



Northern Beaches Health Service Redevelopment
A new wave in healthcare

Northern Beaches Hospital

Stage 1: Concept Design, Site Clearance & Preparatory Works

Appendix L

Soil and Water Management Plan



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Northern Beaches Hospital

Soil and Water Management Plan

Site Clearance & Preparatory Works

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I Introduction

I.1 Background

This Soil and Water Management Plan (SWMP) has been prepared as a supporting document for the Stage 1 environmental assessment for the Northern Beaches Hospital (NBH) development as required by the Director General's requirements.

The SWMP has been prepared with reference to *Managing Urban Stormwater – Soils and Construction*, 4th Edition (Landcom 2004), and would be implemented with reference to the site clearance and preparatory works on the hospital site.

This SWMP identifies best management practices for soil and water management during the site clearance and preparatory works. Best management practice provides design considerations to keep sediment as close as practicable to its source.

It will be the Managing Contractor's responsibility to ensure that the design of the sedimentation and erosion control works for the site accords with the SWMP.

I.2 Site location

The site is located at Frenchs Forest, and is bounded by Frenchs Forest Road West, Wakehurst Parkway, Warringah Road and The Forest High School. There is a public road (Bantry Bay Road) that presently runs through the site, generally parallel to Wakehurst Parkway. This road would be closed to public access as part of the site clearance and preparatory works (refer Section I.3).

The hospital site is shown in the context of the broader hospital precinct in Figure 1.

I.3 Description of the site clearance and preparatory works

The site clearance and preparatory works would broadly comprise:

- Establishment of site office, including temporary connection to services (water, sewer, power)
- Closure of Bantry Bay Road to the public and establishment of construction traffic management controls
- Removal of existing temporary fencing and installation of construction fencing
- General clearance of site vegetation including tree stumps, but with retention of the area of vegetation broadly consistent with the former Blinking Light Reserve at the eastern end of the site
- Thinning of the understorey in the aforementioned area of vegetation
- Chipping of cleared vegetation (excluding weed species) to use on site for ground stabilisation/erosion control in the period prior to commencement of Stage 2
- Offsite disposal of surplus cleared vegetation to green waste recycling facility or other beneficial reuse
- Removal of foundations, concrete pads, etc associated with former buildings and subsequent disposal of these materials to an appropriate receiving facility

- Site stabilisation (such as establishment of erosion and sediment controls) in preparation for Stage 2.

Areas previously occupied by buildings may be used for activities such as temporary storage of plant and equipment, and for workforce personnel vehicle parking. No stockpiling of cleared/chipped vegetation would be permitted in these areas in order to avoid any risk of contamination with unsuitable material (eg demolition materials).

Following completion of the site clearance and preparatory works, ongoing site management would be undertaken up to commencement of Stage 2. This would largely relate to maintaining erosion and sedimentation controls, managing the potential for dust emissions, and limiting regrowth in cleared areas. This SWMP applies to this period as well as the site clearance and preparatory works.

1.4 Objectives and goals

The objectives of the SWMP are as follows:

- To effectively manage the risk for mobilisation of unconsolidated material to air and drainage pathways consistent with *Managing Urban Stormwater – Soils and Construction*, 4th Edition (Landcom 2004)
- To inform preparation of the erosion and sediment control plan(s) for the site clearance and preparatory works with respect to required performance outcomes (preparation of the plan(s) to be managed by the Managing Contractor)
- To effectively manage the risk of prosecution with respect to Section 120 of the *Protection of the Environment Operations Act 1997*.

The goals of the SWMP are as follows:

- The hospital site is effectively stabilised following vegetation clearing such that there are no dust emissions or sediment exported from the site (with reference to the adopted design rainfall event)
- Runoff from the site is of a suitable quality for disposal to stormwater drains or natural drainage lines
- The site is appropriately maintained with regard to erosion risk in the period between completion of the site clearance and preparatory works and commencement of the Stage 2 works
- There are no material impacts on nearby receivers or sensitive environments.

1.5 Relationship to other site management documents

Preliminary Construction Management Plan

The separate Preliminary Construction Management Plan (CMP) establishes the overarching context for the effective management of the site in relation to the site clearance and preparatory works, and will be a key guidance document for the preparation of the final CMP by the Managing Contractor. This SWMP will effectively comprise a sub-plan to the final CMP.

