

TOTALFINAELF EXPLORATION NORGE

MCP01 Decommissioning Study

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This report is not to be used for contractual or engineering purposes unless the above is signed where indicated by both the originator of the report and the checker/approver and the report is designated 'FINAL'.



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1. INTRODUCTION

Fugro GEOS has been commissioned by TotalFinaElf Exploration Norge to carry out a study to evaluate the potential downtime and operability during the decommissioning of the MCP01 platform. Continuous wind and wave data from the NEXTRA hindcast for the complete years 1989 to 1998 has been used as source data for the study, and the proprietary Fugro GEOS Weather Windows software has been used to model the TotalFinaElf operational profiles and provide the raw statistics for the deliverable products.

The products are presented as a set of tables in the Criteria Reference section of this report. The tables are grouped into three divisions:

1. **Percentage Operability:** provides monthly percentages of uptime possible in a scenario where work will be halted when the sea state exceeds defined thresholds.
2. **Percentage Downtime:** in three of the percentage operability cases above, the equivalent percentage downtime statistics are presented.
3. **Operational Windows:** presents monthly statistics on the number of operations of length 2, 3, 6 or 9 days which may be carried out when working subject to defined ceilings of wave height.
4. **The Criteria Overview** discusses the source data used in the study and the methods of analysis used in the derivation of the product tables.

It was found, during the preparation of Revision 0 of this report, that the wind speed ceiling of 6ms^{-1} dominated the statistics. At the request of TotalFinaElf, the parameter wind speed has been taken out of all the operational profiles, leaving only significant wave height governing operability and operation length.

2. FRAMES OF REFERENCE

2.1 Units and Conventions

The following list outlines the units and conventions adopted in this report. Where possible, units have been expressed in the SI convention.

- Wave height is expressed in metres (m).
- Wind speed is expressed in metres per second (ms^{-1} or m/s), at the reference level of 10m above Mean Sea Level (MSL).

2.2 Parameter Descriptions

The following tables provide summary descriptions of the parameters used in this report.

PARAMETER	UNITS	DESCRIPTION	COMMENTS
Hs	m	Significant Wave Height	From the NEXTRA hindcast
WS_1hour	ms^{-1}	Hourly Mean Wind Speed	From the NEXTRA hindcast
WS10min	ms^{-1}	10-Minute Mean Wind Speed	Derived from WS_1hour using NPD profile

Table 2.1 Parameter Descriptions

3. CRITERIA REFERENCE

3.1 Operability Tables

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	3.3	2.5	2.2	8.4	22.0	28.9	44.8	34.1	16.9	3.8	2.9	5.6	14.7
Min Uptime	0.0	0.0	0.0	4.6	4.4	8.3	29.4	13.3	5.4	0.0	0.0	0.0	9.5
Max Uptime	13.7	n/a	14.1	20.0	41.9	48.8	68.5	60.5	29.6	8.1	8.8	12.5	20.1
SD Uptime	4.7	4.7	4.6	5.0	10.8	12.4	13.2	15.5	8.3	2.8	3.1	3.7	3.6
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	8.9	8.3	5.7	13.0	33.5	41.1	63.4	55.0	25.9	6.8	6.1	9.3	18.4
P30	5.1	3.4	1.9	11.0	28.9	37.1	54.5	46.9	24.7	6.2	5.1	7.6	17.8
P40	3.3	1.6	1.0	8.6	24.9	34.0	45.6	36.7	20.8	5.1	4.8	7.0	16.3
P50	2.0	1.3	0.6	6.8	21.0	30.8	41.7	30.8	17.3	4.2	2.9	5.8	15.0
P60	0.9	1.1	0.4	6.2	18.8	28.3	40.9	29.3	15.6	3.9	1.1	4.7	14.7
P70	0.4	0.8	0.3	5.7	18.3	26.5	38.8	28.0	13.7	3.0	0.7	4.1	13.8
P80	0.2	0.5	0.2	5.3	16.9	22.8	35.6	25.6	10.7	1.5	0.4	3.1	11.7
P90	0.1	0.3	0.1	5.0	12.8	13.6	32.3	19.5	6.5	0.7	0.2	2.2	10.3

Table 3.1 Percentage Operability: Hs ≤ 1.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	10.6	7.9	8.8	30.4	50.8	61.0	73.2	61.0	41.4	19.3	13.2	17.2	33.1
Min Uptime	0.0	0.4	0.0	20.4	37.9	47.5	55.2	29.8	25.0	6.9	2.5	2.4	27.3
Max Uptime	35.5	n/a	30.6	46.3	78.2	75.4	85.1	83.1	55.8	35.9	26.7	32.7	37.1
SD Uptime	11.9	7.1	9.9	8.6	12.3	8.5	9.3	16.7	9.0	8.7	9.2	8.9	3.6
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	24.5	16.3	21.0	41.6	62.4	69.4	83.8	79.8	48.8	25.9	25.3	27.5	36.6
P30	17.3	13.7	11.8	36.4	56.8	66.2	81.2	75.6	46.5	23.1	20.9	22.3	35.4
P40	12.9	11.9	7.4	31.6	52.4	63.9	78.4	67.2	45.5	22.7	18.7	20.1	34.7
P50	9.1	8.0	6.3	29.2	48.4	62.7	75.7	61.1	44.8	22.4	13.5	17.7	34.6
P60	5.6	4.5	5.6	28.4	46.1	61.0	72.4	59.4	42.4	19.4	8.3	15.1	34.2
P70	2.8	3.6	4.2	26.6	45.0	58.5	69.6	58.4	38.2	15.1	7.3	13.6	33.0
P80	0.7	2.3	2.4	23.1	43.8	56.5	68.9	54.8	35.5	13.6	6.2	12.1	30.2
P90	0.4	0.8	0.7	21.9	39.7	50.5	65.8	43.3	33.3	9.8	4.0	9.7	27.7

Table 3.2 Percentage Operability: Hs ≤ 1.5m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	20.6	20.2	21.8	51.6	70.2	81.1	88.3	81.9	62.0	40.3	32.5	31.9	50.4
Min Uptime	0.8	3.5	2.4	37.1	60.9	71.3	80.6	60.9	44.6	24.2	9.2	8.1	46.0
Max Uptime	64.9	n/a	48.8	73.0	91.5	87.9	96.4	93.1	72.5	58.5	52.1	50.8	54.2
SD Uptime	20.8	10.9	13.9	10.7	10.3	6.4	6.2	11.0	8.8	11.1	13.2	13.7	2.9
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	43.6	30.2	37.8	61.9	83.8	87.6	95.4	92.8	72.2	52.0	44.8	48.2	53.8
P30	33.2	26.8	28.3	58.3	74.0	86.9	94.9	92.5	70.0	49.0	41.5	44.2	52.5
P40	22.6	24.2	24.9	53.7	69.6	85.7	93.1	89.4	66.2	47.2	40.3	38.2	51.8
P50	16.5	21.3	23.3	50.4	68.3	84.6	88.7	85.9	62.3	41.5	36.0	32.9	51.7
P60	12.1	17.8	21.0	49.9	67.6	81.3	84.8	81.5	59.9	35.2	31.9	28.6	50.2
P70	5.9	14.5	18.7	48.6	65.8	76.8	83.8	76.9	59.0	32.9	28.8	25.2	48.1
P80	5.6	13.6	15.3	45.2	62.0	75.8	83.4	75.2	58.5	32.6	22.0	24.0	48.0
P90	4.8	10.7	8.2	40.5	61.5	73.9	82.8	71.8	56.2	31.5	20.4	20.4	47.7

Table 3.3 Percentage Operability: Hs ≤ 2.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	32.0	32.9	39.2	68.5	82.9	91.3	95.3	91.7	74.6	58.1	48.1	48.5	63.7
Min Uptime	3.2	17.3	8.5	52.5	74.2	81.7	87.9	81.5	64.6	44.4	25.4	23.0	59.6
Max Uptime	83.5	58.0	65.7	86.3	99.2	96.3	100.0	99.2	80.4	76.2	67.5	72.6	67.9
SD Uptime	25.4	12.8	17.1	9.7	8.5	5.0	3.8	6.7	5.7	11.6	13.6	16.7	3.0
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	60.9	44.9	57.7	78.3	95.6	95.9	98.7	98.2	80.1	73.0	59.5	66.5	67.8
P30	48.8	39.2	49.7	74.5	85.7	95.5	98.1	97.1	79.7	67.7	56.9	63.8	66.2
P40	35.6	37.6	45.7	70.8	81.7	93.7	97.7	96.5	79.1	63.5	55.4	58.3	64.6
P50	27.6	35.9	40.7	68.6	81.6	92.3	96.8	96.2	76.7	59.5	54.4	52.2	63.6
P60	23.2	31.0	36.5	67.5	81.1	91.9	95.6	93.1	74.4	54.1	51.3	44.6	63.1
P70	16.8	25.3	36.2	65.2	79.4	91.5	94.6	88.2	73.5	49.6	43.6	36.8	63.1
P80	13.5	23.3	33.1	62.4	76.5	90.0	92.9	86.2	71.2	48.5	35.3	35.8	62.3
P90	11.9	18.9	20.8	60.8	76.0	84.7	91.5	82.5	67.2	47.3	33.7	34.2	59.7

