



Augusta Boat Harbour

Compliance of Completion Criteria for the 2012 Rehabilitation Area

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1. INTRODUCTION

1.1 Preamble

The proposed Augusta Boat Harbour is a community-driven project, arising from the need for safe navigation and mooring in the Southern Ocean off the Augusta coast. The proposed Project area is located on the newly proclaimed Augusta Boat Harbour Reserve 51096 (January 2012), and occurs on the lower side of the Leeuwin-Naturaliste National Park. The project required the clearing of approximately 3.72 ha of native vegetation.

The concept plan for the boat harbour was redesigned in April 2011 as a result of the state environmental impact assessment process and negotiations regarding native vegetation clearing. Alterations were made to the quarry boundary and native vegetation clearing boundary in the northern area of the site at the request of the Department of Parks and Wildlife (DPaW). The new concept plan (concept design F2R) for the boat harbour further buffered the direct impact area from the threatened *Kennedia lateritia*, which was identified at the northern end of the site, adjacent to the proposed quarry area, as well as the southern sector of the project area during the baseline flora and vegetation survey (Onshore Environmental 2007, 2008). The F2R concept design provided a greater buffer between the proposed quarry site and the northern population of the Threatened Flora *Kennedia lateritia*, as requested by DPaW.

In addition to reducing and redesigning the clearing footprint to conserve populations of *Kennedia lateritia*, the revised plan also identified areas where remedial rehabilitation could be undertaken to improve the *in situ* vegetation condition and incorporating revegetation of the Threatened Flora.

1.2 Location

The Augusta Boat Harbour site is located within the Shire of Augusta Margaret River, midway between the Augusta town site and Cape Leeuwin Lighthouse on the eastern side of Leeuwin Road. The site is opposite the Skippy Rock Road turnoff and adjacent the Leeuwin Naturaliste National Park (Figure 1).

1.3 Climate

The Project area experiences a Mediterranean climate with hot, dry summers and mild, wet winters. Average rainfall of 967.4 mm is recorded at the nearest meteorological station of Cape Leeuwin, 6 km south west of the Augusta Boat Harbour site, with approximately 90 percent of this total received between April and October. The maximum 100 year annual rainfall recorded is 1,464.4 mm. Average maximum temperatures range from 23.3 C in February to 16.4 C in July and August. Average minimum temperatures range from 11.2 C in August to 17.2 C in February. Strong winds are predominantly from the west. Winter storms bring squally winds from the north-west to south-west. During summer, prevailing hot dry winds are from the east and south-east. The area experiences strong onshore winds and as a result the existing vegetation is stunted at elevated parts of the site.