Waste Management Strategy

The separate Waste Management Strategy addresses the effective management of waste streams arising from the site clearance and preparatory works. The Strategy provides for the chipping of cleared vegetation on site and use as a mulching agent to assist in managing erosion risk associated with cleared areas.

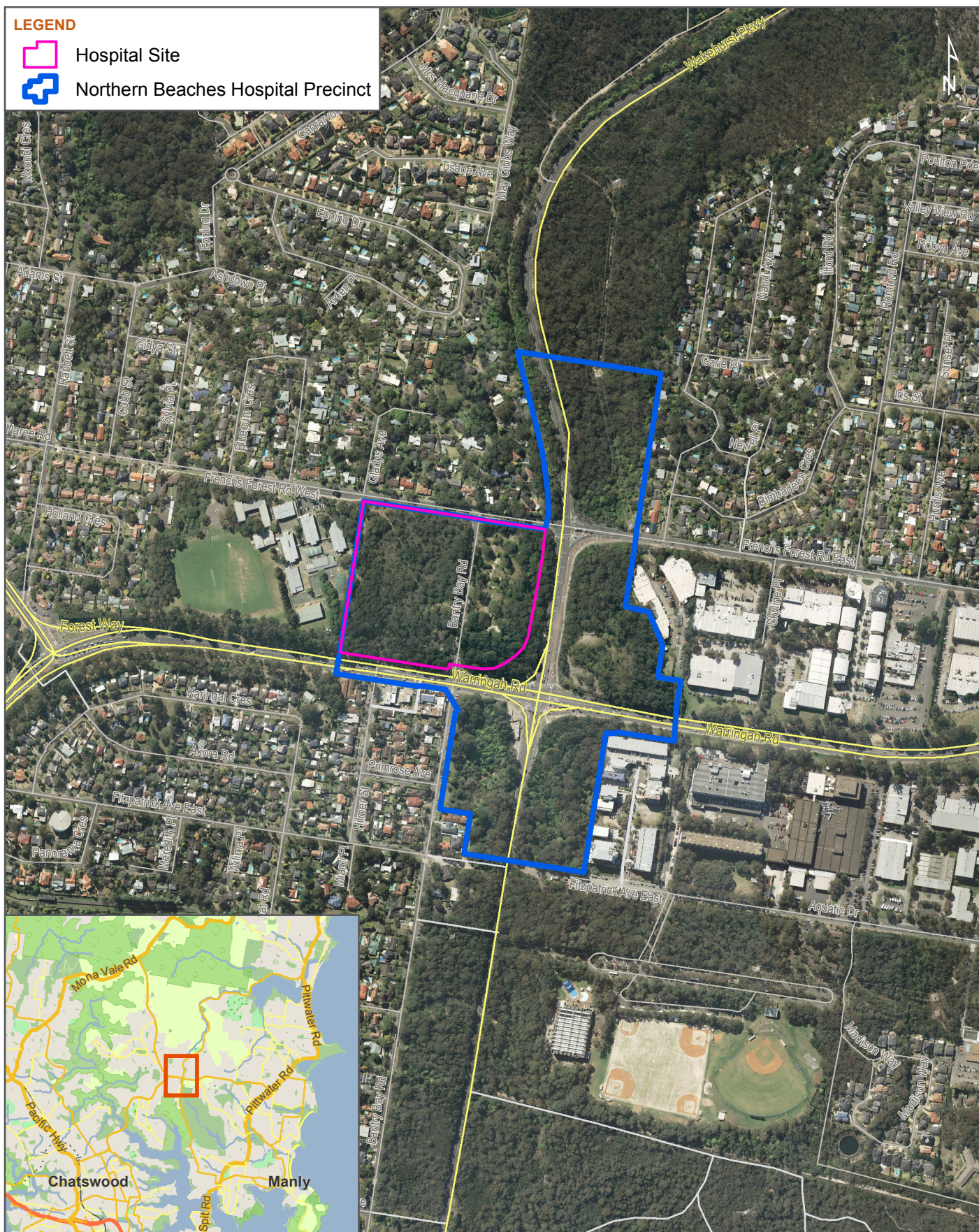
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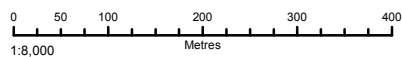
Hospital Site



Northern Beaches Hospital Precinct



DATE 07/11/2012



PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1

FIGURE TITLE Project Location

PROJECT NO. 30011256

PROJECT TITLE Northern Beaches Hospital Stage 1 EIS

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2 Overview of Site Clearance and Preparatory Works and Potential Impacts

