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# 1 INTRODUCTION AND BACKGROUND

Lloyd Hughes Park has significant conservation value arising from its diverse vegetation and geology, its location on the Darling Scarp and its potential as part of a corridor linkage between the Canning River and bushland to the north and east. Figure 1.1 shows the location of Lloyd Hughes Park in a regional context.

The Park is of regional significance, having been identified for conservation in Environmental Protection Authority's System 6 Report in 1983 (Environmental Protection Authority, 1983) and as part of the Darling Range Regional Park (Ministry for Planning, 1995). It is reserved for Parks and Recreation under the Metropolitan Region Scheme.

The Park is an A Class reserve (Reserve No 6468) for the purpose of "Parklands" which has been vested with the City of Armadale since 1899. It has an area of about 17.7 ha.

A Friends of Lloyd Hughes Park Management Committee was formed in May 1997. The Friends group has liaised closely with the City of Armadale to undertake some management-related works and achieve this Management Plan.

In March 1998 a biology student's Draft Management Plan for the Park (Easton, 1994) was circulated for comment but was then withdrawn because the report had been used without permission of the author. The author felt that his understanding of management plans had increased since he was a student and that the plan circulated was deficient and inaccurate in parts. Much of the information in the previous Management Plan was accurate and has been utilised in the preparation of this Management Plan.

The life of this Management Plan is five years, from January 2000 to December 2005.

## 1.1 Values of Lloyd Hughes Park

Recognition of the values and ecology of the foothills of the Darling Scarp is essential for the Park's management and preservation. The values of Lloyd Hughes Park include:

### NATURAL WILDLIFE and RESOURCES

- Habitat for the Quenda or Southern-Brown Bandicoot *Isodon obesulus fusciventer* that is listed as a Priority 4 species by the Department of Conservation and Land Management. It also provides habitat (breeding, feeding and refuge) for a variety of birds, reptiles, amphibians, mammals and invertebrates.
- The presence of at least three vegetation associations characteristic of the alluvial soils on foothills of the Darling Scarp in Very Good - Excellent condition.
- Importance as a source of seeds for nearby bush land in case of fire or disease.
- The stream zone vegetation traps nutrients and acts as filter to reducing pollution loads to the Canning River.

**Figure 1.1    Location of Lloyd Hughes Park**

## STUDY and EDUCATION

The geological and biological diversity provides excellent study opportunities for bird watchers, nature enthusiasts, students and researchers.

## RECREATION

The Park offers opportunities for passive recreation such as walking, photography, sightseeing and bird watching.

## AESTHETICS

The Park provides scenic and landscape features of regional significance, a link with the original bush landscape and contributes to the natural heritage and lifestyle of the region.

## **1.2 Relationship to Darling Range Regional Park Management Plan**

In 1993 the Western Australian Planning Commission put forward initial proposals for a Darling Range Regional Park which included parcels of land from the Avon Valley National Park south along the scarp to Serpentine River National Park (Department of Planning and Urban Development, 1993). Following public consultation the proposals were amended and adopted in 1995 (Ministry for Planning, 1995).

The Darling Range Regional Park will cover approximately 38,500 hectares and include Lloyd Hughes Park that is currently vested in the City of Armadale. In the long-term the Darling Range Regional Park will be owned by the Government and vested in the National Parks and Nature Conservation Authority or local government (Ministry for Planning, 1995, p.17).

In July 1999, the Department of Conservation and Land Management was given responsibility for coordinating the management of the Darling Range Regional Park. The Department has also accepted the operational management of lands within the park owned by the Western Australian Planning Commission which were formerly managed by the Ministry for Planning.

The Department of Conservation and Land Management intends to commence preparation of a Darling Range Regional Park Management Plan during the 1999/ 2000 financial year. The Management Plan will consider the entire Regional Park, including areas vested in local government.

**Following finalisation of the Darling Range Regional Park Management Plan implementation of this management plan will continue where it is consistent with the Regional Park Management Plan.**

## 2 EXISTING ENVIRONMENT AND PARK USAGE

### 2.1 Tenure, surrounding land use and easements

As noted in the introduction, Lloyd Hughes Park is an A Class reserve (Reserve No 6468) for the purpose of "Parklands" which has been vested with the City of Armadale since 1899.

As at December 1999, the Department of Land Administration had agreed in principle to a 15m wide easement in favour of the Water Corporation diagonally across the Park in a south easterly direction from the corner of Martin St and Marmion St. A 1,370mm diameter steel water pipe passes underground through the proposed easement that carries water from Canning dam. The pipe was constructed in the 1970's and in parts has left a wide cleared area that continues to erode and which is now used as a walking track.

Access needs to be provided to each of the seven maintenance points along the pipe, but not necessarily along the length of the pipe. The Water Corporation occasionally fells large trees growing along this easement in order to protect the pipeline from root damage.

Long term plans include duplication of the pipeline within the proposed 15m easement.

The Park is surrounded by urban development on all sides except for a portion on the northern boundary between the rear of lots along Ashley Drive and Canning Mills Road. Martin Street Road Reserve lies between the Park and land owned freehold by the Ministry for Planning which also forms part of the Darling Range Regional Park (See Figure 1.1).

### 2.2 Geology and soils

In Perth's Bushplan (Government of Western Australia, 1998), landform and soil mapping at 1:250,000 scale by Heddle et al. (1980) was used to determine the remaining area of each vegetation type present on the Swan Coastal Plain. Lloyd Hughes Park sits on or near the boundary between the Ridge Hill Shelf and Darling Scarp landform soil types (Heddle et al., 1980).

The Ridge Hill Shelf landform and soil type is described as "*Laterised foothills of the Darling Scarp dominated by gravelly and sandy soils*". The Darling Scarp landform and soil type is described as "*Very steep slopes with shallow red and yellow earths and much rock outcrop*". A vegetation survey by Keighery and Trudgen (1992, p.13) included Lloyd Hughes Park in the Ridge Hill Shelf landform and soil type.

Environmental Geology mapping at 1:50,000 scale reveals a complex geology with six different units occurring within the park (see Figure 2.1). The Environmental Geology mapping also shows geomorphology mapped at a 1:100,000 scale and Lloyd Hughes is almost all mapped as Colluvial Slope (Jordan, 1986).

Unfortunately, there is no consistency between authors for the boundaries and geological terms used in large and small scale geological mapping for the Ridge Hill Shelf (Markey, 1997).

### **2.3 Topography, hydrology and erosion**

The Park's topography ranges from a peak of 100 m above sea level, generally sloping down to 25-30 m in the south-west (see Figure 2.1).

The upper area of the creek probably originates from a spring (Keighery and Trudgen, 1992). The creek rarely exceeds 0.5-1 metre at its deepest point and during the drier months of the year the creek is mostly dry. Drainage is poor near the creek but good on the heights. The creek leaves the Park through a stormwater drainage pipe and flows into the Canning River.

Piped stormwater enters the Park at four locations (Figure 2.4 - Drains 1, 3, 4 & 5) and stormwater pipes take water from the Park at two locations (Figure 2.4 Drains 2 & 6). Water from Drain 3 travels through the Park in a gully that appears to have been created through a combination of earthworks and erosion. The gully is up to about 1.2m deep in places.

A water diversion bank is located behind houses that face Ashley Drive that collects water from a large area behind the houses. Water from the diversion bank flows along tracks located on or near the boundary of the Park and Martin St, joins water from stormwater Drain 5 and exits the area through Drain 6.

Water from Drains 4 and 5 flow into bushland and disperse. Evidence of gully erosion up to one metre deep occurs about 15m downhill of Drain outlet 5.

Erosion is occurring on many of the existing tracks in the Park, and some tracks have gully erosion reaching 500mm deep. Erosion of the track that runs north-east across the middle of the Park has deposited sediment into the creek. Figure 2.4 highlights track condition including the extent of erosion. In summary, several tracks are too steep, too straight, or too wide, and have no tracks have erosion control mechanisms for water flow.

Sheet erosion is also occurring where pedestrian traffic is heavy.

The creekline itself is in good condition and does not show signs of erosion.

Erosion and water drainage into the Park are major problems and need to be addressed to prevent further damage to the landscape and vegetation.

### **2.4 Visual resources**

The Darling Range Regional Park and Landscape Study classified the area using a Visual Resource Analysis technique as "*Landscape Management Zone A. Highest Priority Visual Quality Objective: Maximum Retention*" (Department of Planning and Urban Development, 1993). It recommended maintenance be of the highest priority and should involve proper site planning, construction controls and rehabilitation or landscaping.

The Park offers visual relief from the surrounding built-up areas and has an important aesthetic value for the identity of the 'hills' area of Kelmscott.

Spectacular views across the coastal plain can not be gained from within Lloyd Hughes Park.

**Figure 2.1 Environmental Geology of Lloyd Hughes Park**

**Figure 2.2 Topography**

## 2.5 Vegetation and flora

### 2.5.1 Vegetation types and condition

Keighery and Trudgen (1992) have conducted the most thorough vegetation survey of Lloyd Hughes Park to date in which three main vegetation associations were identified (Figure 2.3 & Appendix A);

1. Flooded Gum Woodland over *Viminaria juncea* High Open Shrub land over Pampas Grass Open Grassland over Closed Sedgeland. This vegetation occurs along the creek.
2. Marri Woodland over Low Shrubland over Open Grassland and Herbland. This vegetation occurs on the slopes higher up from the creek and on the higher flats with Jarrah often adjacent.
3. Wandoo Low Open Woodland over *Acacia lateriticola* Shrubland over Low Shrubland. This vegetation occurs on the higher flats.