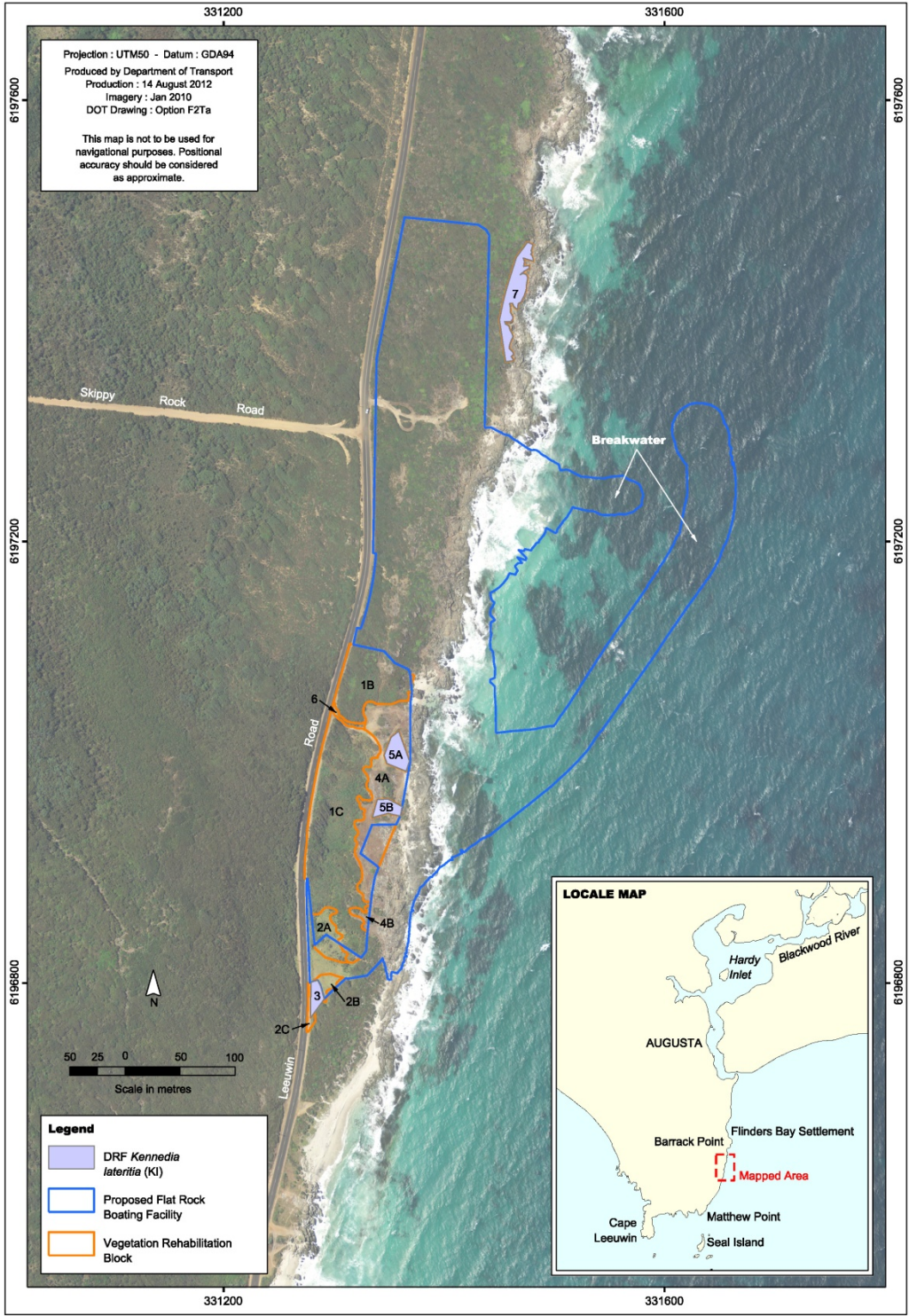


Figure 1 Location of the Augusta Boat Harbour, including rehabilitation blocks.

1.4 Current Condition of the Environment

The project area is part of the Boranup vegetation system, situated in the Warren Botanical District of the South West Botanical Province (as described by Beard 1981). The Boranup system extends from Cape Naturaliste in the north to Irwin Inlet in the south, and covers the Leeuwin-Naturaliste Ridge and coastal dunes of the Scott River Plain. The Leeuwin-Naturaliste Ridge is a north-south trending horst of Precambrian granite and granulite forming hills rising to 200 m. Most of the outcrop is obscured by laterite and sand on the eastern side, and by dune sand and calcarenite on the western, seaward side. The seaward slopes are exposed to prevailing storm winds and sea spray. Vegetation is an intricate mosaic controlled by soil type and exposure (Beard 1981). The coast has a rugged retrograding shoreline with small sandy bays between promontories of granite and limestone. Soils are calcareous sands on the seaward slope and acidic grey earths on the inland side.

Five broad vegetation complexes were recorded during a two season Level 2 flora and vegetation survey of the Flat Rock survey area in February 2007 and October 2008 (Onshore Environmental Consultants 2007 and 2008). Vegetation at the Flat Rock site is strongly associated with five distinct landforms:

1. Primary Sand Dune;
2. Humic Granitic/ Sandy Swale;
3. Granitic Coastal Hill Slope;
4. Granitic/ Sandy Foreshore; and
5. Humic Granitic Platforms.

- In addition, there is bare sand (beach sand) and bare rock (exposed granite) landform features represented that are devoid of vegetation.

Two flora species of conservation significance were recorded from the proposed Augusta Boat Harbour study area during the above survey:

- *Kennedia lateritia* is listed as 'Endangered' under the EPBC Act (Federal), and as Threatened (Declared Rare) Flora (T) under the Wildlife Conservation Act (State); and
- *Bossiaea disticha* is listed as Priority 4 flora by DPaW.