Table 3.4 Percentage Operability: Hs ≤ 2.5m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	44.8	47.2	56.3	81.8	92.2	95.5	98.3	96.6	83.2	70.8	63.2	63.0	74.6
Min Uptime	13.7	24.4	23.4	68.8	81.5	90.0	94.8	89.1	73.8	58.1	38.8	48.0	70.5
Max Uptime	93.1	n/a	75.8	97.1	100.0	98.8	100.0	100.0	87.1	83.5	77.5	81.9	77.5
SD Uptime	24.2	15.0	17.4	8.3	6.0	3.0	1.8	3.9	4.9	8.5	13.8	12.5	2.8
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	69.9	60.8	70.6	89.5	98.4	98.4	n/a	n/a	86.8	80.6	74.8	78.7	77.4
P30	59.9	56.0	69.1	86.4	97.4	98.0	99.7	99.4	86.1	76.2	73.9	73.9	77.0
P40	52.7	53.0	66.5	85.1	95.2	97.7	99.5	98.5	85.7	74.4	73.0	69.8	76.4
P50	44.0	50.5	61.3	83.4	93.5	96.9	99.3	97.9	85.5	74.0	70.8	64.7	75.9
P60	35.5	48.2	57.5	81.1	92.5	95.6	99.0	97.7	85.3	71.4	66.8	58.9	75.1
P70	30.2	43.0	57.0	79.0	90.9	94.3	98.5	97.2	84.8	66.3	59.3	54.4	73.6
P80	28.6	34.9	51.8	77.1	88.9	93.5	97.6	95.3	82.5	62.8	49.9	52.0	71.7
P90	25.7	30.3	32.1	74.8	86.5	92.3	96.6	90.9	75.6	62.1	48.5	49.8	70.7

Table 3.5 Percentage Operability: Hs ≤ 3.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	69.2	70.7	81.3	94.5	98.2	99.4	99.9	99.4	93.0	87.5	84.0	84.4	88.5
Min Uptime	37.9	43.4	61.7	88.0	92.7	97.9	98.8	95.6	87.5	72.2	65.0	71.4	84.1
Max Uptime	98.0	n/a	96.0	100.0	100.0	100.0	100.0	100.0	97.5	96.4	96.7	97.6	92.1
SD Uptime	19.0	14.9	10.9	4.3	2.5	0.8	0.4	1.5	3.5	7.0	11.6	8.6	2.7
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	91.5	n/a	95.0	98.7	n/a	n/a	n/a	n/a	96.5	95.7	94.3	96.3	91.1
P30	84.6	85.2	89.7	98.1	n/a	n/a	n/a	n/a	95.8	91.0	93.2	89.8	90.7
P40	79.4	78.3	85.3	97.0	n/a	n/a	n/a	n/a	95.3	88.9	90.7	86.2	90.5
P50	73.2	73.1	82.8	96.1	99.6	n/a	n/a	n/a	94.6	88.3	87.3	85.3	89.5
P60	65.6	69.4	80.8	95.0	98.9	99.8	n/a	n/a	93.5	87.6	85.1	83.7	88.3
P70	59.9	65.6	79.1	93.2	98.1	99.3	n/a	n/a	92.0	86.9	84.1	80.4	87.7
P80	58.3	63.1	76.8	91.1	97.3	98.7	n/a	99.8	90.3	86.0	79.4	77.8	86.4
P90	55.7	55.4	70.0	88.7	96.0	98.3	99.9	98.8	87.9	83.4	65.4	76.8	85.4

Table 3.6 Percentage Operability: Hs ≤ 4.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	84.7	87.7	93.1	98.5	99.8	100.0	100.0	100.0	97.9	95.7	93.7	95.0	95.5
Min Uptime	60.9	73.1	85.1	94.6	98.8	100.0	100.0	99.6	95.0	83.9	81.3	83.9	93.2
Max Uptime	99.6	n/a	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.1
SD Uptime	12.4	8.1	5.1	1.7	0.4	0.0	0.0	0.1	1.9	4.9	7.1	5.0	1.8
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	96.7	96.3	99.7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	97.6
P30	94.3	93.4	97.6	n/a	n/a	n/a	n/a	n/a	99.7	99.2	98.5	98.6	97.0
P40	91.6	91.8	95.3	99.5	n/a	n/a	n/a	n/a	99.3	98.1	97.4	97.8	96.4
P50	89.3	88.6	93.5	99.0	n/a	n/a	n/a	n/a	99.0	97.4	96.9	96.2	95.9
P60	86.2	85.4	92.4	98.6	n/a	n/a	n/a	n/a	98.4	96.9	96.3	94.6	95.4
P70	80.9	84.5	91.2	98.3	n/a	n/a	n/a	n/a	97.4	96.1	94.5	94.2	94.6
P80	75.6	83.8	89.3	97.9	99.9	n/a	n/a	n/a	96.1	95.2	89.6	93.4	94.1
P90	73.2	81.5	88.0	97.3	99.5	n/a	n/a	100.0	95.4	93.3	82.8	91.9	93.3

Table 3.7 Percentage Operability: Hs ≤ 5.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	93.3	95.2	97.8	99.5	100.0	100.0	100.0	100.0	99.1	98.1	97.5	97.9	98.2
Min Uptime	82.3	89.0	94.8	97.5	100.0	100.0	100.0	100.0	95.8	89.9	86.7	91.6	97.2
Max Uptime	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.5
SD Uptime	6.0	4.2	1.9	0.9	0.0	0.0	0.0	0.0	1.6	3.2	4.4	2.7	0.8
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	98.7	99.7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.3
P30	98.1	98.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.5	98.9
P40	96.8	97.2	99.3	n/a	n/a	n/a	n/a	n/a	n/a	99.8	n/a	99.1	98.4
P50	95.8	95.4	98.2	n/a	n/a	n/a	n/a	n/a	n/a	99.4	n/a	99.0	98.1
P60	94.6	94.4	97.4	n/a	n/a	n/a	n/a	n/a	n/a	99.0	99.5	98.8	98.0
P70	92.4	93.6	97.1	99.9	n/a	n/a	n/a	n/a	99.8	98.5	98.1	98.6	97.9
P80	89.7	92.6	96.7	99.4	n/a	n/a	n/a	n/a	98.7	97.9	96.4	97.9	97.8
P90	85.2	91.4	96.2	98.3	n/a	n/a	n/a	n/a	96.6	96.8	94.5	95.6	97.3

Table 3.8 Percentage Operability: Hs ≤ 6.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	96.9	97.8	99.5	99.8	100.0	100.0	100.0	100.0	99.4	99.2	98.4	99.0	99.2
Min Uptime	91.1	94.8	98.0	99.2	100.0	100.0	100.0	100.0	97.1	94.0	87.9	94.4	98.5
Max Uptime	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SD Uptime	3.2	2.5	0.8	0.4	0.0	0.0	0.0	0.0	1.1	2.0	4.0	2.1	0.5
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	100.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.9
P30	n/a	99.7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.4
P40	99.0	98.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.2
P50	98.0	98.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.2
P60	97.1	97.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.1
P70	96.3	96.1	99.8	99.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.9	99.0
P80	95.3	95.8	99.0	99.6	n/a	n/a	n/a	n/a	99.6	99.8	99.5	99.0	98.8
P90	92.6	95.6	98.3	99.4	n/a	n/a	n/a	n/a	97.8	98.3	96.5	96.2	98.6

Table 3.9 Percentage Operability: Hs ≤ 7.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Uptime	99.6	99.6	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.6	99.9	99.6	99.8
Min Uptime	98.4	98.8	100.0	99.6	100.0	100.0	100.0	100.0	99.2	96.0	99.2	97.6	99.5
Max Uptime	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SD Uptime	0.6	1.2	0.0	0.1	0.0	0.0	0.0	0.0	0.3	1.3	0.3	0.8	0.2
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	100.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100.0
P30	n/a	100.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.9
P40	n/a	100.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.9
P50	n/a	100.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.9
P60	n/a	100.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.9
P70	99.9	100.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.9	99.8
P80	99.5	99.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	99.5	99.8
P90	99.1	99.2	n/a	100.0	n/a	n/a	n/a	n/a	99.9	99.6	99.9	98.7	99.7

Table 3.10 Percentage Operability: Hs ≤ 9.0m

3.2 Sea State - Induced Downtime

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Downtime	6.7	4.8	2.2	0.5	0.0	0.0	0.0	0.0	0.9	1.9	2.5	2.1	1.8
Max Downtime	17.7	11.0	5.2	2.5	0.0	0.0	0.0	0.0	4.2	10.1	13.3	8.4	2.8
Min Downtime	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
SD Downtime	6.0	4.2	1.9	0.9	0.0	0.0	0.0	0.0	1.6	3.2	4.4	2.7	0.8
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	1.3	0.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.7
P30	1.9	1.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5	1.1
P40	3.2	2.8	0.7	n/a	n/a	n/a	n/a	n/a	n/a	0.2	n/a	0.9	1.6
P50	4.2	4.6	1.8	n/a	n/a	n/a	n/a	n/a	n/a	0.6	n/a	1.0	1.9
P60	5.4	5.6	2.6	n/a	n/a	n/a	n/a	n/a	n/a	1.0	0.5	1.2	2.0
P70	7.6	6.4	2.9	0.1	n/a	n/a	n/a	n/a	0.3	1.5	1.9	1.4	2.1
P80	10.3	7.4	3.3	0.6	n/a	n/a	n/a	n/a	1.3	2.1	3.6	2.1	2.2
P90	14.8	8.6	3.8	1.7	n/a	n/a	n/a	n/a	3.4	3.2	5.5	4.4	2.7

Table 3.11 Percentage Downtime: Hs ≤ 6.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Downtime	3.1	2.2	0.5	0.2	0.0	0.0	0.0	0.0	0.6	0.8	1.6	1.0	0.8
Max Downtime	8.9	5.2	2.0	0.8	0.0	0.0	0.0	0.0	2.9	6.0	12.1	5.6	1.5
Min Downtime	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SD Downtime	3.2	2.5	0.8	0.4	0.0	0.0	0.0	0.0	1.1	2.0	4.0	2.1	0.5
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1
P30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.6
P40	1.0	1.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.8
P50	2.0	1.7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.8
P60	2.9	2.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.9
P70	3.8	3.9	0.2	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1	1.0
P80	4.7	4.2	1.0	0.4	n/a	n/a	n/a	n/a	0.4	0.2	0.5	1.0	1.2
P90	7.4	4.4	1.7	0.6	n/a	n/a	n/a	n/a	2.2	1.7	3.5	3.8	1.4

