February 2008

Guidelines for controlled activities
Outlet structures

This guideline relates to the design of stormwater outlets and spillways from infrastructure (including roads, buildings, constructed basins/wetlands, swales or other drainage works) into a watercourse or waterfront land.

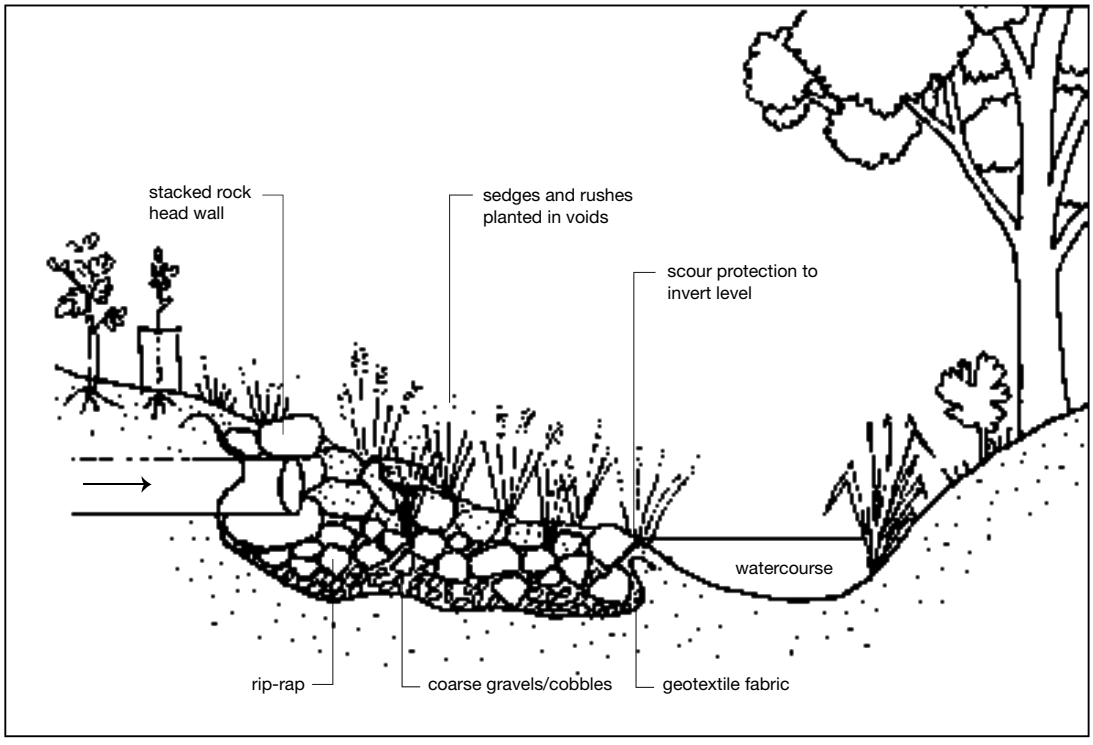
Controlled activities carried out in, on or under waterfront land are now regulated by the *Water Management Act 2000* (WMA). The Department of Water and Energy is required to assess the impact of a controlled activity to ensure that minimal harm will be done to any waterfront land, ie the bed and a distance inland of 40 metres from a river, lake or estuary.

This means that a controlled activity approval must be obtained from the Department prior to carrying out a controlled activity.

The design and construction of stormwater outlets should aim to be 'natural', yet provide a stable transition from a constructed drainage system to a natural flow regime (see Figure 1). The design and construction footprint and extent of disturbances within the riparian corridor should be minimised while still achieving the intended discharge function (refer to the Department's *Guidelines for controlled activities – Riparian corridors)*.

All ancillary drainage infrastructure, such as oil/grease interceptors, sediment & litter traps, constructed wetlands and detention basins, should be located outside the riparian corridor. Run-off should be of appropriate water quality and quantity before discharging into a riparian corridor or watercourse. Appropriate rehabilitation of disturbed areas following the installation of outlet structures should adequately restore the integrity of the riparian corridor.

Figure 1. 'Natural' outlet structure.



NSW Government
Department of Water & Energy

The design and construction of outlet structures should consider, but not be limited to, the following design principles.

- Define the infrastructure route and identify the specific point of discharge. Ideally select a route along an existing cleared or disturbed area that avoids trees (preferably beyond their drip line).
- Choose a stable section of the stream for the discharge point, preferably mid-way between bends. Alternatively, if appropriate, incorporate outlet discharge points into disturbed/eroded areas which are to be stabilised or rehabilitated.
- Minimise construction footprint and ensure that disturbance to soil and vegetation within the riparian corridor is kept to the minimum extent required.
- Assess changes to the hydrology of the receiving watercourse to demonstrate that there is no detrimental impact on discharge volumes and channel velocities. Discharge velocities and flow rates should mimic 'natural' flows and not initiate erosion.
- Discharge from an outlet should not cause bed or bank instability.
- Protect the bed of the watercourse below the outlet, if not bedrock, or if bed scour is likely. Consider bank material and outlet 'jet' effect and protect the opposite streambank if required.
- Point outlet structure and direct discharge downstream.
- The outlet should not protrude beyond the streambank but tie-in with the adjoining bank alignment.
- Calculate tractive stresses generated from outlet discharges and from bank full discharges to determine rock size requirements for the structure.
- Rock rip-rap is the preferred material to provide a 'natural' outlet. Rip-rap should extend for the full extent of the design scour apron and adjoining flanks/streambank. Rip-rap should be appropriately keyed in and cut-off trenches provided.
- Rip-rap should consist of durable, angular run-of-quarry rock placed over a bedding layer of angular cobbles over geotextile. Where possible, incorporate vegetation, eg. sedges and rushes, into scour management (Figure 1).
- Grade the scour apron to the bed level of the watercourse, or just below any permanent water created by any stable feature, eg. a rock bar, within the watercourse.
- Stabilise and rehabilitate all disturbed areas including topsoiling, revegetation/regeneration, mulching, weed control and maintenance.

