Giessenweg 51
2921 LP Krimpen a/d IJssel

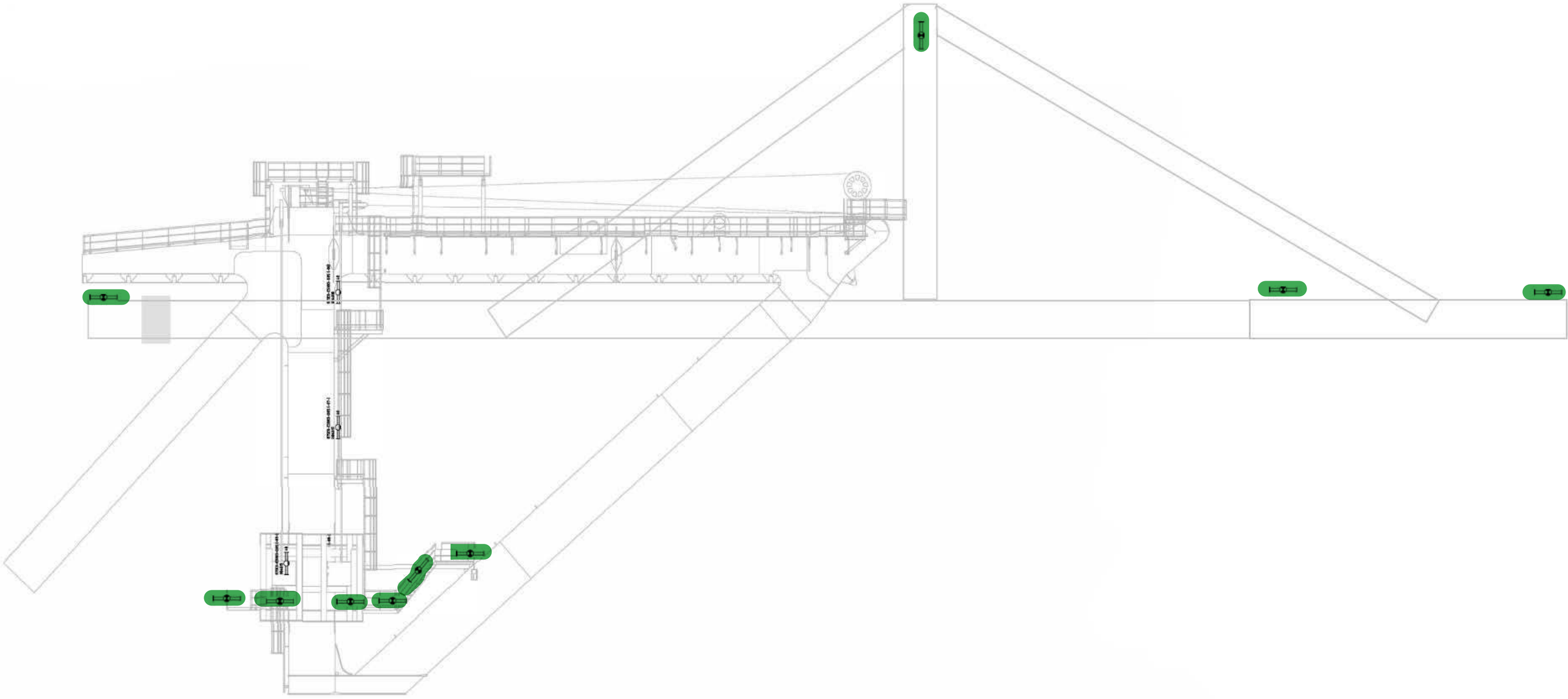
PROJECT
ACCOMODATION UNIT PLV AUDACIA

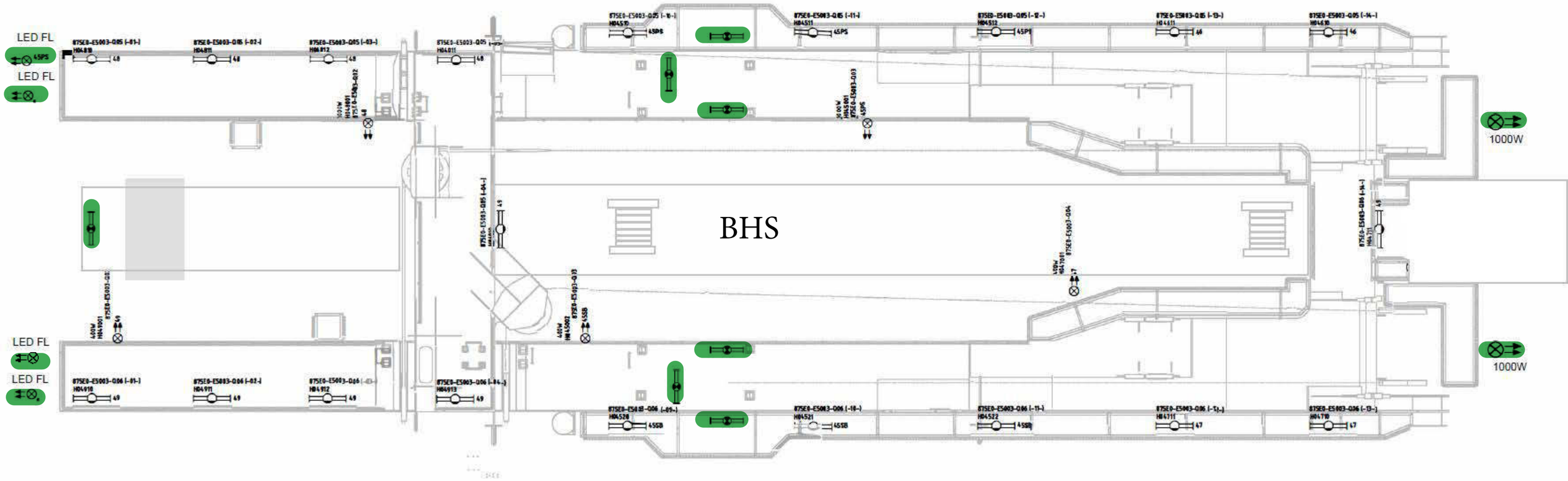
SUBJECT
ACCOMODATION F- DECK
LIGHTING CEILING

DRAWING				PROJECTION
ORIGINATOR	SIZE	UNITS	SCALE	
KR	A1	mm	1:100	

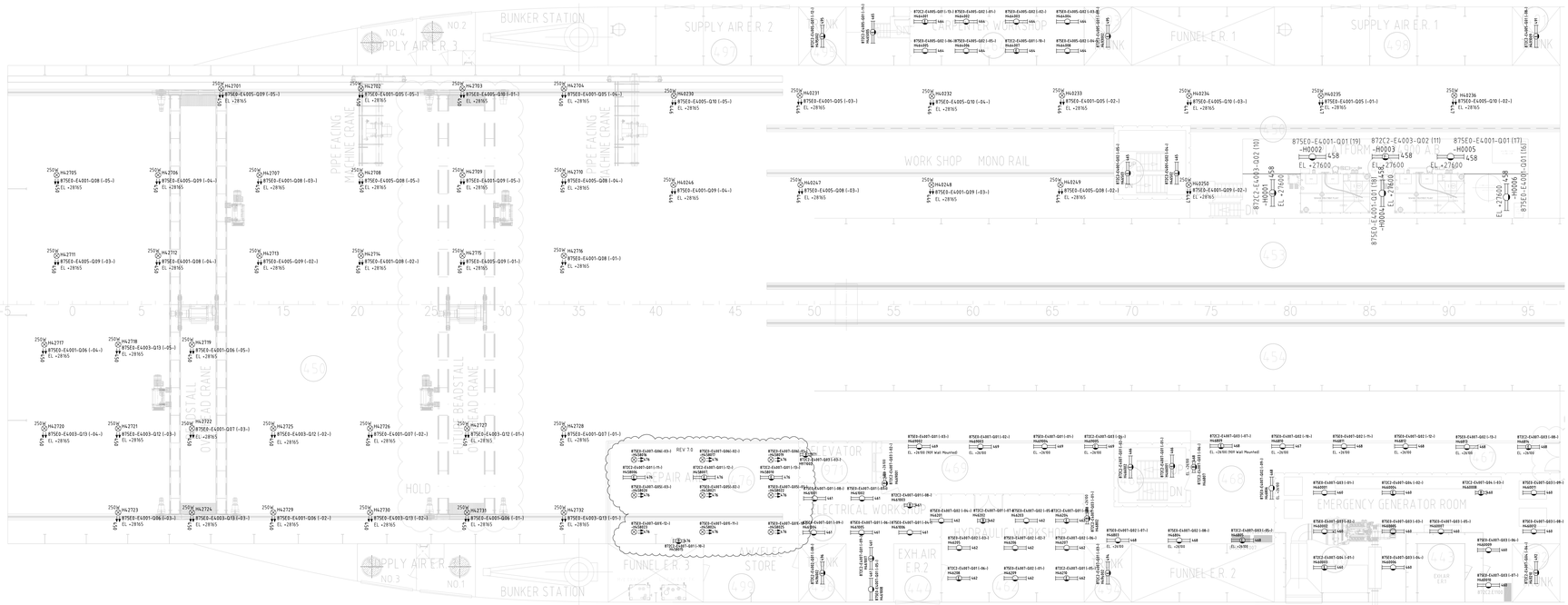
CLIENTS DRAWING No.
320000-890UO/872C2-008-2

JOB No.	ALLSEAS DRAWING No.			
	discipline	ident. no.	subject no.	sheet no.	revision
570001	AU-	890UO-	51-	008-1	E



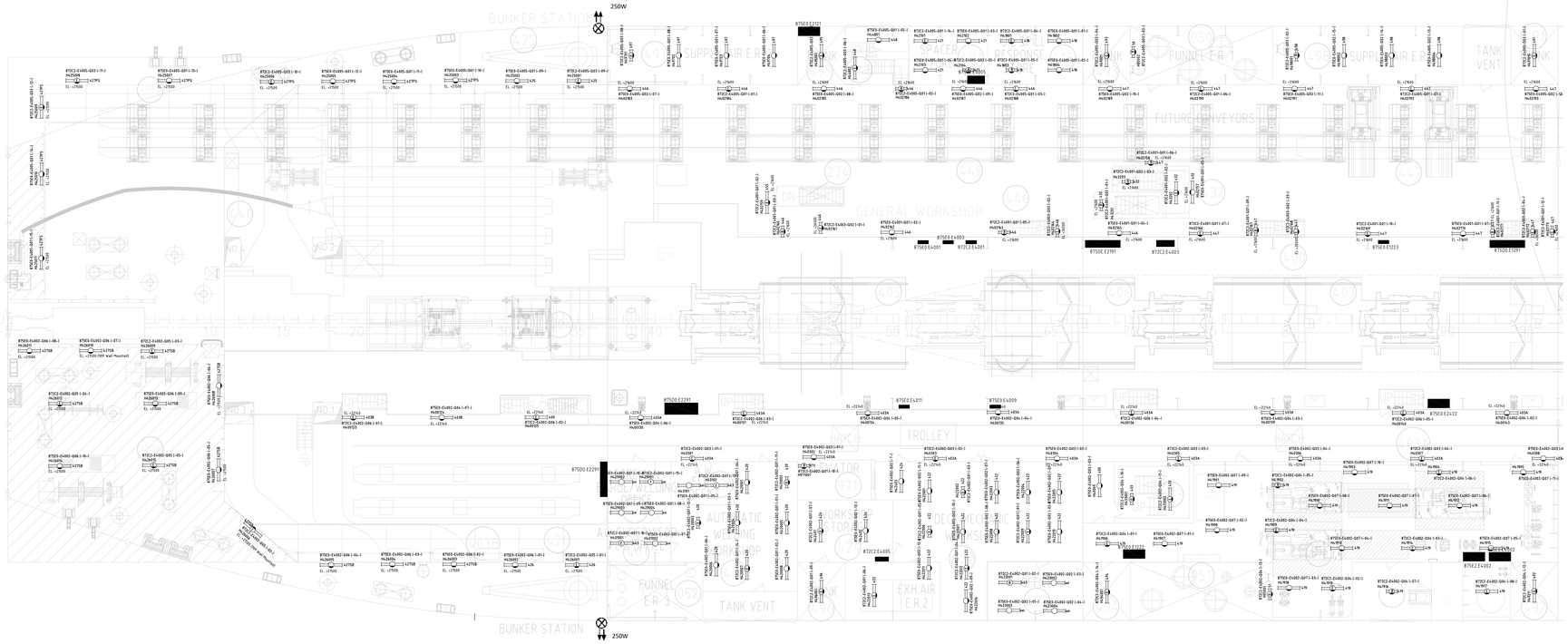


View Stinger Handling Frame +48640 A.B.



PLAN VIEW B-DECK 23800 A.B.

VIEW ON B DECK



PLAN VIEW A-DECK 19200 A.B.

LEGEND

TYPE	SYMBOL	DESIGNATION
AQU 14441		Watertight multipurpose luminaire, surface 2x18W battery backup
AQU 10441		Watertight multipurpose luminaire, surface 2x18W
AQU 15441		Watertight multipurpose luminaire, surface 2x18W emergency
AQU 10444		Watertight multipurpose luminaire, surface 2x36W
AQU 10446		Watertight multipurpose luminaire, surface 2x36W emergency
AQU 1076080H	1hv	Floodlight for HPS lamp 1x70W
AQU 1076010H	2hv	Floodlight for HPS lamp 1x250W
AQU 1076011H	4hv	Floodlight for MH lamp 1x400W
AQU 1076011H	4hv	Floodlight for HPS lamp 1x400W
AQU 1076080M	1thv	Floodlight for MH lamp 1x1000W
AQU 5070002B		Ceiling luminaire, 2x36W
AQU 5070		Ceiling luminaire, 2x36W battery backup
AQU 5070002B		Ceiling luminaire, 2x36W emergency

REV.	DATE	REV. DESCRIPTION
7.0	22-02-2007	REPAIR AREA (476) UPDATED
6.0	17-11-2006	PUT-IN LIGHTING FIXTURES SEAWAGE TREATMENT PLANT, SPACE 458
5.0	31-10-2006	UPDATE LIGHTING GROUPS A-DECK SB
4.0	05-10-2006	LIGHTING GROUP AND FIXTURES CHANGED
3.0	07-07-2006	APPROVED FOR CONSTRUCTION BY ALLSEAS
2.0	09-06-2006	APPROVED COMP.
1.0	04-01-2006	BASIC ENGINEERING

Customer: Soc d' Exploitation Audacia SA	Drawn	TLEEUWEN	16-12-2005
	Revised	EDRENTH	22-02-2007
Latest revision description: Approved For Construction by A.	Checked		Par.
	Prod. no.		
Doc. type: Installation drawing	Scale: -/-	Size: A0	

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P.O. Box 5054
3008 AB Rotterdam
The Netherlands
Phone : +31-10-487 19 11
Fax : +31-10-487 17 02

Imtech Marine & Offshore

© 2005

Project : D.P. PIPELAY VESSEL 'AUDACIA'
Product : Lighting Systems
Part : General, A-deck 19200 A.B. / B-Deck 23800 Frame -5 up to 95

Doc. no. 290103-890U0-1ST | Sheet 201 | Rev. 7.0
File code : 290103-890U0-1ST-200.DWG

Project BAROSSA outside lightning information

We made some updates to light layout drawings because there is considerable difference between drawings and current situation. You will find that there is quite a lot of fixtures added in last 13 years.

In the following table is a number and type of light fixtures and tubes used on every deck.

