KEMERTON INDUSTRIAL PARK LANDSCAPE STUDY

PREPARED FOR THE
KEMERTON ADVISORY BOARD

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Executive Summary

This landscape study provides a framework for the development of industry at Kemerton Industrial Park in an attractive natural setting. It recognises that industry can be established sensitively by using the visual attributes of the natural landscape. It has been prepared by the Recreation and Landscape Branch of the Department of Conservation and Land Management at the request of the Kemerton Parklands Working Committee for the Kemerton Advisory Board.

The Kemerton Park Final Report[1] and the Kemerton Core/Buffer Definition Study[2] have provided the planning structure and defined the land-use zones in Kemerton Industrial Park. The reports have defined the boundaries of the zones and assessed the impacts of industrial development on the landscape. These have been used as the basis for this landscape study.

Site Analysis

Site analysis of Kemerton Industrial Park uses past studies for data and relates this information to the specific requirements of the Landscape Development Concept, a concept which considers both industrial development and the surrounding environment. The site analysis outlines factors affecting the physical environment, land use and community values, aesthetics and perceptions, and user requirements and desires.

Key considerations are

- natural animal and plant habitats that are found in Kemerton Industrial Park merit protection
- the industrial area is visually protected by a row of dunes that run parallel to the Old Coast Road
- the industrial area can be seen from the Darling escarpment, but is less visible from the South West Highway
- the designation of a 400m to 700m buffer zone between the industrial and recreation sites to comply with EPA recommendations for recreational activities in industrial buffer zones
- the coordinated approach to planning and design, and insistence on quality landscape development and maintenance to reduce the negative perceptions of industrial development.
- the present community has few expectations in regard to recreation, but generally feels that any recreational activity should maintain the sites

[1] *Kemerton Park Final Report* prepared by the Kemerton Steering Committee and Fielman Planning Consultants, Dames and Moore, G.B. Hill and Partners and P. & M. Tooby, 1989.
[2] *Kemerton Core/Buffer Definition Study* prepared by Dames and Moore and Study Team for the Kemerton Advisory Board, 1991.

environmental values and be reliant on an appreciation of the natural environment.

Landscape Development Concept

The landscape development concept provides the Kemerton Advisory Board with a plan for the future development of the industrial park and provides for the protection and recreational use of the surrounding areas.

The concept creates a landscape theme for Kemerton Industrial Park to present industrial development in an attractive setting and to ensure its landscape and environmental values are retained wherever possible.

The desired land use and landscape character of the area will direct the future design of the industrial areas, the infrastructure to be built, and the use of parklands and wetlands.

The planting of vegetation will reflect and reinforce existing vegetation patterns. However, no more pines should be planted and existing plantations will be blended into the surrounding natural environment by the planting of native vegetation. The long-term use of the plantations will have to be decided.

Entry statements will be developed at key road entries to the park to create a sense of arrival and an image for Kemerton. They will also direct and inform visitors. Visitor information will be provided through signs, an interpretation centre, maps, brochures and interaction with the public.

The landscape development concept explains the factors considered to minimise the visual impact of the industrial park, the emphasis being placed on the setting of existing industries in the landscape and the coordinating of future developments to achieve a unified and attractive setting.

The management of stormwater will be integrated into the natural landscape and appear as natural wetlands.

Development Recommendations

Development recommendations are provided to enable the Kemerton Advisory Board and industrial developers to achieve the landscape development concept. The recommendations provide the developer with conditions for the planning and design of industrial buildings and landscape. A checklist is also provided to enable the managing authority to check that the conditions are implemented.

The development recommendations consider aspects such as site planning, roads, verges and medians, parking, paths and tracks, fences, signs, recreation facilities, building design, irrigation and maintenance.

1.0 Project Description

1.1 Background

Kemerton Industrial Park has been established as a site for future development of heavy industries in the south-west of Western Australia. The Kemerton Industrial Park Final Report[3] was commissioned to assess the effects industrial development would have on the region and, in particular, the suitability of the Kemerton area for future development. The report concluded "that there is a demand for industrial processing in the Bunbury Region and opportunities for this land use are limited. We consider that Kemerton should accept additional industrial development"[4] . The report divided Kemerton into various land-use zones and provided a landscape concept for further development of the site.

The report outlined the conditions necessary for the development of Kemerton. The concept of an industrial park was put forward and the need for a Landscape Master Plan identified. After extensive analysis of environmental, community and industrial factors, zones were identified for industrial development and protection buffers.

A Parkland Concept and landscape guidelines were provided with the objective "to present industrial development in a more favourable and acceptable light"[5]. The future development of the Park is required to meet strict and regulated performance criteria to ensure the successful implementation of the Parkland Concept.

The Kemerton Core/Buffer Definition Study[6] has defined the boundaries for an industrial core zone and associated buffer zone. These boundaries are the basis for the landscape study.

The Parkland Concept refers to the concept developed in the Kemerton Final Report which has been expanded and developed in this study.

1.2 Objectives

The landscape study provides the Kemerton Advisory Board with a Landscape Development Concept that can be used to guide the industrial park development, protect the surrounding buffer areas, and provide appropriate recreational activities.

The landscape study aims to create a landscape theme for Kemerton Industrial Park, present industrial development in an attractive setting, and ensure the site's landscape and environmental values are retained as much as possible.

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[3] *Kemerton Park Final Report* prepared by the Kemerton Steering Committee and Fielman Planning Consultants, Dames and Moore, G.B. Hill and Partners and P. & M. Tooby, 1989.
[4] *Kemerton Park Final Report* , 1989, page 1.
[5] *Kemerton Park Final Report* , 1989, page 49.
[6] *Kemerton Core/Buffer Definition Study* prepared by Dames and Moore and Study Team for the Kemerton Advisory Board, 1991.

The objectives of the study are to:

- provide an attractive and functional landscape setting for the Kemerton Industrial Park
- ensure that existing landscape values are retained and protected, and that new developments are a positive addition to the overall landscape setting
- provide for and enable appropriate recreational uses in the buffer areas
- provide a framework for landscape development to proceed in accordance with the Parkland Concept as set down by the Kemerton Park Final Report[7]
- provide criteria and standards for developers to ensure the planning and design of industrial plants is carried out in accordance with the landscape development concept.

[7] *Kemerton Park Final Report* , 1989, page 49 - 55.

2.0 Site Analysis

The site analysis for the landscape study draws heavily upon the previous studies and reports which have assessed the Kemerton site. The Draft Land Use Plans for the Leschenault Coastal Park and the Kemerton Community Park[8] has outlined the natural and managed resources, and community needs. The Kemerton Park Final Report[9] outlines existing site conditions, community attitudes, social impact and community needs, and industrial development - existing and potential.

2.1 Physical Factors

Landform and Soils

Kemerton lies between the Bassendean and Spearwood dune systems. The Bassendean Dune system to the east forms a gently undulating landscape of low dunes of Gavin and Jandakot Sands. Joel Sands occupy the lower lying areas, part of which are subject to inundation in winter, particularly in the area immediately west of Wellesley River.

The western section of the Kemerton site is made up of the Spearwood Dunes, where the yellow and grey phases of the Karrakatta Sands form parallel north-south dunes, at least 40 metres above sea level. Small outcrops of limestone are evident in the higher parts of the dune system, while a chain of permanent wetlands exists in the central low-lying areas.

A small area of the Yoonganillup Plain is found to the north of the site on the eastern edge of the Mialla Lagoon. The terrain is generally flat with minor ridges and swales, and permanent wetlands in lower-lying parts.

The soils of the park directly result from marine, river and wind activity. These sandy soils have a low natural fertility and high drainage rates.

Climate

The Kemerton area experiences a Mediterranean climate, with mild wet winters and hot, dry summers.

The summer wind pattern is dominated by the diurnal land breeze/sea breeze pattern of light night and morning south-easterlies followed by stronger afternoon westerly breezes.

In autumn, the occurrence of sea breezes decrease and the east to south-easterly winds are dominant.

In winter the wind pattern is more directly related to the synoptic flow. Relatively strong winds are more diverse in their direction.

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[8] *The Draft Land Use Plans for the Leschenault Coastal Park and the Kemerton Community Park* issued by the South West Development Authority, 1985.
[9] *Kemerton Park Final Report*, 1989.

In spring south-easterly and southerly winds are common, and afternoon sea-breezes start to affect the weather pattern.

Hydrology

Wellesley River along the eastern boundary of the site is the major drainage channel for the area. Several minor channels drain the site. Flow within the channels is seasonal, however, the naturally low summer flows are augmented by irrigation. The Wellesley River joins the Collie River and is discharged into the ocean via the Leschenault Inlet.

A number of lakes and swamps are located in the area, including the Myalup and Benger Swamps and the Mialla Lagoon north of the site, the Kemerton wetlands in the east, and south-eastern wetland basin. These are mostly surface waters and as such are subject to changes in groundwater level.

Vegetation

Much of Kemerton has been cleared for agricultural purposes although large wooded areas remain over most of the Karrakatta dunes to the west. The remaining vegetation does retain recognisable remnants of its original structure and species type. The native vegetation is closely related to soil type.

The area is diverse in landforms and soil types which is reflected in a variety of plant species. Fifteen vegetation associations are defined and have been mapped.

The area includes two upland ridges (dunes), the eastern ridge supporting a *Eucalyptus gomophocephala* (Tuart)-*Agonis flexuosa* (Peppermint) forest, and the western ridge supporting a *Eucalyptus decipiens* (Redheart)-*Agonis flexuosa* (Peppermint) low forest.

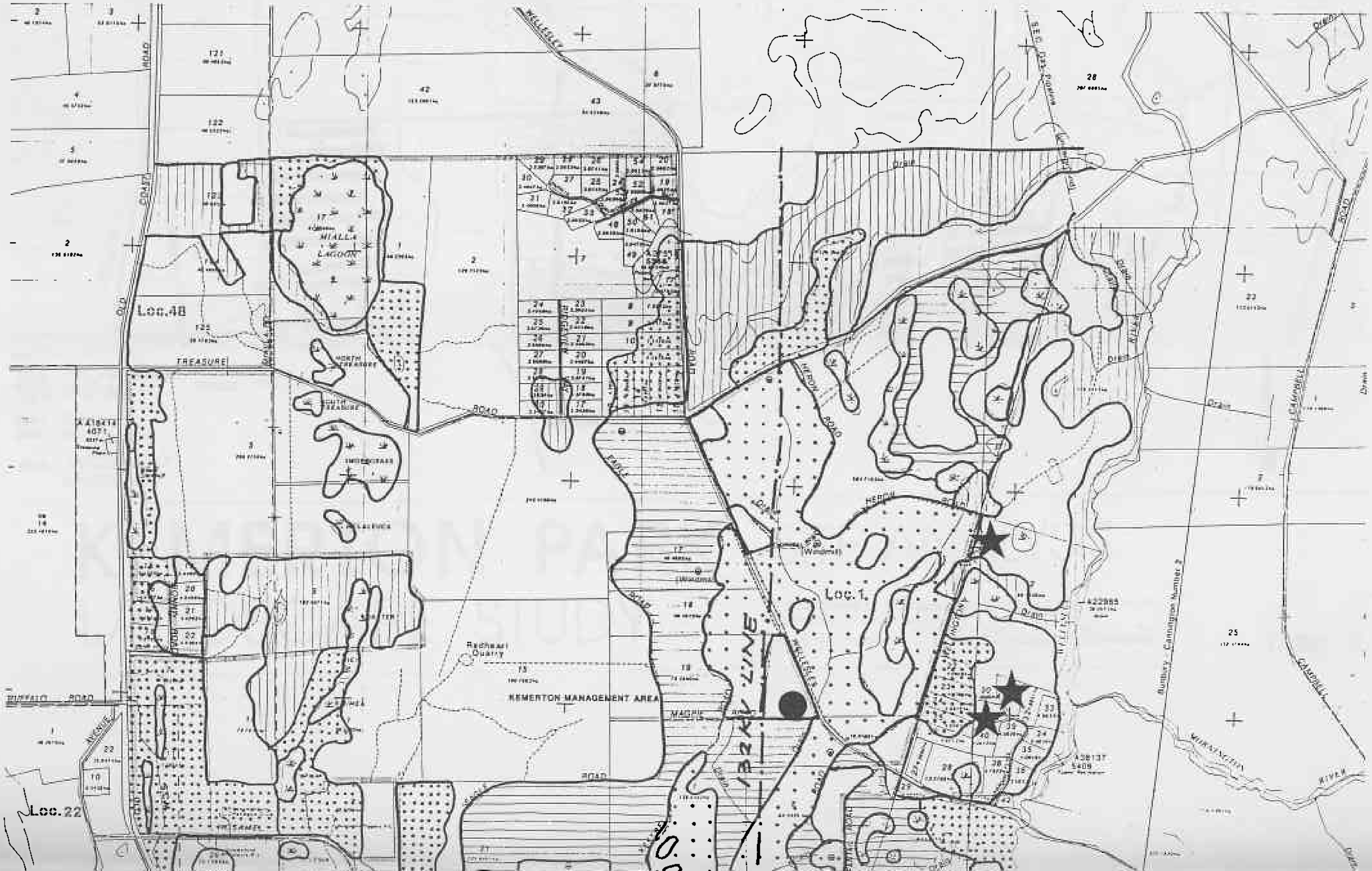
The interdunal lows have three chains of swamplands of varying vegetation types that include dense fringing bands of trees and dense heathlands. The remaining sandy slopes consist of *Eucalyptus marginata* (Jarrah)-Banksia woodlands and areas that are either partially cleared (parkland) or totally cleared (pasture).

