

GLOUCESTER SHIRE COUNCIL
NEW SOUTH WALES

STRATFORD INDUSTRIAL PARK
STRUCTURE PLAN



November 2009





RENAISSANCE Planning Pty Ltd
307/91 Murphy Street
Richmond Victoria 3121

strategic planners | urban designers | economists

Tel: (03) 9428 1116
Fax: (03) 9428 9077

admin@rplan.com.au
www.renaissanceplanning.com.au

Project No: 09-006

©Copyright, Renaissance Planning Pty Ltd, June 2009

This work is copyright. Apart from any use as permitted under Copyright Act 1963, no part may be reproduced without written permission of Renaissance Planning Pty Ltd

Disclaimer: Neither Renaissance Planning Pty Ltd nor any member of employee of Renaissance Planning Pty Ltd takes responsibility in any way whatsoever to any person or organisation (other than that for which this report has been prepared) in respect of the information set out in this report, including any errors or omissions herein. Renaissance Planning is not liable for errors in plans, specifications, documentation or other advice nor prepared or designed by Renaissance Planning.

TABLE OF CONTENTS

1	Study Context	2
2	Subject Land	4
3	Study Objectives	5
4	Vision	5
5	Site Analysis	6
	5.1 <i>Location and Local Climate</i>	6
	5.2 <i>Site Presentation and Visual Analysis</i>	6
	5.3 <i>Slope Analysis</i>	8
	5.4 <i>Drainage</i>	8
	5.4 <i>Aboriginal Heritage and Conservation</i>	8
6	Demand Profile and Design Implications	10
7	Structure Plan Principles	11
	7.1 <i>Main Avenue and Entry</i>	11
	7.2 <i>Buffers</i>	11
	7.3 <i>Topographically Sensitive Design</i>	11
	7.4 <i>Connector Road</i>	11
	7.5 <i>Subdivisional Flexibility</i>	11
	7.6 <i>Rail Operations and Access</i>	12
	7.7 <i>Water Sensitive Urban Design</i>	12
	7.8 <i>Entry Node</i>	12
	7.9 <i>Sympathetic Landscaping</i>	12
8	Structure Plan Concept	14
9	Landscape and Design Principles	16
	9.1 <i>Local Environment</i>	16
	9.2 <i>Signage</i>	27
	9.3 <i>Soil and Water Management and Sediment and Erosion Control</i>	27
	9.4 <i>Water Sensitive Urban Design</i>	28
10	Conclusion	34

LIST OF FIGURES

1	Regional Location of Subject Site	3
2	Topography and Drainage Subject Site	9
3	Structure Plan Principles	13
4	Structure Plan: Zone 2 Area	15
5	Main Entry Perspective	21
6	Sketch Elevations: Main Entry	22
7	Sketch Plan and Elevation Main Entry	23
8	Sketch Plan: Typical Planting Theme for Larger Lot	24
9	Sketch Plan: Typical Planting Theme for Smaller Industrial Lot	25
10	Typical Planting Theme Screen Planting	26

The Stratford coal mine is located on Bucketts Way, approximately one kilometre south of Stratford and fifteen kilometres south of the Gloucester township. Bucketts Way is an important regional road that links the Pacific Highway to Gloucester and Taree with route connections to Tamworth.

The Stratford coal mine has been in operation for some ten years and has existing infrastructure to facilitate the development of an industrial park as a possible option. Advantages that would facilitate an industrial park development include:

- location on the Sydney-Brisbane rail line which "passes through the mining site";
- an "existing rail loop" at the site "which facilitates access to the Stratford coal loader";
- effective road access for heavy vehicles to the subject site provided by Bucketts Way;
- extensive "underutilised flat land adjacent to the access road" and "rail loop";
- earth moving equipment used by the mine which could be deployed to develop the site;
- identified extensive "reserves of coal bed methane gas" in the region with potentials to locate a "gas aggregation and compression station" at the subject site;
- abundant supplies of industrial quality water available at the subject site;
- potential access to high voltage (32,000 volts) powerlines;
- natural buffering by virtue of the topography of the site and surrounds.

