Sleeps Hill Quarry Reserve

Maintenance Plan

2005

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City of Mitcham
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1. Reserve Identification

Reserve Name: Sleeps Hill Quarry Reserve
(formerly part of Belair Reserve (R616) – southern section).

LGA: Mitcham

Location: The reserve is located within the suburbs of Belair and Lynton, bounded by the following:
- Northern boundary - rehabilitated Lynton landfill;
- Northern-eastern boundary - Kalyra Road, Caroline Avenue and High Street;
- Southern boundary - Mead Street and portion of Lind Avenue;
- Western boundary - railway line;
- Western boundary - woodland, part of Lot 2 (Lynton landfill).

Title Information: Section 702 Certificates of Title
- C/T 5764/699, DP 105100, 0.17 ha

Section 1147 Certificates of Title
- Lot 39, C/T 3766/08, DP 9401, 2.94 ha
- Lot 40, C/T 5860/468 (formerly CT 4207/613), DP 17195, 7.9 ha

Section 1148 Certificate of Title
- Lot 1, C/T 5518/779, (formerly CT 4115/547), DP 9378, 2.3 ha

Section 1073, Certificate of Title
- Lot 19, C/T 5772/172 (formerly CT 4115/546), DP 149652, 19.83 ha. Confirmed on State Heritage Register 8/8/96

Refer to Appendix A for certificates of titles

Zoning: Hills Face Zone (HFZ)

Size: Approximately 33 hectares

Class of Reserve: Category 5, Undeveloped – modified woodland (a) semi-natural
2. Background, History & Status of the Reserve

2.1 BACKGROUND AND STATUS

Sleeps Hill Quarry Reserve is amongst the largest of City of Mitcham's undeveloped woodland reserves with an area of approximately thirty-three (33) hectares. It is situated approximately 1.5 kilometres south-west of the Belair Country Fire Service station.

The reserve is irregular in shape with residential development on its north-eastern, eastern and southern boundaries. The majority of its northern boundary is adjacent to the former Lynton landfill. The railway line forms the reserve's western boundary.

Sleeps Hill Quarry Reserve is part of a large network of undeveloped woodland reserves across the Mitcham Hills such as Ashby Reserve, Watiparinga National Trust Reserve, O'Dea's Quarry Reserve (west of railway line), Windy Point, Randell Park and Shepherds Hill Recreation Park. These reserves provide an attractive, green backdrop to metropolitan Adelaide and are an important aesthetic feature.

Watiparinga and Ashby Reserve are in close proximity to Sleeps Hill Quarry Reserve and share many similarities such as vegetation associations and terrain. Consequently, their management and maintenance plans have been utilised as valuable sources of information and have been acknowledged accordingly.

The southern section of Belair Reserve (R616) has been renamed "Sleeps Hill Quarry Reserve." This followed public consultation of the draft Belair Reserve (southern section) Maintenance Plan July 2003, and a report to Council's
Engineering and Environmental Services Committee recommending that Council endorse the plan.

The draft maintenance plan recommended the following name changes which have been ratified by Council:

- **Belair Reserve** (southern section) - change to "Sleeps Hill Quarry Reserve," as this section contains the 'Sleeps Hill Quarry Trail.' The remaining parts of Belair Reserve (depot and landfill) should also be renamed at a later date to avoid confusion with the nearby Belair National Park.

- **Existing Sleeps Hill Reserve** (situated west of the railway line, south of Seaview Crescent) - renamed *O'Dea's Quarry Reserve*. Quarries within this reserve were opened in 1846 by John O'Dea.

The *City of Mitcham Open Space Survey 1982* (Moyle et. al, 1982) classified the entire Belair Reserve (R616) as “Undeveloped: modified woodland – (a) semi-natural, designated rubbish dump.” Definitions of the classification from chapter four of the report state:

- “Undeveloped Reserves” – those reserves which remain in a largely semi natural or cleared condition without any specific development for a particular function.

- “Modified woodland” – all areas of wooded land. The group is further subdivided into: (a) Semi-Natural Woodland: woodland in a largely natural condition; some with exotic shrubs in the understorey, and (b) Woodland Dominated by Exotic Plants: most of the natural vegetation has been crowded out by exotics.

The above classifications assigned to the reserve in 1982 are still accurate today.

**2.2 ABORIGINAL HISTORY & CURRENT STATUS**

According to Robertson (1999 p61) the area lies within the country of the Kaurna, the Adelaide Plains people. The stringy bark forests of the Mount Lofty Ranges marked their eastern boundary. The Kaurna were seasonally nomadic people tending to travel along coastal areas in summer and moving to the more timbered foothills in winter, where there was more shelter and firewood. Uses of indigenous plants found in the region by Aboriginals is listed in Appendix B.

Currently, there is a native title claim on Lot 702 (CR 5764/699) which is approximately 1,700m² in area and situated on the reserve's eastern boundary. It appears that this title overlaps a portion of Quarry J.
2.3 EUROPEAN HISTORY

Land Ownership

A concise history of Sleeps Hill Quarry Reserve has been compiled from land titles and old system searches by City of Mitcham’s Historian (Maggy Ragless).

During the mid 1800s, land in the southern section of Belair Reserve (now Sleeps Hill Quarry Reserve) was held by absentee landholders and rented out to small scale farmers. Later, land was leased or purchased for quarrying which commenced during the late 1800s (Ragless, M., pers. comm., 2002).

The reserve is known locally as 'Sleeps Hill Quarry Reserve' and contains the 'Sleeps Hill Quarries Interpretive Trail.' According to Ragless (pers. comm., 2002 citing Oborn et al (1981) and Cockburn (1970s), the name 'Sleeps Hill' is derived from Samuel Sleep who was employed as a shepherd by the South Australian Company. Samuel later became a pastoralist in the far north of South Australia but went broke due to a succession of bad years. He died in 1864 during the Great Drought.

Quarrying Operations

According to an interpretive sign above Quarry E by the Department of Mines and Energy, quarries were opened in the reserve by A.H. Birt in 1916 and taken over by Adelaide Quarries Ltd in 1919. During the 1920s these quarries were one of the leading producers of crushed rock in South Australia and employed up to 100 men. The rock was used as aggregate and sand for a variety of purposes. After 1930 following the Depression, quarry operations were seriously curtailed and only a few men were employed. Quarrying ceased around 1950.

Land Transfers

An undated map of the reserve has noted the transfer of land from previous owners to the City of Mitcham and are listed below.

Lot 1: Transferred from Residential Developers Pty Ltd, 13 September 1970

Lot 19 & S.702: Transferred from Residential Developers Pty Ltd, 23 October 1970

Lot 39: Land vested in the City of Mitcham from Residential Developers Pty Ltd, 13 September 1971

Lot 40: Transferred from Residential Developers Pty Ltd, 7 June 1971

Elders Lensworth Finance Ltd, transferred allotment 36 High Street, Lynton to the City of Mitcham to merge with the adjacent reserve. This allotment was originally set aside for the E&WS Department, who later did not require the 9 x 13 metre site.

Woodland Restoration

Over the years the section of reserve adjacent to the old crushing plant has been the focus of a weed control and revegetation project by the 'Sleeps Hill Scrub Landcare Project' and Clapham Primary School. In 1993 the primary school planted 170 indigenous trees and shrubs north-east of the Sleeps Hill tunnel. The Landcare group
has received a number of awards to recognise their achievements. In 1996 Trees For Life requested the establishment of three Bushcare (now called 'Bush For Life') sites in the Sleeps Hill Quarry complex, which were approved and continue to be funded by the City of Mitcham.

**Disused Quarries**

A discussion paper titled 'The Proposed Rehabilitation of Mitcham Hills Quarries' by City of Mitcham Councillor, Bob Marshall, was released in June 1995. The paper proposed filling the disused quarries with inert waste and clean fill, then later revegetating the capped surface with native vegetation. The primary objectives were to:

- Screen the exposed quarry faces along the Hills Face Zone;
- Extend the life of existing landfills in Adelaide;
- Receive revenue from tipping fees to fund revegetation works in the reserve;
- Community participation and consultation in revegetation of capped landfills; and
- Reduce hazards to bushwalkers posed by steep quarry faces.

The discussion paper was met with strong objection from some residents highlighting the heritage value of the quarries, educational opportunities and impacts on native vegetation. However, the paper was successful in raising the profile of Mitcham's quarries and providing a catalyst for formulating management actions, i.e. quarry fencing and vegetation surveys.

Soon after Councillor Marshall’s discussion paper, Mr Royce L. Wells released a report titled 'Mitcham Quarries: The Definitive Analysis for Total Preservation' (1995). The report provided a comprehensive list of quarries within the City of Mitcham, their history, geological significance and argued against using the quarries for landfills. Mr Wells opposed the argument that disused quarries were a scar on the landscape. He argued that they:

- Are a valuable educational resource;
- Display significant geological formations;
- Are already screened in many instances by regenerating native plants;
- Display beautiful rock faces.

In regards to the Sleeps Hill Quarries, he comments on the unique faces of the complex, walking trails and the great 100 foot face of Quarry ‘D’ as... "one of the most exiting natural rock faces anyone could wish to see in the Adelaide Hills.”

Council later resolved that before any development of the quarries can be considered, a safety audit was required for each quarry. Information was also sought to identify boundaries, vegetation and history. A sum of $15,000 was approved. In 1996 Council received the 'Report on Quarries for City of Mitcham' - prepared by Gupta Environmental and Planning Consultants and A&M Drilling and Blasting Services.

In 1998 a working party was formed to investigate and report on safety issues in the Mitcham quarries. The working party comprised of members from the Local Government Mutual Liability Scheme, Department of Mines and Energy SA, Mitcham Open Space Advisory Committee (MOSAC), a City of Mitcham Councillor and three officers. Eighteen months later the working party released 'The City of Mitcham Quarries 1999' report. Various recommendations were made to upgrade fencing and signage in specific areas.
Heritage Values

A heritage survey by Taylor Weidenhofer (1995) was commissioned by the City of Mitcham, in association with the State Heritage Branch of the Department of Environment and Natural Resources. This report was part of a wider heritage survey within the City of Mitcham. The heritage value of the Sleeps Hill Quarries were considered significant as they:

... illustrated a typical pre war quarry. Small scale quarries such as Sleeps Hill (and there were many in this area) have become no longer viable because of changed methods of operation and changing attitudes to worker safety. Sleeps Hill is important because it is intact and clearly displays the technologies and methods used to quarry and process the rock. There are few unfilled or intact quarries remaining from this period that are accessible.

The State Heritage Authority provisionally entered the Sleeps Hill Quarries on its Register on 11 April 1996. In correspondence to Council on 6 May 1996, the Authority sought comment on this entry. A letter from the State Heritage Authority to Council on 8 August 1996 (Appendix C), confirms the entry of the Sleeps Hill Quarries on the Register in recognition of its value to the heritage of South Australia. Relevant criteria being:

(d) is an outstanding representative of a particular class of places of cultural significance in illustrating an in-tact pre-Second World War quarry that reveals quarrying methods and technologies.

As the Sleeps Hill Quarries have been entered on the Register, any proposed developments must be referred to the planning authority for approval under the Development Act 1993 (Towle, 1996).

Pedestrian Access across Railway Line

Council files reveal a resident's concern over Trans Adelaide transit police (1996) prohibiting residents from crossing the railway line at Gamma Crescent, Panorama into the reserve. This was undertaken to minimise the risk to residents as the railway line is a busy transport route. An alternative route is to access the quarries via Hillrise Road.

Pipe Laying

A contractor (ADCIV) in 1999 completed pipe laying through an easement for the sewer relay at Kalyra Road.

Bush For Life

Native vegetation is largely managed through a number of Bush For Life (formerly Bushcare) sites and the City of Mitcham.
A title search by Maggy Ragless is listed below.

**Application 25797 and other sources**

**Sections 1073 and 1074 Hundred of Adelaide**

3rd Oct 1846  Section 1074. For L80.06.0 of 80 acres. Land grant to Hiram Manfull of Chellaston Grove Farm, farmer

27th Oct 1846  Section 1073. Land grant to John O’Dea labourer of Adelaide for L78 of 78 acres.

7th April 1853  Section 1074. Power of Attorney – H. Manfull, gentleman “about to leave the province and I have requested William Bartley and William Bakewell of Adelaide, solicitors and co-partners to take upon themselves to care of my estate and property in SA.”

10th Oct 1853  Conveyance of Sections 1074 and 1080 from William Bartley and others to George Morphett for L415.16.00

6th Dec 1856  Sections 1074 and 1080. Contract for sale from G. Morphett to T. H. Ayliffe.