	120 CM FIXTURE- 2 TUBES		60 CM FIXTURE - 2 TUBES		FLOODLIGHTS			
							LED	
	LED 20W	FLUO	LED 10W	FLUO	400W	1000W	SINGLE	DOUBLE
TOP DECK	6	2			8			
BRIDGE DECK		6			2			
F DECK		28			6			
E DECK		24						
D DECK	27	19			2			
C DECK	55	55	16	24	24			
A & B DECK	10	56		4				
SHF	29		6			7		4
SPC							10	
PTC + BOOM REST				5			1	1
SUMMARY	127	190	22	33	42	7	11	5

1. LED tubes

VOLTACON LED-T8-6010-F-CW-SE 6000 K 60 cm tube

VOLTACON LED-T8-12020-F-CW-SE 6000K 120 cm tube

2. Fluorescent tubes

PHILIPS Master TL-D 18W/840 60 cm tube

PHILIPS Master TL-D 36W/830 120 cm tube

3. LED Floodlight types

DIALIGHT Vigilant High bay

186W, 5000K, 26500 lumens single

385W, 5000K, 54000 lumens double

4. Halogen floodlight

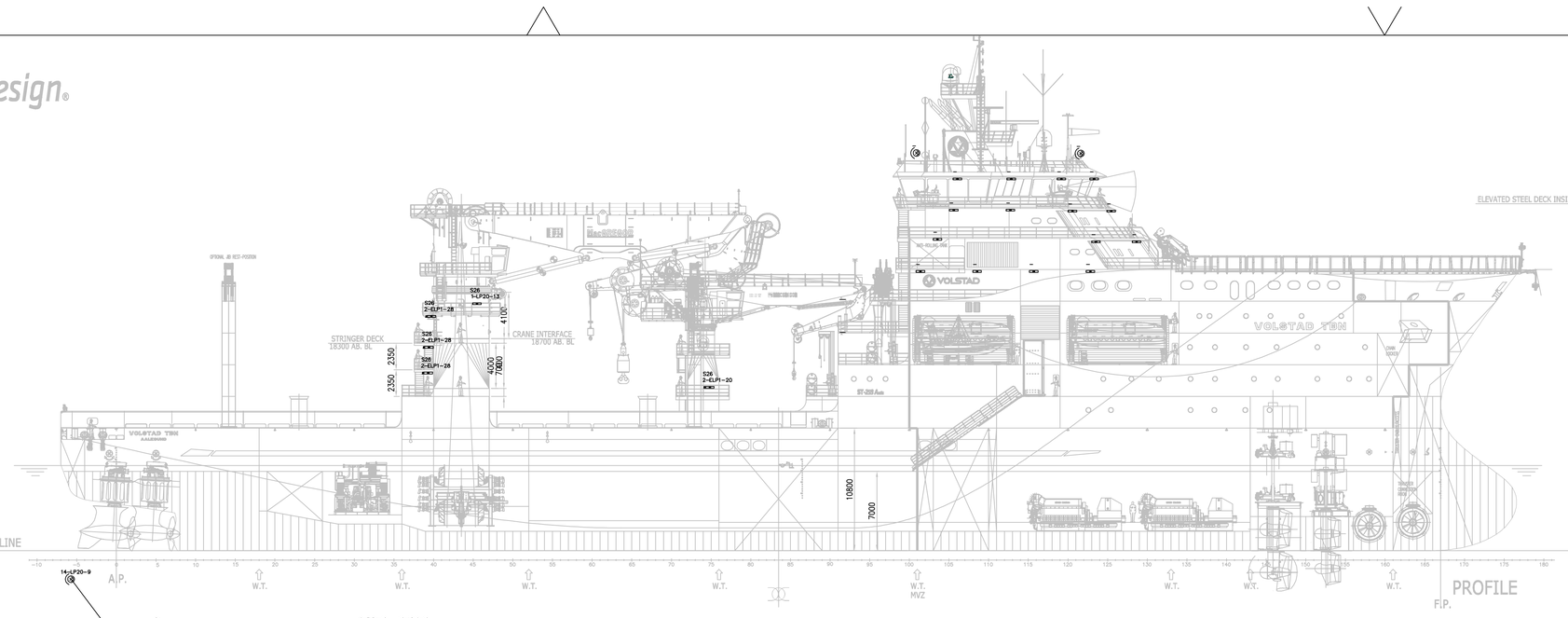
Philips SON-T 1000W E40

Philips HPI-T Plus 400 W E40

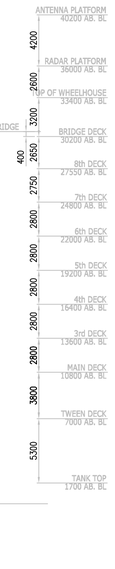
Sylvania HIT 250/HOR/E40 250 W

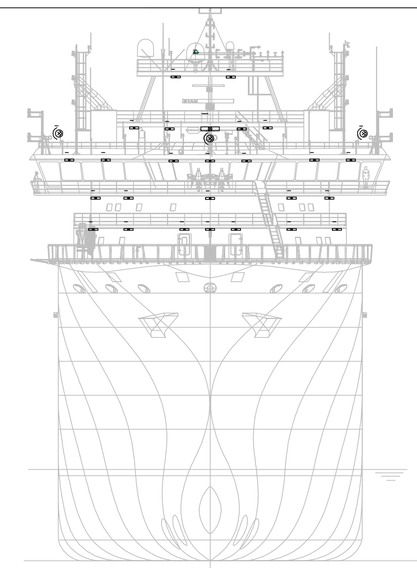
Appendix 2: Vessel light inventory details: *Oceanic* construction vessel

ST-design®

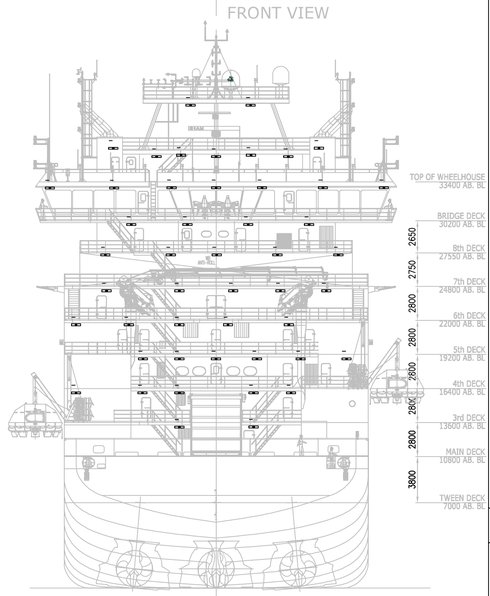


PROFILE

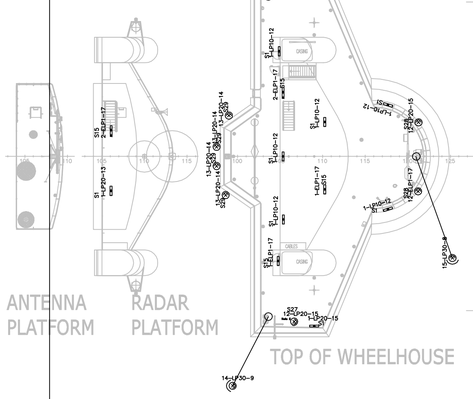




FRONT VIEW



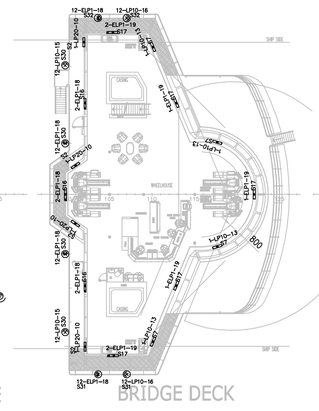
AFT VIEW



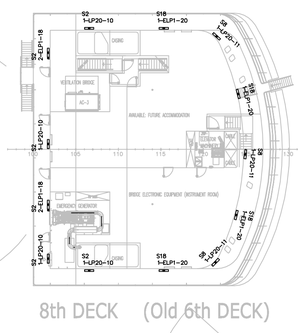
ANTENNA PLATFORM

RADAR PLATFORM

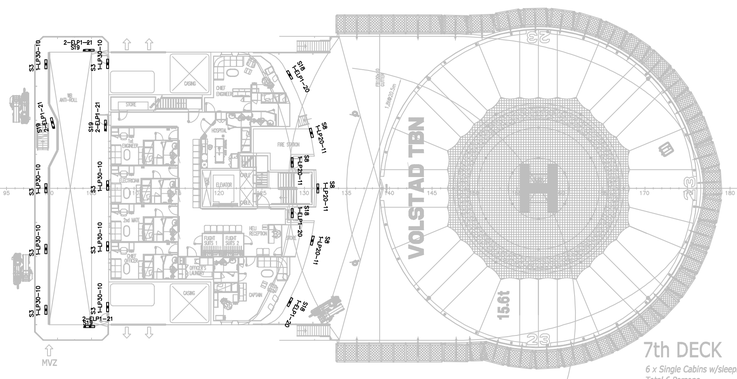
TOP OF WHEELHOUSE



BRIDGE DECK

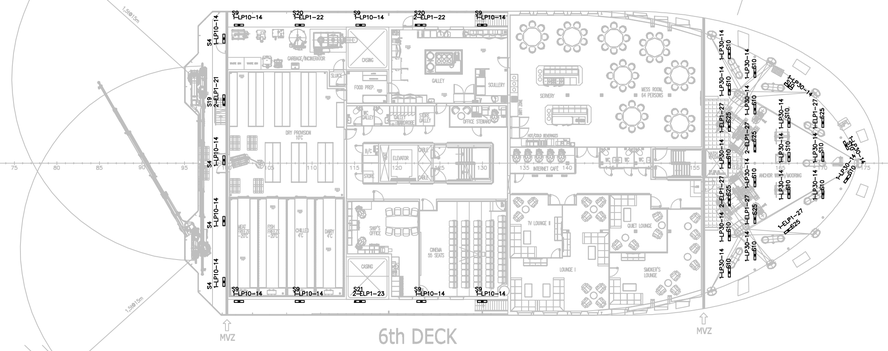


8th DECK (Old 6th DECK)

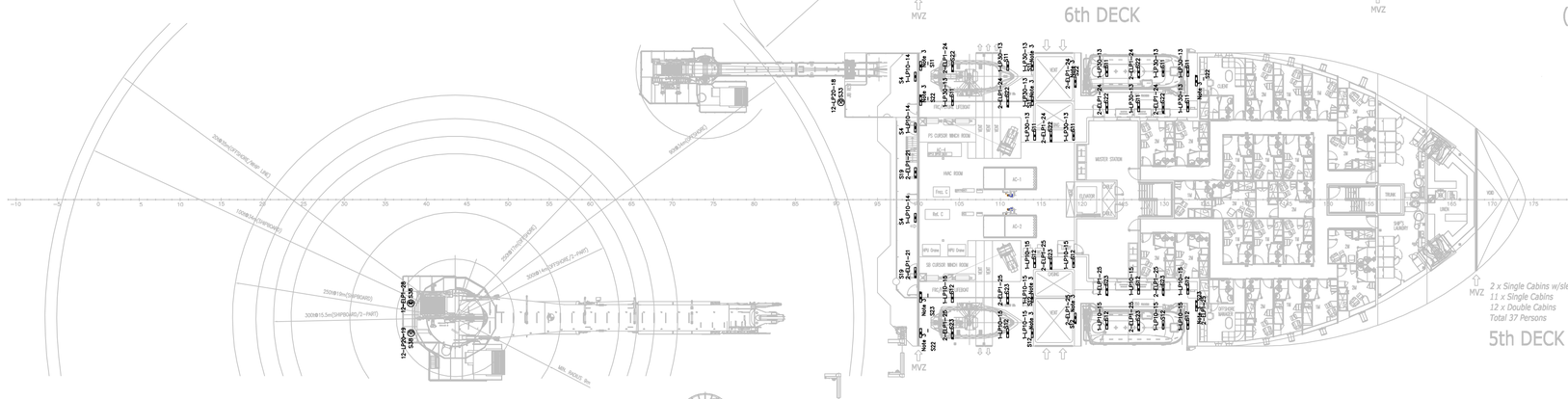


7th DECK (Old 5th DECK)

6 x Single Cabins w/sleeping quarter
Total 6 Persons

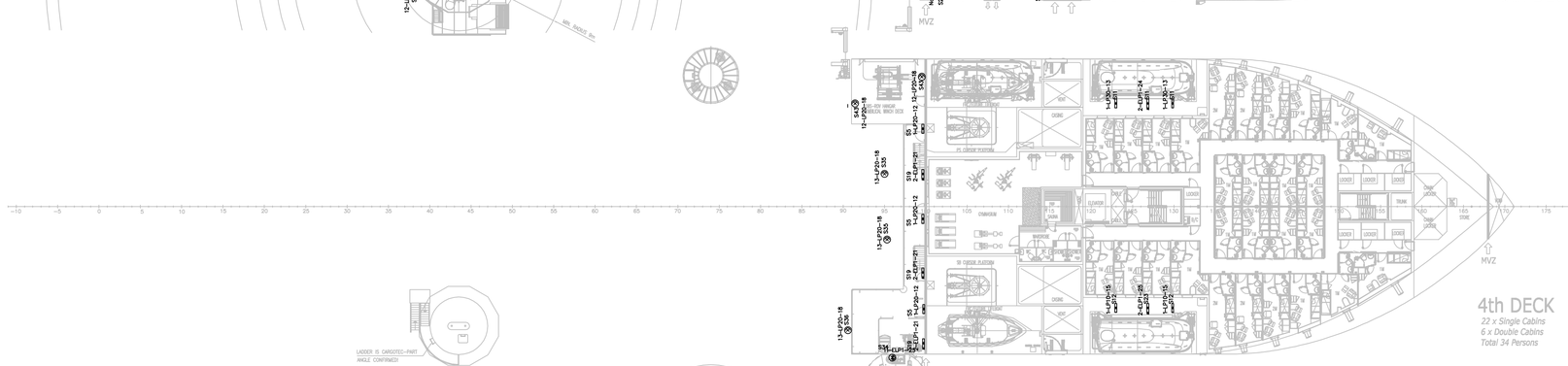


6th DECK (Old 4th DECK)



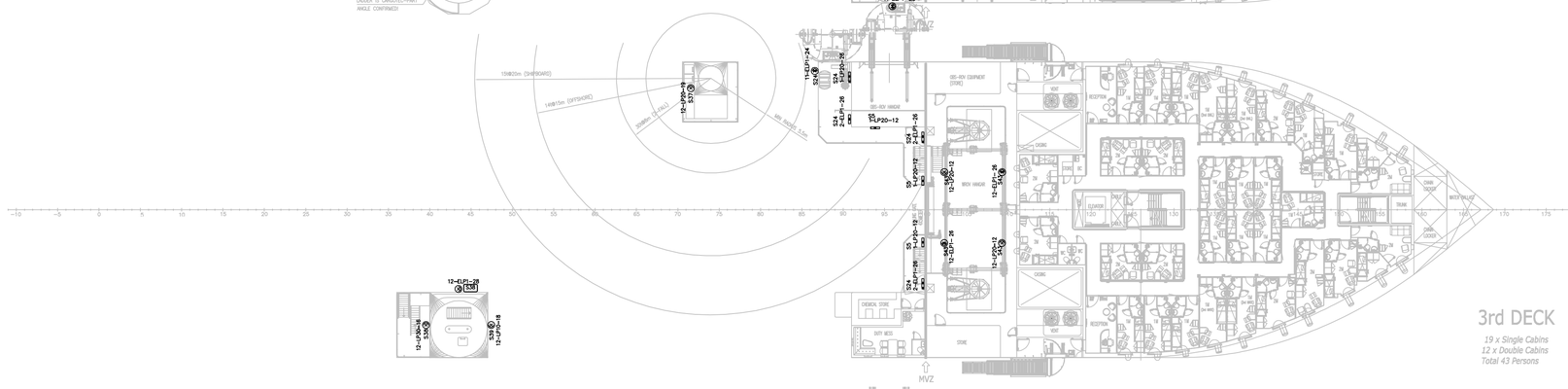
2 x Single Cabins w/sleeping quarter
11 x Single Cabins
12 x Double Cabins
Total 37 Persons

5th DECK (Old 3rd DECK)



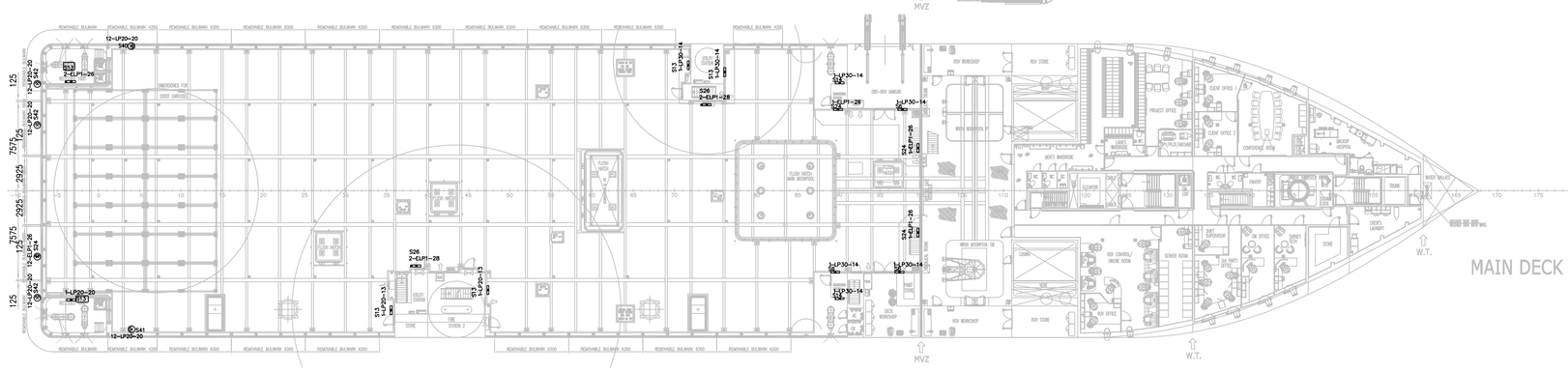
4th DECK (Old 2nd DECK)