In 2008, Gloucester Shire Council resolved to commission an independent assessment of the potential to develop a viable industry park adjacent to the Stratford coal mine. In this context it also resolved to commission a Structure Plan to provide a framework for the sustainable development of an attractive industry park adjacent to the Stratford coal mine.

In February 2009 Collie Pty Ltd was commissioned by Gloucester Shire Council to prepare a demand overview and prepare a Structure Plan for the proposed Stratford Industrial Park. In May 2009 the strategic team undertaking the Structure Plan transferred from Collie to establish a new practice, Renaissance Planning Pty Ltd. The completion of the demand assessment and preparation of the Structure Plan was undertaken by Renaissance Planning Pty Ltd.

Figure 1 Regional Location Context



The subject land for the assessment is comprised of lots Pt41/979859, 60/979859 and 2/556576 on Bucketts Way in Gloucester Shire.

For the purpose of the Structure Plan the subject land is comprised of three zones:

- Zone 1 is land to the south of Parkers Road and is approximately 20 hectares, net of the proposed Environmental Protection Zone (E3) to be applied to a strip of land running along Bucketts Way, and net of railway reserves and buffers within the site;
- Zone 2 is land to the north of the railway line and is approximately 32 hectares (net of the proposed Environmental Protection Zone and railway reserves),
- Zone 3 is the area between Parkers Road and the railway line and is approximately 15 hectares (net of the proposed Environmental Protection Zone and railway reserves).

The subject land is currently zoned RU1 - Rural in the Gloucester Shire Local Environmental Plan (LEP) and an approximate development area of 67 hectares, net of the proposed Environmental Protection Zone and railway reserves within the subject site and is generally bounded as follows (refer Figure 1):

- to the east by the Stratford coal mine;
- to the north by general farmland;
- to the west and south west by Bucketts Way;
- to the south east by general farmland

Under the new LEP it is proposed that the subject land be rezoned to IN3 - Heavy Industrial, and that an Environment Protection Zone (E3) be applied to the strip of land running along Bucketts Way

3

Study Objectives

The study has the following principal objectives:

- to develop a visionary plan for the development of an industrial estate in the Stratford area;
- to investigate likely future demands for industrial land with the infrastructure and energy advantages of the Stratford site and to prepare a structure planning framework to guide physical planning and development over the next thirty years.

4

Vision

The Structure Plan seeks to achieve a high quality industry park that is attractively designed in its rural setting focused on the effective use of the site's significant energy resources and transport infrastructure.



5.1 Location and Local Climate

The subject land is located on Bucketts Way, approximately 60 kilometres north of the Pacific Highway and 14 kilometres south of the town of Gloucester. The site has an elevation of approximately 127 metres above sea level at the main entry road and Bucketts Way, rising to approximately 145 metres at the eastern boundary of the subject site and the main entry road.

The site is located at 32 degrees south latitude in a valley encompassed by the Bucketts Range, which forms part of the Great Dividing Range. The climate is temperate - maritime with a summer rainfall maximum. The nearest meteorological station is Chichester Dam at an elevation of 194 metres above sea level, located some 28 kilometres south west of the subject site. Average annual rainfall at Chichester Dam based on 67 years of records is approximately 1,315 millimetres. Rainfall occurs in all months with precipitation varying from approximately 59 millimetres per month over the period July - September to approximately 161 millimetres per month over the period September - March. The highest recorded rainfall in a single day was approximately 262 millimetres (25 January 1955).

Mean daily temperature through the year averages approximately 20.6 degrees celsius. This ranges from an average of 25.9 degrees during the summer months (December - February) to 14.5 degrees during the winter months (June - August).

In summary it is likely that the local climate of the subject site is generally reflective of the pattern displayed at Chichester Dam. This indicates a mild climate with extensive rainfall in a typical year. Allowance for effective

disposal of surface water flows have been provided for in the Structure Plan.

5.2 Site Presentation and Visual Analysis

The broad physical setting of the subject land may be described as a rolling landscape framed by the Liverpool Range. The subject land rises steadily from Bucketts Way and the landscape is broadly undulating framed by stands of native trees with some introduced *Pinus Radiata*. The elevated nature of the site affords vistas to the surrounding ranges (refer to photos below and opposite).