23rd July 1859  Sections 1074 and 1080. Agreement of sale to John O’Dea some six months before the term contracted for Ayliffe’s completion.

16th Sept 1864  Sections 1074: 80 acres & Section 1080: 5 acres. Indenture from George Morphett later of Adelaide now of Windsor, county Berks, England gentleman to John O’Dea, of Spring Gully, farmer. For L297 “together with all buildings, fences, timbers, ways and rights.

18th June 1868  Section 1073. CT 115/240. Henry Hobhouse Turton gentleman of Adelaide part Section 1073 of lac 2 rds and 4 perches.

15th Oct 1875  Section 1073. Trans 592 85 from HHT to Patrick Callaghan of Adelaide. CT CCXIV/167 (Lands Department Old Systems and Lands Title Office).

21st June 1878  Sections 1073, 1074 and 1080 (82 acres). Conveyance from John O’Dea of Humphreys Springs farmer and Daniel O’Dea (son of John of Springbank stockdealer “in consideration of the natural love and affection which the said John O’Dea hath and beareth towards the said son, Daniel O’Dea...for 5/-”

19th Jan 1882  Sections 1073, 1074 and 1080 (82 acres). Mortgage from Daniel O’Dea to Hon Sir William Milne off Sunnyside near Adelaide and Samual Tomkinson for L2500.

25th Jan 1886  Sections 1073, 1074 and 1080 (82 acres). Mortgage between Henry Palmerston Tomkinson, Hon Sir William Milne of Sunnyside and Hon. Samual Tomkinson member of Leg. Council for 2500 for 82 acres of Section 1080; 78 acres of Section 1073; 2 acres of Section 1073 to John O’Dea to Henry Hobhouse Turton and also except for Part Sections 1073 and 1074 and 1080 16 acres 1 rood Y 17 perches from Dan O’Dea to Honourable James Garden Ramsay. CT 1029/162 and 163.

25th Jan 1886  Sections 1073, 1074 and 1080 (82 acres).
1886 Conveyance from Sir William Milne and Samual Tomkinson to H. P. Tomkinson for L2500.


1888 Section 1073. License to quarry stone expired.

1901 Sections 1073 and 1080 no occupier Taylor’s Estate owner 4 acres Quarry L50.

Mattingly, E. occupier Taylor’s Estate owner 4 acres, Quarry L100.

1910 Real Property Act.

10th Mar 1915 Letter Occupancy of these lands by Richard Mitchell.

5th June 1915 Sections 1073, 1074 and 1080 (82 acres). CT 1029/162 ex App 25797 SAR Part section 1073 of 2 acres, 3 roods and 29 perches.


18th April 1950 Sections 1073, 1074 and 1080 (82 acres). CT 2074/103 ex CT 1446/91 Kevin Sygieh Rasheed and his wife Joyce Frances Rasheed of 277 Goodwood Road, Springbank Refuelling Officer.

25th May 1948 Sections 1073, 1074 and 1080 (82 acres). CT 2074/103 ex CT 1446/91 Mortgage 1527790 from KSR & JFR to Director of War Service Homes. Discharged 17th September 1951. Continually mortgaged to 1980.

29th Oct 1971 Sections 1073, 1074 and 1080 (82 acres). CT 1029/162 ex App 25797 Trans 235441 to the City of Mitcham CT 4028/233

Section 1147 Hundred of Adelaide

1891 Mrs Thomas occupier, A. Hall occupier building 100.


2.4 CLEARANCE HISTORY

Coppice re-growth of Grey box (*Eucalyptus microcarpa*) is typical throughout the reserve. It is likely that timber was cleared for fuel, building materials and quarry operations. Quarrying has produced crater-like depressions across the reserve.
A number of large stumps and tree hollows with a diameter of approximately 1.5 metres are evidence that substantial eucalypts once colonised the reserve. Unfortunately these have all been felled.

### 2.5 FIRE HISTORY

A snapshot of the fire history of Sleeps Hill Quarry Reserve has been sourced from Thomson (pers., comm, 2002) and a review of the City's District Bushfire Prevention Plans that were available from the past ten years. Robertson (1999, pages 64-65) lists fires occurring in Watiparinga, which is in close proximity to Sleeps Hill Quarry Reserve:

- **27 Dec 1961** Fire started in the Centennial Park area (Pasadena-Panorama) fanned by a strong north wind, completely burnt out Watiparinga National Trust Reserve on both sides of the railway line and threatened homes in the Eden Hills district - *The Advertiser* December 28, 1961 and National Trust records.

- **Summer 1972/73** Country Fire Service (CFS) records at Belair CFS station list many fires in the vicinity of Watiparinga when the area was considered a definite fire hazard. These records are given in acres: 1 acre = 0.405 hectares.

- **26 Mar 1973** Mead Street and Gloucester Avenue extension. Two-acre grass fire deliberately lit.

- **28 Aug 1994** Mead Street Belair. 1.5 hour grass-scrub fire, alerted at 2:00 AM

- **1 Jan 1999** Mead Street Belair. 43 minute fire

### 2.6 EASEMENTS

The following sewage easements are located within the reserve and are illustrated in Appendix A:

- **Lot 1** Section 1148 CT 518/779 Easement over the land marked B hereon to the Minister for Infrastructure (T 4141540).
  
  Easement for sewerage purposes over the land marked 'A' on DP 9378.

- **Lot 19** Section 1073 CT 772/172 Easement over the land marked 'A' and 'B' to the Minister for Infrastructure (T 3841105 and 4141540 respectively).

  (cont)

  It appears that this is a sewage easement running east-west along the gully from the rear of residential properties on Hawker Avenue. The smell of sewage was apparent near the crushing plant and wetland.

  Confirmed in State Heritage Register 8/8/96.
Lot 39  Section 1147  CT 766/082  Triangular reserve at the end of High Street, adjacent to Lot 1. Source: subdivision plan of part section 1147, 1971.

Lot 36 was originally set aside for the E&WS but was surplus to their requirements and transferred to the City of Mitcham. Source: subdivision plan of part section 1147, 1971.

Lot 40  Section 1147  CT 860/468  Easement over the land marked 'A' to the Minister for Infrastructure (T 4944102). Subject to a free and unrestricted right of way over the land marked 'B.'

SA Water (formerly E&WS) sewage pump station adjacent to Kalyra Road. Source: file plan number 17195 for Plan of Land Division Hundred of Adelaide Part Section 1147, 12/10/82.

Water flowing from the tanks was observed and smelled like sewage.

Section 702  CT 764/699  No easements on title

Adverse impacts can occur during maintenance works or emergency repairs by staff indiscriminately dumping of materials, driving on the reserve or spreading nutrient rich waste water. To avoid this utilities such as SA Water (and United Water) should comply with this maintenance plan.

2.7 LEGISLATION

Legislation that needs to be taken into account when managing the City's woodland reserves include (but not limited to) the:

- Local Government Act 1999
- Natural Resources Management Act 2004
- Native Vegetation Act 1991
- Country Fires Act 1989
- Development Act 1993
- Environment Protection Act 1993
- Metropolitan Drainage Act 1935
- Fences Act 1975
- Environment Protection and Biodiversity Conservation Act 1999
2.8 FENCING

2.8.1 Boundary Fencing

Fencing is generally poor along residential-reserve boundaries, particularly:

- South-west corner of Lot 19 where residential properties along Mead Street adjoin the reserve.
- Eastern boundary of Lot 1 where the original post and wire fence has collapsed, making it difficult to determine the boundary.

The post and wire fence dividing Lot 40, Lot 39 and the north-western portion of Lot 19 from Lot 2 (Lynton landfill) is barely visible in most sections, having fallen and rotting with no apparent fence in the north-western portion of Lot 19. There is no need to erect a fence along the edge of the landfill for the sake of marking a title, or in the north-western section of Lot 19 where Lot 2 and 19 are both woodlands.

It would assist residents and Council staff when undertaking maintenance activities to know the exact locations of residential-reserve boundaries. This can be achieved by surveying and marking boundaries with posts or star droppers at 10-20 metre intervals. Fencing may be required to restrict access to areas of high habitat value.

There are arguments for and against fencing. Adequately designed fencing may restrict the range of feral animals that prey upon native fauna. Fences can also restrict the movement of people entering the reserve from many points, creating new tracks and causing damage to native vegetation. Erecting fences can reduce the benefits of habitat corridors which link areas of remnant bushland.

### STRATEGIES

2.8.1 (a) Install boundary markers along residential-reserve boundaries during a survey.

2.8.1 (b) Consider appropriate fencing around areas of high habitat value with entry and exit points for indigenous fauna.

2.8.2 Quarry Fencing

The scope of this maintenance plan does not include the inspection of quarry fencing.

Extensive fencing was installed along sections of the quarry complex in the late 1980s. The author is aware of fencing upgrades in 2004 and 2005.

### STRATEGIES

2.8.2 (a) Inspect quarry fencing for compliance to the Occupational, Health, Safety and Welfare Act (if not already done).

2.8.2 (b) Maintain and repair existing quarry fencing as required.
2.9 CURRENT MAINTENANCE OPERATIONS

Maintenance of the reserve is undertaken by the City of Mitcham and four Bush For Life sites (Appendix D). Maintenance undertaken by Council has included:

- 2004/05, follow up weed control in NHT Boneseed removal site below Caroline Avenue - Kalyra Road. Additional olive removal has also occurred;

- 2003, removal of olives along the fire track in the northern section of the reserve under Council's Bushfire Prevention Program;

- 2002, Four hectares of boneseed control, below Caroline Avenue during September and October. This project was jointly funded through the Natural Heritage Trust’s “Weeds of National Significance (WONS)” project and the City of Mitcham;

- 2001, Olive and boneseed removal below Caroline Avenue and Kalyra Road, part of Council’s Bushfire Prevention Program;

- Past ten years, environmental weed control has occurred:
  - Near the crushing plant ruins;
  - Reserve between Quarry K and Mead Street;
  - Gully north of Mead Street (west of Quarry A);
  - Reserve between Quarry G and rear of houses on Hawker Avenue;
  - Sections of the fire track (from High Street to Quarry J) to assist Bush For Life volunteers.

- Brush cutting and mowing exotic grasses for weed control and fuel breaks along accessible sections of the reserve adjacent residential properties.

For Council to effectively control environmental weeds and manage indigenous vegetation in the reserve, considerably more resources are needed. Council has a woodland reserve team who undertake weed control in fuel breaks and to a lesser extent areas of vegetation with a high condition rating. This is in addition to maintaining fencing, signs and tracks. However, Council may still need to commit additional resources as their efforts will be stretched amongst some 500 hectares of woodland and road reserves throughout the Mitcham Hills.

The Bush For Life volunteers continue to make an invaluable contribution to the reserve on each of the four sites (see Figure 2). Through minimal disturbance weed control, indigenous flora is regenerating in degraded bushland. As Council lacks the resources to undertake work on the same scale as the volunteers, Council must continue supporting the Bush For Life sites and consider increasing their number in the reserve. Establishing and maintaining these sites is considered an optimum way in which to control environmental weeds in the long-term. Benefits to Council include community involvement, increasing the range of native plants and animals, fuel load reduction and cost-effective weed control.

**STRATEGIES**

2.9 (a) Review existing reserve and “woodland crew” budgets to achieve strategies of this management plan.

2.9 (b) City of Mitcham to continue supporting existing Bush For Life sites with a view to increasing their number in the reserve.
3. Reserve Description

3.1 PHYSICAL DESCRIPTION

3.1.1 Topography / Land Form

The reserve is dominated by steep north facing slopes with the exception of a steep south–west slope where Quarry E, H and J are situated and three gullies which carry stormwater from surrounding streets.

Two gullies are almost identical in orientation, draining in a north-westerly direction and having slopes with a northern and south-western aspects. These gullies are situated at the rear of houses on Mead Street/Lind Avenue and Kalyra Road. The dominant gully of the reserve dissects Lot 19, providing a north and south facing slope which carries stormwater, spring water and sewage (piped) in a westerly direction.

Quartzite rock outcrops are common throughout the reserve especially on the steeper slopes. Intact indigenous flora can be found on the steep, north facing slopes which contain quartzite outcrops and poor soils.

3.1.1.1 Geology

The ‘Geological Map of the Adelaide Region’ by Thomson (1972) indicates that Sleeps Hill Quarry Reserve is of the Late Pre-Cambrian Belair Sub-Group - part of the larger Burra Group. The Belair Sub-Group have an age in excess of 750 million years (Drew, 1999, p 79).