22 x Single Cabins
6 x Double Cabins
Total 34 Persons



3rd DECK (Old, 1st DECK)

19 x Single Cabins
12 x Double Cabins
Total 43 Persons



NOTE 4:		
LP10-12,LP20-15 LP20-13,LP10-15	ELP1-18	ELP1-18, LP10-15
LP20-10	ELP1-18, ELP1-19	ELP1-18,LP10-16
LP30-10	ELP1-20	ELP1-18,LP10-16
LP10-14	ELP1-21	LP20-18
LP20-12	ELP1-22	ELP1-25
LP30-14	ELP1-23	LP20-18
LP10-13	ELP1-24	LP20-18
LP20-11	ELP1-25	LP20-19
LP10-14	ELP1-26, LP20-26	ELP1-28, LP20-18, LP30-16
LP20-14	ELP1-27	LP10-18
LP30-13	ELP1-28, LP20-28, LP20-13	LP20-20
LP10-15	LP20-15	ELP1-26, LP20-20
LP30-16, LP20-13	ELP1-17, LP20-15	LP20-13,LP10-15
LP30-14	LP20-14	ELP1-28, LP20-12, LP20-18
ELP1-17		

NOTE1: All emergency light to be equipped with heatingcable for De-icing
NOTE2: To brighten up the Volstad brand
NOTE3: The light shall be installed with 45°
NOTE4: All switches to be integrated inn the safety desk

REV:	DESCRIPTION:	DATE APPR:	DATE REV:	SIGN:
J	UPDATED.		16.07.15	BS/SRH
I	UPDATED.		24.03.15	BS/BH/TSO
H	UPDATED.		23.12.14	BS/BH/TSO
G	UPDATED.		24.10.14	BS/BH/TSO
F	UPDATED.		28.08.14	BS/BH/TSO
E	UPDATED.		10.07.14	SRH/BS/BH
D	UPDATED.		13.06.14	SRH/BS/BH
C	UPDATED.		11.04.14	SRH/BS/BH
B	UPDATED.		18.02.14	SRH/BS/BH
A	FIRST ISSUE AFTER CONTRACT		31.01.14	SRH/BS/BH

ORDER: TERSAN SHIPYARD
YARD NO.: 1063
FORMAT: A0
TITLE: GENERAL ARRANGEMENT
SCALE: 1:250
DATE: 27.11.12
SIGN.: SRH
CHECKED:
PROJECT NO.: 2012066
ALTERNATIVE DRAWING NO.: -
DRAWING NO.: 1063-101-001-J

Skipsteknisk®
CONSULTING NAVAL ARCHITECTS AND MARINE ENGINEERS
Klaus Nilsens gt. 4 P.O. Box 36 Sentrum NO-6001 Aalesund Norway
PHONE: +47 70 10 33 44 FAX:+47 70 10 33 48 MAIL: office@skipsteknisk.no WEB: www.skipsteknisk.no

REV.NO	REVISION	DATE	DRAWN
02	Updated switch number for capstan and floodlight on main crane	23.09.2015	KF
01	Updated with switch number and new info about floodlight	09.03.2015	KF
00	First issue	27.11.2014	KF

ST-259 DCV Subsea Vessel
El. Inst Plan, Deck lighting
YARD: Tersan
YARD No.: 1063

Scale: 1:250 A0
Drawn: KF
Date: 11.11.2014
Check: BEK
Chk Date: 23.09.2015
Replaces: -

SKANEL® MARINE ELECTRICAL ENGINEERING
Telephones: 70172020
Telefax: 70172021
Lerstadveien 545
NO-6018 ÅLESUND
www.skanel.no

DRAWG. NO.: 1063-893-100
Rev: 02
Sheet: 1 Total: 1
Project No: 2012066

Tersan Shipyard - Volstad OSCV - ST259 - Rev.4 (Extra floodlights rear of vessel)

Luminell LED Floodlight Simulation

Rev.4 - Simulation including floodlight rear of vessel.

Average illumination levels on Main Deck: above 100lux.

Floodlights are placed as following:
- 2pc RLX, Top of Wheelhouse - Buyer's Logo
- 2pc RLX, Top of Wheelhouse fwd
- 4pc RLX, Top of Wheelhouse aft
- 4pc RLX - Bridge Deck aft
- 4pc RLX, Bridge Deck, PS/SB wings (Lifeboats, MOB boats, gangways)
- 1pc RLX, 3rd Deck
- 4pc RLX - 2nd Deck, centre/SB/Liferaft
- 1pc RLX - PS LIferaft
- 1pc RLX, PS Crane aft
- 5pc RLX, SB Crane
- 2pc RLX, Main Deck, aft bulwarks sides
- 4pc RLX, Aft of vessel

~~Options:~~
~~- Floodlights above main engines?~~
- OBS ROV?
- WROV Moonpool?

Project: Volstad ST259
Company: Tersan Shipyard
Contact person:

Date: 25.08.2014
Operator: Morten Kalvø

Luminell AS
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NORWAY

Operator Morten Kalvø
Telephone +47 4860 5031
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Table of contents

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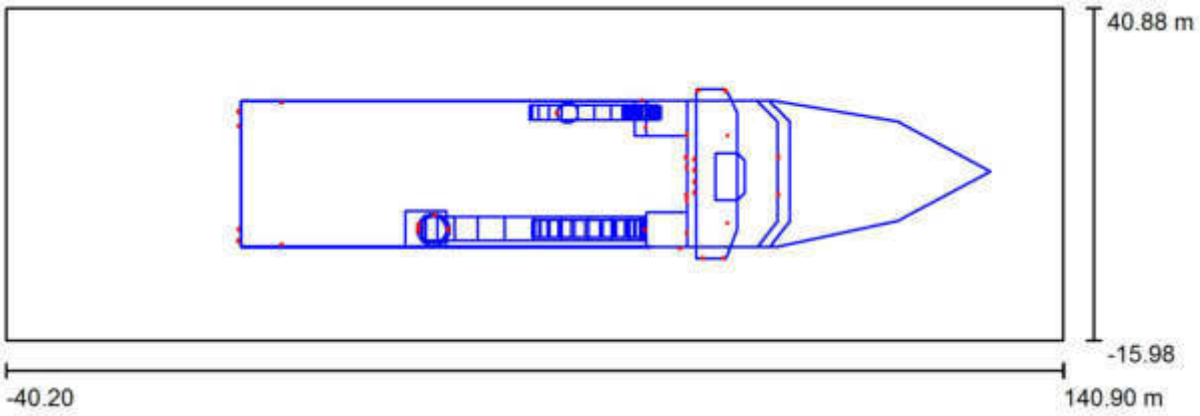
Simulation / Planning data



Light loss factor: 0.80, ULR (Upward Light Ratio): 9.0%

Scale 1:1295

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Luminell AS RLX C - Wbs110.45 Wide Beam (Horisontal) (1.000)	3022	3500	40.0
2	2	Luminell AS RLX C - Wbs110.45 Wide Beam (Horisontal) (1.000)	6045	7000	80.0
3	6	Luminell AS RLX D - Mbe30 Medium Beam 30 Deg (1.000)	11891	14000	160.0
4	9	Luminell AS RLX D - Mbe40 Medium Beam 40 Deg (1.000)	11080	14000	160.0
5	9	Luminell AS RLX D - Wbs110.45 Wide Beam (Horisontal) (1.000)	12090	14000	160.0

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Simulation / Planning data

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
6	4	Luminell AS RLX E - Sbe10 Spot Beam 10 Deg (1.000)	18328	20500	240.0
7	2	Luminell AS RLX E - Wbs110.45 Wide Beam (Horisontal) (1.000)	17703	20500	240.0
			Total: 406722	Total: 480000	5520.0

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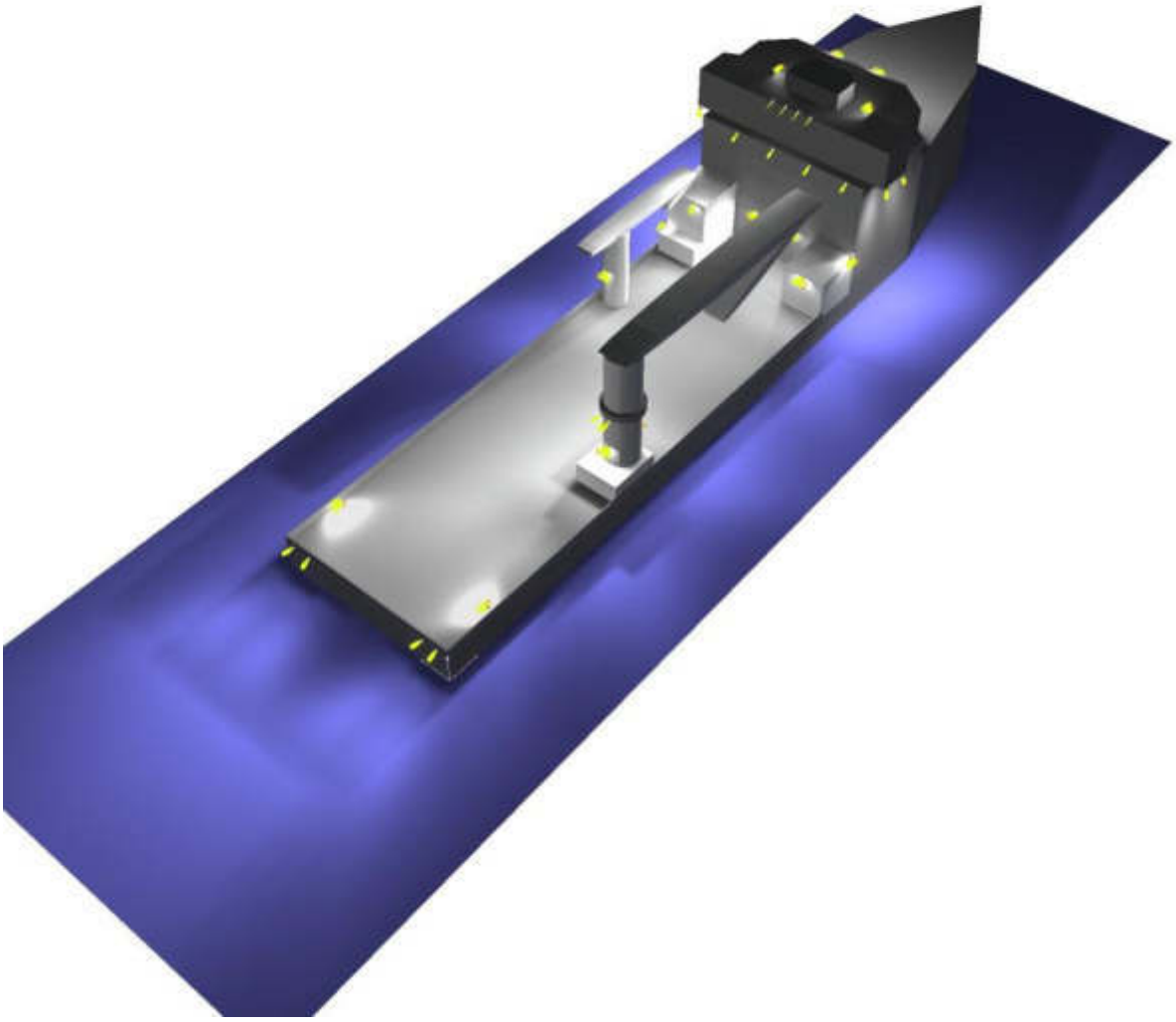
Simulation / 3D Rendering



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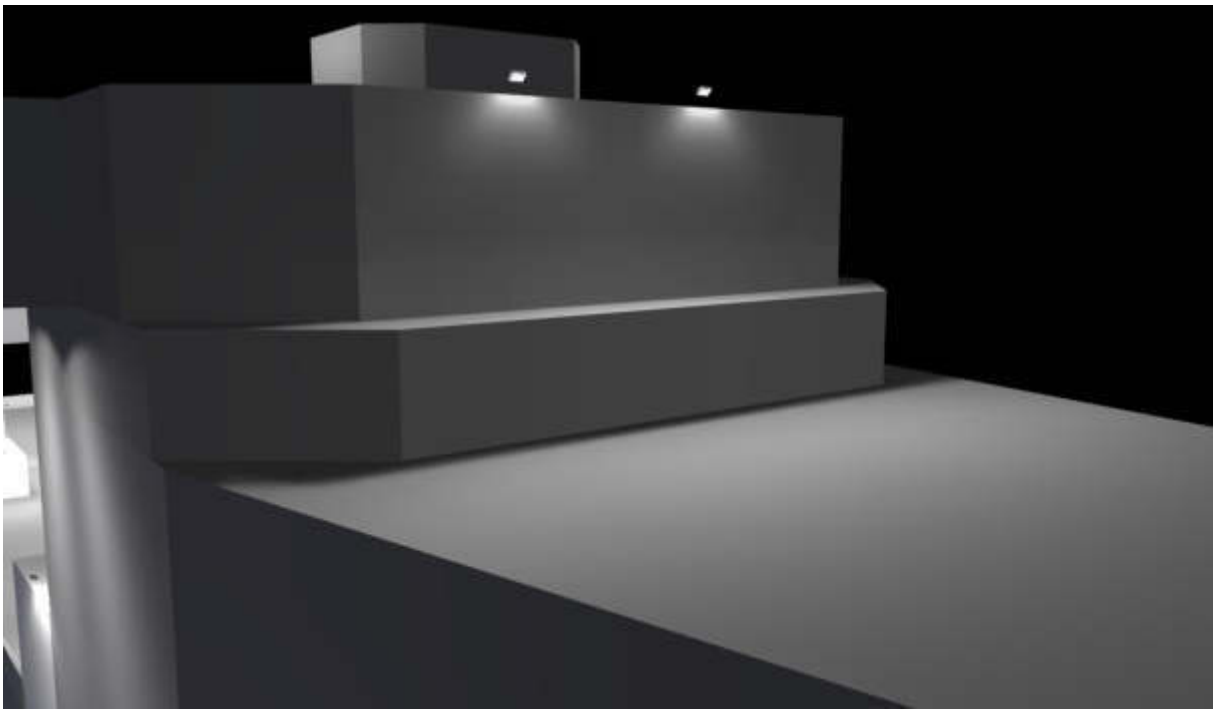
Simulation / Raytrace preview 4



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Simulation / Raytrace preview 5

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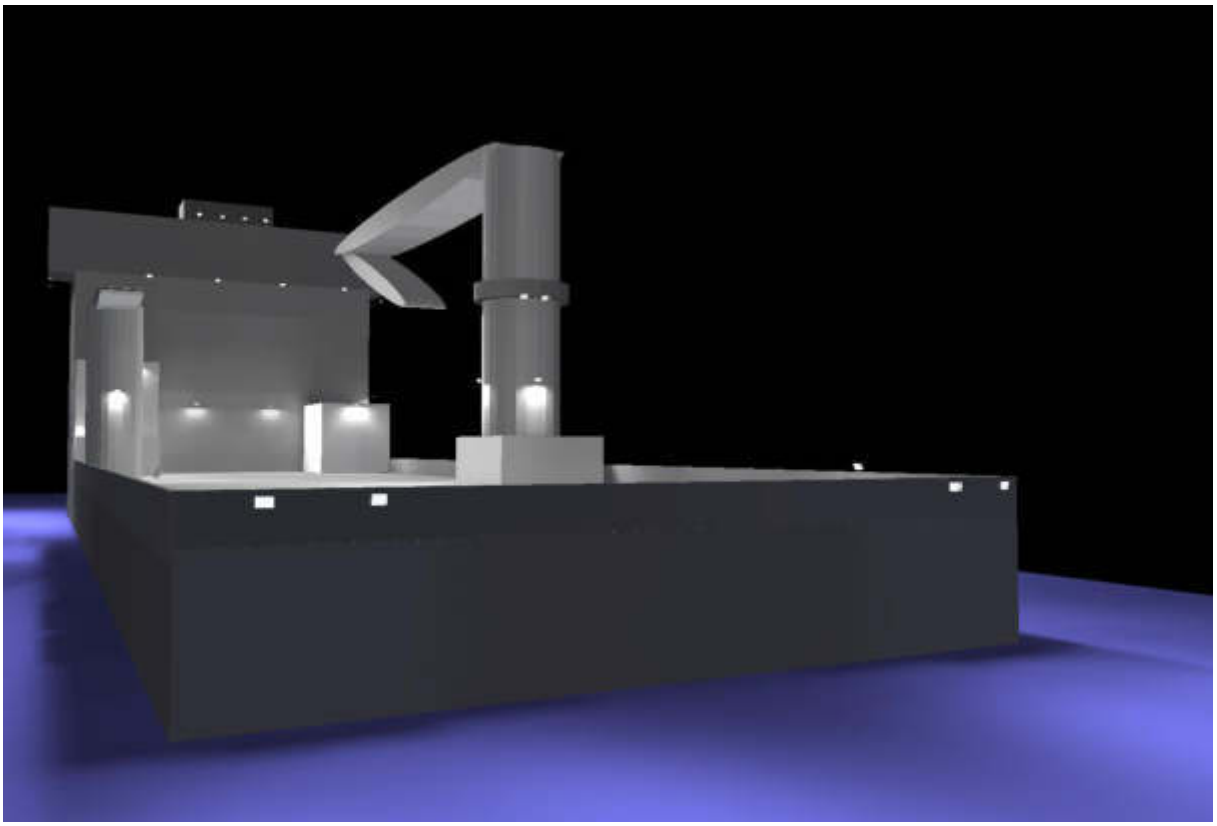
Simulation / Raytrace preview 7