The Augusta Boat Harbour site does not show visual evidence of being significantly impacted by disease or pests, and surrounding vegetation generally remains in good health. Glevan Consulting (2011) conducted an assessment for the presence of the disease caused by *Phytophthora cinnamomi* within remnant vegetation of the Augusta Boat Harbour Project area in September 2011. The threat of *P. cinnamomi* was considered to be low, as site conditions were thought to be unfavorable for the pathogen. Grazing by rabbits and snails has been observed in areas of reduced vegetation condition. The proposed Augusta Boat Harbour Project area includes previously disturbed sites that support established populations of environmental weed species. The boat harbour reserve is also located adjacent to a major local road (Leeuwin Road), which increases the likelihood of new species being introduced, or spreading.

A total of 25 environmental weeds were recorded during the baseline flora and vegetation survey (Onshore Environmental Consultants 2007). None are listed as Declared Weeds under the *Agriculture and Related Resources Protection Act, 1976* (ARRP Act). The majority of weeds were recorded at locations that have been subject to historical ground disturbance including road verges, the southern end of the 'Humic Granitic / Sandy Swale' vegetation association, and the granite platform along the eastern fringe of the Project area supporting skeletal sandy soils with high exposure to prevailing winds. Few weeds were recorded from 'intact' vegetation types.

2. 2012 REHABILITATION

The first stage of native rehabilitation at the Augusta Boat Harbour was completed between the 25th and 29th June 2012 and included approximately 0.56 ha situated in the south-east corner of the project area. A native seed mix collected from site prior to clearing and comprising a total of 54 plant taxa was hand broadcast at a rate of 4,310 grams per ha. In addition, a total of 23 taxa were planted as nine month old seedlings at a rate of 6,455 seedlings per ha equivalent.

Annual monitoring of rehabilitation development within the 2012 rehabilitation area has been completed on three occasions; 16th and 17th November 2012 (5 months), 15th and 16th November 2013 (17 months), and 7th and 8th October 2014 (28 months). The adjacent analogue (reference) site situated on the coastal ridge above nearby Granny's Pool has also been assessed annually between 2012 and 2014, with this data providing a comparison for the developing rehabilitation site.

3. COMPLETION CRITERIA

Completion Criteria are defined as 'an agreed standard or level of performance which demonstrates successful closure of a site'. Industry is looking for criteria that indicate the success of its rehabilitation and enable it to determine when its liability for the area ceases. Governments also want successful rehabilitation to ensure they are not inheriting an ongoing liability. Finally, the public wants to know that the rehabilitation will be successful and a sustainable land use will be restored.

For the Augusta Boat Harbour completion criteria were developed in five stages that could be progressively assessed throughout the project and therefore increasing confidence in a positive outcome:

- Planning;
- Pre-clearing;
- Pre-rehabilitation;
- Establishment (0 - 15 months); and
- Development (15 months onwards).

The targets (performance indicators) developed were both qualitative (audit of design implementation during early stages to ensure maximum likelihood of a positive outcome), and quantitative (direct measure of performance outcomes).

At October 2014 and with the 2012 rehabilitation block aged 28 months a compliance audit has confirmed that all completion criteria have successfully reached the performance indicators established (Table 1). The audit is supported by the 2014 annual rehabilitation monitoring report (Onshore Environmental 2014), which concluded "At November 2014 with the 2012 rehabilitation aged 28 months, all targets for completion criteria associated with the planning, pre-clearing, pre-rehabilitation and establishment stages of the 2012 rehabilitation block at the Augusta Boat Harbour have been achieved and are compliant."

Table 1 Compliance audit for completion criteria in the 2012 rehabilitation block, Augusta Boat Harbour.