Keighery and Trudgen (1992) note that “*Much of the location is in very good to good condition but there are many areas of severe localised disturbance*”.

Figure 2.4 shows the results of a site assessment of weeds and vegetation condition conducted in March 1999. It should be noted that Figure 2.4 is not the result of a detailed mapping exercise and should not be used as a basis for monitoring the success or otherwise of management measures.

In general, the area north of the creekline is in Very Good – Excellent condition except near the Park boundaries and along some tracks. It appears that the old quarry sites have revegetated successfully with local species and are in Very Good – Excellent condition.

In general the understorey vegetation south of the creekline and a point halfway between Drains 5 & 6 (See Figure 2.4) is dominated by alien grasses, *Watsonia* and *Acacia pulchella*. The overstorey is in good condition.

Most of the creekline is in Very Good – Excellent condition. However, there is a large patch of Pampas Grass *Cortaderia sellonana* along part of the creekline.

### 2.5.2 Flora

Ninety-four species of flora have been recorded at Lloyd Hughes Park, of which 16 are weeds. A list of the flora recorded appears in Appendix B. Weed species are further considered in Section 4.1.1.

*Gonocarpus pithyoides* was formerly listed as Priority 3 species under the *Wildlife Conservation Act 1950*. However, it was deleted from the priority list some years ago as it is known from many sites on the coastal plain.

Twenty-two species are confined to the Scarp and eastern side of the Swan Coastal Plain, and five of these were outside recorded range (Keighery and Trudgen, 1992). Of the flora

classified by form there are four trees, 25 shrubs, nine grasses, 25 herbs, two sedges and one fern (see Appendix B).

## **2.6 Fauna**

No systematic survey of native fauna at Lloyd Hughes Park has been undertaken.

Information about native fauna at Lloyd Hughes Park comes from residents around the Park who completed a questionnaire in 1994 and opportunistic observations by Mr Peter Easton (Easton, 1994).

Therefore, the fauna list probably represent only a small fraction of the species present.

Native fauna play important roles in the functioning of the Park's ecosystem by maintaining the soil, pollinating plants, dispersing seed and recycling nutrients.

Alien fauna seen in the park includes foxes and cats. Rabbits have not been seen in the Park for many years.

### **2.6.1 Mammals**

Quenda *Isodoodon obesulus fusciventer* are seen by local residents and marks in the soil characteristic of burrowing for feeding can be seen in the Park. Quenda are listed as a Priority 4 Species by the Department of Conservation and Land Management.

Priority 4 species are species “in need of monitoring” and which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. Priority 4 species are usually represented on conservation lands.

Grey Kangaroos *Macropus fuliginosus* come from the bushland to the north and have been seen well into the Park. Fresh scats were observed in March 1999.

Brush-tail Possums *Trichosurus vulpecula* also occurs in the Park.

### **2.6.2 Reptiles and frogs**

Reptiles found in the park include the Bobtail Lizard *Tiliqua rugosa rugosa*, Fence Skink *Cryptoblepharus plagiocephalus*, Dugite, and Gould's monitor *Varenius gouldii*.

Many frog calls can be heard around the creek.

**Figure 2.3**    **Vegetation associations and sample site locations at Lloyd Hughes Park**

**Figure 2.4 Site assessment of weeds, vegetation condition, and track condition March 1999. Locations and boundaries are indicative only and should not be used for monitoring.**

### 2.6.3 Birds

A local ornithologist has provided an annotated bird list based on 50 visits between April 1996 and March 1999 (Tony Kirkby pers. com). The annotated list appears in Appendix C. Sixty-six species of birds have been recorded of which 26 are noted as common or regularly recorded. Four species have been recorded breeding. Five are introduced species (e.g the Laughing Kookaburra).

The best areas for bird observation appear to be towards the eastern side of the Park higher up the scarp.

Rare or endangered species recorded are shown in Table 2.1 below.

**Table 2.1: Rare or endangered bird species recorded in Lloyd Hughes Park.**

Species	Status	Notes from 50 visits 1996-1999
Long-billed or Baudin's Black-Cockatoo <i>Calyptorhynchus baudinii</i>	Vulnerable - threatened species under <i>Wildlife Conservation Act</i> 1950.	Irregular visitor but sometimes in groups of up to 40 birds feeding on <i>Dryandra nivea</i> flowers and <i>Hakea</i> sp.
Short Billed or Carnaby's Black Cockatoo <i>Calyptorhynchus latirostris</i>	Endangered - threatened species under <i>Wildlife Conservation Act</i> 1950.	Seen flying over park to feed on pines along River Road. About 100 birds recorded preening and bill cleaning at western edge of park March 1999.
Red-tailed of Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii</i>	Rated as Priority 3 - species with several, poorly known populations, some on conservation lands by CALM.	One record of three birds at northern side of park.

### 2.6.4 Invertebrates

No work was done to identify invertebrates. However, invertebrates are an extremely important part of the Park because they:

- are food source for other animals;
- decomposers of dead material; and
- facilitate of seed production and dispersal.

## 2.7 History and heritage

The Park was named after a local accountant, Mr Lloyd Hughes (deceased). Mr Hughes was the founding Secretary of the Byford Agriculture Society (1926), joint-secretary of the Kelmscott Agriculture Society, secretary of the brick works and the Hospital Board secretary. Mr Hughes was also an outstanding sportsman, playing league football for Claremont-Cottesloe, tennis and captaining A-grade cricket.

The Park appears to have been used as a quarry for shale. It has been speculated that steam shovels were used to undertake mining operations because large piles of ash occur in some parts of the Park.

In mid-1999 the Aboriginal Affairs Department had no records of sites of Aboriginal significance in Lloyd Hughes Park.

## **2.8 Recreational use**

Present use of the Park is passive. The Park is a popular area for local children to play.

A network of small and large walk trails have been formed, mostly around the higher areas from many years of pedestrians exploring the area (Figure 4.2). Walking is a daily activity in the Park.

Other activities in the Park include walking dogs, bush walking and bird watching.

Trail bikes are a problem both for the Park and nearby residents. The use of trail bikes in the Park is illegal, and occurs more frequently on weekends than weekdays. The noise annoys nearby residents.

Trail bikes damage the Park by creating new trails and loosening the soil facilitating water erosion and widening of tracks. Mountain bike use along trails also loosens the soil.

## **3 COMMUNITY CONSULTATION**

In 1994 a questionnaire was distributed to houses surrounding the Park to assist in the collection of information regarding fauna, recreational uses, fire history, and general status of the Park over the past years. Forty-eight questionnaires were delivered and there were five responses. Despite the low number of responses, some valuable information was gained (Easton, 1994).

Nearly all replies indicated the best feature of the Park was its association with the natural environment, whilst the worst features were rubbish, motorbikes, vandals, weeds and erosion. In general, respondents considered that the Park had remained in the same condition over the years. All responses agreed with the Park being used for walk trails, nature reserve and educational use, whilst most disagreed with it being used by horse riders or as a picnic area (Easton, 1994).

In 1994 those surveyed appeared to be unfamiliar with the name "Lloyd Hughes Park" but could identify "...the area of bushland going up Canning Mills on the left-hand side, up from the Kelmscott Primary School." Most were unaware that the bushland was regionally significant (Easton, 1994).

## 4 DISCUSSION OF MANAGEMENT ISSUES AND RECOMMENDATIONS

### 4.1 Vegetation management

#### 4.1.1 Weeds

Problems caused by weeds establishing themselves in the Park include:

- Threatening indigenous flora by interfering with the natural processes of succession, competing for space, nutrients and sunlight and altering the natural attributes of the soil as to exclude or inhibit the establishment of indigenous species due to their aggressive colonising and propagating ability and potential to spread throughout the Park;
- disrupting fauna communities by denying them suitable habitats and food sources normally supplied by native flora;
- Increasing fire hazards from the build up of dead weeds;
- A reduction in the aesthetic quality of the bushland; and
- Promotion of an environment encouraging other potentially harmful weeds and feral animals.

Table 4.1 below lists the weeds found in the Park and provides ratings based on assessments by Ecoscape Australia Pty Ltd (1998) and Dixon & Keighery (1995) .

Ecoscape Australia Pty Ltd (1998) considered the following characteristics of each weed species:

*Invasiveness* – the ability to invade bushland in good to excellent condition or ability to invade waterways.

*Distribution* – wide current or potential distribution including consideration of known history of widespread distribution elsewhere in the world.

*Environmental impacts* – ability to change the structure, composition and function of an ecosystem, and in particular ability to form a monoculture in a vegetation community.

Each of these criteria were scored yes or no by an expert on weeds and the ratings of weeds determined by the following scoring system:

- High – yes for all three criteria.
- Moderate – yes for two of the above criteria.
- Mild – yes for one of the above criteria; and
- Low – no for all three criteria.

Dixon & Keighery (1995) classified weeds according to the threat they are thought to pose in the Perth Metropolitan region, using the following criteria: P1 = Major weed; P2 = Nuisance weed; and P3 = Minor weed.

