



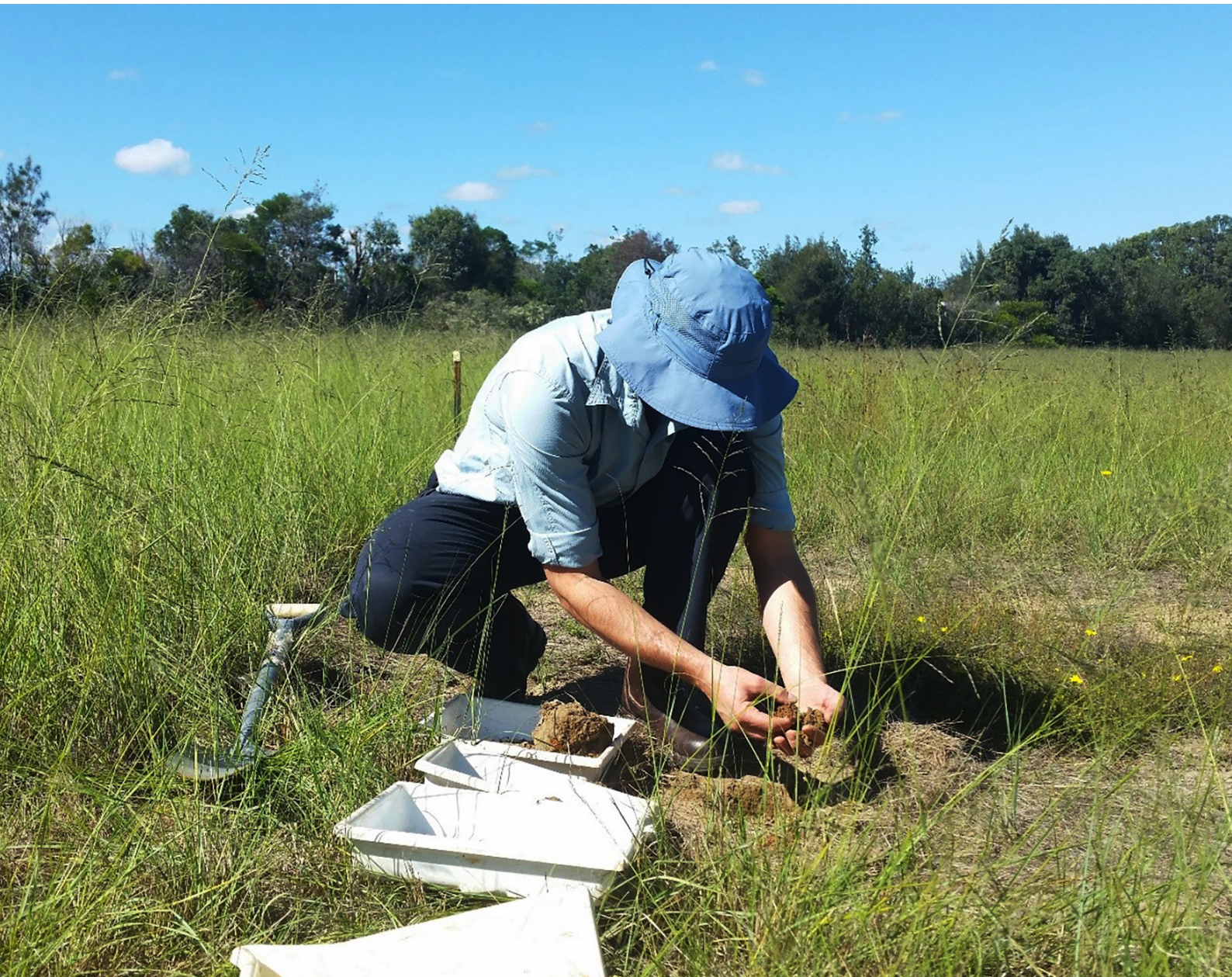
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OFFICE OF ENVIRONMENT & HERITAGE

# Soil investigation for the *Hibbertia* sp. Bankstown translocation project

Identifying favourable new sites for a critically endangered species



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Cover photography: OEH soil scientist Mark Young investigating the soil at the *Hibbertia* sp. Bankstown source area. G Steenbeeke/OEH.

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ISBN 978 1 925753 51 6  
OEH 2018/0186  
June 2018

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One of the most endangered plant species in NSW is *Hibbertia* sp. Bankstown, found only on a small area of already disturbed land near Bankstown Airport. A key action to prevent extinction of this species is to find compatible areas nearby into which it can be translocated, but the locally unique characteristics of the soil on which the species grows make successful translocation a challenge. With a detailed soil investigation, we assess the suitability of available areas and recommend the most promising locations for translocation.

## 1. Background

‘...known only from Tertiary alluvial soil along Airport Creek on Bankstown Airport and not from areas where subsequent fill has been deposited in between.’

Toelken and Miller (2012)



*Hibbertia* sp. Bankstown.  
Photo: Greg Steenbeeke/OEH

### 1.1 A critically endangered species

The yellow-flowered, prostrate shrub *Hibbertia* sp. Bankstown (*Hibbertia puberula* subsp. *glabrescens*) is listed as a critically endangered species under both the NSW *Biodiversity Conservation Act 2017* and the National *Environment Protection and Biodiversity Conservation Act 1999*. The species is endemic to NSW and is currently only known in a single population of fewer than 50 individuals covering 2 hectares at Bankstown Airport in Sydney’s southern suburbs.

The location of *Hibbertia* sp. Bankstown is at the north-western end of the airport, confined between the airfield, surrounding suburbs and a golf course. The area is very heavily modified from its natural state – it has been completely cleared, lacks canopy species and currently consists of a low grass/shrub association with many pasture grasses and other introduced herbaceous weeds.

Because its geographic distribution is so restricted and precarious, and because of the extremely low number of mature individuals, *Hibbertia* sp. Bankstown has been listed as critically endangered since 2010.

### 1.2 Survival through translocation

One of the recommendations from the Approved Conservation Advice (2008) for *Hibbertia* sp. Bankstown is to establish additional populations through translocation to other favourable locations, if such locations can be identified.

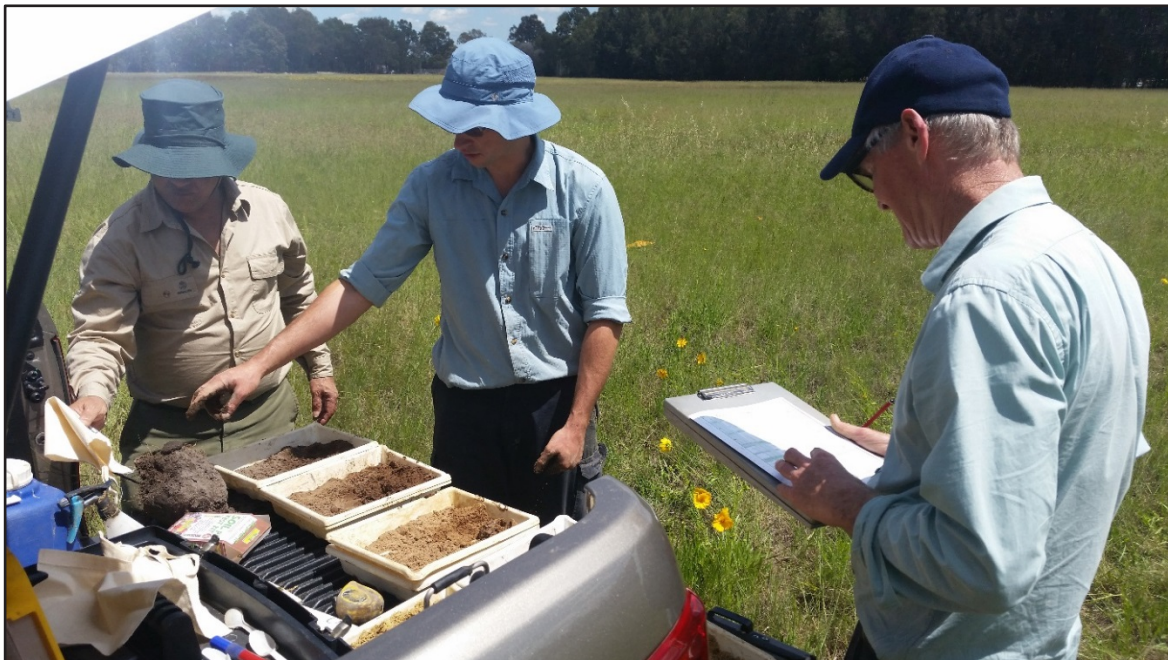
To extend the range of *Hibbertia* sp. Bankstown and better assure its survival, OEH’s Regional Operations Division (Greater Sydney branch) has collaborated with the City of

Canterbury Bankstown and Liverpool City Council to identify five possible translocation areas.

Regional Operations Division requested assistance of the Assessment Team (Ecosystem Management Science branch, Science Division) to provide existing soil information that would allow the suitability of soils in the five proposed translocation areas to be assessed.

Since no actual area-specific data for the source location and translocation areas existed, the Assessment Team carried out detailed investigations. A sixth translocation area was subsequently made available by Sydney Metro Airport Bankstown, on the eastern side of the Bankstown Airport site. This location was also investigated.

The location of the source and translocation areas are shown in Figure 2.



**Figure 1** Describing the soil at site 1, in the *Hibbertia* sp. Bankstown source area. Photo: Greg Steenbeeke/OEH

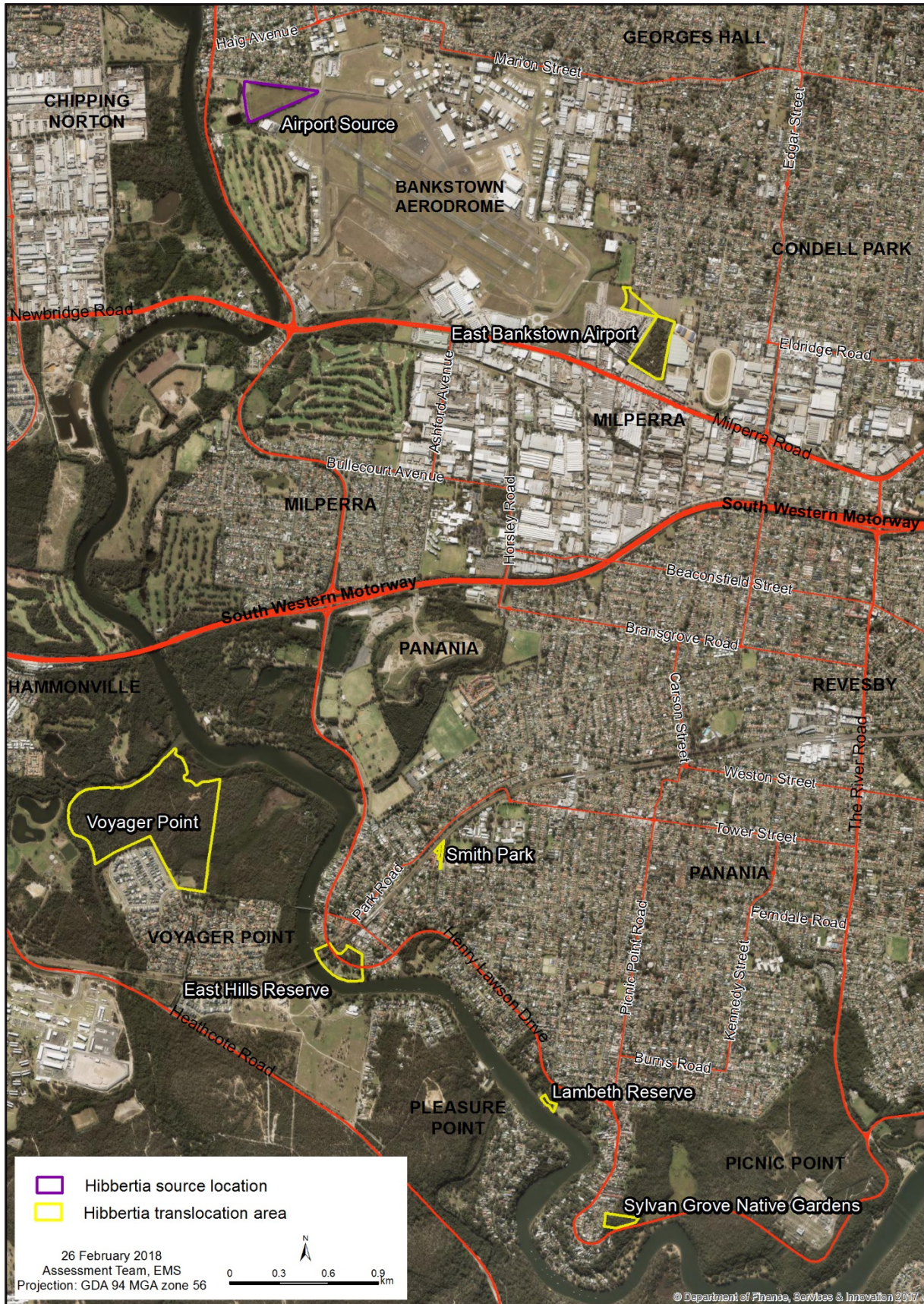


Figure 2 Location of source and translocation areas for *Hibbertia* sp. Bankstown



## 2 Soil investigation

### Accessing the data

You can access the soil information from this investigation, as well as soil information from other parts of NSW, on the internet through the eSPADE spatial viewer (<http://espade.environment.nsw.gov.au>)

### 2.1 Site investigation

Investigations of the source and first five translocation areas were carried out on 9–10 November 2017 with the assistance of Ahamad Sherieff (Project Officer, Natural Heritage).