Figure 2. Rip-rap outlet structure with vegetation growing in voids between rocks.

When seeking approval to construct outlet structures, information detailing the above is required for the Department to assess the works.

Additional information will generally also be required and may include but not be limited to:

- detailed design drawings of outlet structures
- cross-sections and long-section of the stream
- hydrology report detailing pre and post construction hydrology of the channel
- a Vegetation Management Plan (VMP) prepared in accordance with the Department's *Guidelines for controlled activities – Vegetation Management Plans*
- a Site Management Plan incorporating the schedule, sequence and duration of works, erosion and sediment controls, etc.
- costing of all works (ie. materials, labour) and stages of works (eg. outlet structure installation, rehabilitation).

Further information

If you require more information about controlled activity approvals please contact your local Departmental office or visit our website www.dwe.nsw.gov.au

Important notes

DWE has prepared these guidelines in good faith. In the case of any inconsistency between the guidelines and the controlled activity approval or legislation, the controlled activity approval or legislation will prevail to the extent of that inconsistency.

Nothing in these guidelines is taken to authorise a controlled activity. These guidelines are designed to provide information to assist in the design of any development or work that constitutes a controlled activity and the preparation of an application for a controlled activity approval. Users are advised to seek professional advice and to refer to the legislation and any relevant approvals, as necessary, before taking action in relation to any matters covered by the guidelines.

Disclaimer

While every reasonable effort has been made to ensure that this document is correct at the time of publication, the State of New South Wales, its agencies and employees, disclaim any and all liability to any person in respect of anything or the consequences of anything done or omitted to be done in reliance upon the whole or any part of this document.

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APPENDIX 5

STORMWATER CATCHMENT & CONCEPT PLANS

(JMD Development Consultants, 2008)

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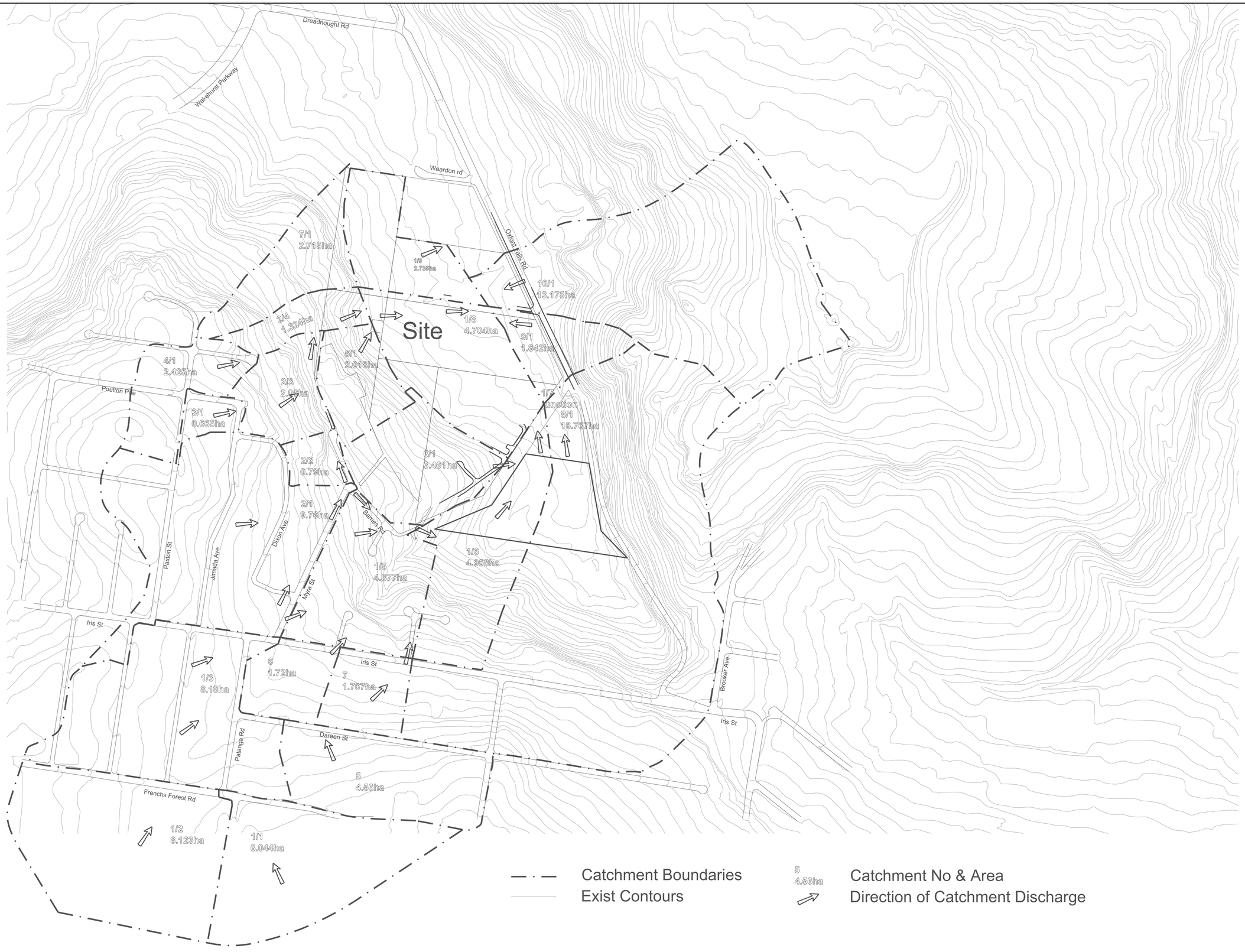