There are three locations in the east of Kemerton Industrial Park containing vegetation species that are declared rare. Species that are priority listed also occur in the east of the Park in four locations (refer Map 1).

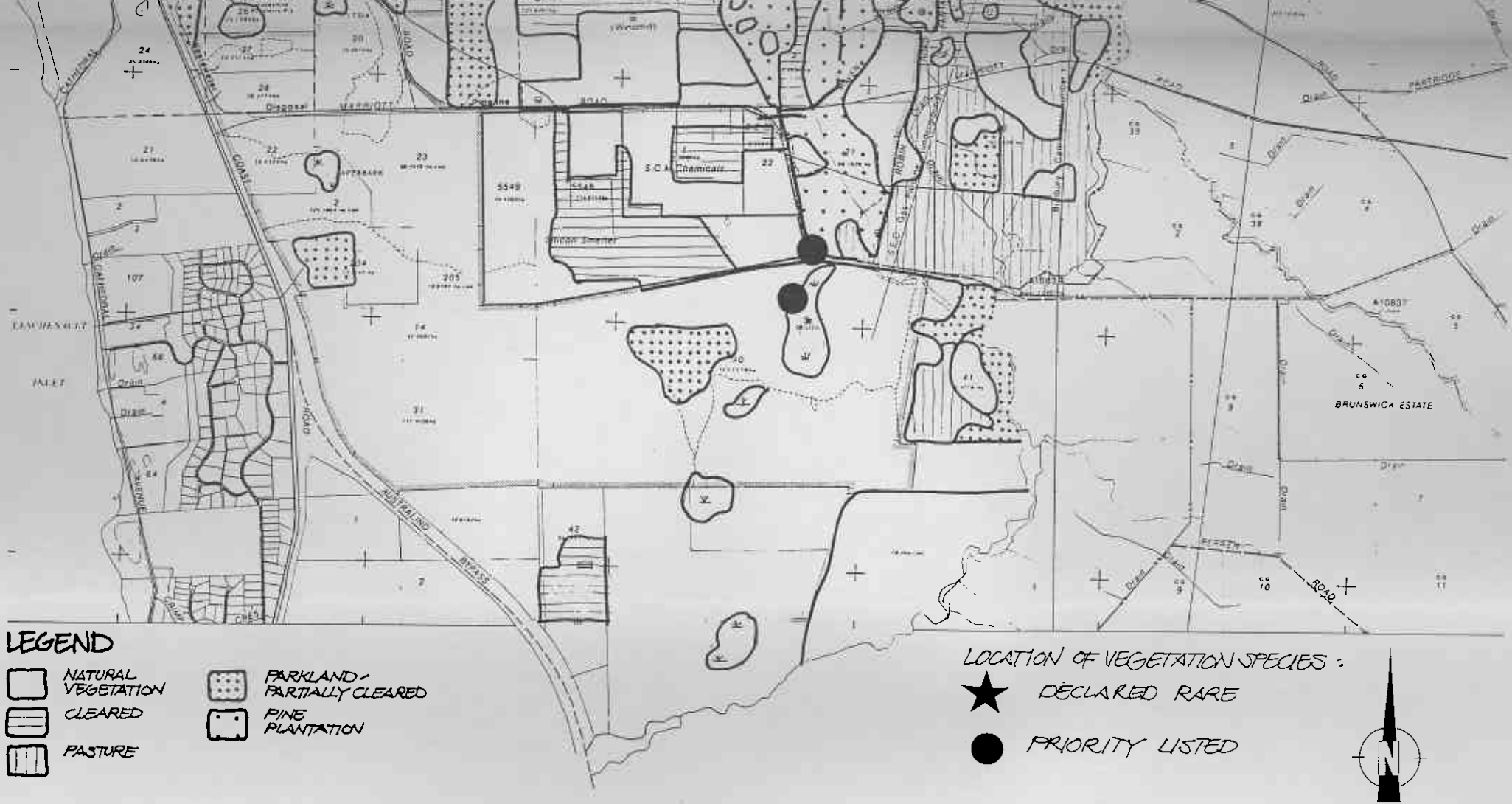
Wildlife

Surveys show that the fauna of the Kemerton area is typical of similar habitats elsewhere on the Swan Coastal Plain. No uncommon species were found that are not represented elsewhere on the Swan Coastal Plain.

The distinguishing features of the area are the richness of its waterbird species, and the wetland areas that have been identified as an important regional resource for waterbirds.



Loc.48
Loc.1
Loc.22
MIALLA LAGOON
TREASURE
WELLESLEY
HERON ROAD
132KV LINE
KEMERTON MANAGEMENT AREA
BUFFALO ROAD
CAMPBELL
Bunbury - Cannington Number 2
S.E.C. Gas Pipeline



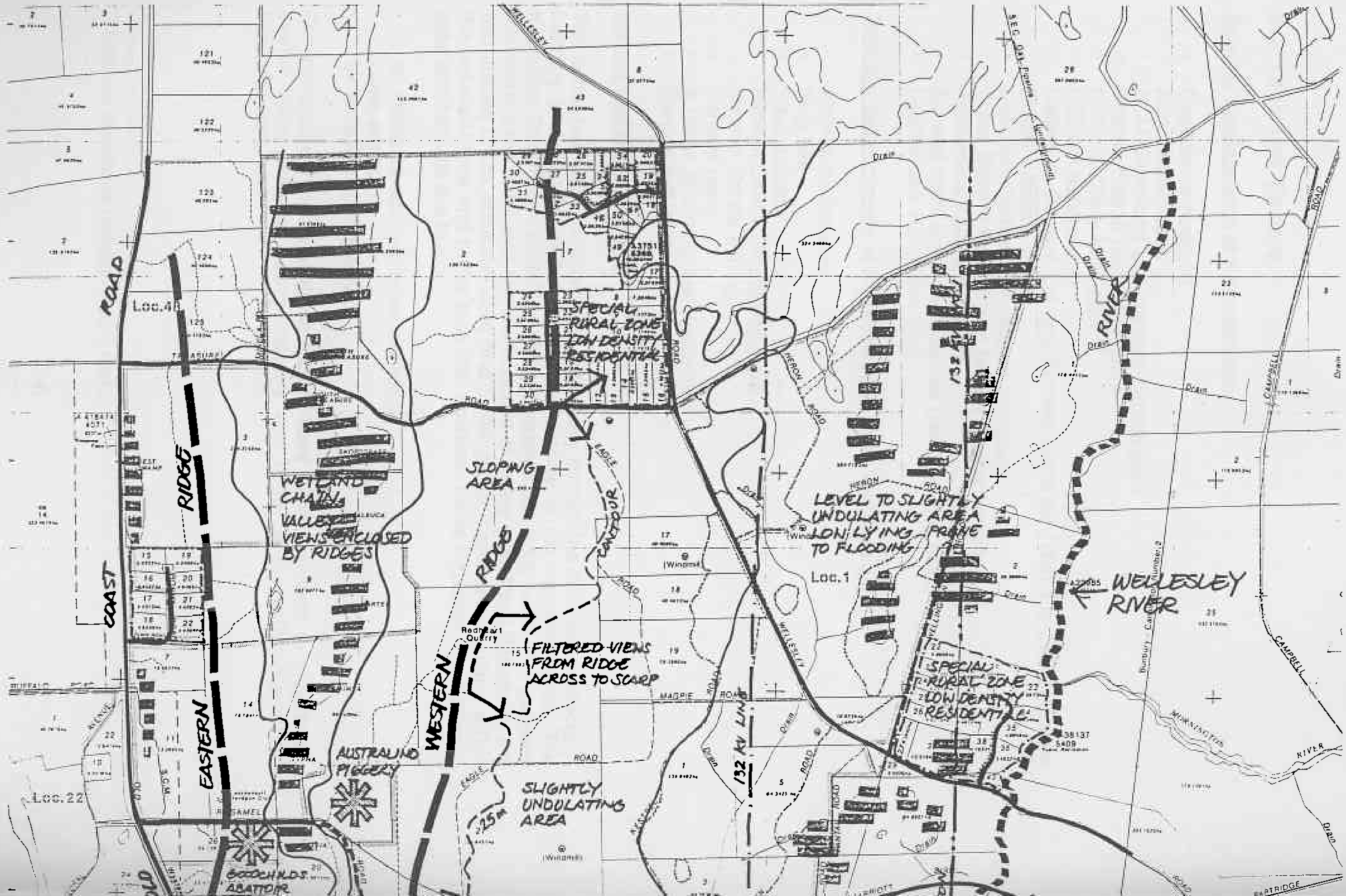
KEMERTON PARK LANDSCAPE STUDY

VEGETATION

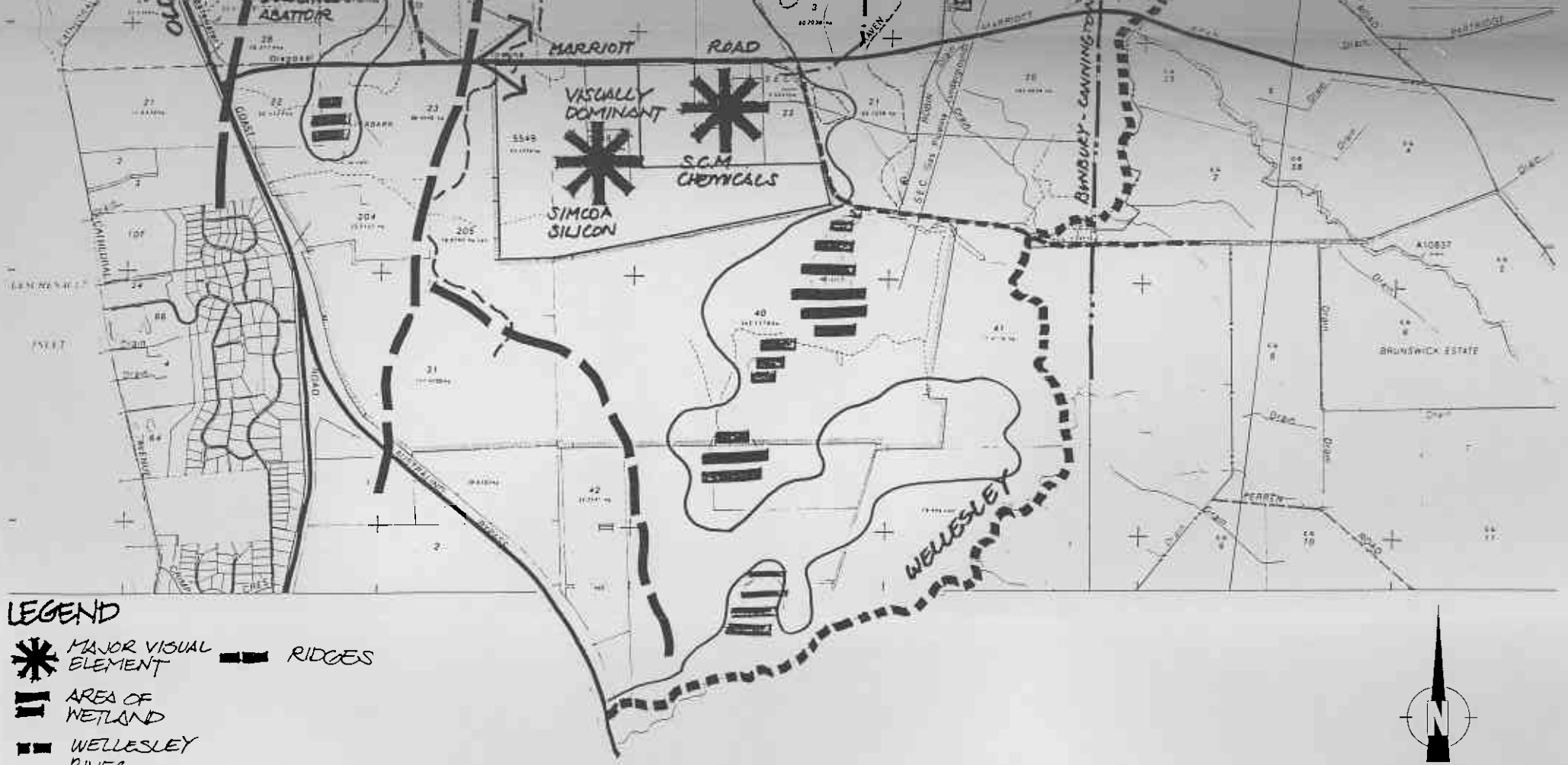
Department of Conservation and Land Management
Recreation and Landscape Branch

