

Draft Media Stripping & Stockpiling Procedure

Rum Jungle Rehabilitation Project

RJ3-4-Pr-009

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Acronyms	Full form
AAPA	Aboriginal Australians Protection Authority
CEMP	Construction Environment Management Plan
CCGC	Coomalie Community Government Council
CHMP	Cultural Heritage Management Plan
DITT	Department of Industry, Tourism and Trade (NT)
ESCP	Erosion Sediment Control Plans
EPBC	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cwth)
FMP	Fire Management Plan
FRALT	Finness River Aboriginal Land Trust
HSE	Health Safety Environment
JSEA	Job Safety Environment Analysis
NT	Northern Territory
NTG	Northern Territory Government
NT EPA	Northern Territory Environmental Protection Authority
WMP	Weeds Management Plan
WSF	Water Storage Facility

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1. Introduction

This Rehabilitation Media Stripping and Stockpiling Procedure has been developed to guide how to strip and stockpile topsoil so it is correctly stored and able to be used for rehabilitation purposes when required. This procedure also outlines the correct stripping and stockpiling methods for other rehabilitation media such as woody debris, rocks and subsoils.

This procedure does not cover the capping material winning, handling and placement processes – this is to be covered by another document. This procedure does not cover placement of rehabilitation media on the WSFs and other areas being revegetated.

1.1. Purpose

This procedure is required as part of the Rum Jungle Stage 3 Construction Environment Management Plan (CEMP) RJ3-3-MP-003. The procedure covers the vegetation and topsoil survey, depth and method of stripping, and method of stockpiling. It is aimed at maximising topsoil recovery while retaining soil viability and productivity. It is also aimed at ensuring other rehabilitation media such as woody debris and rocks are also conserved appropriately.

This procedure does not cover placement of rehabilitation media – see RJ3-4-MP-009 Revegetation Management Plan.

1.2. Legal Requirements

Any work or change within the Project area that may potentially impact the environment requires approval from the Health, Safety and Environment team to ensure that legal requirements are complied with. Breaches of conditions of the Environmental Approval may expose the Project, or any person who contravenes conditions to being liable to a fine or imprisonment.

Legislation	Relevance to activities
<i>Aboriginal Sacred Sites Act</i>	The project contains several sacred sites and an AAPA Authority Certificate (C2019/082) has been issued for the Rehabilitation Project.
<i>Bushfire Management Act (NT)</i>	Provides the protection of life, property and the environment through the mitigation, management, and suppression of bushfires, and for related purposes. The project sites are located in the Northern Fire Protection Zone and the Vernon Arafura Fire Management Zone. Fire breaks will need to be established and maintained and permits obtained prior to undertaking any prescribed burning of excess vegetation.
<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cwth)</i>	The project requires assessment under the <i>NT Environmental Assessment Act 1982</i> and is a 'controlled action' under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> . The project is being assessed at the level of an Environmental Impact Statement (EIS) under the bilateral agreement between the NT and Australian Governments. The relevant controlling provisions are: listed threatened species and communities (sections 18 and 18A) protection of the environment from nuclear actions (sections 21 and 22A).
<i>Heritage Act (NT)</i>	Addresses conservation of the NT's culture and natural heritage. All declared heritage places or archaeological sites, Aboriginal and Macassan sites or objects are protected under the Act. Archaeological heritage sites must not be disturbed or destroyed without a permit. There are no sites on the NT Heritage Register within the project area. There are several sacred sites and two historical sites within the Rum Jungle. If previously unrecorded sites