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NORWAY

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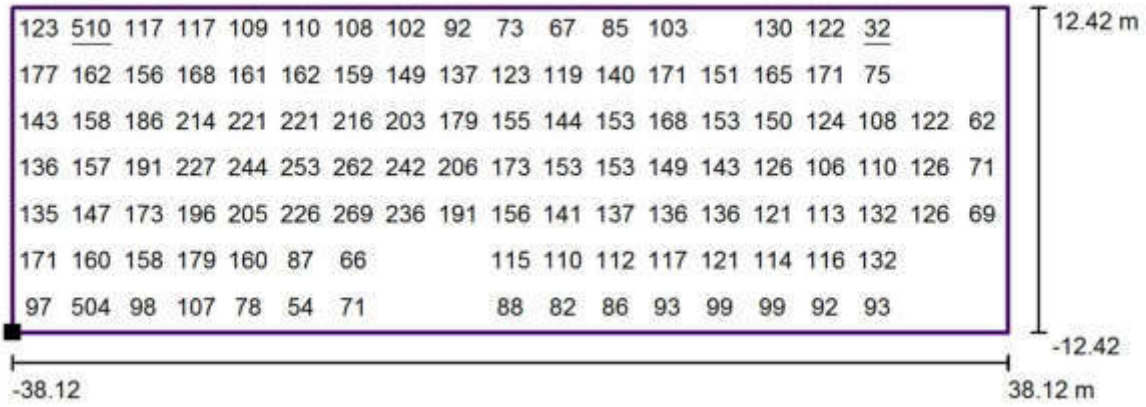
Fax
e-Mail mk@luminell.com

Simulation / Calculation Grid 1 - Main Deck / Value Chart (E, Camera)



Values in Lux, Scale 1 : 579

Position of surface in external scene:
Marked point: (0.006 m, 0.086 m, 4.000 m)
Camera Position: (77.199 m, 12.202 m, 27.000 m)

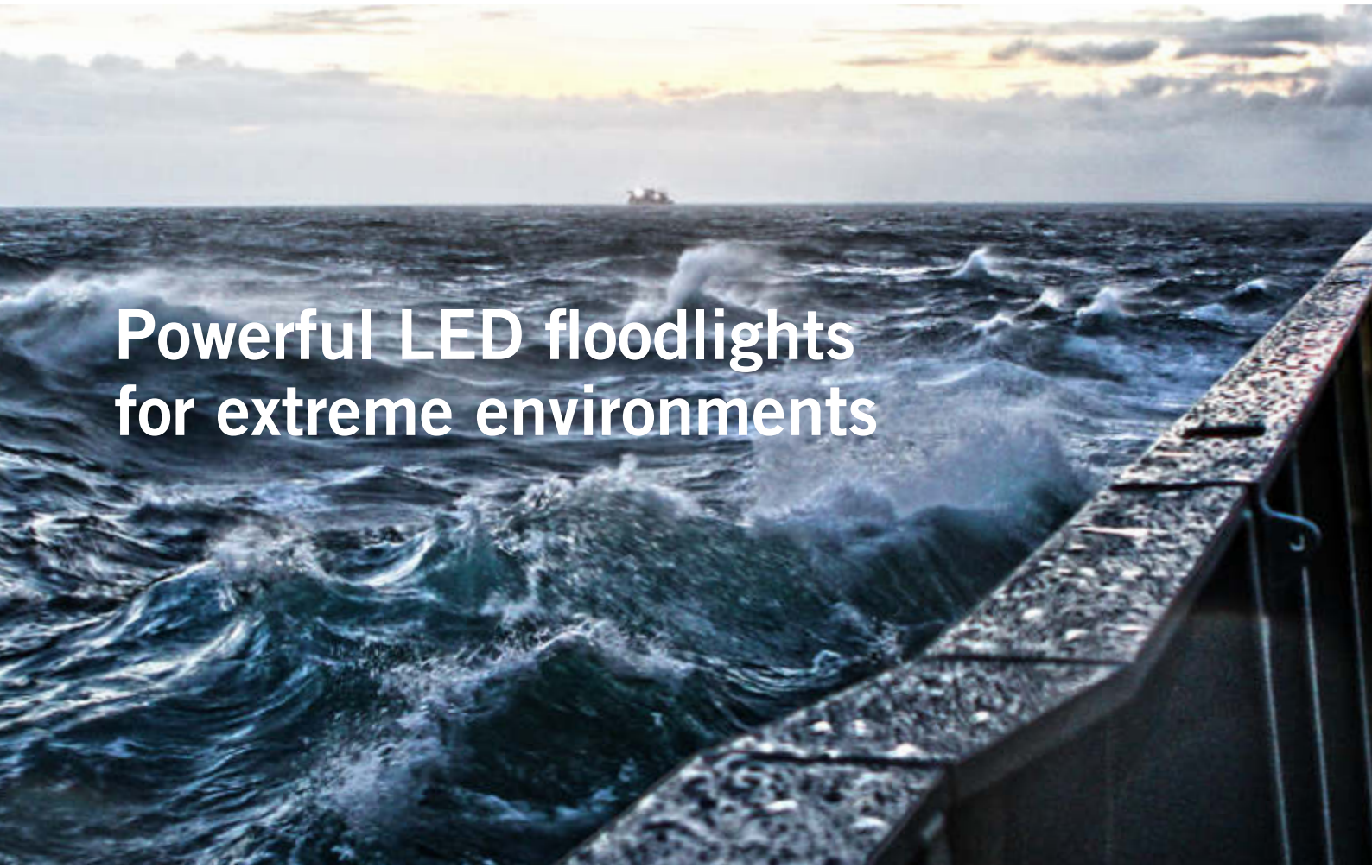
Grid: 120 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
146	32	510	0.22	0.06

RLX® Series

luminell®
simply bright

Proven endurance



Powerful LED floodlights for extreme environments

- Made to handle shocks and vibrations over time
- Seawater resistant and ”easy clean” design
- No maintenance
- Designed and produced in Scandinavia
- Low power consumption
- Compact, robust and sealed
- Excellent EMC characteristics
- Encapsulated internal electronics
- No ballast required
- Submersible version < 40m
- Wide range of accessories and options
- Available for hazardous areas
- 5 years warranty
- Corrosion class C5m

5 YEAR WARRANTY

RLX C Series

RLX D Series

RLX E Series

Input Specifications

	RLX C Series	RLX D Series	RLX E Series
Input voltage range	100 - 305 VAC	100 - 305 VAC	100 - 305 VAC
Alternative voltage range	17 - 31 VDC	N/A	N/A
Frequency range	47 - 63 Hz	47 - 63 Hz	47 - 63 Hz
Rated power	80W	160W	240W
Alternative rated power	40W	N/A	N/A
Current at 230VAC	0,35 A (80W)	0,75 A	1,1 A
Leakage current	<0,75 mA /227 VAC	<0,75 mA /227 VAC	<0,75 mA /227 VAC
Inrush current (230VAC cold start)	~65A (445 µs)	~65A (445 µs)	~70A (1010 µs)

Light Specifications

Initial luminious flux @ Ta 25°C	8.280	16.560	21.456
Minimum color rendering index	70 (CRI)	70 (CRI)	70 (CRI)
Color temperature	+ - 5.000 K	+ - 5.000 K	+ - 5.000 K
Beam angles	10° spot beam - 110° wide beam		
Candela (min-max) in 1.000	3,75´ - 85´ cd	6´ - 170´ cd	8,4´ - 238´ cd
Maximum light intensity	1.060 cd/W	1.060 cd/W	990 cd/W

General Specifications

Startup time	1 sec.	1 sec.	1 sec.
Operating ambient temperature (Ta)	- 40°C to + 55°C	- 40°C to + 55°C	- 40°C to + 55°C
Storage temperature	- 40°C to + 80°C	- 40°C to + 80°C	- 40°C to + 80°C
Weight (apx.)	6.5 kg	10.5 kg	16 kg
IP class	IP 66/67	IP 66/67	IP 66/67
Lifetime prediction (L70) in hours	80.000	100.000	85.000
Corrosion class	C5m ISO 9223/12944 (for offshore and maritime environments)		

Materials

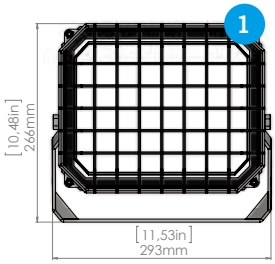
Body / casing / chassis	Seawater resistant; casted, anodized, and powder coated aluminium
Glass	Tempered glass
Bracket, bolts, nuts, etc.	Stainless steel AISI 316L (1.4404), A4

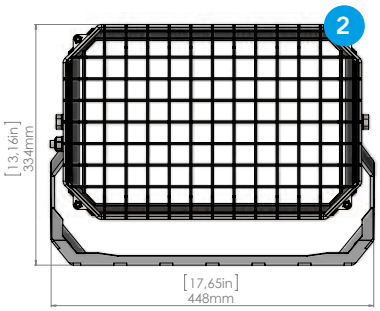
Safety Standards for RLX Series

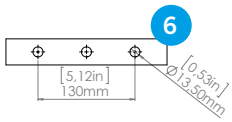
Description	**Standard**
LED modules for general lightning	IEC 62031
Photobiological safety	IEC 62471: 2009 (Low risk - RG1)
Radiated emissions	EN 60945
	MIL-STD461F
EMS immunity	EN 61000-4-2,3,4,5,6,8,11

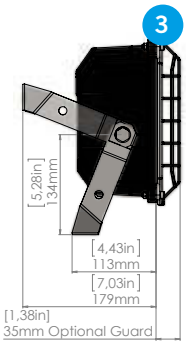
Dimentions and Mounting

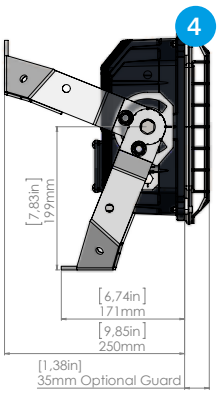
	RLX C Series	RLX D Series	RLX D Ex Series	RLX E Series
Front view	Fig.1	Fig.2	Fig.2	Fig.2
Side view	Fig.3	Fig.4	Fig.4	Fig.5
Bracket	Fig.6	Fig.7	Fig.7	Fig.7

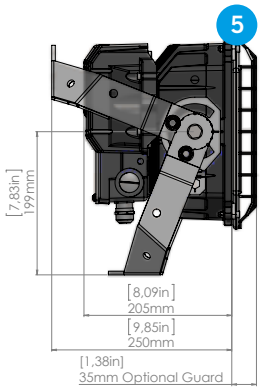


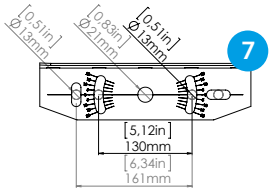












RLX D Ex nA

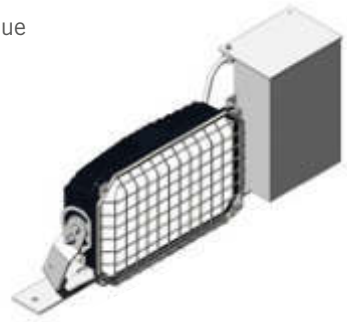
Marking	Ex II 3 G Ex nA IIC T5 Gc
Certificate	TÜV 12 ATEX 104001 X
ATEX directive safety	EN 60079-0:2009
ATEX directive safety	EN 60079-15:2010
Operating ambient temperature (Ta)	- 25°C to + 55°C

Options and Accessories

- Casing available in white color as option/upon request
- Light color available in: red, blue, white/red, white/blue
- RLX series available with dimming as option
- Specialized products on request

Protection grid

Lux switch

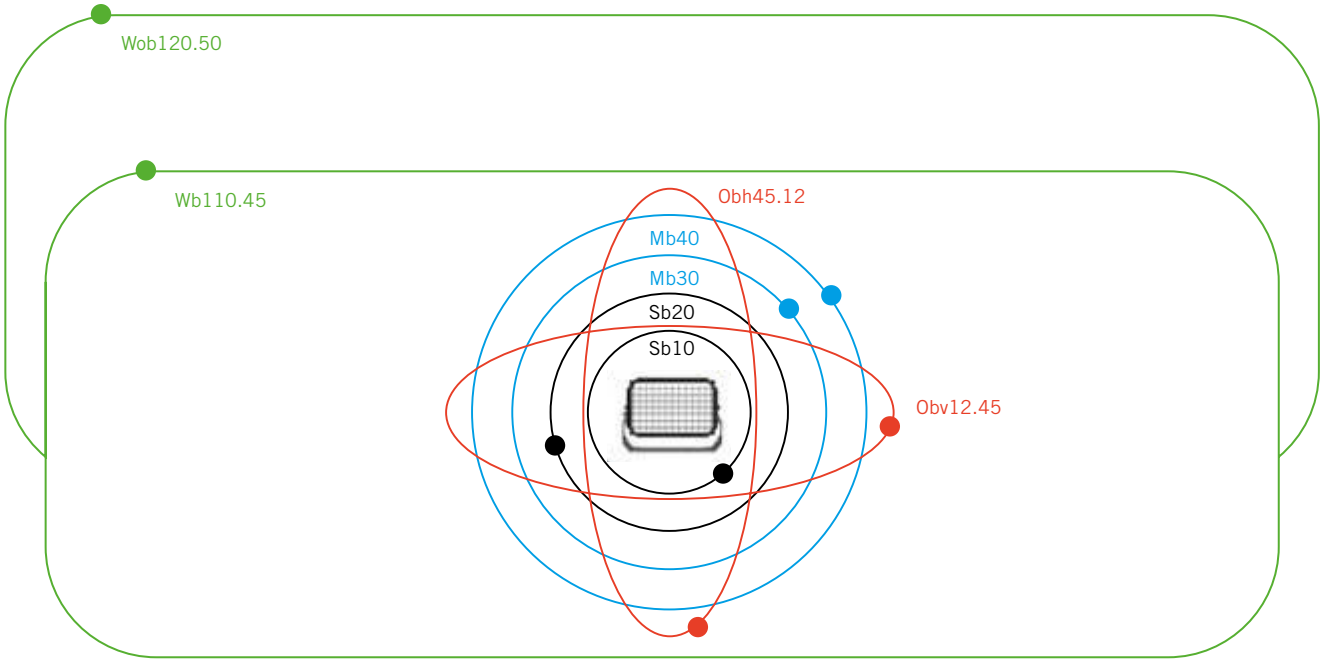


Submersible
IP68 < 40m

Damper (Pendulum mounting)

RLX Series, standard beam alternatives

Beam group	Beam code	Light projection – diameter, 10m distance	Color code
Spot beams (Sb)	Sb10	2m	●
	Sb20	3m	
Medium beams (Mb)	Mb30	5,4m	●
	Mb40	7m	
Wide beams (Wb)	Wb110.45	28m	●
	Wob120.50	34m	
Oval beams (Ob)	Obh45.12	8,2 x 2m	●
	Obv12.45	2 x 8,2m	



Specifications are subject to change at any point without prior notice.