The additional sixth area was investigated on 18 January 2018. This location was selected as it was hoped to have the same deep sandy soils as the source area, which lies on a Tertiary (Palaeogene) terrace and is quite unique in the local area.

Access to restricted areas was provided by Sydney Metro Airport Bankstown and by the City of Canterbury Bankstown and Liverpool City Council.

### 2.2 Soil information

A total of 18 sites were described, consisting of 15 detailed soil profile descriptions and 3 observations. Soils were excavated, using an auger to minimise disturbance to groundcover and vegetation.

Site information was recorded on OEH Soil Data Cards and in Electronic Digital Infield Regolith Tool (eDIRT), then uploaded to the NSW Soil and Land Information System (SALIS).

Laboratory analysis of physical and chemical properties was undertaken for each of the representative soil types identified as having at least some potential for translocation.

Additional testing of soil pH was undertaken on samples from some soils developed on sandstone. This was to confirm their expected strongly acidic nature.

The soil descriptions collected for this project are found in the Appendix to this report, and are also accessible online through the eSPADE spatial viewer at <http://espade.environment.nsw.gov.au>.

### 3 Results

Table 1 (below) summarises the soil characteristics and constraints in the source area and each of the six proposed translocation areas. More details for each translocation area are provided in the following sections.

**Table 1** Summary of soils and possible constraints

Areas	Soil description	Possible soil constraints
Bankstown Airport (source area)	Tertiary alluvial terrace Fed by run-on from shale-based landscapes Deep, moist, permeable, coarse sandy soils Unique in soil depth and moisture availability.	None known.
Voyager Point	Slowly permeable, poorly drained texture contrast soil on alluvial terrace. Deep, moderately well-drained silty/fine sandy soils on levee.	Terrace — imperfectly drained, clay subsoil within ~30 cm may be a barrier for root growth and soil permeability Levee — high silt/fine sand content can lead to compacted soils with fewer pore and air spaces compared to coarser sandy soils.
East Hills	Shallow Well to rapidly drained Transitional between Wianamatta Shale and Hawkesbury Sandstone geologies (site 6 and 7) Topsoils in north (site 6) heavier (closer to shale) than south (site 7) Clayey sand subsoils Rock benches more common to north.	Shallow soil depth Limited moisture availability Hydrophobic (water repellent) topsoils.
Lambeth Reserve	Shallow Sandy Well to rapidly drained Overlies Hawkesbury Sandstone (site 8 and 9) No subsoil of clayey sand observed, only A1 and A2 horizons overlying rock Rock benches and outcrops are common.	Shallow soil depth and rock outcrop Very limited moisture availability and retention Hydrophobic (water repellent) topsoils.
Smith Park	Gently inclined slopes Overlies Wianamatta Shale Shallow hardsetting topsoils Medium clay subsoils within ~30 cm of surface (site 10).	Imperfectly drained, slowly permeable clay subsoils ~30 cm Limited rooting depth Limited permeability

Areas	Soil description	Possible soil constraints
		Very thin topsoils (A1 <5 cm) with very hardsetting A2 horizon.
Sylvan Grove Native Gardens	Overlies Hawkesbury Sandstone Originally shallow (up to 40 cm), sandy, well to rapidly drained soils Likely to have been deepened through built-up garden beds with less rock outcrop Watering (by garden managers) in dry periods limits moisture availability as a constraint.	Soil depth in certain areas Hydrophobic (water repellent) topsoils.
East Bankstown Airport (additional area)	Disturbed, with areas of stony/clayey fill on east and west boundaries Less disturbed soils are texture contrast, slowly permeable and poorly drained Likely to receive high water run-on from adjoining urban and industrial areas.	Stony, dense, clayey fill on the elevated eastern and western boundaries Elsewhere, poorly drained Hardsetting topsoils Slowly permeable clayey subsoils Possible salinity, particularly between drainage plain and fill areas High water run-on in central area.

## 3.1 Source area

### 3.1.1 Landscape

A gently sloping Tertiary terrace plain with slopes <2%, local relief <3 m and elevation ~10 m. The area shows some signs of disturbance and possible reshaping. Most rainfall will permeate through the porous sandy soils with little run-off. Excess run-off, when it does occur, appears to be transmitted via several very shallow narrow depressions, which distribute water to a drain to the south of the site.

### 3.1.2 Soils

Generally consistent, consisting of deep (>150 cm), well-drained Grey and Brown Orthic Tenosols (Earthy Sands) of low fertility (low CEC, cations, organic carbon, P and N) and with a slightly acidic to neutral pH. Topsoils are relatively deep (20 – 35 cm) consisting of coarse to medium textured loamy sands. These grade gradually into deep clayey sand-textured subsoils. As moisture increases, iron coloured mottles, of heavier texture (sandy clay loam), became prominent at >100 cm and occur within a pale grey clayey sand. Soils were generally moist beyond ~50 cm becoming very moist to wet between 80 – 150 cm. Soil moisture is likely to be due to run-on from adjoining shale-based landscapes and possibly lateral subterranean flow through the porous sandy soils from the drains to the north and south of the area.



Figure 3 Locations of observation sites at Bankstown Airport (source area)

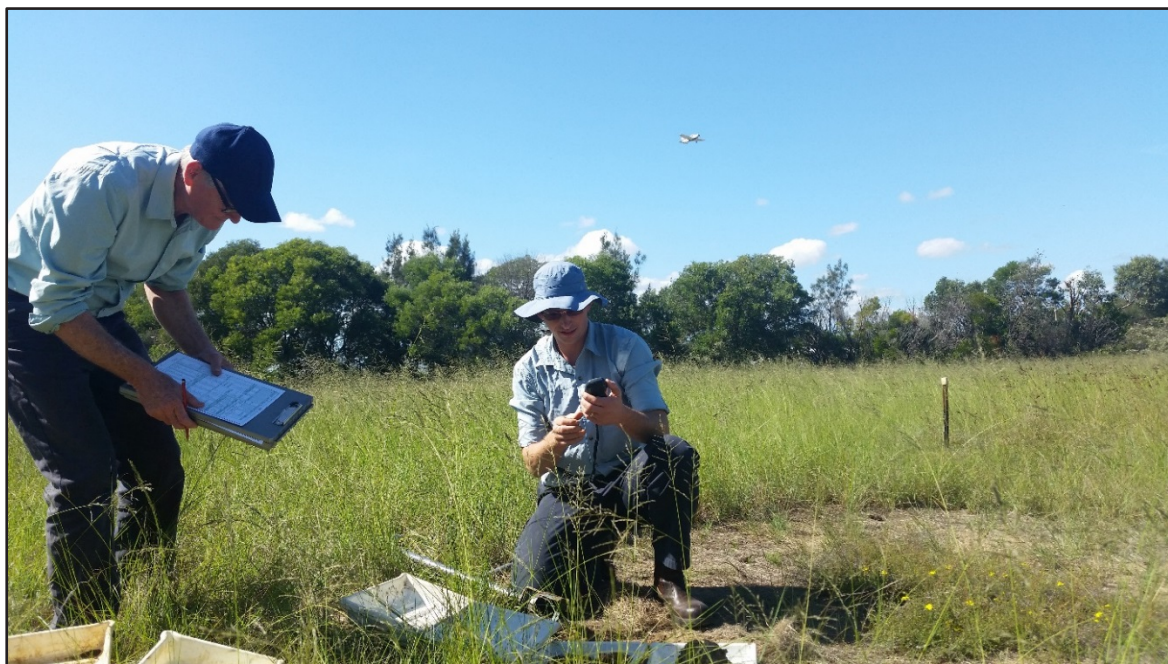


Figure 4 Describing the soil at site 1, in the source area. Photo: Greg Steenbeeke/OEH



**Figure 5** Very deep, moist, sandy soils at the source area, typical of observation sites 1, 2 and 3. Photo: Greg Steenbeeke/OEH

### 3.1.3 Constraints

The species seems to be increasing its extent in the source area (this may be due to the species being in flower and thus more observable at the time of survey). There appear to be no identifiable soil constraints for *Hibbertia* sp. Bankstown in this location.

## 3.2 Translocation areas

### 3.2.1 Voyager Point

#### Landscape

A level to very gently undulating plain, possibly a Tertiary (Palaeogene) terrace, with an apparently more recently-deposited Quaternary (Neogene) levee adjacent to the Georges River. Slopes are mainly <2%, local relief is <5 m and elevation is <10 m. Drainage seems to be mostly via sheet flow as no distinctive drainage lines were observed.

#### Soils

Deep (100 cm) laterized Brown Kurosols (Brown and Yellow Podzolic Soils), comprising a thin (<10 cm) fine sandy clay loam topsoil overlying a brown light medium clay (observation site 5). This overlies a lateritic layer (with pisolithic ironstone gravels) at depth, observed at a gravel excavation site nearby and exposed along the walking track in various areas. These soils were not sampled for testing due to the constraints presented by the clayey subsoils. These are likely to present a major limitation for translocation.

Soils on the levee (site 5 and 6) consist of very deep (>150 cm), moderately well-drained Brown Kandosols. They are very high in fine sand and silt (with little coarse sand, unlike the source area) and are slightly acidic to neutral in pH with low fertility. Topsoil (A1 horizon) is brownish black, ~10 cm deep, fine sandy loam to loam, fine sandy. This overlies a paler A2 horizon to ~30 cm depth which then overlies yellowish-brown fine sandy clay loam subsoil. All boundaries are gradual.

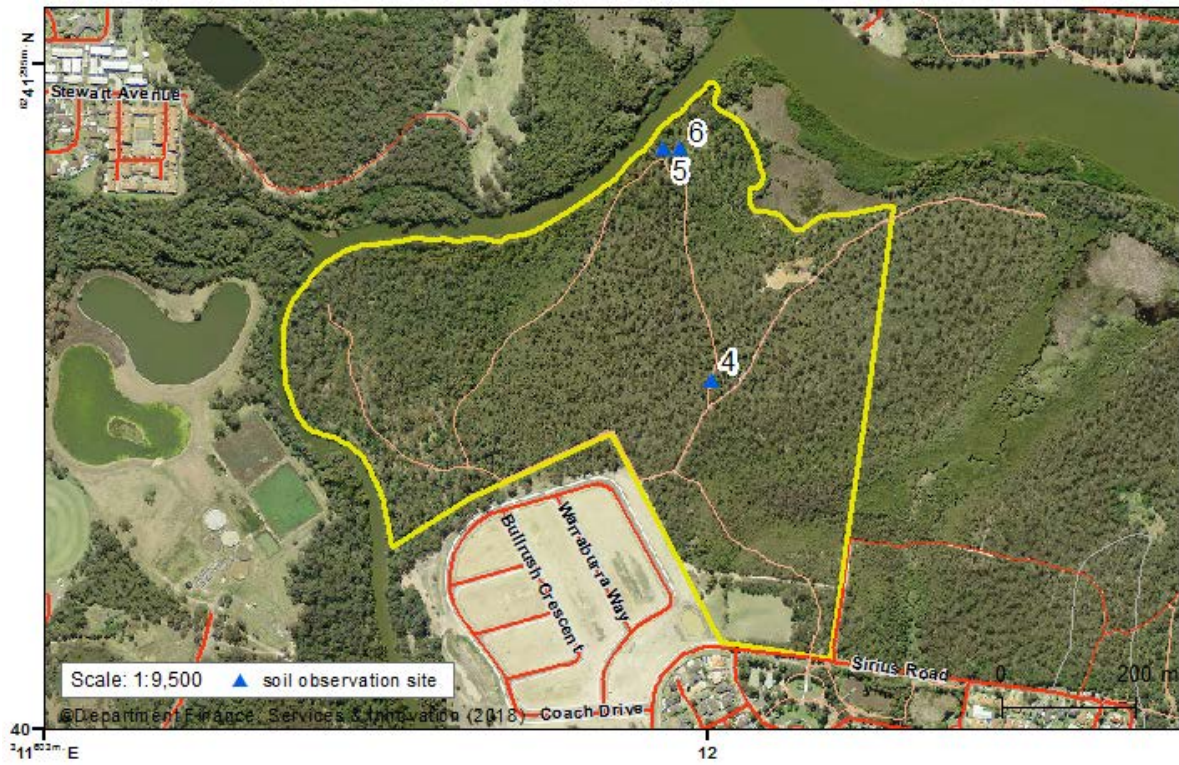


Figure 6 Location of observation sites at Voyager Point



Figure 7 Imperfectly drained terrace plain at Voyager Point (site 4). Photo: Mark Young/OEH



**Figure 8 Moderately well-drained levee at Voyager Point (sites 5 and 6).  
Photo: Mark Young/OEH**

### **Constraints**

Unlike the sandy soils at the Bankstown Airport source area, drainage on the terraces is expected to be slow, and the soils are imperfectly drained with areas of poorer drainage observed in some areas. The soils are very dissimilar physically to the source area and this soil is considered generally unsuitable for translocation.