**Table 4.1: Weeds of Lloyd Hughes Park Reserve, and their priority ratings (Dixon and Keighery, 1995, Ecoscape Australia Pty Ltd, 1998)**

Species	Rating(s)
Pampus Grass <i>Cortaderia selloana</i>	P1 Major, High
Veld Grass <i>Ehrharta calcyina</i>	P1 Major, High
African Love Grass <i>Eragrostis curvula</i>	P1 Major, High
Watsonia <i>Watsonia</i> sp.	P1 Major, High
Wild Oat <i>Avena fatua</i>	P1 Major, Moderate
Kikuyu <i>Pennisetum clandestinum</i>	P1 Major, Moderate
Blowfly Grass <i>Briza maxima</i>	P2 Nuisance, Moderate
Shivery Grass <i>Briza minor</i>	P2 Nuisance, Moderate
Hop Clover <i>Trifolium campestre</i>	P3 Minor, Moderate
Tree Lucerne <i>Cytisus proliferus</i>	P2 Nuisance
Pimpernel (Blue or Scarlet) <i>Anagallis arvensis</i>	P3 Minor, Moderate
Queensland Silver Wattle <i>Acacia podarylifolia</i>	P3 Minor
Radiata Pine <i>Pinus radiata</i>	P3 Minor
Rice Millet <i>Piptatherum miliaceum</i>	P3 Minor
Narrow Leaf Clover <i>Trifolium angustifolium</i>	P3 Minor
False Hawkbit <i>Urospermum picroides</i>	P3 Minor

Pampas Grass is a strongly invasive weed that has become established along the creek-line. This weed is a large tussock-forming grass that flowers in spring and seeds later during summer. It is difficult to remove because the leaves can cut skin, and the grass forms large tussocks. The seeds are easily dispersed by the wind, however vegetative spread is most common from rhizomes. Removal is a long-term proposition because seeds can remain viable for many years. However, removal is much easier when the plants are small.

Watsonia occurs throughout the area but mainly on the lower, wetter and poorly drained areas of the Park and on the southern side of the creek. The lower slopes around the southern side of the creek are particularly affected with Watsonia, dominating up to 80% in some areas. Watsonia is also present in smaller groups scattered throughout other areas. Both seeds and corms propagate Watsonia. Watsonia is spread easily by disturbing the corms in the ground. Watsonia favours moist conditions and withstands flooding for several weeks but also grows well on higher, well-drained sites. It should be removed from the watercourse immediately to reduce its spread.

Table 4.2 details the priorities for weed removal at Lloyd Hughes Park. In general, weeds should be removed from the least infested areas that are generally in the centre of the park, and from near the stream zone first.

**Table 4.2      Priorities for weed removal at Lloyd Hughes Park**

Scientific name	Priority
Pampus Grass <i>Cortaderia selloana</i>	Highest priority.
Watsonia <i>Watsonia</i> sp.	Remove from near the creek then move up the hill.
Veld Grass <i>Ehrharta calcyina</i>	Remove from middle of park first.
African Love Grass <i>Eragrostis curvula</i>	As above
Wild Oat <i>Avena fatua</i>	As above.
Kikuyu <i>Pennisetum clandestinum</i>	Only one occurrence in middle of park. Remove.
Tree Lucerne <i>Cytisus proliferus</i>	Remove from central track first. Gradual removal along drain area.
Queensland Silver Wattle <i>Acacia podarylifolia</i>	Remove – only a few occurrences
Radiata Pine <i>Pinus radiata</i>	Remove – only one occurrence

Techniques and principles for weed control in bushland were most recently detailed in Scheltema and Harris (1995). It is not intended to reproduce the information in Scheltema and Harris (1995) in this Management Plan. However, since 1995 it has become apparent that frogs were being adversely affected by surfactants used when applying glyphosate, and this is now a consideration when using herbicides in natural areas.

Some fauna, such as the Quenda, utilise thick weeds for cover. Weed control and replanting efforts should be staged so that fauna habitat is not all disrupted at once.

Further weed invasion in the Park can be limited by keeping disturbance to a minimum, modifying stormwater outlet drains and management of fertiliser/ nutrient application by residents so nutrients do not reach the Park.

### Recommendation

1. Weed removal occur according to the priorities detailed in Table 4.2 and using methods detailed in Scheltema and Harris (1995).

#### 4.1.2 Disease

Dieback (*Phytophthora cinnamomi*.) and Native honey fungus *Armillaria* are fungal diseases that can result in the death of many species of indigenous plants. Up to 25% of native Western Australian plant species are susceptible to *P. cinnamomi* including many common plants such as Blackboys *Xanthorrhoea preissii* [Kilgour, 1999 #26].

An assessment of *Phytophthora cinnamomi* (dieback) in Lloyd Hughes Park was carried out in March 1999 and found (Glenvan Dieback Consultancy Services, 1999):

Dieback disease has spread through some areas of the park, mostly on the south-eastern half. The disease has most likely been introduced to the park from Canning Mills Road, with all

areas from the road to the creek infested. The dieback is slowly moving upslope the other side of the creek.

The rate of spread on the north-western side of the creek is slower as the infestation is moving upslope. In this area there are fewer dieback susceptible species with long lateral root systems (ie Banksias) that will drag the disease upslope.

The dieback in the park is expressing mostly in the Xanthorrhoea species with many fresh deaths defining the active infection. Some of these deaths have been sampled with mixed results. (See section on Samples).

The area that could be considered free of dieback infestation is noted on the plan as 'NPC' (Not *Phytophthora cinnamomi*). This area is demarcated in the reserve using green tape tied onto the trees with the knot in the tape facing the dieback infestation. This taping is as close to the active dieback edge as possible. Along this taped edge will be the fresh dieback deaths as well as a determinable change in the density of the remnant vegetation.

Increased plant resistance to dieback can be achieved through injection or leaf absorption of phosphite. However, as concentrations in the plant reduce due to plant growth and leaf loss so does resistance to dieback. *P. cinnamomi* can not be eradicated and remains viable for many years.

If dieback reaches an area that has been treated with phosphite, plant survival rates are much higher, and the spread of dieback up-slope can be slowed.

No long-term treatment for dieback or native honey fungus has yet been developed.

A plan for the Management of *Phytophthora cinnamomi* (Dieback) in Lloyd Hughes Park has been prepared by the Dieback Working Group in September 1999 and a copy appears as Appendix D. Figure 4.1 maps current distribution of dieback. The plan includes recommendations in regards to:

- Reserve management
- Earthworks and reserve maintenance
- Revegetation
- Access
- Communication
- Protecting vegetation
- Fire; and
- Horses/ livestock/ animals.

Table 4.3 summarises the recommendations made by the Dieback Working Group and the response adopted by this Management Plan.

**Figure 4.1    Distribution of dieback, April 1999**

**Table 4.3 Dieback Working Group recommendations and City of Armadale comments**

<b>Dieback Working Group Recommendation</b>	<b>Comments</b>
<p>1. In regards to access management and maintenance:</p> <ul style="list-style-type: none"> <li>• No new tracks are to be constructed that will pass from the infested to the uninfested parts of the Park.</li> <li>• Options for rationalising tracks within the reserve are to be investigated.</li> <li>• Improve track condition so they are well drained and there are no puddles.</li> </ul>	<p>There is a need to upgrade existing tracks to provide for fire access and management through minor clearing and piping the drain from the levy behind the houses where it crosses the fire access route (see Figure 4.2). The track needs to be set back from the houses to allow for back-burning around the boundary. Dieback control measures will be used in the construction phase.</p>
<p>2. No soil/gravel/mulch/plants to be brought into the uninfested parts of Lloyd Hughes Park. If these materials must be introduced, they must be <i>P. cinnamomi</i> free.</p>	<p>Accepted as a recommendation of this Section of the Management Plan.</p>
<p>3. The discharge of drainage water into Lloyd Hughes Park should be avoided. If water must be discharged into the Park, it should be confined to formal drains, and not allowed to spread throughout the Park.</p>	<p>Drainage from Canning Mills Road goes into an already infected area and is causing erosion. Drainage outlets are to be modified to reduce erosion, which will spread the water. Piping of drain along Martin St to be considered in the long term, with confinement in the short-medium term.</p>
<p>4. Communication to occur with surrounding landholders, visitors to the Park, and other stakeholders to inform them that <i>P. cinnamomi</i> is present, and how they can assist in slowing its spread.</p>	<p>Covering letter to residents within 400m of the Park advising of availability of Draft Management Plan for public comment will advise of <i>P. cinnamomi</i> presence and management. Draft Management Plan forwarded to all stakeholders.</p>
<p>5. Maintenance activities (such as fencing, track maintenance etc) to occur in dry soil conditions, when possible/practical.</p>	<p>Accepted as a recommendation of this Section of the Management Plan.</p>
<p>6. Off Road Vehicles (ORV's), motorcycles and horses to be excluded from Lloyd Hughes Park.</p>	<p>Clauses 4 and 8 of the Local Law Relating to Reserves prohibits bringing animals other than dogs or vehicles onto a reserve except in particular circumstances. No physical measures proposed because would probably be ineffective.</p>

<b>Dieback Working Group Recommendation</b>	<b>Comments</b>
7. A program of phosphite treatment to be implemented and <i>P. cinnamomi</i> infestation to be monitored.	Accepted as a recommendation of this Section of the Management Plan.
8. The City of Armadale, Friends Groups and others undertaking on-ground works, to implement hygiene measures.	Accepted as a recommendation of this Section of the Management Plan.
9. The management guidelines listed in Appendix 1 to be considered in all management decisions, particularly in relation to bush restoration activities.	Implement as appropriate.

