



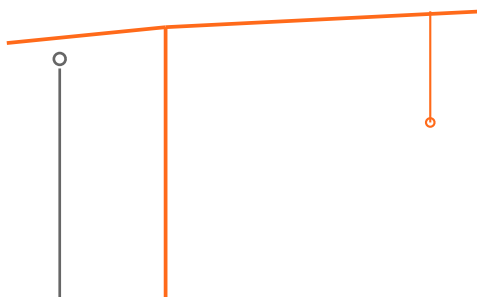
JMR LIFTING SOLUTIONS

Certified Heavy Lift Engineering

LIFT PLAN

Wind Turbine Nacelle Installation – 130 m Hub

Plan number: LP-2026-002



CLIENT	[CLIENT CONFIDENTIAL]
LOCATION	[LOCATION CONFIDENTIAL]
REVISION	Rev 0 — SAMPLE
DATE	02 August 2026
PREPARED BY	Muthuraj Jeyabal, LEEA Certified Appointed Person
AP CERTIFICATE NO.	8234-13608-8667-27-1
REVIEWED BY	JMR Lifting Engineering
STANDARDS	BS 7121 · LOLER 1998 · ASME B30

01 Executive Summary & Scope

Single-crane lift of a wind turbine nacelle assembly to a 130 m hub height on a completed tower, using a main boom plus luffing jib configuration to achieve the required tip height and radius.

Key Parameters

Parameter	Value
Load weight (t)	82 t
Dimensions (L × W × H)	12 m x 4.5 m x 4.5 m
Lift radius (m)	22 m
Lift height (m)	130 m
Duration (est.)	6 hrs (weather permitting)
Location	Wind farm (greenfield)

Critical Risks

- Load overload beyond crane rated capacity at working radius
- Loss of control during dynamic/weather-sensitive lift phases
- Rigging failure due to incorrect sling angle or WLL selection
- Ground/foundation bearing failure under crane or outrigger loads

02 Load Data, Centre of Gravity & Dimensions

Nacelle assembly including gearbox, generator, and yaw system, lifted as a single unit onto the tower flange.

Weight Breakdown

Component	Weight
Nacelle housing & drivetrain	74.5 t
Yaw system & bedplate	5.8 t
Lifting beam/attachments	1.0 t
Uncertainty allowance (0.9%)	0.7 t
Total	82.0 t

Centre of Gravity

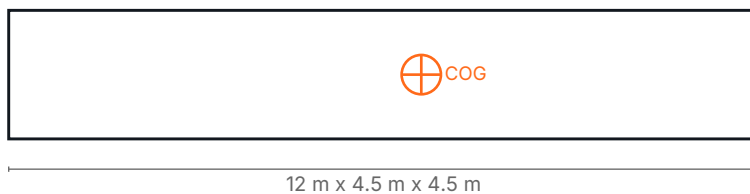
Parameter	Value
X-axis	6.0 m from tower centreline (X)
Y-axis	0.0 m (Y)
Z-axis	2.1 m above bedplate (Z)

Lift Points

4 no. certified lifting points on bedplate, dedicated nacelle lifting beam

Dimensional Sketch

Simplified load outline with centre-of-gravity marker (not to scale):



03 Crane Selection & Configuration

Selected Crane: Liebherr LR 11000

Parameter	Value
Rated capacity	1000 t
Boom length	138 m
Configuration	SL13DFB - main boom 138 m + luffing jib 60 m
Working radius	22 m
Capacity at working radius	128 t

Utilization Calculation

$(82 \times 1.15) / 128 = 74\%$. Hub height 130 m, tip height 176 m.

Utilization result: **74%** (within 85% safe working threshold)

Ground Bearing Pressure

Ground bearing = $(\text{crane wt } 420 \text{ t} + \text{load} \times \text{DAF } 94.3 \text{ t}) \times 9.81 / 90 \text{ sqm} = 56.0 \text{ kPa}$

Standing / Pick Radius

Working radius maintained at 22 m throughout the critical lift phase.

04 Load Chart & Utilization Calculation

Manufacturer load chart extract for the selected boom/jib configuration:

Radius	Capacity
15 m	195 t
18 m	162 t
22 m → WORKING POINT	128 t
26 m	102 t
30 m	84 t

Dynamic Amplification Factor (DAF)

DAF applied: **1.15**

Total Lifted Load Including DAF

$(82 \times 1.15) / 128 = 74\%$. Hub height 130 m, tip height 176 m.

Ground Pressure Calculation

Ground bearing = $(\text{crane wt } 420 \text{ t} + \text{load} \times \text{DAF } 94.3 \text{ t}) \times 9.81 / 90 \text{ sqm} = 56.0 \text{ kPa}$

Parameter	Value
Calculated ground pressure	56.0 kPa
Allowable bearing pressure	120 kPa
Crane pad / matting	Compacted crane hardstand, 30 m x 30 m graded pad

05 Rigging Configuration

Parameter	Value
Sling type	Dedicated nacelle lifting beam with wire rope drops
Sling angle (min.)	70°
Number of slings	4
WLL per sling	32 t
Shackle grade	Green Pin G-2130 35 t bow shackle
Spreader / master link	Purpose-built nacelle lifting beam, rated 100 t

Rigging Schematic (Summary)

Component	Specification
Hook / block	Rated to crane main hoist capacity, latch-equipped
Master link / spreader	Purpose-built nacelle lifting beam, rated 100 t
Sling legs	4 × Dedicated nacelle lifting beam with wire rope drops
Shackles	Green Pin G-2130 35 t bow shackle
Sling angle from horizontal	70° (minimum safe angle 60° unless noted)

Sling Length Calculation

With a sling angle of 70° from horizontal, sling length is derived from headroom and spread geometry per rigging arrangement drawing; angle maintained $\geq$ the minimum safe angle for the configuration.