Soils on the levee have more similarity to source area soils as they are deep and moderately well-drained. They differ in that they have very high levels of fine sand and silts rather than the coarse to medium sands at the source area. Soils with high levels of fine sand and silt can have poor pore space, can set very hard when dry and lose all strength when wet (low wet bearing strength). These issues may or may not present constraints for *Hibbertia* sp. Bankstown.

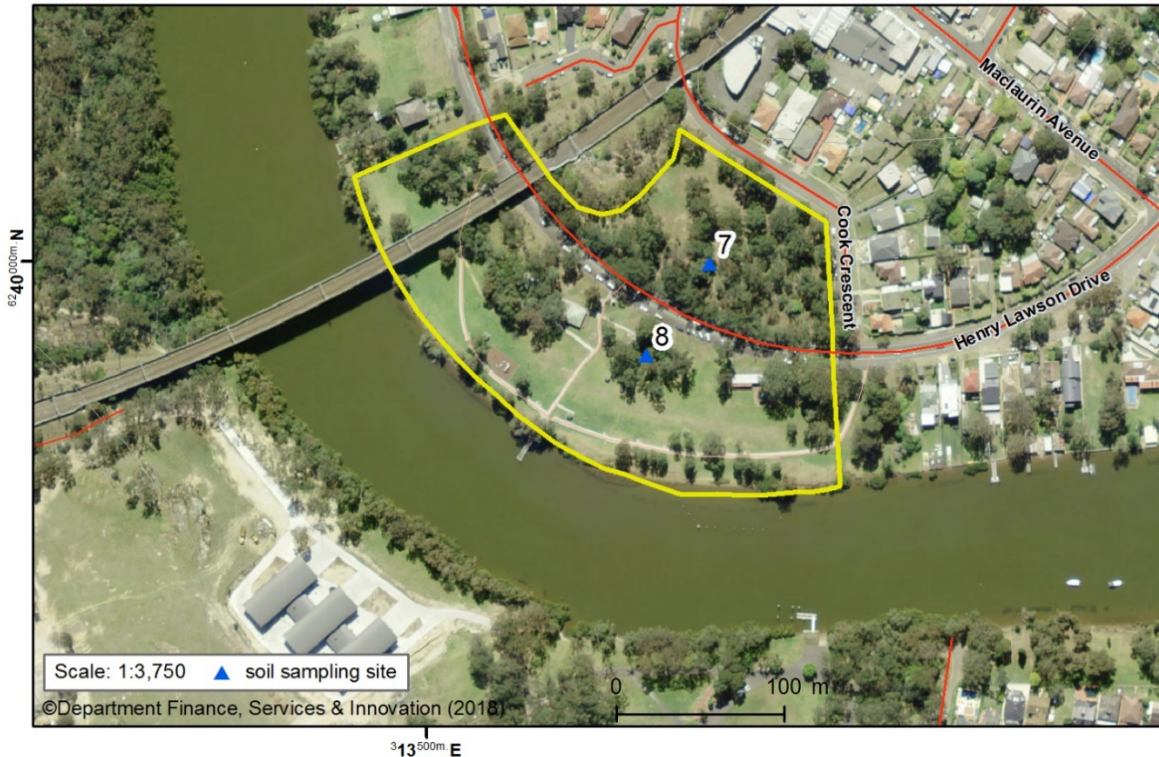
## **3.2.2 East Hills Reserve**

### **Landscape**

A gently inclined slope with sandstone rock benches in a transition area between Wianamatta Shale and Hawkesbury Sandstone. Slopes are <5%, while local relief is <20 m and elevation is <20 m. Drainage is primarily by sheet flow.

### **Soils**

Shallow (up to 50 cm), rapidly to well-drained, sandy Leptic Tenosols (site 7) and Orthic Brown Tenosols (site 8) occur. These soils are slightly acidic, consist mainly of coarse and medium sands, and have low fertility. Topsoils range from 10 – 15 cm and consist of loamy sands (site 8) to sandy clay loams (site 7). These overlie brown clayey sands subsoils to 40 cm which overlie sandstone bedrock.



**Figure 9** Location of observation sites at East Hills Reserve



**Figure 10** Shallow, sandy soils with occasional sandstone rock outcrop occur at East Hills Reserve (sites 7 and 8). Photo: Casey Murphy/OEH

### Constraints

Texturally the soils at East Hills Reserve are most similar to the source area, however the most significant constraining difference is the shallow soil depth and available moisture. The shallow sandy soils are very well-drained with little capacity to hold onto moisture. If the site is chosen for translocation then it is suggested that micro-sampling of the soils with a spade should be undertaken to locate the deeper soils for planting.





**Figure 11** Sandy clay loam topsoils (left) overlying paler A2 horizons (middle) and a clayey sand subsoil (right). Photo: Mark Young/OEH

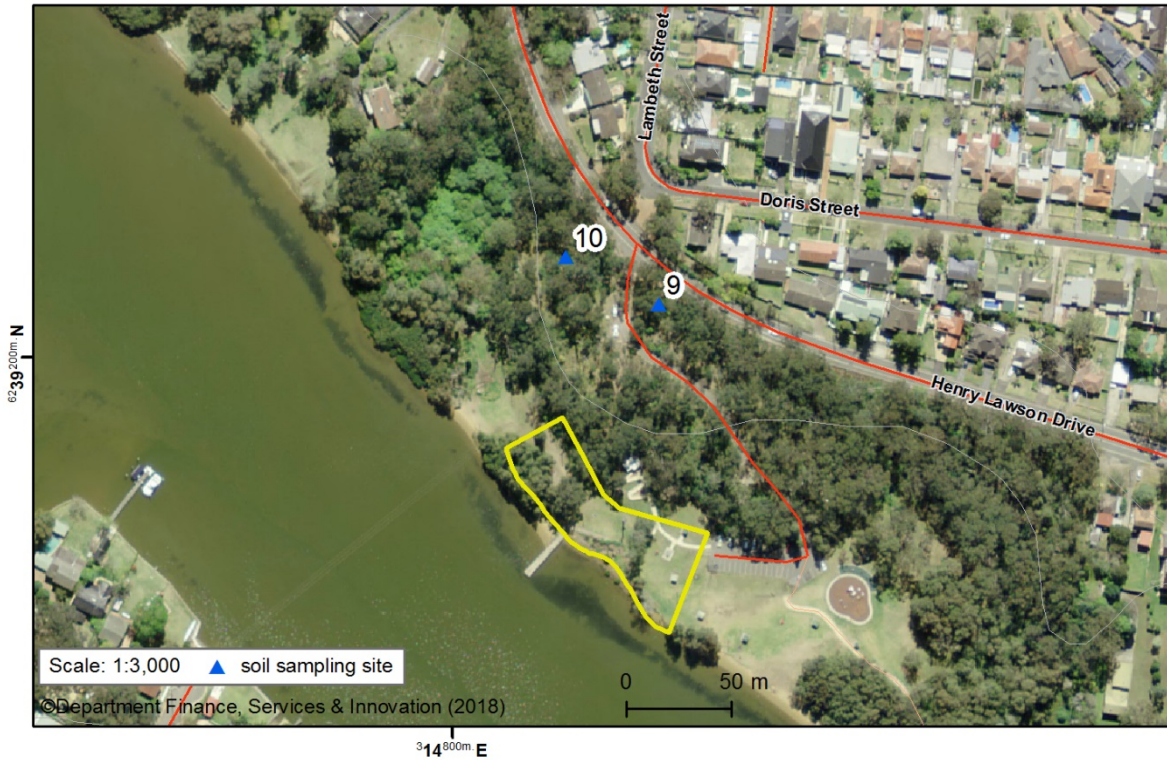
### 3.2.3 Lambeth Reserve

#### Landscape

Rocky undulating rises to low hills on Hawkesbury Sandstone. At sites 9 and 10, slopes are 5 – 10%, local relief is <30 m and elevation varies between 10 – 13 m. Sandstone rock benches are common and increase as slope increases. Site disturbance from prior road construction is evident in numerous areas above the road leading down to Lambeth Reserve.

#### Soils

Discontinuous, very shallow to shallow (<50 cm), rapidly drained Leptic Tenosols (Siliceous Sands) (sites 9 and 10) which are very similar to sites 7 and 8 as they contain high levels of coarse sand, have slightly acid pH and low fertility. A typical profile consists of a very dark greyish brown coarse loamy sand A1 horizon with a weak structure overlying a dark greyish brown loamy sand A2 horizon, with no structure, which in turn overlies sandstone bedrock. Topsoils were noted as being hydrophobic (water repellent) in the field.



**Figure 12 Location of observation sites at Lambeth Reserve**



**Figure 13 Vicinity of site 9 at Lambeth Reserve. Photo: Casey Murphy/OEH**

### **Constraints**

Discontinuous shallow, hydrophobic, sandy soils with areas of rock outcrop. No subsoils observed. Most limiting factor is soil depth and ability of the shallow sandy soils to retain soil moisture. Wetting of soils could also be a factor due to observed water repellence (hydrophobic).



**Figure 14** Soil at site 9, showing weakly structured loamy sand topsoil (right) overlying a slightly paler and unstructured loamy sand (middle and left) to 45 cm depth. Photo: Mark Young/OEH

### 3.2.4 Smith Park Reserve

#### Landscape

Gently undulating rises on Wianamatta Group shale. Slopes are <5%, local relief is <30 m and elevation is <16 m. Broad rounded crests with gently inclined slopes.

#### Soils

Moderately deep (>50 cm), imperfectly drained Brown Kurosols (Yellow Podzolic Soils). A typical profile (site 11) consist of a very shallow (<3 cm) weakly structured sandy loam A1 horizon overlying a pale, hardsetting, massive A2 horizon to 14 cm, which in turn sharply overlies brown medium clay.

#### Constraints

With very thin A1 horizons overlying very hardsetting A2 horizons, and imperfectly drained clayey B horizons, the soils here are significantly different from the deep, moist, well-drained sandy soils of the source area, and it is not considered suitable for relocation. The pale A2 horizon indicates the soil is imperfectly drained with some lateral flow above the less permeable clayey B horizon.



Figure 15 Location of observation site at Smith Park Reserve



Figure 16 Vicinity of site 11 at Smith Park Reserve. Photo: Paul Angel, City of Canterbury Bankstown/OEH



Figure 17 Soil at site 11, consisting of very thin sandy loam topsoil (right) overlying paler, hardsetting clay loam A2 horizon (middle) and a brown medium clay subsoil (left). Photo: Casey Murphy/OEH

### 3.2.5 Sylvan Grove Native Gardens

Although no field sites were described, the area was visited and landscape and soils were observed. Being on Hawkesbury Sandstone, the gardens contain similar sandy soils to those described at Lambeth Reserve. The original shallow sandy soils have been built up into beds in most areas. Occasional rock outcrop was observed. Unlike Lambeth Reserve, where poor moisture availability is the most major concern, the gardens are watered during dry periods so the major constraint of moisture availability is absent.