Table 3.12 Percentage Downtime: Hs ≤ 7.0m

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Mean Downtime	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.1	0.4	0.2
Max Downtime	1.6	1.2	0.0	0.4	0.0	0.0	0.0	0.0	0.8	4.0	0.8	2.4	0.5
Min Downtime	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SD Downtime	0.6	1.2	0.0	0.1	0.0	0.0	0.0	0.0	0.3	1.3	0.3	0.8	0.2
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0
P30	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1
P40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1
P50	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1
P60	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1
P70	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1	0.2
P80	0.5	0.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5	0.2
P90	0.9	0.8	n/a	0.0	n/a	n/a	n/a	n/a	0.1	0.4	0.1	1.3	0.3

Table 3.13 Percentage Downtime: Hs ≤ 9.0m

3.3 Operational Windows

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.1	0.2	0.1	0.2	1.7	2.0	3.4	2.7	0.8	0.1	0.1	0.3	11.7
Minimum	0.0	0.0	0.0	0.0	0.0	0.1	1.0	0.0	0.0	0.0	0.0	0.0	5.0
Maximum	1.0	1.0	1.0	1.0	3.0	4.3	7.0	7.2	2.0	0.7	0.7	1.0	21.0
Std Deviation	0.3	0.4	0.3	0.4	0.9	1.2	1.7	2.6	0.8	0.2	0.2	0.4	5.3
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	0.9	n/a	0.9	n/a	2.9	3.3	5.8	6.2	n/a	0.3	0.4	n/a	17.8
P30	0.8	0.9	0.8	0.9	2.7	2.4	4.5	4.6	1.3	0.2	0.3	0.5	16.3
P40	0.7	0.8	0.7	0.8	2.4	2.1	4.0	3.4	0.9	0.2	0.2	0.3	13.6
P50	0.6	0.6	0.6	0.6	2.1	2.1	3.8	2.3	0.8	0.2	0.2	0.2	11.0
P60	0.5	0.5	0.5	0.5	1.9	2.0	3.4	1.6	0.6	0.1	0.2	0.2	9.6
P70	0.3	0.4	0.3	0.4	1.6	1.8	2.7	1.2	0.3	0.1	0.1	0.1	8.7
P80	0.2	0.3	0.2	0.3	1.3	1.3	2.0	0.9	0.2	0.1	0.1	0.1	7.8
P90	0.1	0.1	0.1	0.1	0.9	0.9	1.8	0.5	0.1	0.0	0.0	0.0	6.8

Table 3.14 Operational Windows: 48 Hour Operation; Hs ≤ 1.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.8	0.4	0.4	2.0	4.4	6.1	8.5	6.5	3.6	1.0	0.4	0.9	35.1
Minimum	0.0	0.0	0.0	0.0	1.0	1.3	5.0	2.0	1.0	0.0	0.0	0.0	22.0
Maximum	3.0	2.0	2.0	3.6	8.6	9.1	11.0	12.1	7.0	2.0	2.1	3.0	44.0
Std Deviation	1.1	0.7	0.8	1.2	2.1	2.3	1.8	2.9	1.8	1.0	0.8	0.9	8.0
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	2.2	1.6	1.6	3.4	6.6	8.2	10.2	9.6	6.2	n/a	1.2	2.6	n/a
P30	1.7	1.2	1.3	3.1	5.3	7.7	9.8	8.3	5.2	n/a	0.9	2.2	41.2
P40	1.2	0.9	1.1	2.8	4.9	7.2	9.5	7.4	4.4	n/a	0.8	1.7	39.4
P50	0.7	0.7	0.9	2.5	4.6	6.8	9.2	6.5	3.7	1.5	0.7	1.3	38.5
P60	0.4	0.6	0.7	2.2	4.2	6.4	8.6	5.8	3.3	0.9	0.5	0.8	36.6
P70	0.3	0.5	0.6	1.7	3.9	5.9	7.9	5.4	2.9	0.7	0.4	0.4	33.0
P80	0.2	0.3	0.4	1.0	3.4	5.4	7.4	4.8	2.4	0.5	0.3	0.1	28.6
P90	0.1	0.2	0.2	0.8	2.8	3.7	6.8	3.8	1.9	0.2	0.1	0.1	24.7

Table 3.15 Operational Windows: 48 Hour Operation; Hs ≤ 1.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	1.4	0.9	1.5	4.8	8.2	9.6	11.6	10.4	6.2	2.9	2.1	2.5	62.2
Minimum	0.0	0.0	0.0	3.0	5.0	6.3	8.0	6.8	3.0	0.0	0.0	0.0	51.0
Maximum	4.8	2.0	5.0	7.1	12.6	11.6	14.8	13.6	9.0	6.0	5.0	5.0	70.0
Std Deviation	1.8	0.8	1.6	1.4	2.2	1.7	2.2	2.6	1.8	2.2	1.6	1.5	6.9
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	3.4	n/a	3.3	6.2	10.8	11.3	14.0	13.3	8.4	5.3	3.5	4.2	68.4
P30	2.9	1.4	2.3	6.0	9.3	11.2	13.4	12.5	7.3	5.0	3.1	3.5	67.8
P40	2.2	1.2	1.8	5.4	8.4	10.9	12.7	11.6	6.7	4.4	3.0	3.1	66.9
P50	1.1	1.1	1.5	4.8	8.0	10.0	11.8	11.2	6.5	3.5	2.5	2.7	64.9
P60	0.3	1.0	1.2	4.6	7.8	9.2	11.2	10.9	6.3	2.6	2.0	2.3	62.6
P70	0.3	0.8	0.9	4.2	7.4	9.1	10.6	10.0	5.9	1.9	1.7	2.0	60.8
P80	0.2	0.2	0.7	3.8	7.0	8.9	10.0	8.0	5.1	1.4	0.8	1.8	58.7
P90	0.1	0.1	0.3	3.2	6.7	8.2	9.6	7.0	4.6	0.9	0.1	1.5	51.9

Table 3.16 Operational Windows: 48 Hour Operation; Hs ≤ 2.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	3.2	2.4	2.9	7.9	10.6	12.4	13.4	12.6	8.0	5.9	3.8	4.2	87.3
Minimum	0.0	0.1	0.0	4.8	9.0	10.3	10.7	9.2	6.0	2.0	0.2	0.0	75.0
Maximum	10.4	5.8	7.4	10.8	14.8	13.6	15.5	15.4	9.6	9.3	8.4	7.8	100.5
Std Deviation	3.6	1.8	2.6	1.8	2.1	1.1	1.6	2.2	1.2	2.6	2.4	2.6	8.4
P10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P20	7.9	4.4	6.3	10.3	14.0	13.5	15.0	14.5	9.3	9.1	5.7	7.6	98.1
P30	4.9	3.9	4.6	9.2	11.2	13.4	14.5	14.3	8.8	8.6	4.7	6.5	95.2
P40	3.5	3.5	3.9	8.4	10.0	13.1	14.3	14.0	8.5	7.6	4.4	5.3	92.3
P50	2.7	2.9	2.9	7.9	9.9	12.8	14.2	13.8	8.4	6.0	4.1	4.6	88.5
P60	1.8	2.4	1.8	7.6	9.8	12.6	13.7	13.0	8.4	4.9	3.8	3.7	84.9
P70	0.8	1.7	1.4	7.3	9.7	12.2	12.8	11.4	7.9	4.5	3.4	2.7	83.1
P80	0.3	1.0	1.0	7.0	9.4	11.8	12.0	10.4	6.9	4.0	2.6	2.5	82.0
P90	0.1	0.7	0.8	6.6	9.2	11.2	11.5	10.2	6.7	3.6	0.9	1.8	78.6

Table 3.17 Operational Windows: 48 Hour Operation; Hs ≤ 2.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	4.0	3.0	5.5	10.0	12.7	13.4	15.0	14.1	10.0	7.7	5.8	6.5	107.8
Minimum	0.0	0.4	1.0	6.0	10.9	11.8	13.6	11.3	8.4	3.9	1.3	3.8	100.0
Maximum	13.1	7.7	9.5	14.2	15.5	14.5	15.5	15.5	11.4	11.8	9.6	10.6	116.6
Std Deviation	4.3	2.1	3.0	2.3	1.5	1.0	0.6	1.6	0.9	2.4	2.8	2.3	5.0
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	9.3	6.2	9.1	12.3	14.7	14.4	n/a	n/a	11.2	10.4	8.3	9.3	113.3
P30	6.0	4.6	8.3	11.4	13.9	14.2	15.4	15.3	10.7	9.7	7.3	7.9	111.6
P40	4.3	3.7	7.4	10.5	13.0	14.1	15.3	15.2	10.5	8.6	6.9	7.0	110.5
P50	3.6	2.8	6.5	10.1	12.6	13.8	15.2	14.9	10.3	7.6	6.8	6.5	108.6
P60	2.5	2.1	5.6	9.8	12.4	13.5	15.2	14.7	9.9	6.9	6.6	6.2	106.7
P70	1.2	2.0	4.7	9.4	12.0	13.1	15.1	14.0	9.6	6.6	5.8	5.5	105.5
P80	0.9	1.9	3.5	8.8	11.6	12.5	15.0	12.8	9.5	6.5	3.8	4.3	104.7
P90	0.5	1.5	1.2	7.7	11.0	12.3	14.6	12.2	9.2	5.8	1.9	4.0	103.6