ASPECT	COMPLETION CRITERION	PERFORMANCE INDICATOR	COMPLIANCE (Y/N)
1. PLANNING			
Access	1. Stakeholders have been consulted with proposed boat harbour access plans	Emails, letters, minutes of meetings	Yes
Fire	2. Fire management strategies are incorporated into the SREMP aimed at protecting developing rehabilitation	SREMP approved, Fire is excluded from developing rehabilitation for a minimum period of ten years following rehabilitation.	Yes ¹
Land Use	3. Area meets land use purpose as defined by land owner / manager	Shire of Augusta Margaret River formally approves & adopts the end land use for the project area	Yes ²
Flora Vegetation and Fauna	4. Baseline flora & vegetation and fauna surveys have been completed	Management strategies for flora, vegetation and fauna of conservation significance are developed, as evidenced by correspondence.	Yes ³
2. PRE-CLEARING			
Hydrology Landform and soils	5. Prior to commencement of clearing, surface drainage plan developed for areas earmarked for clearing	Surface drainage plan sighted by Project Manager	Yes
Clearing	6. Disturbance boundaries delineated with white sighter wire	Site inspection, photographs	Yes
Clearing	7. Machinery operators informed of clearing measures	Meeting minutes, correspondence	Yes
Vegetation and flora	8. Search for DRF (and other conservation significant flora) completed prior to clearing	Flora & vegetation survey report, photographs of flagged DRF	Yes ⁴
Vegetation and flora	9. Seed and plant material required for propagation removed and appropriately stored	Site inspection, photographs, invoices/receipts from seed merchants & nurseries	Yes ⁵
Vegetation and flora	10. Infrastructure and stockpile areas approved for clearing surveyed and pegged	Site inspection, photographs, survey/site plans, approval documents	Yes ⁶

¹ Fire management of adjacent National Park by DPaW; fire has been excluded from this area for a long period but DPaW are aware of rehabilitation at the boat harbour and presence of the Threatened Flora *Kennedia lateritia*.

² The 2012 rehabilitation area is within the newly proclaimed Augusta Boat Harbour Reserve 51096 (January 2012). All access into the rehabilitation is excluded and these areas now support a consolidated population of the Threatened Flora *Kennedia lateritia*.

³ Baseline flora and vegetation survey completed by Onshore Environmental (2007, 2008), fauna survey by Green Iguana (2010), and site rehabilitation and management plan by Onshore Environmental.

⁴ All *Kennedia lateritia* populations and sub-populations had perimeters delineated by a combination of pegging and flagging.

⁵ Native seed collection completed by Formosaflora and seedlings propagated and supplied by Carramar Coastal Nursery.

⁶ Native Vegetation Clearing Permit approved and stockpiles surveyed, mapped and quantified.

ASPECT	COMPLETION CRITERION	PERFORMANCE INDICATOR	COMPLIANCE (Y/N)
3. PRE-REHABILITATION			
Landform and soils	11. Native vegetation topsoil stripped in two layers: 0 - 50 mm and 50 - 150 mm, with clear signage delineating the two resources to prevent later confusion	Site inspection, photographs	Yes ⁷
Landform and soils	12. Native vegetation topsoil stripped during dry conditions wherever practicable	Site inspection, photographs	Yes ⁷
Landform and soils	13. Upper topsoil stripped with a grader (or similar) and stockpiled into pre-determined locations	Site inspection, photographs	Yes ⁷
Landform and soils	14. Native vegetation topsoil stockpiled over cleared native vegetation areas to a maximum height of 1 m	Site inspection, photographs, site plan	Yes ⁷
Landform and soils	15. Landform design is integrated with existing landscape	Survey plan for proposal area (showing contours before and after development)	Yes ⁷
Vegetation and flora	16. Clear and stockpile understorey vegetation	Site inspection, photographs	Yes ⁷
Landform and soils	17. Topsoil spread over 100% of the rehabilitated areas	Site plan, schedule, site inspection, photographs	Yes ⁷
Landform and soils	18. Aim to direct return 100% of the upper (top 50 mm) topsoil resource over disturbed rehabilitation areas	Site plan, schedule, site inspection, photographs	Yes ⁷
Landform and soils	19. Post-disturbance surfaces re-contoured with a Posi Track following survey	Survey report (including pre- and post-disturbance contours), site inspection, photographs	Yes ⁷
Landform and soils	20. Re-contoured surface deep ripped / scarified with appropriate machine (gPosi Track)	Site inspection, photographs	Yes ⁷
Landform and soils	21. 'Lower topsoil' material replaced at 150 mm depth	Monitoring (survey) results, site inspection, photographs	Yes ⁷
Landform and soils	22. 'Upper topsoil' material replaced at 50 mm	Monitoring (survey) results, site inspection, photographs	Yes ⁷
Landform and soils Hydrology	23. No uncontrolled surface runoff or soil erosion that is unstable and degrading, and/or compromises end land use objectives	Site inspection, photographs, monitoring results	Yes
Vegetation and flora	24. Fencing strategically erected to minimise impact of prevailing south-easterly winds on seedling development	Invoice/ receipt from fencing contractor, site plan, site inspection, photographs	Yes ⁸
4. ESTABLISHMENT (0 - 15 months)			
Vegetation and flora	25. Prepared rehabilitation areas direct seeded with a native species mix	Seed list outlining volume of seed utilised for each species, area direct-seeded, site inspection, photographs	Yes ⁹

⁷ Overseen by the Works Supervisor, Mr Peter Walker.