Figure 18 Location of Sylvan Grove Native Gardens

### 3.2.6 East Bankstown Airport

#### Landscape

A central gently sloping footslope/drainage plain overlying shale substrate, flanked (to east and west) by slightly more elevated stony/clayey fill probably associated with levelling of the adjoining industrial areas (e.g. site 14).

Although initially the central drainage plain (prior to urbanisation of the catchment) was likely to shed water via non-concentrated sheet flow, two gullies have now formed from the increase in urban stormwater run-off. One of the gullies (at site 17) is active and is up to 3 m deep in the northern area of the drainage plain below the netball courts. Slopes are < 5%, local relief is <10 m and elevation ranges between ~10 – 15 m.

The central drainage plain and footslope areas also show considerable disturbance including scouring of the topsoils (e.g. around site 13), and various areas of rubbish.



Figure 19 Location of observation sites at East Bankstown Airport

#### Soils

The more elevated areas, which adjoin the industrial land in the west and east of the central drainage plain, were observed to contain deposits of compacted stony-clayey fill (Anthrosols) which may overlie shale parent material at depth (sites 14, 16 and 17).

The soils of the central drainage plain (sites 12 and 13) are mainly Natric Brown and Yellow Kurosols (Soloths). They consist of 8 – 12 cm of A1 horizon topsoil, comprising a weak to moderate structured loam, overlying 12 – 26 cm of a massive structured, hardsetting, often bleached, silty clay loam A2 horizon. The A2 horizon overlies a yellowish brown medium clay B horizon >100 cm depth, with mottling indicating poor drainage. The B horizon tends to become redder upslope, indicating better drainage, as observed at site 15.

## Constraints

The main limitations are the disturbed, dense stony-clayey fill on the western and eastern areas and hardsetting topsoils, poor drainage and very slowly permeable subsoils of the central drainage plain. White salt on the ground and vegetation indicative of dryland salinity was also observed at a gully on the western edge of the drainage plain (see photo site 18).



**Figure 20** Poorly drained central drainage plain at East Bankstown Airport, with *Melaleuca* spp.  
Photo: Casey Murphy/OEH



**Figure 21** Active gully erosion in the central drainage plain, caused by urban stormwater run-off.  
Photo: Casey Murphy/OEH



**Figures 22 and 23** To left, site 12 (Natric Kurosol), typical of the central drainage plain, showing bleached A2 horizon and poorly drained, mottled clayey B horizon. To right, site 17 (Anthrosol/Brown Sodosol), typical of the surrounding footslopes, showing a deep layer of fill above a bleached A2 and poorly-drained, mottled clayey B horizon. Photos: Mark Young/OEH



**Figure 24** Areas of fill (shown here at site 14) are found on elevated parts of both the western and eastern side of the area, adjoining industrial land. Photo: Casey Murphy/OEH





**Figure 25** Vegetation indicating salinity, observed at a gully head at site 18 on the lower slope/drainage plain boundary. Salt present on northern edge of gully. Photo: Mark Young/OEH

## 4 Conclusions and recommendations



A sodic, salty soil in a gully at East Bankstown Airport.  
Photo: Mark Young/OEH

### What the soil investigation found...

In summary, our conclusions are:

- The source area for *Hibbertia* sp. Bankstown is unique in the local area
- None of the translocation areas has the same soils as the source area
- All the translocation areas exhibit some physical limitations for plant growth
- Sylvan Grove Native Gardens, with its deeper soils and regular watering, is the most suitable site for translocation
- The levee at Voyager Point and part of East Hill Reserve are the next most suitable areas for translocation
- The other translocation areas are generally unsuitable.

From the summary of constraints in **Table 1**, it is clear that none of the six translocation sites examined have the same soil attributes as the deep, moist, sandy soils of the source area.

Furthermore, the soils at all the potential translocation sites exhibit at least some physical constraints to plant growth.

However, as we have limited knowledge of the range of soil conditions suitable for *Hibbertia* sp. Bankstown, the constraints identified may not necessarily be significant limitations to survival and growth of this species, but they should be considered in assessing suitability for translocation.

The sandstone-derived soils at Sylvan Grove Native Gardens are watered during dry periods; soils have been built up into garden beds and are deeper than other areas on sandstone. Given the ability for ongoing water management, this would be probably the most suitable site for translocation.

The next most promising area is Voyager Point on the levee bank (sites 5 and 6) with its deep silty soils. Although the soils here have some constraints, being deep silts and fine sands instead of the deep sands of the source area, they are deep, are moderately well-drained and have more ability to hold soil moisture than the shallow sandstone-based soils.

East Hills Reserve is the final recommended translocation area, particularly around site 8 south of Henry Lawson Drive. These sandstone soils have significant constraints, being shallow and water-repellent with a low moisture-holding capacity, and hence pose some significant risks. Some deeper pockets of soil (up to 60 cm) occur locally and it is recommended that micro-sampling (to identify deeper soils) and an extended seedling watering program be implemented if this area is selected for translocation.

In other parts of Voyager Park apart from the levee bank, the clayey subsoils are not free-draining. This is a significant constraint shared with the soils at Smith Park and East Bankstown Airport. Conversely, the sandstone soil sites of Lambeth Hills Reserve are rapidly drained, have occasional rock outcrop, very shallow and sandy soils, are often hydrophobic and have limited ability to retain soil moisture. We conclude that these other sites are generally unsuitable for translocation.

Given the unique nature of the source area, and the fact that none of the translocation sites have equivalent soil characteristics, we suggest that it is important that the source area be rehabilitated and preserved for the ongoing survival and health of the species.

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(<http://www.environment.gov.au/biodiversity/threatened/species/pubs/81969-conservation-advice.pdf>, accessed 27 February 2018).

## 6 Appendix

Following are reports for each of the sites investigated for this project. This information is also available online through eSPADE (<http://espade.environment.nsw.gov.au>).



# Soil Profile Report

## SITE DETAILS

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Site Location:	Translocation Bankstown source site
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 1, collected from a auger by Mr Casey Murphy on November 13, 2017
Map Reference:	MGA Grid Reference: Zone 56, 313271E, 6245227N.
Physiography:	terrace flat on sand lithology and used for improved pasture. Slope 1.0% (measured, Inclinometer), local relief extremely low (< 9m), elevation 110.1 m, aspect south west. Surface condition is soft, profile is mod. well drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	cleared, no cultivation at the site, used for improved pasture, with industrial, urban and improved pasture in the general area
Surface Condition:	soft when described, expected to be soft when dry, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is highly permeable and mod. well drained, no free water, run on is low and runoff is low
Soil Type:	Basic Arenic Grey-Orthic Tenosol (ASC), Earthy Sand (GSG)
Base of observation:	layer continues
Profile Field Notes:	Probable old Tertiary aged Terrace with very deep sandy soils. The sands are probably kept moist for long periods due to run on from adjacent hardrock (shale landscapes) with a layer of a less permeable layer at 1.15m - >1.75m depth which contains patches of sandy clay loam and is heavily mottled indicating poor drainage. Layer 1 and 2 appear to be fill overlying original soil.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

### Layer 1 Horizon: A1

0.00 - 0.05 m	Texture:	coarse sandy loam
	Colour:	very dark greyish brown (brownish black) (10YR 3/2) [moist] with not evident mottles
	Structure:	weak pedality (sub-angular blocky, 10 - 20 mm, fabric is rough-faced peds)
	Coarse Fragments:	not evident,
	Pans:	not evident
	Segregations:	not evident,

Roots: many (25-100/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm), none (Root size 2-5 mm), none (Root size >5 mm),  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,  
 Field chemical tests: Field pH is 6.0 (Raupach),  
 Sample taken: disturbed  
 Layer Notes: Weathered sandstone/ironstone rock fragments. Very thin fine sand wash on surface.

## Layer 2

Horizon: A2b (buried horizon)

0.05 - 0.25 m Texture: coarse light sandy clay loam  
 Colour: brown (dull yellowish brown) (10YR 4/3) [moist] with 10% - 20% prominent weathered orange mottles  
 Structure: massive (fabric is earthy), ped coatings are none  
 Coarse Fragments: very few (< 2%), ironstone, dispersed, strongly weathered, sub-angular tabular, sub-rounded tabular, fine gravel (2-6 mm), gravel (6-20 mm),  
 Pans: not evident  
 Segregations: not evident,  
 Roots: common (10-25/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm), few (1-10/10x10cm) (Root size 2-5 mm), few (1-2/10x10 cm) (Root size >5 mm), few (1-10/10x10cm) (Root size unknown),  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, disruptive test result was very weak force,  
 Field chemical tests: Field pH is 6.0 (Raupach),  
 Sample taken: disturbed  
 Layer Notes: ironstone/sandstone highly weathered rock fragments producing orange mottles in soil. Possibly fill?

## Layer 3

Horizon: 2A1b (buried horizon)

0.25 - 0.55 m Texture: coarse loamy sand  
 Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with not evident mottles  
 Structure: single grained (fabric is sandy), ped coatings are none  
 Coarse Fragments: not evident,  
 Pans: not evident  
 Segregations: not evident,  
 Roots: few (1-10/10x10cm) (Root size unknown),  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: moderately moist, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was no change,  
 Erodibility Tests: Crumb (EAT) test showed no change,

Field chemical tests: Field pH is 6.0 (Raupach),  
Sample taken: disturbed  
Layer Notes: Possibly old buried topsoil layer.

**Layer 4** Horizon: 2B1b (buried horizon)

0.55 - 0.95 m Texture: coarse clayey sand  
Colour: greyish brown (greyish yellow brown) (10YR 5/2) [moist] with 10% - 20% prominent unspecified orange mottles  
Structure: massive (fabric is sandy), ped coatings are none  
Coarse Fragments: not evident,  
Pans: not evident  
Segregations: not evident,  
Roots: none (Root size unknown),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: moist, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,  
Field chemical tests: Field pH is 6.0 (Raupach),  
Layer Notes: Orange mottled sands

**Layer 5** Horizon: 2B2b (buried horizon)

0.95 - 1.15 m Texture: coarse clayey sand  
Colour: light yellowish brown (dull yellow) (2.5Y 6/4) [moist] with 10% - 20% prominent unspecified orange mottles  
Structure: massive (fabric is sandy), ped coatings are none  
Coarse Fragments: not evident,  
Pans: not evident  
Segregations: not evident,  
Roots: none (Root size unknown),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: moist, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,  
Field chemical tests: Field pH is 5.5 (Raupach),

**Layer 6** Horizon: 2BCb (buried horizon)

1.15 - 1.75 m Texture: coarse clayey sand  
Colour: light brownish grey (greyish yellow) (2.5Y 6/2) [moist] with 20% - 50% prominent unspecified orange mottles  
Structure: massive (fabric is earthy), ped coatings are none  
Roots: none (Root size unknown),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: wet, slightly sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was labile,  
Field chemical tests: Field pH is 5.5 (Raupach),



Layer Notes: Patches of iron stained orange sandy clay loam in a clayey sand pale grey matrix.

## LABORATORY TESTS

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**None available**

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Site 2 Bankstown Aerodrome
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 2, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 313281E, 6245187N.
Physiography:	terrace flat under grassland/herbland on sand lithology and used for improved pasture. Slope 1.0% (measured), local relief extremely low (< 9m), elevation 11.0 m, aspect south west. Surface condition is soft, profile is well drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	cleared, no cultivation at the site, used for improved pasture, with urban, industrial in the general area
Surface Condition:	soft when described
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is well drained, no free water, run on is low
Soil Type:	Basic Arenic Brown-Orthic Tenosol (ASC), Earthy Sand (GSG)
Base of observation:	layer continues
Profile Field Notes:	

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

Coarse Fragments: not evident,

### Layer 1

Horizon: A11

0.00 - 0.20 m

Texture: coarse sandy loam

Colour: very dark grey (brownish black) (10YR 3/1) [moist] with no recorded mottles

Structure: weak pedality (fabric is sandy)

Coarse Fragments: not evident,

Pans: not evident

Segregations: not evident,

Roots: few (1-10/10x10cm) (Root size <1 mm), many (25-100/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: moderately moist, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,

Field chemical tests: Field pH is 6.0 (Raupach),

Sample taken: disturbed

Layer Notes: Medium sand grains.