The Water Corporation, in their letter of 9 December 1999, included the following commitment.

The Water Corporation will ensure that its activities (and those of its subcontractors) - for both maintenance and any future construction work in the park are in accordance with the Dieback Management and Hygiene recommendations in the Draft Management Plan. To achieve this for the Corporation's maintenance activities on the DN 1370mm water main traversing the park, Asset Development and Management Section in the Corporation, which has asset management responsibility for the main, will in conjunction with the Corporations' Environmental Management Branch and the City of Armadale develop a dieback management plan for these activities.

A dieback management and rehabilitation plan will be a contractual requirement for any future construction works through the park.

### **Recommendation**

2. Implement the management recommendations from the Dieback report, namely:
  - 2.1 No soil/gravel/mulch/plants to be brought into the uninfested parts of Lloyd Hughes Park. If these materials must be introduced, they must be *P. cinnamomi* free.
  - 2.2 Maintenance activities (such as fencing, track maintenance etc) to occur in dry soil conditions, when possible/practical.
  - 2.3 A program of phosphite treatment to be implemented and *P. cinnamomi* infestation to be monitored.
  - 2.4 The City of Armadale, Friends Groups and others undertaking on-ground works, to implement hygiene measures.

## 4.2 Fire

The following information is generally summarised from Hobbs (1995).

Fire has been an important force in shaping Australia's vegetation. The fire regime in place before European Settlement is not known but probably varied from place to place. Fragmentation of bushland and increased invasion by weeds has led to dramatic changes in the types of fuel available for fires which in conjunction with increasing numbers of people results in an increasing number of fires.

While much of Australia's vegetation is adapted to cope with fire, frequent burning is harmful as it changes vegetation community composition and favours weed species. Plants that reproduce by seed can take from two to 12 years to replenish seed banks. Plants that re-sprout are weakened if burnt too often because they do not have time to build up new food reserves. A study of blackboys in the Jarrah forest near Perth concluded that in the 150 years prior to European settlement, the plants had been burnt one to three times, that is, an average of once every 50 years (Hussey and Wallace, 1993).

Other aspects of fire regime that alter the effect of fire on plant communities include:

- fire frequency;
- time of year;
- intensity of the fire; and
- the patchiness (distribution) of the fire.

The vegetation report by (Keighery and Trudgen, ) (1992) (see Appendix A) indicated that in 1992 there was a “predominance of shrub species regenerating from rootstocks at the site and there is a significant weed cover”.

The City of Armadale commenced a fire frequency mapping program in late 1998.

Fire prevention strategies that could be considered for Lloyd Hughes Park include:

- fuel reduction through weed management;
- public education and involvement;
- strategic placement of firebreaks with due consideration for likely fire behaviour; and
- a reduction in prescribed burning.

An effective fire suppression plan also needs to be developed that considers factors such as fire behaviour and emergency vehicle access.

A fire management plan was prepared in 1996 and has recently been reviewed to reduce fragmentation of the area. These changes are reflected under Section 4.7.1 Location of trails.

Currently one member of Friends of Lloyd Hughes Park acts as a Reserve Custodian, but people are needed on all sides of the park.

### Recommendations

3. There should be no controlled burning of Lloyd Hughes Park for the term of this Implementation Management Plan.

4. Encourage more Reserve Custodians.

## **4.3 Fauna**

### **4.3.1 Alien fauna**

Alien fauna can damage native plants by grazing, digging, trampling, or interfering with plant ecology (e.g. pollination or seed ecology), can compete with native fauna for food resources or feed on native fauna.

Control programs for a range of alien fauna, including the introduced honeybee, are detailed in Hussey and Wallace (1993).

It is notable that no agency has developed control programs for introduced species considered 'naturalised' or too difficult to control. For example, the introduced Laughing Kookaburra eats reptiles and small birds and has undoubtedly influenced the populations of a range of species. It has been suggested by some ecologists that attempts to control introduced fauna in urban areas is not necessary because the remaining fauna have survived these influences for many years and will probably continue to do so. It can also be argued that we should attempt to take actions that favour native fauna over alien fauna.

Actions to reduce numbers of alien fauna must be undertaken from an ecological viewpoint. For example, controlling rabbits alone could lead foxes to turn more to native animals or domestic stock (Hussey and Wallace, 1993).

Other than not permitting apiarists to locate apiaries on Lloyd Hughes Park, honeybee control is difficult and rarely practical (Hussey and Wallace, 1993).

Hussey and Wallace (1993) suggest a range of control measures for cats and foxes. However, in an urban environment many of the methods such as shooting or poisoning are inappropriate. Other methods suggested include exclusion fencing, fumigation or implosion of fox dens, and trapping.

Exclusion fencing is expensive and can result in the creation of non-viable fauna populations if the area fenced is too small to maintain genetic diversity within a population. Exclusion fencing would probably not be accepted by surrounding residents.

Fumigation or implosion of fox dens is considered an appropriate method of control, but even with trapping will only reduce the populations of introduced species. Fumigation of fox warrens is most effective in spring, and this does not prevent re-invasion by foxes from nearby areas (Hussey and Wallace, 1993 p.117).

In Kings Park trapping is one of the main methods of feral fauna control and it is favoured because native animals or domestic animals can be released if inadvertently caught (Dixon et al., 1995, p.67). Trapping is undertaken when populations of rabbits and foxes are low and easily controlled such as at the end of summer when food is scarce (Dixon et al., 1995), p.67). At Kings Park, the community is informed prior to commencement of trapping operations to reduce the number of domestic pets caught in traps.

Cats and dogs from surrounding areas can adversely affect native fauna by eating them, disturbing them or leaving scents.

There is clear evidence that feral cats have caused the decline and extinction of native animals on islands through predation, and in Australia's arid zone. However, the impact of domestic and stray cats around urban and semi rural areas is not so well known. The following extracts from the Federal Government's *Threat Abatement Plan for Predation by Feral Cats* succinctly describes our understanding of pressures on wildlife from domestic cats (Environment Australia, 1999):

"Concern about predation on wildlife by domestic cats developed in Victoria during investigations into the decline of the eastern barred bandicoot (Brown 1989). It has since become a national issue among cat owners, veterinarians, conservationists and wildlife managers. Results published in 1990 suggested that domestic cats in South Australia killed an average of 26 animals per year, many of them native birds (Paton 1990). Subsequent surveys have both supported (Trueman 1991) and contradicted (Reark 1994) Paton's conclusions. In urban areas of Victoria, traumatised small mammals are reported as usually being victims of cat attack (Dowling *et. al.* 1994).

The quality of data on predation by domestic cats is poor and does not provide information about the impact on populations of prey species (Barratt 1995)."

and

"Nevertheless, domestic cats in cities occur in very high densities because their requirements are primarily met by their human owners. As a consequence, even if each individual cat is taking only a small number of prey, the sum of that predation may depress populations of desirable urban wildlife."

Responsible cat ownership such as sterilisation, identification and confinement at night are recommended to ease cat overpopulation and impacts on wildlife (Cat Sterilisation Society and City of Gosnells, 1997).

Methods to limit the impacts of pets on fauna are suggested by Hussey and Wallace (1993) and Dixon, et al. (1995) and include:

- (i) implementation of an education program which informs the community about the adverse impacts of pets on native fauna; and
- (ii) the introduction of a cat curfew;
- (iii) encouragement of cat sterilisation; and
- (iv) regulations that dogs either be excluded or remain on a leash; and
- (v) when dogs are permitted on a leash that all dog excreta is collected and disposed of outside of the park.

Local governments have lobbied the Western Australian Government to introduce uniform laws to control cats for a number of years, with the most recent call coming from the Country Shire Councils association in August 1999. The Western Australian Government is reported to have chosen instead to monitor recent legislation in Victoria and South Australia

(*The West Australian* 4 Aug. 1999, p.31). Uniform laws are considered to be the best option, and the City of Armadale awaits progress on this matter.

Under the City of Armadale’s current Local Laws, dogs can be exercised on Lloyd Hughes Park, but must be kept under control by the owner. When dogs are off a leash and out of control they can chase, frighten and intimidate fauna, not only by their activities but also by their scent. The existing situation appears to be considered acceptable by the community.

**Recommendations**

5. Commence an education program which:
  - 5.1 Informs the community around Lloyd Hughes Park about the adverse impacts of pets on native fauna; and
  - 5.2 Notifies the community when feral animal control programs are being undertaken.
6. Monitor and when necessary control the population of foxes by a combination of trapping and methods that destroy fox dens.