Table 3.18 Operational Windows: 48 Hour Operation; Hs ≤ 3.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	7.8	7.2	10.1	13.1	14.7	14.5	15.4	15.3	12.6	12.2	10.2	10.8	144.0
Minimum	1.6	2.0	4.9	11.3	12.8	14.0	15.2	14.2	10.3	9.1	6.3	8.8	135.1
Maximum	14.4	12.3	13.5	15.0	15.5	15.0	15.5	15.5	14.2	14.3	12.9	14.5	152.4
Std Deviation	4.4	3.4	2.8	1.3	1.0	0.5	0.1	0.4	1.1	1.6	2.5	2.0	6.0
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	13.0	10.1	13.1	14.5	n/a	n/a	n/a	n/a	13.5	14.2	n/a	13.6	152.0
P30	11.5	9.4	12.4	14.1	n/a	n/a	n/a	n/a	13.2	13.1	12.3	12.1	149.1
P40	10.2	9.2	11.5	13.8	n/a	n/a	n/a	n/a	13.0	12.6	11.7	11.3	146.2
P50	8.8	8.7	10.8	13.4	15.2	14.8	n/a	n/a	12.9	12.5	11.1	10.9	144.5
P60	6.8	7.7	10.0	13.0	14.7	14.4	n/a	n/a	12.7	12.3	10.7	10.4	143.5
P70	5.1	6.1	9.2	12.6	14.5	14.1	n/a	n/a	12.5	12.0	9.6	9.8	141.5
P80	4.6	3.9	8.7	11.8	14.3	14.1	15.5	15.5	12.3	11.5	7.7	9.3	138.8
P90	2.9	3.1	6.8	11.5	13.4	14.0	15.3	15.2	11.9	10.8	7.5	8.8	137.8

Table 3.19 Operational Windows: 48 Hour Operation; Hs ≤ 4.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.1	0.0	0.0	0.0	0.4	0.9	1.8	1.0	0.1	0.0	0.0	0.0	4.3
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.0
Maximum	1.0	0.0	0.0	0.0	1.0	2.0	5.0	3.7	1.0	0.0	0.0	0.0	11.0
Std Deviation	0.3	0.0	0.0	0.0	0.5	0.8	1.4	1.3	0.3	0.0	0.0	0.0	3.2
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	0.9	n/a	n/a	n/a	n/a	n/a	3.4	3.0	0.9	n/a	n/a	n/a	7.8
P30	0.8	n/a	n/a	n/a	n/a	1.8	2.6	2.3	0.8	n/a	n/a	n/a	6.3
P40	0.7	n/a	n/a	n/a	n/a	1.5	2.2	1.4	0.7	n/a	n/a	n/a	4.8
P50	0.6	n/a	n/a	n/a	0.9	1.2	1.6	0.9	0.6	n/a	n/a	n/a	3.8
P60	0.5	n/a	n/a	n/a	0.7	1.0	1.3	0.7	0.5	n/a	n/a	n/a	3.3
P70	0.3	n/a	n/a	n/a	0.5	0.7	1.2	0.5	0.3	n/a	n/a	n/a	2.9
P80	0.2	n/a	n/a	n/a	0.4	0.0	1.1	0.4	0.2	n/a	n/a	n/a	2.4
P90	0.1	n/a	n/a	n/a	0.2	0.0	0.9	0.2	0.1	n/a	n/a	n/a	1.9

Table 3.20 Operational Windows: 72 Hour Operation; Hs ≤ 1.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.3	0.1	0.1	0.6	2.4	3.2	4.4	3.5	1.7	0.3	0.1	0.5	17.3
Minimum	0.0	0.0	0.0	0.0	1.0	0.2	3.0	0.0	0.0	0.0	0.0	0.0	11.0
Maximum	2.0	1.0	1.0	2.0	4.8	5.4	7.0	8.4	4.0	1.0	0.6	2.0	23.0
Std Deviation	0.7	0.3	0.3	0.7	1.2	1.5	1.5	2.5	1.1	0.5	0.2	0.7	4.4
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	1.2	0.9	0.4	1.4	3.7	4.8	6.9	5.7	2.6	n/a	0.4	1.6	22.2
P30	0.9	0.8	0.3	1.1	3.1	4.2	5.1	5.0	2.2	0.8	0.3	1.2	21.3
P40	0.8	0.7	0.2	0.8	2.7	3.7	4.4	4.4	2.1	0.6	0.3	0.6	20.1
P50	0.6	0.6	0.2	0.7	2.4	3.4	4.3	3.8	2.0	0.5	0.2	0.4	18.8
P60	0.5	0.5	0.2	0.6	2.2	3.3	4.1	3.3	1.6	0.4	0.2	0.3	17.6
P70	0.4	0.3	0.1	0.4	1.9	3.1	3.9	2.7	1.0	0.3	0.1	0.2	16.4
P80	0.3	0.2	0.1	0.3	1.5	2.9	3.5	1.8	1.0	0.2	0.1	0.2	14.6
P90	0.1	0.1	0.0	0.1	1.3	2.2	3.2	0.9	0.9	0.1	0.0	0.1	12.8

Table 3.21 Operational Windows: 72 Hour Operation; Hs ≤ 1.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.8	0.2	0.5	2.0	4.9	5.6	7.5	6.0	3.8	1.3	0.4	1.1	34.0
Minimum	0.0	0.0	0.0	0.8	3.3	3.2	5.1	3.0	2.0	0.0	0.0	0.0	26.0
Maximum	2.0	1.0	2.0	3.0	7.5	8.1	9.8	9.2	5.5	3.0	2.0	3.0	38.0
Std Deviation	1.0	0.4	0.8	0.8	1.3	1.7	1.5	2.1	1.2	1.1	0.8	1.0	4.7
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	n/a	1.7	n/a	6.2	7.4	9.3	8.6	5.4	2.7	1.8	2.6	n/a
P30	1.9	0.4	0.8	2.4	5.4	7.1	8.5	7.5	4.8	2.4	1.6	2.2	37.3
P40	1.4	0.1	0.5	2.1	5.1	6.4	8.0	6.9	4.6	2.1	1.4	1.8	36.4
P50	0.9	0.1	0.4	2.0	5.0	5.9	7.7	6.6	3.9	1.8	1.1	1.5	35.8
P60	0.7	0.1	0.3	2.0	4.8	5.5	7.3	6.1	3.1	1.3	0.9	1.2	35.5
P70	0.5	0.1	0.2	1.9	4.4	5.0	6.9	5.0	3.1	0.8	0.7	0.8	35.2
P80	0.4	0.0	0.2	1.6	4.0	4.6	6.7	4.0	3.0	0.3	0.5	0.2	34.1
P90	0.2	0.0	0.1	1.0	3.9	3.3	5.9	3.8	2.9	0.1	0.2	0.1	30.1

Table 3.22 Operational Windows: 72 Hour Operation; Hs ≤ 2.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	1.5	0.9	1.5	4.4	6.4	7.9	8.9	8.1	4.7	2.8	1.8	2.0	50.9
Minimum	0.0	0.0	0.0	2.8	5.0	6.2	6.8	5.0	3.0	0.0	0.0	0.0	39.0
Maximum	5.3	2.5	4.0	5.8	9.8	9.1	10.3	9.6	6.0	5.3	5.3	4.7	58.3
Std Deviation	2.1	0.9	1.4	1.0	1.7	0.8	1.2	1.6	1.1	1.8	1.6	1.6	6.8
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	4.7	2.1	3.6	5.4	9.1	8.5	10.0	9.6	5.9	5.1	3.5	4.0	58.1
P30	2.7	1.3	3.1	5.2	7.0	8.2	9.9	9.3	5.5	4.4	2.4	3.3	57.8
P40	1.7	1.0	2.6	5.1	6.1	8.0	9.7	9.2	5.2	3.5	2.1	2.9	56.1
P50	1.3	1.0	2.0	4.6	6.0	8.0	9.5	8.8	5.2	2.9	2.0	2.6	52.5
P60	1.1	0.8	1.4	4.1	5.9	7.9	9.0	8.4	4.9	2.7	1.6	2.0	49.2
P70	0.8	0.5	0.9	4.0	5.5	7.9	8.3	7.8	4.3	2.3	0.9	1.4	47.7
P80	0.5	0.3	0.5	3.7	5.2	7.8	8.0	6.9	3.6	1.8	0.6	1.0	46.6
P90	0.3	0.2	0.3	3.0	5.2	7.4	7.8	6.7	3.5	0.9	0.1	0.8	44.4

Table 3.23 Operational Windows: 72 Hour Operation; Hs ≤ 2.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	2.6	1.8	2.4	5.9	8.0	8.6	9.8	9.2	6.2	4.6	3.0	3.2	65.3
Minimum	0.0	0.0	0.0	4.0	6.0	6.9	8.8	5.5	3.7	2.7	0.0	1.0	60.0
Maximum	8.3	4.5	5.0	8.8	10.3	9.3	10.3	10.3	7.3	6.8	6.0	5.7	71.7
Std Deviation	2.9	1.6	1.8	1.5	1.2	0.8	0.5	1.6	1.2	1.4	1.8	1.6	3.9
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	6.1	3.6	n/a	7.4	9.1	9.2	n/a	n/a	7.2	6.0	5.2	5.1	69.0
P30	4.5	3.1	4.3	6.6	8.4	9.1	10.2	10.2	7.1	5.5	4.0	4.2	68.1
P40	3.3	2.4	3.6	6.3	8.2	9.0	10.1	10.1	7.0	5.3	3.5	3.7	67.4
P50	2.4	1.5	3.0	6.1	8.1	8.9	9.9	10.1	6.7	5.1	3.2	3.3	66.5
P60	1.6	1.0	2.4	5.8	8.0	8.8	9.8	9.9	6.3	4.6	3.1	2.9	65.2
P70	0.9	1.0	1.7	5.4	7.8	8.6	9.7	9.5	6.0	4.0	2.7	2.7	63.4
P80	0.6	0.9	0.9	5.1	7.6	8.2	9.6	8.7	5.8	3.7	1.9	2.1	61.8
P90	0.3	0.5	0.7	4.0	6.9	7.9	9.4	7.6	5.0	2.9	1.1	1.3	60.9