Legislation	Relevance to activities
	are uncovered by the project activities a Works Approval may be required from the NT Heritage Branch.
<i>Planning Act (NT)</i>	A Land Clearing Permit may be required for unzoned land such as the proposed borrow pit locations on the properties belonging to the Finnis River Aboriginal Land Trust (FRALT) and Coomalie Community Government Council (CCGC) as described in this document.
<i>Soil Conservation and Land Utilisation Act (NT)</i>	This Act provides for the prevention of soil erosion, and for the conservation and reclamation of soil, and requires Erosion and Sediment Control Plans (ESCPs) for development projects. An ESCP is included as part of the CEMP.
<i>Territory Parks and Wildlife Conservation Act (TPWC Act) (NT)</i>	Provision for protection, conservation, and sustainable utilisation of wildlife. Land clearing activities are to be undertaken in a manner to reduce harm to wildlife.
<i>Water Act (NT)</i>	<p>Provisions for protection, management, allocation, use, control and administration of NT water resources. A permit to interfere with a waterway is required if a waterway is to be interfered with of flow obstructed.</p> <p>It is an offence to interfere with a waterway or to obstruct the flow of water in a waterway unless there is an exemption in place (published in a Gazette notice) or there is an authority to do so under the <i>Water Act 1992</i>.</p> <p>New or upgraded river crossings: several diversion channel, creek line and river crossings are required to facilitate site access during wetter months of the year. The location of river crossings has been selected to both avoid areas of importance (cultural, historical and environmental)</p>
<i>Weeds Management Act (NT)</i>	Landholders and occupiers have statutory obligations to manage declared under the <i>Weeds Management Act 2001</i> . A baseline weed survey has been undertaken across the project area and weed management is addressed in the WMP. A further weed survey will be undertaken on the areas to be cleared prior to clearing to reduce the risk of spread. All machinery will be weed/seed free and inspected prior to use on site.

Table 1 Application Legislation

1.3. Related Documents

- RJ3-3-MP-003 Rum Jungle Construction Environmental Management Plan (CEMP) and sub-plans:
 - RJ3-4-F-004 Ground/Vegetation Disturbance Form
 - RJ3-4-Pr-007 Vegetation Clearing Procedure
 - RJ3-4-MP-011 Weed Management Plan (WMP)
 - RJ3-4-MP-013 Cultural Heritage Management Plan (CHMP)
 - RJ3-4-MP-014 Erosion and Sediment Control Plan (ESCP)
 - RJ3-4-Pr-008 Cycad Salvaging Procedure
 - RJ3-4-MP-027 Fire Management Plan (FMP)

2. Safety

The following safety measures must be followed:

- Appropriate PPE must be worn for each work area.
- When managing the topsoil, the personnel involved must be familiar with the JSEA.
- Communication must be maintained on the Site radio **channel 4**.
- Work is not to be carried out by any person, or using any equipment/machinery which have not met all Project safety and competency requirements.

3. Roles and Responsibilities

All personnel – particularly Managers and Supervisors: fill out and submit the Ground Disturbance Request form prior to carrying out any activity that may cause environmental harm. Such activities are listed below. Do not disturb or damage topsoil stockpiles. Comply with directions of HSE personnel with regard to rehabilitation media management. Ensure all land disturbance or vegetation clearing is approved by the HSE Team prior to work commencing.

Project Director – Review and decide if to approve the Ground Disturbance Request ensuring that all conditions are noted on the Form. Decide if to approve the developed conditions and identify any that are missing. Ensure that trained and authorised persons are present on the job to adequately supervise and manage any activities related to the clearing and stripping of any media that can be used in future revegetation activities.

Superintendent – Act as the Project Director's representative when authorised to do so. Ensure that all conditions and requirements are in place prior to allowing work on the ground to commence. Ensure that all safety requirements are met and that all additional support personnel are adequately informed of the job and present.

Health, Safety and Environment Team – Conduct vegetation, topsoil and rehabilitation media surveys when Ground/Vegetation Disturbance Request Forms are submitted, provide advice on vegetation, topsoil and rehabilitation media removal and stockpiling. Supervise the vegetation, topsoil and rehabilitation media stripping and stockpiling program; direct contractor and ensure requirements are met.

Contract Manager – Discuss all planned and upcoming ground disturbance activities at the weekly planning meeting to ensure sufficient notice to all parties to plan for work. Prior to submission of Request forms, visit the proposed work area with the Superintendent and HSE Manager to review the work area and discuss/plan for work conditions. Ensure the work area is adequately marked out prior to meeting in the field so that minor adjustments to the planned work area can be made to satisfy the need to reduce impact as far as is possible. Submit Ground/Vegetation Disturbance Request Forms to Health Safety and Environment Team.

Machine Operators – Strictly follow the agreed marked out ground disturbance survey limits. Follow all requirements set out in the Approved Form. Ask questions if not clear and actively work towards a good quality of work. If in doubt ask.