Issue	App	Date	Description

Client: TIFFANY DEVELOPMENTS

Designed by : TH

Date of Drawing : MAY 2005

Ratio (A1) : 1:3000

Datum : AHD

Origin of Levels :

Date of Survey : 2004

JMD Development Consultants

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Project : OXFORD FALLS RETIREMENT RESORT

CATCHMENT PLAN - DEVELOPED CONDITIONS

Sheet 1 of 1 sheets

Ref: 03508E6

Locality : FRENCHS FOREST

L.G.A. : WARRINGAH

CAD Ref: S:\~\eng\aug o8\O3508E6.DGN

FLOWS FROM BARNES ROAD ARE CURRENTLY DIRECTED TO ESCARPMENT. FLOWS COLLECTED BY PROPOSED ROAD DRAINS AND DIVERTED TO DRAINAGE LINE 1

EXIST. COUNCIL BASIN TO BE REPLACED AS INDICATED WITH DISCHARGE FLOWS FROM NEW BASIN TO BE DIRECTED TO DRAINAGE LINE1 WHICH WILL BE DIVERTED AROUND PROP. BUILDINGS

COUNCIL DETENTION TANK

ROOF WATER FROM BUILDINGS IN THIS AREA DIRECTED TO TANK - VOLUME & LOCATION SUBJECT TO FINAL DESIGN

DRAIN COLLECTS AND DIRECTS FLOWS TO DRAINAGE LINE 1

ROOF WATER FROM BUILDINGS IN THIS AREA DIRECTED TO TANK - VOLUME & LOCATION SUBJECT TO FINAL DESIGN

FLOWS FROM BARNES ROAD ARE CURRENTLY DIRECTED TO EXISTING GULLY AND DAM. NO CHANGE TO THIS PROPOSED AS A RESULT OF PROPOSED DEVELOPMENT

DRAIN COLLECTS AND DIRECTS FLOWS TO ACCESS RD DRAIN

PLAZA AREA DRAINS TO MIDDLE CREEK TRIB. VIA FILTER PITS

ROOF WATER FROM THIS BUILDING DIRECTED TO TANK - VOLUME & LOCATION SUBJECT TO FINAL DESIGN

FLOWS FROM EXISTING DAM TO BE DIVERTED TO DRAINAGE LINE 2

EXISTING DAM

FLOWS DIRECTED TO MIDDLE CREEK TRIB

EXTENT OF FLOODING OVER ADJOINING PROPERTY UNCHANGED

ACCESS TO OXFORD FALLS ROAD TO BE PROVIDED AS REQUIRED VIA BRIDGE STRUCTURES TO AVOID IMPACT ON FLOOD LEVELS

1% AEP EFL RL77.99
1% AEP DFL RL77.99

1% AEP EFL RL78.75
1% AEP DFL RL78.79

1% AEP EFL RL82.00
1% AEP DFL RL82.00

1% AEP EFL RL82.96
1% AEP DFL RL82.96

1% AEP EFL RL82.96
1% AEP DFL RL82.96

BARNES ROAD

WEARDON ROAD

OXFORD FALLS ROAD

DRAINAGE LINE 1

DRAINAGE LINE 2

TRIBUTARY

MIDDLE CREEK

EXISTING CREEK LINE

ROCK WALL

ROCK WALLS

EASEMENT

RIGHT OF WAY

5x 5/0.3/8 PLANE TREES

DENOTES EXTENT OF FLOODING IN 1% AEP STORM EVENT FOR PROPOSED DEVELOPED SITE

DENOTES EXTENT OF FLOODING IN 1% AEP STORM EVENT UNDER EXISTING CONDITIONS (PRE-DEVELOPED)

1% AEP EFL RL77.99 DENOTES EXISTING FLOOD LEVEL
1% AEP DFL RL77.99 DENOTES DEVELOPED FLOOD LEVEL

ARROWS INDICATE DIRECTION OF STORMWATER FLOWS

Revision	Date	Remarks
C	26-09-08	PLANS AMENDED
B	04-09-08	PLAN AMENDED TO INDICATE URBIS LAYOUT
A	29-3-06	INITIAL ISSUE