According to Taylor et al.,(1974, p 13):

The Belair Sub-Group...is characterised by sandstones and quartzites embedded with siltstones. The Sub-Group exceeds 300 metres in thickness and extends from the Glen Osmond area in a folded and faulted belt to the Blackwood area.....The uppermost units display extensive ripple marks and mud cracks. The resistant members of the Sub-Group have been responsible for preserving part of the Tertiary weathering profile from erosional stripping after uplift. The relict weathering is expressed by the skeletal and podzolic soils of the Eden Hills-Belair-Coromandel Valley area occurring near the tilted old land surface preserved in places on the uplifted Eden Fault Block.

According to Drew (1999, p79) the Belair Sub-Group was probably the result of deposition under shallow marine conditions. The finely laminated siltstones would represent low energy subtidal conditions. “The sediments were derived from the Gawler Craton to the west and entered the Adelaide Geosyncline…”

A summary of the geological history of the Adelaide region by Taylor et al., (1974, p 15) and specific details of nearby Watiparinga Reserve by Drew (1999, p 79) are listed below.
### TABLE 1. GEOLOGICAL HISTORY OF THE ADELAIDE REGION

<table>
<thead>
<tr>
<th>Geological Time</th>
<th>Millions of Years</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleistocene</td>
<td>2-now</td>
<td>Change from arid to present climate, modern drainage regime fully established.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continued uplift of fault blocks, erosion of calcrete and older sediments, blanket of Pooraka Formation as slope deposits extending to the Lower Outwash Plain. Uplift rejuvenated streams such as nearby Watiparinga Creek, draining from uplifted blocks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Active block uplift of ranges area, high rainfall and rapid erosion of younger cover sediment deposition of riverine fans of Hindmarsh Clay in plains area; followed by arid interval, low sea level and formation of a calcrete mantle. End of tertiary, lacustrine sand and clays were deposited in the Belair-Blackwood area on the pre - or early -Tertiary peneplain.</td>
</tr>
<tr>
<td>Pliocene</td>
<td>11-2</td>
<td>Marine sedimentation in plains area, lake deposits and laterite development in ranges area, followed by block uplift on revived para and Eden-Burnside Faults establishing framework for modern topography. Gentle faulting and erosion continues</td>
</tr>
<tr>
<td>Miocene</td>
<td>25-11</td>
<td>Marine sedimentation in Adelaide Plains area, subsidence on fault blocks. Then gentle faulting and erosion in Miocene-Pliocene period.</td>
</tr>
<tr>
<td>Oligocene</td>
<td>40-25</td>
<td></td>
</tr>
<tr>
<td>Eocene</td>
<td>60-40</td>
<td></td>
</tr>
<tr>
<td>Cainozoic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palaeocene</td>
<td>70-60</td>
<td></td>
</tr>
<tr>
<td>Cretaceous</td>
<td>135-70</td>
<td>Prolonged erosion and peneplanation (erosion causing a flat landscape) in late Mesozoic and early Tertiary, deep watering, some lake and swamp deposits.</td>
</tr>
<tr>
<td>Jurassic</td>
<td>180-135</td>
<td></td>
</tr>
<tr>
<td>Mesozoic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triassic</td>
<td>225-180</td>
<td></td>
</tr>
<tr>
<td>Permian</td>
<td>270-225</td>
<td>Uplift of fold belt and glaciation of mountain range</td>
</tr>
<tr>
<td>Carboniferous</td>
<td>350-270</td>
<td></td>
</tr>
<tr>
<td>Devonian</td>
<td>400-350</td>
<td></td>
</tr>
<tr>
<td>Silurian</td>
<td>430-400</td>
<td></td>
</tr>
<tr>
<td>Ordovician</td>
<td>500-430</td>
<td>Delamerian folding, faulting and metamorphosis in the Lower Ordovician and development of fold belt on site of future Mount Lofty Ranges.</td>
</tr>
<tr>
<td>Palaeozoic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambrian</td>
<td>600-500</td>
<td>Development of Adelaidean and Lower Cambrian sedimentation in the Adelaide Geosyncline formed by downwarp of Pre-</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Geological Time</th>
<th>Millions of Years</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(cont) Cambrian crystalline basement, which includes the Barossa Complex in the ranges area.</td>
</tr>
<tr>
<td>Proterozoic</td>
<td>Pre-Cambrian</td>
<td>4,500-600</td>
</tr>
</tbody>
</table>

### 3.1.1.2 Physiography

Sleeps Hill Quarry Reserve is situated on the Eden Fault Block (Figure 3). According to Taylor et al., (1974) late Cainozoic block faulting has shaped the current topography, drainage patterns and the Eden, Burnside and Para Faults. The Eden Fault forms the backdrop to Adelaide and its suburbs. It rises rapidly to 300 metres, or more above sea level in the central region, but falls slightly to the north and south.

Below the Eden and Burnside fault blocks are the upper outwash plains. They formed before European settlement through seasonal deposition of flood materials from watercourses such as the Sturt River and Brownhill Creek (Taylor et al., 1974, p 16).

### 3.1.2 Soils

Dominant soil types of the reserve and adjacent areas are illustrated in Figure 4 and include:

- Shallow soil rock (L1)
- Gradational red-brown loam on rock (C2)
- Loam over clay on rock (D1)

Soil data has been sourced from Primary Industries and Resources SA and the Department of Environment and Heritage.

### 3.1.3 Rainfall

Sleeps Hill Quarry Reserve is situated between the 650-700 millimetre isohyets (Figure 6) according to a study by Taylor et al. (1974, p29) using data that was compiled some twenty eight years ago. Climatic data from the Bureau of Meteorology Australia (2002) for Belair is presented in Table 3.

It is worth noting the difference between the mean and median rainfall data for Belair, being 33.4 millimetres. It is preferable to use the ‘median’ as it represents the middle value in an array of numbers, and is likely to more accurately represent the data set. The ‘mean’ is subject to variation by outlying numbers, which in terms of rainfall can be skewed by exceptionally wet or dry periods.
### TABLE 2. CLIMATE AVERAGES OF BELAIR.

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Daily Max. Temp °C</th>
<th>Mean Daily Min. Temp °C</th>
<th>Mean 9am wind speed (km/hr)</th>
<th>Mean 3pm wind speed (km/hr)</th>
<th>Median Rainfall (mm)</th>
<th>Mean Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>26.6</td>
<td>14.9</td>
<td>14.2</td>
<td>15.0</td>
<td>20.4</td>
<td>24.4</td>
</tr>
<tr>
<td>Feb</td>
<td>26.8</td>
<td>15.4</td>
<td>14.0</td>
<td>14.7</td>
<td>13.7</td>
<td>24.6</td>
</tr>
<tr>
<td>Mar</td>
<td>24.0</td>
<td>14.0</td>
<td>14.5</td>
<td>14.3</td>
<td>22.2</td>
<td>30.8</td>
</tr>
<tr>
<td>Apr</td>
<td>20.1</td>
<td>12.1</td>
<td>14.1</td>
<td>14.6</td>
<td>52.8</td>
<td>58.2</td>
</tr>
<tr>
<td>May</td>
<td>16.4</td>
<td>10.1</td>
<td>14.7</td>
<td>15.6</td>
<td>83.6</td>
<td>93.2</td>
</tr>
<tr>
<td>Jun</td>
<td>13.2</td>
<td>7.8</td>
<td>15.3</td>
<td>16.5</td>
<td>90.2</td>
<td>100.9</td>
</tr>
<tr>
<td>Jul</td>
<td>12.5</td>
<td>7.0</td>
<td>16.4</td>
<td>18.7</td>
<td>97.6</td>
<td>97.5</td>
</tr>
<tr>
<td>Aug</td>
<td>13.8</td>
<td>7.4</td>
<td>16.8</td>
<td>19.5</td>
<td>83.1</td>
<td>87.5</td>
</tr>
<tr>
<td>Sep</td>
<td>16.0</td>
<td>8.5</td>
<td>17.1</td>
<td>17.9</td>
<td>67.4</td>
<td>73.5</td>
</tr>
<tr>
<td>Oct</td>
<td>19.4</td>
<td>10.0</td>
<td>16.8</td>
<td>17.4</td>
<td>54.9</td>
<td>58.7</td>
</tr>
<tr>
<td>Nov</td>
<td>22.6</td>
<td>11.9</td>
<td>15.7</td>
<td>16.7</td>
<td>32.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Dec</td>
<td>24.7</td>
<td>13.3</td>
<td>15.0</td>
<td>16.0</td>
<td>25.8</td>
<td>34.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19.5</strong></td>
<td><strong>10.9</strong></td>
<td><strong>15.4</strong></td>
<td><strong>16.4</strong></td>
<td><strong>689.8</strong></td>
<td><strong>723.2</strong></td>
</tr>
</tbody>
</table>

Belair (Kalyra)  
Alt. 305 m 1895-1996
3.1.4 Adjacent Land Uses

Sleeps Hill Quarry Reserve is surrounded by a diverse range of unrelated land uses which inherently pose threats to its management (Figure 7).

The rehabilitated Lynton Landfill lies along the reserve’s northern boundary, with bushland on the same title along part of its western boundary. Residential properties abut the reserve’s eastern and southern boundaries. A Trans Adelaide reserve along the Adelaide-Melbourne railway line forms a portion of its western boundary. From these mixed land uses comes the threat of weed invasion, nutrient rich stormwater run-off, litter, predatory animals and increased public use (some inappropriate). Weed invasion from residential properties and the former landfill is evident and is one of the most difficult threats to manage.

When viewed from a topographic map, Sleeps Hill Quarry Reserve is part of a large network of interlocking reserves (Figure 8) such as Ashby Reserve, Watiparinga National Trust Reserve, O'Dea's Quarry Reserve and Shepherds Hill Recreation Park. Council should consider increasing habitat corridors between these reserves.

STRATEGY

3.1.4 Council to consider increasing habitat corridors between nearby woodland reserves.

3.2 VEGETATION

3.2.1 General Description

The reserve is described by Moyle et al., (1982) as a Grey box (*Eucalyptus microcarpa*) woodland with Golden wattle (*Acacia pycnantha*) and various shrubs such as *Olearia* sp., ferns, lilies and perennial grasses in the understorey. Boneseed and Olive were noted as serious threats to the continued survival of indigenous understorey species. A long-term weed control program was recommended. Field observations during August 2002 and previous vegetation surveys support the above description.

During a recent vegetation survey (Appendix E), thirteen vegetation associations were described and mapped across the reserve. The dominant associations include *Eucalyptus microcarpa* (Grey box) +/- *Allocasuarina verticillata* (Drooping sheoak) woodland or *Eucalyptus microcarpa / Allocasuarina verticillata* woodland.

Degraded areas such as creek lines and quarries often contain a dominant overstorey of *Pinus halepensis* (Aleppo pine), *Olea europaea* (European olive) or *Fraxinus rotundifolia* (Desert ash).
### 3.2.2 Plant Species Richness

Separate flora surveys undertaken by Solveig Gillis in 1993 and later by Trees For Life (Appendix F) have identified:

- 140 indigenous species;
- 10 non-indigenous native species;
- 58 non-native weed species.

### 3.2.3 Significant Flora

Sleeps Hill Quarry Reserve contains twenty nine (29) indigenous plant species with conservation ratings (Table 4).