#### Layer 2

Horizon: A12

0.20 - 0.35 m

Texture: coarse loamy sand

Colour: dark brown (10YR 3/3) [moist] with no recorded mottles

Structure: single grained (fabric is earthy)

Coarse Fragments: not evident,

Pans: not evident

Segregations: not evident,

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: moderately moist, non-sticky, texture modifier test result was no change, disruptive test result was loose,

Field chemical tests: Field pH is 6.0 (Raupach),

Sample taken: disturbed

Layer Notes: Medium sand grains.

#### Layer 3

Horizon: 2B1

0.35 - 0.60 m

Texture: coarse loamy sand

Colour: brown (dull yellowish brown) (10YR 4/3) [moist] with no recorded mottles

Structure: massive (fabric is earthy)

Coarse Fragments: few (2-10%), ironstone, dispersed, weakly weathered, gravel (6-20 mm),

Pans: not evident

Segregations: not evident,

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: moderately moist, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,

Field chemical tests: Field pH is 6.0 (Raupach),

Sample taken: disturbed

Layer Notes: Medium sand grains.

#### Layer 4

Horizon: 2B2

0.60 - 0.95 m

Texture: coarse clayey sand

Colour: yellowish brown (10YR 5/6) [moist] with 10% - 20% unspecified orange mottles

Structure: massive (fabric is earthy)

Coarse Fragments: few (2-10%), ironstone, dispersed, weakly weathered, sub-rounded platy, gravel (6-20 mm), coarse gravel (20-60 mm),

Pans: not evident

Segregations: not evident,

Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: moist, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,  
 Field chemical tests: Field pH is 6.5 (Raupach),  
 Sample taken: disturbed  
 Layer Notes: Medium sand grains.

#### Layer 5

Horizon: 2B3  
 0.95 - 1.20 m Texture: coarse clayey sand  
 Colour: brownish yellow (bright yellowish brown) (10YR 6/6) [moist] with 10% - 20% unspecified orange mottles  
 Structure: massive (fabric is earthy)  
 Coarse Fragments: not evident,  
 Pans: not evident  
 Segregations: not evident,  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: wet, slightly sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was labile,  
 Field chemical tests: Field pH is 6.5 (Raupach),  
 Sample taken: disturbed  
 Layer Notes: Patches of orange/iron light sandy clay loam in matrix of clayey sand. Same bottom layer as site 1, very moist.

## LABORATORY TESTS

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**Sample Code:** YNC/17/41/1(1)

**Upper bound: 0.00 Lower bound: 0.20**

Name	Value	Unit of measure
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	1.02	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.31	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7, no pretreatment]	0.48	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	1.91	cmol/kg
2A1 [Air-dry moisture content]	0.49	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.9	pH
4B2 [pH of 1:5 soil/0.01M CaCl2 extract - (meth N4A1)]	4.8	pH
514.99 [Dispersion percentage]	0	%
517.99_CL [PSA clay - hydrometer]	5	%
517.99_CS [PSA coarse sand - hydrometer]	66	%
517.99_FS [PSA fine sand - hydrometer]	24	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	5	%

517.99_ST [PSA stone - hydrometer]	0	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	1.47	%
7A5 [Total nitrogen - Dumas]	0.10	%
9B2 [HCO <sub>3</sub> - extractable P - automated)	4	mg/kg

**Sample Code: YNC/17/41/2(1) Upper bound: 0.20 Lower bound: 0.35**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.35	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.17	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.23	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	0.85	cmol/kg
2A1 [Air-dry moisture content]	0.33	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.7	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.6	pH
514.99 [Dispersion percentage]	0	%
517.99_CL [PSA clay - hydrometer]	5	%
517.99_CS [PSA coarse sand - hydrometer]	71	%
517.99_FS [PSA fine sand - hydrometer]	19	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	5	%
517.99_ST [PSA stone - hydrometer]	0	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.72	%
7A5 [Total nitrogen - Dumas]	0.05	%
9B2 [HCO <sub>3</sub> - extractable P - automated)	4	mg/kg

**Sample Code: YNC/17/41/3(1) Upper bound: 0.35 Lower bound: 0.60**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.49	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.13	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.25	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	0.97	cmol/kg
2A1 [Air-dry moisture content]	0.32	%
3A1 [EC of 1:5 soil/water extract]	0.03	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.8	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.7	pH
514.99 [Dispersion percentage]	0	%
517.99_CL [PSA clay - hydrometer]	5	%
517.99_CS [PSA coarse sand - hydrometer]	65	%
517.99_FS [PSA fine sand - hydrometer]	23	%

517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	7	%
517.99_ST [PSA stone - hydrometer]	0	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.47	%
7A5 [Total nitrogen - Dumas]	0.03	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	3	mg/kg

**Sample Code: YNC/17/41/4(1) Upper bound: 0.60 Lower bound: 0.95**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.26	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.14	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.41	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	0.91	cmol/kg
2A1 [Air-dry moisture content]	0.26	%
3A1 [EC of 1:5 soil/water extract]	0.03	dS/m
4A1 [pH of 1:5 soil/water suspension]	6.2	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	5.1	pH
514.99 [Dispersion percentage]	50	%
517.99_CL [PSA clay - hydrometer]	6	%
517.99_CS [PSA coarse sand - hydrometer]	70	%
517.99_FS [PSA fine sand - hydrometer]	15	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	8	%
517.99_ST [PSA stone - hydrometer]	1	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.23	%
7A5 [Total nitrogen - Dumas]	0.02	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	4	mg/kg

**Sample Code: YNC/17/41/5(1) Upper bound: 0.95 Lower bound: 1.20**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.35	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.19	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	1.25	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	1.89	cmol/kg
2A1 [Air-dry moisture content]	0.46	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	6.3	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	5.5	pH
514.99 [Dispersion percentage]	20	%
517.99_CL [PSA clay - hydrometer]	15	%

517.99_CS [PSA coarse sand - hydrometer]	66	%
517.99_FS [PSA fine sand - hydrometer]	14	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	5	%
517.99_ST [PSA stone - hydrometer]	0	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.09	%
7A5 [Total nitrogen - Dumas]	0.01	%
9B2 [HCO <sub>3</sub> - extractable P - automated)	5	mg/kg

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Observation site 3 - Bankstown Aerodrome
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 3, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 313136E, 6245207N.
Physiography:	terrace plain on sand lithology and used for improved pasture. Slope 2.0% (measured), local relief extremely low (< 9m), elevation 14.0 m, aspect south. Surface condition is soft, profile is well drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	cleared, no cultivation at the site, used for improved pasture, with urban, industrial and other in the general area
Surface Condition:	soft when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is highly permeable and well drained, no free water, run on is low and runoff is low
Soil Type:	Basic Arenic Brown-Orthic Tenosol (ASC), Earthy Sand (GSG)
Base of observation:	
Profile Field Notes:	Same as site 2, mottles at 80cm. Very moist not saturated. Depth >100 cm. Observation site. pH 5.5 - 6 all layers.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

## LABORATORY TESTS

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None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Voyager Point observation site
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 4, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 312608E, 6240822N.
Physiography:	plain under woodland shrub understorey and used for timber/scrub/unused. Slope 1.0% (estimated), local relief extremely low (< 9m), elevation 8.0 m, aspect east. Surface condition is firm, profile is imperfectly drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	natural disturbance at the site, used for timber/scrub/unused, with timber/scrub/unused in the general area
Surface Condition:	firm when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is slowly permeable and imperfectly drained, no free water, run on is low and runoff is low
Soil Type:	Brown Kurosol (ASC), Yellow Podzolic Soil (GSG)
Base of observation:	layer continues
Profile Field Notes:	Observation site only consisting of fine sandy clay loam overlying medium clay B horizon.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

### Layer 1

Horizon: A

0.00 - 0.13 m

Texture:	fine light sandy clay loam
Colour:	colour not recorded with no recorded mottles
Soil fauna:	Activity is nil
Cracks/Macropores:	Cracks are nil, macropores are nil

### Layer 2

Horizon: B

0.13 - 0.50 m

Texture:	medium clay
Colour:	colour not recorded with no recorded mottles
Soil fauna:	Activity is nil
Cracks/Macropores:	Cracks are nil, macropores are nil

# LABORATORY TESTS

---

None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Voyager Point toe of levee
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 5, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 312537E, 6241170N.
Physiography:	levee under woodland shrub understorey on sand, alluvium lithology and used for timber/scrub/unused. Slope 4.0% (measured), local relief extremely low (< 9m), elevation 9.0 m, aspect south west. Surface condition is firm, profile is mod. well drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	no effective disturbance at the site, used for timber/scrub/unused, with timber/scrub/unused in the general area
Surface Condition:	firm when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is moderately permeable and mod. well drained, no free water, runoff is low and runoff is low
Soil Type:	Haplic Brown Kandosol (ASC)
Base of observation:	layer continues
Profile Field Notes:	Silty relatively deep soil lots of fine sand - clay at depth 47cm.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

Coarse Fragments: not evident,

### Layer 1

Horizon: A1

0.00 - 0.12 m

Texture: fine sandy loam

Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles

Structure: weak pedality (sub-angular blocky, 10 - 20 mm, fabric is rough-faced peds), ped coatings are none

Coarse Fragments: not evident,

Pans: not evident

Segregations: not evident,

Roots: many (25-100/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, slightly sticky, texture modifier test result was no change, disruptive test result was very weak force,  
Field chemical tests: Field pH is 5.5 (Raupach),  
Sample taken: disturbed

**Layer 2**

Horizon: A2

0.12 - 0.32 m Texture: fine sandy clay loam  
Colour: dark brown (10YR 3/3) [moist] with no recorded mottles  
Structure: massive (fabric is earthy), ped coatings are none  
Coarse Fragments: not evident,  
Pans: not evident  
Segregations: not evident,  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, slightly sticky, texture modifier test result was no change,  
Erodibility Tests: Crumb (EAT) test showed worked bolus disperses,  
Field chemical tests: Field pH is 5.5 (Raupach),  
Sample taken: disturbed  
Layer Notes: Very high silt/fine sand content. Strong dilation, very low wet strength.

**Layer 3**

Horizon: B1

0.32 - 0.47 m Texture: fine light sandy clay loam  
Colour: brown (dull yellowish brown) (10YR 4/3) [moist] with no recorded mottles  
Structure: massive (fabric is earthy), ped coatings are none  
Coarse Fragments: not evident,  
Pans: not evident  
Segregations: not evident,  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, moderately sticky, texture modifier test result was no change,  
Erodibility Tests: Crumb (EAT) test showed worked bolus disperses,  
Field chemical tests: Field pH is 6.0 (Raupach),  
Sample taken: disturbed

**Layer 4**

Horizon: B2

0.47 - 0.60 m Texture: heavy sandy clay loam  
Colour: brown (dull yellowish brown) (10YR 4/3) [moist] with no recorded mottles  
Structure: massive (fabric is earthy)  
Coarse Fragments: not evident,  
Segregations: not evident,  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: dry, moderately sticky, texture modifier test result was no change,

Field chemical tests: Field pH is 6.0 (Raupach),

## LABORATORY TESTS

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**Sample Code:** YNC/17/41/6(1)

**Upper bound: 0.00 Lower bound: 0.12**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	2.6	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.45	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7,no pretreatment]	1.13	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7,no pretreatment]	0.27	cmol/kg
15J1 [Effective cation exchange capacity]	4.45	cmol/kg
2A1 [Air-dry moisture content]	1.06	%
3A1 [EC of 1:5 soil/water extract]	0.08	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.4	pH
4B2 [pH of 1:5 soil/0.01M CaCl2 extract - (meth N4A1)]	4.4	pH
514.99 [Dispersion percentage]	14	%
517.99_CL [PSA clay - hydrometer]	6	%
517.99_CS [PSA coarse sand - hydrometer]	10	%
517.99_FS [PSA fine sand - hydrometer]	69	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	15	%
517.99_ST [PSA stone - hydrometer]	0	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	3.13	%
7A5 [Total nitrogen - Dumas]	0.14	%
9B2 [HCO3 - extractable P - automated)	6	mg/kg

**Sample Code:** YNC/17/41/7(1)

**Upper bound: 0.12 Lower bound: 0.32**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	1.06	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.29	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7,no pretreatment]	0.7	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7,no pretreatment]	0.18	cmol/kg
15J1 [Effective cation exchange capacity]	2.23	cmol/kg
2A1 [Air-dry moisture content]	0.71	%
3A1 [EC of 1:5 soil/water extract]	0.05	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.4	pH
4B2 [pH of 1:5 soil/0.01M CaCl2 extract - (meth N4A1)]	4.3	pH
514.99 [Dispersion percentage]	25	%
517.99_CL [PSA clay - hydrometer]	8	%
517.99_CS [PSA coarse sand - hydrometer]	7	%
517.99_FS [PSA fine sand - hydrometer]	67	%