**4.3.2 Native fauna**

In order for native fauna to survive, four aspects of the environment must be considered. Table 4.3 (adapted from Hussey and Wallace, 1993)

**Table 4.4 Environmental aspects of native fauna management and where addressed in this Management Plan**

Environmental aspect	Where addressed
Resources (food, space and shelter)	This Section
Mates	Section 4.5 Linkage
Predators and disease	Section 4.4.1 Alien fauna – addresses predators. Disease not addressed.
Natural disasters and other gross physical changes in the environment	Section 4.2 Vegetation (don’t remove all the cover at once) Section 4.3 Fire, and Section 4.6 Linkage

Resources such as dead trees, fallen logs, rocks and other non-living material provide important habitats for a diverse range of animals in the Park. Dead trees provide hollows for birds to use for breeding and shelter. These “habitat trees” are extremely important. Many native parrots and cockatoos, such as the Galah, vigorously defend the same hollow for many years. Different species of birds use different types of hollows of varying height, size and preference of tree species, so the need to ensure diversity among the habitat trees is equally important. Logs, branches and leaf litter provide reptiles and invertebrates with shelter and protection. The creek is a haven for frogs, as can be heard from the sounds around the creek.

## 4.4 Stormwater

Storm water drains discharging into the Park pose serious problems because of high peak flows and by transporting sediments, nutrients, weed seeds, fungal spores and litter into the Park.

High peak flows cause erosion that then provides ideal conditions for weed seeds brought in to germinate and establish in a flow zone of relatively nutrient rich water. The high density of weeds around stormwater outlets supports this contention.

A recommendation of the Dieback Management Plan is to "Divert the run-off from the surrounding areas and roads so it does not enter the reserve" (Dieback Working Group, 1999). This recommendation has been applied to the run-off from the diversion bank behind Ashley Drive.

The area around each drain outlet has been inspected by the City's Technical Services Department and the assessments reached are documented in Table 4.4.

**Table 4.5 Assessment of drain inlet and outlets**

Drain inlet/ outlet	Assessment
Outlet 1	Does not appear to be causing erosion and weeds are not establishing around the outlet.
Inlet 2	No problem.
Outlets 3 & 4	Evidence of siltation and weed infestation near the outlet and erosion just down from Drain 2. Modify with a silt trap and water spreading bank.
Outlet 5 & inlet 6	Water exits drain 4 travels along edge of Lloyd Hughes park depositing silt about half way between storwater drain inlet 5. Siltation at drain inlet 5 has caused water to erode behind kerb. To be dealt with separately to this management plan.
Ashley Dr Diversion Bank	

The cost of undertaking modifications at outlets 3 and 4 has been costed at about \$1,700.

### Recommendations

7. Alter drain outlets 3 and 4 to trap silt and spread water to prevent erosion.
8. Council address drainage management of waters flowing from the diversion bank behind houses in Ashley Drive and from Drain 5 so that water flows are contained or piped.

## **4.5 Linkages**

Lloyd Hughes Park links with a large area of bushland to the north and east that should provide an adequate area for larger fauna to survive.

The creekline that flows through Lloyd Hughes Park connects with the Canning River, which may provide a permanent water source for some species living in Lloyd Hughes Park.

The Strategic Plan for Perth's Greenways identifies a link between Lloyd Hughes Park and the Canning River (See Map 1 Link No 71 Alan Tingay and Associates, 1998).

The City of Armadale's Strategic Plan seeks development of a plan to "*embrace the Corridors of Green philosophy providing links between natural environments and bushland reserves*" (City of Armadale, 1998). A "Green Link" plan is being prepared which seeks to link major areas of remnant vegetation within the City and the viability of a connection between the Canning River and Lloyd Hughes Park will be further considered as part of development of the plan.

## **4.6 Recreational use and service vehicle access**

### **4.6.1 Location and design of trails and seating**

It is proposed that the existing network of tracks and trails in the Park be rationalised as shown in Figure 4.2.

This pattern of trails provides access for fire fighting vehicles, vehicles servicing and maintaining the Water Corporation pipeline and Council service vehicles. Clearing of large trees will be necessary along Water Corporation and fire service vehicle access routes to a width of 3m to permit movement of machinery.

No new trails are recommended.

Walk trails are to be between 0.45-1 m in width except walk trails 3, 4 and 6 which are to be the minimum width required to accommodate a ranger or fire brigade vehicle, but no wider than three metres. Where the natural soil cannot support the traffic a suitable surfacing material should be laid. Recommendations to prevent the spread of dieback need to be implemented. Closure of tracks is addressed under Section 4.7 Erosion below.

Figure 4.2 also shows locations recommended for seating. Seating enables people to sit and enjoy the bush, birdwatch or contemplate.

### **Recommendation**

9. Upgrade or close and rehabilitate tracks as shown in Figure 4.2 to minimise the chances of dieback spread and install seating at locations indicated in Figure 4.2.

#### **4.6.2 Signage**

The existing Park signs have a uniform standard that takes the appearance from the standard CALM signage (Department of Conservation and Land Management, Undated). However, some old metal signs need to be removed.

Further signage could provide an overview of features of the park such as its geology and vegetation. Such a sign should be located at the main entry point to the park which is considered to be the intersection of Martin and Marmion Streets.

Signage is also needed at entry points to the Park which identify acceptable and unacceptable activities in the Park.

Tracks could also have small signs with information about the flora, fauna or geology of the area. Signage about dieback as recommended by the Dieback Working Group also needs to be provided.

Signage should be generally consistent with Department of Conservation and Land Management's standards and carry the City of Armadale's logo.

#### **Recommendation**

10. Instal signage around the Park as follows:
  - 10.1 At the main entrance a sign providing an overview of the park, its values and management;
  - 10.2 Along tracks small information signs about individual flora, fauna or sites of geological interest;
  - 10.3 Option B dieback management signage as recommended by the Dieback Working Group (see Appendix 2 of Appendix D); and
  - 10.4 At park entrance points signs highlighting acceptable and unacceptable activities.

**Figure 4.2 Proposed network of tracks, showing tracks to be closed and rehabilitated**

### **4.6.3 Trail bikes and mountain bikes**

Trail bikes and mountain bikes loosen and move soil, which can result in water erosion, widening of tracks, the spread of dieback and the spread of weeds.

Clause 4 the City of Armadale's Local Law Relating to Reserves states:

A person shall not without consent of the Council –

- (a) drive or ride or bring any vehicle onto a reserve or permit any person to drive or ride or bring any vehicle onto a reserve except on or over such parts of the reserve that are set aside as roads or carriageways or vehicle parking areas, and then not at a speed exceeding 15 kilometres per hour;
- (b) park or stand any vehicle on a reserve except in an area set aside for that purpose.

A vehicle in the Local Law has the same meaning as in the Road Traffic Act and therefore includes bicycles and trail bikes.

Clauses 16 & 17 of the Local Law Relating to Reserves provides for on-the-spot fines of \$50 or fines to a maximum of \$500 plus costs and damages (e.g. for bush re-instatement) if the matter is taken to court. The City of Armadale is also able to confiscate the vehicle (i.e. trail bike or bicycle) if the matter is taken to court.

The City's Rangers catch many offenders each year (62 in the six months from September 1998) and have a track record of successful prosecutions. Ranger patrols do not utilise a predictable pattern of patrols.

The Friends of Lloyd Hughes Park have suggested that Ranger patrols should be increased at Lloyd Hughes Park. However, it is recommended that the most effective method of policing would be for neighbours to call the Rangers if illegal vehicle use is noticed and to rely upon the current system of patrols. Recommendation 4, which seeks to increase the number of Reserve Custodians, addresses this need.

## **4.7 Erosion**

Erosion is evident on existing tracks (See Figure 4.2), including tracks that are to be retained or improved for fire management or recreation.

All tracks currently showing signs of erosion, including those that are not to be retained, should have cross fall banks installed consistent with advice from the Bungendore Park Management Plan (Hames Sharley, 1997, pp.41-42). Tracks that are not to be retained should also be revegetated, utilising the erosion control works to enhance water availability for the revegetation works.

The cost of erosion repair and revegetation works has been estimated by the City's Technical Services Department.

## **Recommendations**

11. Undertake erosion repair works on all tracks.
12. Revegetate tracks that are to be closed.

## **4.8 Litter and refuse**

Litter is ugly, encourages further littering, creates a fire hazard and can be a hazard to fauna.

Litter has consistently been a problem in the Park. Litter and rubbish of all sorts has been found throughout the Park, particularly along Canning Mills Road and internal tracks and walk trails. Rubble including concrete kerbs, pipes and bitumen remains from roadworks along Canning Mills Road. Storm water drains discharging into the Park also bring in litter and rubbish.

In 1999 the Friends of Lloyd Hughes Park participated in the Clean-up Australia day and removed many bags of rubbish.

## **Recommendations**

13. Lloyd Hughes Park should be cleaned-up on each Clean-up Australia Day.
14. Remove road construction rubble from along Canning Mills Road.

## **4.9 Community involvement and education**

Participation by the community has many benefits. Socially it creates a stronger community identification, increases recreational opportunities and decreases vandalism, whilst environmentally it can benefit the maintenance of the Park through volunteer projects, and with a greater appreciation and care for the Park the community can give economic benefits (e.g. reduced rate needs to achieve better management).