Table 3.24 Operational Windows: 72 Hour Operation; Hs ≤ 3.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	4.8	4.0	6.3	8.1	9.8	9.6	10.3	10.2	8.0	7.3	6.4	6.4	91.2
Minimum	1.4	0.4	3.0	6.2	8.2	9.3	10.1	9.5	7.1	5.0	2.8	4.7	86.0
Maximum	8.8	7.2	9.0	10.0	10.3	10.0	10.3	10.3	8.5	9.3	8.6	9.5	97.3
Std Deviation	2.8	2.5	2.2	1.2	0.8	0.3	0.1	0.3	0.5	1.5	1.9	1.8	4.1
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	8.2	6.2	8.6	9.1	n/a	n/a	n/a	n/a	8.4	9.2	8.3	8.8	97.0
P30	7.2	5.8	8.4	8.8	n/a	n/a	n/a	n/a	8.3	8.5	7.8	7.8	94.2
P40	6.7	5.5	7.5	8.8	n/a	n/a	n/a	n/a	8.2	8.0	7.6	6.8	92.4
P50	5.3	5.3	6.6	8.5	10.2	9.7	n/a	n/a	8.2	7.6	7.3	6.3	91.9
P60	3.6	4.7	6.1	8.3	10.0	9.4	n/a	n/a	8.1	7.2	6.9	5.8	91.0
P70	2.9	3.6	5.9	7.9	9.8	9.4	n/a	n/a	8.1	6.6	6.2	5.2	89.3
P80	2.3	2.2	5.2	7.0	9.5	9.4	10.3	10.3	7.9	5.8	5.2	5.1	87.4
P90	1.9	0.9	3.0	6.8	8.9	9.3	10.2	10.1	7.5	5.6	3.9	4.9	86.3

Table 3.25 Operational Windows: 72 Hour Operation; Hs ≤ 4.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.7
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	0.0	0.0	0.0	0.0	0.0	1.0	2.0	1.4	0.0	0.0	0.0	0.0	3.0
Std Deviation	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.5	0.0	0.0	0.0	0.0	1.1
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	n/a	n/a	n/a	n/a	0.9	1.2	1.2	n/a	n/a	n/a	n/a	2.2
P30	n/a	n/a	n/a	n/a	n/a	0.8	0.8	1.1	n/a	n/a	n/a	n/a	1.3
P40	n/a	n/a	n/a	n/a	n/a	0.7	0.6	0.9	n/a	n/a	n/a	n/a	0.9
P50	n/a	n/a	n/a	n/a	n/a	0.6	0.5	0.8	n/a	n/a	n/a	n/a	0.7
P60	n/a	n/a	n/a	n/a	n/a	0.5	0.4	0.6	n/a	n/a	n/a	n/a	0.6
P70	n/a	n/a	n/a	n/a	n/a	0.3	0.3	0.5	n/a	n/a	n/a	n/a	0.5
P80	n/a	n/a	n/a	n/a	n/a	0.2	0.2	0.3	n/a	n/a	n/a	n/a	0.3
P90	n/a	n/a	n/a	n/a	n/a	0.1	0.1	0.2	n/a	n/a	n/a	n/a	0.2

Table 3.26 Operational Windows: 144 Hour Operation; Hs ≤ 1.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.1	0.0	0.0	0.0	0.5	0.8	1.4	0.7	0.3	0.0	0.0	0.0	3.9
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0
Maximum	1.0	0.0	0.0	0.3	1.0	2.0	3.0	3.3	2.0	0.0	0.0	0.0	7.0
Std Deviation	0.3	0.0	0.0	0.1	0.5	0.7	0.7	1.1	0.7	0.0	0.0	0.0	2.0
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	0.9	n/a	n/a	0.2	n/a	1.4	2.0	2.7	1.2	n/a	n/a	n/a	n/a
P30	0.8	n/a	n/a	0.1	0.9	1.2	1.7	2.0	0.9	n/a	n/a	n/a	5.6
P40	0.7	n/a	n/a	0.1	0.8	1.2	1.6	1.3	0.8	n/a	n/a	n/a	4.7
P50	0.6	n/a	n/a	0.1	0.7	1.1	1.5	0.9	0.6	n/a	n/a	n/a	4.3
P60	0.5	n/a	n/a	0.1	0.6	1.0	1.4	0.7	0.5	n/a	n/a	n/a	3.8
P70	0.3	n/a	n/a	0.0	0.5	0.8	1.3	0.5	0.4	n/a	n/a	n/a	3.4
P80	0.2	n/a	n/a	0.0	0.3	0.2	1.2	0.4	0.3	n/a	n/a	n/a	2.9
P90	0.1	n/a	n/a	0.0	0.2	0.1	1.1	0.2	0.1	n/a	n/a	n/a	2.5

Table 3.27 Operational Windows: 144 Hour Operation; Hs ≤ 1.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.3	0.0	0.1	0.4	1.5	1.8	3.0	2.2	1.1	0.2	0.0	0.0	10.7
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4	0.6	0.0	0.0	0.0	6.0
Maximum	1.0	0.1	1.0	1.0	2.8	3.5	4.9	4.1	1.8	1.0	0.0	0.0	15.0
Std Deviation	0.5	0.0	0.3	0.5	1.0	1.2	1.2	1.3	0.4	0.4	0.0	0.0	2.8
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	0.1	0.9	n/a	2.5	3.2	4.0	3.8	1.7	n/a	n/a	n/a	13.4
P30	1.0	0.0	0.8	0.9	2.3	3.1	3.7	3.2	1.6	0.9	n/a	n/a	12.3
P40	0.8	0.0	0.7	0.6	2.2	2.7	3.5	2.6	1.5	0.8	n/a	n/a	11.8
P50	0.7	0.0	0.6	0.3	2.1	1.8	3.3	2.2	1.4	0.6	n/a	n/a	11.5
P60	0.6	0.0	0.5	0.2	1.8	1.1	3.1	2.1	1.3	0.5	n/a	n/a	11.2
P70	0.4	0.0	0.3	0.2	1.4	1.1	2.7	1.9	1.2	0.4	n/a	n/a	10.7
P80	0.3	0.0	0.2	0.1	0.9	1.0	2.0	1.4	1.1	0.3	n/a	n/a	9.4
P90	0.1	0.0	0.1	0.1	0.4	0.9	1.8	0.9	1.0	0.1	n/a	n/a	6.9

Table 3.28 Operational Windows: 144 Hour Operation; Hs ≤ 2.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.5	0.3	0.4	1.3	2.5	3.3	4.0	3.5	1.7	1.0	0.3	0.6	19.3
Minimum	0.0	0.0	0.0	0.9	1.6	2.1	2.0	2.0	1.0	0.0	0.0	0.0	14.0
Maximum	1.8	1.3	1.5	2.0	4.9	4.0	5.2	4.8	2.5	2.0	1.0	1.8	22.2
Std Deviation	0.7	0.5	0.6	0.4	1.1	0.5	1.0	1.0	0.6	0.8	0.4	0.7	3.1
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	1.3	1.1	1.3	1.7	4.1	3.7	5.0	4.8	2.5	n/a	n/a	1.5	22.0
P30	1.0	0.5	1.1	1.6	2.6	3.6	4.8	4.4	2.2	1.8	0.7	1.1	22.0
P40	0.8	0.1	0.9	1.5	2.1	3.5	4.6	4.2	1.9	1.5	0.4	1.0	21.9
P50	0.7	0.0	0.7	1.5	2.1	3.5	4.3	3.8	1.6	1.3	0.2	0.7	20.9
P60	0.5	0.0	0.6	1.3	2.0	3.4	4.1	3.5	1.5	1.1	0.1	0.4	19.6
P70	0.4	0.0	0.5	1.1	2.0	3.2	3.9	3.1	1.3	0.9	0.0	0.3	18.7
P80	0.3	0.0	0.3	1.0	2.0	3.0	3.5	2.5	1.2	0.6	0.0	0.2	17.4
P90	0.1	0.0	0.2	0.9	1.8	2.9	2.8	2.4	1.1	0.3	0.0	0.1	14.9

Table 3.29 Operational Windows: 144 Hour Operation; Hs ≤ 2.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.9	0.4	0.7	2.1	3.4	3.7	4.7	4.1	2.2	1.3	0.7	0.8	24.9
Minimum	0.0	0.0	0.0	1.0	2.0	2.9	3.9	2.0	1.0	0.0	0.0	0.0	21.0
Maximum	3.1	1.2	2.5	4.4	5.2	4.2	5.2	5.2	3.5	2.0	1.9	1.9	27.9
Std Deviation	1.3	0.5	1.0	1.1	1.0	0.4	0.4	1.2	0.8	0.7	0.6	0.6	2.1
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	2.8	1.1	2.1	3.3	4.4	4.1	5.1	5.1	3.1	n/a	1.3	1.3	26.4
P30	1.5	1.0	1.7	2.8	4.0	4.1	5.0	5.0	2.7	1.9	1.1	1.1	26.0
P40	1.0	0.5	1.2	2.3	3.7	4.0	5.0	4.8	2.3	1.8	1.0	1.1	26.0
P50	0.8	0.2	0.9	1.9	3.5	3.9	4.9	4.5	2.1	1.4	0.8	1.0	26.0
P60	0.7	0.1	0.7	1.7	3.5	3.7	4.8	4.5	2.1	1.0	0.5	1.0	25.7
P70	0.5	0.1	0.5	1.6	3.2	3.5	4.6	4.3	1.9	1.0	0.2	0.8	24.5
P80	0.3	0.1	0.4	1.5	2.8	3.4	4.4	3.7	1.6	1.0	0.1	0.4	23.0
P90	0.2	0.0	0.2	1.0	2.4	3.1	4.2	2.4	1.4	0.7	0.0	0.2	22.8