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NORWAY

Org.nr 995 504 553

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Sales inquiries: sales@luminell.com

www.luminell.com

Watertight LED luminaire

TL60404002

TL60 LED 2200 840 110-240 M25 GL

The innovative LED outdoor lighting fixtures are applicable for a wide range of different areas, e.g. workshops, engine rooms, stores, passage ways etc. They are designed to meet maritime requirements. And to save energie and maintanance cost due to extream long lifetime.

Ta 55 | Ta -35 | IP 66 67 | LED

Light source	
Number of lamps	2
Lamp power (W)	10
Light source	LED
Lamp code supplied light source	CRI>80, 4000K
Lumen value supplied light source (lm)	2200
Lumen/Watt	89
Lumen Out	2220

Electrical data	
Maximum voltage (V)	240
Maximum frequency (Hz)	60
Minimum frequency (Hz)	50
Voltage from (V)	110
Total consumption (W)	25

Dimensions	
Height (mm)	75
Gross weight (kg)	3,6
Length (mm)	718
Width (mm)	186

Body	
Body material	Aluminium
Colour of body	Silver
Body colour code	RAL 9016

Termination	
Number of cable entries	2
Number of blind plugs	2
Cable gland	M25-Polyamide
Blind-plug	M25-Polyamide
min cable diameter	7
max cable diameter	17
Ready for mounting	Holder Glamox

Optic	
Optic	Opal
Material of reflector	Aluminium
Colour of reflector	White
Material of diffuser	Polycarbonate

Technical data	
Maximum ambient temperature (°C)	55
Minimum ambient temperature (ºC)	-35
IP classification	66/67

Ballast	
Type of Ballast	High frequency

Remarks	
Remarks	Cable entry: 2xM25x1.5 polyamide D7-17mm + blind p

Watertight LED luminaire

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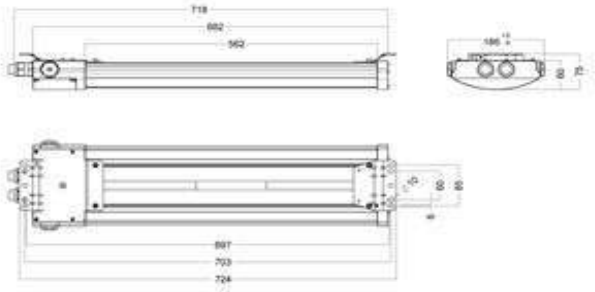
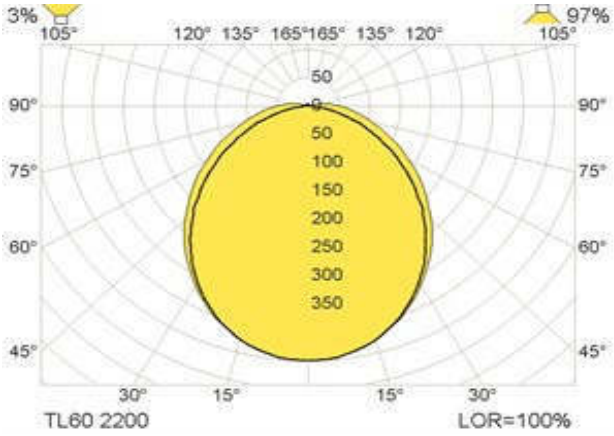
Ta 55 | Ta -35 | IP 66 67 | LED

Drawings





Watertight LED luminaire

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Ta 55 | Ta -35 | IP 66 67 | LED

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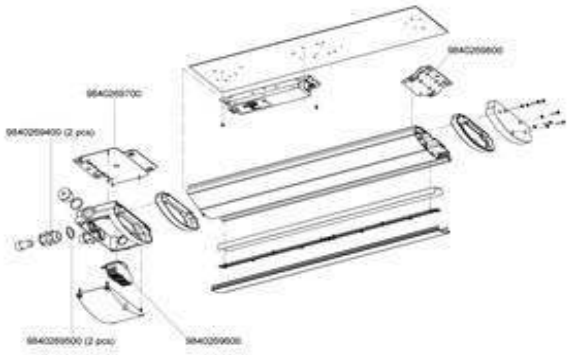

Jacobs

ConocoPhillips Barossa Project – Potential Impacts of Pipeline Installation Activities on Marine Turtles - literature update

REV 2

Prepared by

Pendoley Environmental Pty Ltd

For

Jacobs

5/7/2019

PENDOLEY ENVIRONMENTAL

MARINE CONSERVATION ENVIRONMENTAL SERVICES

PENDOLEY ENVIRONMENTAL
MARINE CONSERVATION ENVIRONMENTAL SERVICES

DOCUMENT CONTROL INFORMATION

TITLE: ConocoPhillips Barossa Project – Potential Impacts of Pipeline Installation Activities on Marine Turtles

Disclaimer and Limitation

Document History

Revision	Description	Date issued	Date received	Personnel
Draft	Report Draft to CDM Smith	26/05/2017		Dr K Pendoley
Rev A	Internal Review to CDM Smith	25/05/2017	29/09/2017	Dr C Bell/Dr P Whittock
Rev D	Client review CDM Smith	29/05/2017		K McCann
Rev 0	Final report issued CDM Smith	31/05/2017		Dr K Pendoley
Rev 1	Minor updates CDM Smith	6/06/2017		Dr K Pendoley
Rev 2	Update literature review for Jacobs and internal review	3/7/2019		Dr K Pendoley Dr A Knipe
Rev 2	Update issued to Jacobs	5/7/2019		Dr K Pendoley

Printed:	13 September 2019
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Name of project:	ConocoPhillips Barossa Project
Client	Jacobs
Client representative:	K Peat
Report number:	J67002
Cover photo:	NA

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1 INTRODUCTION

ConocoPhillips, as proponent of the Barossa Area Development, is progressing early-stage environmental assessment of a potential field development concept in the Timor Sea, 300 km north of Darwin, Northern Territory (NT). As part of this development concept, a potential gas export pipeline connection is being evaluated to connect the offshore gas field to the existing Bayu-Undan to Darwin gas export pipeline.

On behalf of ConocoPhillips, CDM Smith engaged Pendoley Environmental, as Subject Matter Experts, to provide an independent review and professional opinion on the potential impacts of the Barossa gas export pipeline installation, on local marine turtles, as it passes through waters west of the Tiwi Islands (**Figure 1**).

The initial literature review, carried out in June 2017, assumed the pipeline route would be located on the eastern-most extent of the pipeline corridor adjacent to Bathurst Island. The final pipeline route has been moved further to the west as it approaches Bathurst Island from the north, however, it remains on the eastern edge of the proposed corridor as it passes Cape Fourcroy at its closest point in the south (see ★ location in **Figure 1**).

This technical note has been revised and updated at the request of ConocoPhillips in June 2019 to include the final location of the pipeline route and update the literature review.

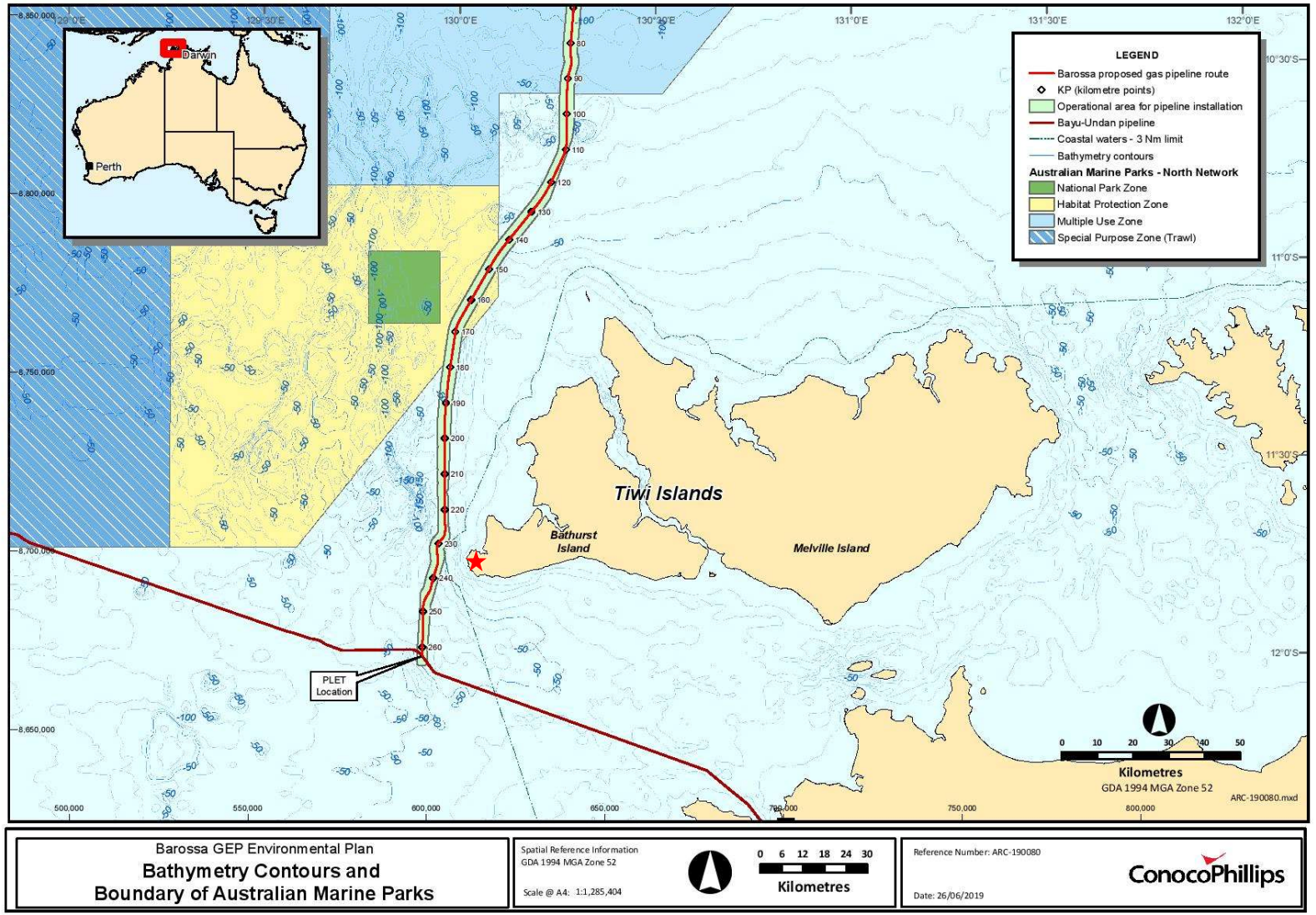

Figure 1: Barossa Project pipeline route location and bathymetry relative to Tiwi Islands. ★ is the location of Cape Fourcroy

2 OBJECTIVES

The objective of this study is to review published and grey literature with a focus on the impacts of artificial light on marine turtles as a priority, and to include a review of the impact of the physical presence of vessels and noise on marine turtles.

The project scope is as follows:

1. Review of the current Biologically Important Areas (BIA) boundaries using recent publications on flatback turtle internesting behaviour by Whittock et al. (2014, 2016), to more precisely define the likely internesting zone to the north and west of Tiwi Islands (primarily Bathurst and Melville Island).
2. Development of a project specific impact assessment, within the context of the site-specific factors (e.g. local turtle species and their habitat usage, seabed bathymetry, benthic habitats, distance of the project footprint offshore, temporary nature of the light source, currents, tidal influences, existing anthropogenic light sources). The assessment will:
    a. Target the highest conservation value receptors (i.e. internesting flatback and olive ridley female turtles and dispersing hatchlings);
    b. Integrate the site-specific factors to define a notional spatial extent at which potential impacts may be anticipated; and
    c. Form a conclusion on whether the proposed activities represent a significant risk to flatback and olive ridley turtles at a population level, as per Department of the Environment and Energy's 'Significant Impact Guidelines 1.1 – Matters of National Environmental Significance'.

This scope was revised in June 2019 to include the actual pipeline route (Figure 1) and to update the literature review.

3 ASSESSMENT SCOPE

3.1 Local Species Status and Nesting Seasonality

The species that are the focus of this assessment, flatback and olive ridley turtles, are listed as vulnerable and endangered, respectively, under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Marine turtles are long lived, migratory animals who are slow to reach sexual maturity; they nest every 1 – 9 years, producing 1-3 clutches and show no parental care following egg nesting (Bjorndal *et al,* 2013; Miller, 1997; Hirth, 1980).

Population estimates of Tiwi Island regional marine turtle nesting populations have been reported using a mix of aerial track census and ground based surveys by Chatto & Baker (2008). The west coast beaches of Bathurst Island, and the north coast beaches of Melville Island, are dominated by flatback turtle nesting and dispersed olive ridley nesting Whiting et al 2007a). Flatback turtles are endemic to Australia, their nesting range extending from the Pilbara region of Western Australia (WA), across the NT into Queensland (Limpus et al. 1988, Chatto & Baker 2008, Pendoley et al. 2014, Pendoley et al. 2016). Extrapolation of tagging data from the Pilbara, together with track census results from Cape Domett and the Tiwi Islands, suggests that flatback turtles nest in the tens of thousands throughout this range (Pendoley et al. 2014, Whiting et al. 2008). Studies undertaken by Chatto & Baker (2008) along sections of coastline in the NT, including the Tiwi Islands, estimate high numbers of flatback turtles nest within five segments (Segments 3.5 to 3.9; **Figure 2**) of the Tiwi Islands coastline, producing in the order of thousands of nests annually.

In comparison, olive ridley turtle nesting is geographically constrained, restricted to nesting sites in the NT and western Cape York in Queensland (Chatto & Baker, 2008). The Species Nesting Map for olive ridley turtles provided in the Commonwealth Recovery Plan for Marine Turtles in Australia (Department of the Environment and Energy (DoEE) 2017), together with Chatto & Baker (2008), identify the Tiwi Island rookeries as matters of national environmental significance supporting high levels of annual nesting (thousands of nests/year), compared to the wider geographical region which reports approximately 1000 nests/year (Indonesia), 100's nests/year (Myamar and Brunei) and <50 nests/year (Papua New Guinea, Malaysia, Thailand and Vietnam) (see Jensen et al. 2013 and references therein). The greatest concentration of olive ridley turtles has been recorded around Cape Van Diemen and on Seagull Island off the north west coast of the Tiwi Islands (Segment 3.8 and 3.9, respectively; **Figure 2**) (Whiting et al., 2007a).

Both flatback and olive ridley turtles nest at low numbers year round in the NT, however there are recognised windows of peak breeding activities during the Austral winter, as shown in **Table 1** (M Guinea pers comm.; DoEE 2017).

Table 1: Annual activity calendar for olive ridley and flatback turtles in the Tiwi Islands. Light grey: year round low level, dispersed activity; dark grey: peak months for each activity.

Species/Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flatback (Arafura stock, Tiwi Islands)												
Nesting												
Internesting												
Hatchlings												
Olive Ridley (NT stock, Tiwi Islands)												
Nesting												
Internesting												
Hatchlings												

Figure 2: Section of pipeline route relative to Tiwi Islands marine turtle nesting beaches (white line). Survey segment codes 3.5 – 3.9 from Chatto & Baker (2008).

4 IMPACT ASSESSMENT OF BAROSSA PIPELINE INSTALLATION

4.1 Project Description

The vessels required for the installation of a pipeline typically comprise a slow moving pipelay vessel and an attendant supply vessel that may or may not be permanently stationed in the vicinity of the pipelay vessel. The entire gas export pipeline will be installed over an approximately 6 – 12 month period, potentially across the peak of the flatback and olive ridley turtle internesting/nesting seasons. The pipeline route traverses the floor of the Timor Sea, including a portion to the west of the Tiwi Islands, approaching to within 7 km at its closest point near Cape Fourcroy in the southwest, approximately 20 km off Rocky Point on the mid-west coast and approximately 25 km off Seagull Island to the northwest (**Figure 2**). Water depths along the eastern edge of the pipeline route range from

approximately 30 m deep northwest of Rocky Point to 50 m deep as the route passes to the west of Cape Fourcroy.

The existing predominant source of light, boat strike and underwater noise along the pipeline route has been identified as commercial shipping. However, the most heavily used shipping routes are located to the south of the Tiwi Islands

4.2 Internesting Females

4.2.1 Literature review

An exhaustive analysis of a large dataset of 47 internesting flatback turtles satellite-tracked from five summer nesting, Pilbara region, mainland and island rookeries provided 5402 internesting positions over 1289 tracking days which showed that flatback females remained in water depths of <44 m and favoured a mean depth of <10 m (Whittock et al. 2016). These results were consistent with those of Sperling et al. (2010) who observed flatback turtles off Bare Sand Island in the NT in a maximum depth of 44 m.