If Lloyd Hughes Park is to remain as an area of remnant bushland, highly valued for native animals and unique flora associations, the public can't expect government authorities and 'others' to manage everything. We all must accept a part of the responsibilities needed to help manage the Park. This highlights the necessity for much greater public awareness, knowledge and participation in matters of remnant bushland management. It is ultimately the sincere involvement of everyone that makes a Management Plan work successfully.

In the past, areas of the Park have been subject to vandalism such as damaging the concrete access outlets, trail bike damage and pushing over small trees.

Community groups play an important role in the protection and care of bushland. Effective communication with the community enables them to contribute and be informed about issues affecting the bushland. It enables integrated land management when management issues go beyond the bushland boundaries (e.g. fire, weed control and visual resource management).

It is important to foster a sense of pride and ownership of bushland by the community who can provide a pool of volunteer labour with various skills. Community volunteers can

become involved by joining the Friends of Lloyd Hughes Park and by participating in activities coordinated by the Friends group such as weeding and planting days.

Training of community volunteers (particularly Friends Group members) in leadership and bushland care and management is recognised as desirable to facilitate better management of the Park.

A sense of pride and ownership may also be encouraged by providing information about the Park. A brochure could be prepared outlining the values of the Park and measures being taken to protect those values such as dieback management.

The City of Armadale has recently established a Bushcare and Environment Advisory Committee that includes 12 community groups concerned with the environment. Communication between the City of Armadale and the Council on strategic matters and budget items should occur through the Bushcare and Environment Advisory Committee. Day to day management concerns about matter that are consistent with this Management Plan and Council's budget should continue to be addressed directly to the City's Manager of Parks.

### **Recommendations**

15. Support funding applications for volunteers to attend courses on leadership, bush rehabilitation, direct seeding and other related workshops.
16. Support preparation of information brochures about Lloyd Hughes Park

## **4.10 Vesting and purpose**

Lloyd Hughes Park is currently an "A" Class Reserve vested in the City of Armadale for the purpose of "Parkland".

Concern has been expressed by some members of the community that this vesting may permit developments that are incompatible with the Park's current objectives and that the Park's purpose should be amended to Conservation of Flora and Fauna. A conservation purpose could also discourage infrastructure providers from seeking easements across the Park.

However, under the Wildlife Conservation Act, land with the purpose of Conservation of Flora and Fauna must be vested in the National Parks and Nature Conservation Authority or "a person or persons". Furthermore, such a purpose is not intended to provide for passive recreation.

The Department of Conservation and Land Management has advised it would recommend against Conservation of Flora and Fauna as a purpose, but instead suggests that the Park's purpose could be Conservation and Passive Recreation. This suggestion is considered appropriate.

The portion of Martin Street Road Reserve between the rear of lots along Ashley Drive and Canning Mills Road is not needed as a road reserve and should be added to the Park.

Changing the purpose of an "A" Class reserve requires approval of Parliament.

### **Recommendations**

17. Close the portion of Martin Street Road Reserve between the rear of lots along Ashley Drive and Canning Mills Road and add to the Park.
18. Change the purpose of Lloyd Hughes Park from "Parkland" to "Conservation and Recreation".

## **5 IMPLEMENTATION, COSTING AND FUNDING**

### **5.1 Monitoring and review**

During the term of the Management Plan, progress will be reviewed on an annual basis by the Friends of Lloyd Hughes Park and the City of Armadale. The review should precede but be a part of the budget cycle. It will be at this stage that strategies are altered or improved and be documented as an appendix to the Management Plan.

This plan is for a term of five (5) years from January 2000 to December 2005.

#### **Recommendation**

19. Review progress in implementing the Management Plan in February each year and review the Management Plan in 2004.

### **5.2 Potential funding sources**

The City of Armadale's Strategic Plan as at 1998 recommends that Council allocates \$20,000 per annum towards implementing Management Plans. The Strategic Plan recommendation, as well as information about priorities for works recommended in management plans prepared during the 1999/2000 financial year are expected to be presented to Council during its 2000/2001 budget deliberations. Over the next five years, 12 Management Plans are likely to be prepared. Council budgets include an allocation for Natural Reserve Maintenance and activities such as weed control are funded through that allocation.

It is often possible to implement management plan recommendations without Council funds or to significantly extend Council's funding by applying for additional funding from sources such as:

- Private companies and trusts such as Alcoa of Australia;
- Lotteries Commission (e.g. Gordon Reid Foundation);
- Recreation Grants (Ministry of Sports & Recreation);
- Greening Western Australia;
- Swan Canning Clean Up Program (Swan Catchment Centre);
- Government Community Environment Grants (Minister for the Environment)
- Urban Bushland Strategy funding (Ministry for Planning & Department of Conservation and Land Management); and
- Natural Heritage Trust (Commonwealth Government).

However, the Friends of Lloyd Hughes Park is not an incorporated body. Therefore, the City of Armadale would need to act as trustee for funds raised by the group.

Some minor works can be undertaken from the Natural Reserves Maintenance budget that is administered by the Manager, Parks.

### 5.3 Implementation plan

	Recommendation	Desirable timeline	Implementation notes
1.	Weed removal occur according to the priorities detailed in Table 4.2 and using methods detailed in Scheltema and Harris (1995).	Ongoing	City can remove weeds as part of Parks and Reserves Maintenance. City may supply herbicides to Friends Group subject to volunteers being able to certify adequate training in the use of herbicides.  Weed control and replanting efforts will be staged so that fauna habitat is not all disrupted at once.
2.	Implement the management recommendations from the Dieback report, namely:		
2.1	No soil/gravel/mulch/plants to be brought into the uninfested parts of Lloyd Hughes Park. If these materials must be introduced, they must be <i>P. cinnamomi</i> free.	1999/2000	City and Friends Group to ensure actions consistent with recommendation.
2.2	Maintenance activities (such as fencing, track maintenance etc) to occur in dry soil conditions, when possible/practical.	1999/2000	City and Friends Group to ensure actions consistent with recommendation.
2.3	A program of phosphite treatment to be implemented and <i>P. cinnamomi</i> infestation to be monitored.	1999/2000	City can supply chemicals, funded by Parks and Reserves Maintenance.
2.4	The City of Armadale, Friends Groups and others undertaking on-ground works, to implement hygiene measures.	1999/2000	City and Friends Group to ensure actions consistent with recommendation.
3.	There should be no controlled burning of Lloyd Hughes Park for the term of this Implementation Management Plan.		City responsibility.
4.	Encourage more Reserve Custodians.	2000/2001	City responsibility to be undertaken as part of a larger program to encourage more reserve custodians.

	<b>Recommendation</b>	<b>Desirable timeline</b>	<b>Implementation notes</b>
5.	Commence an education program which:		Such activity <i>may</i> be undertaken or supported by the City as part of a larger program to enhance community appreciation of the natural environment. The Friends Group is encouraged to undertake such activities.
5.1	Informs the community around Lloyd Hughes Park about the adverse impacts of pets on native fauna; and		
5.2	Notifies the community when feral animal control programs are being undertaken.		
6.	Monitor and when necessary control the population of foxes by a combination of trapping and methods that destroy fox dens.		Feral animal control would only be undertaken if there were obvious adverse impacts and would probably be contracted out to the Agriculture Protection Board. Fund from Parks and Reserves Maintenance.
7.	Alter drain outlets 3 and 4 to trap silt and spread water to prevent erosion.	2000/2001	Estimated cost \$1,700.
8.	Council address drainage management of waters flowing from the diversion bank behind houses in Ashley Drive and from Drain 5 so that water flows are contained or piped.		Piping is a low priority.
9.	Upgrade or close and rehabilitate tracks as shown in Figure 4.2 to minimise the chances of dieback spread and install seating at locations indicated in Figure 4.2.	2000/2001	Upgrade to put gravel over muddy areas where tracks cross dieback infection lines \$600.  CoA has a budget for seating and can be met from that budget.
10.	Instal signage around the Park as follows:		CoA to consult with Friends Group on design and locations.
10.1	At the main entrance a sign providing an overview of the park, its values and management;	1999/2000 – Design 2000/2001– Build and install	Council will consult with Department of Conservation and Land Management Regional Parks Unit and Lloyd Hughes Park Friends Group on the design and location of signage. Costs depend on signage. A frame information shelter/ display costs about \$2,700.

	<b>Recommendation</b>	<b>Desirable timeline</b>	<b>Implementation notes</b>
10.2	Along tracks small information signs about individual flora, fauna or sites of geological interest;	2000/2001 develop concept	Cost depends on signage system used.
10.3	Option B dieback management signage as recommended by the Dieback Working Group; and	2000/2001	Estimated cost \$600 per sign, at four locations
10.4	At park entrance points signs highlighting acceptable and unacceptable activities.	2000/2001 develop concept	Cost depends on design.
11.	Undertake erosion repair works on all tracks.	2000/2001	Upgrade of tracks to remain open - estimated cost of cross ripping to prevent erosion \$700. See also Recommendation 12 regarding tracks to be closed.
12.	Revegetate tracks that are to be closed.	2000/2001	Estimated cost of earthworks to repair erosion and cross ripping \$700, purchase of plants and seed for direct seeding \$1,500, and small post & rail fence \$300 - Total \$2,500.
13.	Lloyd Hughes Park should be cleaned-up on each Clean-up Australia Day.	1999/2000	Friends of Lloyd Hughes Park have indicated a willingness to do this.
14.	Remove road construction rubble from along Canning Mills Road.	1999/2000	To be undertaken as part of road maintenance budget.
15.	Support funding applications for volunteers to attend courses on leadership, bush rehabilitation, direct seeding and other related workshops.	2000/2001	City on advice of the Bushcare and Environmental Advisory Committee.
16.	Support preparation of information brochures about Lloyd Hughes Park.	1999/2000	City can provide letters of support for funding applications by Friends Group.
17.	Close the portion of Martin Street Road Reserve between the rear of lots along Ashley Drive and Canning Mills Road and add to the Park.	2000/2001	City responsibility. Estimated cost \$250.
18.	Change the purpose of Lloyd Hughes Park from "Parkland" to "Conservation and Recreation".	2000/2001	May be achieved through Darling Range Regional Park Management Plan processes.