**Table 3. Indigenous Plants with a Conservation Rating in Sleeps Hill Quarry Reserve**

<table>
<thead>
<tr>
<th>Plant Family and Botanical Name</th>
<th>Common Name</th>
<th>Australia</th>
<th>South Australia</th>
<th>Southern Lofty Botanical Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADIANTACEAE Cheilanthes distans</td>
<td>Bristly Cloak-fern</td>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>AMARANTHACEAE Ptilotus spathulatus</td>
<td>Pussy-tails</td>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>CAMPANULACEAE Wahlenbergia litticola</td>
<td>Coast Bluebell</td>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>CARYOPHYLLACEAE Stellaria palustris var. tenella</td>
<td>Swamp Starwort</td>
<td></td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>CHENOPODIACEAE Maireana enchylaenoides</td>
<td>Wingless Fissure-plant</td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>COMPOSITAE Chrysocephalum semipapposum</td>
<td>Clustersed</td>
<td></td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Senecio hypoleucus Vittadinia blackii</td>
<td>Pale Groundsel</td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>CYPERACEAE Lepidosperma curtisiae</td>
<td>Little Sword-sedge</td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>GERANIACEAE Geranium solanderi var. solanderi</td>
<td>Austral Geranium</td>
<td></td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>GOODENIACEAE Goodenia albiflora</td>
<td>White Goodenia</td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Plant Family and Botanical Name</td>
<td>Common Name</td>
<td>Australia</td>
<td>South Australia</td>
<td>Southern Lofty Botanical Region</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>-----------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Goodenia pinnatifida</td>
<td>Cut-leaf Goodenia</td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Velleia paradoxa</td>
<td>Spur Velleia</td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td><strong>GRAMINEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Danthonia auriculata</td>
<td>Lobbed Wallaby-grass</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Danthonia linkii var. fulva</td>
<td>Leafy Wallaby-grass</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dichanthium sericeum spp. sericeum</td>
<td>Silky Blue-grass</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microlaena stipoides var. stipoides</td>
<td>Weeping Rice-grass</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stipa elegantissima</td>
<td>Feather Spear-grass</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stipa eremophila</td>
<td>Rusty Spear-grass</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HYPOXIDACEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoxis vaginata var. vaginata</td>
<td>Yellow star</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LEGUMINOSAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acacia acinacea</td>
<td>Wreath Wattle</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycine tabacina</td>
<td>Variable Glycine</td>
<td>V</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Lotus australis</td>
<td>Austral Trefoil</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LILIACEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lomandra sororia</td>
<td>Sword Mat-rush</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MYOPORACEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myoporum viscosum</td>
<td>Sticky Boobialla</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MYRTACEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eucalyptus microcarpa</td>
<td>Grey Box</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PITTOSPORACEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pittosporum phylliraeoides var. microcarpa</td>
<td>Native Apricot</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PLANTAGINACEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantago gaudichaudii</td>
<td>Narrow-leaf Plantain</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PORTULACACEAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calandrinia eremaea</td>
<td>Dryland Purslane</td>
<td>U</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to Appendix F for an explanation of keys to the conservation ratings of indigenous flora and fauna.

3.2.4 Significant Plant Communities

Turner (2001) reports that in 1995 Neagle upgraded Davies (1992 p13) conservation rating of Grey box woodland to a priority 4 plant association in South Australia - previously priority 5. According to Davies (1992 p 13) Grey box are poorly conserved in South Australia, being very depleted with only a few large examples remaining.

A provisional listing of threatened ecosystems (DEH, 2001) in South Australia lists ‘E. microcarpa Grassy Low Woodland on foothills and slopes of southern Mount Lofty Ranges’ as ‘endangered.’ The unpublished report states that the ecosystem has limited distribution on the hills south of Adelaide. It is heavily modified by urban sprawl and associated invasion of exotics. Only a few degraded examples exist within reserves.

3.2.5 Condition of Native Vegetation

Infestations of European Olive, Boneseed and exotic grasses are widespread throughout the reserve (Figures 9a, 9b and Appendix E). This is not surprising considering a long history of disturbance through grazing, quarrying and urbanisation.

Creek lines are largely dominated by Olives, Desert ash and exotic grasses which will require a long-term control program.

Native grasses are widespread over the reserve and can be encouraged over the long term through timed slashing of fuel breaks, controlling weeds and direct seeding in areas with low densities.

At the time of drafting the maintenance plan in 2002-2003 a vegetation survey by Gillis (1993-1994) was relied upon. From field observations the author applied condition ratings to each major vegetation type (Figures 9a and 9b) in accordance with Robertson's (1995 p3) system (Table 5).

<table>
<thead>
<tr>
<th>Condition Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Native vegetation in which there are few weeds</td>
</tr>
<tr>
<td>2</td>
<td>Disturbed vegetation in which there are many-non indigenous plants but also a variety of native plants</td>
</tr>
<tr>
<td>3</td>
<td>Very degraded vegetation dominated by non-indigenous plants but with some native plants present</td>
</tr>
</tbody>
</table>

A recommendation of the draft plan was that comprehensive vegetation condition mapping should be undertaken. This was completed in 2005 as part of a project funded by the Urban Forest Biodiversity Program to restore some of the City's Grey box woodlands.

The recent survey is contained in Appendix E and illustrates the extent of each vegetation associations and condition classes (five). The survey is consistent with the

Both vegetation surveys have been included despite using different vegetation association descriptions and condition ratings.

The 1993-94 survey recorded more detail on quarry vegetation, locations of some significant flora and a comprehensive species list. The scope for the 2005 survey was limited to mapping vegetation associations and their condition.

It is important to treat all surveys with caution and inspect an area before undertaking on-ground works to determine presence/absence of species and condition ratings.

3.2.6 Relationship to Other Vegetation

Sleeps Hill Quarry Reserve should be managed with regard to surrounding vegetation. This reserve is an important link with a number of other woodland reserves and properties along the Hills Face Zone.

The reserve’s relationship to other nearby vegetation is summarised below in Table 6.

<table>
<thead>
<tr>
<th>Property / Reserve</th>
<th>Distance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watiparinga National Trust Reserve</td>
<td>400 m</td>
<td>• Located south-west.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Grey box woodland.</td>
</tr>
<tr>
<td>Ashby Reserve</td>
<td>400 m</td>
<td>• Directly south.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Grey box woodland.</td>
</tr>
<tr>
<td>Belair Reserve / Lynton Landfill (northern section)</td>
<td>0 m</td>
<td>• Adjacent reserve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Grey box woodland.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Threats – landfill gas, seed source of feral olives and other weeds.</td>
</tr>
<tr>
<td>O'Dea's Quarry Reserve</td>
<td>50 m</td>
<td>• West of Sleeps Hill Quarry Reserve. Railway line divides both reserves.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Grey box woodland.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Threats – seed source of feral olives and other weeds.</td>
</tr>
<tr>
<td>Shepherds Hill Recreation Park (National Parks &amp; Wildlife SA)</td>
<td>1,500 m</td>
<td>• South-west of Sleeps Hill Quarry Reserve, adjoins Watiparinga Reserve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Red gum / SA blue gum / Grey box woodland – open woodland.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Threats – large seed source of feral olives, although Sleeps Hill Quarry Reserve has an</td>
</tr>
<tr>
<td>Property / Reserve</td>
<td>Distance</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------------------------------</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Saddle Hill Reserve                       | 1,100 m  | - South-west of Sleeps Hill Quarry Reserve, adjoins Shepherds Hill Recreation Park and Watparinga National Trust Reserve.  
       - Grey box woodland.  
       - Contains *Cullen parvum* & *Eryngium rostratum* which have State and Southern Lofty Botanical Region ratings. *Cullen parvum* also has a national rating.  
       - Threats – seed source of feral olives and other weeds. |
| Ellis Avenue Reserve                      | 1,750 m  | - South-west of Sleeps Hill Quarry Reserve, adjoins Shepherds Hill Recreation Park.  
       - Grey box woodland.  
       - Threats – seed source of feral olives and other weeds. |
| Adjacent land-use surrounding Sleeps Hill Quarry Reserve | Adjoining reserve | - Threats include spread of weeds, illegal dumping, stormwater run-off, vandalism, inappropriate public use, fire and feral animals.  
       - Some of the properties contain patches of remnant vegetation which provide fauna habitat. |
| Wittunga Botanic Gardens                  | 1,700 m  | - South of Sleeps Hill Quarry Reserve.  
       - Wittunga contains die back disease (*Phytophthora cinnamomi*) which can be carried into the reserve from vectors such as vehicles, humans and equipment.  
       - |
| Hills Face Zone                           | Part of it | - HFZ contains many Council and State Reserves and, bushland on private property.  
       - Each patch of bushland is important in conserving native flora and fauna. |
3.3 FAUNA

Council is unaware of any fauna studies conducted on Sleeps Hill Quarry Reserve. However, fauna surveys have been undertaken on nearby reserves (Appendix G):

- Shepherds Hill Recreation Park (National Parks and Wildlife SA);
- Watiparinga National Trust Reserve.

These surveys have recorded the presence of 71 avian species (indigenous and non-indigenous), 18 reptile species and 2 amphibian (frog) species. Conservation ratings (Table 7) apply to 21 avian and 4 reptile species.

It is likely that species occurring on nearby reserves also occur in Sleeps Hill Quarry Reserve based upon its close proximity, similar plant communities (Grey box woodland) and habitat corridors.
<table>
<thead>
<tr>
<th>Class</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Conservation Status</th>
<th>Metro Region</th>
<th>SA</th>
<th>MLR</th>
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</thead>
<tbody>
<tr>
<td>AVES</td>
<td>Yellow Thornbill</td>
<td>Acanthiza nana</td>
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<tr>
<td>AVES</td>
<td>Eastern Spinebill</td>
<td>Acanthorhynchus tenuirostris</td>
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<tr>
<td>AVES</td>
<td>Little Wattlebird</td>
<td>Anthochaera chrysoptera</td>
<td></td>
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<td>U</td>
</tr>
<tr>
<td>AVES</td>
<td>Dusky Woodswallow</td>
<td>Artamus cyanopterus</td>
<td></td>
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<tr>
<td>AVES</td>
<td>Sulphur-crested Cockatoo</td>
<td>Cacatua galerita</td>
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<tr>
<td>AVES</td>
<td>Galah</td>
<td>Cacatua roseicapilla</td>
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<tr>
<td>AVES</td>
<td>Yellow-tailed Black-Cockatoo</td>
<td>Calyptorhynchus funereus</td>
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<tr>
<td>AVES</td>
<td>Crested Shrike-tit</td>
<td>Falcunculus frontatus</td>
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<tr>
<td>AVES</td>
<td>Musk Lorikeet</td>
<td>Glossopsitta concinna</td>
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<tr>
<td>AVES</td>
<td>Superb Blue Wren</td>
<td>Malurus cyaneus</td>
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<tr>
<td>AVES</td>
<td>Noisy Miner</td>
<td>Manorina melanocephala</td>
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<tr>
<td>AVES</td>
<td>White-naped Honeyeater</td>
<td>Melithreptus lunatus</td>
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<tr>
<td>AVES</td>
<td>Southern Boobook</td>
<td>Ninox novaeseelandiae</td>
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<tr>
<td>AVES</td>
<td>Rufous Whistler</td>
<td>Pachycephala rufiventris</td>
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<tr>
<td>AVES</td>
<td>Spotted Pardalote</td>
<td>Pardalotus punctatus</td>
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<tr>
<td>AVES</td>
<td>Scarlet Robin</td>
<td>Petroica multicolor</td>
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<tr>
<td>AVES</td>
<td>Common Bronzewing</td>
<td>Phaps chalcoptera</td>
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<tr>
<td>AVES</td>
<td>Tawny Frogmouth</td>
<td>Podargus strigoides</td>
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<tr>
<td>AVES</td>
<td>White-browed Babbler</td>
<td>Pomatostomus superciliosus</td>
<td></td>
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<td></td>
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<tr>
<td>AVES</td>
<td>Grey Currawong</td>
<td>Strepera versicolor</td>
<td></td>
<td>U</td>
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<td></td>
</tr>
<tr>
<td>AVES</td>
<td>Rainbow Lorikeet</td>
<td>Trichoglossus haematodus</td>
<td></td>
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</tr>
<tr>
<td>REPTILIA</td>
<td>Cunningham's Skink</td>
<td>Egernia cunninghami</td>
<td></td>
<td>En</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>REPTILIA</td>
<td>Barking Gecko</td>
<td>Nephrurus milii</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>REPTILIA</td>
<td>Common Bearded Dragon/ Eastern Bearded Dragon</td>
<td>Pogona barbata</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>


Refer to Appendix F for an explanation of keys to the conservation ratings of indigenous flora and fauna.

4. Reserve Values

4.1 CONSERVATION SIGNIFICANCE OF VEGETATION AND HABITAT

In addition to the significance of Grey box (*Eucalyptus microcarpa*) woodlands (s.3.2.4) other features of conservation significance in the reserve include:

- 140 indigenous plant species recorded;
- 29 indigenous plant species with a Southern Lofty Botanical Region conservation rating;
- 2 indigenous plant species with a State conservation rating;
- 71 avian species, 18 reptile species and 2 amphibian species surveyed on nearby reserves;
- 21 avian species with a Mount Lofty Ranges conservation rating (on nearby reserves);
- 3 reptile species with a Metropolitan Region conservation rating (on nearby reserves);
- 2 avian species and 2 reptiles with a state-wide conservation rating (on nearby reserves);
- Native grasslands on the reserve i.e. Kangaroo grass (*Themeda triandra*), Spear grass (*Stipa* spp.) Weeping rice grass (*Microlaena stipoides var. stipoides*) and Iron grass (*Lomandra* spp) are disappearing due to impacts of urban development and agriculture;
- A small wetland fed by a freshwater spring near the crushing plant ruins;
- Part of a large habitat corridor along the western slopes of the Mount Lofty Ranges;
- In close proximity to the Watiparinga National Trust Reserve, which has significant conservation, values, i.e. 46 indigenous plant species with conservation ratings and 19 native bird species with a conservation rating;
- Contains indigenous vegetation which provides an historical link to pre-European landscapes and guides future revegetation projects;
- Provides a seed source for future revegetation projects in and around Sleeps Hill Quarry Reserve.
4.2 LANDSCAPE VALUES

Sleeps Hill Quarry Reserve contains a unique landscape with twelve disused quarries, steep slopes covered with indigenous vegetation and scattered remains of a local quarry industry. According to Wells (1995):

“... the unique faces in this complex of workings which are now incorporated into the most beautiful and interesting walking trails in Mitcham. The great 100 ft. face of the “D Quarry” is one of the most exciting natural rock faces anyone could wish to see in the Adelaide Hills.”