Main Line from entrance



Buffer zone looking south



Looking south to rail cutting



Looking southwest from access road



Front Entrance looking east



Main Entrance looking south

5.3 Slope Analysis

As indicated above the subject land is undulating. The land rises in the vicinity of the main entry road from approximately 127 metres at Bucketts Way to approximately 145 metres at its eastern boundary (refer Figure 2).

Zone 2, which is that part of the subject land north of the railway line is the principal area for subdivision and development and the focus of the Structure Plan. The land rises in a series of terraces with contours broadly parallel to Bucketts Way. The average slope along the main entry road is approximately 1:20 or 5 per cent.

Along the northern boundary the land slope is more undulating and the steeper section is approximately 1:15.5 or approximately 6.5 per cent (for a limited distance of 155 metres). In Zones 1 and 2 the average slope is approximately 1:26.9 or approximately 3.7 per cent.

As a rule of thumb, in optimal circumstances, the preferred maximum slope in industrial estates and parks is approximately 4 per cent, however, comparatively short sections of moderately higher sloping land can be readily managed.

In summary the slope analysis indicates that the average slope across the subject land is between 4 per cent and 5 per cent and there are some limited sections where the slope exceeds 6 per cent. On balance the land form is suitable for industrial park design and the limited areas where land slope exceeds 5 per cent is not considered an impediment for an efficient, attractive and cost effective design for the subject land.

5.4 Drainage

There are no extensive creeks that traverse the subject land. Analysis of the available aerial photography indicates retention basins and dams located in the western area of the subject site, with some identifiable drainage lines. Figure 2 shows the likely direction of indicative surface sheet flows at times of peak rainfall.

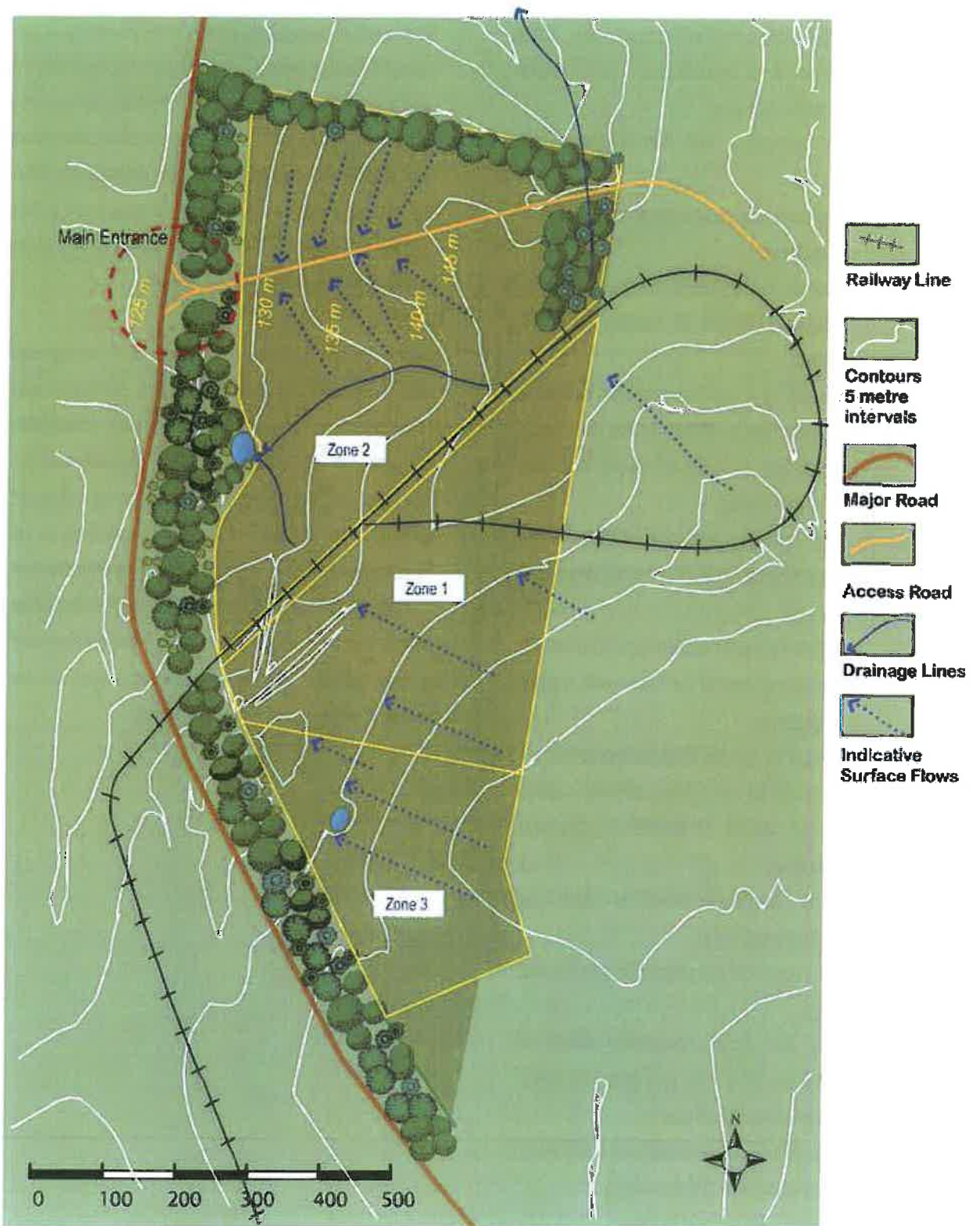
In summary the drainage patterns of the subject land have been noted and drainage principles have been incorporated as part of the planning and site design for the Structure Plan.