Table 3.30 Operational Windows: 144 Hour Operation; Hs ≤ 3.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	1.6	1.4	2.1	3.5	4.6	4.8	5.1	5.1	3.2	2.8	2.1	2.4	38.8
Minimum	0.0	0.0	0.0	2.8	3.0	4.2	5.1	4.7	2.0	1.9	0.0	1.0	34.0
Maximum	3.9	3.1	4.0	4.6	5.2	5.0	5.2	5.2	4.1	4.0	4.0	4.0	43.1
Std Deviation	1.5	1.2	1.3	0.7	0.8	0.3	0.0	0.2	0.6	0.8	1.4	1.1	2.8
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	3.2	3.0	3.8	4.5	n/a	n/a	n/a	n/a	3.8	3.7	3.7	3.9	42.2
P30	2.9	2.3	3.2	4.2	n/a	n/a	n/a	n/a	3.7	3.5	3.4	3.4	41.3
P40	2.4	2.0	2.7	3.8	n/a	n/a	n/a	n/a	3.6	3.3	3.0	2.9	39.8
P50	2.0	1.9	2.3	3.5	5.1	4.9	n/a	n/a	3.5	2.9	2.4	2.4	38.5
P60	1.6	1.4	2.0	3.3	4.9	4.7	n/a	n/a	3.3	2.6	1.8	2.0	38.0
P70	0.7	0.9	1.8	3.1	4.7	4.7	n/a	5.1	3.2	2.3	1.4	1.9	37.7
P80	0.0	0.6	1.3	3.0	4.4	4.7	5.2	5.1	3.0	2.0	1.1	1.5	37.0
P90	0.0	0.3	0.9	2.9	3.7	4.6	5.1	4.9	2.6	2.0	0.4	1.3	36.6

Table 3.31 Operational Windows: 144 Hour Operation; Hs ≤ 4.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0
Std Deviation	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	n/a	n/a	n/a	n/a	n/a	0.9	n/a	n/a	n/a	n/a	n/a	0.9
P30	n/a	n/a	n/a	n/a	n/a	n/a	0.8	n/a	n/a	n/a	n/a	n/a	0.8
P40	n/a	n/a	n/a	n/a	n/a	n/a	0.7	n/a	n/a	n/a	n/a	n/a	0.7
P50	n/a	n/a	n/a	n/a	n/a	n/a	0.6	n/a	n/a	n/a	n/a	n/a	0.6
P60	n/a	n/a	n/a	n/a	n/a	n/a	0.5	n/a	n/a	n/a	n/a	n/a	0.5
P70	n/a	n/a	n/a	n/a	n/a	n/a	0.3	n/a	n/a	n/a	n/a	n/a	0.3
P80	n/a	n/a	n/a	n/a	n/a	n/a	0.2	n/a	n/a	n/a	n/a	n/a	0.2
P90	n/a	n/a	n/a	n/a	n/a	n/a	0.1	n/a	n/a	n/a	n/a	n/a	0.1

Table 3.32 Operational Windows: 216 Hour Operation; Hs ≤ 1.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.0	0.0	0.0	0.0	0.2	0.2	0.6	0.2	0.0	0.0	0.0	0.0	1.2
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	0.0	0.0	0.0	0.2	0.9	1.0	2.0	1.5	0.0	0.0	0.0	0.0	3.0
Std Deviation	0.0	0.0	0.0	0.1	0.4	0.4	0.7	0.5	0.0	0.0	0.0	0.0	1.1
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	n/a	n/a	0.1	0.8	0.9	1.7	1.4	n/a	n/a	n/a	n/a	2.7
P30	n/a	n/a	n/a	0.1	0.7	0.8	1.4	1.2	n/a	n/a	n/a	n/a	2.4
P40	n/a	n/a	n/a	0.1	0.6	0.7	1.1	1.0	n/a	n/a	n/a	n/a	2.1
P50	n/a	n/a	n/a	0.1	0.5	0.6	0.7	0.9	n/a	n/a	n/a	n/a	1.8
P60	n/a	n/a	n/a	0.0	0.4	0.5	0.3	0.7	n/a	n/a	n/a	n/a	1.3
P70	n/a	n/a	n/a	0.0	0.3	0.3	0.1	0.5	n/a	n/a	n/a	n/a	0.9
P80	n/a	n/a	n/a	0.0	0.2	0.2	0.1	0.3	n/a	n/a	n/a	n/a	0.6
P90	n/a	n/a	n/a	0.0	0.1	0.1	0.0	0.2	n/a	n/a	n/a	n/a	0.3

Table 3.33 Operational Windows: 216 Hour Operation; Hs ≤ 1.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.0	0.0	0.0	0.0	0.4	1.1	1.7	1.0	0.3	0.0	0.0	0.0	4.7
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
Maximum	0.0	0.0	0.0	0.3	1.3	2.4	3.3	2.7	1.8	0.0	0.0	0.0	7.0
Std Deviation	0.0	0.0	0.0	0.1	0.5	0.8	0.9	1.1	0.6	0.0	0.0	0.0	1.6
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	n/a	n/a	n/a	0.2	1.1	2.1	2.3	2.3	1.2	n/a	n/a	n/a	6.6
P30	n/a	n/a	n/a	0.1	0.9	2.0	2.1	1.9	0.4	n/a	n/a	n/a	6.2
P40	n/a	n/a	n/a	0.1	0.8	1.7	2.1	1.4	0.2	n/a	n/a	n/a	5.7
P50	n/a	n/a	n/a	0.1	0.7	1.5	2.0	1.1	0.1	n/a	n/a	n/a	5.3
P60	n/a	n/a	n/a	0.1	0.5	1.2	2.0	0.9	0.1	n/a	n/a	n/a	4.8
P70	n/a	n/a	n/a	0.1	0.4	1.0	1.7	0.7	0.1	n/a	n/a	n/a	4.4
P80	n/a	n/a	n/a	0.0	0.3	0.9	1.2	0.5	0.1	n/a	n/a	n/a	3.8
P90	n/a	n/a	n/a	0.0	0.1	0.4	1.0	0.2	0.0	n/a	n/a	n/a	2.9

Table 3.34 Operational Windows: 216 Hour Operation; Hs ≤ 2.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.2	0.0	0.0	0.6	1.3	1.9	2.6	1.8	0.8	0.2	0.1	0.2	9.7
Minimum	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	6.0
Maximum	1.0	0.0	0.0	1.4	2.7	2.4	3.4	2.8	1.7	1.0	1.0	1.0	12.4
Std Deviation	0.3	0.0	0.0	0.5	0.8	0.4	0.8	1.0	0.5	0.4	0.3	0.3	2.0
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	0.6	n/a	n/a	1.1	2.1	2.3	3.3	2.7	1.2	0.8	0.4	0.6	12.1
P30	0.4	n/a	n/a	1.0	1.7	2.1	3.2	2.7	1.0	0.7	0.1	0.5	11.3
P40	0.3	n/a	n/a	1.0	1.3	2.0	3.1	2.5	1.0	0.6	0.0	0.4	10.7
P50	0.3	n/a	n/a	0.8	1.0	2.0	2.9	2.3	1.0	0.5	0.0	0.4	10.3
P60	0.2	n/a	n/a	0.5	1.0	1.9	2.7	1.8	0.9	0.4	0.0	0.3	9.8
P70	0.2	n/a	n/a	0.3	1.0	1.9	2.5	1.4	0.7	0.3	0.0	0.2	9.4
P80	0.1	n/a	n/a	0.2	1.0	1.8	2.3	1.2	0.4	0.2	0.0	0.1	8.8
P90	0.1	n/a	n/a	0.1	0.9	1.6	1.8	0.9	0.2	0.1	0.0	0.1	7.8

Table 3.35 Operational Windows: 216 Hour Operation; Hs ≤ 2.5m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	0.3	0.2	0.2	1.1	1.9	2.3	2.9	2.5	1.5	0.6	0.3	0.4	14.1
Minimum	0.0	0.0	0.0	0.0	1.0	1.8	1.9	0.2	0.8	0.0	0.0	0.0	10.0
Maximum	1.4	1.0	1.0	2.0	3.4	3.0	3.4	3.4	2.0	1.9	1.0	1.6	17.0
Std Deviation	0.5	0.3	0.3	0.6	0.7	0.4	0.5	1.0	0.4	0.7	0.4	0.6	2.1
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	1.1	0.5	0.5	1.7	2.9	2.8	n/a	n/a	1.7	1.7	n/a	1.1	16.7
P30	0.7	0.4	0.4	1.5	2.3	2.6	3.4	3.4	1.7	1.4	0.5	1.0	15.5
P40	0.6	0.3	0.3	1.4	2.0	2.5	3.2	3.0	1.7	1.1	0.2	0.8	15.0
P50	0.5	0.3	0.3	1.3	2.0	2.3	3.0	2.7	1.7	0.9	0.1	0.7	14.7
P60	0.4	0.2	0.2	1.1	1.8	2.1	2.9	2.6	1.6	0.7	0.1	0.6	14.2
P70	0.3	0.2	0.2	1.0	1.6	2.0	2.9	2.5	1.4	0.5	0.0	0.4	13.8
P80	0.2	0.1	0.1	0.9	1.5	2.0	2.8	2.2	1.2	0.3	0.0	0.3	13.4
P90	0.1	0.1	0.1	0.6	1.3	1.9	2.4	1.8	1.0	0.2	0.0	0.1	12.7