2.1 General sequencing of site clearance and preparatory works

In general, works would be undertaken in the following sequence:

1. Establish stabilised site access in a location(s) nominated by the Managing Contractor and in accordance with any relevant engineering specification(s)
2. Establish delineation of areas where site clearing is to be undertaken and 'no go' areas (eg by installation of temporary fencing)
3. Install sediment fencing and other required controls to meet the requirements of the SWMP
4. Install sediment control protection measures at all natural and built drainage structures, and maintain until all disturbed areas are stabilised
5. Establish controls as required to divert clean water (running on to the site) around disturbed areas
6. Implement dust generation control measures in accordance with the SWMP
7. Establish erosion and sediment control measures for disturbed areas in accordance with the guidance provided in the SWMP
8. Clear vegetation (including stumps) within designated work area(s)
9. Chip cleared vegetation and apply mulch to disturbed areas where clearing works have been completed; temporary stockpiles of chipped vegetation should be located away from drainage paths and any required temporary stabilisation measures implemented

Sediment control elements would be inspected regularly, including after significant rainfall events, and cleared of sediment before the design capacity is reached.

2.2 Potential impacts

Potential impacts relate to the mobilisation of unconsolidated material (soils, vegetation) from wind or rainfall/runoff. Spills of hazardous materials such as fuel is another potential risk. The nature of these is characterised briefly in Table 1 (following page).

Potential impacts include:

- Deposition of material on local roads
- Degraded downstream water quality from increased levels of suspended sediments and nutrients
- Sedimentation in receiving drainage lines and water bodies
- Negative effects on biodiversity
- Soil/groundwater contamination
- Reduced amenity from dust deposition.

Table 1 Impact sources, pathways and receivers

Source	Pathway	Receiver
Eroded soil, other particulate matter	Formal and informal drainage pathways	• Down-gradient waterbodies (Middle Creek and Narrabeen Lagoon) • Local roads
Hazardous material spill	Formal and informal drainage pathways Soil water column	• Offsite surface water bodies • Local soils • Groundwater
Dust from exposed ground	Atmosphere	• Residents • Staff and students of The Forest High School • Users of open space (eg Brick Pit Reserve) • Business owners and patrons • Road users

3 Site Analysis

3.1 Site constraints and characteristics

Table 2 summarises the design parameters assessed for the hospital site with respect to management of erosion risk associated with rainfall and runoff, as per *Managing Urban Stormwater – Soils and Construction*, 4th Edition (Landcom 2004).

Table 2 Adopted design parameters

Design parameter	Value	Reference
Rainfall erosivity (R-factor)	3500	Appendix B – Map 10
Soil erodibility (K-factor)	0.018 - 0.023	Table C20 – Lucas Heights (lh)
Length/slope gradient factor (LS)	C1* – 0.91 C2 – 0.41 C3 – 0.65 C4 – 0.65 C5 – 1.02	Table A1
Erosion control practice factor (P-factor)	1.3 (compacted and smooth)	Table A2
Cover factor (C-Factor)	1.0 (during site clearing) 0.1 (post site clearing)	Table A3
Calculated soil loss, A (RUSLE equation) t/ha/yr	C1 – 174 C2 – 78 C3 – 124 C4 – 124 C5 – 194	$A = R K L S P C$
Soil loss class (1 Low to 3 High)	C1 – 2 C2 – 1 C3 – 1 C4 – 1 C5 – 2	Table 4.2
Soil hydrologic group	Group D	Table C20 – Lucas Heights (lh)
75 th percentile 5-day rainfall event	29.0 mm (Mona Vale)	Table 6.3a
Volumetric runoff coefficient (Cv)	0.64 (Group D)	Table F2

* C1-5 refers to catchment identified on Figure 2

3.2 Erosion and sediment control components

Based on a consideration of site characteristics and local topography, the site has been subdivided into five catchments (Figure 2).

The need for sediment basins has been considered in the preparation of the SWMP. This was conducted on a rate per hectare of disturbed area basis with preliminary sizing of basins undertaken in accordance with *Managing Urban Stormwater–Soils and Construction* for Type D soils. In this regard, the following is noted:

- The disturbed area within a catchment at any one time should be limited to an area for which each sediment basin if required can handle
- The sediment basin size assessment has been considered with regard to accommodating the 75th percentile of a five day continuous rainfall event
- Preliminary catchment calculations provided soil loss figures ranging from 78–194 t/ha/year. This range is below the best management practice identified basin trigger criterion of less than 200 tonnes per year. As such, provision of a sediment basin can be considered unnecessary, and alternate measures may be employed to protect receiving waters.
- The soil loss equation results are consistent with the low erosional hazard where the normal suite of erosion control measures are considered appropriate and, matched with appropriate project staging, would achieve appropriate water quality for runoff leaving site.