The spectacular and colourful quarry faces exhibit quartzites and slate formations of the Belair Sub-Group which was formed during the Late Pre-Cambrian, in excess of 750 million years old. This a valuable educational resource, preserved by its inclusion on the State Heritage List in 1996.

Situated within the Hills Face Zone the reserve has an important aesthetic value as it forms part of the green backdrop to metropolitan Adelaide. From several vantage points in the reserve, views of the Gulf St Vincent and Adelaide’s suburbs are fantastic.

As stated previously, the reserve provides the community with a link to a pre-European landscape. Since European settlement, Grey box woodlands (part of the Black Forest) have been extensively cleared for agriculture and urban development. It is a plant association requiring conservation and appreciation by the community.

According to Edwards and Spurling (1999) the Sleeps Hill Quarry Reserve have a high ecotourism value:

“This reserve is of excellent ecotourism potential. With interpretive signs already in place, self-guiding is its major focus. The showcase of geology, bird life and native vegetation (although there is much exotic vegetation) represent a resource that should be maintained. The Adelaide to Belair train provides close linkage from Lynton Station.

4.3 EDUCATIONAL, HISTORICAL OR SCIENTIFIC VALUES

The reserve contains a recognised interpretive geology trail with a pamphlet published by Mines and Energy South Australia titled ‘Sleeps Hill Quarries: A guide to the walking trail.’ It is understood that geology students have studied the quarries as part of their curriculum.

With a lack of studies undertaken on the reserve it is difficult to assess its scientific values. However, it is important to conserve the genetic diversity of flora and fauna within and around the reserve. For example, revegetation projects should always source local provenance seed to maintain this gene pool.
As a consequence of human activity, only small remnants of bushland remain and these should be protected. Other reasons for conservation may include:

- Enjoyment / appreciation by the community;
- Potential medical uses of plants;
- Reducing salinity;
- Reducing soil erosion
- Sequestering carbon dioxide;
- Improving water quality;
- Buffers between housing.
5. Reserve Management Objectives

Management objectives for the reserve must be consistent with relevant legislation such as the Local Government Act 1999 and policies of the City of Mitcham. Council’s policies regarding the management and use of woodland reserves such as Sleeps Hill Quarry Reserve are listed below.

Management objectives specified in this document can be applied to other woodland reserves managed by Council, and are consistent with the following policies:

City of Mitcham Policy 05.02 ‘Biodiversity Policy’:

As custodian of lands containing significant remnant vegetation and threatened species, Council aims to ensure protection and enhancement of biological diversity in the City. The Council will:

- Benchmark its procedures and decision making against legislation and strategies aimed at preserving and enhancing biodiversity;
- Develop an understanding and appreciation among the community of the importance of biodiversity;
- Identify, protect and enhance significant habitats and corridors by replanting and revegetating using local seed sources;
- As far as practicable, provide support and supervision to community members protecting and enhancing biodiversity on Council lands;
- As far as practicable, prevent the removal of fallen or standing dead timber from Council woodland reserves;
- Minimise, as far as practicable, biodiversity impacts caused by:
  - Transferring weed seeds and pathogens;
  - Developing and operating recreation facilities;
  - Developing and managing trails;
  - Bushfire prevention works;
  - Construction works;
  - Use of herbicides and pesticides;
  - Erosion.

City of Mitcham Policy 16.26 ‘Reserves - Management of Woodland Using Watiparinga Procedures’:

It is the long term policy of the City of Mitcham to support and promote the management of its semi-natural modified woodland reserves using procedures developed by the Watiparinga Management Committee at Watiparinga and the adjacent Ashby Reserve. That is action is taken which
limits the use of those reserves to activities which do not significantly affect the natural qualities of the reserves.

The siting of bicycle tracks and walking paths in semi-natural modified woodland reserves should be subject to careful consideration of likely environmental impacts.

As a general rule it is advised that bicycle tracks should be sited on the margins of such reserves and away from creek-lines.

City of Mitcham Policy 05.10 'Water Use and Catchment Protection':

To reduce potable water consumption and to protect watercourse health in the City.

One of the statements is that Council will: act to protect and enhance the ecological value of watercourses in the City.

Management objectives are also consistent with actions listed in Council’s Open Space Strategy 2001 under the following sections (not limited to):

- Section 2. Meeting Statutory Obligations;
- Section 6. Regional Open Space Linkages;
- Section 8. Providing Quality Open Space;
- Section 9. Open Space with Conservation Value and Natural Features of Significance.

5.1 ECONOMIC OBJECTIVES

5.1.1 To employ “best management” practices in the operation and maintenance of the reserve (i.e. Watiparinga Procedures).

5.1.2 To benchmark management operations such as weed control, revegetation and grass slashing.

5.2 ENVIRONMENTAL OBJECTIVES

5.2.1 To protect and enhance indigenous flora, fauna and associated habitats within Sleeps Hill Quarry Reserve;

5.2.2 To minimise and where practicable eliminate potential environmental impacts to other landholders from reserve management operations;

5.2.3 To minimise and/or eliminate (where practicable) adverse environmental impacts from maintenance activities and public use of Sleeps Hill Quarry Reserve;

5.2.6 To manage Sleeps Hill Quarry Reserve using methodologies developed by the Watiparinga Management Committee.
5.3 SOCIAL OBJECTIVES

5.3.1 To provide the local community with a natural woodland reserve that can be accessed and enjoyed for passive recreation with consideration given to all user groups;

5.3.2 Council in consultation with stakeholders will look at options for sustainable trails in the reserve;

5.3.3 To provide the community with a link to pre-European landscapes and habitats;

5.3.4 To provide the community with opportunities to learn about the Aboriginal, European and natural history of the reserve;

5.3.5 To manage the reserve in accordance with landholder obligations specified in the Country Fires Act 1989;

5.3.6 To reduce fuel loads by removing exotic plants, establishing native grasses and timed slashing of fuel breaks. Removal of native plants in accordance with the Native Vegetation Act 1991 should only be undertaken where a legitimate hazard has been identified or noted by the Mitcham District Bushfire Prevention Committee.
6. Management Issues & Strategies

6.1 CONSERVATION OF INDIGENOUS FLORA AND FAUNA

6.1.1 Sites or Features of Significance

Weed control in native bushland will primarily focus on removing weeds from areas with indigenous vegetation that contain relatively few weeds. Areas of bushland which are highly degraded, that is dominated by weeds with some indigenous plants will be a lower priority. However, degraded areas may receive a high priority when they:

- Contain indigenous flora with a conservation rating;
- Contain priority weed species in low abundance;
- Are adjacent to dwellings and pose a risk.

Remnant vegetation of particular importance from the 2005 vegetation survey (Appendix E) include:

- *Eucalyptus microcarpa / Allocasuarina verticillata* Woodland - condition class 2;
- *Eucalyptus microcarpa +/- Allocasuarina verticillata* Woodland - condition class 2;
- *Eucalyptus microcarpa / Allocasuarina verticillata* Woodland - condition class 2-3;
- *Eucalyptus microcarpa* Open Woodland - condition class 2-3;
- *Eucalyptus microcarpa* Woodland - condition class 2-3;

Remnant vegetation of particular importance from the 1992-93 vegetation survey (Figure 9B) include:

- Vegetation type “Intact Remnant Vegetation” (adjacent Quarry K and L2) contains some of the lowest weed infestations amongst indigenous flora. Therefore, this vegetation type should receive the highest priority by management.

Quarry vegetation during the 2005 survey was not assessed to the same extent as the survey in 1992-93.
6.1.2 Natural Regeneration

Regeneration is occurring throughout the reserve and should be considered the primary way in which indigenous flora is re-established. Regeneration is nature’s way of selecting species composition, density and distribution.

The random spacing of plants, densities and number of species from natural regeneration is difficult to replicate in revegetation programs. Regeneration is also extremely cost effective. For Council to purchase tube stock, stakes, grow bags, weed mats and plant the tube stock, it costs approximately $5.50 per plant.

Regeneration still requires management to maintain suitable growing conditions which mainly involves weed control. There are substantial costs associated with good weed control and it is required for both regeneration and revegetation.

Some methods that encourage regeneration include:

- Bradley and Watiparinga methods of weed control – (i) work outwards from good bush areas (few weeds) towards areas of degraded bush (many weeds), (ii) minimise environmental disturbance, and (iii) do not over clear;

- Reduce degrading influences – such as dumping of garden refuse, new walking trails into bushland and stormwater containing high nutrient loads and/or causing erosion from discharge;

- Maintain native grasses and ground covers in fuel breaks by annually slashing. Avoid blanket spraying of herbicides which produces bare earth, resulting in further weed infestations and erosion. These are often sites from which weeds move deeper into a reserve;

6.1.3 Revegetation

Revegetation should always complement regeneration and never thwart natural processes. It should only be considered when it is deemed a cost effective action as part of an overall reserve assessment of vegetation priorities. According to Robertson
(1994 p9) there may be a need to supplement natural regeneration at particular sites by seeding or planting with a clear goal to:

- Prevent weed re-invasion;
- Suppress troublesome weeds;
- Provide particular fauna habitat;
- Add to the appearance of degraded sites and foster public appreciation;
- Stabilise eroding areas;
- Rehabilitate old quarries.

In this context, there are revegetation opportunities within Sleeps Hill Quarry Reserve and include:

- Creek lines – acute infestations of woody and herbaceous weeds require significant resources for weed control and revegetation immediately after;
- Stormwater Outlets – causing serious rill and gully erosion from Mead Street and to a lesser extent Caroline Avenue. These areas must be stabilised, weeds controlled and quickly revegetated to reduce further soil erosion. Significant resources are required;
- Fuel Breaks – where clearance of indigenous plants and weeds are required to establish a fuel break, revegetate bare earth areas using indigenous grasses and ground covers to stabilise soil and reduce weed invasion;
- Quarries - infestations of olives, boneseed and Aleppo pines are common at the base and sides of quarries amongst regenerating native plants. Revegetation can take place once weeds have been controlled.
- Dumped Refuse – once removed it may be suitable to direct seed native grasses, trees and shrubs if the area lacks indigenous plants;
- Exotic grass and herbaceous weed infestations – large infestations may require gradual removal by spraying or annual brush cutting (before seed heads mature), then revegetating with indigenous grasses, shrub and trees. Trees would normally be planted before grasses as it can be difficult to distinguish between exotic and indigenous grasses when spraying. Introduction of native grasses can be undertaken once trees have established and aggressive weeds such as phalaris have been adequately controlled.

Some guidelines to follow during revegetation include:

- Always use indigenous plants - collect local provenance seed;
- Do not disturb areas which shows signs of regeneration. Undertake a site survey when considering revegetation;
- Consider revegetation to re-introduce species or those low in numbers;
• Use pioneering tree and shrub species in degraded areas. Consider using plants that are taller than the weeds you are controlling. This will assists in follow up maintenance of the site;

• Where practicable, for each tube stock planting use a blue marker stake, grow bag and weed mat (370 x 370 mm) to maximise its chance of survival – do it right the first time! Today’s opportunity may not present itself tomorrow.

Source tube stock from growers that:

• Use local provenance seed;
• Have current seed collection permits for the area;
• Grow quality plants (not root bound, leggy or haven't been sun-hardened, etc);
• Have quality assured hygiene practices to prevent the spread of *Phytophthora cinnamomi* (Pc).

**STRATEGY**

6.1.3 Revegetation should only be considered as a supplement to regeneration. Revegetation should focus first on establishing pioneering species in degraded areas of the reserve.

6.1.4 Seed Collection

Seed collection from Sleeps Hill Quarry Reserve can be utilised for revegetation programs within the reserve. However, unrestricted collection can lead to lower rates of regeneration and damage to native plants and habitats.