Whittock et al. (2016) defined suitable internesting habitat as water 0 – 16 m deep and within 5 – 10 km of the coastline, while unsuitable internesting habitat was defined as water >25 m deep and >27 km from the coastline (Whittock et al. 2016). Flatback turtles generally demonstrate internesting displacement distances of 3.4 – 62 km from the nesting beach, typically confined to longshore movements in nearshore coastal waters or traveling between island rookeries and the adjacent mainland (Whittock et al. 2014). There is no evidence to date to indicate flatback turtles swim out into deep offshore waters during the internesting period.

The literature on internesting olive ridley turtles is less complete than flatback turtles. Eight internesting olive ridley turtles, satellite tracked post-nesting from Cape Van Diemen on the Tiwi Islands, were initially recorded travelling 'slowly' through waters 45 – 55 m deep at distances 17 – 37 km from the nesting beach before moving into shallower water, waiting offshore from the nesting beach in the days prior to renesting (Whiting et al. 2007, Whiting et al. 2005). The internesting habitat was located to the north and west of Cape Van Diemen. The selection of this internesting habitat appears to be deliberate given that two olive ridleys tracked from Groote Eylandt (approximately 700 km east of Cape Van Diemen) travelled long distances of 125 and 200 km during extended internesting periods, and it is understood that this behaviour may be linked to a relatively low metabolic rate in this species (Hamel et al. 2008, McMahan et al. 2007).

Similar internesting behaviour was observed in olive ridleys tracked in the Atlantic Ocean. The internesting habitat described for four of five olive ridleys nesting in the mouth of the Congo River in Angola travelled over 50 km from the nesting beach along the coast, remaining within waters 6 – 20 m deep. A fifth animal selected internesting habitat <6 m deep and within 4 km of the nesting beach (Pikesley et al., 2013, Maruca et al., 2012).

Adult turtles are at risk of lethal injury from vessel collision when they return to the sea surface to bask, breathe or as part of a 'startle 'response to sudden noise (e.g. dredging, explosions) or visual cues (MMS 2007). The collision risk between vessels and sea turtles is linked to vessel speed; specifically, turtles are struck by boats travelling at 11 km h^{-1} more often than by boats travelling at 4 km h^{-1} (Hazel et al. 2007). In the US, 9 % – 18 % of stranded turtles displayed boat strike injuries

(Lutcavage et al. 1996) while in Queensland, 56 % of 139 stranded turtle records showed injuries consistent with boat strike (Haines & Limpus 2000). Species impacted included green, loggerhead, hawksbill and olive ridley turtles.

A further consideration regarding flatback turtles, as opposed to olive ridley turtles, is the likelihood that boat strike of flatback turtles may be underreported due to the lack of keratin in their carapace. Flatbacks strand far less often than the keratin enriched, hard shelled turtles, and it is possible this is due to the carcasses sinking rapidly to the seabed and decomposing offshore without ever floating ashore following death. Hard shelled turtles such as green, olive ridley and hawksbill are more likely to float longer as a result of the decomposing gasses trapped in their body and are far more likely to wash ashore as stranded carcasses.

While marine turtle behavioural responses, including startle responses (abrupt movements, increase in swimming) and prolonged inactivity, have been documented in response to continuous, low frequency noise (Lenhardt et al., 1983, 1996, Lenhardt 1994), turtles have also been observed rapidly acclimating to regular, continuous noise (O'Hara & Wilcox 1990, Dickerson et al. 2004, Geraci & Aubin 1980, Whittock et al. 2017), with the response dependent on the distance from the sound source (Bartol et al. 1999).

The bulk of the large nesting population of flatback turtles using the west and north coast beaches of the Tiwi Islands for nesting are expected to use the shallow nearshore waters adjacent to the Bathurst Island and Melville Island coast for internesting; in <16 m deep and within 10 km of the coastline (Whittock et al. 2016) with individuals occasionally moving into waters up to 44 m deep (within 5 – 15 km of the coastline) (**Figure 3**). The seabed characteristics off Cape Fourcroy (i.e. narrow continental shelf, steep seabed slope and relatively high current speeds) are not typical of the internesting habitat used by flatback turtles. Further to the north where the continental shelf is wider and slopes more gently offshore, the 10 m deep internesting grounds are located approximately 10 – 20 km inshore of the pipeline route. As such, while most of the nesting females in the area are not expected to internest within the vicinity of the pipeline route, it is possible some individuals will use waters up to 50 m deep, in the vicinity of the pipeline route.

While the literature is less complete regarding Australian olive ridley internesting behaviour, the females nesting on Cape Van Diemen and Seagull Island beaches are expected to move through the waters <55 m deep and < 37 km from the coast (Marquez 1990). In the days prior to nesting, the olive ridley turtles, like flatback turtles, are likely to rest on the seabed in the shallow waters off their nesting beaches (Whiting et al. 2005), approximately 10 – 20 km away from the pipeline route (**Figure 4).** While the majority of the nesting olive ridley females are not expected to internest within the pipeline route it is possible some individuals will use waters in the vicinity if the pipeline route where water depths approach 55 m deep.

4.2.2 Impact Assessment

The number of internesting females potentially exposed to the pipelay operations over the approximate 6 – 12 month period the pipeline installation will take to complete will be generally low due to the presence of low level nesting effort throughout the year, but could increase during the April to September peak in nesting of both species. This together with the low risk of pipe lay activities occurring within internesting habitat is expected to substantially reduce the overall risk to the internesting females

The threats to the few individual internesting females that may occur along the pipeline route include; light, boat strike and underwater noise, in addition to the current levels of risk posed by the existing shipping in the area.

There is no evidence, published or anecdotal to suggest internesting turtles are impacted by light from offshore vessels, and nothing in their biology would indicate this is a plausible threat. The physical presence and risk of boat strike the pipelay vessel anchored or moving slowly through the ocean is also not expected to impact internesting females. Fast moving supply vessels are a greater risk of boat strike (Hazel et al. 2007), however Whittock et al. (2017) found no evidence of vessels associated with a full dredge spread causing an increase in boat strike in shallow waters <5 km offshore from a major flatback rookery on Barrow Island. This lack of impact was likely due to the internesting turtles resting on the seabed, physically removing them from the surface activity of the vessels.

Noise from the project will be confined to engines on the pipelay vessel and supply vessels. This low level constant noise will be audible over a long distance and while there may be a response initially, it is unlikely to result in displacement or prevention of activities critical to population persistence, and It is likely animals in the vicinity will become rapidly habituated to the sound.

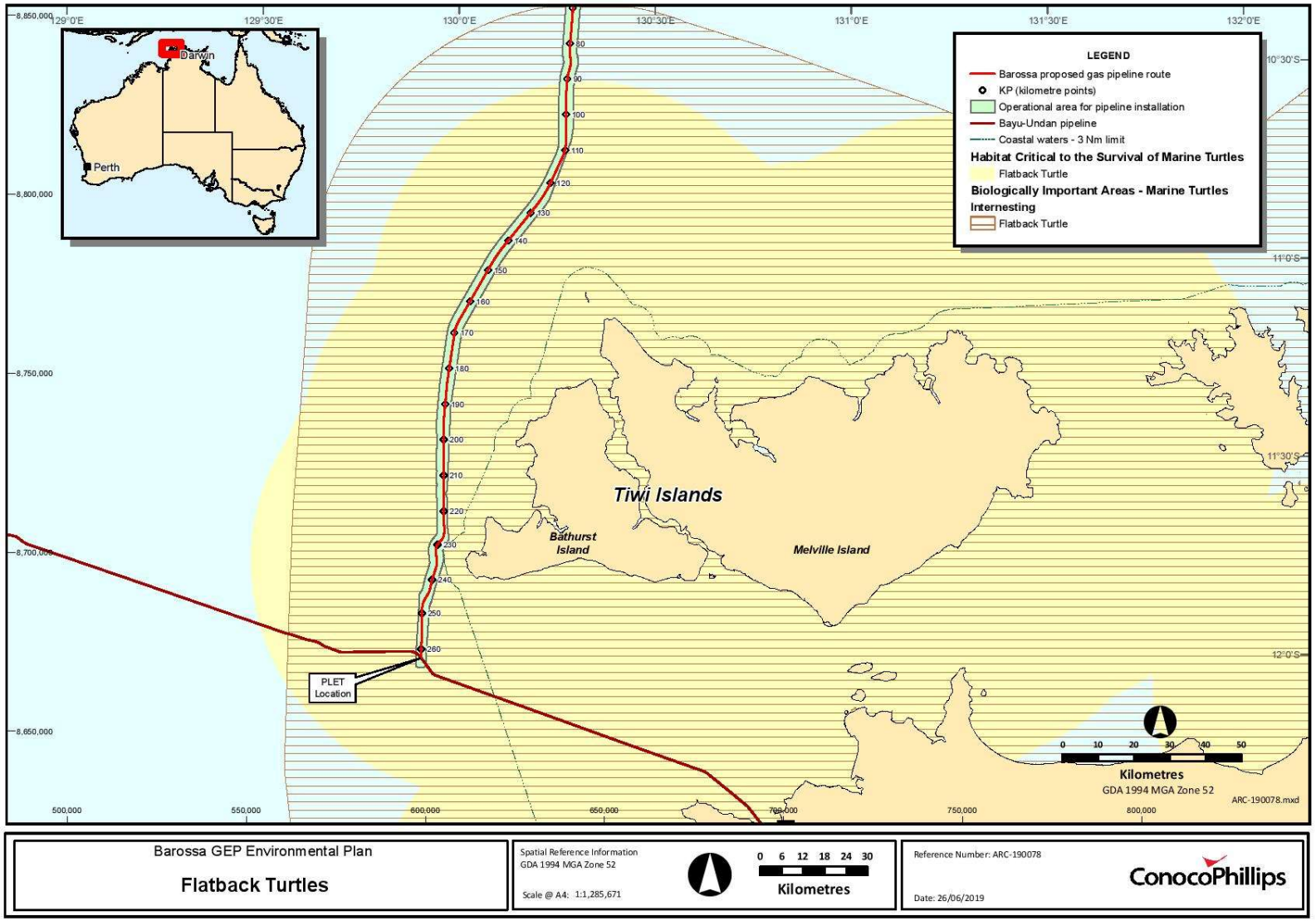

Figure 3: Flatback turtle in water habitat

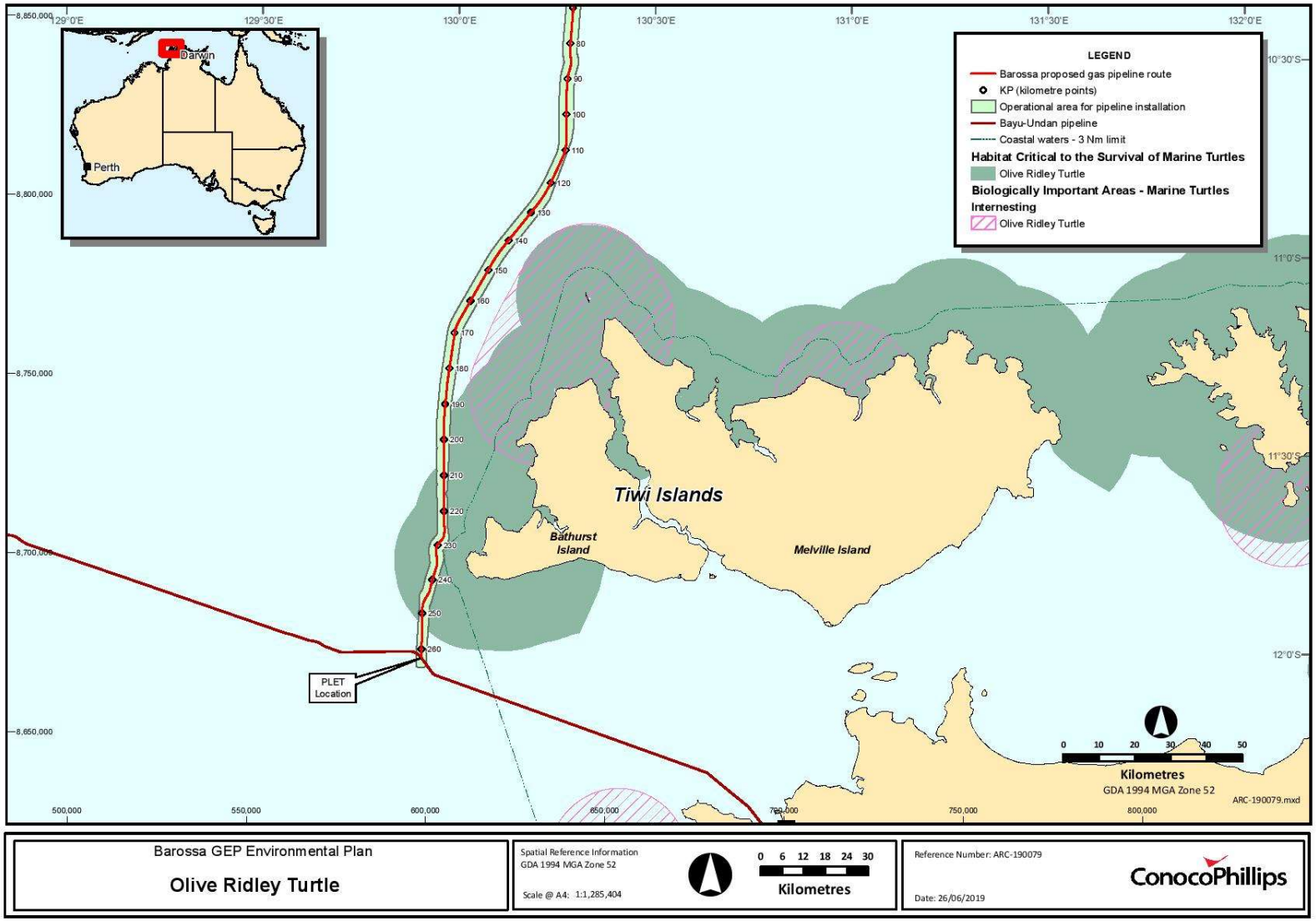

Figure 4: Olive Ridley in water habitat

4.3 Dispersing Hatchlings

4.3.1 Literature Review

Following an incubation period of between 37 – 85 days (flatback) and 42 – 63 days (olive ridley) (Hirth 1980, Miller 1985, Whiting et al. 2008, Pendoley et al. 2014), hatchlings emerge from the sand, crawl to the ocean and swim offshore, in a behaviour termed the "swim frenzy", under the influence of tides and currents before reaching deeper, less predator rich, waters. Hatchlings rely on their internal egg yolk reserves to sustain the offshore migration for the first 3 – 6 days at sea until they intercept food, typically associated with seaweed rich convergent zones (Trullas et al. 2006). In both species, this offshore migration occurs in the top 30 cm of the ocean and this swimming behaviour is regularly interrupted by rest periods when hatchlings float on or near seaweed at the sea surface (Duran & Dunbar 2015, Bell et al., 2014).

Following emergence from the nest, hatchlings locate the ocean using a combination of topographic and brightness cues, orienting towards the lower, brighter oceanic horizon and away from elevated silhouettes of dunes and/or vegetation bordering the beach on the landward side (Limpus 1971, Salmon et al. 1992, Limpus & Kamrowski 2013, Pendoley & Kamrowski 2017). Hatchling behaviour is impacted by both direct, point source lighting (e.g. unshielded lights) and indirect 'sky glow' an accumulation of light from multiple sources (Salmon et al. 1995, Salmon 2006, Kamrowski et al. 2014). Hatchling orientation has been shown to be disrupted by light produced at distances of up to 18 km from the nesting beach (Hodge et al. 2007, Kamrowski et al. 2014). The relative brightness, and therefore potentially disorienting impact of artificial lighting, fluctuates as a function of moon phase (Salmon & Witherington 1995, Pendoley 2005), and the amplification effects of cloud cover (Kyba et al. 2011).

Once hatchlings enter the ocean, an internal compass set while crawling down the beach, together with wave cues, are used to reliably guide them offshore (Lohmann & Lohmann 1992, Stapput & Wiltschko 2005; Wilson et al, in press). In the absence of wave cues however, swimming hatchlings have been shown to orient towards light cues (Lorne & Salmon 2007, Harewood & Horrocks 2008).

The impact of offshore lights on vessels and facilities is recognised as a risk to hatchlings orienting offshore. A substantial body of research exists which demonstrates most species of turtle hatchlings, including olive ridley and flatbacks, show a preference for (and are therefore more influenced by) shorter wavelength, high intensity light (Witherington & Bjorndal 1991a, Witherington & Bjorndal 1991b, Witherington 1992, Pendoley 2005, Pendoley & Kamrowksi 2016, Karnard et al. 2009). Light rich in short wavelength emissions are the most disruptive to hatchling sea-finding behaviour in all species of marine turtles (Pendoley & Kamrowski 2016).