An erosion and sediment control plan (ESCP) would be developed prior to the commencement of the site clearance and preparatory works. This would be the responsibility of the Managing Contractor. The ESCP would be reviewed at the completion of the site clearance and preparatory works and revised as required to address site management requirements for the intervening period between completion of the site clearance and preparatory works and commencement of Stage 2 in 2015.

3.3 Land disturbance

- Where practicable, the soil erosion hazard should be minimised
- Limitations on access within and to/from the site would generally be in accordance with Table 3.

Table 3 Access limitations

Land Use	Limitation
Access areas	Site access would be limited to the designated work zones only.
Truck cleaning area	Prior to leaving the site all trucks should be thoroughly cleaned to limit the risk of distribution/exportation of soil and sediment on to the surrounding public roads.
Remaining site (undisturbed areas)	Entry would be restricted to any remaining (undisturbed) sections of the site. Access would only be permitted with permission from the Project Manager and/or site Superintendent, to allow actions such as thinning of growth in the interests of fire protection and/or flora and fauna management.



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FIG NO. 2	FIGURE TITLE Catchments and flow direction	PAGE SIZE A3	
PROJECT NO. 30011256	PROJECT TITLE Northern Beaches Hospital Stage 1 EIS		
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4 Management

4.1 Mitigation and management principles

The following general principles would apply to the site clearance and preparatory works:

- Minimise the extent of ground disturbance at any one time across the site
- Progressive stabilisation of exposed ground once clearing is completed
- Control clean water running onto and through the site
- Implement appropriate erosion control strategies to prevent dust emissions and movement of sediment-containing runoff off the site
- Monitoring of management controls and implementation of remedial works as required to maintain required efficiency.

This SWMP should be read in conjunction with any relevant plans or specifications that may be issued in relation to the site clearance and preparatory works.

The Managing Contractor and all site personnel should ensure that all soil, water and dust management works are undertaken as directed in this SWMP and implemented consistent with relevant matters specified in *Managing Urban Stormwater – Soils and Construction*, 4th Edition (Landcom 2004).

The Managing Contractor should ensure that all subcontractors working on the hospital site are informed of their responsibilities to minimise the potential for soil erosion and potential pollution of down gradient areas and for dust impacts on neighbouring sites.

4.2 Erosion control

Erosion control measures would include, but not be limited to, the following:

- Vehicle access to the site would be limited to that required for site clearance and preparatory works
- Vehicles would enter and exit the site through designated entry and exit points
- Unless otherwise approved by the Managing Contractor, all vehicles are to park in the designated parking area(s)
- Progressively spread chipped vegetation to provide soil stability on bare areas as soon as practicable following completion of clearing activities
- Notwithstanding the above, a disturbed areas are to be stabilised within seven (7) working days of completion of vegetation clearing
- The ground cover factors for the period between completion of the site clearance and preparatory works and commencement of Stage 2 should be managed so they do not exceed the limits in Table 4 (following page).

The Managing Contractor would assess the need for any additional erosion control measures as part of design development for the ESCP.

Table 4 Ground cover factors for site in period between site clearance and preparatory and Stage 2

Location	Maximum C-factor	Comments
Waterways and other areas of concentrated flows, post construction	0.05	Applies after 10 working days of completion of formation and before concentrated flows are applied. Foot and vehicular traffic is prohibited in this area and 70% ground cover is required.
Stockpiles - Post Construction	0.10	Applies after 10 working days from completion of formation. 60% ground cover is required.
All land, including waterways and stockpiles, during construction.	0.15	Applies after 20 days of inactivity, even though works may be incomplete. 50% ground cover is required.
Wood fibre mulch	0.01	Applies after 20 days of inactivity, even though works may be incomplete. 50% ground cover is required

4.3 Sediment control

Sediment control measures would include, but not be limited to, the following:

- Appropriate silt fencing would be installed in accordance with the ESCP and elsewhere at the discretion of the Managing Contractor to contain coarser sediment fractions as near as possible to their source
- Sediment removed from any trapping device should be relocated so that risk of pollution to down-gradient areas and waterways would be avoided or minimised
- Stockpiles would be located by the Managing Contractor in accordance with the ESCP
- Runoff should be prevented from entering permanent drainage systems unless it is free of sediment. Drainage pits would be protected in accordance with the ESCP
- Use of chipped vegetation as a mulch to provide a protective cover for the soil surface and prevent erosion of unconsolidated material.