Client: TIFFANY DEVELOPMENTS
Origin of Levels: N/A
Date of Survey : VARIOUS
Ratio (A1) : 1:1000

Datum : AHD
Designed by : N/A
Drawn by : N/A
Approved for issue : TH 29-03-2006

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Project : PLAN DETAILING PROPOSED STORMWATER CONCEPTS FOR PROPOSED RETIREMENT RESORT DEVELOPMENT OVER LOTS 1110, 1111, 1113 & 1336 IN D.P.752038, LOT 20 IN D.P.842523 & LOT 80 D.P.846099 OXFORD FALLS ROAD, FRENCHS FOREST & EXTENT OF 1% AEP FLOOD UNDER DEVELOPED CONDITIONS

Locality : FRENCHS FOREST
L.G.A. : WARRINGAH

Sheet 2 of 2 sheets
Ref: 03508E7
CAD Ref: S:\DATA\OXFORD FALLS\ENG\aug08design\FLOOD-aug08.DGN

APPENDIX 6

DESIGN OF DROP ROCK STRUCTURES

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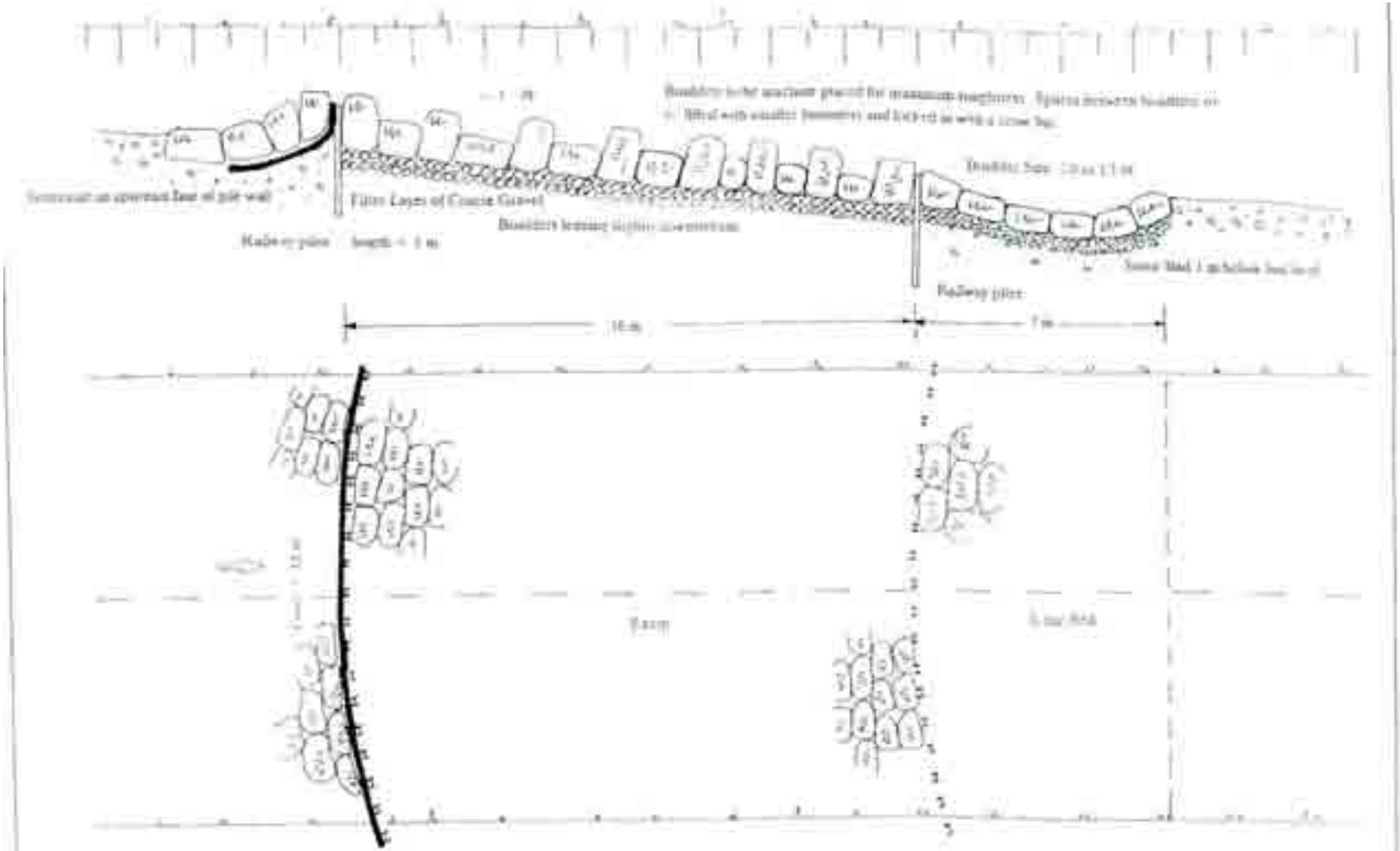

Figures 42 a
Schauberger Ramp (drawing based on sketch by Schauberger)

SCHAUBERGER RAMP

APPENDIX 7

WEED CONTROL TECHNIQUES

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WEED MANAGEMENT TECHNIQUES
FOR USE IN AREAS OF NATIVE VEGETATION RETENTION

Weeds are to be progressively removed in accordance with the following techniques recommended by the National Trust, NSW Department of Environment and Conservation and the Australian Association of Bush Regenerators.