5.5 Aboriginal Heritage and Conservation

The site does not have any aboriginal or European heritage issues, nor are there any known endangered species of flora or fauna. Additionally, there are no known natural or man made hazards on the site which would pose risks to the development, people or the environment. The property has previously been used for grazing purposes.

The proposed development will also not have any effect on conserving and using land resources such as productive or prime agricultural land, mineral and extractive resources or water supply. It is also outside of the proposed coal extraction area. There will only be minimal reduction in land for grazing.

**Figure 2 Subject Site:
Topography and Drainage**



The economic significance of the subject site for an industrial park is derived from the resources and operations of the adjacent Stratford coal mine. More particularly the economic importance of the site arises from several factors including:

- very extensive coal bed methane gas reserves;
- significant non potable water supplies;
- rail access;
- proximity to the Port of Newcastle, Hunter Valley and access to eastern seaboard markets;
- potential for a gas compression station to facilitate transfer of gas to the Newcastle market and provision of on-site electrical power generation.

The energy and resource attributes of the site are powerful generators for a range of potential industries. These include:

- a gas compression plant to pipe commercial quantities of gas to the Newcastle market and beyond;
- potential for on-site electrical generation;
- potentials for industries utilizing carbon or coal based materials in chemical production;
- energy intensive industries such as aluminium extrusion;
- brick manufacturing utilising local clay and energy;
- heavy and light engineering plants to service the coal mine and potential future gas and/or electrical plants;
- timber milling or processing and laminating;
- rail servicing and maintenance;
- intermodal freight and logistics.

As illustrated above, research undertaken for the study showed that there are a range of potential industries that could be supported by the site. However, it was recognised that unlike industrial parks in metropolitan and large regional cities a broad diversity of demands could not be supported. In large urban environments well sited industrial parks could be expected to have the diversity and depth of demand to support a fully subdivided industrial park with a range of site sizes and a definitive land release program.

In the Stratford context, although it is recognised that there are significant resource attributes and advantages of the site and there are identifiable demand potentials, the geographic separation of the site from major urban areas predicates that demand is likely to be intermittent and there are likely to be significant variations in the requirements of individual tenants. The implication for the design of the industrial park is that the subdivision will need to be structured so that the rate and extent of development can be varied in response to market demand.

The proposed Structure Plan for Stratford Industrial Park was developed on the basis of the following principles:

7.1 Main Avenue and Entry

The existing entry road to the Stratford Coal Mine provides effective access to the Zone 2 area, which is north of the railway line. In addition the gradient of the entry road is moderate with an approximate 5 per cent gradient.