To enable seed collection, individuals and/or organisations must obtain the necessary permit by the State environment department with approval by Council.

Care must be taken not to harvest seed from non-indigenous native plants in the reserve for use in and around the reserve.

**STRATEGY**

6.1.4 Allow seed collection of common species in the reserve by permitted individuals/organisations for planting in the local area. Seed collection must not remove more than 10% of available seed at the site.

6.1.5 Fauna Habitat

There is a lack of research into native fauna and their habitats in Grey box woodlands. It should be a high priority to update Council’s database and records of emerging studies and best practice techniques in managing Grey box woodlands or similar vegetation associations.
When controlling weed infestations it is important to consider indigenous flora and fauna that may be displaced. If management actions will impact on a species it will be necessary to modify the planned works, i.e. stage works or revegetate with suitable indigenous plants to replace lost habitat. It may even be necessary to refrain from weed control in an area for a period until suitable habitat is provided or a relocation program is undertaken.

6.1.6 Weeds

The reserve contains acute environmental weed infestations. As previously stated, Olive and Boneseed are the dominant woody weeds. There are also a plethora of exotic grasses and herbaceous weeds that have invaded the understorey, i.e. Soursob, Plantain, Wild oats and Quaking grass. Generally it is harder to control the herbaceous understorey weeds as opposed to Olives and Boneseed.

Council has concentrated its past efforts in clearing woody weeds along property boundaries and the fire track. The Bush For Life sites (volunteers) are successfully regenerating bushland by concentrating on smaller sites, controlling both herbaceous and woody weeds. A site visit confirmed their progress with good levels of regeneration and few woody weeds.

It is apparent that on-going weed control is necessary, especially where urban development impacts upon the reserve through, stormwater discharge, illegal dumping and recreation. Through these impacts, weeds are always spread. Even if these impacts could be stopped, weeds would continue to be spread from vectors such as birds, foxes and rabbits. It will never be a question of whether or not weed control is required, but simply a question of what level is required and what resources can be committed. In the long term as weeds are progressively removed, bushland will regenerate, condition ratings improve and weed control inputs will reduce.

Areas and species of particular weed importance include (Figure 10a, 10b):

- **Monadenia or South African Weed Orchid** (*Disa bracteata*) – not observed during a site visit, but is recorded in the vegetation surveys and surrounding reserves. This weed must be the highest priority for any environmental weed control program to prevent its spread throughout the reserve and neighbouring properties;

- **Italian Lavender** – infestations occurring along the fire track on the northern portion of the reserve and adjacent Quarry G and L2. This has a potential to become widely established throughout the entire reserve and requires urgent action;

- **African Boxthorn** – growing along the fire track and quarries in the south-eastern sections of the reserve. This weed should be a high priority for control as it is a proclaimed plant, difficult to treat with sharp spines and few populations exist;

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**STRATEGY**

6.1.5 Collect information on Grey box woodland ecosystems and incorporate findings into management practices where practicable.
• **Exotic plants and weeds that are escaping from residential properties adjoining the reserve.** Observed along all residential-reserve boundaries. Residents should be educated about the impacts of “garden escapes” and these species must be removed from the reserve. An exotic specie may be retained only if it does not have a potential to become invasive;

• **All creek lines which receive stormwater and possible seepage of effluent from the United Water pump stations.** The high nutrient loads and moist conditions are promoting herbaceous weed infestations such as couch and kikuyu near the crushing plant and spring. Olives are proliferating especially in the main gully dissecting the quarry reserve and the gully near Kalyra Road.

• **Drainage Lines carrying stormwater to creeks** – are harbouring herbaceous weeds such as Soursob, Olives and Ash trees.

• **Fire tracks and Trans Adelaide Reserve** – annual grasses have established along fire tracks and the Trans Adelaide Reserve (between railway line and crushing plant ruins) due to disturbance. Control is required to reduce invasion from these areas into bushland;

### 6.1.6.1 Weed Control Principles

As stated earlier, management of the reserve will be based upon methodologies developed by the Watiparinga Management Committee. For weed control this will require 'minimal disturbance’ techniques. Principles of the 'Bradley' method are similar to the Watiparinga methodologies developed by Enid Robertson, and include:

1. **Work outwards from good bush areas towards areas of weeds** – i.e. start weeding in bushland with a condition rating 1, where weed infestations are negligible. Gradually move outwards to areas with a lower condition rating.

2. **Minimal disturbance to the environment** – bare or disturbed soil is an invitation for weed invasion. Reduce soil disturbance by employing methods such as cutting and swabbing, spot spraying, hand-pulling, careful grubbing and brush cutting exotic grasses before seed set.

3. **Do not over clear** – over clearing can increase weed infestations by exceeding the rate at which the control areas can regenerate with indigenous plants. The extent of weeding should match regeneration rates of the surrounding bush. Over clearing can also impact on native fauna that use some weeds as habitat, i.e. Blues Wrens in Olives.

An exception to the Bradley method is that it may be necessary to target small infestations of certain weed species irrespective of the condition of native vegetation. This is to prevent highly invasive species from becoming established throughout the reserve. Some of the weeds that fit into this category within the reserve include:

- South African weed orchid
- Cape Broom
- Olive
- Lavender
- Nasturtium
- *Disa bracteata (Monadenia bracteata)*
- *Genista monspessulana*
- *Olea europaea*
- *Lavandula stoechas*
- *Tropaeolum majus*
• Pussy tail  \textit{Pentaschistis thunbergii}
• White Arum Lily  \textit{Zantedeschia aethiopica}
• Mile-a-minute, Cape Ivy  \textit{Senecio milkanioides}
• Kikuyu  \textit{Pennisetum clandestinum}

The weed of most concern from the list is South African weed orchid and should receive the highest priority for eradication.

6.1.6.2 Weed Control Techniques

The following techniques listed by Roche (2001) are suited to minimal disturbance weed control in native vegetation. Brush cutting has been added to the list as it is integral to grassy woodland areas of the reserve such as residential-reserve boundaries.

• Hand weeding
• Frill and fill or Drill and fill
• Cut and swab
• Weed brush
• Spot spraying
• Grub
• Brush cutting (before seed set in spring)

For a comprehensive list of weed control techniques and timing refer to Appendix H for a weeding calendar.

6.1.6.3 Weed Hygiene & Dieback Disease

To minimise the spread of weeds and introduction of new species between reserves, weed hygiene is a top priority. Weed hygiene practices can also be developed in association with those for Dieback Disease - \textit{Phytophthora cinnamomi} (Pc).

Simple weed hygiene practices include:

• Thoroughly wash down and clean all equipment, vehicles, tools and boots before entering the reserve. For Pc hygiene this would include disinfection;

• Do not transport any organic material to the reserve which may contain weed seeds, stems and roots;

• Each day (where practicable) commence weed control in areas with fewest weeds and/or least invasive and progress to areas with most weeds and/or most invasive weeds;

• Do not slash or brush cut weeds and exotic grasses with mature seed heads. However, this rule may be broken during annual slashing of fuel breaks as coordinating contractors, staff and equipment place restrictions on timing of cuts. Each season’s weather also plays a major role as maturity of seed heads vary and even the number of cuts required as in spring-summer 2001/02.

Should Pc be identified within the reserve, action will need to be taken to minimise its spread. This may include fencing off infected areas, warning signs, hygiene stations, restricted access and timing of maintenance works. Actions will need to be consistent with guidelines adopted by Council.
6.2 PUBLIC USE

6.2.1 Recreation

Recreation in Sleeps Hill Quarry Reserve should be consistent with Objective 5.3.1:

To provide the local community with a natural woodland reserve that can be accessed and enjoyed for passive recreation with consideration given to all user groups.

Passive recreation activities are appropriate in the reserve such as:

- Bush walking;
- Jogging;
- Painting;
- Photography;
- Bird watching.

A geological walking trail was established in 1986 with the assistance of Mines and Energy South Australia. Excellent interpretative signs highlighting the reserve’s geology, quarrying history and vegetation have been installed. A brochure is available to the public as a guide to the walking trail (Appendix I).

It is important that trail networks are provided that enable a variety of recreational pursuits for the community. Trail networks should be suitable for the activities they are designed for whilst minimising environmental impacts and safety hazards.

Field observations revealed a number of issues which should be addressed to improve trails and recreational experiences:

- Interpretive signs posted at all reserve entrances – stating recreation activities allowed (or prohibited), importance of native vegetation on the reserve, map of trails, etc. Some of the wooden signs identifying each quarry are rotted and need replacing;
• Trail markers – many are rotted and need replacing.

• Well maintained walking tracks – eroding tracks near Quarries J, K and G;

• Fencing around indigenous vegetation of conservation significance or considered high value. This may tie in with any additional quarry fencing in the future.

Bush For Life volunteers and Council staff have observed the formation of new trails by mountain bike riders. These trails damage indigenous vegetation, increase soil erosion and have the potential to spread weeds and soil borne pathogens such as Phytophthora cinnamomi.

Consultation may be required to assess the current recreational activities in the reserve and community views. Instead of immediately erecting signs prohibiting certain activities, a consultative process may identify activities which can occur through subtle changes to existing trails.

The reserve can be accessed by at least seven frontages / points (ignoring adjacent private property) - Figure 11. This is a high number of access points and increases the need for signs and impacts on vegetation. The access points include:

1. High Street – fire track and road frontage;
2. High Street – end of street where the geological trail commences;
3. Caroline Avenue – entire road frontage;
4. Railway line near tunnel – Trans Adelaide have fenced sections and erected signs in an attempt to stop people crossing the railway line to enter the reserve;
5. Mead Street - road frontage;
6. Kalyra Road – road frontage and SA Water easement (bitumen track);
7. Lynton Landfill.

Consideration should be given to closing access points that do not have a track leading from them, this would include:

1. High Street – fence road frontage, leaving reserve access via the geological trail and fire track;
2. Caroline Avenue – fence entire road frontage. Leave access to the walking trail on the eastern end of the road;
3. Railway line near tunnel – consider adding to fencing and signage to prevent entry to the reserve from Trans Adelaide land along the railway line. A fence can even be installed on the opposite side of the railway line.
4. Mead Street - fence entire road frontage, leaving access to the walking trails;
5. Kalyra Road – most of this has recently been fenced along the road frontage as mountain bike riders have vandalised a Bush For Life site nearby.


**STRATEGIES**

6.2.1 (a) Council should maintain and where appropriate upgrade infrastructure to guide recreation within the reserve to minimise environmental impacts and safety hazards.

6.2.1 (b) Community consultation should be undertaken to determine current recreational uses occurring in the reserve and community needs.

6.2.1 (c) Reduce the number of access points to the reserve to minimise signage, management of these areas and damage to native vegetation.

**6.3 DRAINAGE**

Soil erosion from stormwater is occurring in the reserve, as with many others in the Mitcham Hills. Most of the stormwater outlets are only a few metres from the kerb, and considerable distances from the creek (Figure 12). Therefore, stormwater run-off is often discharged at high velocities and quickly erodes the soil in between the discharge outlet and creek. An option is to locate dissipaters at the end of an outlet and rock line its discharge route into the nearby watercourse. Examples of some stormwater drainage structures are illustrated in Figures 13 and 14.

Impacts of stormwater and their outlets include:

- Rill and gully erosion – soil loss and landscape change;
- Stream bank undercutting and bed scour;
- Increased sedimentation within the catchment;
- Loss of aquatic biota;
- Infrastructure choked with sediment;
- Reduced channel capacity from sedimentation and an increased risk of flooding;
- Loss of indigenous vegetation.

Stormwater outlets that require particular attention include (Figure 12):

- Mead Street (above Quarry K) - water is discharged onto the reserve and is forming a gully on the western edge of Quarry K. This may result in the weakening of the quarry face (potential collapse) and obvious hazards along the walking track. Attempts have been made by the City of Mitcham to reduce water velocity and erosion. This includes placing large rocks at the
stormwater discharge point and wooden logs that act as groins trapping sediment and directing water flow.

- Caroline Avenue – small narrow channel has formed linking the outlet to the creek (gully). A simple remedy is to reduce water velocity and enable the stormwater run-off to flow over a vegetated swale.

STRATEGY
6.3 Consider undertaking remedial works to stormwater outlets and drainage channels.

6.4 DUMPING

Illegal dumping of garden refuse, soil and general rubbish is a common problem in woodland reserves.

Impacts from rubbish dumping include aesthetics, spread of weeds, loss of indigenous plants, destruction of habitat and release of toxic compounds into the soil, air and/or water. Once rubbish is dumped onto a reserve, it often encourages more dumping. Therefore, it is important to remove the rubbish promptly.