While most erosion control techniques are satisfactory under sheet flows conditions (eg wood chip mulches), special measures are essential under concentrated flow conditions. For example, where jute mesh is used it, should be sprayed with an anionic bitumen emulsion for extra stability in areas where concentrated runoff might occur.

The Managing Contractor would assess the need for any additional sediment control measures as part of design development for the ESCP.

4.4 Dust control

There is potential for dust impacts on receivers in close proximity to the works (refer Figure 3) if works are not appropriately managed.

Anticipated dust sources and dust-generating activities would include:

- Areas of cleared vegetation within the site
- Soil deposited on access routes within the site
- Vehicle and mobile plant movements on paved and unpaved areas within the site
- Clearing of vegetation and removal of stumps
- Chipping of cleared vegetation.

The pattern of dispersion of fine particulate matter would depend on meteorological conditions present during the works. During certain weather conditions, such as dry and windy conditions, the risk of particulate emissions would be higher and would require appropriate management measures.

Emissions associated with operation of plant and equipment are not anticipated to be a significant issue with regard to local air quality. This notwithstanding, the Managing Contractor would ensure that all plant used on site has been maintained in accordance with manufacturers' recommendations. Idling of plant would also be minimised.

Measures to minimise air quality impacts on sensitive receptors (ie school, surrounding residents and businesses) both during and following the site clearance and preparatory works together with the resources required to implement them and the timeframe and responsibility for implementation are contained in Table 5 (following page).

It should be noted that this is not an exhaustive list and it would be the responsibility of the Managing Contractor to confirm the suitability of these measures, the associated required resources, the timing of implementation, and whether any additional measures would be required.

4.5 General site management

The Managing Contractor (or delegate) should inspect the site at least weekly and should:

- Ensure that all drains are operating effectively and shall make any necessary repairs
- Remove any spilled material from area subject to runoff or concentrated flow
- Remove trapped sediment where the capacity of the trapping device falls below 60%
- Construct additional erosion or sediment control works as may be appropriate to ensure the protection of down-slope lands and waterways
- Maintain erosion and sediment control measures in a fully functioning condition at all times until the site is released to the Hospital Operator for Stage 2.

Table 5 Air quality management measures and implementation framework

Measure	Resource Required	Timing
Methods for management of emissions will be incorporated into project inductions, training and pre-start (toolbox) talks.	Induction, training and pre-start training packages to include dust and air quality prevention and management.	Prior to start of works During works
Activities with potential to cause significant emissions would be identified in the CMP. All works and activities occurring at the site would be carried out in a manner that would minimise dust generation.	Work method statements to consider dust and air pollution minimisation.	Prior to start of works During works
Limit vehicle movements to designated entries and exits, haulage routes and parking areas. Site exits would be fitted with appropriate measures to limit the amount of material transported off-site (where required).	Signage to indicate designated transport routes. Hardstand, rumble grids and other physical measures.	During works
Visually monitor dust and where necessary implement the following measures: ▪ Apply water (or alternate measures) to exposed surfaces that are causing dust generation. Surfaces may include unpaved roads, stockpiles, hardstand areas and other exposed surfaces (for example recently graded areas). ▪ Appropriately cover loads on trucks transporting material to and from the construction site. Securely fix tailgates of road transport trucks prior to loading and immediately after unloading. ▪ Prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces.	Water cart/s Tarps or fitted truck covers Vehicle wheel wash / rumble grids etc	During works
Limit the area and duration of exposed or unconsolidated areas. For example, stage vegetation stripping to maintain vegetation as long as possible prior to clearing, revegetate as soon as possible (including use of interim sterile cover corps), cover unconsolidated stockpiles, or apply hydro mulch or other site sourced mulch to stockpiles or surfaces left standing for extended periods.	Appropriate revegetation stock Covers / hydro mulch	During works
Cease works when conditions are excessively dusty until dust suppression can be adequately carried out.	Water cart(s) System for checking & communicating meteorological conditions	During works



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FIG NO. 3	FIGURE TITLE Catchments and potential dust extent	PAGE SIZE A3	
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