The first principle of the Structure Plan is to use the existing access road and entry, as the location for a dual carriageway tree-lined avenue to serve as the principal access for the industrial park.

Similarly the location of the existing entry way is proposed to be the site of the principal entrance for the industrial park with themed landscaping and gateway design utilising natural materials.

7.2 Buffers

The second principle of the Structure Plan is the application of extensive buffers to Bucketts Way applying the current environmental protection zone, and the application of significant buffers along the eastern and northern boundaries of the subject Zone 2 land.

The buffers will be maintained with natural site drainage where feasible, and be revegetated with indigenous and native species as set out in the landscape principles.

7.3 Topographically Sensitive Design

A key principle of the Structure Plan is that the internal road network minimises change of gradient and any required modifications to the existing land form.

7.4 Connector Road

The Structure Plan seeks to provide a framework for interconnection between the major land parcels (that is zones 1, 2 and 3) and to facilitate opportunities for a second entry point located as distant as possible from the existing main entry.

7.5 Subdivisional Flexibility

The principle applied in developing a road network and an indicative subdivisional pattern, was to provide a framework which offered the highest flexibility for a range of potential site sizes.

7.6 Rail Operations and Access

An important principle of the Structure Plan is that it seeks to maintain and makes provision for ongoing use of the rail facilities by Gloucester Coal Mine. Within this context provision has been made for additional rail access for sites in the industrial park that will not prejudice the operations of the existing line (refer Figure 4).

7.7 Water Sensitive Urban Design

The Structure Plan provides a drainage concept for the Zone 2 area, built on the principles of water sensitive urban design (WSUD). Drainage framework for the Structure Plan uses the existing land form and directs water run-off to extensive native and indigenous planted buffers.