Table 3.36 Operational Windows: 216 Hour Operation; Hs ≤ 3.0m

WINDOWS PER YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average	1.1	0.8	1.2	2.1	3.0	3.0	3.4	3.3	1.9	1.6	0.8	1.0	23.2
Minimum	0.0	0.0	0.0	0.7	2.1	2.4	3.4	2.5	1.2	0.0	0.0	0.0	20.0
Maximum	2.9	2.0	2.5	3.3	3.4	3.3	3.4	3.4	2.4	3.0	2.0	2.2	26.6
Std Deviation	1.1	0.9	0.8	0.8	0.5	0.4	0.0	0.3	0.4	0.9	0.6	0.9	2.3
P10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P20	2.7	n/a	2.1	3.0	n/a	n/a	n/a	n/a	2.2	2.5	1.4	2.1	26.2
P30	2.4	1.6	1.8	2.5	n/a	n/a	n/a	n/a	2.2	2.3	1.2	2.1	25.4
P40	2.1	1.2	1.5	2.3	n/a	n/a	n/a	n/a	2.1	2.1	1.0	1.8	24.4
P50	1.3	1.0	1.2	2.3	3.3	3.3	n/a	n/a	2.0	1.8	0.9	1.3	23.7
P60	0.5	0.6	1.1	2.2	3.0	3.2	n/a	n/a	1.9	1.4	0.7	0.9	23.2
P70	0.3	0.0	1.0	2.1	2.8	2.9	n/a	n/a	1.7	1.1	0.4	0.6	22.7
P80	0.2	0.0	0.9	1.9	2.6	2.5	3.4	3.4	1.7	1.1	0.3	0.4	21.7
P90	0.1	0.0	0.4	1.3	2.3	2.5	3.4	3.3	1.6	0.9	0.1	0.2	20.9

Table 3.37 Operational Windows: 216 Hour Operation; Hs ≤ 4.0m

3.4 Monthly Maximum Significant Wave Height

(m)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1964	-	-	-	-	-	-	-	-	-	3.85	4.52	6.54
1965	5.28	8.67	4.17	-	-	-	-	-	-	5.98	4.64	4.29
1966	4.85	3.21	5.37	-	-	-	-	-	-	3.76	4.46	6.52
1967	3.98	6.41	5.97	-	-	-	-	-	-	5.14	4.31	6.71
1968	5.59	5.60	6.93	7.69	-	-	-	-	-	4.62	4.99	5.44
1969	5.20	6.17	8.58	4.66	-	-	-	6.87	6.71	4.18	9.32	8.33
1970	6.36	4.73	5.92	-	-	-	2.75	-	-	10.27	4.96	4.73
1971	5.28	3.91	4.59	-	-	-	-	-	-	4.05	6.65	5.34
1972	9.06	5.91	7.75	-	-	-	-	-	-	5.92	5.97	6.12
1973	4.59	5.10	4.15	4.21	-	-	-	-	-	4.10	9.75	6.93
1974	9.97	4.78	4.65	-	-	-	-	-	3.51	5.82	4.38	7.10
1975	6.60	5.98	4.42	-	5.38	-	-	-	-	4.59	5.92	6.91
1976	9.16	5.81	6.69	-	-	-	-	-	5.40	6.00	5.01	5.66
1977	6.29	5.39	8.07	8.28	3.52	2.86	3.56	4.03	5.75	6.84	7.20	8.85
1978	6.87	8.48	4.74	3.66	2.44	4.35	4.10	2.71	5.87	4.75	6.16	8.83
1979	5.19	4.63	4.76	5.72	5.23	3.49	2.64	3.42	4.57	7.11	8.14	10.46
1980	8.32	6.10	5.76	7.77	-	-	2.96	5.07	3.75	8.07	6.28	6.87
1981	8.92	9.59	9.14	5.77	7.11	-	-	-	6.04	5.75	9.49	7.13
1982	5.53	6.46	5.40	6.10	3.54	-	-	-	1.36	6.23	6.28	7.26
1983	6.96	7.80	4.51	-	-	-	-	1.64	5.12	6.80	5.66	5.33
1984	8.29	8.15	9.46	-	-	-	-	-	3.14	6.58	9.07	7.45
1985	7.88	5.45	5.72	6.42	-	-	-	-	-	6.02	9.67	5.44
1986	7.28	4.78	6.77	-	-	3.44	-	3.36	3.19	6.49	5.27	7.30
1987	4.87	4.64	8.98	-	3.45	3.44	3.39	-	-	6.02	6.25	5.22
1988	8.53	9.97	9.66	4.78	1.52	-	6.36	-	4.15	6.29	8.02	6.58
1989	6.77	7.95	4.84	5.95	3.76	4.03	3.60	4.10	5.95	4.61	5.76	6.10
1990	7.89	7.92	6.55	5.67	2.68	3.78	3.25	3.28	9.42	7.64	5.41	10.39
1991	6.38	5.98	5.13	7.36	5.59	3.17	3.13	3.65	5.68	11.49	6.82	9.43
1992	9.84	6.17	5.53	7.71	3.72	3.35	2.86	5.14	6.28	6.55	6.66	6.47
1993	9.31	7.51	8.59	5.58	4.78	4.18	3.94	3.43	4.73	6.46	8.28	6.43
1994	7.99	7.92	6.57	4.90	4.06	3.30	2.31	3.20	7.92	6.05	5.40	6.48
1995	9.07	6.05	7.34	4.21	3.24	4.55	3.13	2.95	5.44	6.46	4.59	4.70
1996	8.38	10.16	8.43	3.27	5.05	4.24	3.02	3.26	4.92	5.63	4.43	4.54
1997	5.12	8.80	6.84	5.25	4.48	3.88	4.43	2.53	5.22	4.98	9.23	6.43
1998	8.14	5.90	5.27	9.29	3.97	4.22	3.75	3.47	4.47	-	-	-
MAX	9.97	10.16	9.66	9.29	7.11	4.55	6.36	6.87	9.42	11.49	9.75	10.46
MIN	3.98	3.21	4.15	3.27	1.52	2.86	2.31	1.64	1.36	3.76	4.31	4.29
MEAN	7.05	6.53	6.39	5.92	4.08	3.75	3.48	3.65	5.16	6.03	6.44	6.71
SD	1.78	1.87	1.74	1.74	1.50	0.54	1.11	1.39	1.94	1.85	1.81	1.65

Table 3.38 Maximum Significant Wave Height, Calendar Months 1964 – 1998

4. CRITERIA OVERVIEW

4.1 NEXTRA Hindcast

The North European Storm Study (NESS) hindcast winds and waves from October 1964 to March 1989. The hindcast has since been revised and re-analysed (NEXTRA) and now extends to September 1998. Data for nine complete years, 1989 to 1997, from the NEXTRA hindcast has been used to estimate the operational statistics presented in this report. A more complete technical description of the hindcast model is provided in the Technical Reference.

4.2 Selection of NEXTRA Grid Point

The MCP01 platform is located at 58° 49' 39" N, 000° 17' 12" W. The map below illustrates the locations of the NEXTRA grid points in the vicinity of MCP01.

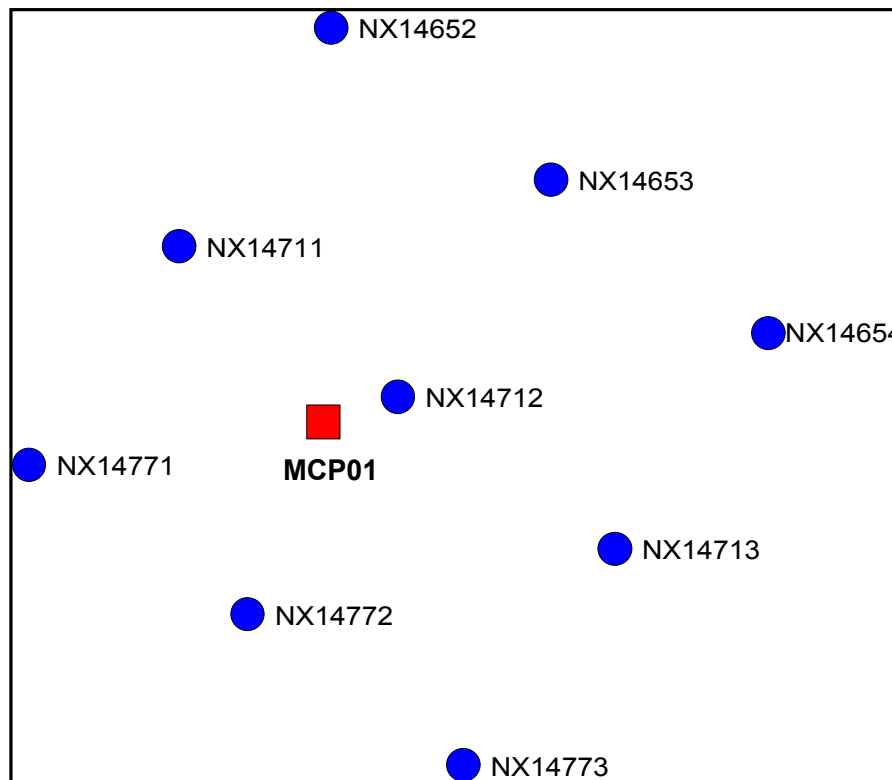


Figure 4.1 Map Illustrating MCP01 Location and NEXTRA Grid Points

Data for grid point 14712 were selected for this analysis, since this point is the closest to MCP01.

4.3 NEXTRA Parameters

The parameter required for this study is significant wave height. The parameter extracted from the hindcast is:

Hs significant wave height (metres)

4.4 Analyses by Weather Windows Software

The nine-year continuous hindcast of significant wave height was mounted in a Weather Windows database.

4.4.1 Operability Tables

Weather Windows profiles designed to derive the uptime or operability under prescribed wave conditions were set up. The following table lists the profiles set up in this way:

PROFILE	SIGNIFICANT WAVE HEIGHT (m)
1	1.0
2	1.5
3	2.0
4	2.5
5	3.0
6	4.0
7	5.0
8	6.0
9	7.0
10	9.0

Table 4.1 Profiles for Operability

These profiles were passed through the 9 years of hindcast data, and uptime and downtime data were assembled by the software. For each profile, a summary table was produced; these tables are presented in the Criteria Reference, Table 3.1 to Table 3.10.

The tables present, for each calendar month, the mean, minimum, maximum and standard deviation uptime, taken over the 9 years of data analysed. Also presented are the uptime figures for the 10% probability level through to the 90% probability level, at probability intervals of 10%. All uptimes are expressed as percentages.

Uptime is defined as the percentage of the month during which weather conditions allowed work to be carried out. For example, on average in January, it is possible to work for 3.3% of the time when work can only proceed if $H_s \leq 1.0\text{m}$ (Table 3.1).