Woody Weeds Removal Techniques:

Cut and Paint (Woody weeds to 10 cm basal diameter)

- Make a horizontal cut close to the ground using secateurs, loppers or a bush saw; and
- Immediately apply herbicide to the exposed flat stump surface.

Considerations:

- Cuts should be horizontal to prevent herbicide from running off the stump, sharp angle cuts are hazardous;
- Herbicide must be applied immediately before the plant cells close (within 30 seconds) and translocation of herbicide ceases;
- If plants resprout, cut and paint the shoots after sufficient re-growth has occurred; and
- Stem scraping can be more effective on some woody weeds.

Stem Injection

- At the base of the tree drill holes at a 45 degree angle into the sapwood;
- Fill each hole with herbicide immediately; and
- Repeat the process at 5 cm intervals around the tree.

Frilling or Chipping

- At the base of the tree make a cut into the sapwood with a chisel or axe;
- Fill each cut with herbicide immediately; and
- Repeat the process at 5 cm intervals around the tree.

Considerations:

- Plants should be actively growing and in good health;
- Deciduous plants should be treated in spring and autumn when leaves are fully formed;
- For multi-stemmed plants, inject or chip below the lowest branch or treat each stem individually; and
- Herbicides must be injected immediately before plant cells close (within 30 seconds) and translocation of herbicide ceases.

Small Hand-Pullable Plants Removal Techniques:

Hand Removal

- Remove any seeds or fruits and carefully place into a bag,
- Grasp stem at ground level, rock plant backwards and forwards to loosen roots and pull out, and
- Tap the roots to dislodge any soil, replace disturbed soil and pat down.

Considerations:

- Leave weeds so roots are not in contact with the soil, e.g. hang in a tree, remove from site or leave on a rock.

Vines and Scramblers Removal Techniques:

Hand Removal

- Take hold of one runner and pull towards yourself,
- Check points of resistance where fibrous roots grow from the nodes,
- Cut roots with a knife or dig out with a trowel and continue to follow the runner,

- The major root systems need to be removed manually or scrape/cut and painted with herbicide, and
- Any reproductive parts need to be bagged.

Stem Scraping
- Scrape 15 to 30 cm of the stem with a knife to reach the layer below the bark/outer layer, and
- Immediately apply herbicide along the length of the scrape.

Considerations:
- A maximum of half the stem diameter should be scraped. Do not ringbark,
- Larger stems should have two scrapes opposite each other, and
- Vines can be left hanging in trees after treatment.

Weeds with Underground Reproductive Structures Removal Techniques:

Hand Removal of Plants with a Taproot
- Remove and bag seeds or fruits,
- Push a narrow trowel or knife into the ground beside the tap root, carefully loosen the soil and repeat this step around the taproot,
- Grasp the stem at ground level, rock plant backwards and forwards and gently pull removing the plant, and
- Tap the roots to dislodge soil, replace disturbed soil and pat down.

Crowning
- Remove and bag stems with seed or fruit,
- Grasp the leaves or stems together so the base of the plant is visible,
- Insert the knife or lever at an angle close to the crown,
- Cut through all the roots around the crown, and
- Remove and bag the crown.

Herbicide Treatment – Stem Swiping
- Remove any seed or fruit and bag; and
- Using an herbicide applicator, swipe the stems/leaves.

Considerations:
- Further digging may be required for plants with more than one tuber,
- Some bulbs may have small bulbils attached or present in the soil around them which need to be removed,
- It may be quicker and more effective to dig out the weed,
- Protect native plants and seedlings, and
- For bulb and corm species the most effective time to apply herbicide is after flowering and before fruit is set.

Exotic vegetation should be removed and stockpiled in a clear area away from adjoining bushland. This stockpile should be removed from the site at a convenient time. As part of the regular maintenance of the restored area any re-growth of the exotic plant species should be removed and disposed of appropriately.

Use of Herbicides
Herbicides should not be applied prior to rain occurring. This reduces the herbicides effectiveness as well as being transported in runoff to creeklines and waterways.

An advantage of herbicide use is the low time taken to spray weeds as compared to physically removing them, particularly for large infestations of weeds.

Travers Environmental recommends that the use of herbicides should be considered when:

- there are small areas of dense weeds with few or no native plants to protect.
- there are large areas of weeds.

- the weeds are growing too rapidly for physical removal.

The spraying of weeds must only be undertaken by experienced persons with Chemcert or equivalent qualifications. The success of each treatment must be evaluated by the operator after a set period of time and re-applied (if necessary) according to the labelled effectiveness for each herbicide. Care must be taken when applying herbicides near drainage corridors to avoid excess use due to the sensitivity of the waterbodies into which runoff will eventually flow.

APPENDIX 8

BUSH REGENERATION SPECIFICATIONS

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REVEGETATION REQUIREMENTS

1 REVEGETATION OF DISTURBED AREAS

The revegetation of the site can be undertaken within highly disturbed areas with native species that are considered to be endemic to the local area. It is highly recommended that sufficient material is collected while plants are in seed (early in the calendar year).