⁸ Fencing was removed in October 2014 after annual rehabilitation assessments confirmed revegetation had successfully established and would be tolerant of prevailing winds.

ASPECT	COMPLETION CRITERION	PERFORMANCE INDICATOR	COMPLIANCE (Y/N)
Vegetation and flora	26. Nursery propagated seedlings (from a mixture of seed, cuttings, root divisions, and tissue culture) replanted throughout the rehabilitation area at a density >1,000 seedlings ha ⁻¹	Species list showing seedling numbers for each species, area of rehabilitation, site inspection, photographs, monitoring results	Yes ¹⁰
Vegetation and flora	27. At 15 months total number of <i>Kennedia lateritia</i> plants at the site to be 150% of the number recorded prior to development	Site inspection, photographs, monitoring results	Yes ¹¹
Vegetation and flora	28. At 15 months species richness to be at least 80% of that recorded at the analogue site, with not more than 10 percent of the annual assessment plots failing to record this level of diversity	Monitoring results confirm species richness at least 80% of that recorded at the analogue site, with not more than 10 percent of the annual assessment plots failing to record this level of diversity	Yes ¹²
Landform and soils	29. Surfaces stable with no evidence of surface erosion that is likely to limit establishment of a native vegetation cover	Monitoring results (erosion and vegetation) confirming that erosion is not limiting plant establishment in the rehabilitation	Yes
Vegetation and flora	30. No areas greater than 0.01 ha without understorey	Monitoring results, site inspection to confirm there are no areas greater than 0.01 ha without understorey	Yes
5. DEVELOPMENT (>15 months)			
Vegetation and flora	31. Longer term species richness to be at least 80% of that recorded at the analogue site, with not more than 10 percent of the annual assessment plots failing to record this level of diversity	Monitoring results confirm species richness at least 80% of that recorded at the analogue site, with not more than 10 percent of the annual assessment plots failing to record this level of diversity	Yes ¹³
Vegetation and flora	32. For Peppermint trees (<i>Agonis flexuosa</i>) planted to consolidate the existing southernmost clump of taller trees at the project site, a minimum number of 15 trees have survived 5 years following commencement of rehabilitation.	Annual monitoring results confirm survival of at least 15 Peppermint trees (<i>Agonis flexuosa</i>) at 5 years.	Yes, noting rehabilitation is 2.5 years old ¹⁴
Vegetation and flora	33. No Declared Plants (weeds) as defined by DAFWA (2007) present within rehabilitation areas.	Monitoring results, site inspection confirm no Declared Plants present in the rehabilitation	Yes
Access	34. The agreed access plan has been implemented	Access plan, site inspection, correspondence from regulatory authorities	Yes

⁹ A total of 54 plant taxa were sown at 4,310 grams per hectare.

¹⁰ A total of 23 plant taxa were planted at 6,455 seedlings per hectare.

¹¹ At 17 months *Kennedia lateritia* was recorded at 0.58 plants per m² (5,800 per hectare) and provided 18 percent ground cover within the rehabilitation area.

¹² At 17 months species richness within the rehabilitation area was 57 taxa, compared to 18 taxa at the analogue site.

¹³ At 29 months species richness within the rehabilitation area was 43 taxa, compared to 14 taxa at the analogue site.

¹⁴ *Agonis flexuosa* density averages 0.76 plants per m² (7,600 per hectare) within the rehabilitation area at 29 months of age.

ASPECT	COMPLETION CRITERION	PERFORMANCE INDICATOR	COMPLIANCE (Y/N)
Land use	35. The site meets the agreed end land use	Site inspection, photographs, correspondence from regulatory agencies	Yes
Landform and soils	36. The rehabilitation surface is stable and vegetated, with no uncontrolled run-off	Monitoring results, site inspection, photographs	Yes

4. REFERENCES

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