Unless otherwise specified, the provisions within this procedure are the responsibility of the (HSE) Manager. Responsibility for implementation may be delegated to contractors undertaking the work; however, NTG will maintain overarching responsibility for compliance. The (HSE) Manager or delegated authorised representative (HSE Officer) will conduct pre-clearing inspection and be on-site to oversee the clearing activities.

4. Theory

Soil is differentiated into layers called **HORIZONS**. The surface layer, the O horizon, is usually darker than the subsurface layers, the A, B and C horizons. Organic matter gives the A horizon its

characteristic dark color while enhancing desirable physical properties such as tilth (ease of tillage), structure, water infiltration, and water holding capacity. Topsoil is defined as the O and A horizons, while the B and C horizons compose the subsoil. Subsoil horizons have higher levels of clay, salt and lime than topsoil. These properties make subsoils poor quality substitutes for true topsoils. Subsoils do however have value as rehabilitation media.

How is a soil formed?

Many elements contribute to the formation of soil; the weathering of rocks, the action of water, wind, and ice which carry and drop earth materials in places where they settle and mix with other materials to become soil. The key ingredient to the making of soil is the living and once-living things (organic matter) that are found in it. They turn the sand, silt, and rock pieces into a mixture that is good for more life to live and grow.

What is in soil?

Soil is a mixture of four main ingredients: weathered rock, organic matter, air, and water. The weathered rock can be in the form of sand, silt, clay, pebbles, or other size rocks. Organic matter can be anything from old leaves, dead animals and plants, roots or microscopic living things. The last two ingredients are air and water, without which organisms found in soil cannot live, grow, and help dead matter to decay.

What are the four layers of soil like?

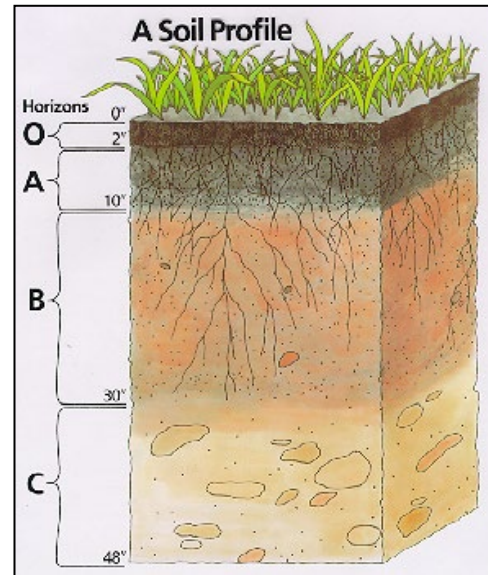
The top layer is called the organic layer. This layer is about an inch thick and takes from 100 to 600 years to form. Within this layer, living things carry on with their life activities. Also in this layer are millions of dead plant and animal organisms that are slowly decomposing, or rotting, away. As these once-living things decay, the organic layer becomes rich in nutrients. The depth of this layer may range from 0 mm to a few centimeters, or even more in forested areas.

Section A in the diagram above is called the upper soil layer. This is where you will find many plant roots, different types of fungus, and other very tiny living things. This soil is dark in color because there is are so many chemical reactions taking place as living things grow and die. A great deal of bacteria is found in this layer. The bacteria help make chemical reactions happen so that materials of the earth can be recycled. This layer is usually about 10 cm deep.

Section B in the diagram above is the middle soil layer. It has less living and once-living things and less of the darker topsoil. The soil here has less air, too. Because of these characteristics, plants do not grow well here. You will find fewer roots and fewer signs of life. At about two to three feet deep, you are digging into the subsoil.

The lowest layer is section C, where you will find that the soil may have an orange or yellow color. It may be sandier or have more gray clay. In this layer you will see that there are many pebbles and rocks. This layer has the least amount of organic material. If you are digging a hole and you get more than one or two meters deep, your shovel may begin to hit many rocks. If this happens, then you are probably in the lowest soil layer. One important thing to know, though, is that this layer might still have a lot of water. It depends on how much water is in the environment from where the soil sample was taken.

Why do we want topsoil for revegetation?



Topsoil provides the right combination of soil structure, minerals, seeds and microorganisms to promote plant growth, compared with other types of growth media which may need chemical or physical intervention to provide the right environment for plants to flourish.