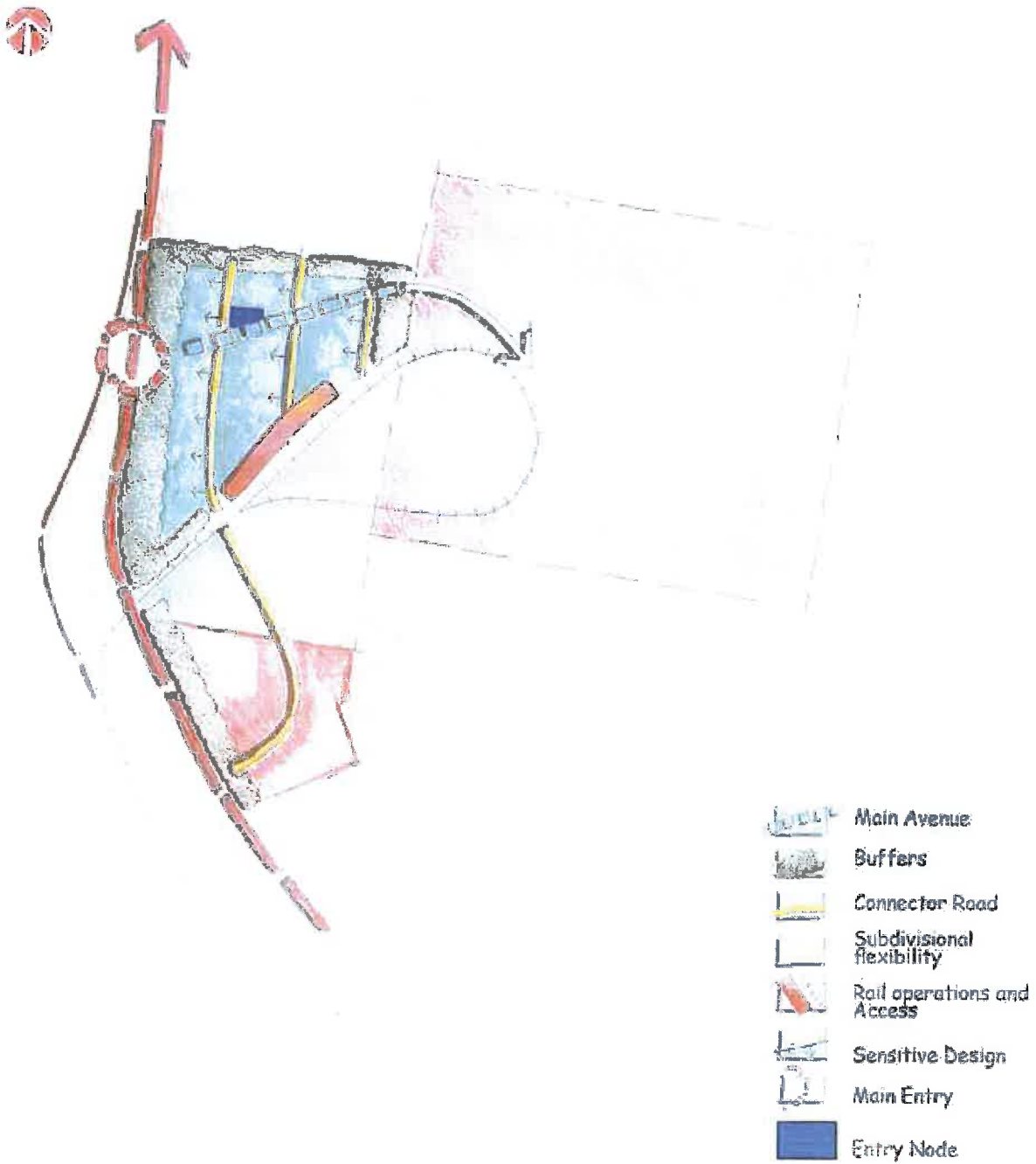
7.8 Entry Node

The Structure Plan seeks to provide a sense of place and orientation with the industrial park through the location of an entry service node. The optimal location of the service node is at the point of highest internal access and visibility; at the junction of the main entry avenue and connector road.

7.9 Sympathetic Landscaping

The landscaping approach for the Structure Plan seeks to provide a framework for naturally regenerative buffers through the use of a range of indigenous and native plantings with supplemental water being delivered by a gravity fed drainage system. It also provides a hierarchy of selected native trees for street planting to reflect the planned road hierarchy.

Figure 3: Structure Plan Principles



The industrial park Structure Plan is primarily focused at Zone 2 with a potential road linkage to Zones 1 and 3. It is comprised of the following elements:

- an environmental protection zone incorporating a landscaped buffer to the industrial park to run parallel to Bucketts Way. The Structure Plan has applied the current environmental protection zone of approximately 100 metres;
- a landscaped limited access entry from Bucketts Way to the industrial park. It is proposed that the existing entry to the Stratford coal mine will serve as the principal entry to the industrial park (indicative elevation sketches are shown in Figures 5, 6 and 7);
- an entry boulevard extending from Bucketts Way through the Zone 2 site. It is proposed that the entry boulevard be a 30 metre reserve with provision for central and edge planting;
- east-west roads providing access from the central boulevard to the estate. It is proposed that the east-west roads be a 20 metre reserve with provision for edge planting (approximately 5 metres on each edge) with a total landscape and road reserve of 30 metres (refer Figures 4 - 7);
- an edge buffer of no less than 25 metres to the northern (farmland) boundary (refer Figure 4);
- potential for the first crossroad in Zone 2 to be linked with a bridge across the railway line to a future internal road in Zones 3 and 1 with a new future road access to Bucketts Way to be located approximately 290 metres south of the railway line;
- a drainage network to be comprised of drainage culverts to be located on the edge of the main

approach avenue and on the north side of each of the east west roads and on the northern edge of the buffer planting area. The culverts are placed to intercept sheet flows and transfer excess water across the site to the planting buffer.