In order to supplement the natural regeneration process and protect the soils from erosion it is proposed to plant and seed the disturbed and rehabilitated areas with appropriate indigenous tree, shrub and groundcover species in addition to the stabilising cover. All other vegetation, fauna habitats, groundcover, etc. on the site is to be retained in an undisturbed condition.

In selecting appropriate species for planting and seeding it was determined that the primary purpose of the revegetation was to establish a quick growing plant community which would provide sufficient canopy cover to enable establishment in later years of species typical of the conditions present throughout the site. Plant species diversity is expected to increase in later years through natural colonisation of suitable species into stabilised areas.

Revegetation of degraded areas is an integral part of the restoration process. Re-establishing vegetation can be undertaken via:

- Direct seeding
- Leaf litter / mulching
- Natural regeneration

Direct Seeding
Direct seeding is a quick and efficient method. The seeds germinate when conditions are suitable and at higher densities than those plants that are planted as seedlings. However, there are disadvantages to this method. The seed requires an exact temperature range to germinate and if this range is not met the seed will not germinate.

This method is only suitable to supplement direct planting for the revegetation of shrublayer and groundlayer species. That is, seeds should be used to supplement growth of understorey species that have been directly planted.

The density of planting of each species must be defined in order to revegetate the sites to a 'near natural' state. Species classified as trees are to be placed at 6 metre spacings, with the remainder of the 2 metre spacings to be planted with shrubs, which will allow each tree room to mature properly. Revegetation specifications outlining planting densities and methods are listed in Attachment 1.

Utilisation of Leaf Litter and Mulch
Another effective way of re-establishing native vegetation into an area is to collect bush litter from local healthy bushland that contains similar species to that which is desired within the revegetation area. This litter must be weed free and can then be scattered throughout revegetation areas over weed free soil. Beneficial micro-organisms and spores are transported to the soil via the mulch and aid in the regeneration process. Seeds of desired plant species can also be transported within this mulch / leaf litter which again aids the regeneration process.

It is recommended that as much vegetative material as possible be salvaged from the proposed development site prior to clearing. This material may be in the form of seeds, individual plants for transplanting or material to be used for mulch.

This method is suitable for use on the subject site and is to be used to cover all disturbed soil areas. The mulch shall be a minimum of 50 mm thick.

ATTACHMENT 1 – REVEGETATION SPECIFICATIONS

Timetable of Work

The Contractor shall provide a preliminary planting schedule which incorporates a draft timetable of works for the planting activities. This shall be submitted at the time of tendering. A final planting schedule shall be prepared in consultation with the Project Manager, and approved by the Project Manager within 14 days of award of Contract. This schedule should be designed to minimise the time the sites are exposed and take into account seasonal factors, availability of tubestock plants, and timing of construction works.

Site Preparation

Site preparation activities for all planting sites will include preliminary weed control, rubbish removal and (where necessary) minor earthworks (levelling, ripping). It is expected that any bare soil areas will be sown with a nurse crop to provide temporary soil stabilisation, and (where applicable) soil erosion control measures installed.

Plant Material

Plant material used to revegetate within the project area shall be sourced only from local bushland areas. Contractors are responsible for obtaining all necessary permits and licenses.

All plants are to be provided in a healthy condition. They must have good root development and a sturdy shoot system. Plant with an elongated or yellowed shoot system shall not be accepted.

Planting shall be undertaken immediately after delivery. If this is not possible, the Contractor shall be required to provide appropriate storage to keep the plants in good condition on the site, adequately protected from frost, wind, sun and vermin, and secured from vandals.

Planting Guidelines

PLANTING DENSITIES AND NICHE SPECIES

The Contractor shall be responsible for planting according to the Site Planting Plan prepared by the client. This Plan will detail the required species and their distribution across the bushland reconstruction and landscaping sites and will be supplied to the successful Contractor. The Contractor shall be responsible for ensuring planting densities and appropriate niche species.

Only locally indigenous plants will be used. Niche preferences shall be considered in planting, with plants being placed in the correct position with regard to soil type, moisture, aspect and slope.

Plantings should be at a density which will result in a near natural canopy density at all structural levels (strata). Plants will be placed at average 2-3 units/m^2 in order to achieve the following densities.

- Canopy Trees @ 1 unit / 5m^2
- Sub-canopy (small trees / large shrubs) @ 1 unit / 2 m^2
- Shrubs @ 1 unit / 1.5 m^2
- Grasses and Ground Covers @ 1 unit / m^2
- To achieve a planting density of 5 units/m^2, the grasses and groundcovers should be increased to 3 units/m^2

PLANTING METHODS

Planting holes shall be excavated to a depth of 150 mm and a diameter of 200 mm. Slow-release native plant fertiliser (low phosphorous formulated native plant fertiliser tablet/granules) shall be placed into the planting hole. In poorly structured soils, approximately 200 cubic centimetres of native plant soil mix is to be placed and incorporated into the planting hole with fertiliser and water storing granules.

Plants must be placed into moistened soil preferably by soaking 1-2 litres of water into each hole. After planting the soil shall be replaced and carefully firmed, leaving a slight depression around each plant to allow for water collection. Soil is to be replaced in the hole so that the base of the stem is level with the soil surface, not set below the soil, or sitting above.