5. Definitions

Topsoil - Top section of natural surface soil possessing the characteristics that enable vegetation growth. Topsoil includes grasses and other vegetation. In the case where topsoil is required for rehabilitation at Rum Jungle, topsoil will be referred to as the layers of soil where the plant root zone is prevalent (down to bottom of the B Horizon). In most cases this is the top 300-500mm of material. This includes the subsoils below the true topsoil layer.

Subsoil - In practice at Rum Jungle, the subsoil is considered to be all material deeper than the root zone (topsoil made of Horizon O,A and B)) but that which still has the physical and chemical properties of soil – in other words Horizon C. In other words, it can be used as rehabilitation media though it will not have the same biological properties as the topsoil fraction and might not be so suitable for the upper layer of the rehabilitation area. This will require field inspection on a case by case basis by a suitably trained person.

Vegetation - All vegetation that exists on an area of land to be cleared shall be retained for rehabilitation purposes. Large logs shall be put aside to use in habitat nodes. Smaller branches, leaves and grasses are to be mixed into the topsoil and subsoil when stripping.

Stripping - Removal of topsoil, subsoils by approved methods to designated dimensions and transportation of topsoil to stockpile area.

Pre-stripping – removal of contaminated upper layers to stop weeds like Gamba Grass getting into the revegetation areas from brought in topsoil.

Stockpiling - Storage of approved materials by approved methods in areas selected by the Contractor and approved by the Superintendent in consultation with the HSE Manager.

6. Procedure

6.1. Vegetation and Topsoil Inspection

No vegetation, topsoil or subsoil is to be moved without a Ground/Vegetation Disturbance Form being filled out and approval gained from the Superintendent/Project Director. See the RJ3-4-F-004 Ground/Vegetation Disturbance Form for approval delegations. See Vegetation Clearing Procedure RJ3-4-Pr-007 for detail on the approvals process to help complete the Form.

Vegetation and topsoil inspections are to be carried out by the HSE Team prior to any land disturbance. The purpose of these surveys is to determine the vegetation species growing on the topsoil, what can be salvaged or protected by adjusting clearing lines and the extent and quality of topsoil and other rehabilitation media available. The inspection will also provide a set of conditions in which the clearing and stripping conditions can occur under to ensure maximum material and viability of such is maintained.

The inspection should determine:

- Extent of weed cover and contamination of the soil to determine the depth of weed decontamination stripping that may be required (nominal 200mm if weedy);
- Areas of unsuitable topsoil or lower depth revegetation media;
- vegetation types on the areas to be stripped and used for stockpiling;

- salvagable large rocks and boulders for habitat nodes;
- hollow logs to be protected insitu or preserved;
- salvagable seed or other revegetation resource;
- likely fauna habitat and a recovery plan;
- soil types;
- extent of each soil type, including approximate depth; and
- soil quality, noting the presence of any contaminants.

The information on soils is to be used in planning the topsoil stripping program. The areas to be stripped of topsoil and the stripping depths shall be shown on a plan. A record of the flora species shall be filed for later use in determining suitable species in rehabilitation programmes. This information will also be used to establish conditions in the Ground/Vegetation Disturbance Request Form for the work to be undertaken.

6.2. Vegetation Clearance and Topsoil Stripping

Vegetation (namely trees and shrubs) must be cleared ahead of topsoil stripping and in preparing the stockpile area. The vegetation must be removed and stockpiled either separately or in windrows on top of the topsoil stockpiles. Windrows must be a maximum of one truck load wide and placed a minimum of 6 m apart to allow vegetation growth on the stockpile surface.

Removing topsoil during the clearing operation should be kept to a minimum. Grasses do not have to be removed prior to topsoil stripping as they can be stripped and stockpiled within the topsoil. Unless, of course, they are weeds.

If there is no vegetation to strip, the area might be a Gamba Grass infestation which requires a different process – the HSE Manager will advise. If so, the topsoil itself will require pre-stripping of the top 150-200mm of soil to isolate soil that's contaminated with Gamba Grass seeds. This is not good soil for revegetation work. Pre-strip and windrow all Gamba Grass contaminated soils.

