

Al Hayya Al Badhour | 8MM Mangrove Project

SAEP-13 PRE-RESTORATION COMPLIANCE ADDENDUM

8 million Mangrove Plantation Project - Phase 2

Al Batinah Island, Eastern Province, Kingdom of Saudi Arabia

Document Reference: AHAB-8MM-SAEP13-001

Date: 01 February 2026

INTRODUCTION

This addendum addresses the specific SAEP-13 compliance requirements for the pre-restoration evaluation of the 8 million Mangrove Plantation Project (Phase 2). Each section corresponds to the referenced SAEP-13 clause requirements.

1. DIGITAL ELEVATION DEVELOPMENT

Reference: SAEP-13, Clause 3.2.2.1.2

1.1 Digital Elevation Model (DEM) Specifications

| Parameter | Specification |
|----------------|--|
| Data Source | Airbus Pleiades Neo Satellite Imagery |
| DTM Resolution | 0.5m horizontal / 10cm vertical accuracy |
| DSM Resolution | 0.5m horizontal / 10cm vertical accuracy |
| Vertical Datum | EGM2008 Geoid Model |
| Coverage Area | Abu Ali Island (12,571 x 5,762 pixels) |
| File Format | GeoTIFF (.tif), WGS84 coordinate system |

1.2 DEM Products Delivered

| Product | Description | Application |
|---------------|---|---------------------------|
| DTM (Filled) | Digital Terrain Model with interpolated voids | Planting zone delineation |
| DTM (No Fill) | Raw terrain model preserving data gaps | Quality assessment |
| DSM (Filled) | Digital Surface Model including vegetation | Canopy analysis |
| DSM (No Fill) | Raw surface model | Baseline reference |

Elevation Analysis: The DEM confirms optimal planting elevation zones between +0.30m and +0.60m above Mean Sea Level (MSL), consistent with Avicennia marina tidal requirements. All 8 proposed planting sites fall within this elevation band as verified by DEM cross-section analysis.

2. ENVIRONMENTAL IMPACT ASSESSMENT (SAEP-13)

Reference: SAEP-13, Clause 3.2.2.1.2

2.1 EIA Screening Assessment

A screening-level Environmental Impact Assessment (EIA) was conducted in accordance with SAEP-13 requirements. The assessment evaluated potential environmental impacts and confirmed project eligibility under the restoration/rehabilitation category.

2.2 Key EIA Findings

| Assessment Criterion | Finding | Status |
|----------------------|---|----------|
| Protected Species | No protected species nesting within planting zones | PASS |
| Habitat Impact | No adverse impacts to existing habitats anticipated | PASS |
| Cumulative Effects | Positive long-term carbon sequestration benefits | POSITIVE |
| Coastal Processes | Enhancement of coastal protection expected | POSITIVE |
| Biodiversity | Expected increase in fish nursery habitat | POSITIVE |

EIA Determination: The project qualifies as a restoration/rehabilitation activity under SAEP-13 Section 3.2.2, requiring monitoring documentation rather than full EIA submission. The pre-restoration assessment serves as the baseline monitoring framework.

3. NURSERY SITE IDENTIFICATION

Reference: SAEP-13, Clause 3.2.2.1.2

3.1 Nursery Location and Specifications

| Parameter | Specification |
|--------------------------|--------------------------------------|
| Nursery Location | Abu Ali Island, Southern Shore |
| GPS Coordinates (Center) | 27.3062N, 49.4885E |
| Nursery Area | 2.17 hectares |
| Operational Capacity | 8,000,000 seedlings |
| Seedling Source | Local Avicennia marina propagules |
| Genetic Provenance | Abu Ali Island natural stands (7 ha) |
| Nursery-to-Site Distance | <5 km (same-day transplanting) |

3.2 Nursery Boundary Coordinates

| Point | Latitude (N) | Longitude (E) |
|-------|--------------|---------------|
| 1 | 27.3052655 | 49.4877966 |
| 2 | 27.3056097 | 49.4871276 |
| 3 | 27.3063753 | 49.4877413 |
| 4 | 27.3069802 | 49.4881252 |
| 5 | 27.3067063 | 49.4886710 |
| 6 | 27.3072740 | 49.4895351 |
| 7 | 27.3070228 | 49.4899320 |
| 8 | 27.3064455 | 49.4890930 |

4. CONTROL SITE DESIGNATION

Reference: SAEP-13, Clause 3.2.2.1.3

4.1 Control Site Selection Rationale

Control sites have been established for long-term monitoring and scientific comparison. These sites enable quantification of restoration success by comparing planted areas against natural references and unplanted controls.