517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	17	%
517.99_ST [PSA stone - hydrometer]	1	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	1.56	%
7A5 [Total nitrogen - Dumas]	0.07	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	4	mg/kg

**Sample Code: YNC/17/41/8(1) Upper bound: 0.32 Lower bound: 0.47**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.96	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.18	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.54	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.15	cmol/kg
15J1 [Effective cation exchange capacity]	1.83	cmol/kg
2A1 [Air-dry moisture content]	0.39	%
3A1 [EC of 1:5 soil/water extract]	0.03	dS/m
4A1 [pH of 1:5 soil/water suspension]	6.1	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.8	pH
514.99 [Dispersion percentage]	43	%
517.99_CL [PSA clay - hydrometer]	9	%
517.99_CS [PSA coarse sand - hydrometer]	7	%
517.99_FS [PSA fine sand - hydrometer]	68	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	16	%
517.99_ST [PSA stone - hydrometer]	0	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.60	%
7A5 [Total nitrogen - Dumas]	0.03	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	2	mg/kg

**Sample Code: YNC/17/41/9(1) Upper bound: 0.47 Lower bound: 0.60**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	1.52	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.19	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	1.28	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.28	cmol/kg
15J1 [Effective cation exchange capacity]	3.27	cmol/kg
2A1 [Air-dry moisture content]	0.76	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.8	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.5	pH
514.99 [Dispersion percentage]	27	%
517.99_CL [PSA clay - hydrometer]	17	%

517.99_CS [PSA coarse sand - hydrometer]	6	%
517.99_FS [PSA fine sand - hydrometer]	61	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	16	%
517.99_ST [PSA stone - hydrometer]	0	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.56	%
7A5 [Total nitrogen - Dumas]	0.03	%
9B2 [HCO <sub>3</sub> - extractable P - automated)	3	mg/kg

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Voyager Point
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 6, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 312561E, 6241171N.
Physiography:	levee on sand, silt, alluvium lithology and used for timber/scrub/unused. Slope 2.0% (measured), local relief extremely low (< 9m), elevation 15.0 m. Surface condition is firm, profile is mod. well drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	limited clearing at the site, used for timber/scrub/unused, with timber/scrub/unused in the general area
Surface Condition:	firm when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is moderately permeable and mod. well drained, no free water, run on is low and runoff is moderate
Soil Type:	Haplic Brown Kandosol (ASC)
Base of observation:	layer continues
Profile Field Notes:	50m from site 5, similar soil.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

Coarse Fragments: not evident,

### Layer 1

Horizon: A11

0.00 - 0.09 m

Texture: fine loam

Colour: very dark grey (brownish black) (10YR 3/1) [moist] with no recorded mottles

Structure: weak pedality (sub-angular blocky, 20 - 50 mm, fabric is rough-faced peds), ped coatings are none

Coarse Fragments: not evident,

Segregations: not evident,

Roots: many (25-100/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil



Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, texture modifier test result was no change, disruptive test result was very weak force,  
Field chemical tests: Field pH is 6.0 (Raupach),

**Layer 2**

Horizon: A12

0.09 - 0.26 m Texture: fine sandy clay loam  
Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles  
Structure: massive , none  
Coarse Fragments: not evident,  
Segregations: not evident,  
Roots: common (10-25/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, slightly sticky, texture modifier test result was no change,  
Field chemical tests: Field pH is 6.0 (Raupach),

**Layer 3**

Horizon: B1

0.26 - 0.42 m Texture: fine light sandy clay loam  
Colour: brown (dull yellowish brown) (10YR 4/3) [moist] with no recorded mottles  
Structure: massive (fabric is earthy), ped coatings are none  
Coarse Fragments: not evident,  
Segregations: not evident,  
Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, moderately sticky, texture modifier test result was no change,  
Field chemical tests: Field pH is 5.5 (Raupach),

**Layer 4**

Horizon: B2

0.42 - 0.58 m Texture: fine light sandy clay loam  
Colour: dark yellowish brown (brown) (10YR 4/4) [moist] with no recorded mottles  
Structure: massive (fabric is earthy), ped coatings are none  
Coarse Fragments: not evident,  
Segregations: not evident,  
Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, moderately sticky, texture modifier test result was no change,  
Field chemical tests: Field pH is 5.5 (Raupach),

**LABORATORY TESTS**

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**None available**

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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Soil Profile Report

96776



# Soil Profile Report

## SITE DETAILS

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Site Location:	East Hills Reserve hillslope
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 7, collected from a auger, pit by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 313669E, 6239997N.
Physiography:	hillslope under dry sclerophyll forest on sandstone-quartz lithology and used for timber/scrub/unused. Slope 5.0% (measured), local relief very low (9-30 m), elevation 17.0 m, aspect south. Surface condition is soft, profile is rapidly drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	natural disturbance at the site, used for timber/scrub/unused, with urban in the general area
Surface Condition:	soft when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is highly permeable and rapidly drained, no free water, run on is moderate and runoff is moderate
Soil Type:	Lithic Leptic Tenosol (ASC), Earthy Sand (GSG)
Base of observation:	bedrock reached
Profile Field Notes:	Photos 1 - 7. Rock benches. Soil depth variable but generally <50 cm.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

### Layer 1

Horizon: A11

0.00 - 0.12 m	Texture:	coarse sandy clay loam
	Colour:	very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles
	Structure:	moderate pedality (sub-angular blocky, 5 - 10 mm, also sub-angular blocky, 10 - 20 mm, fabric is rough-faced peds), ped coatings are none
	Coarse Fragments:	very few (< 2%), as parent material, dispersed, weakly weathered, sub-angular,
	Pans:	not evident
	Segregations:	not evident,
	Roots:	many (25-100/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,  
 Field chemical tests: Field pH is 5.5 (Raupach),  
 Sample taken: disturbed  
 Layer Notes: Weak to moderate structure.

**Layer 2**

Horizon: B12  
 0.12 - 0.23 m Texture: coarse clayey sand  
 Colour: olive brown (2.5Y 4/3) [moist] with no recorded mottles  
 Structure: massive (fabric is sandy), ped coatings are none  
 Pans: not evident  
 Segregations: not evident,  
 Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, shearing test result was no change,  
 Field chemical tests: Field pH is 5.5 (Raupach),  
 Sample taken: disturbed

**Layer 3**

Horizon: B2  
 0.23 - 0.37 m Texture: coarse clayey sand  
 Colour: olive brown (2.5Y 4/4) [moist] with no recorded mottles  
 Structure: massive (fabric is sandy), ped coatings are none  
 Pans: not evident  
 Segregations: not evident,  
 Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, shearing test result was no change,  
 Field chemical tests: Field pH is 6.0 (Raupach),  
 Sample taken: disturbed

**LABORATORY TESTS**

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**Sample Code:** YNC/17/41/10(1)      **Upper bound:** 0.00    **Lower bound:** 0.12

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	2.97	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.6	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7, no pretreatment]	2.76	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7, no pretreatment]	0.15	cmol/kg

15J1 [Effective cation exchange capacity]	6.48	cmol/kg
2A1 [Air-dry moisture content]	1.89	%
3A1 [EC of 1:5 soil/water extract]	0.06	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.3	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.4	pH
514.99 [Dispersion percentage]	7	%
517.99_CL [PSA clay - hydrometer]	16	%
517.99_CS [PSA coarse sand - hydrometer]	30	%
517.99_FS [PSA fine sand - hydrometer]	26	%
517.99_GR [PSA gravel - hydrometer]	3	%
517.99_SI [PSA silt - hydrometer]	19	%
517.99_ST [PSA stone - hydrometer]	6	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	4.76	%
7A5 [Total nitrogen - Dumas]	0.24	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	11	mg/kg

**Sample Code: YNC/17/41/11(1) Upper bound: 0.12 Lower bound: 0.23**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.38	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.24	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.61	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	1.33	cmol/kg
2A1 [Air-dry moisture content]	0.50	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.4	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.3	pH
514.99 [Dispersion percentage]	14	%
517.99_CL [PSA clay - hydrometer]	9	%
517.99_CS [PSA coarse sand - hydrometer]	57	%
517.99_FS [PSA fine sand - hydrometer]	24	%
517.99_GR [PSA gravel - hydrometer]	2	%
517.99_SI [PSA silt - hydrometer]	6	%
517.99_ST [PSA stone - hydrometer]	2	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	1.05	%
7A5 [Total nitrogen - Dumas]	0.06	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	5	mg/kg

**Sample Code: YNC/17/41/12(1) Upper bound: 0.23 Lower bound: 0.37**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.23	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.16	cmol/kg

15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7,no pretreatment]	0.42	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7,no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	0.91	cmol/kg
2A1 [Air-dry moisture content]	0.42	%
3A1 [EC of 1:5 soil/water extract]	0.03	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.5	pH
4B2 [pH of 1:5 soil/0.01M CaCl2 extract - (meth N4A1)]	4.5	pH
514.99 [Dispersion percentage]	14	%
517.99_CL [PSA clay - hydrometer]	9	%
517.99_CS [PSA coarse sand - hydrometer]	57	%
517.99_FS [PSA fine sand - hydrometer]	24	%
517.99_GR [PSA gravel - hydrometer]	2	%
517.99_SI [PSA silt - hydrometer]	6	%
517.99_ST [PSA stone - hydrometer]	2	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.83	%
7A5 [Total nitrogen - Dumas]	0.05	%
9B2 [HCO3 - extractable P - automated]	3	mg/kg

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	East Hills Reserve
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 8, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 313631E, 6239944N.
Physiography:	hillslope under dry sclerophyll forest on sandstone-quartz lithology and used for timber/scrub/unused. Slope 4.0% (measured), local relief very low (9-30 m), elevation 13.0 m. Surface condition is soft, profile is rapidly drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	natural disturbance at the site, used for timber/scrub/unused, with urban in the general area
Surface Condition:	soft when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is rapidly drained, no free water, run on is moderate and runoff is moderate
Soil Type:	Lithic Brown-Orthic Tenosol (ASC), Earthy Sand (GSG)
Base of observation:	
Profile Field Notes:	Probably on Hawkesbury Sandstone. Grey gums in woodland. Sandier topsoil than site 7.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

Coarse Fragments: not evident,

### Layer 1

Horizon: A1

0.00 - 0.13 m

Texture: coarse loamy sand

Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles

Structure: weak pedality (10 - 20 mm, fabric is rough-faced peds), ped coatings are none

Coarse Fragments: not evident,

Pans: not evident

Segregations: not evident,

Roots: many (25-100/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,  
 Field chemical tests: Field pH is 5.5 (Raupach),  
 Layer Notes: Coarser sand than site 7.

### Layer 2

Horizon: A2  
 0.13 - 0.30 m Texture: coarse clayey sand  
 Colour: olive brown (2.5Y 4/3) [moist] with no recorded mottles  
 Structure: , none  
 Coarse Fragments: not evident,  
 Pans: not evident  
 Segregations: not evident,  
 Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,  
 Field chemical tests: Field pH is 5.5 (Raupach),

### Layer 3

Horizon: B  
 0.30 - 0.50 m Texture: coarse clayey sand  
 Colour: light olive brown (yellowish brown) (2.5Y 5/6) [moist] with no recorded mottles  
 Structure: , none  
 Coarse Fragments: not evident,  
 Pans: not evident  
 Segregations: not evident,  
 Roots: few (1-10/10x10cm) (Root size <1 mm),  
 Soil fauna: Activity is nil  
 Cracks/Macropores: Cracks are nil, macropores are nil  
 Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,  
 Field chemical tests: Field pH is 6.0 (Raupach),

## LABORATORY TESTS

---

Sample Code: YNC/17/41/13(1)

Upper bound: 0.00 Lower bound: 0.13

Name	Value	Unit of measure
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	0.62	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.24	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7, no pretreatment]	0.57	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7, no pretreatment]	0	cmol/kg



15J1 [Effective cation exchange capacity]	1.53	cmol/kg
2A1 [Air-dry moisture content]	0.60	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.2	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.2	pH
517.99_GR [PSA gravel - hydrometer]	1	%

**Sample Code: YNC/17/41/14(1) Upper bound: 0.13 Lower bound: 0.30**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.19	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.22	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.36	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	0.87	cmol/kg
2A1 [Air-dry moisture content]	0.65	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.0	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.1	pH
517.99_GR [PSA gravel - hydrometer]	1	%

**Sample Code: YNC/17/41/15(1) Upper bound: 0.30 Lower bound: 0.50**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.11	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.21	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.68	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.11	cmol/kg
15J1 [Effective cation exchange capacity]	1.11	cmol/kg
2A1 [Air-dry moisture content]	0.63	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.2	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.3	pH
517.99_GR [PSA gravel - hydrometer]	1	%

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Lambeth Reserve - south-east site
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 9, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 314898E, 6239224N. 9030 PENRITH (1:100000) map sheet.
Physiography:	hillslope under dry sclerophyll forest on sandstone-quartz lithology and used for timber/scrub/unused. Slope 6.0% (measured), local relief very low (9-30 m), elevation 23.0 m, aspect south. Surface condition is soft, profile is rapidly drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	used for timber/scrub/unused, with timber/scrub/unused, urban in the general area
Surface Condition:	soft when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is highly permeable and rapidly drained, no free water, run on is low and runoff is moderate
Soil Type:	Acidic Lithic Leptic Tenosol (ASC), Siliceous Sand (GSG)
Base of observation:	bedrock reached
Profile Field Notes:	More acid than other sandstone sites.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

### Layer 1 Horizon: A1

0.00 - 0.30 m	Texture:	coarse loamy sand
	Colour:	very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles
	Structure:	weak pedality (sub-angular blocky, 5 - 10 mm, fabric is rough-faced peds), ped coatings are none
	Pans:	not evident
	Segregations:	not evident,
	Roots:	many (25-100/10x10cm) (Root size <1 mm),
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are nil, macropores are nil

Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,

Field chemical tests: Field pH is 5.0 (Raupach),

Sample taken: bulked

Layer Notes: Hydrophobic.