4.4.2 Downtime Tables

For profiles 8 to 10, tables of downtime probability have also been produced.

PROFILE	SIGNIFICANT WAVE HEIGHT (m)
8	6.0
9	7.0
10	9.0

Table 4.2 Profiles for Downtime Probability

These tables, presented in Table 3.11 to Table 3.13, have been derived from the same raw statistics used in deriving the operability tables.

The tables present, for each calendar month, the mean, minimum, maximum and standard deviation downtime, taken over the 9 years of data analysed. Also presented are the downtime figures for the 10% probability level through to the 90% probability level, at probability intervals of 10%. All downtimes are expressed as percentages.

Downtime is defined as the percentage of the month for which weather conditions prohibited work. For example, on average in January, it is not possible to work for 6.7% of the time when work can only proceed if $H_s \leq 6.0\text{m}$ (Table 3.11).

4.4.3 Operational Windows

Wave conditions for operations of varying length, from 48 hours to 216 hours, were composed into a set of profiles for Weather Windows.

PROFILE	DURATION OF OPERATION (hours)	SIGNIFICANT WAVE HEIGHT (m)
11	48	1.0
12	48	1.5
13	48	2.0
14	48	2.5
15	48	3.0
16	48	4.0
17	72	1.0
18	72	1.5
19	72	2.0
20	72	2.5
21	72	3.0
22	72	4.0
23	144	1.0
24	144	1.5
25	144	2.0
26	144	2.5
27	144	3.0
28	144	4.0
29	216	1.0
30	216	1.5
31	216	2.0
32	216	2.5
33	216	3.0
34	216	4.0

Table 4.3 Profiles for Counts of Operational Windows

These profiles were passed through the hindcast time series, and the number of operations performed in each month counted. Tables presenting statistics of completed operations appear in the Criteria Reference, from Table 3.14 to Table 3.37.

The tables present, for each calendar month, statistics regarding the number of windows. That is the mean, minimum, maximum and standard deviation, taken over the 9 years of data analysed, together with figures for the 10% probability level through to the 90% probability level, at probability intervals of 10%.

The operational windows count is the number of operations that can be undertaken in the month in question, in the average year. For example, referring to Table 3.18, on average in July, it is possible to complete 15 operations when the operational constraint is $H_s \leq 3.0\text{m}$. There is a 40% chance that at least 10 operations may be completed in April.

4.5 Monthly Maximum Significant Wave Height

Statistics of the maximum significant wave height for each month of the hindcast 1964 to 1998 are presented in Table 3.38. Note that there are no data for the summer months in years 1964 to 1988 (excepting the three years 1977-1979), except where the hindcast has incorporated a summer storm. Years 1989 to 1998, which have been used in the Weather Windows profiles reported here, are continuous.

5. TECHNICAL REFERENCE

The North European Storm Study (NESS) was initiated in order to produce a high quality hindcast database of winds, waves, currents and water levels for the North European continental shelf¹. The wave model made use of a coarse (150km) grid for the North Atlantic and a fine (30km) grid for the North European shelf. The hydrodynamic model was operated using the coarse grid, nested within which was a hyperfine grid with a resolution of 10km. Wind fields were specified by the UK Meteorological Office (UKMO) and by the Norwegian Meteorological Institute (NMI). GKSS Forschungszentrum performed the wave modelling using a version of the spectral wave model, HYPAS. The hydrodynamic model, System 21, which was used to determine the tide and surge parameters, was developed by the Danish Hydraulic Institute (DHI). In addition, the wave model was run using a hyperfine (10km) grid for the Southern North Sea where the sea bed topography is highly variable. Wave parameters were archived for significant storms that occurred during the period October 1964 to March 1989.

Advances in wave modelling improved the predictive capabilities considerably. Shortcomings in the first and second-generation wave models, developed during the 1960s and 1970s were identified soon after, and in some cases during, development. These shortcomings are discussed in detail in the SWAMP wave-model intercomparison study². The SWAMP study concluded that none of the previously existing wave models were applicable for all wind fields and that none were reliable during extreme weather for which forecasts are most often needed. Despite the basic forcing mechanisms (the source functions) of wave generation being understood since the 1950s, first and second-generation models were always based on ad hoc assumptions to force the wave spectrum to some pre-conceived shape. The third-generation models compute the wave spectrum from first principles alone by solving the components of the source function³. The source function for deep water may be thought of as a superposition of the wind input, non-linear transfer due to wave-wave resonance and a dissipation term caused by white capping and turbulence. Shallow water adjustments are also made to take into account loss of energy due to bottom friction and percolation. The response of the model for arbitrary wind fields is then determined solely by the structure of these source functions.

¹ Peters D.J., Shaw C.J., Grant C.K., Heideman J.C. and Szabo D. *Modelling the North Sea through the North European Storm Study (NESS)*. Offshore Technology Conference, Report Number OTC 7130, 479-493, 1993.

² SWAMP Group. *Sea Wave Modelling Project (SWAMP): An intercomparison study of wind wave prediction models. Part 1: Principal results and conclusions*. Ocean Wave Modelling, Plenum Press, 256 pp, 1985.

³ WAMDI Group. *The WAM Model - a third-generation ocean wave prediction model*. Journal of Physical Oceanography, 18, 1775-1810, 1988.

The NESS extension (NEXT) was commissioned in order to make use of these advances in wave model technology and to incorporate the effects of severe storm events that have occurred since March 1989. As a result a hindcast database was generated using the NESS grids, a third generation wave model of the WAM type and wind fields for the period 1964 to 1995. Wind fields for the period 1964 to 1989 were produced by the UKMO using a combination of UKMO and NMI pressure fields. For the six years post-1989, the wind fields were generated by Oceanweather Inc. (OWI) using pressure fields supplied by the National Oceanic and Atmospheric Administration (NOAA). The wave model makes use of the coarse and fine grids and the hydrodynamic model uses the fine and hyperfine grids. The wave modelling was performed by OWI; the hydrodynamic modelling by the DHI. The study produced wind, wave, current and water level parameters every hour for the following time periods:

- a) for the winters (October-March) from 10/1964 - 3/1995,
- b) for the summers (April-September) for 1977 - 1979 and 1989 - 1994, and
- c) for significant storms that occurred during the months April - September.

Wind and wave parameters are available from the fine grid (30km) wave model archive; current and level parameters from the hyperfine grid (10km) hydrodynamic model archive.

The hindcast has again (2001) been extended, now to September 1998, and a re-analysis has been carried out on the hindcast, using improved wind fields and algorithms. The NEXTRA (NEXT Re-Analysis) hindcast data has been employed in this study.

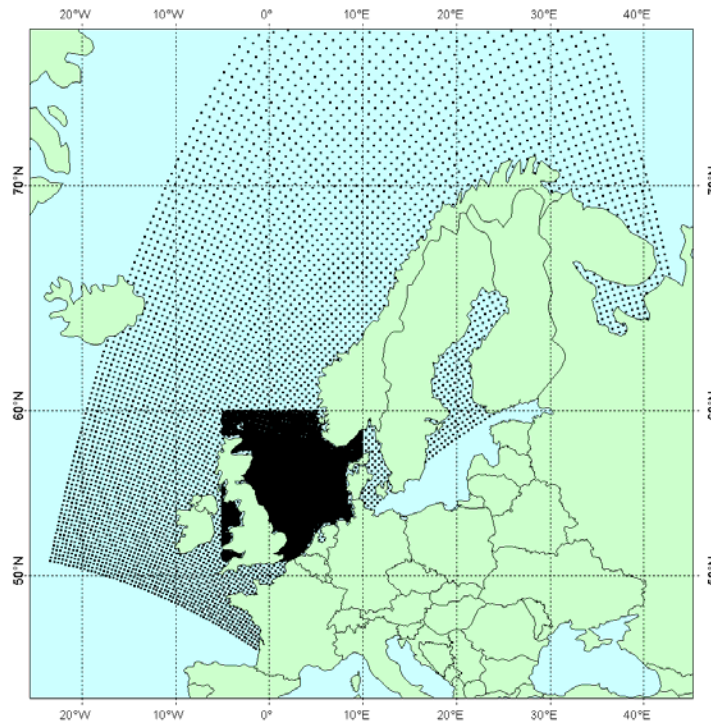


Figure 5.1 NEXTRA Model Domain

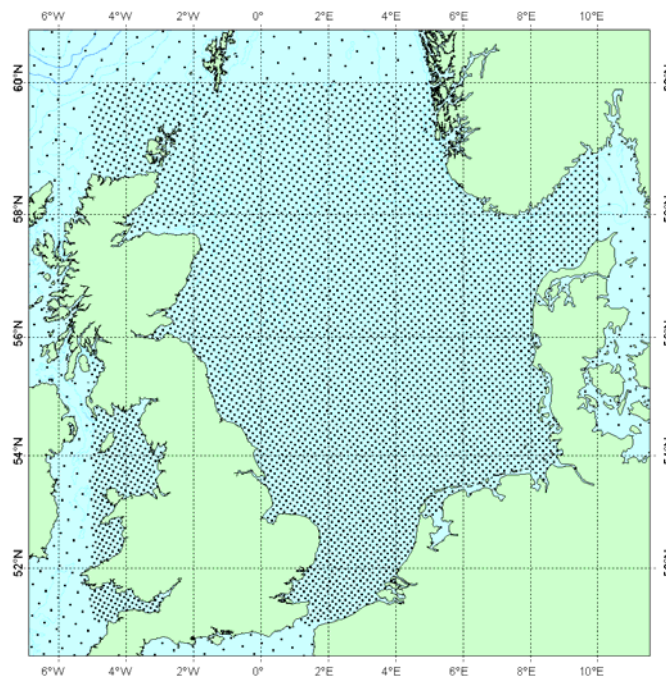


Figure 5.2 NEXTRA Model Domain – North Sea Grid