All plants are to be thoroughly watered before planting and again after planting. If the weather is hot, a third watering shall be carried out within two (2) days or a t-tape or drip irrigation system set up to water plants on a weekly basis.

PLANT PROTECTION

The Contractor shall be responsible for adequately protecting plant material from frost, wind, sun, vermin and animals. Two (2) Litre cardboard guards (including 2 stakes) shall be placed around each plant and maintained throughout the maintenance period of up to 3 years. The use of Jute mats (mulch mats) is recommended where annual or grass regrowth is expected.

MULCHING

After planting, the exposed ground should be thickly mulched with low-nutrient mulch such as chipped eucalyptus. A depth of approximately 75 mm and a diameter of 400 mm around each plant are recommended. No exotic plant material is to be used. Pine bark is not considered to be a suitable mulch material. The provenance of all mulch material must be known and approved by the Project Manager.

Mulch is not to be used in sand dunes ecosystems as the mulch inhibits plant establishment and provides a nutrient source for the growth of weeds in dune ecosystems.

Care should be taken to keep mulch material away from the stems of the newly planted tubestock. Alternatively, a light sowing of a suitable nurse crop (Rye Corn or Japanese Millet) can be made between plantings to provide a protective microclimate. Sowing rates to be used are those recommended by the supplier and agreed with the Project Manager.

MAINTENANCE AND WEED CONTROL

Tube stock must be suitably maintained (watering and weeding) are to be maintained over a 3 year period on the following basis:-

- 1-3 months post planting – weekly watering and maintenance.
- 4-12 months post planting – monthly watering and maintenance.
- 13-36 months post planting – quarterly watering and maintenance.

During the maintenance phase any plant losses in excess of 15% of the total number planted must be replaced at the expense of the Contractor.

Site maintenance shall consist of the following tasks:

- Weeding throughout the planting area
- Watering tubestock
- Replacing lost plants (as required)
- Removing wind-blown or other rubbish from the planting area

The Contractor shall provide a preliminary maintenance schedule which incorporates a timetable of works for each of the activities listed above.

1.1 GENERAL DESCRIPTION OF WORK

This document outlines the general principles to be used in a bush regeneration and rehabilitation program. The term bush regeneration includes both weed control and re-vegetation (planting) in bushland and semi-bushland areas.

1.2 DEFINITIONS

Bush regeneration is defined as "the practice of restoring bushland by focusing on reinforcing and reinstating the ecosystem's on-going natural regenerative processes (Australian Association of Bush Regenerators).

1.3 AIMS OF BUSH REGENERATION

To create an environment where native plants are able to re-colonise degraded/cleared areas

- To restore degraded areas far as possible, to viable, manageable ecosystems.
- To protect the bushland from further external disturbance events.
- To preserve and enhance local and regional biodiversity.
- To enhance and extend habitat for native fauna.
- To protect the site's special features (natural, geological, landscape and cultural).

1.4 PROCESS

The Bush Regeneration process involves:

- *Primary Weeding* - initial weed clearance, through hand weeding and/or the use of herbicides.
- *Secondary or Follow-up Weeding* - maintenance of sites which have already received primary weeding.
- *Maintenance weeding* - monitoring/removal of weed re-growth and care of native plant seedlings (naturally occurring and planted).
- *Re-vegetation* - the use of locally indigenous species to restore an area via tubestock planting, direct seeding, transplanting and/or brush matting.

In areas where degradation has been serious enough to severely deplete or extinguish native regenerative capacity, it may be necessary to reconstruct or fabricate a plant community as close as possible to the original. This will involve a variety of techniques, including weeding, soil remediation, planting and on-going site maintenance. Scale-scale soil stabilisation, earthworks, and remedial drainage works are often required.

1.5 WEED CONTROL

Weed removal shall include any species likely to significantly invade bushland, prevent natural regeneration, or impede native seedling growth. Priority shall be given to species listed as 'noxious plants' in Warringah LGA in the Schedules of the *NSW Noxious Weeds Act 1993*.

1.6 WEEDING TECHNIQUES

See Appendix 7 for detailed weed control techniques. Within the bush regeneration context weed control is described as the removal or control of weeds using hand removal and/or the application of

selected herbicides. In specific circumstances, the use of machinery is used when the extent of the infestation is very large and will not cause significant erosion or destabilisation. Weeding techniques should be appropriate to the weed type, growth form and to the existing site conditions.

Wherever possible, weed removal should be carried out prior to annual seed set. Herbicide application via stem injection or foliar spray must not be applied to plants bearing ripe or semi-ripe fruit. It is important to plan herbicide control of target species according to a weeding calendar that recognises the weed's life form and seasonality (i.e. flowering, fruiting and seed set).

The techniques and methodologies used for bush regeneration shall conform to those identified in the National Trust Bush Regenerators Handbook (1991) and currently taught through the NSW TAFE Bushland Regeneration Certificate Course.

1.7 LABOUR

Bush regeneration work shall be carried out in a competent manner by experienced and qualified bush regenerators. A minimum 50% of the workforce must have completed a TAFE Bushland Regeneration Certificate Course or equivalent, and have suitable field experience (e.g. Minimum 200 hour's prior employment as a bush regenerator).