	<b>Recommendation</b>	<b>Desirable timeline</b>	<b>Implementation notes</b>
19.	Review progress in implementing the Management Plan in February each year and review the Management Plan in 2004.		Occurs as part of Bushcare and Environmental Advisory Committee and Council budget process.

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**APPENDIX A -VEGETATION SURVEY NOTES BY KEIGHERY AND TRUDGEN 1992**

## APPENDIX B - FLORA LIST FOR LLOYD HUGHES PARK

Species Name	Form
<i>Acacia ?lateriticoia</i>	Shrub
<i>Acacia diptera</i>	
<i>Acacia pulchella</i> Prickly Moses	Shrub
<i>Acacia stenoptera</i>	
<i>Acenthocarpus cansliculatus</i>	Herb
<i>Arthropodium capilipes</i>	Herb
<i>Baumea sp.</i>	Sedge
<i>Beeckea camphorosme</i>	
<i>Bossiaca ornata</i>	Shrub
<i>Burchardia multiflora</i>	Herb
<i>Caesia micrantha</i>	Herb
<i>Casstha sp.</i>	Herb
<i>Cassytha glabella</i>	Herb
<i>Cheilanthes austroltenunfolia</i>	Fern
<i>Chorizema dicksonii</i>	Shrub
<i>Dayiesia pectinate</i>	
<i>Deviasea horrids</i>	Shrub
<i>Drosera emhrorhiza</i>	
<i>Drosera menziesii</i>	
<i>Dryandre nivea</i>	Shrub
<i>Eryngium dinnatifidum</i>	
<i>Eucalyptus calophylla</i> Marri	Tree
<i>Eucalyptus marginata</i> Jarrah	Tree
<i>Eucalyptus rudis</i> Flooded Gum	Tree
<i>Eucalyptus wandoo</i> Wandoo	Tree
<i>Gastrolobium spinosum</i>	
<i>Gompholobium</i>	Shrub

Species Name	Form
<i>marginatum</i>	
<i>Gompholobium polymorphum</i>	Shrub
<i>Gompholobium reticulatum</i>	Shrub
<i>Gonocarpus pithyoides</i>	Shrub
Grasses	
<i>Hakea lissocarpha</i>	Shrub
<i>Hakea trifurcata</i>	Shrub
<i>Hakea undulata</i>	Shrub
<i>Hakea unquiata</i>	Shrub
<i>Hibbertia commutata</i>	Shrub
<i>Hibbertia hypercoides</i>	Shrub
<i>Hibbertia lasiopus</i>	
<i>Isopogon asper</i>	Shrub
<i>Kennedia coccinea</i>	
<i>Kennedia prostrata</i>	Herb
<i>Lasiopetalum floribundum</i>	Shrub
<i>Lechenaultia bibola</i>	
<i>Lepidosperma ?tenua</i>	Herb
<i>Lepidosperma sp.</i>	Sedge
<i>Lobelia alata</i>	
<i>Macrozamia riedii</i> Zamia Palm	Shrub
<i>Microlaena stipoides</i>	Grass
<i>Olearia eiaeophila</i>	Herb
<i>Opercularia vaginata</i>	Herb
<i>Oxalis sp.</i>	
<i>Patersonia juncea</i>	
<i>Patersonia juncea</i>	Herb
<i>Patersonia occidentalis</i>	Herb
<i>Petrophile biloba</i>	Shrub

Species Name	Form
<i>Phyllanthus calycinus</i>	Shrub
<i>Pimelea imbricata</i>	Shrub
<i>Pimelea sp.</i>	Shrub
<i>Pronaya sp.</i>	Herb
<i>Ptilotus manglesii</i>	Herb
<i>Ptilotus sp.</i>	
<i>Scaevola sp.</i>	Herb
<i>Sphaerolobium medium</i>	Shrub
<i>Stipa camphylachne</i>	Grass
<i>Stipa campylachne</i>	Grass
<i>Stipa eaegantissima</i>	Grass
<i>Stipa glauca</i>	

Species Name	Form
<i>Stylidium affine</i>	
<i>Stylidium bulbiferum</i>	Herb
<i>Stypandra glauca</i>	Herb
<i>Sylidium affine</i>	Herb
<i>Tetrarrtiena leavis</i>	Grass
<i>Thesomelaena sp.</i>	
<i>Thyzenotus multiflorus</i>	Herb
<i>Trichocline spathulata</i>	Herb
<i>Typha ?domingensis</i>	Herb
<i>Viminaria juncea</i>	Shrub
<i>Xanthosia candida</i>	Herb
<i>Xenthorrhoea preissii</i> Blackboy	Shrub

### Alien species

Species	Common Name	Form
<i>Acacia podarylifolia</i>	Queensland Silver Wattle	Tree
<i>Anagallis arvensis</i>	Pimpernel (Blue or Scarlet)	Herb
<i>Avena fatua</i>	Wild Oat	Grass
<i>Briza maxima</i>	Blowfly Grass	Grass
<i>Briza minor</i>	Shivery Grass	Grass
<i>Cortaderia selloana</i>	Pampus Grass	Grass
<i>Cytisus prolifera</i>	Tree Lucerne	Tree
<i>Ehrharta calcyina</i>	Veld Grass	Grass
<i>Eragrostis curvula</i>	African Love Grass	Grass
<i>Pinus radiata</i>	Radiata Pine	Tree
<i>Pennisetum clandestinum</i>	Kikuyu	Grass
<i>Piptatherum miliaceum</i>	Rice Millet	Grass
<i>Trifolium angustifolium</i>	Narrow Leaf Clover	Herb
<i>Trifolium campestre</i>	Hop Clover	Herb
<i>Urospermum picroides</i>	False Hawkbit	Herb
<i>Watsonia sp.</i>	Watsonia	Herb



## APPENDIX C - ANNOTATED BIRD LIST FOR LLOYD HUGHES PARK

<b>Lloyd Hughes Park</b>	
<i>Birds recorded from around 50 visits between 10<sup>th</sup> April 1996 to 1<sup>st</sup> March 1999</i>	
Australian Shelduck	A few pairs seen flying over and also perched on dead trees.
Australian Wood Duck	A few pairs seen flying over and also perched on dead trees.
Black Duck	A few seen on small pool in centre of Park.
White Faced Heron	Rare – one seen perched in dead tree and one at pool.
Square-tailed Kite	Regular summer visitor. During this period one bird is usually observed either in the park or nearby suburbs about twice a week.
Brown Goshawk	A few sightings usually at eastern side of park.
Little Eagle	Rare visitor, usually seen soaring above heath-land of eastern side of park.
Wedge Tailed Eagle	Rare visitor, usually seen soaring above heath-land of eastern side of park.
Penequine Falcon	Rare visitor, usually single but a pair seen over park on January 199.
Australian Kestrel	One recorded over heath near eastern side of park.
Black-shouldered Kite	One record of a single bird perched in dead tree.
Painted Button Quail	One pair flushed from side of water catchment channel.
Fenal Pigeon	Seen regularly along Canning Mills Road. A small group of 10 birds breeding in a dead tree at corner of Canning Mills and Roberts Road.
Laughing Turtle Dove	Often seen on the edges of park near suburbs but very rarely within.
Spotted Turtle Dove	Often seen on the edges of park near suburbs but very rarely within park (not quite as common as Laughing TurtleDove).
Common Bronzewing	Common on tracks and firebreaks often heard calling.
Ringneck Parrot	Common breeding species.
Recapped Parrot	Fairly common but not as common as Ringneck.
Elegant Parrot	Two records of birds flying over.
Carraby's Cockatoo	Seen flying over park to feed on pines along River Road (about a week after writing this, I recorded approx. 100 birds preening and bill cleaning in dead trees at western edge of park).