Dumping in the reserve is evident at the following locations and should be acted upon promptly by Council:

- Rear of houses on Hawker Street – garden and general refuse;
- Rear of houses on Mead Street (western end, across Quarry A) – wood pile that appears to be collected from Grey box in the reserve;

STRATEGY
6.4 Council officers to arrange prompt disposal of rubbish on reserves and known offenders to be served notices or fines.

6.5 FIRE

6.5.1 Fire Risk Factors

Woodland reserves present a fire hazard to adjacent properties and surrounding suburbs. In the case of Sleeps Hill Quarry Reserve there are a number of factors which increase the fire hazard:

- Terrain – steep terrain over the majority of the reserve makes it difficult to undertake fire prevention and fire fighting activities. A fire will generally travel faster burning uphill, as opposed to burning on relatively flat terrain or downhill. Houses surrounding the reserve on the southern, eastern and north-eastern boundaries are all situated at the top of slopes where a fire is most likely to be travelling toward;
• Vegetation – open grassy woodland. Dry grasses provide fine surface fuels, enabling a small fire to rapidly gain momentum and burn through an area quickly. Woody weed infestations such as olives can significantly increase elevated fuel loads in the reserve.

• Adjacent properties – part of a network of woodland reserves and private properties across the Hills Face Zone. A fire occurring within any of these areas has the potential to spread into Sleeps Hill Quarry Reserve;

• Community assets – houses adjoin the reserve on the southern, eastern and north-eastern boundaries. The railway line on the western boundary separates the reserve from houses. A fire starting in Sleeps Hill Quarry Reserve has the potential to spread to other properties and surrounding suburbs;

• Deliberate fires – the risk may increase with the reserve being situated in an urban area and easily accessed from many points. Evidence of a camp fire was observed in Quarry C.

6.5.2 Fire Protection Measures

Fuel load reduction throughout the reserve is the most effective method in which the City of Mitcham can reduce the potential fire hazard. It is also one of the few tools available to Council in reducing the fire hazard.

Existing Measures

Existing fire prevention and suppression measures observed in Sleeps Hill Quarry Reserve undertaken by the City of Mitcham and volunteers include (Figure 15):

• Fuel Load Reduction – indirectly undertaken as part of bushland regeneration. Weeds targeted include Olives and Boneseed which can increase elevated fuel loads. Olives are highly flammable due to oil contained in their foliage. Some areas are virtually free of these weeds or at least contain very low juvenile populations.

• The City of Mitcham has recently controlled boneseed and olives in over four hectares of the reserve (below Caroline Avenue and Kalyra Road) in 2002-2003 through a Natural Heritage Trust project (Appendix J). The City of Mitcham has undertaken removal of woody weeds along sections of the fire track in cooperation with Bush For Life volunteers.

• Fuel Breaks – the City of Mitcham annually slashes grass along reserve boundaries that adjoin residential properties (where accessible due to terrain).

• Annual grading of fire tracks.

Listed exemptions under the Native Vegetation Act 1991 enable landowners to clear native vegetation (except significant trees - under the Development Act 1993) for fuel breaks provided certain conditions are met.
Particular attention should focus on maintaining effective fuel breaks along the southern and eastern boundaries of the reserve, such as:

- Mead Street and Lind Avenue;
- Hawker Avenue and High Street;
- Caroline Avenue to Kalyra Road.

**Additional Measures**

City of Mitcham's Fire Prevention Officer in consultation with the CFS Sturt Group has recommended the establishment and maintenance of the following fuel breaks (Figure 15):

- **15 High Street**
  
  Establish a 20 metre fuel break along the property's eastern boundary as the dwelling is situated only metres from the reserve boundary.
  
  Further removal of mid-stratum vegetation (*i.e. Dodonaea viscosa*) is required in addition to the existing 10-15 meter wide fuel break. Mature grey box trees are to be retained in the fuel break. Small branches (< 100 mm diametre) of trees within 1.5 metres of the ground are to be cut back to the main trunk.

- **Rear of houses on Hawker Avenue, extending to the southern boundary of 15 High Street**
  
  Establish a 10 metre wide fuel break along the reserve boundary, where possible due to steep terrain along the western side of Quarry G.
  
  A focus will be on removing woody weeds such as olives, with selective removal of mid stratum indigenous vegetation. It may not be possible to access the entire boundary. Therefore, clearing of woody weeds at the base of quarries will occur to form a continuous fuel break.

- **Caroline Avenue to Kalyra Road**
  
  Along the boundary a 15 meter wide break is required which will be brush cut annually prior to the fire danger season. Selective removal of indigenous shrubs, small trees and low tree limbs within 1.5 metres of the ground is required.
  
  An additional fuel reduced zone (along the track and, between the track and fuel break) should be maintained. This will require selective removal of regenerating trees and shrubs.

**High Street to Caroline Avenue Verge**

Annual brush cutting of the Caroline Avenue - High Street verge (next to the reserve) is necessary in preparation for the fire danger season. The verge contains indigenous grasses and some understorey plants which are encouraged in all fuel breaks.

- **Mead Street Verge**
  
  Annual brush cutting of grasses along the road verge prior to the fire danger season.
Selective removal of indigenous shrubs and low tree limbs within 1.5 metres of the ground may be required.

- **Mead Street (rear of houses adjacent to the reserve)**

Annual brush cutting of a 10 metre wide fuel break along the reserve boundary prior to the fire danger season. Selective removal of indigenous shrubs and low tree limbs within 1.5 metres of the ground is necessary.

Control burns may be trailed in this gully (between the rear of house and fire track) to assess resulting fuel loads, vegetation and soil stability.

- **Fire Tracks**

In February 2003, the CFS recommended the removal of mid-storey vegetation on the low side of fire tracks, within four metres of the track’s edge. This is considered essential to provide a level of protection to CFS personnel and appliances fighting a fire along the track.

Within two metres of the high-side and/or flat sections of fire track, mid-storey vegetation posing a hazard should also be removed. Particular plants to be removed include Olive and Kangaroo thorn (*Acacia paradoxa*) which can form a highly flammable mid-storey layer. It is anticipated that the bulk of vegetation removal will consist of pest plants.

Overhanging tree limbs along fire tracks are to be cut back to provide a five metre wide corridor, extending vertically to five metres. In some cases tree removal may be required if pruning (i) unbalances the tree and is likely to cause a safety hazard, or (ii) long term maintenance issues.

Maintaining indigenous vegetation in the ground and canopy layers should result in a defined fuel break along the fire track with reduced fuel loads and maintenance costs.

It is proposed that for each indigenous plant removed at least three tube stock of the same species be planted well outside of fuel breaks and fire tracks.

The fire track is generally in good condition. However, a small downhill section near the landfill is very rough and would benefit from additional road metal, compaction and grading.

The Native Vegetation Council should be consulted regarding vegetation clearances to ensure compliance with the Native Vegetation Act 1991.

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**STRATEGIES**

6.5.2 (a) Continue weed control in the reserve to reduce fuel loads by targeting woody weed species and exotic grasses such as Wild oats and Phalaris. Slashing annual grasses in August-September, and later for native grasses (after seed has dropped) is recommended.

6.5.2 (b) Promote and establish indigenous grasses, herbs and ground covers within fuel breaks to reduce fuel loads, slashing and weed control costs. Avoid planting trees and shrubs within 20 metres of reserve boundaries to maintain a fuel reduced zone.
6.5.3 Ecological Fire Management

Consent is required from the Native Vegetation Council for burning native vegetation outside of the listed exemptions as it is considered clearance under the Native Vegetation Act 1991.

Prescribed fires can be beneficial for those indigenous plant species that depend on fire for germination. Fire can also be used as a tool in weed control programs. However, fire is a double edged sword as many weed species germinate profusely after a fire, increasing infestations and even fuel loads. Therefore, an intensive follow up weed control program may be required for many years following a single fire.

Robertson (1995) states that frequent fires (10-30 year intervals) have historically occurred in much of the fragmented vegetation in the Mount Lofty Ranges and have been associated with its degradation.

The impacts to native vegetation from frequent fires will be the loss of species dependent on longer periods between fires and dominance by species favouring shorter periods in between fires. Frequent fires will affect the diversity and density of vegetation. With a lack of intensive weed control, indigenous plants are likely to be displaced by weeds.
Mosaic burning can be used to reduce fuel loads and assist in regeneration of indigenous species dependant on fire for germination. Mosaic burning requires adequate planning to assess areas that will benefit from fire, frequency of burning, timing (hot/cool burns), impacts on flora and fauna, and follow up weed control. When considering mosaic burning land mangers should consult with those experienced in native vegetation management and fire prevention. Trial sites would be beneficial in evaluating mosaic burning.

### STRATEGIES

6.5.3 (a) Monitor resulting fuel loads and vegetation changes following fires that occur in the reserve.

6.5.3 (b) When considering mosaic burning as an option, Council should consult with those experienced in native vegetation management and fire prevention.

6.5.3 (c) Consider establishing a trial site to monitor the impacts of mosaic burning.

6.5.3 (d) Maintain a detailed history of fires occurring in the reserve and adjacent areas to assess impacts on vegetation and fuel loads.

### 6.6 QUARRIES

There are twelve quarries in various locations on both sides of the main gully which divides the reserve (Figure 16).

The quarries are geologically significant and provide an example of early quarrying methods. Consequently, they have been placed on the State Heritage Register. A cultural heritage management strategy may need to be developed at a later date.

In partnership with the Department of Mines, the City of Mitcham has constructed a geological trail linking all the quarries. Interpretive signs have been installed describing geological formations, vegetation and past quarrying methods in the reserve (Appendix I). The trail is an excellent educational and ecotourism initiative.

Pest plants are well established in the quarries and include Olive, Boneseed and Aleppo pine. It should be a high priority to remove these weeds so visitors can view the rock faces, reduce fuel hazards and further weed incursion.

Fences have been installed around sections of the quarries, mainly along steep faces adjacent to walking trails. It is beyond the scope of this maintenance plan to evaluate the adequacy of quarry fencing for public safety. Council should inspect fencing for compliance to occupational health, safety and welfare legislation and rectify any deficiencies. A quarry audit commissioned by the Council in the 1990s may assist with an inspection.
6.7 COMMUNITY EDUCATION

Implementation of this maintenance plan will be more effective if the community is aware of the issues affecting the reserve.

Educating the community on issues such as biodiversity, illegal dumping and fire prevention can enact behavioural change. This can be delivered through interpretive signs along trails, mail-outs, brochures, Council’s website, local newspapers, Mitcham Community News and on-site meetings.

Community participation in management of the reserve can then be gained by individual residents modifying or ceasing inappropriate practices or even joining volunteer organisations (i.e. Trees For Life).

STRATEGIES

6.7 (a) The Sleeps Hill Quarry Reserve Maintenance Plan should be readily available to the community and viewed as a working document.

6.7 (b) Council seeks to educate the community on issues such as biodiversity, bushfire prevention and illegal dumping.

6.7 (c) Council should fund the establishment and annual maintenance of additional Bush For Life sites in the reserve to involve the community in vegetation management.
7. Implementation of Strategies

7.1 RESERVE STATUS

The *City of Mitcham Open Space Survey 1982* classified Sleeps Hill Quarry Reserve as “Undeveloped: modified woodland – (a) semi-natural.” Refer to Section 2.1 for definitions of these terms.

This description is accurate and useful for Council’s internal purposes. However, a simplified classification such as “Native Woodland Reserve” or “Native Bushland Reserve” is more appropriate when stating the reserve's classification on signage. Council may wish to consider this change to its classification system.

As previously stated, in 1986 a large section of the reserve was entered onto the State Heritage Register where the quarries are situated (CT 4115/546 Part sections 1148, 1147, 1073 and 1074 Hundred of Adelaide).

Any development occurring on a property entered into the State Heritage Register must be referred to the planning authority for approval (Appendix C). According to Towle (1996), development includes the demolition, removal, conversion, alteration of, or addition to, the place or any other work that could materially affect the heritage value of the place.

7.2 MANAGEMENT ZONES

Sleeps Hill Quarry Reserve has been divided into eleven (Figure 17) management zones based upon recognisable on-ground features such as tracks and creek lines.

7.3 MANAGEMENT COMMITTEE

In the case of a management plan, Robertson (1995 p11) recommends the formation of a management committee to:

- Coordinate, oversee and review implementation of the plan;
- Resolve management issues as they arise;
- Provide feedback to Council.