Measuring the swimming speed of hatchlings is important to understanding the impact of various cues (waves and light) on hatchlings as they leave the natal beaches. Recent studies tracked flatback turtle hatchling movements in the nearshore waters off Thevenard Island in the Pilbara region of WA (Wilson et al. 2018; Wilson et al. 2019). These studies used an acoustic array located within 300 m of the shoreline and encompassed a small spatial (200m – 300m) and temporal (7 – 10 minute) component of the 24 hour swim frenzy phase of the hatchlings offshore migration through coastal waters to offshore developmental habitat. At Thevenard Island, hatchlings dispersed offshore at speeds of 0.5 $m.s^{-1}$ under the influence of tidal currents which ran parallel to the beach, displacing their offshore

trajectory by carrying them along the beach (Wilson et al. 2018, 2019). These results suggest that hatchlings can move in any direction when their swimming speed is greater than the speed of the nearshore current.

Neither of these studies reported the "resting" behaviour observed in flatback turtle hatchings during a daytime tracking study carried out on flatback hatchlings at Barrow Island in 2009/2010 and 2011/2012 (Bell et al, 2014). During this study individual hatchlings were tracked by observers in a small boat, recording position, heading and behaviour (power stroking or resting) every minute for up to 7 hours and over 6 – 8 km swim distance. This study found hatchlings swam steadily using a power stroke in the first 2 hours taking them up to 2 km from shore. In the following hours, the proportion of observations recorded as resting (typically in seaweed) increased from 37% (2 – 4 hours) to 56% of all observations longer than 4 hours. This passive floating behaviour is thought to conserve energy while carrying the flatback hatchlings away from nearshore waters. Similar resting behaviour was also observed in hawksbill hatchings tracked at Varanus Island in 2003; hatchlings crawled up onto seaweed within 1 – 2 hours of swimming away from the beach and remained there until the survey was suspended (more than 10 minutes of non-activity) (K Pendoley pers obs).

An additional component of the Wilson et al. (2018) study investigated flatback hatchling orientation under the influence of wave cues. This work was carried out under controlled conditions in a wave tank and found that wave height was a significant factor in the orientation direction of hatchlings with the wave height most similar to the prevailing oceanographic conditions at the rookery beach have the greatest influence on orientation direction (Wilson et al in prep).

The literature suggest, therefore, that coastal tides and surface currents in excess of approximately 0.5 knots (0.3 $m.s^{-1}$) will carry smaller olive ridley hatchlings offshore (Wyneken 1997; K Pendoley pers obs), while the larger flatback turtles can swim against this current speed if exposed to stronger orientation cues (Wilson et al 2018). The results also suggest that hatchlings do not swim continuously for 24 hours as they move offshore and instead are passively dispersed after a few hours of swimming when they climb into sea weed to rest. Olive ridleys are expected to be carried offshore to development habitat associated with rafts of floating sargassum (Musick and Limpus, 1996. In contrast, flatback turtles do not have an oceanic (pelagic) phase, instead residing exclusively in neritic (i.e. shallow) waters on the Australian continental shelf (Musick and Limpus, 1996; Walker & Parmenter 1990).) and their coastal dispersal is facilitated by local water circulation and directional swimming as the hatchling grows (Wildermann et al. 2017). The location of this coastal developmental habitat and the actual mechanism or route flatback hatchlings use to reach this habitat is unknown.

Recent studies on the influence of artificial light cues on hatchling nearshore dispersal have shown that over short distances of up to 150 m, flatback hatchlings are more influenced by light than wave cues (i.e. the light cue overrode the wave cue). This Ningaloo based study also found that green hatchlings were not trapped indefinitely in light pools and eventually continued the migration offshore (Thums et al. 2013; 2016). In contrast, a follow-up study by Wilson et al (2018) at Thevenard Island found that when an artificial light was located within 150 m of the beach, flatback hatchlings were able to swim against low velocity currents of up to 0.3 $m.s^{-1}$ orienting towards and remaining within the light spill from the light source located on a boat in the nearshore. Hatchlings were reported in the vicinity of the light for up to 15 minutes, departing the light spill only after the light was turned off.

These results suggest that under calm conditions with low tidal flow rates hatchlings may be attracted to and trapped by light over short distances (<500m).

There is no published or anecdotal information on the impacts of underwater noise on hatchlings. It is possible they will be sensitive to sound in the same way as adults, though this will depend on the development on the internal ear structure. With less manoeuvrability, hatchlings will be less able to move away from the source of sound.

4.3.2 Impact Assessment

Both species of hatchlings leaving the Tiwi Islands nesting beaches will swim offshore, under the influence of tides and currents, dispersing over large geographical areas of the ocean. Limited observations on hatchling behaviour as they leave the beach suggests that they will search out and use floating weed to rest on after 2 hours of swimming (Bell et al, 2014; Trullas et al. 2006; Pendoley pers obs). This, together with the overriding influence of tides and currents (stronger than 0.5 knot) on swimming speeds (Wilson et al 2018), will carry the hatchlings to some common convergent zones where they will use floating rafts of seaweed for shelter and foraging (Musick & Limpus 1997). The primary threat hatchlings face from the pipelay operations is the attraction to vessel lights and potential predation within the light spill zone.

Overnight observations of flatback turtle hatchlings trapped by the light spill from a pipelay vessel moored approximately 10 km off the east coast of Barrow Island found hatchlings remained within the light spill in the lee of the barge all night until dawn when they swam away from the barge and were carried away by currents (K Pendoley pers obs 2003). None of the monitored hatchlings were observed being predated. These observations, together with experimental results that demonstrated the attraction of green hatchlings to light at sea over 150 m (Thums et al. 2016, Wilson et al 2018), suggests that hatchlings carried by currents into the vicinity (estimated 500 – 1000 m) of a pipelay barge can potentially become trapped by light. The 2010 study by Thums et al. found this light trapping was very temporary (minutes) possibly due to the small size of the vessel which did not provide the same shelter from tides as a pipe lay vessel (K Pendoley pers obs) . In contrast Wilson et al (2018) found the larger and stronger flatback hatchlings were able to remain in the vicinity of the vessel for extended periods of time (up to 1 hour). The risk of trapping and possible predation is greatest in the southern end of the pipeline route where it passes at 7km, its closest point to Bathurst Island, off Cape Fourcroy.

The risk of this occurring is considered relatively low when taking into account:

- the limited time the pipelay vessel and associated support vessel will be present on any one location off the west coast of the Tiwi Islands;
- the temporally restricted four month peak hatchling season (June – September);
- the low risk of hatchlings intersecting a small zone (approximately 500 m – 1000 m) around the pipelay vessel over which they might be influenced to orient towards the vessel lights;
- the low likelihood the hatchlings will be in slow moving water (< 0.3 knots) that will allow them to swim against a current towards; and
- the short (overnight) time frame the hatchlings could be trapped.

Any hatchlings that do become trapped in the light spill from a vessel may be at risk from an increased risk of predation however the risk of this is likely reduced due to the distance offshore from predator rich inshore waters. The risk to the olive ridley and flatback turtle populations from the proposed project is therefore considered to be low and undetectable against normal population fluctuations.

4.4 BIA Assessment

Currently the Biological Important Area (BIA) as defined by the Recovery Plan and the Commonwealth EPBC site (National Conservation Values Atlas) ranges from 60 – 80 km for flatback turtles. These boundaries are intended to provide additional protection for internesting turtles nesting on the Tiwi Islands. Recently published literature describing the range of flatback turtle internesting habitat can now be used to better refine these boundaries for more effective protection this species during this life-stage. However, it is important to note that the delineation of these boundaries is based on limited *in situ* data for olive ridley turtles (Whiting et al 2005, 2007) and results from other, more southerly, summer nesting populations of flatback turtles. A study to ground truth these assumptions regarding internesting boundaries for both olive ridley and this winter nesting population flatback turtles is necessary to fill this gap in the knowledge on local nesting populations at the Tiwi Islands.

The following boundary limit is presented here for consideration. The existing 24 nm (44.5 km) Contiguous Zone boundary, as shown in **Figure 3**, would comfortably encompass the olive ridley and flatback internesting habitat (including Seagull Island) and is beyond the 50 m depth contour to the north and west of the Tiwi Islands.

5 CONCLUSIONS

The installation of the Barossa gas export pipeline is not expected to form a significant risk to flatback and olive ridley turtles at a population level, as per DoEE's Significant Impact Guidelines 1.1 – Matters of National Environmental Significance. This conclusion is based on the following points:

1. There is a spatial separation (between 10 – 20 km) between much of the favoured coastal internesting habitat for flatback and olive ridley turtles, and the offshore pipeline route.
2. The relatively short 6 – 12 month time frame of the pipeline installation is insignificant within the context of the long breeding period of marine turtles and so the time frame the breeding females are potentially exposed to the project is low.
3. Pipelay vessels are mobile and will not be on any one location for extended periods of time. Any exposure of internesting females or dispersing hatchlings to project related risk will be temporary.
4. The seasonally dispersed nesting behaviour reduces the risk of exposure to the entire breeding population.
5. While migrating offshore, hatchlings will be dispersed by currents across large areas of ocean, under the influence of tides and currents which will reduce the opportunity for individuals to intercept or pool around a vessel.
6. Hatchlings are unable to swim against fast moving tides and currents and a few individuals might be trapped by light spill from a vessel if they are carried directly to the vessel location

by tides or currents. This trapping impact is likely to affect a small number of individuals, will be short term and will not have an impact at the population level

7. Hatchlings will only be able to engage in directional swimming (i.e. to actively swim directly towards a vessel light) if they have been carried offshore into the vicinity of the vessel and if they reach the vessel location during the few hours a day when water speeds are very slow or at slack water and they can swim toward the vessel and become trapped by the light. They are likely to then be swept away as the tide gains strength. The number of individuals potentially impacted are expected to be low.
8. The current large (60 – 80 km) BIA boundary to the north and west of Tiwi Islands can be re-assessed based on recent publications that indicate internesting habitat for flatback and olive ridley turtles is in shallow water closer to shore and can be comfortably encompassed by the Contiguous Zone Boundary (24 nm, 44.5 km).

An assessment against the significance impact criteria in the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance is provided in **Table 2**. Note, the assessment has been undertaken against the endangered species criteria, as this represents a more conservative approach.

Table 2: Assessment against the significant impact criteria

Significant Impact Criteria	Assessment of Significance
Lead to a long-term decrease in the size of a population	No significant impact at a population level Due to the short time frame of the activity, the spatially restricted area of impact, the lack of identified risk and the limited number of individuals that might be exposed to the activities.
Reduce the area of occupancy of the species	No significant impact on area of occupancy of the species. Due to the limited degree of overlap between the pipeline route and the defined internesting habitat and the limited impact of vessel lighting on hatchling dispersal.
Fragment an existing population into two or more populations	No significant impact. The project will not fragment the population.
Adversely affect habitat critical to the survival of a species	No significant impact. Due to the spatially and temporally limited duration of the activities, footprint of the pipe lay spread, overlap between the project area and the internesting habitat, the speed of tides and currents sweeping hatchlings along and the small number of individuals animals that might be present, both in the internesting habitat and in the surface waters used by dispersing hatchlings
Disrupt the breeding cycle of a population	No significant impact at a population level Due to the short time frame of the activity, the spatially restricted area of impact, the lack of identified risk and the limited number of individuals that might be exposed to the activities.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No significant impact to population. The small amount of habitat potentially removed by the installation of a pipeline will be balanced by the creation of artificial reef habitat once the pipeline is installed. Temporary modification of habitat due to the presence of the pipelay vessel is not expected to result in population level effects.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No significant impact at population level. No invasive species risks have been identified by this assessment.
Introduce disease that may cause the species to decline	No significant impact at population level. Assuming all AQIS guidelines for vessels are followed there are no identified risks of introduced disease.
Interfere with the recovery of the species	No significant impact at population level. No threats to the recovery of the species were identified during this assessment.

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Technical Note

Assessment of survey equipment and positioning equipment for the Barossa Gas Export Pipeline Installation

From: Craig McPherson
JASCO Applied Sciences (Australia) Pty Ltd

Date: 22 January 2020

Document: 01977

1. Estimating Sound Exposure from Multi-Beam Echo Sounders

Multi-Beam Echo Sounders (MBES) operate at very high frequencies that cannot be accurately modelled using a Parabolic Equation (PE) method. At high frequencies, a simple spreading loss model provides acceptable estimates of sound propagation, so for sources with high frequencies, received levels were calculated based on an assumption of spherical spreading with absorption loss, which is described by the following formula: RL = SL – 20logR – αR.

In this equation RL is received level, SL is source level, α is the absorption coefficient, and R is range in metres. The absorption coefficient, α, was calculated using François and Garrison (1982) formula using a 100 m water depth, 33.5 ppt salinity, a temperature of 28°C. The considered Reson SeaBat 7125's transmit frequency was 400 kHz and the source level 220 dB re 1 µPa (Coastal Frontiers Corporation 2017), with results presented in Table 1.

Table 1. Estimated distance to SPL isopleths for a Reson SeaBat 7125 MBES

Distance (m)	SPL (dB re 1 µPa)
10	198
50	178
95	166
120	160

Measurements of a Reson SeaBat 8101 sonar operating at 240 kHz were reported in Chorney et al. (2011), and shown in Figure 1. These measurements show that at 40 m, the PK levels are approximately 170 dB re 1 µPa, and the per-pulse SEL 130 dB re 1 µPa^2·s. To provide context for the accumulation of SEL over 100 pulses, the SEL from 100 pulses at 40 m, assuming the source is stationary, is 150 dB re 1 µPa^2·s.

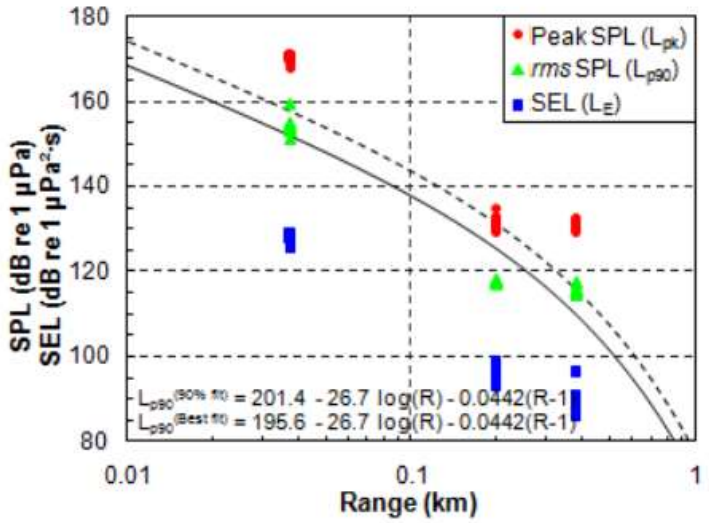

Figure 1. Figure 3.103 in Chorney et al. (2011). Multibeam sonar (RESON SeaBat 8101) 240 kHz pulse in-beam PK (peak SPL), 90% rms SPL, and SEL versus range, at 7 m receiver depth. Solid line is best fit of the empirical function to Lp90 values. Dashed line is the best-fit shifted to exceed 90% of the Lp90 values (90th percentile fit). Measurements at 200 and 380 m range are at near background noise levels of these recordings.

2. Estimating Sound Exposure from Acoustic Positioning Systems

Acoustic positioning systems for Long Base Line (LBL) and Ultra Short Base Line (USBL) will likely involve Sonardyne or Kongsberg systems, which could include the Ranger or High Precision Acoustic Positioning (HiPAP) acoustic positioning system (Table 2). The source level and an empirical spreading loss equation was applied as obtained from previous field measurements of one of the proposed acoustic positioning systems (Warner and McCrodan 2011) with the results presented in Table 3. This is a similar approach as applied in Austin et al. (2012).

Table 2. Specifications of Acoustic Positioning Systems

Manufacturer	Model	Source Frequency (kHz)	Source Level (dB re 1 µPa @ 1 m)
Kongsberg	HiPAP 500	33	206
Sonardyne	Ranger USBL	18-36	204

Table 3. Ranges to SPL isopleths for acoustic positioning systems, extracted from Austin et al. (2012).