August 1991 Scale

Map 1



SPECIAL RURAL ZONE LOW DENSITY RESIDENTIAL
SLOPING AREA
WETLAND CHAIN
VALLEYS
VIEWS ENCLOSED BY RIDGES
LEVEL TO SLIGHTLY UNDULATING AREA LOW LYING PRONE TO FLOODING
WELLESLEY RIVER
RIVER
FILTERED VIEWS FROM RIDGE ACROSS TO SCARP
SLIGHTLY UNDULATING AREA
AUSTRALIND PIGGERY
GOODCHILDS ABATTOIR
WESTERN RIDGE
EASTERN RIDGE
COAST ROAD
132 KV LINE
CONTOUR
Loc.1
Loc.22
Redheart Quarry
MAGPIE ROAD
HERON ROAD
CAMPBELL ROAD
WELLESLEY
S.E.C. Gas Pipeline
Drain



KEMERTON PARK LANDSCAPE STUDY

SITE ANALYSIS

Department of Conservation and Land Management
Recreation and Landscape Branch
August 1991 Scale

Map 2

2.2 Land Use Factors

Existing developments at Kemerton are:

- Goodchilds Abattoirs
- Australind Piggery
- SCM Chemicals Ltd Titanium Dioxide plant
- Simcoa Silicon production plant
- NuFarm Chlor-Alkali plant
- SECWA substation
- Cockburn Cement Ltd and Pioneer Concrete (WA) Pty Ltd temporary mobile batching plants
- Cockburn Cement Ltd - slaked lime plant
- Three Special Rural Zones for low density housing
- Agricultural holdings grazing
- Several small limestone quarries (not presently used)
- Leschenault Hand Gun Club

Potential developments at Kemerton have been identified as:

- Aluminium Smelter
- Pulp Mill
- Steel smelter
- Mineral Sands Processing plant
- Mineral Sands Mining
- Cement plant
- A range of downstream industries
- Service Industries

Hazard and risk projections

The buffer has been established to sufficiently contain the cumulative effects of industry and protect land-use activities outside of the industrial area. The Kemerton Core/Buffer Definition Study[10] studied the risks, noise and gaseous emissions associated with the development of heavy industry to determine the boundaries of the industrial core and buffer areas. Land-use planning within the industrial core and buffer took into account these hazards. The potential risks and hazards are from:

- an industrial accident to an individual
- noise emissions
- air emissions (air quality)

The composite impacts of these factors have been assessed to provide an overall siting plan for heavy industry and buffer areas within Kemerton Industrial Park.

[10] *Kemerton Core/Buffer Definition Study*, 1991.

Industry impact on recreation uses

Although the Kemerton Core/Buffer Definition Study[11] has defined the boundaries needed for the buffer, it does not assess the types of recreational uses that can be accommodated within the park. Following consultation with the Environmental Protection Authority[12], it was established that public recreation or indeed public access should not be allowed within the 10-in-a-million (1×10^{-5}) per year risk level. The contour for the 1×10^{-5} risk level was taken from the Kemerton Core/Buffer Definition Study[13] . A 'no public access zone' buffer varying between 400m-700m has been identified around the heavy industry area. Public access for recreation is not to be permitted off public roads.

However, when siting recreation facilities outside the 'no public access zone' the potential risks and hazards should still be considered. The furthermost location away is generally desirable.

The Kemerton Emergency Working Party Group will determine risk management and emergency procedures for the public.

2.3 Social and Community Factors

The Kemerton Park Final Report examines community attitudes, social impacts and community needs. The report states that population increases are expected to live in the suburban areas of Bunbury, Australind and Eaton. These communities are expected to be subject to social impacts as a result of the Kemerton Industrial Park development. The attitudes of the existing communities around Kemerton towards recreational pursuits in the Kemerton parkland varied considerably. There was, however, an emphasis on activities which require an appreciation of the natural environment[14] .

2.4 Aesthetic and Perception Factors

The perception of heavy industrial development is often that of ugliness and untidiness, of alien structures and chimneys that are overpowering and threatening. The root of this perception is not only in the visual image of the structures but also in the associated potential hazards and toxic pollutants. Some of the components that offend are:

- unsightliness of emission plumes from stacks (visual pollution)
- smell and taste of the air (air pollution)
- noise (aural pollution)
- unsightliness of plant (visual pollution)
- dominance of structures over the viewer and the landscape (out of scale)
- intrusion in the landscape
- fear of the unknown

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[11] *Kemerton Core/Buffer Definition Study* , 1991.
[12] Jeff Penno, pers. comm. 6.11.1991.
[13] *Kemerton Core/Buffer Definition Study* , 1991.
[14] *Kemerton Park Final Report* , 1989 page 56-66.

The first three are controlled in some measure by EPA criteria and the problems are, therefore, minimised. The Parkland Concept of Kemerton Industrial Park provides the opportunity to minimise the visual pollution, physical intrusion and the public's lack of knowledge of planning and design controls and education.

The important aesthetic factors in the perception of industry are:

- physical characteristics of the structures and stacks
- visual character of roadways and views from the roads
- viewpoints (where industry is being seen from)
- distance from industry (from afar or close up)
- landscape setting
- attitudes of the viewer to the industrial development

2.5 User Analysis

The existing users of Kemerton Industrial Park are:

- industry
- residents of the special rural areas
- leased land for grazing
- hand gun club
- travellers on Old Coast Road - visual corridor
- small number of recreators - occasional horse riders, birdwatchers and bushwalkers
- travellers on rural roads between the Old Coast Road and South West Highway

Potential users could be:

- further industry
- education/interpretive groups
- travellers/picnickers
- increased numbers of bushwalkers, horseriders, birdwatchers
- industry employees recreating

Expectations and aspirations

The recreational needs of the workforce will depend largely on the types of industry established at Kemerton. Recreation amenities are often provided by individual companies on site. However, a recreation central facility would be more cost effective to establish and maintain. Greater standards may also be possible with a central facility. A health and fitness centre may be popular with the workforce.

A cycle path from Bunbury and Australind could be considered to encourage people to cycle to work. The route of the cycle path is to be determined.

The development of a central commercial centre in the support industry area provides an opportunity to establish an outdoor park for relaxation, picnicking or company outdoor functions.

Currently, local residents have little use for recreational activities at Kemerton Industrial Park. However, there may be a demand for in the future when the surrounding population increases and the industrial area expands. Currently the local community tends to prefer recreational activities that require an appreciation of the natural environment[15].

2.6 Visual Resources

CALM is developing a Visual Resource Management system (refer to flow chart opposite) that applies to this area. Kemerton Industrial Park lies within the southern portion of the Swan Coastal Plain Landscape Character Type, a broadscale area of common distinguishing visual characteristics. The basic components are:

Landform - generally flat to undulating with low dune ridges running north-south.

Vegetation - characterised by mosaic patterns of remnant vegetation, pine plantations and cleared grazing land.

Waterform - a combination of permanent and intermittent wetlands in low lying zones between ridges and in undulations.

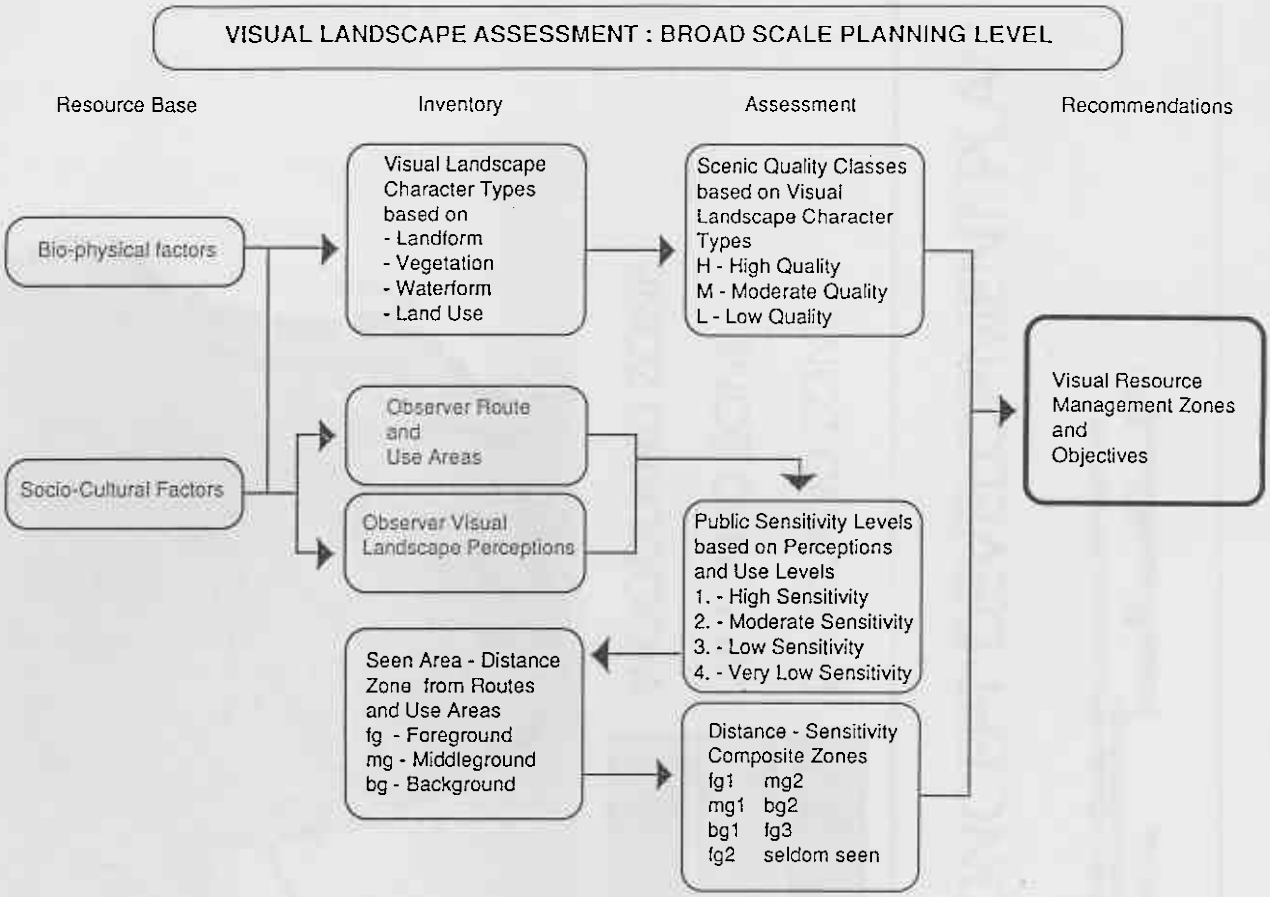
The Visual Management System identifies classes of scenic quality, a hierarchy of sensitivity levels on all travel routes and defines seen areas from these. Management Priority Zones result for which Visual Quality Objectives are established. The Objectives provide measurable standards for the management of visual resources.

Travel routes are classified in levels:

Level One -	Old Coast Road Australind By-pass Buffalo Road
Level Two -	Marriott Road Wellesley Road

Scenic Quality classification is progressing for the Kemerton area but is incomplete at present. Target date for completion is late 1992. Management Zones indicate priority for management of landscape elements. Planning and development proposals in the Park should implement the Visual Quality Objectives once they are established. Liaison with CALM officers whilst this planning is undertaken will ensure the Visual Resource Management system is fully understood and incorporated into the Kemerton Industrial Park planning process.

[15] *Kemerton Park Final Report*, 1989 page 58.



SWAN COASTAL PLAIN LANDSCAPE CHARACTER TYPE
SCENIC QUALITY CLASSIFICATION FRAME OF REFERENCE

	HIGH SCENIC QUALITY	*MODERATE SCENIC QUALITY*	*LOW SCENIC QUALITY*
LANDFORM	*Rounded foothills with steep slopes *Distinctly dissected valleys *Gently undulating areas with well defined drainage patterns *Rock outcrops and large scattered boulders *Plains with distinctive drainage patterns	*Areas of plains with common patterns of dissection evident but not distinctive *Areas of uniform undulation with less distinct drainage	*Areas of uniformly flat, indistinctly dissected plains with few features of visual interest
VEGETATION	*Remnant or other areas of native vegetation exhibiting an unusual diversity of colour, height or species *Areas with combinations of pasture-land, vegetation exhibiting attractive patterns of diversity in texture and colour *Distinctive displays of seasonal colour (eg WA Christmas Tree)	*Less diversity in vegetation combinations of agriculture and native vegetation with more regular patterns appearing *Remnant and extensive areas of native vegetation with some structural diversity and common patterns of colour and texture evident	*Extensive areas of agricultural and native vegetation with repetitive or similar patterns *Extensive areas of vegetation with little pattern variation or diversity
WATERFORM	*Permanent or intermittent watercourses continually changing in flow characteristics with attractive features such as rapids *Wetlands with an undisturbed appearance *Reservoirs with dominant natural characteristics, ie shape borrowed from surrounding landforms and fringing vegetation remaining	*Permanent or intermittent watercourses with long stretches of unchanging flow characteristics *Partially undisturbed wetlands *Reservoirs with some natural characteristics of shape and vegetation	*Waterbodies with little evident natural characteristics (shape, vegetation etc) *Waterforms absent