At this stage, Council does not consider it necessary to form additional committees for maintenance plans as existing Council operations enable the processes listed above.
7.4 MONITORING, EVALUATION AND REVIEW

Implementation of this maintenance plan can be assessed through evaluating on-ground actions which are derived from recommended strategies. Therefore, monitoring of actions are critical.

Some monitoring methods are listed below.

- **Photo-points** – monitoring weed removal programs, long term native vegetation change and erosion control;

- **Vegetation Surveys** – in specified areas, survey species to give an indication of weed control effectiveness in regeneration of indigenous vegetation. This may occur at 1-5 year intervals and involve sampling the same quadrats each time. This will provide a good indication of whether or not management techniques are effective.

- **Community Surveys** – to obtain feedback on community education initiatives whether or not the “messages” are understood, relevant, changing attitudes, information gaps, etc;

- **Documentation** – confirmation of actions such as fuel breaks being slashed, grading of fire tracks, clean up notices issued can be recorded and entered into a database (i.e. MapInfo) for future reference and analysis. This will provide Council and the community with a comprehensive database providing historical data for a myriad of uses at a later date.

Annual or half yearly reviews of the maintenance plan can take place by evaluating outcomes of each action. Outcomes of the evaluation may be to alter actions for the coming year, re-prioritise actions and make changes to the maintenance plan in the next review. It is advisable to review the maintenance plan every five years.

7.5 RESOURCING AND PERSONNEL

To implement the strategies in this maintenance plan it is vital that Council commits to providing adequate financial and human resources.

Sleeps Hill Quarry Reserve is relatively large at thirty-three hectares. Council’s ‘woodland reserve crew’ (two staff) will play a key role in reserve maintenance and vegetation management. However, they will have a limited number of hours to devote each year to this reserve as their workload is spread across 500 hectares reserves in the Mitcham Hills. It is vital that Council identifies resource limitations and ways to combat these. Establishment of more Bush For Life sites throughout the reserve can greatly assist Council.

Council will need to ensure that a staff member is assigned to implement the maintenance plan and audit on-ground works.
### 7.6 IMPLEMENTATION GUIDE

Implementation of this plan has been summarised in Table 8. An action plan should follow this document to implement the recommended strategies in line with available resources.

**TABLE 7. IMPLEMENTATION GUIDE**

<table>
<thead>
<tr>
<th>Task</th>
<th>Issue</th>
<th>Duration &amp; Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public consultation on draft plan</td>
<td>Review community feedback and modify draft plan where appropriate.</td>
<td>Completed</td>
</tr>
<tr>
<td>Council adopts maintenance plan</td>
<td>Maintenance plan is adopted by Council and strategies are endorsed.</td>
<td>Short term</td>
</tr>
<tr>
<td>Reserve status</td>
<td>Ensure reserve’s classification is appropriate for long-term protection of flora and fauna in the reserve.</td>
<td>Short term</td>
</tr>
<tr>
<td>Appoint staff</td>
<td>Define roles, responsibilities and person to lead implementation.</td>
<td>Short term</td>
</tr>
<tr>
<td>Record keeping</td>
<td>Develop a system to record activities on the reserve.</td>
<td>Short-medium term</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Establish a monitoring system to observe and record long-term changes in flora and fauna.</td>
<td>Medium term, ongoing</td>
</tr>
<tr>
<td>Action Plan</td>
<td>Develop an action plan to guide the implementation of strategies of this plan.</td>
<td>Medium term</td>
</tr>
<tr>
<td>Evaluate and review</td>
<td>Annually review implementation of strategies and monitoring results.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Revise plan .</td>
<td>Plan should be updated to include new issues, modified strategies and updated vegetation maps.</td>
<td>5 year intervals</td>
</tr>
</tbody>
</table>
### 7.6 SUMMARY OF STRATEGIES

#### TABLE 8. HIGH PRIORITY STRATEGIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Strategy</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6 (a)</td>
<td>Communicate relevant sections of this management plan with SA Water (and United Water) to minimise impacts of their operations in the reserve.</td>
<td>Stormwater pollution</td>
</tr>
<tr>
<td>2.6 (b)</td>
<td>Promptly report sewage overflow events in the reserve to United Water.</td>
<td>Stormwater pollution</td>
</tr>
<tr>
<td>2.8.2 (a)</td>
<td>Inspect quarry fencing for compliance to the Occupational, Health, Safety and Welfare Act (if not already done).</td>
<td>OHS&amp;W</td>
</tr>
<tr>
<td>2.8.2 (b)</td>
<td>Maintain and repair existing quarry fencing as required.</td>
<td>OHS&amp;W</td>
</tr>
<tr>
<td>2.9 (a)</td>
<td>Review existing reserve and “woodland crew” budgets to achieve strategies in this maintenance plan.</td>
<td>Budgets</td>
</tr>
<tr>
<td>2.9 (b)</td>
<td>City of Mitcham to continue supporting existing Bush For Life sites with a view to increasing their number in the reserve.</td>
<td>Flora</td>
</tr>
<tr>
<td>4.1</td>
<td>Sleeps Hill Quarry Reserve should be managed to protect and promote indigenous flora and fauna.</td>
<td>Flora &amp; Fauna</td>
</tr>
<tr>
<td>6.1.1</td>
<td>Bushland restoration should focus on areas of remnant vegetation with high condition ratings (say scores of 2-3 from the 2005 survey).</td>
<td>Flora</td>
</tr>
<tr>
<td>6.1.2</td>
<td>Focus on establishing indigenous flora by regeneration (natural process) through minimal disturbance weed control and minimising degrading influences.</td>
<td>Flora</td>
</tr>
<tr>
<td>6.1.3</td>
<td>Revegetation should only be considered as a supplement to regeneration. Revegetation should focus first on establishing pioneering species in degraded areas of the reserve.</td>
<td>Flora</td>
</tr>
<tr>
<td>6.1.5</td>
<td>Collect information on Grey box woodland ecosystems and incorporate findings into management practices where practicable.</td>
<td>Flora &amp; Fauna</td>
</tr>
<tr>
<td>6.1.6.3 (a)</td>
<td>Only minimal disturbance weed control is to be used in Sleeps Hill Quarry Reserve.</td>
<td>Flora</td>
</tr>
<tr>
<td>6.1.6.3 (b)</td>
<td>Adopt weed hygiene practices for Council employees, contractors and other users of the reserve where practicable.</td>
<td>Flora</td>
</tr>
<tr>
<td>6.1.6.3 (c)</td>
<td>Implement an action plan to address weed control within the reserve based upon conservation values, fire management and priority weeds.</td>
<td>Flora</td>
</tr>
<tr>
<td>6.1.6.3 (d)</td>
<td>Undertake patrols of reserve boundaries and promptly control garden escapes.</td>
<td>Flora</td>
</tr>
<tr>
<td>Section</td>
<td>Strategy</td>
<td>Issue</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>6.2.1 (a)</td>
<td>Council should maintain and where appropriate upgrade infrastructure to guide recreation within the reserve to minimise environmental impacts and safety hazards.</td>
<td>Recreation</td>
</tr>
<tr>
<td>6.3</td>
<td>Consider undertaking remedial works to stormwater outlets and drainage channels.</td>
<td>Erosion</td>
</tr>
<tr>
<td>6.4</td>
<td>Council officers to arrange prompt disposal of rubbish on reserves and known offenders to be served notices or fines.</td>
<td>Illegal dumping</td>
</tr>
<tr>
<td>6.5.2 (a)</td>
<td>Continue weed control in the reserve to reduce fuel loads by targeting woody weed species and exotic grasses such as Wild oats and Phalaris. Slashing annual grasses in August/September, and later for native grasses (after seed has dropped) is recommended.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (b)</td>
<td>Promote and establish indigenous grasses, herbs and ground covers within fuel breaks to reduce fuel loads, slashing and weed control costs. Avoid planting trees and shrubs within 20 metres of reserve boundaries to maintain a fuel reduced zone.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (c)</td>
<td>Promote indigenous flora within the reserve to compete with weeds, increase biodiversity and to reduce the overall biomass.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (d)</td>
<td>Council should establish and maintain fuel breaks along reserve boundaries and fire tracks as specified in section 6.5.2 'Additional Measures' and illustrated in Figure 15 - subject to approval by the Native Vegetation Council.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (e)</td>
<td>Maintain fire tracks surfaces in good condition and minimise the formation of dirt and rubble piles along tracks which promote weed infestations.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (f)</td>
<td>Council should encourage properties adjacent to the reserve to implement bushfire prevention practices and establish their own fuel breaks.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (g)</td>
<td>Council should educate the local community on bushfire prevention practices which can be assisted by the CFS.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (h)</td>
<td>Council should assist in establishing a 'reserve watch' to report suspicious behaviour and identify arsonists in the reserve.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (i)</td>
<td>The Sleeps Hill Quarry Reserve Maintenance Plan should be included in the annual Mitcham District Bushfire Prevention Plan.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.2 (j)</td>
<td>Trial control burns at the rear of houses on Mead Street to assess its effectiveness to reduce fuel loads and impacts on vegetation and soil stability.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.3 (a)</td>
<td>Monitor resulting fuel loads and vegetation changes following fires that occur in the reserve.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.6 (a)</td>
<td>Maintain the existing geological trail and signs.</td>
<td>Education</td>
</tr>
<tr>
<td>6.6 (b)</td>
<td>Control weed infestations in quarries.</td>
<td>Flora</td>
</tr>
</tbody>
</table>
### Table 9. Medium Priority Strategies

<table>
<thead>
<tr>
<th>Section</th>
<th>Strategy</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.6 (c)</td>
<td>Council should inspect quarry fencing for compliance to occupational health, safety and welfare legislation and rectify any deficiencies.</td>
<td>OHS&amp;W</td>
</tr>
<tr>
<td>6.7 (a)</td>
<td>The Sleeps Hill Quarry Reserve Maintenance Plan should be readily available to the community and viewed as a working document.</td>
<td>Community</td>
</tr>
<tr>
<td>6.7 (b)</td>
<td>Council seeks to educate the community on issues such as biodiversity, bushfire prevention and illegal dumping.</td>
<td>Community</td>
</tr>
<tr>
<td>6.7 (c)</td>
<td>Council should fund the establishment and annual maintenance of additional Bush For Life sites in the reserve to involve the community in vegetation management.</td>
<td>Community &amp; Flora</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>2.8.1 (a)</td>
<td>Install boundary markers along residential-reserve boundaries during a survey.</td>
<td>Property boundaries</td>
</tr>
<tr>
<td>2.8.1 (b)</td>
<td>Consider appropriate fencing around areas of high habitat value with entry and exit points for indigenous fauna.</td>
<td>Fencing</td>
</tr>
<tr>
<td>3.1.4</td>
<td>Council to consider increasing habitat corridors between nearby woodland reserves.</td>
<td>Fauna</td>
</tr>
<tr>
<td>6.1.4</td>
<td>Allow non-commercial seed collection of common species in the reserve by permitted individuals/organisations for planting in the local area. Seed collection must not remove more than 10% of available seed at the site.</td>
<td>Flora</td>
</tr>
<tr>
<td>6.1.6.3 (e)</td>
<td>Adopt guidelines for managing sites infected with <em>Phytophthora cinnamomi</em> (Pc).</td>
<td>Flora</td>
</tr>
<tr>
<td>6.2.1(b)</td>
<td>Community consultation should be undertaken to determine current recreational uses occurring in the reserve and community needs.</td>
<td>Recreation</td>
</tr>
<tr>
<td>6.2.1(c)</td>
<td>Reduce the number of access points to the reserve to minimise signage, management of these areas and damage to native vegetation.</td>
<td>Flora and Recreation</td>
</tr>
<tr>
<td>Section</td>
<td>Strategy</td>
<td>Issue</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>6.5.3 (b)</td>
<td>When considering mosaic burning as an option, Council should consult with those experienced in native vegetation management and fire prevention.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.3 (c)</td>
<td>Consider establishing a trial site to monitor the impacts of mosaic burning.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.5.3 (d)</td>
<td>Maintain a detailed history of fires occurring in the reserve and adjacent areas to assess impacts on vegetation and fuel loads.</td>
<td>Fire Prevention</td>
</tr>
<tr>
<td>6.6 (d)</td>
<td>A cultural heritage management strategy may need to be developed for the quarries.</td>
<td>Cultural Heritage</td>
</tr>
</tbody>
</table>
References & Bibliography


Gillis, S. (1992-93) Flora survey in Belair Reserve (southern section) for the City of Mitcham.


Towle, C. (1996) Correspondence, 8 August 1996 from the State Heritage Authority to the City of Mitcham.