06 Rigging Load Calculations

Individual Sling Load

Formula: Sling load = (Load × DAF) ÷ (n × sin θ)

$(82 \times 1.15) / (4 \times \sin 70\text{deg}) = 25.1 \text{ t per sling} \rightarrow \text{select } 32 \text{ t WLL sling set}$

Parameter	Value
Calculated sling load	25.1 t
Selected sling WLL	32 t
Sling utilization	78.4%
Sling safety factor (design)	5:1 minimum
Shackle safety factor (design)	4:1 minimum

Safety Factor Basis

All wire rope slings are selected to a minimum design factor of 5:1 against minimum breaking load, in accordance with LEEA COPSULE guidance. All shackles are selected to a minimum design factor of 4:1. Working load limits (WLL) are marked and certificated per item.

07 Ground Bearing & Site Layout

Ground Bearing Pressure

Ground bearing = (crane wt 420 t + load x DAF 94.3 t) x 9.81 / 90 sqm = 56.0 kPa

Parameter	Value
Ground bearing pressure (required)	56.0 kPa
Allowable bearing pressure (site)	120 kPa
Margin	53.3% below allowable

Crane Pad / Matting

Compacted crane hardstand, 30 m x 30 m graded pad

Site Plan (Schematic)

Simplified site layout showing crane standing position, load path, and exclusion zone (not to scale):



08 Risk Assessment (BS 7121 Format)

Risk scoring uses Likelihood (L) × Severity (S), each rated 1–5. Residual score after controls is shown in the right-hand columns.

Hazard	L	S	Score	Controls	L	S	Score
Overload beyond crane capacity	3	5	15	Load chart verified; utilization capped below 85%; independent AP check	1	5	5
Crane mechanical/structural failure	2	5	10	Pre-use inspection; current LOLER thorough examination certificate	1	5	5
Load drop during lift	2	5	10	Certified rigging, redundant sling legs, trial lift at 25% load	1	5	5
Adverse weather conditions	3	3	9	Weather forecast monitoring; defined go/no-go thresholds	1	3	3
Personnel struck by load/rigging	3	4	12	Exclusion zone enforced; banksman control; no personnel under suspended load	1	4	4
Ground/foundation failure	2	5	10	Ground bearing calculation verified; crane mats/pads sized to load	1	4	4
Sling/shackle failure	2	5	10	Certified rigging to 5:1 (sling) / 4:1 (shackle) design factor; pre-use inspection	1	5	5
Overhead obstruction contact	2	4	8	Route survey completed; spotter assigned; boom angle indicator monitored	1	3	3
Wind speed exceedance	3	4	12	Continuous anemometer monitoring; lift limit 8 m/s at hub height	1	4	4

Risk score key: **1–6 Low** · **7–12 Medium** · **13–25 High** — all residual scores must be Low or Medium with documented additional controls before lift authorization.

09 Method Statement

1. Confirm current LOLER thorough examination certificates for crane(s), rigging, and lifting accessories.
2. Conduct toolbox talk with all lift personnel; confirm roles per Section 11.
3. Establish exclusion zone and barrier the lift area; brief banksman and signaller.
4. Position crane(s) on verified ground bearing / matting per Section 07; set outriggers (if mobile) to full extension.
5. Rig load per configuration in Section 05; attach taglines; conduct visual rigging inspection.
6. Perform trial lift: raise load approximately 300 mm, hold at 25% of test criteria for a minimum dwell to verify rigging geometry, crane response, and brake holding.
7. Confirm sling angles, load indicator readings, and COG behavior match plan before proceeding.
8. Execute main lift at working radius 22 m
9. Travel/luff/slew load along planned path, maintaining radius and load chart compliance throughout.
10. Position load over set point; lower under controlled taglines to final bearing/foundation.
11. Confirm secure landing, release rigging tension gradually, and inspect for damage.
12. De-rig, remove accessories, and return crane to travel/stow configuration.
13. Conduct post-lift debrief and close out permit-to-work documentation.

10 Roles & Responsibilities

Role	Assignment
Appointed Person	Muthuraj Jeyabal, LEEA Certified Appointed Person (Cert. No. 8234-13608-8667-27-1) — overall lift planning responsibility
Lift Supervisor	[TBD — assigned at mobilization, LEEA/CPCS certified]
Crane Operator(s)	[Certified operator(s), current CPCS/NPORS or equivalent license]
Slinger / Signaller	[Certified slinger/signaller per LEEA/CPCS standard]
Banksman	[Certified banksman — controls exclusion zone and ground personnel]
Reviewed by	JMR Lifting Engineering

Contact

JMR Lifting Solutions — contact@jmrlifting.com

SAMPLE

11 Approvals & References

Signature Block

Role	Name	Signature / Date
Appointed Person	Muthuraj Jeyabal, LEEA Certified Appointed Person	
Client Representative	[CLIENT CONFIDENTIAL]	
HSE Representative	[TBD]	
Client Project Manager	[CLIENT CONFIDENTIAL]	

References

- BS 7121-1:2016 — Code of practice for the safe use of cranes
- LOLER 1998 — Lifting Operations and Lifting Equipment Regulations (UK)
- ASME B30.5 — Mobile and Locomotive Cranes
- LEEA COPSULE — Code of Practice for the Safe Use of Lifting Equipment
- Crane manufacturer load chart (referenced Section 04/05)

This document is a SAMPLE lift plan produced for demonstration purposes only. It does not constitute an approved lift plan for any live lifting operation. Actual JMR Lifting Solutions project deliverables include site-specific surveys, certified equipment schedules, and a signed authorization prior to any lift.