Table 1: Swan Coastal Plain Landscape Character Type Frame of Reference

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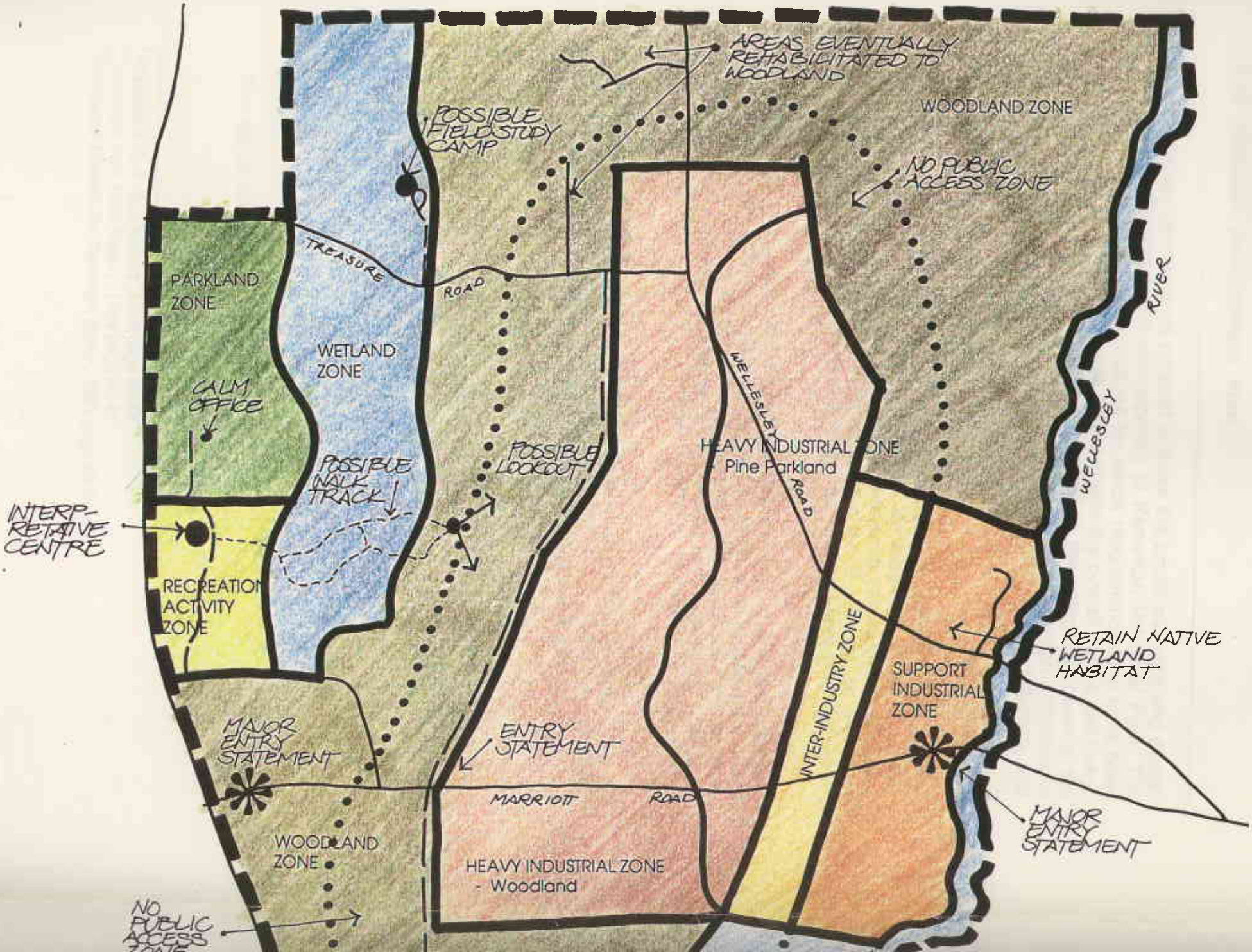
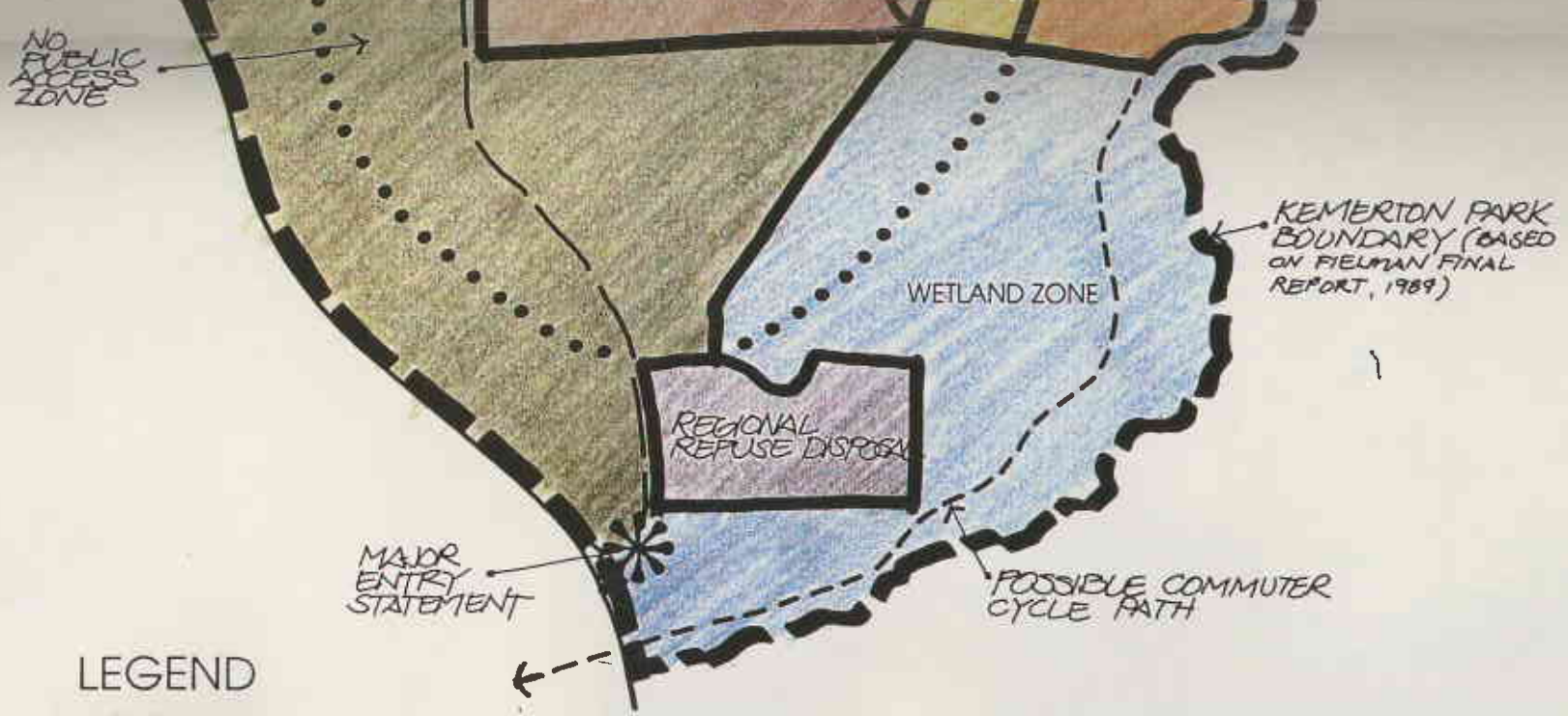

AREAS EVENTUALLY REHABILITATED TO WOODLAND
WOODLAND ZONE
POSSIBLE FIELD STUDY CAMP
NO PUBLIC ACCESS ZONE
TREASURE
ROAD
PARKLAND ZONE
WETLAND ZONE
CALM OFFICE
POSSIBLE WALK TRACK
POSSIBLE LOOKOUT
HEAVY INDUSTRIAL ZONE - Pine Parkland
WELLESLEY ROAD
WELLESLEY RIVER
INTERP-RETATIVE CENTRE
RECREATION ACTIVITY ZONE
INTER-INDUSTRY ZONE
RETAIN NATIVE WETLAND HABITAT
SUPPORT INDUSTRIAL ZONE
MAJOR ENTRY STATEMENT
ENTRY STATEMENT
MARRIOTT ROAD
WOODLAND ZONE
HEAVY INDUSTRIAL ZONE - Woodland
MAJOR ENTRY STATEMENT
NO PUBLIC ACCESS ZONE



LEGEND

- HEAVY INDUSTRIAL CORE
- SUPPORT INDUSTRIAL ZONE
- INTER-INDUSTRY ZONE
- RECREATION ACTIVITY ZONE
- NO PUBLIC ACCESS ZONE
- WOODLAND ZONE
- WETLAND ZONE
- PARKLAND ZONE

KEMERTON PARK CONCEPT DEVELOPMENT PLAN

LANDSCAPE STUDY

Department of Conservation and Land Management
Recreation and Landscape Branch

August 1991 Scale 0 500 1000 1500m

3.0 Concept Development Plan

The landscape development concept outlines the broad planning and design requirements for the future development of Kemerton Industrial Park. The concept comprises landscape zones for which recommendations have been made to guide the future land use and to create the overall theme and image for the Park. The landscape zones are based on the categories given in the Kemerton Park Final Report[16]. A number of significant design components have been explained, such as entry statements, visual impact reduction, and stormwater management.

3.1 Landscape Character

The task of the landscape study is to create a landscape character for Kemerton Industrial Park, present industrial development in an attractive setting and ensure the landscape and environmental values of the sites are retained as much as possible. The concept aims to achieve an industrial parkland setting in which industrial buildings are presented as attractive assets.

The proposed landscape character of the site will extend and enhance the natural landscape setting. Buffers will help retain the natural landscape and the industrial areas will be designed to complement the landscape rather than intrude upon it. Industrial development will be sited behind parkland buffers of trees and natural vegetation. "Garden" treatment of the landscape will be avoided.

The Kemerton Park Final Report[17] defines zones to control development and to minimise potential land-use conflicts. The Kemerton Core/Buffer Definition Study[18] has further defined the boundaries for the industrial areas.

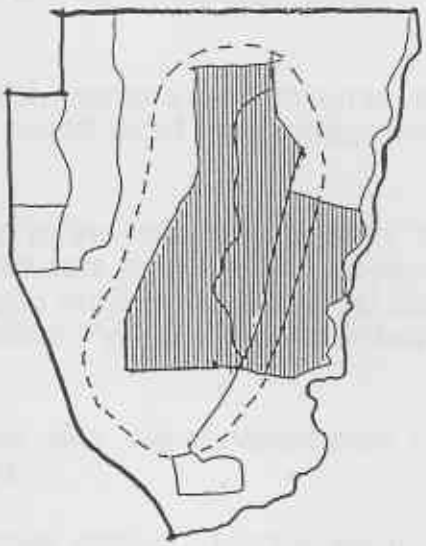
The zones are:

- Industrial zone - heavy industry core, support industry area and inter-industry buffer area
- Industrial infrastructure zone
- Woodland zone
- Wetland zone
- Parkland zone
- Recreation activity area zone

[16] *Kemerton Park Final Report*, 1989 page 50-51.
[17] *Kemerton Park Final Report*, 1989 page 47-48.
[18] *Kemerton Core/Buffer Definition Study*, 1991 page 50-54.

3.2 Industrial Zone

Land Use	heavy industry core, support industry area and a inter-industry buffer area
Recreation Use	no public recreation
Landscape Character	a mosaic of woodland, cleared land and pine parkland. This zone recognises the existing mix of vegetation patterns, and buildings are designed around the existing vegetation rather than promoting large scale clearing or planting.



Guidelines:

The following guidelines will help integrate industrial development into the landscape by minimising their visual intrusion and providing a pleasant working environment for employees:

- Locate industry back from public roads and plant indigenous vegetation to create a buffer zone as a means of presentation. Plant according to the original vegetation patterns. (Refer development recommendations in section 4.1 and figures 1 and 2.)

- Retain the remaining native vegetation wherever possible. Rehabilitate areas of cleared land not required for development. (Refer development recommendations in section 4.8.)

- Maintain areas of existing pines until their future use is determined. Areas of pines not cleared for industrial development should be maintained in the buffer areas. These areas will be softened with native plantings. (Refer development recommendations in section 4.8 and figure 5.) If harvesting occurs, replant the area with native vegetation, gradually phasing out the pines.

- Replant areas of native species that may be susceptible to being affected by industrial emissions with less susceptible species.

- Retain and integrate wetlands that have indigenous vegetation into the surrounding industrial landscape.

- Design attractive entrances into major industrial sites, emphasising indigenous native species and minimal cosmetic landscape treatments.

- Maximise the aesthetic presentation of industrial developments in the site planning of industrial components. Locate unattractive structures or untidy functions at the rear of the plant and out of public view wherever possible. If unavoidable, these structures and functions will be adequately screened with suitable mounds or vegetation.

- Choose building forms, structures, claddings, colours and textures to minimise visual impact and promote a coordinated and integrated development.

- Install an individual and distinctive entry sign at the main private entry to each industrial site. This recognises the corporate image of a company operating in Kemerton Industrial Park. All signs outside the individual site will be in accordance with the Kemerton Industrial Park sign system. (Refer to section 3.12.)

- Screen parking for visitors and employees with either vegetation or mounding. Provide trees to shade parking bays.

- Design and site fences to minimise their visual impact. Locate security fencing behind the vegetated buffer.