## Layer 2

Horizon: A2

0.30 - 0.45 m Texture: coarse loamy sand

Colour: dark greyish brown (dark greyish yellow) (2.5Y 4/2) [moist] with no recorded mottles

Structure: , none

Coarse Fragments: few (2-10%), as parent material, dispersed, weakly weathered, sub-rounded, gravel (6-20 mm),

Pans: not evident

Segregations: not evident,

Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,

Field chemical tests: Field pH is 5.0 (Raupach),

Sample taken: bulked

## LABORATORY TESTS

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**Sample Code: YNC/17/41/16(1) Upper bound: 0.00 Lower bound: 0.30**

Name	Value	Unit of measure
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	1.56	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.17	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7, no pretreatment]	0.76	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7, no pretreatment]	0.1	cmol/kg
15J1 [Effective cation exchange capacity]	2.59	cmol/kg
2A1 [Air-dry moisture content]	1.10	%
3A1 [EC of 1:5 soil/water extract]	0.05	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.0	pH
4B2 [pH of 1:5 soil/0.01M CaCl2 extract - (meth N4A1)]	4.1	pH
517.99_GR [PSA gravel - hydrometer]	1	%

**Sample Code: YNC/17/41/17(1) Upper bound: 0.30 Lower bound: 0.45**

Name	Value	Unit of measure
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	0.38	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.17	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7, no pretreatment]	0.31	cmol/kg

15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7,no pretreatment]	0.11	cmol/kg
15J1 [Effective cation exchange capacity]	0.97	cmol/kg
2A1 [Air-dry moisture content]	0.48	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.0	pH
4B2 [pH of 1:5 soil/0.01M CaCl2 extract - (meth N4A1)]	4.1	pH
517.99_GR [PSA gravel - hydrometer]	1	%

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Lambeth Reserve - north-west site
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 10, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 314854E, 6239248N.
Physiography:	hillslope on sandstone-quartz lithology. Slope 8.0% (measured), local relief very low (9-30 m), elevation 11.0 m, aspect west. Surface condition is soft, profile is rapidly drained, and no salting evident
Vegetation/Land Use:	natural disturbance at the site, with timber/scrub/unused, urban in the general area
Surface Condition:	soft when described, ground cover is 100%
Erosion/Land Degradation:	erosion at site is none
Soil Hydrology:	profile is highly permeable and rapidly drained, no free water, run on is low and runoff is moderate
Soil Type:	Lithic Leptic Tenosol (ASC), Siliceous Sand (GSG)
Base of observation:	
Profile Field Notes:	Basically same as site 9.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

### Layer 1

Horizon: A1

0.00 - 0.09 m

Texture:	coarse loamy sand
Colour:	very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles
Structure:	weak pedality (sub-angular blocky, 5 - 10 mm, fabric is sandy), ped coatings are none
Coarse Fragments:	not evident,
Segregations:	not evident,
Roots:	many (25-100/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),
Soil fauna:	Activity is nil
Cracks/Macropores:	Cracks are nil, macropores are nil

	Moisture/Consistence:	dry, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,
	Erodibility Tests:	Crumb (EAT) test showed no change,
	Field chemical tests:	Field pH is 5.5 (Raupach),
	Sample taken:	disturbed
<b>Layer 2</b>	Horizon:	A2
0.09 - 0.35 m	Texture:	coarse loamy sand
	Colour:	dark greyish brown (greyish yellow brown) (10YR 4/2) [moist] with no recorded mottles
	Structure:	single grained (fabric is sandy), ped coatings are none
	Coarse Fragments:	very few (< 2%), not identified, dispersed, weakly weathered, sub-rounded,
	Segregations:	not evident,
	Roots:	common (10-25/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are nil, macropores are nil
	Moisture/Consistence:	dry, non-sticky, texture modifier test result was no change, disruptive test result was loose, shearing test result was no change,
	Erodibility Tests:	Crumb (EAT) test showed no change,
	Field chemical tests:	Field pH is 5.5 (Raupach),
	Sample taken:	disturbed

## LABORATORY TESTS

---

**Sample Code:** YNC/17/41/18(1)

**Upper bound:** 0.00 **Lower bound:** 0.09

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH4Cl @ pH 7, no pretreatment]	2.28	cmol/kg
15B1_K [Exchangeable K - 1M NH4Cl @ pH 7, no pretreatment]	0.16	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH4Cl @ pH 7, no pretreatment]	0.62	cmol/kg
15B1_NA [Exchangeable Na - 1M NH4Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	3.16	cmol/kg
2A1 [Air-dry moisture content]	0.60	%
3A1 [EC of 1:5 soil/water extract]	0.04	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.1	pH
4B2 [pH of 1:5 soil/0.01M CaCl2 extract - (meth N4A1)]	4.2	pH
514.99 [Dispersion percentage]	0	%
517.99_CL [PSA clay - hydrometer]	3	%
517.99_CS [PSA coarse sand - hydrometer]	73	%
517.99_FS [PSA fine sand - hydrometer]	19	%
517.99_GR [PSA gravel - hydrometer]	0	%
517.99_SI [PSA silt - hydrometer]	5	%
517.99_ST [PSA stone - hydrometer]	0	%

6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	2.61	%
7A5 [Total nitrogen - Dumas]	0.15	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	7	mg/kg

**Sample Code: YNC/17/41/19(1) Upper bound: 0.09 Lower bound: 0.35**

<b>Name</b>	<b>Value</b>	<b>Unit of measure</b>
15B1_CA [Exch. Ca - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.6	cmol/kg
15B1_K [Exchangeable K - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.17	cmol/kg
15B1_MG [Exchangeable Mg - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0.35	cmol/kg
15B1_NA [Exchangeable Na - 1M NH <sub>4</sub> Cl @ pH 7, no pretreatment]	0	cmol/kg
15J1 [Effective cation exchange capacity]	1.22	cmol/kg
2A1 [Air-dry moisture content]	0.37	%
3A1 [EC of 1:5 soil/water extract]	0.03	dS/m
4A1 [pH of 1:5 soil/water suspension]	5.3	pH
4B2 [pH of 1:5 soil/0.01M CaCl <sub>2</sub> extract - (meth N4A1)]	4.3	pH
514.99 [Dispersion percentage]	0	%
517.99_CL [PSA clay - hydrometer]	2	%
517.99_CS [PSA coarse sand - hydrometer]	76	%
517.99_FS [PSA fine sand - hydrometer]	12	%
517.99_GR [PSA gravel - hydrometer]	2	%
517.99_SI [PSA silt - hydrometer]	6	%
517.99_ST [PSA stone - hydrometer]	2	%
6B2b [Total organic C - Dumas high-temperature combustion, infrared/thermal cond	0.93	%
7A5 [Total nitrogen - Dumas]	0.06	%
9B2 [HCO <sub>3</sub> - extractable P - automated]	6	mg/kg

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Smith Park East Hills
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 11, collected from a auger by Mr Casey Murphy on November 14, 2017
Map Reference:	MGA Grid Reference: Zone 56, 314219E, 6240663N.
Physiography:	hillslope on siltstone/mudstone lithology and used for timber/scrub/unused. Slope 2.0% (measured), local relief very low (9-30 m), elevation 16.0 m, aspect west. Surface condition is hard set, profile is mod. well drained, erosion hazard is slight, and no salting evident
Vegetation/Land Use:	no effective disturbance at the site, used for timber/scrub/unused, with timber/scrub/unused, urban in the general area
Surface Condition:	hard set when described, ground cover is 100%
Erosion/Land Degradation:	slight, erosion at site is none
Soil Hydrology:	profile is slowly permeable and mod. well drained, no free water, run on is low and runoff is low
Soil Type:	Haplic Brown Kurosol (ASC), Brown Podzolic Soil (GSG)
Base of observation:	equipment/auger refusal
Profile Field Notes:	Very shallow A1 bleached A2 then clayey B. Ironbark. Very thin A, everywhere <3 cm. Photos 22 - 24.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

### Layer 1      Horizon: A1

0.00 - 0.03 m	Texture:	coarse sandy loam
	Colour:	very dark brown (brownish black) (10YR 2/2) [moist] with no recorded mottles
	Structure:	weak pedality (5 - 10 mm, )
	Pans:	not evident
	Segregations:	not evident,
	Roots:	common (10-25/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),
	Soil fauna:	Activity is nil
	Cracks/Macropores:	Cracks are nil, macropores are nil



Moisture/Consistence: dry, slightly sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,

Field chemical tests: Field pH is 5.5 (Raupach),

Sample taken: disturbed

## Layer 2

Horizon: A2

0.03 - 0.14 m

Texture: clay loam

Colour: dark yellowish brown (brown) (10YR 4/6) [moist] or pale brown (dull yellow orange) (10YR 6/3) [dry] with no recorded mottles

Structure: massive (fabric is earthy)

Coarse Fragments: few (2-10%), as parent material, dispersed, weakly weathered, sub-rounded platy, sub-angular tabular, fine gravel (2-6 mm), gravel (6-20 mm),

Pans: not evident

Segregations: not evident,

Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: dry, moderately sticky, texture modifier test result was no change, disruptive test result was very firm force, shearing test result was brittle,

Field chemical tests: Field pH is 5.5 (Raupach),

Sample taken: disturbed

## Layer 3

Horizon: B

0.14 - 0.25 m

Texture: medium clay

Colour: strong brown (bright brown) (7.5YR 5/6) [moist] with no recorded mottles

Pans: not evident

Segregations: not evident,

Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: dry, moderately sticky, texture modifier test result was no change,

Field chemical tests: Field pH is 5.5 (Raupach),

Sample taken: disturbed

## LABORATORY TESTS

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None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Alluvial depression, 150m south of netball courts
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 12, collected from a gully by Mr Mark Young on January 18, 2018
Map Reference:	MGA Grid Reference: Zone 56, 315551E, 6243734N.
Physiography:	drainage depression under woodland shrub understorey on alluvium, unconsolidated lithology and used for timber/scrub/unused. Slope 1.0% (measured, Inclinator), local relief extremely low (< 9m), elevation 16.0 m, aspect south west. Surface condition is hard set, profile is very poorly drained, erosion hazard is very high, and no salting evident
Vegetation/Land Use:	limited clearing at the site, used for timber/scrub/unused, with timber/scrub/unused, industrial in the general area
Surface Condition:	hard set when described, ground cover is 50%
Erosion/Land Degradation:	very high; wind erosion at site is none; sheet erosion at site is none; rill erosion at site is none; gully erosion at site is none; scald erosion at site is none; tunnel erosion at site is evident, active; streambank erosion at site is evident, active; wave erosion at site is none; mass movement erosion at site is none; no salting evident
Soil Hydrology:	profile is very slowly permeable and very poorly drained, no free water, runoff is very high and runoff is low
Soil Type:	Mottled Natric Yellow Kurosol (ASC), Soloth (Solod) (GSG)
Base of observation:	layer continues
Profile Field Notes:	

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

Coarse Fragments: not evident,

### Layer 1

Horizon: A1

0.00 - 0.12 m

Texture: clay loam

Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles

Structure: moderate pedality (sub-angular blocky, 5 - 10 mm, also sub-angular blocky, 2 - 5 mm, fabric is rough-faced peds)

Coarse Fragments: not evident,

Pans: not evident

Segregations: not evident,  
Roots: common (10-25/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,  
Field chemical tests: Field pH is 7.0 (Raupach),  
Sample taken: disturbed

**Layer 2**

Horizon: A2

0.12 - 0.36 m

Texture: silty clay loam  
Colour: dark brown (10YR 3/3) [moist] or light yellowish brown (dull yellow orange) (10YR 6/4) [dry] with no recorded mottles  
Structure: moderate pedality (sub-angular blocky, 5 - 10 mm, also sub-angular blocky, 2 - 5 mm, )  
Coarse Fragments: not evident,  
Pans: not evident  
Segregations: very few (< 2%), manganiferous, weak, soft segregations, fine (< 2 mm),  
Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, non-sticky, disruptive test result was moderately firm force, shearing test result was brittle,  
Erodibility Tests: Crumb (EAT) test showed no change,  
Field chemical tests: Field pH is 6.0 (Raupach),  
Sample taken: disturbed  
Layer Notes: Close to being bleached. Appears massive when in undisturbed gully but breaks up to be moderate structure.