<b>Lloyd Hughes Park</b>	
<i>Birds recorded from around 50 visits between 10<sup>th</sup> April 1996 to 1<sup>st</sup> March 1999</i>	
Baudins Cockatoo	Irregular visitor but sometimes in groups up to approx. 40 birds feeding on <i>Dryandra nivea</i> flowers and Hakeas.
Red Tailed Black Cockatoo	One record of three birds at northern side of park.
Galah	Breeding species. A least five nests. Seem to have increased in number in the past two years.
Fantailed Cuckoo	Uncommon but regular visitor.
Shining Bronze Cuckoo	As for Fantailed Cuckoo but seems in slightly higher numbers in surrounding suburbs.
Boobook Owl	Only a few records of birds calling. Possibly a breeding species. A pair seen along Canning Mills Road with a newly fledged youngster.
Tawny Frogmouth	One road kill on Canning Mills Road.
Laughing Kookaburra	Frequently heard at dawn and dusk.
Sacred Kingfisher	Fairly common visitor. Breeding on park and suburbs along Canning Mills Road.
Rainbow Bee eater	Often heard but seldom seen. A few sight records near water catchment channel.
Splendid Wren	Fairly common at eastern edge of park.
Red-winged Wren	Fairly common at eastern edge of park. Unusually at times seen more common than Splendid Wren.
Spotted Pardalote	Surprisingly not many records.
Striated Pardalote	Common all months.
White browed Scrubwren	Recorded regularly along eastern edge of park though not common.
Western Gerygone	Heard all visits.
Weebill	Very common n Wandoo.
Brown Thornbill	Fairly common particularly along eastern edge of park.
Western Thornbill	Very common. Possibly commonest bird in the park.
Yellow-rumped Thornbill	Scarce in park but regular in nearby paddock and gardens.
Brown Honeyeater	Common to very common. More so in gardens and edges of the park. Also very common near <i>Dryandra sessilis</i> .
Singing Honeyeater	Very few records from park but regular in surrounding suburbs.
White-naped Honeyeater	One record from eastern edge of park.

<b>Lloyd Hughes Park</b>	
<i>Birds recorded from around 50 visits between 10<sup>th</sup> April 1996 to 1<sup>st</sup> March 1999</i>	
New Holland Honeyeater	Uncommon away from Dryandra sellilis. Breeding species.
White checked Honeyeater	One record of a small group at eastern edge of park.
Western Spinebill	Sometimes fairly common at Dryandra sessilis. Very common in surrounding suburbs.
White Wattlebird	One record near Canning Mills Road.
Red Wattlebird	Common and conspicuous breeding species.
Scarlet Robin	Two records within park but recorded regularly outside park near water catchment channel.
Golden Whistler	Scarce.
Rufous Whistler	Fairly common but not often noticed unless calling.
Grey Shrike Thrush	Not recorded in park but heard regularly along water catchment channel near Canning Mills Road.
Grey Fantail	Common.
Magpie Lark	A few records from the suburban edges of park.
Black-faced Cuckoo Shrike	Recorded most visits.
Dusky Woodswallow	Often recorded outside park near water catchment channel.
Australian Magpie	Common breeding species.
Australian Raven	Fairly common. Often heard.
Mistletoe Bird	Scarce from park but sometimes recorded in suburbs near park along Canning Mills Road.
Welcome Sparrow	Two records from Canning Mills Road at west of park.
Tree Martin	Strangely very few records.
Silver-eye	very common.
Grey Butcherbird	One pair seen regularly near Canning Mills Road.
Willie Wagtail	Sometimes on Canning Mills Road in gardens but not yet recorded in park.
Australian Hobby	Sometimes on Canning Mills Road in gardens but not yet recorded in park.
Little Corrella Eastern Long Billed Corrella Western Long Billed Corrella	A group of Corrella's in the park consisted of approx. 40 Little Corrella, 1 Eastern Long Billed Corrella and 1 Western Long Billed Corrella. These were regular visitors for a couple of months in September and October 1998. Odd birds sometimes heard but I am not certain of the species.



**APPENDIX D - DIEBACK MANAGEMENT PLAN FOR LLOYD  
HUGHES PARK**

## APPENDIX E - LIST OF SUBMITTERS & SUMMARY AND RESPONSE TO SUBMISSIONS

### Submitters

Organisations	Individuals
Department of Conservation and Land Management	Ian Colquhoun
Conservation Council of Western Australia	Peter Easton
Water Corporation	Elva M Hansen

### Summary and response to submissions - organised by Management Plan section

Comments from submissions appear in *italics* and are followed by the City's response.

#### **2.1 Tenure, surrounding land use and easements**

*We are concerned about Water Corporation plans for a further pipe through the Park and consider that any such proposal should be referred to the EPA. Also the Water Corporation should be made aware of the Management Plan and ensure that operational staff and contractors are aware of its importance.*

The Water Corporation is aware of the Management Plan and stated in its submission that it will ensure dieback hygiene measures are utilised in future operations. Section 4.1.2 has been amended to include copy of their commitment.

A copy of the final plan will be provided to the Water Corporation.

Referral to the Environmental Protection Authority by the City of Armadale of Water Corporation construction or maintenance activities would depend on the extent of clearing (if any) and management commitments made by the Corporation.

*Although agreement has been reached in principle with the Department of Land Administration regarding an easement for the pipeline across Lloyd Hughes Park, it has not yet been finalised. Any change in the reserve's purpose should not adversely impact the granting of an easement.*

Section 2.1 has been amended to reflect the current situation. Given that the proposed easement is largely cleared, the City would not oppose creation of the easement even after the reserve's purpose is changed.

#### **2.7 History and heritage**

*In 1994, the Aboriginal Affairs Department confirmed their database had no known sites in the park.*

The City of Armadale re-checked with the Aboriginal Affairs Department in mid 1999, and no known sites were recorded. Section 2.7 has been amended to include this information.

#### **4.1.1 Weeds**

*Watsonia should be removed from the best areas first. It is important not to remove too much Quenda habitat when undertaking weed control.*

Weeding from the best areas first is a principle in Scheltema and Harris (1995) which is referred to in the Management Plan.

Sections 4.1.1 and 5.3 have been amended to reflect the concern about Quenda habitat.

#### **4.1.2 Disease**

*Should be more discussion on impact of dieback on vegetation and awareness raised that it is impossible to eradicate once introduced.*

Section 4.1.2 has been amended.

#### **4.2 Fire**

*Recommendation 3 that there be no burning is too prescriptive.*

*There should be no controlled burning for 15 years. This should be achievable given that the park is surrounded by roads and low fuel zones could be created around the perimeter.*

#### **4.3.1 Alien fauna**

*The City of Stirling's Cat Control Local Law approach should be applied at Lloyd Hughes Park. The City should take a stronger stand on cat control, as impacts on a small park from cats are greater.*

The City's Environmental Position Paper proposes to re-consider the need for Local Laws to control cats in 2001-02.

#### **4.3.2 Native fauna**

*Consider installing artificial breeding/nesting boxes/hollows high up in some trees to account for those hollows which naturally 'wear out'.*

The art of creating nest boxes that ensures native fauna is favoured over alien fauna is not yet well developed in Western Australia. The use of nest boxes raises complex questions because (like many other human activities) one species can gain advantages over others. Therefore, the City does not intend to consider installation of nest boxes at this stage.

#### **4.6.2 Signage**

*The Department of Conservation and Land Management Regional Park Unit should be consulted on signage. The Department is currently preparing a Regional Park Sign Manual.*

Section 5.3 Implementation Plan has been amended to ensure the Department of Conservation and Land Management Regional Park Unit is consulted.

#### **4.6.3 Trail bikes and mountain bikes**

*Whilst success to date has been noted, additional funds should be allocated to increase Ranger patrols to apprehend more trail bike and mountain bike riders.*

Ranger Services are aware of the importance of Lloyd Hughes Park and will continue to direct efforts to this area on an as-needs basis.

#### **4.8 Litter and refuse**

*Bins should be located along the outside of the park to allow those walking past not to feel tempted to throw litter into the bush.*

Given that the nearest shop is some distance away from the park, it is likely that the litter arises from passing vehicles. Bins would therefore not be effective.

#### **4.9 Community involvement and education**

*Additional funds should be allocated to support Reserve Custodians around Lloyd Hughes Park.*

The City's Environmental Position Paper proposes development of a program to enhance individual involvement in biodiversity protection in 2000-01 and funds have been included in the Draft Five Year Plan for this activity.

#### **4.10 Vesting and purpose**

*Given the public's effort in protecting the park, the City of Armadale should ensure the park has added security of tenure and purpose.*

Noted. Implementation of the recommendations should achieve this.

**APPENDIX F - COUNCILS RESOLUTION ADOPTING THE  
MANAGEMENT PLAN**

Section 6 – Categories of land defined

(5) Nature reserves, for the purposes of this Act, comprise all lands that —

(a) by section 7 (4), are vested in the Authority, either solely or jointly with some other person or persons;

(b) after the commencement of this Act are reserved under Part III of the *Land Act 1933*, or Part 4 of the *Land Administration Act 1997*, for the conservation of flora or fauna, or both flora and fauna, and vested in the Authority by section 7 (2); or

(c) under any other Act become reserved for the conservation of flora or fauna, or both flora and fauna, and vested in the Authority.

Section 7 of the Conservation and Land Management Act states:

(2) Lands which after the commencement of this Act are reserved under Part III of the *Land Act 1933*, or Part 4 of the *Land Administration Act 1997*, for the purpose of a national park or for the conservation of flora or fauna, or both flora and fauna, are by this subsection vested in the Authority unless —

(a) the reservation is made by order; and

(b) by that order —

(i) the national park or nature reserve is vested, within the meaning of the *Land Act 1933*, in; or

(ii) the care, control and management of the national park or nature reserve are placed under Part 4 of the *Land Administration Act 1997* with,

some other person or persons.

**Lloyd Hughes Park  
Management Plan  
Draft for public comment**