- Develop each industrial site and landscape treatment to conform with the development recommendations. Within the boundaries of each industrial plant, landscape treatments will be the responsibility of individual operators.

- Restrict cosmetic landscape treatments to presentation areas such as entry roads, gates and around company amenities. Cosmetic landscapes are not only expensive to install and maintain but are out of character with the overall woodland theme of Kemerton Industrial Park. Large expanses of lawn are also inappropriate.

- Establish construction pads and layout areas that are out of public view at the rear of buildings. These will then be converted to storage or hard standing areas .

- At a commercial centre, a park for outdoor enjoyment could be created to provide for functions, lunchtime relaxation and informal outdoor gatherings. The area will reflect a parkland character with indigenous trees and dryland grass cover. A small area could be irrigated if so desired.

The future landscape character of the inter-industry area is difficult to determine until industrial development occurs. The existing vegetation pattern is mixed and contains woodland, parkland, pine plantations and cleared land.

- Manage the zone as it exists until the future use is determined[19]. Further planting will be carried out if considered necessary for management purposes, such as degradation or erosion, or for aesthetic reasons.

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[19] *Kemerton Core/Buffer Definition Study* , 1991 page 58.

3.3 Industrial Infrastructure Zone

Land Use	infrastructure such as roads, rail, service corridors, power switchyards and terminals, stormwater catchments and rubbish disposal areas
Recreation Use	no public recreation
Landscape Character	a mosaic of woodland and pine parkland that reflects the existing vegetation patterns minimising clearing and further plantings.

Guidelines:

- Plan road verges to complement the landscape character of the park. They are a significant component in the Park's landscape as they are the most visible to the most numbers of people. Road verges are important factors in the following landscape character types:

  - Woodland - a combination of trees and understorey vegetation located on ridges and slopes to filter views of industrial sites. The woodland will relate to the natural landscape.

  - Parkland - a partly cleared landscape of grouped trees and dryland grass that allow filtered and framed views of the industrial sites.

  - Pine parkland - a modified pine plantation with native vegetation to softened the harsh rows of pines.

- Road verges will be attractive and useful corridors (possibly for wildlife movement).

- Plant easements with indigenous trees and shrubs and site to minimise the visual intrusion on the landscape. The size and areas of easement required will depend on the industries developed. Align power lines and mains at right-angles to roads at crossings, choose sensitive methods of pole construction and colour, and minimise the clearing of vegetation.

- Site all service structures that are required in road and rail easements (for example Telecom boxes) sensitively and wherever possible behind vegetation screens.

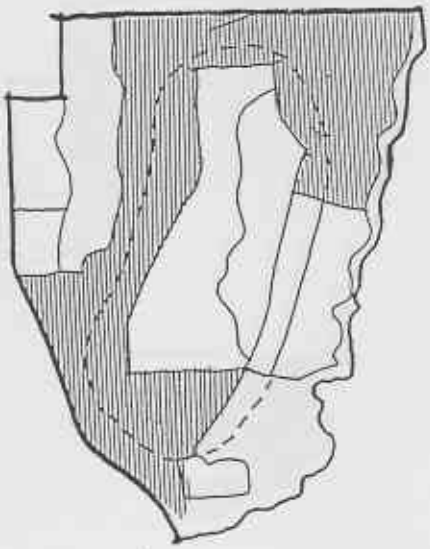
- Design and site structures to integrate with the landscape. Building forms, materials and colours must be appropriate for the location.

- Integrate and design facilities such as stormwater catchments into the environment minimising their visual impact.

- The infrastructure corridors of the park will be designed, planted and maintained by the Park managing authority.

3.4 Woodland Zone

Land Use	protect existing woodland habitat and as part of the buffer for heavy industrial development.
Recreation Use	limited recreational activities will be provided in the longer term if there is a demand. A varied buffer of between 400m and 700m has been designated a "no public access zone" based on EPA criteria[20].
Landscape Character	a woodland of associated trees and understorey vegetation.



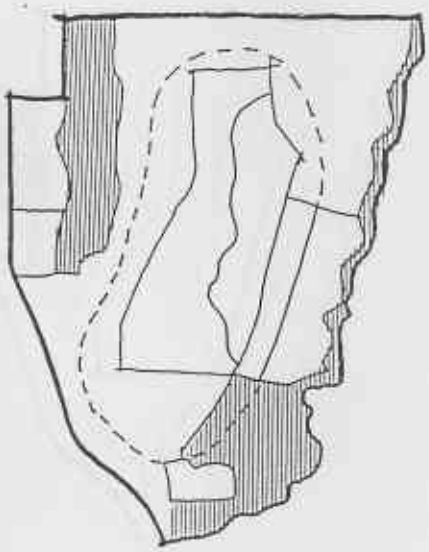
Guidelines:

- Recognise that protection of the landscape as a part of the buffer for industry is the prime function when considering any recreation proposal.
- Allow only recreational activities that relate to the enjoyment of and learning about the natural environment.
- Consider the zone as suitable in which to extend the 10th Lighthorse Bridle Trail. The trail currently runs from Harvey Estuary to Wellesley Road.
- Consider the proposal to construct a walk track from the interpretation centre to a lookout. The eastern ridge provides excellent views across to the east of Kemerton Park. The risks and hazards to the public will be assessed in determining this proposal.
- The Department of Conservation and Land Management will develop and implement a management plan for the area. Recreation development will be in accordance with Department's Policy No. 18 Recreation, Tourism and Visitor Services Policy and departmental standards such as the Sign Manual.

[20]Jeff Penno, pers. comm. 6.11.1991.

3.5 Wetland Zone

Land Use	protection of wetlands
Recreation Use	limited recreational activities could be provided in the long term if there is a demand. It would be subject to seasonal closure
Landscape Character	existing wetlands comprising a chain of depressions, some with open water, with associated fringing vegetation of Melaleuca and understorey species.

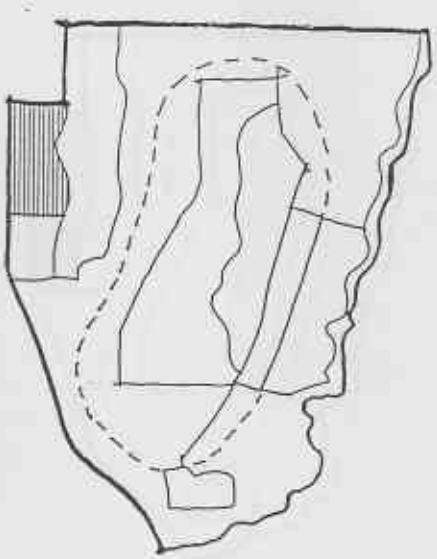


Guidelines:

- Limit public access to defined walking tracks except on special occasions for nature study, interpretive walks and activities.
- Monitor the ecosystem to assess the impacts of industrial development.
- The Department of Conservation and Land Management will develop and implement a management plan for the wetland areas. Recreation development will be in accordance with Department's Policy No. 18 Recreation, Tourism and Visitor Services Policy and departmental standards such as the Sign Manual.
- Protect the Wellesley River riparian zone with a 50m buffer strip of vegetation on each side of the river. The buffer width, however, will vary and only extend to its maximum in areas where native vegetation extends to 50m[21]. The east side of the river is outside the study area.
- Protect riparian vegetation and the river banks when considering recreational activities on or beside the river.

[21] *Kemerton Core/Buffer Definition Study* , 1991 page 53.

3.6 Parkland Zone



Recreation and Land Use

future recreational activities. As there will be no short-term public access, some areas could continue to be used for rural purposes (such as grazing) to manage fire hazards.

Landscape Character

a partially cleared pastoral landscape with groups of mature tuart and melaleuca trees and pasture.

Guidelines:

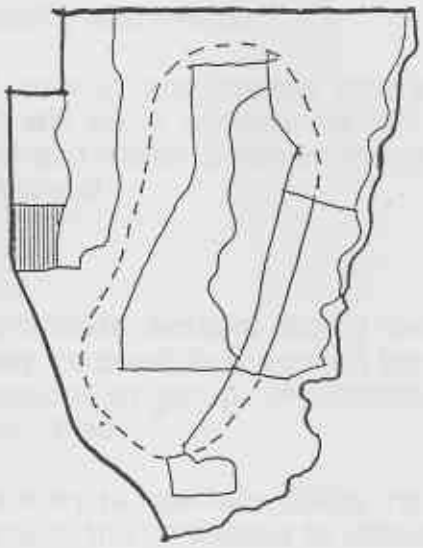
- Relate future recreational uses to the enjoyment of the natural environment, including educational and interpretive activities, picnicking, walking, photography and birdwatching. In the absence of a management plan, each proposal for a recreational activity will be assessed on its suitability and merits.

- Further recreational use of this area will depend on a demonstrated need or demand.

- The Department of CALM will manage the area in accordance with a Management Plan. Recreation development will be in accordance with Department Policy No. 18 Recreation, Tourism and Visitor Services Policy and departmental standards such as Sign Manual.

3.7 Recreation Activity Area Zone

Recreation and Land Use	future recreational uses including an interpretation centre, picnic areas and carparking. An interpretive trail from the centre will provide pedestrian access into the ridge and wetland buffer areas
Landscape Character	a mosaic of natural woodland and parkland areas. The partly cleared areas will accommodate the recreational activities.



Guidelines:

- Develop facilities in the parkland and pastoral landscape between Rosamel and Dunn Roads. An intermittent wetland with mature Melaleucas provide an very pleasant foreground to the area.

- Develop vehicle access from Dunn Road and/or Rosamel Road. Either road could be used for access.

- Locate visitor facilities to the east of the intermittent wetlands.

- Disseminate information on both CALM lands and the Kemerton Park from the interpretation centre. This is envisaged to be the "Gateway to the South" for visitors to CALM lands, giving guidance and information on parks and reserves in the south-west of the State. It will also provide information on the relationship between industry and the environment at Kemerton Park. The centre will be a contact point for visitors with maps, information and literature provided.

- The interpretation centre should be constructed and maintained by the Kemerton managing authority. Training of staff will be the responsibility of both CALM and the Kemerton managing authority.

- Construct an interim information shelter at a road side bay displaying interpretive material and information.

- Provide picnic facilities and parking adjacent to the interpretation centre.

- Construct a walk track from the centre to the wetlands and ridge area. A looped spur track to a lookout on the ridge overlooking the industrial area will provide an excellent view of the Park. Interpretive information will be provided.

- Further development of this area will be determined by community and/or industry needs. In the absence of a management plan, each proposal for a recreational activity will be assessed on its suitability and merits.

- The Department of CALM will manage the area in accordance with a Management Plan. Recreation development will be in accordance with Department Policy No. 18 Recreation, Tourism and Visitor Services Policy and departmental standards such as the Sign Manual.

3.8 Field Study Centre

In the event of a construction camp (to accommodate workers during the development phase of Kemerton) being built, it may be possible to convert into a field study centre. It could be used for short periods by groups of students undertaking environmental and educational studies. If so:

- Plan and design permanent structures that are easy to maintain, taking into consideration passive energy, and site the camp in the landscape to reflect the natural environment.

- Provide outdoor classrooms such as an amphitheatre or areas enclosed by vegetation.

- Design the area so that it can be used by a number of groups pursuing different activities.

3.9 Planting Design

The basic planting design guidelines are to:

- Plant indigenous species wherever possible, following the natural patterns of vegetation, unless it is demonstrated that those particular species are susceptible to industrial emissions.

- Promote a gradual softening of existing pine plantations through thinning, interplanting of native species, and other management techniques. Halt further pine plantings.

- Retain native vegetation wherever possible, especially in sustainable areas.

- Plant buffers between industrial areas and public roads to frame views and lessen the visual impact of development.

- Provide an adequate blend and range of vegetation species to ensure planting is capable of withstanding a mix of pollutants and environmental pressures.

- Encourage the use of waste water for irrigation wherever the planting design does not compromise the overall development concept, avoiding ornamental, exotic flower beds and large expanses of lawn (except for sporting activities in company recreational facilities).

New plantings of vegetation are to reflect and reinforce the existing patterns of vegetation. A significant planting programme with a planting plan will be needed once the structure plans for the industrial areas are prepared and finalised.

The choice of specific plant species will depend on future industrial development and the nature of industrial airborne emissions. Further investigation of native plant species susceptible to pollutants is required before the planting plan can be prepared. An assessment of the impacts on vegetation within the industrial zone may be required after industry has been established. If the vegetation is affected, developers will meet the cost of suitable replacements.

Recommended plantings are woodland, parkland, pine parkland (modified pine plantation) and feature planting. These are expanded upon in the development recommendations in section 4.8.

3.10 Entry Statements

Entry statements will create a specific image for Kemerton Industrial Park. For first-time visitors or those looking for direction they will provide a sense of arrival, give information as well as create an identity for the Park.

Major entry statements are required at both Marriott Road entrances to the Park and on the southern end of the proposed north-south road at the Australind By-pass (refer Map 3). These are to consist of a distinctive entry sign, an information bay and directional signs. The landscape character of these entry points, especially those to the west of the Park, provide excellent opportunities to induct visitors to the Park.

Minor entry statements will be at Treasure Road and Wellesley Road. These will consist of a major sign announcing Kemerton Industrial Park plus directional signs.