**Layer 3**

Horizon: B2

0.36 - 0.97 m

Texture: medium clay  
Colour: light yellowish brown (dull yellow orange) (10YR 6/4) [moist] with 20% - 50% distinct unspecified yellow mottles, and 20% - 50% distinct unspecified red subdominant mottles  
Structure: strong pedality (prismatic, 50 - 100 mm, also angular blocky, 20 - 50 mm, )  
Coarse Fragments: not evident,  
Pans: not evident  
Segregations: not evident,  
Roots: none (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, slightly sticky, disruptive test result was moderately strong force, shearing test result was crumbly,  
Erodibility Tests: Crumb (EAT) test showed no change,

Field chemical tests: Field pH is 5.5 (Raupach),  
Sample taken: disturbed  
Layer Notes: Very dense clay. Minor grey mottles also present.

## LABORATORY TESTS

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None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Site 13 - 50m SW of creek near bare depression
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 13, collected from a auger by Mr Mark Young on January 18, 2018
Map Reference:	MGA Grid Reference: Zone 56, 315478E, 6243618N.
Physiography:	plain under woodland shrub understorey on alluvium lithology and used for timber/scrub/unused. Slope 1.0% (measured, Inclinator), local relief extremely low (< 9m), elevation 15.0 m, aspect south west. Surface condition is firm, profile is poorly drained, erosion hazard is moderate, and no salting evident
Vegetation/Land Use:	used for timber/scrub/unused, with timber/scrub/unused, industrial in the general area
Surface Condition:	firm when described, ground cover is 100%
Erosion/Land Degradation:	moderate; wind erosion at site is none; sheet erosion at site is none; rill erosion at site is none; gully erosion at site is none; scald erosion at site is minor; tunnel erosion at site is none; streambank erosion at site is none; wave erosion at site is none; mass movement erosion at site is none; no salting evident
Soil Hydrology:	profile is very slowly permeable and poorly drained, no free water, run on is moderate and runoff is low
Soil Type:	Bleached Natric Brown Kurosol (ASC), Soloth (Solod) (GSG)
Base of observation:	layer continues
Profile Field Notes:	Area partially disturbed. Seems like soil has been scraped away nearby.

## SOIL DESCRIPTION

---

### Layer 0

0.00 - 0.00 m

Coarse Fragments: not evident,

### Layer 1

Horizon: A1

0.00 - 0.08 m

Texture: loam

Colour: very dark greyish brown (brownish black) (10YR 3/2) [moist] with no recorded mottles

Structure: weak pedality (platy, 50 - 100 mm, also sub-angular blocky, 2 - 5 mm, fabric is rough-faced peds)

Coarse Fragments: not evident,

Pans: not evident

Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was very weak force, shearing test result was brittle,  
Field chemical tests: Field pH is 5.5 (Raupach),  
Sample taken: disturbed

## Layer 2

Horizon: A2l (bleached horizon)  
0.08 - 0.20 m Texture: silty clay loam  
Colour: greyish brown (greyish yellow brown) (10YR 5/2) [moist] or light grey (dull yellow orange) (10YR 7/2) [dry] with no recorded mottles  
Structure: massive (fabric is earthy)  
Coarse Fragments: not evident,  
Pans: not evident  
Segregations: very few (< 2%), manganiferous, weak, soft segregations, fine (< 2 mm),  
Roots: few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, slightly sticky, texture modifier test result was no change, disruptive test result was moderately weak force, shearing test result was brittle,  
Field chemical tests: Field pH is 6.0 (Raupach),  
Sample taken: disturbed  
Layer Notes: Very silty. Manganese/iron soft nodules present at bottom of layer at boundary.

## Layer 3

Horizon: B2  
0.20 - 0.38 m Texture: medium clay  
Colour: yellowish brown (10YR 5/6) [moist] with 20% - 50% prominent unspecified orange mottles, and 20% - 50% prominent unspecified red subdominant mottles  
Structure: moderate pedality (prismatic, 50 - 100 mm, fabric is smooth-faced peds)  
Coarse Fragments: not evident,  
Pans: not evident  
Roots: none (Root size <1 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, slightly sticky, texture modifier test result was no change, disruptive test result was very firm force, shearing test result was crumbly,  
Field chemical tests: Field pH is 5.0 (Raupach),  
Sample taken: disturbed  
Layer Notes: Grey mottles also present.

# LABORATORY TESTS

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None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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# Soil Profile Report

## SITE DETAILS

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Site Location:	Site 14 - on fill, 25m east of adjacent car park
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 14, collected from a pit by Mr Mark Young on January 18, 2018
Map Reference:	MGA Grid Reference: Zone 56, 315459E, 6243736N.
Physiography:	terrace flat on unconsolidated, fill lithology and used for other. Slope 0.0% (measured, Inclinator), local relief extremely low (< 9m), elevation 10.0 m. profile is mod. well drained
Vegetation/Land Use:	used for other, with industrial in the general area
Surface Condition:	
Erosion/Land Degradation:	erosion at site is none
Soil Hydrology:	profile is slowly permeable and mod. well drained, no free water, run on is low and runoff is none
Soil Type:	No available class No available class Urbic Anthroposol (ASC), No suitable group (GSG)
Base of observation:	layer continues
Profile Field Notes:	Fill over possible old terrace or footslope as it is higher than the main plain.

## SOIL DESCRIPTION

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### Layer 0

0.00 - 0.00 m

### Layer 1

0.00 - 0.35 m

Colour:	colour not recorded with no recorded mottles
Soil fauna:	Activity is nil
Cracks/Macropores:	Cracks are nil, macropores are nil
Layer Notes:	Fill with blue metal stones. Clay mixed - possibly from car park construction.

## LABORATORY TESTS

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None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)



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# Soil Profile Report

## SITE DETAILS

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Site Location:	Site 17 - North east gully, 30m from
Profile Details:	Translocation Project Hibbertia Bankstown Survey (1005351), Profile 17, collected from a gully by Mr Mark Young on January 18, 2018
Map Reference:	MGA Grid Reference: Zone 56, 315584E, 6243795N.
Physiography:	footslope on siltstone/mudstone lithology and used for timber/scrub/unused. Slope 2.0% (measured, Inclinator), local relief extremely low (< 9m), elevation 14.0 m, aspect south west. Surface condition is hard set, profile is poorly drained, and salting evident
Vegetation/Land Use:	limited clearing at the site, used for timber/scrub/unused, with industrial, timber/scrub/unused in the general area
Surface Condition:	hard set when described, ground cover is 50%
Erosion/Land Degradation:	wind erosion at site is none; sheet erosion at site is none; rill erosion at site is none; gully erosion at site is minor, partly stabilised gully 1.5 - 3.0 m depth; scald erosion at site is none; tunnel erosion at site is none; streambank erosion at site is none; wave erosion at site is none; mass movement erosion at site is none; salting evident
Soil Hydrology:	profile is slowly permeable and poorly drained, no free water
Soil Type:	No available class No available class Urbic Anthroposol (ASC), No suitable group (GSG)
Base of observation:	bedrock reached
Profile Field Notes:	Urbic Anthroposol (fill) overlying buried soil (Medium, Non-gravelly, Clay loamy, Clayey, Class undetermined, Class undetermined, Brown Sodosol).

## SOIL DESCRIPTION

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### Layer 0

0.00 - 0.00 m

### Layer 1

Horizon: F

0.00 - 0.39 m

Texture:	clay loam
Colour:	dark brown (10YR 3/3) [moist] with no recorded mottles
Structure:	moderate pedality (sub-angular blocky, 10 - 20 mm, also sub-angular blocky, 5 - 10 mm, fabric is rough-faced peds)
Coarse Fragments:	common (10-20%), other,
Pans:	not evident
Roots:	few (1-10/10x10cm) (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),
Soil fauna:	Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was moderately weak force, shearing test result was crumbly,  
Field chemical tests: Field pH is 6.0 (Raupach),  
Layer Notes: Fill but is not bad soil.  
Stone layer between layer 1 and 2.

**Layer 2**

Horizon: 2A1b (buried horizon)

0.39 - 0.55 m Texture: clay loam  
Colour: dark brown (10YR 3/3) [moist] with no recorded mottles  
Structure: moderate pedality (sub-angular blocky, 5 - 10 mm, fabric is rough-faced peds)  
Coarse Fragments: not evident,  
Pans: not evident  
Roots: none (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, non-sticky, texture modifier test result was no change, disruptive test result was moderately firm force, shearing test result was crumbly,  
Field chemical tests: Field pH is 7.5 (Raupach),  
Sample taken: disturbed  
Layer Notes: Unusually high pH - Saline or could be from herbicide spraying. White precipitate on part of batter surface. Looks like salt.

**Layer 3**

Horizon: 2A2b (buried horizon)

0.55 - 0.73 m Texture: silty clay loam  
Colour: dark yellowish brown (brown) (10YR 4/4) [moist] or very pale brown (dull yellow orange) (10YR 7/3) [dry] with 2% - 10% prominent unspecified orange mottles  
Structure: massive  
Coarse Fragments: very few (< 2%), as parent material, strongly weathered, angular platy,  
Pans: not evident  
Segregations: very few (< 2%), ferromanganiferous, soft segregations,  
Roots: none (Root size <1 mm), few (1-10/10x10cm) (Root size 1-2 mm),  
Soil fauna: Activity is nil  
Cracks/Macropores: Cracks are nil, macropores are nil  
Moisture/Consistence: dry, slightly sticky, texture modifier test result was no change, disruptive test result was moderately firm force, shearing test result was brittle,  
Field chemical tests: Field pH is 8.0 (Raupach),  
Sample taken: disturbed  
Layer Notes: Unusually high pH - Saline or could be from herbicide spraying. White precipitate on part of batter surface. Looks like salt.

**Layer 4**

Horizon: 2B2b (buried horizon)

0.73 - 1.14 m Texture: medium clay

Colour: dark yellowish brown (brown) (10YR 4/6) [moist] with 20% - 50% prominent unspecified brown mottles, and 20% - 50% prominent unspecified red subdominant mottles

Structure: strong pedality (prismatic, 50 - 100 mm, also angular blocky, 20 - 50 mm, fabric is smooth-faced peds)

Coarse Fragments: few (2-10%), as parent material, strongly weathered, angular platy, sub-angular platy, fine gravel (2-6 mm), gravel (6-20 mm),

Pans: not evident

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: dry, moderately sticky, texture modifier test result was no change, disruptive test result was very firm force, shearing test result was crumbly,

Field chemical tests: Field pH is 8.0 (Raupach),

Sample taken: disturbed

Layer Notes: Unusually high pH - Saline or could be from herbicide spraying.

#### Layer 5

Horizon: 2Cb (buried horizon)

1.14 - 1.89 m

Colour: colour not recorded with no recorded mottles

Pans: not evident

Soil fauna: Activity is nil

Cracks/Macropores: Cracks are nil, macropores are nil

Moisture/Consistence: dry,

Sample taken: disturbed

## LABORATORY TESTS

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None available

For information on laboratory test data and units of measure, please see: [Soil survey standard test methods](#)

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