SPL (dB re 1 µPa)	Radius (km)	
	Sonardyne Ranger, 18 to 36 kHz*	Kongsberg HiPap 500, 33 kHz*
200	0.002	0.005
190	0.005	0.009
180	0.008	0.017
170	0.018	0.030
160	0.036	0.042
150	0.066	0.064
140	0.17	0.12

* Based on empirical spreading loss estimate measured by Warner and McCrodan (2011)

3. References

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Australian Government
Department of the Environment and Energy

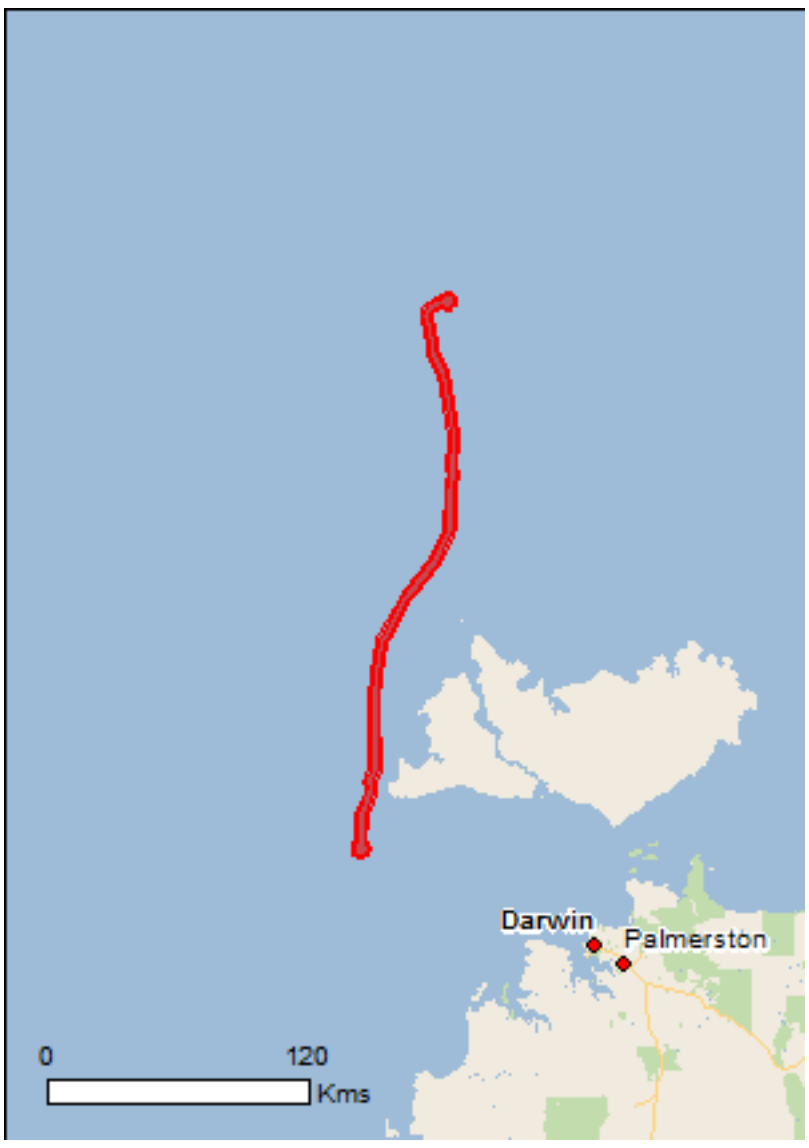
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 04/01/19 11:30:28



Coordinates
Buffer: 1.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	20
Listed Migratory Species:	40

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	69
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	2

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	2

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Sharks		
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis garricki		
Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Glyphis glyphis		
Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat known to occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Fish		
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to

Name	Threatened	Type of Presence
		occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species

Name	Status	Type of Presence
		habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Oceanic Shoals	Habitat Protection Zone (IUCN IV)
Oceanic Shoals	Multiple Use Zone (IUCN VI)

Extra Information

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Van	North
Shelf break and slope of the Arafura Shelf	North

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-11.99992 129.89424,-11.96157 129.89602,-11.90747 129.89553,-11.88941 129.89722,-11.87359 129.90292,-11.85272 129.91527,-11.8311 129.9202,-11.79116 129.9325,-11.78294 129.93373,-11.75516 129.93035,-11.74268 129.93216,-11.73112 129.93772,-11.7174 129.94941,-11.71108 129.95156,-11.527 129.9496,-11.42328 129.94998,-11.32737 129.95851,-11.19104 129.97933,-11.16909 129.98851,-11.00558 130.0833,-10.97933 130.10228,-10.87142 130.18937,-10.84396 130.20828,-10.8187 130.22209,-10.75321 130.25238,-10.73444 130.25816,-10.5914 130.26023,-10.55398 130.26329,-10.52021 130.27146,-10.49159 130.26799,-10.38396 130.27604,-10.3593 130.27534,-10.11461 130.23054,-10.02668 130.18916,-10.01513 130.18704,-9.99474 130.18656,-9.89047 130.16317,-9.87852 130.16201,-9.86646 130.16357,-9.85506 130.16779,-9.84487 130.17447,-9.8364 130.18326,-9.81817 130.21382,-9.81214 130.23671,-9.80439 130.24066,-9.79819 130.24685,-9.79421 130.25466,-9.79284 130.26331,-9.79421 130.27196,-9.79819 130.27977,-9.80439 130.28596,-9.81219 130.28994,-9.82084 130.29131,-9.8295 130.28994,-9.8373 130.28596,-9.8435 130.27977,-9.84747 130.27196,-9.84884 130.26331,-9.84747 130.25466,-9.8435 130.24685,-9.83873 130.24209,-9.84265 130.22562,-9.86043 130.1971,-9.86928 130.19131,-9.87964 130.18937,-9.98972 130.21346,-10.01936 130.21551,-10.09703 130.25323,-10.10834 130.25718,-10.35639 130.30258,-10.38505 130.30342,-10.4923 130.29539,-10.51148 130.29855,-10.52183 130.29882,-10.55815 130.29038,-10.59263 130.28762,-10.72334 130.28667,-10.73896 130.28521,-10.76379 130.27765,-10.83061 130.24674,-10.85765 130.23197,-10.88782 130.21123,-10.99576 130.12413,-11.01922 130.10708,-11.18183 130.01277,-11.19692 130.00622,-11.33073 129.98579,-11.4247 129.97744,-11.71351 129.97898,-11.72979 129.97393,-11.7458 129.96088,-11.75051 129.95852,-11.75612 129.95793,-11.7831 129.96128,-11.79728 129.95933,-11.8383 129.94675,-11.86179 129.94123,-11.88521 129.92781,-11.89509 129.92417,-12.00055 129.92188,-12.00778 129.93009,-12.01558 129.93407,-12.02424 129.93544,-12.03289 129.93407,-12.04069 129.93009,-12.04689 129.9239,-12.05087 129.91609,-12.05224 129.90744,-12.05087 129.89879,-12.04689 129.89098,-12.04069 129.88479,-12.03289 129.88081,-12.02424 129.87944,-12.01558 129.88081,-12.00778 129.88479,-11.99992 129.89424

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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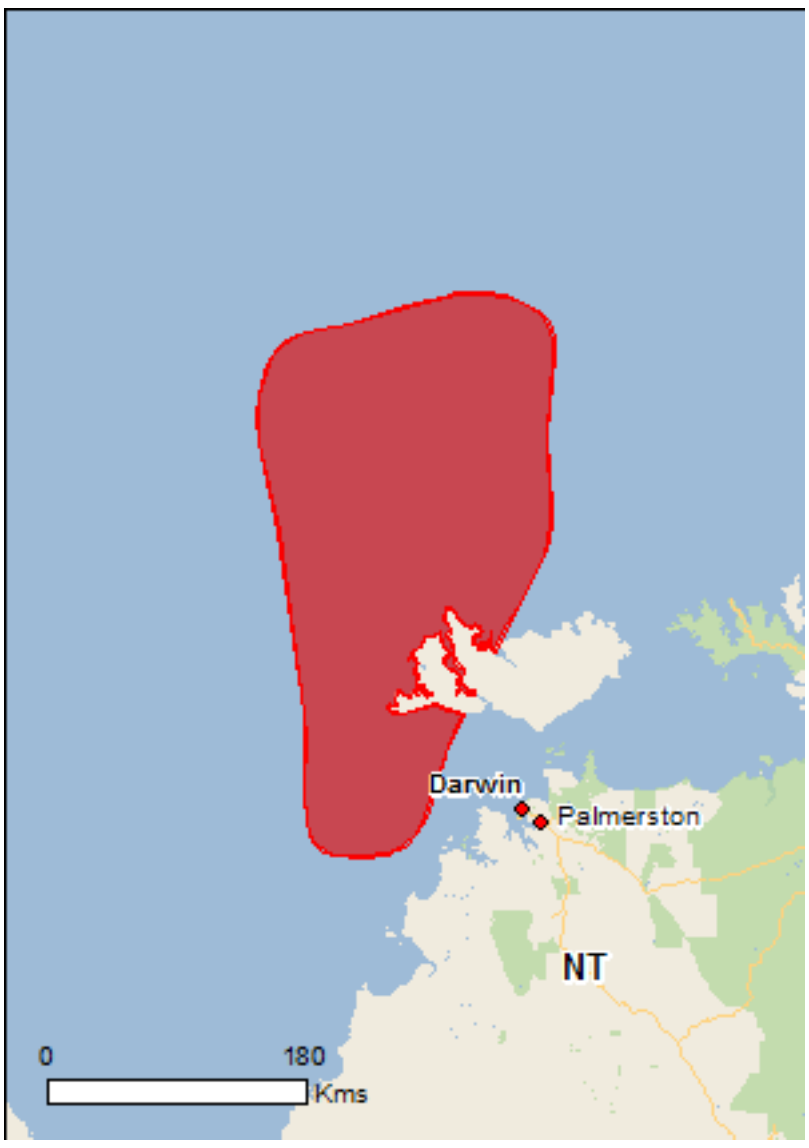

Coordinates
Buffer: 1.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	40
Listed Migratory Species:	49

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	85
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	4

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	2

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Melanodryas cucullata melvillensis Tiwi Islands Hooded Robin, Hooded Robin (Tiwi Islands) [67092]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Tyto novaehollandiae melvillensis Tiwi Masked Owl, Tiwi Islands Masked Owl	Endangered	Species or species

Name	Status	Type of Presence
[26049]		habitat known to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Mesembriomys gouldii melvillensis Black-footed Tree-rat (Melville Island) [87619]	Vulnerable	Species or species habitat known to occur within area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area
Sminthopsis butleri Butler's Dunnart [302]	Vulnerable	Species or species habitat known to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat known to occur within area
Plants		
Burmannia sp. Bathurst Island (R.Fensham 1021) [82017]	Endangered	Species or species habitat likely to occur within area
Hoya australis subsp. oramicola a vine [55436]	Vulnerable	Species or species habitat known to occur within area
Mitrella tiwiensis a vine [82029]	Vulnerable	Species or species habitat likely to occur within area
Typhonium jonesii a herb [62412]	Endangered	Species or species habitat likely to occur within area
Typhonium mirabile a herb [79227]	Endangered	Species or species habitat likely to occur within area
Xylopia monosperma a shrub [82030]	Endangered	Species or species habitat known to occur within area
Reptiles		

Name	Status	Type of Presence
[Acanthophis hawkei](#) Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
[Glyphis garricki](#) Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
[Glyphis glyphis](#) Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
[Pristis clavata](#) Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
[Pristis zijsron](#) Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Anous stolidus](#) Common Noddy [825]		Species or species habitat may occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat known to occur within area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
[Fregata minor](#) Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Migratory Marine Species		
[Anoxypristis cuspidata](#) Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding known to occur within area
[Crocodylus porosus](#) Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
[Dugong dugon](#) Dugong [28]		Species or species habitat known to occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
[Isurus oxyrinchus](#) Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
[Isurus paucus](#) Longfin Mako [82947]		Species or species habitat likely to occur within area
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
[Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat likely to occur within area
[Manta birostris](#) Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
[Megaptera novaeangliae](#) Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
[Orcaella heinsohni](#) Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area
[Physeter macrocephalus](#) Sperm Whale [59]		Species or species habitat may occur within area
[Pristis clavata](#) Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
[Pristis zijsron](#) Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
[Sousa chinensis](#) Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
[Tursiops aduncus (Arafura/Timor Sea populations)](#) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
[Cecropis daurica](#) Red-rumped Swallow [80610]		Species or species habitat may occur within area
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Acrocephalus orientalis](#) Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Sterna bergii Crested Tern [816]		Breeding likely to occur within area
Fish		
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys parvicarinatus Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area

Name	Status	Type of Presence
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Name	Label
Oceanic Shoals	Habitat Protection Zone (IUCN IV)
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Oceanic Shoals	National Park Zone (IUCN II)
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Mimosa pigra Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Pennisetum polystachyon Mission Grass, Perennial Mission Grass, Missiongrass, Feathery Pennisetum, Feather Pennisetum, Thin Napier Grass, West Indian Pennisetum, Blue Buffel Grass [21194]		Species or species habitat may occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Van	North

Name	Region
Shelf break and slope of the Arafura Shelf	North

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-9.25182 130.445,-9.33439 130.13,-9.43611 129.784,-9.4918 129.514,-9.52878 129.414,-9.57513 129.349,-9.63966 129.302,-9.73592 129.263,-9.88306 129.223,-10.0105 129.208,-10.1571 129.218,-10.7047 129.343,-11.8136 129.502,-11.9567 129.509,-12.3118 129.504,-12.4606 129.516,-12.5484 129.539,-12.6111 129.575,-12.6508 129.624,-12.674 129.693,-12.6864 129.855,-12.6639 130.022,-12.6225 130.12,-12.5439 130.196,-12.4784 130.234,-12.3937 130.27,-12.0113 130.395,-11.8241 130.486,-11.801 130.392,-11.7808 130.358,-11.7707 130.313,-11.8272 130.119,-11.8183 130.065,-11.824 130.049,-11.8066 130.031,-11.7763 130.021,-11.7557 130.033,-11.7662 130.057,-11.7648 130.074,-11.7506 130.062,-11.6689 130.076,-11.671 130.091,-11.7034 130.126,-11.7058 130.158,-11.6493 130.202,-11.6642 130.215,-11.6954 130.204,-11.6701 130.222,-11.7074 130.262,-11.6985 130.281,-11.6915 130.279,-11.6951 130.258,-11.6783 130.246,-11.6743 130.255,-11.6616 130.237,-11.6424 130.23,-11.6424 130.192,-11.5862 130.201,-11.5714 130.195,-11.5727 130.187,-11.5584 130.175,-11.511 130.204,-11.4846 130.186,-11.4905 130.152,-11.4761 130.149,-11.4623 130.17,-11.4237 130.186,-11.4094 130.228,-11.3456 130.252,-11.341 130.303,-11.3192 130.341,-11.339 130.354,-11.379 130.361,-11.4166 130.387,-11.4231 130.4,-11.4468 130.404,-11.4729 130.393,-11.4833 130.378,-11.5076 130.376,-11.5401 130.4,-11.5488 130.412,-11.5486 130.429,-11.5772 130.465,-11.6205 130.461,-11.6631 130.47,-11.6954 130.447,-11.6697 130.485,-11.691 130.516,-11.6911 130.553,-11.6743 130.557,-11.6792 130.528,-11.6513 130.491,-11.6206 130.477,-11.5573 130.491,-11.5034 130.432,-11.4756 130.434,-11.4557 130.419,-11.4273 130.427,-11.4085 130.412,-11.3645 130.41,-11.3658 130.39,-11.346 130.384,-11.3175 130.399,-11.3141 130.411,-11.3052 130.41,-11.2746 130.39,-11.254 130.364,-11.1813 130.373,-11.1727 130.38,-11.1734 130.41,-11.2602 130.488,-11.2799 130.516,-11.283 130.543,-11.2661 130.554,-11.2894 130.596,-11.3211 130.604,-11.3424 130.587,-11.3403 130.567,-11.3618 130.555,-11.3882 130.559,-11.3998 130.58,-11.4163 130.591,-11.4253 130.615,-11.3988 130.586,-11.3863 130.601,-11.3873 130.62,-11.3749 130.638,-11.3356 130.657,-11.3412 130.663,-11.4 130.657,-11.4358 130.683,-11.2738 130.765,-10.9583 130.943,-10.8552 130.987,-10.759 131.016,-10.6665 131.029,-10.5592 131.033,-10.1057 131.008,-9.63076 131.052,-9.53575 131.046,-9.46056 131.028,-9.40793 131.0,-9.3656 130.958,-9.32344 130.896,-9.29043 130.822,-9.26774 130.743,-9.25285 130.651,-9.24833 130.438,-9.25182 130.445

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-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
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-State Herbarium of South Australia
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