The positioning of entry statements on the Park boundaries ensures that the Parkland buffers are perceived as being integrated with the Park. The four-way intersection on Marriott Road provides an opportunity to reinforce the entry statements as the intersection begins (and ends) the heavy industrial area. Directional information will also be provided.

3.11 Information and Interpretation

A well designed and integrated information and interpretive system will provide ease of direction for visitors and allow the public to learn about industry in the environment.

Information and interpretive messages will be provided in a concise, unified and attractive manner. A number of communication methods will be used including signs, brochures, pamphlets, and displays. They will be disseminated through the interpretation centre.

A standard design for directional signs will be developed for use throughout the Kemerton Industrial Park to project a professional and integrated image.

An integrated graphics package is needed including signs, stationery, and letterheads. A logo will recognise and reflect the nature of Kemerton Industrial Park.

The design of the signs will be flexible to allow for changes in industry names and to incorporate corporate symbols where necessary. Two types of signs will be erected in the Park. These are:

1. Parkland signs - designs based on the CALM Sign Manual to be mostly timber-routed.

2. Industrial signs - designs reflecting the industrial nature of the Park and a corporate image to be of mixed materials.

The interpretation centre (refer Map 3 for location) will be the main dissemination point for information on both CALM lands and Kemerton Industrial Park. The interpretation centre is envisaged to be the "Gateway to the South" for visitors, giving guidance and information on parks and reserves in the south-west. It will also provide information on the relationship between industry and the environment. Maps, information, and literature will be available to the public. The centre will also be a contact point for visitors providing facilities for group discussion, videos, a gathering area (such as for the start of tours through industrial plants) and displays. The interpretation centre should be constructed and maintained by the Kemerton managing authority.

Construction, staffing and maintenance of the interpretation centre should be undertaken by the managing authority of Kemerton Industrial Park. Staff should be jointly trained by CALM and Kemerton Industrial Park industrial groups.

3.12 Visual Impact Reduction

A well planned and integrated industrial park will reduce the visual impact usually associated with such developments. The visual impact can, therefore, be reduced by the careful siting and design of buildings while considering the landscape in which the buildings are located.

An industrial park can intrude on the natural landscape. Rather than screening and hiding it from view, the large plant structures offer the opportunity to maximise sculptural characteristics and incorporate environmental art in their design.

The following points need to be considered to minimise visual impact:

- Visual impacts differ depending on distance, duration of view and viewer position.

- The vegetation characteristics around the development.

- The existing topography, such as placing developments low in the landscape and the presence of a background ridge .

- Careful treatment of untidy and unattractive elements of industrial developments.

- Building form, materials, cladding, colours and textures to be sympathetic to the surrounding landscape.

- A commitment to regular maintenance and cleaning of the visible parts of industrial plants to ensure a good presentation to the public and a safe and attractive environment for employees.

- The employment of a sympathetic and dynamic design team of architects, industrial engineers, landscape architects and environmental artists who have an empathy for the landscape.

3.13 Stormwater Management

Stormwater and uncontaminated effluent management will utilise the low lying nature of the topography at Kemerton Industrial Park. Stormwater basins and ponds will be integrated into the landscape and appear as natural wetlands. Indigenous plant species will be planted around the ponds. It may be possible to use stormwater run-off to reticulate the area.

3.14 Management Structure

A description of the Parkland Concept is provided in the Kemerton Industrial Parklands Technical Report[22] and the management and areas of responsibility discussed. Following are recommendations based on this report:

- A central managing authority will be responsible for the overall development and management of the architectural, planning and landscape components of the Park.

- Industrial developers will comply with the standards given in this study. The managing authority exercises planning and design controls on the design of industrial plants, and includes control of site planning, roadworks, choice of materials, colour, finishes and landscape treatments.

- A central managing authority will be responsible for the infrastructure of the Park such as road verges, rail and service easements, signs, public education and interpretive facilities, central recreation and commercial facilities.

- The buffer areas surrounding the industrial developments are to be managed by the central managing authority, with companies providing funds for their upkeep.

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[22] *Kemerton Industrial Parklands, Technical Report* Task 9 Landscape Concept, 1988.

- The parkland buffers will be managed by the Department of Conservation and Land Management in consultation with the central managing authority. A Management Plan for the Park will be prepared by CALM.

- A central managing authority will assess and control all plans for industrial development and require developers to conform with the stated guidelines and development recommendations.

4.0 Development Recommendations

The development recommendations indicate the planning and design standards required to establish an industry in Kemerton Industrial Park. They should be used by both the central managing authority and industrial developers.[23]

4.1 Site Planning

- All development plans will include site analysis drawings with consideration for topography, vegetation, climate, views into and out of the site (visual analysis) and drainage patterns.

- A detailed visual analysis of the proposed development will accompany the concept plan with consideration for the visual impact both within and from outside the site. The key viewpoints, distance factors and visual impact reduction considerations are to be noted and outlined.

- A landscape concept plan of each development proposal will be prepared and submitted to the central managing authority for consideration. The plan must show design concepts such as the site entrance design, public and private spaces, use zones, carparking, vegetation planting areas and their character, drainage patterns, landforms, views, fencing location and design, buildings and other structures. The plan should also outline the methods to be employed to reduce the visual impact of the developments.

- After approval of the concept plan, a site plan will be prepared that details the site layout including all the above elements as well as areas for proposed future development.

- The design will be site responsive by integrating development with existing site features such as landform, vegetation (if existing), drainage, views, and existing development structures.

- Administration and amenity buildings should be sited at the front of the site, especially if lawns and sporting facilities are provided, to give a human scale and presentation to visitors and the passing public. Untidy or unattractive functions or structures will be sited at the rear of the site if possible. If not, appropriate screening of vegetation or mounding will be employed.

- New developments will be integrated with existing site works.

- Buffers will be maintained and their use strictly controlled, especially when the removal of vegetation is involved.

[23]The preparation of these guidelines have been assisted by the Coogee Biotechnology Park Landscape Study prepared for the Ministry of Economic Development by the Building Management Authority.

4.2 Roads, verges and medians

- A hierarchy of roads for vehicle access will be designed and constructed. They are the "windows" to Kemerton Industrial Park and are, therefore, a significant indicator to the public of the attractiveness of the industrial park. It is important to have well designed, planted and maintained road corridors.

- The roads will be integrated with the landform and vegetation. This can be achieved by:

  - keeping vegetation clearing to a minimum;
  - designing road gradients to be as close to the existing landform as possible;
  - keeping the finished level of the road surface low in the landscape while considering the potential for flooding;
  - keeping overall road width to a minimum, but allowing for proper industrial traffic allowances;
  - allowing vegetation to grow to the edge of the road shoulder, while acknowledging appropriate sightlines.

- Road easements will allow enough room for buffer planting and commuter cycle paths, especially along major routes.

- Provide adequate space for planting in medians.

- All plantings along roads, except in private industrial entrance roads, will be woodland or parkland in character (Refer section 4.8). Street planting may be appropriate in support industry areas where the width of roads may be too narrow for buffer planting.

4.3 Parking

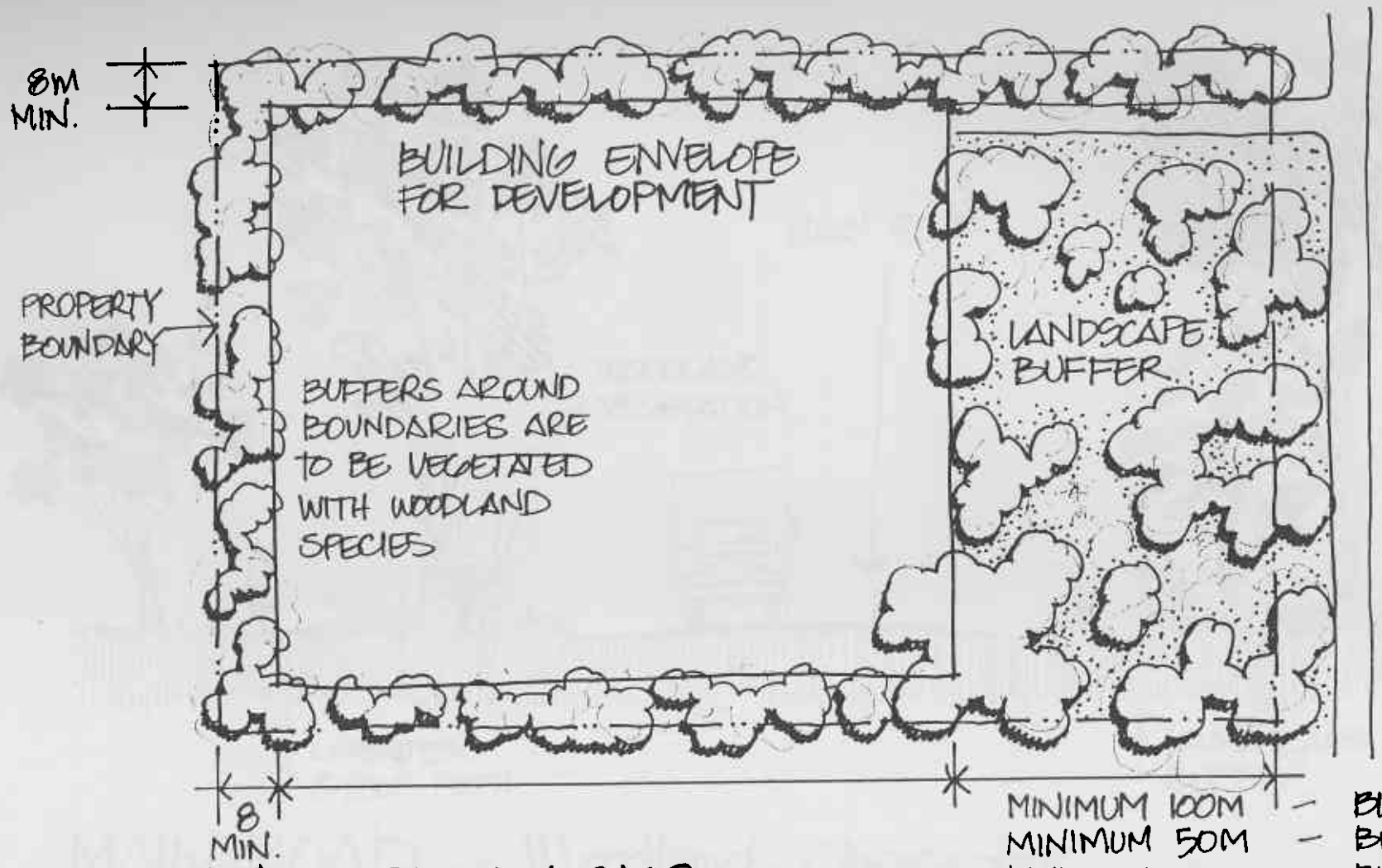
The design of carparks will rely on many considerations, but will follow these design principles:

- Carparks in the heavy industrial area will be sited behind the buffer to reduce the visual impact from public areas.

- Carparks will incorporate water harvesting principles with kerbs used only to redirect stormwater into the planting beds or the natural landscape.

- Blocks of parking will be softened with vegetation and incorporated into the landscape to minimise their visual impact. There will be at least one tree per 15 vehicle bays in heavy industry areas and one tree per 10 vehicle bays in support industry areas. The shade provided by tree planting is maximised when lines of parking are oriented east-west.

- Surface materials will be chosen to complement the use and style of carparks. Large areas will be stabilised so as to reduce dust problems. Colour of materials will be compatible with the surrounding earth colours.