In assessing tenders, preference will be given to bush regeneration contractors with prior experience in the rehabilitation of bushland in the Western Sydney Region.

1.8 USE OF HERBICIDES

The herbicide of choice for bush regeneration work is glyphosate (Roundup). Roundup Biactive shall be used in wet areas (e.g. drainage corridors, sediment basin).

The Contractor shall not use any other herbicide or chemical without the written consent of the Project Superintendent or their appointed representative.

Unless otherwise agreed with the Project Superintendent, herbicides application shall be limited to the following techniques:

- Cut-stump and poison (cut and dab)
- Stem injection
- Stem-scrape and poison
- Basal bark painting
- Selective spot-spraying

1.9 MULCH AND CUT BRUSH

Any mulch imported onto the site shall be weed-free eucalyptus leaf mulch or woodchip. Mulch from Privet, Camphor laurel, Coral Tree, Poplar, Willow, aquatic or declared noxious weeds are not to be used. The Contractor shall ensure that any mulch used is properly composted before use.

Brush cut for erosion control and/or re-vegetation purposes shall be used only when cut branches are seed-laden. Branches shall be spread as quickly as possible to reduce seed loss during stockpiling. The collection of cut brush shall be limited to species occurring naturally in the bushland area. Collection sites are to be agreed between the land owner and the Project Ecologist prior to any collection of brush.

1.10 WEED DEBRIS AND RUBBISH

Disposal of weed debris and other rubbish generated as a result of the work shall be the responsibility of the Contractor. Costs for disposal of rubbish (collection and tipping fees) shall be clearly stated in the tender proposal.

Disposal of weed material via burns piles is permitted only after approval has been obtained from the Project Superintendent. Any burning must be carried out as advised by the Environment Protection Authority and NSW Fire Brigade.

1.11 SOIL EROSION

Where bush regeneration works have the potential to destabilise slopes or embankments, action such as the use of fibre matting and/or the placing of logs across the slope and fixing in place shall be employed to minimise the problem. Erosion matting and/or silt fencing may be required in a number of sites. These sites are to be identified in the tender document and allowance made for the purchase and placement of erosion control matting.

1.12 CONSTRUCTION OF BUSHLAND (PLANTING)

It is expected that the proposed development will require replanting due to the level of disturbance as a result of weed invasion.

The Contractor may be required to supply a set number of endemic (locally occurring native) plants to be used in the bushland reconstruction or other landscaped areas. All plant material used on-site shall be grown from seed or cuttings collected in local bushland.

Plant material may be supplied as tubestock, hykos or virocells depending on the species and planting conditions. The method of delivery should be clearly stated in the tender documents.

HOW TO COLLECT NATIVE PLANT SEED RESPONSIBLY (VERSION 1)

To select seeds that will grow into plants that are best adapted to local conditions, collect seed from near the area where it is proposed to do the planting. If there are no suitable native species immediately nearby, then collect seed from as close as possible and from the same general habitat (same soil type, distance from watercourse, exposure etc.). The more similar the habitat, the greater the likelihood of the propagated seedlings being suitable for the planting site. As a guide, plants within about a 3 km radius can be considered satisfactory.

Seed collected from too far away may not be adapted to the local conditions and may introduce new genes to the site, thereby altering local genetic integrity.

There is one exception to the "local" rule. If the population of any of the native species has fallen to a very low level (eg. less than ten individuals of any species), then *for those species* it is advisable to supplement that seed with collections from elsewhere (but as close as possible) to ensure that there is sufficient genetic diversity to minimise the potential for inbreeding.

Where there are no native species left in the area, and no reasonable stands of native species within 3 km, then the site will probably be better treated as a garden and plants could be obtained from commercial sources. Even so, seed derived from closer to the site is preferred over seed collected further away.

Principles to follow when collecting native plant seed:

(a) Before collecting, obtain any necessary permit from National Parks &Wildlife Service and seek permission from the land owner (private, council, Crown Lands, etc.).
(b) Collect seed from as many different plants of the same species as possible (minimum of 5).
(c) Collect seed from plants of varying vigour, but not individuals with obvious disease symptoms.
(d) Collect seed from plants with different growth forms (straight, branching, straggly etc.).
(e) Try to maintain at least 100 m between each parent of the same species, but do not collect only from the edges of a population and always include the central areas in the collection.
(f) Do not strip plants of seed - collect no more than about 20 % of seed from any one tree.
(g) Collect from various parts of each plant and collect equal amounts of seed from each plant.
(h) If possible, avoid collecting from solitary plants and concentrate on stands or groups of plants (this is to minimise the risk of collecting self-pollinated seed).
(i) Label seed containers: *species name, location, date collected, collector's name, how many plants collected from* - and preferably: *position in the landscape (e.g. water's edge), % of ripe seed, soil/geology, plant associations, aspect/altitude/slope, weeds present.*
(j) Dry out seed and store in a cool and dry place (a refrigerator is ideal) in air-tight containers.

Source: Royal Botanic Gardens Sydney, Greening Australia (NSW) & "Seed Collection of Australian Native Plants" (Ralph, M., 1994).
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