Following clearing/pre-stripping, topsoil is to be stripped according to the identified soil type and depth. Stripping of topsoil at Rum Jungle is typically done as one operation with the depth removed being highly variable depending on localised conditions. Topsoil depth is to be determined through the survey and modified to suit at the time of stripping. However, if two distinct soil layers are evident then two passes should be undertaken: For example

- top 250 mm including Horizon O and A, containing organic matter, seeds, roots, soil and microbes; and
- Horizon B, next 150 mm or greater, sub-soils below the root zone if material deemed suitable for use in other capping layers.

A key factor is to ensure the maximum amount of topsoil is removed in order to minimise the deficit of topsoil available for rehabilitation.

Topsoil is not to be stripped while very wet or very dry as it's both inefficient and damaging to the soil structure.

If watering is required to reduce dust hazard, water from the Rum Jungle Water Treatment Plant may be utilised so long as it is from the correct water source that is low salts.

7. Stockpiling

Preferably topsoil should be placed directly onto areas being rehabilitated therefore topsoil should not be stripped in significant advance of an area required for active borrow pit mining or waste rock tipping. However, if no rehabilitation areas are available then the topsoil must be stockpiled. If soils have been stripped as two layers, then they must be stockpiled separately. All stockpiles and the type of soil within them must be recorded on site plans.

Stockpiles must be no higher than 2 m to prevent compaction of the soil and destruction of the soil structure and biology. Optimum topsoil stockpiling depth is 0.5-1m but this will be determined by the area available for stockpiling. Stockpiles must be in an accessible well drained ground, away from bodies of water and standing timber. There should be at least 5 m working space around the stockpiles, and if they are left for any period of time they should be vegetated to minimise nutrient loss, erosion of fines and soil structure change.

Dust suppression water must not be used while soil is being stockpiled unless it is from the approved location at the Water Treatment Plant to ensure that water of suitable quality is used on the topsoil (not too salty and neutral pH).

Do not flatten the top of the stockpile – leave it rough to encourage soil health and discourage inadvertent driving on the stockpile.

If insufficient vegetation growth occurs on the topsoil stockpiles then prior to the next wet season the slopes should be battered down to a maximum of 20°, contour ripped and the stockpile seeded with local native species.

Stockpiling shall be done concurrently with stripping operations. The stockpiles are to be located in areas which will not cause interference with other operations or disrupt activities on adjacent properties. Stockpiles shall be constructed and maintained in such a manner as to limit erosion and allow adequate drainage of surrounding areas. Stockpiles shall be constructed of a size and shape so as to facilitate cross-sectioning or other means of measurement to determine stockpile volume.

To minimise the effects of sedimentation of waterways, stripped vegetation can stockpiled (windrows) on the downstream sides of the rehabilitation media stockpile to act as a sediment trap.

7.1. Topsoil Balance

A topsoil balance is to be calculated at regular intervals. The required quantities are based on the remaining disturbed areas and the depth of topsoil to be applied to these areas. If a shortfall occurs a plan must be put in place to address this. Possible actions after undertaking investigations and/or research are:

- strip more soil where available;
- change stripping methods to improve extraction;
- determine if alternative materials are available that are suitable as a rehabilitation medium such as bioremediated soils;
- mix topsoil with less suitable rehabilitation mediums and commence the soil building process well prior to final closure;
- reduce the depth of topsoil applied to disturbed areas; and
- reduce the area covered by topsoil (e.g. spread topsoil in strips or mosaic pattern).

The topsoil balance will be calculated on six monthly intervals and records kept by the HSE Team.

7.2. Lower WSF Cover System Layers

Materials required for the lower layers of the WSF cover system (not compacted clay layer) will come from materials salvaged onsite through foundation preparations or from the two borrow pits. Priorities when considering source of materials are:

1. Priority from onsite foundation development work to reuse this material if acceptable.
2. If rehabilitation area is FLAT:
 - a. Higher tolerance to any materials across Particle Size Distribution spectrum as less erosion risk than batters and slopes
 - b. Low grade topsoil materials previously treated for weed control
3. If rehabilitation area is sloped:
 - a. Particle size distribution towards the sandy scale is preferred along with gravels, rock and cobbles to increase erosion resistance in upper layers
 - b. Good soil moisture holding capacity
 - c. Low grade topsoil materials previously treated for weed control
4. Refer to Revegetation Management Plan for further information

8. Records Management

- The procedure is to be reviewed annually.
- Monthly survey to pick up any changes in stripping and stockpiling for the site official survey plans.