BUILDING SETBACKS

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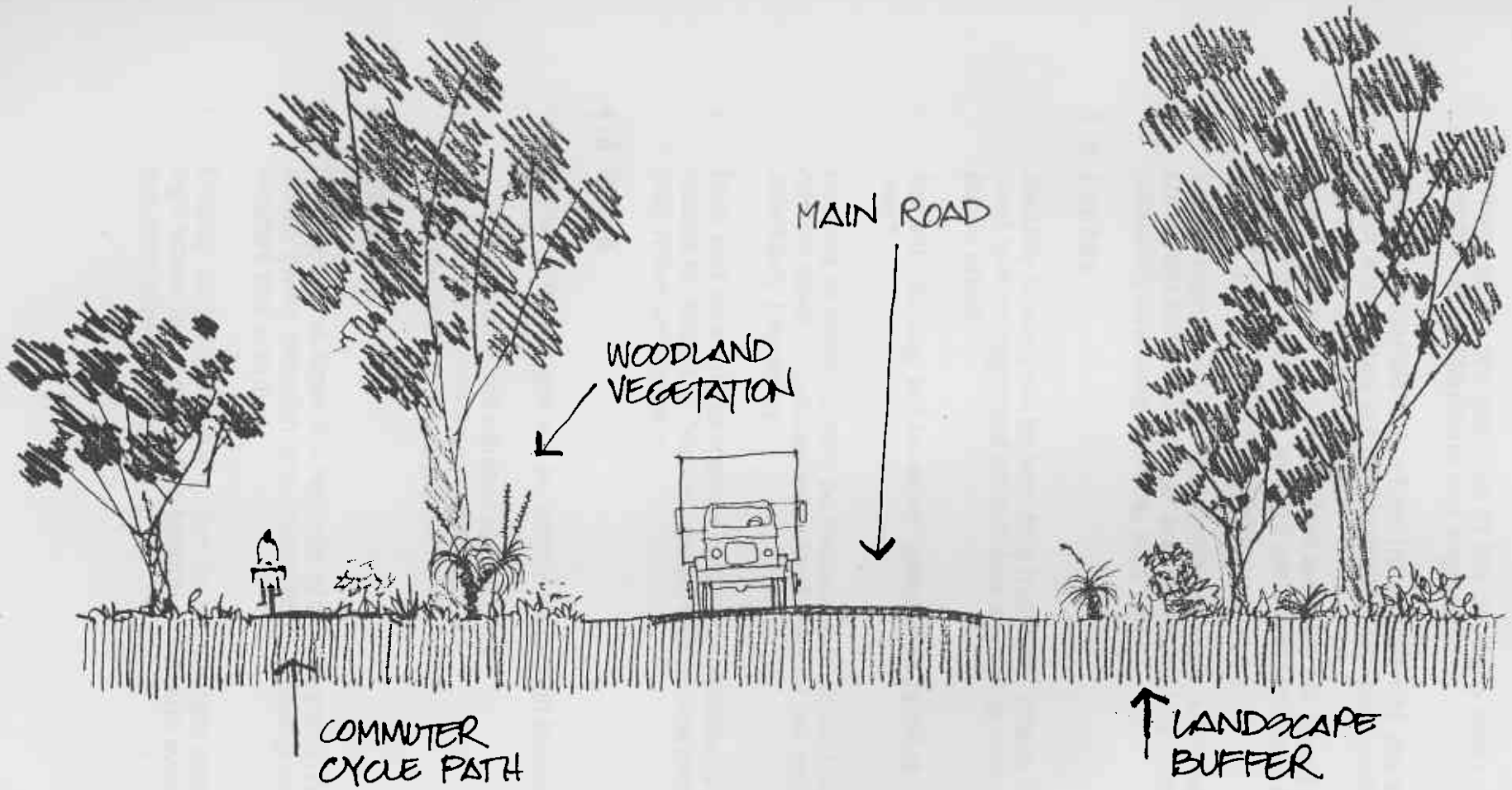
Figure 1



MAIN ROAD – Woodland Character

KEMERTON PARK LANDSCAPE STUDY

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Figure 2

4.4 Paths and Tracks

- Where tracks are provided in the parkland areas they will be integrated into the natural landform and vegetation.

- Surface materials will reflect the function of the track or path, and the colour and texture will be compatible with surrounding landscape.

- Low lying and wet areas will be avoided, but where crossing is necessary, for example along the wetland nature trail, bridges and boardwalks will be built over creeks and low areas.

- Cycle paths will be designed to high standards to accommodate commuter traffic. Gradients and curves will be smoother and vegetation, especially overhanging trees, kept clear.

4.5 Fences

- Security fencing will be kept to a minimum. Where it is necessary it will be sited behind vegetated buffers and aligned to reduce its visual impact on public areas.

- Security fencing will be either galvanised or black plastic coated cyclone mesh.

- Fencing of parkland may be necessary to restrict vehicular access and to contain stock on grazing lease land. Fences will not be constructed unless absolutely necessary.

- Post and wire fences may be installed in parkland areas with pedestrian access by means of "kissing" gates, which allow people access but restrict motorbikes and horses.

4.6 Signs

- Three types of signs will be used in Kemerton Industrial Park:

  . Parkland signs - timber-routed nature
  . Industrial Park signs - steel nature
  . Private industrial signs

<u>Parkland Signs</u>

- Identify on the signs the features of the Parkland, Wetland and Woodland areas, giving direction and information on zoning of the areas, and public facilities and activities.

- Display on signs the Kemerton Industrial Park name and logo, a CALM logo where appropriate, the feature name, and symbol signs to designate activities allowed.

- Construct Parkland Signs from timber boards with routed lettering in accordance with the CALM Sign Manual.

Industrial Park Signs

- Reflect the industrial character of the Park by constructing signs of steel and/or aluminium. Design of the signs should be undertaken as an overall information and marketing package by qualified graphic artists. The package should include a logo, theme, stationary and publication graphics.

- Industrial Park signs are broken into :
  . Entry Statement signs
  . Major Directional Signs
  . Minor Directional Signs

- Locate major directional signs in vehicle bays at three locations - east and west Marriott Road and north of the junction of the new north-south road and the Australind By-pass (refer Map 3). They will display the Kemerton Industrial Park name and logo, industrial business names, and a scaled plan of the Park, including the land uses, Parkland facilities, roads and individual industrial plants.

- Locate minor directional signs at intersections and at entrances of the support industry areas. In the heavy industrial core, these signs will give directions to individual industrial businesses displaying road names, the Kemerton Industrial Park name and logo and individual business names.

- All signs in the support industry area will be in accordance with the standard Kemerton Industrial Park sign. Individual businesses will be identified by a standard Kemerton Industrial Park sign while the corporate and business signs will be allowed on buildings. This will prevent the proliferation of uncoordinated, small signs from cluttering the streets in the area.

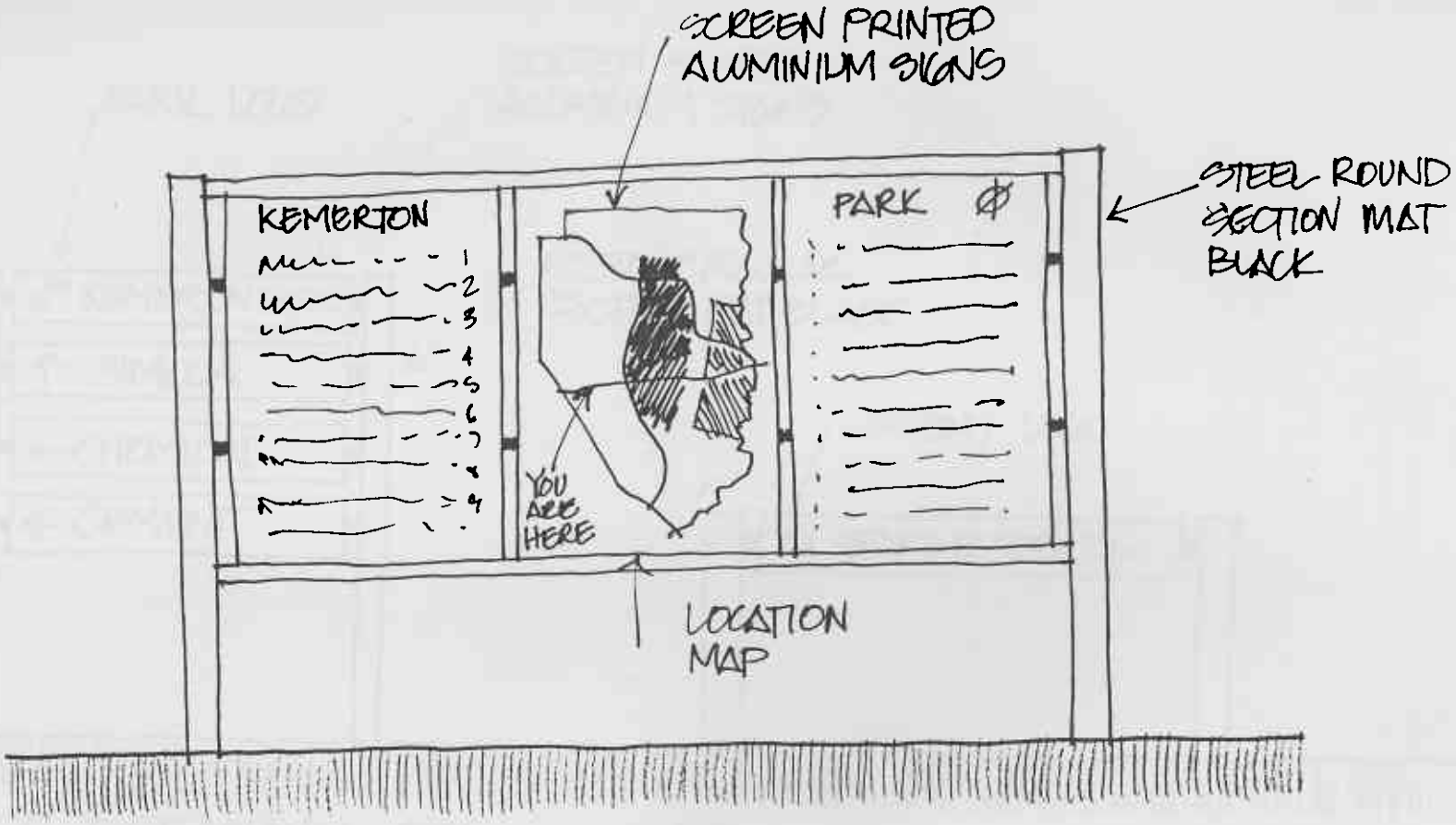
Private Industrial Signs

- Individual businesses will have their own private entrance signs. The design and location for these signs will be submitted with development site plans to be approved by the central managing authority.

4.7 Recreation Facilities

- Develop recreation facilities in accordance with the CALM recreation guidelines and standards. Prepare site analysis, concept and site development plans which consider the site's natural features. Ensure the design integrates development into the landscape.

- Develop recreation facilities in accordance with the designated policies and zonings of the area. Recreational activities are not to compromise those values.



MAJOR DIRECTIONAL SIGN

INDUSTRIAL SIGNS

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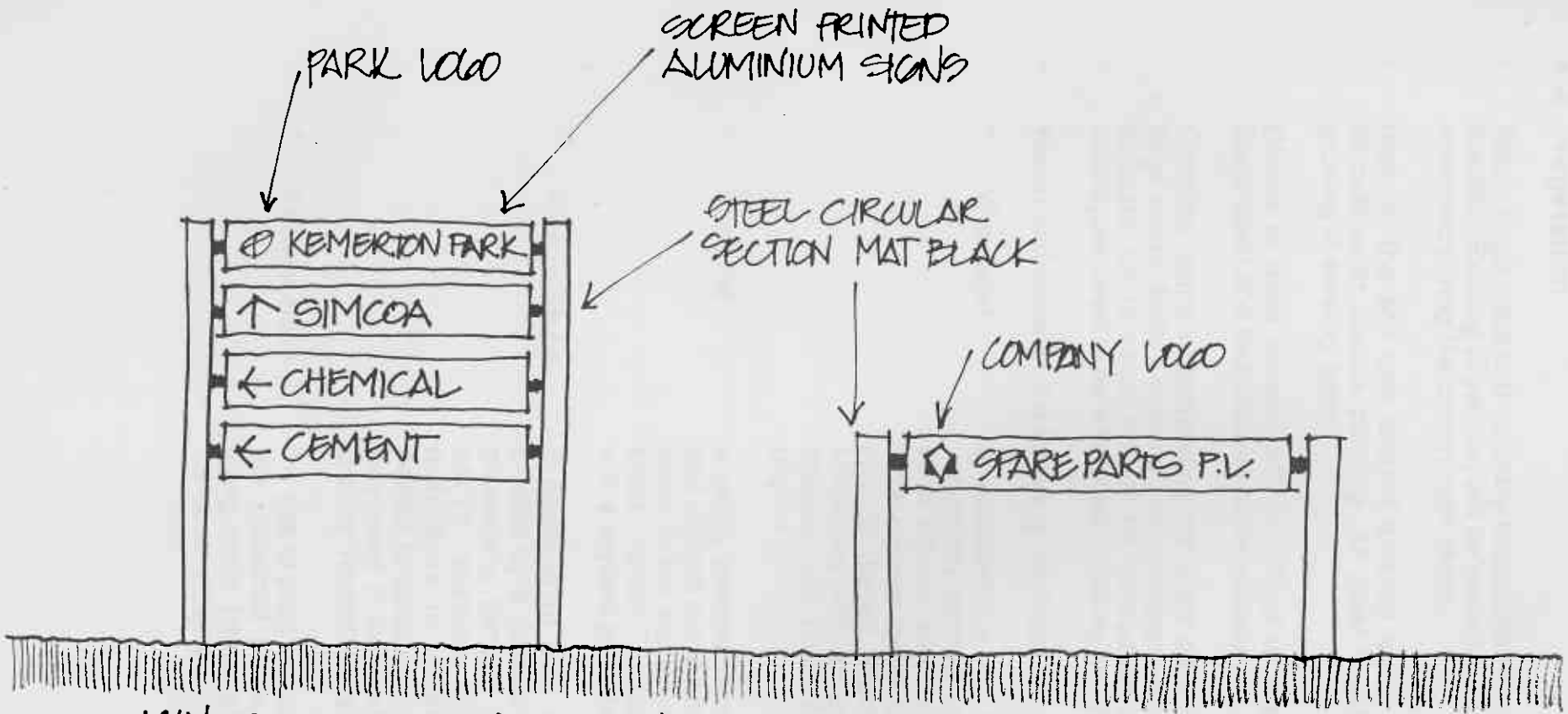
Figure 3



INDUSTRIAL SIGNS

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Figure 4

4.8 Vegetation

- Retain large trees and naturally established remnant vegetation wherever possible. Existing vegetation will be protected by fencing and strict control exercised during the construction phase.