4.2 Control Site Specifications

| Control Type | Location | Coordinates | Purpose |
|-------------------|----------------------------------|--------------------|---------------------|
| Unplanted Control | Adjacent intertidal (50m buffer) | 27.1900N, 49.5350E | Baseline comparison |
| Natural Reference | Existing 7 ha mangrove stand | 27.3060N, 49.4880E | Growth benchmarking |
| Substrate Control | Representative bare plots | 27.2000N, 49.5500E | Soil development |

4.3 Control Site Monitoring Schedule

Control sites will be monitored concurrently with planted areas at the following intervals: 3 months, 6 months, 12 months, 36 months, and 60 months post-planting, per SAEP-13 monitoring protocols.

5. SITE HISTORY VERIFICATION

Reference: SAEP-13, Clause 3.2.2.1.4

5.1 Natural Mangrove Occurrence

| Assessment Item | Finding |
|-----------------------------|--|
| Existing Natural Mangroves | Approximately 7 hectares of naturally regenerated Avicennia marina on southern shore |
| Establishment Method | Natural propagule dispersal and colonization |
| Historical Imagery Analysis | Satellite imagery (2010-2025) confirms gradual natural expansion |
| Genetic Origin | Local Arabian Gulf ecotype, adapted to hypersaline conditions (38-52 ppt) |

5.2 Previous Restoration Attempts

| Assessment Item | Finding |
|--------------------------|---|
| Phase 1 (2025) | 5 million seedlings planted (December 2025) - COMPLETED |
| Other Formal Restoration | No other documented restoration activities at Phase 2 sites |
| Phase 2 Site Status | All 8 proposed sites contain no existing mangroves |

Determination: The proposed Phase 2 restoration sites are distinct from Phase 1 planting areas and contain no existing mangroves from natural occurrence or previous restoration attempts. Sites are verified suitable for new plantation establishment.

6. SPATIAL DATA SUBMISSION (ESRI FORMAT)

Reference: SAEP-13, Clause 3.2.2.1.6

6.1 ESRI Data Package Contents

| Deliverable | Format | Contents |
|------------------------------|------------------|-------------------------------|
| 8MM_Final_Locations_Points | Shapefile (.shp) | 62 survey point locations |
| 8MM_Final_Locations_Polygons | Shapefile (.shp) | 4 planting zone boundaries |
| Abu_Ali_8MM_Sites_Points | Shapefile (.shp) | 68 site survey points |
| Abu_Ali_8MM_Sites_Polygons | Shapefile (.shp) | 8 site polygon boundaries |
| All_Survey_Points | Shapefile (.shp) | 130 combined survey points |
| All_Planting_Zones | Shapefile (.shp) | 12 combined planting polygons |
| Nursery Boundary | Shapefile (.shp) | Nursery extent (2.17 ha) |
| Control Sites | Shapefile (.shp) | 3 control site locations |
| DEM Products | Geotiff (.tif) | DTM and DSM (filled/unfilled) |

6.2 Coordinate System and Projection

| Parameter | Specification |
|----------------|------------------------------------|
| Geographic CRS | WGS 84 (EPSG:4326) |
| Projected CRS | WGS 84 / UTM Zone 39N (EPSG:32639) |
| Datum | World Geodetic System 1984 |
| Vertical Datum | EGM2008 (for DEM products) |

6.3 KML Reference Files

Google Earth compatible KML/KMZ files are provided for visualization purposes alongside the ESRI shapefiles. These include: new 8 mm final locations.kml and Abu Ali 8mm site new.kml.

6.4 Submission Details

| Field | Details |
|-------------------|---|
| Submission Method | Digital delivery via approved channel |
| Submission Date | Upon final location approval |
| Data Package | ESRI_Data.zip (all shapefiles + metadata) |

SAEP-13 COMPLIANCE MATRIX

| Clause | Requirement | Status | Reference |
|-----------|--------------------------------------|-----------|-----------|
| 3.2.2.1.2 | Digital Elevation Model Developed | COMPLIANT | Section 1 |
| 3.2.2.1.2 | EIA Conducted per SAEP-13 | COMPLIANT | Section 2 |
| 3.2.2.1.2 | Nursery Site Identified | COMPLIANT | Section 3 |
| 3.2.2.1.3 | Control Sites Included | COMPLIANT | Section 4 |
| 3.2.2.1.4 | Natural/Restoration History Verified | COMPLIANT | Section 5 |
| 3.2.2.1.6 | Spatial Data in ESRI Format | COMPLIANT | Section 6 |

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