- Improve the soil only around amenity areas and office buildings for decorative or feature planting. All other vegetation will be capable of growing in existing soils.

- Choice of plant species will be critical to ensure their survival in the Spearwood and Bassendean dune systems.

- Consider using hydroseeding for plant establishment, especially over large areas. Before clearing and development starts, local seeds will be collected for re-establishment on cleared areas. Proper establishment techniques need to be employed including weed control.

- Retain and enhance the following landscape characters:

  * Woodland — a combination of trees and understorey vegetation located on ridges and slopes that allow filtered views through to industrial sites while relating to the natural landscape. Species include Jarrah, Marri, Agonis, Banksia and Melaleuca with an understorey of indigenous species that occur naturally in these areas. (Figure 6).

  * Parkland — a partly cleared landscape of grouped trees and dryland grass allowing filtered and framed views to the industrial sites. Comprises Jarrah, Marri, Agonis, Banksia and Melaleuca trees with a dryland grass understorey. (Figure 6).

  * Pine parkland — a parkland of pine and native tree species created by a gradual softening of existing pine plantations through thinning, interplanting of native species and other management techniques to integrate the pines into the overall landscape character. Pine plantations only need to be modified along roads and in publicly viewed areas.(Figure 5).

  * Feature areas — the use of plant species for effect in and around the industrial areas, such as intersections, along roads (street planting), entrances and in the commercial area.

4.9 Irrigation

- Reticulation of vegetation will be discouraged. However, the use of uncontaminated, treated waste water can be used on planting beds or grassed areas. Recreation areas in the heavy industry and support industry areas that provide for workforce enjoyment, such as the picnic and sports areas, may be irrigated.

4.10 Maintenance

- A high standard of maintenance is required by both the central managing authority and individual companies. Maintaining both the landscape and industrial buildings and structures in a clean and neat manner is essential to the overall image of Kemerton Industrial Park as an attractive and desirable area.

- Clean and freshly paint industrial structures, such as stacks, tanks, buildings, and processing structures whenever necessary.

- Conduct maintenance work and construction activities in a tidy manner, and rubbish and mounds of earth removed from development sites.

- Maintenance of new plantings/rehabilitation areas is essential. When establishing these areas a staff and financial commitment will be made to their upkeep.

4.11 Checklist of Development Requirements

The following checklist is intended to give designers of industrial development a guide to the planning and design requirements within Kemerton Industrial Park.

- All development applications will include landscape plans. The plans should show:

  - existing site conditions including vegetation, landform, drainage patterns, any outstanding landscape features, utility services, and vehicle access;

  - detailed visual analysis of the site following an assessment of the views into and out of the site, and potential areas of high and low visibility;

  - detailed visual analysis of the proposed development, including the visual impact both within and outside the site. The key viewpoints, distance factors and visual impact reduction considerations will be included

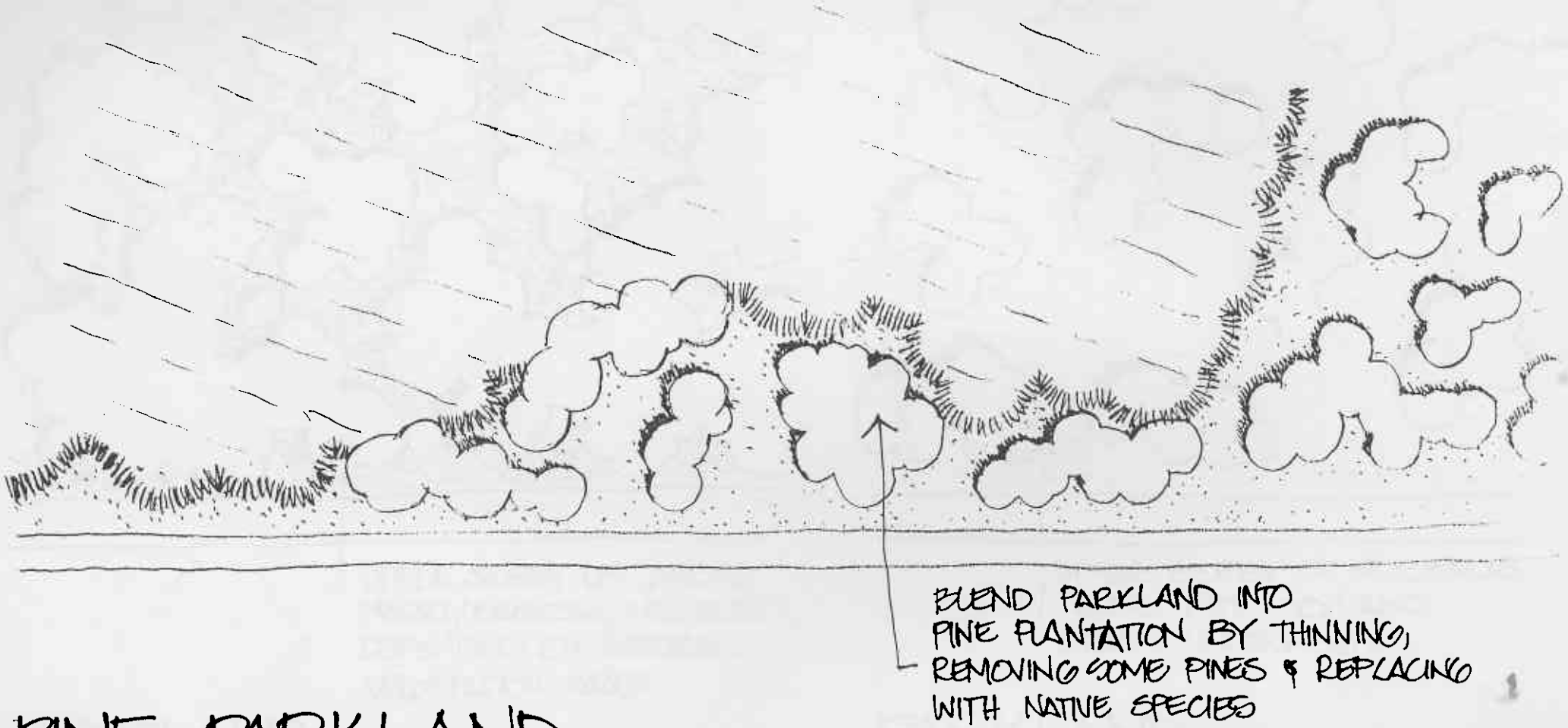
  - areas zoned into functions such as public areas, buildings, entrances, vegetated buffers, and industrial plant;

  - design elements relating to site entrances, public and private spaces, zones, carparking, planting areas and their character, drainage

patterns, modified landform, views, fencing location, screening, storeyards, hardstanding areas, buildings and other structures;

- designs of buildings and structures, including elevation of form, cladding materials and colours, siting in the landscape and relationship to public entry and view;
- vegetation areas and comprehensive listing of plant species to be used;
- earthworks and drainage design and how the modified landform is integrated with the surrounding landscape and surface drainage;
- specified setbacks and treatments for planting, retention of vegetation or screening;
- parking arrangements with drainage and planting treatments;
- fence alignments and design;
- the location and design of the company's individual entry sign;
- areas to be irrigated and the source of irrigation water; and
- maintenance requirements.

It is recommended that the design team include appropriately qualified designers such as architects, landscape architects and environmental artists with an empathy for siting major structures into the landscape.



PINE PARKLAND

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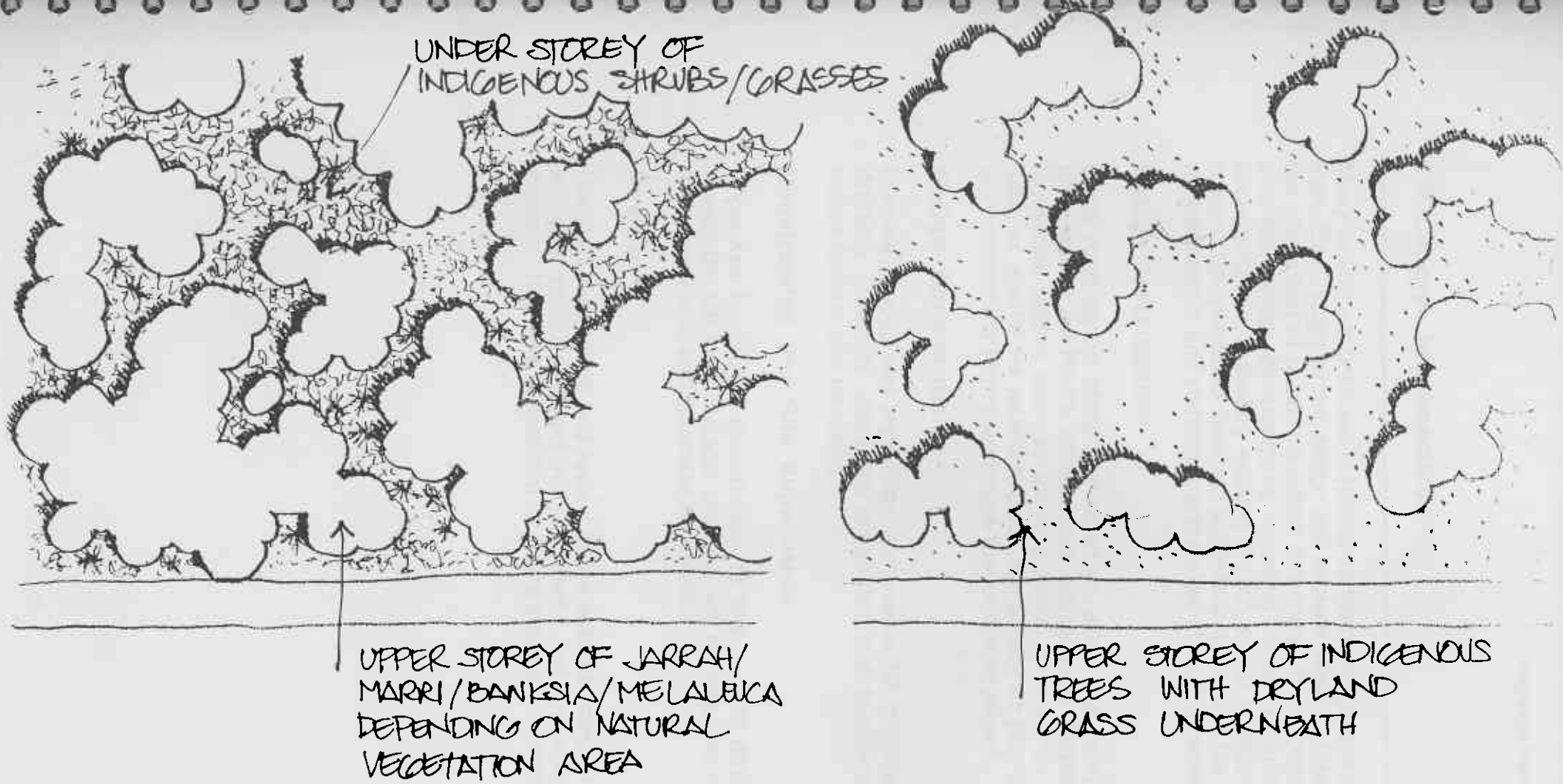
Figure 5



KEMERTON PARK LANDSCAPE STUDY

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Figure 6

5.0 Concept Implementation

Many factors are unknown in relation to the development of Kemerton Industrial Park. Each stage of the design and implementation of the concept will require the interaction of suitably qualified designers. The process for implementation involves design development, including plans outlining design elements; documentation, including working drawings and schedules for tendering and construction purposes; contract supervision to ensure the works are carried out to specification and standards; and review of the final works.

Design Development

Once road layout plans and structure plans are determined, development drawings for the Park's infrastructure are required. These plans should outline landscape details such as planting areas, earthworks, and what landscape features should be retained. Each component of planning and development will consider the Park's landscape and aesthetic values.

Design Documentation

Prepare tender and instruction documents for proposed landscape works. Working drawings, materials schedules and specifications are necessary before tenders can be called.

Construction and Site Supervision

Supervise landscape construction to ensure that design and specification standards are met. Suitable persons will be required to administer tenders, award contracts and supervise construction.

Review

Constant monitoring and review of the establishment of the landscape works will give valuable insight into successful and unsuccessful procedures and designs. This data is essential for future successful planning and design.

6.0 Further Studies/Work Required

- A further analysis of the visual resource and the means of reducing the visual impact on the landscape from areas outside the park is needed.

- The Kemerton Core/Buffer Definition Study has recommended that

  > "A study should be commissioned to determine the level of protection from industrial emissions required by existing ecosystems within the Kemerton parklands and adjoining areas. Such a study would review national and international air quality criteria and recommend appropriate criteria for the types of vegetation found within and adjoining Kemerton Industrial Park. A range of potential pollutants should be assessed, including sulphur dioxide."[24]

- Landscape planning and design should be considered in the further planning of structure plans, roads and service layouts, determination of open space, and drainage and stormwater disposal systems.

- Social research and public perception studies would determine how people would like to use the area and how they respond to the developing industrial park. These would assist in future decision and policy making in regards recreation and visual impact reduction of industrial development.

[24] *Kemerton Core/Buffer Definition Study* , 1991 page 63.