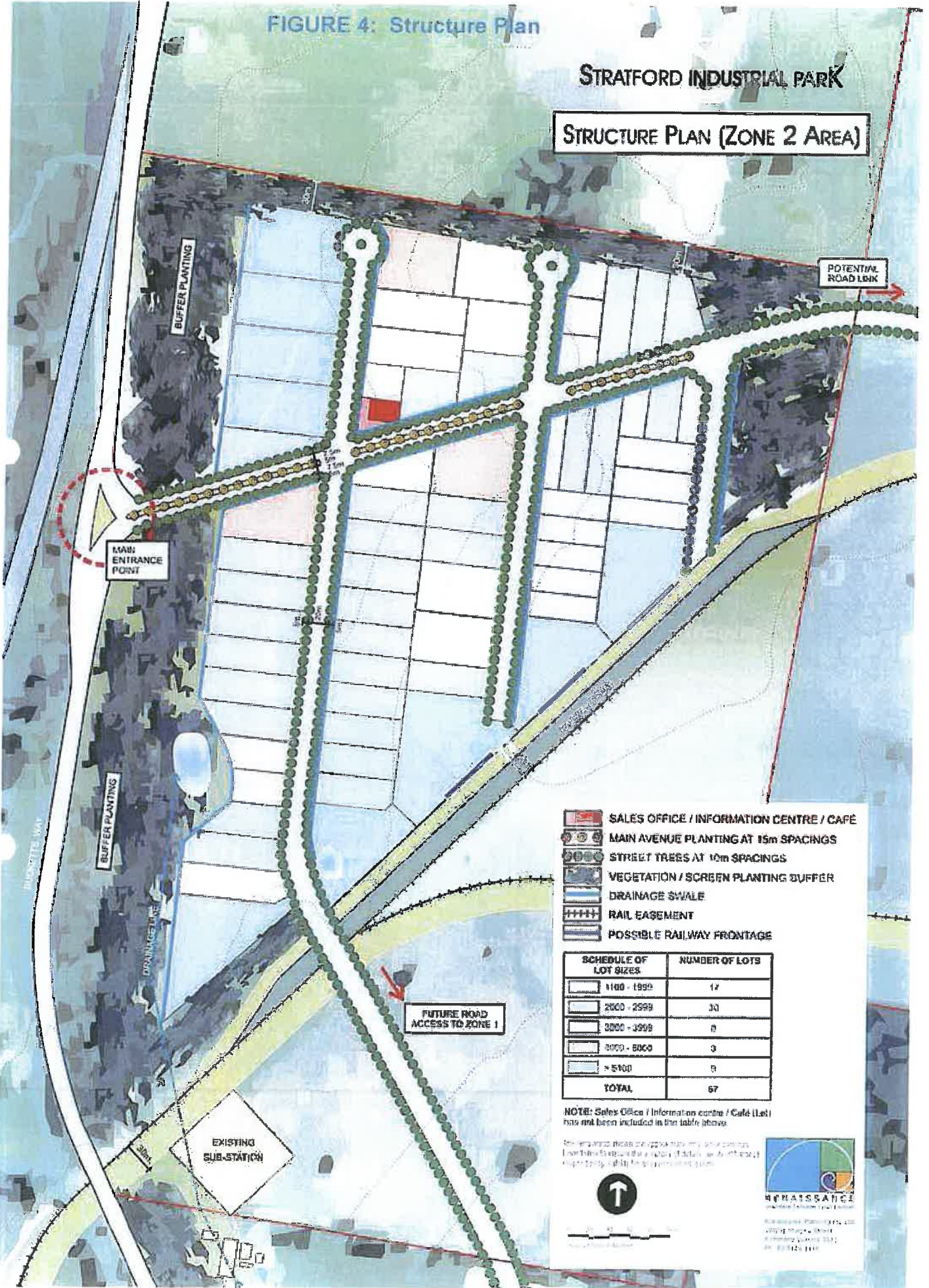
An indicative subdivision of land is shown in the Structure Plan (refer Figure 4) to illustrate how a range of different site sizes could be accommodated within the Structure Plan. It is emphasised however that the essential elements of the Structure Plan are comprised on the main entry road and the east-west access roads. The Structure Plan provides for a range of site sizes that can be combined to provide for larger lots. It is recommended that the approved subdivision plan allow for combinations of site sizes to be used to maximise flexibility in the progressive development of the site.

The following section provides planning and design principles for landscape treatment and site design, consistent with the Gloucester Local Environmental Plan (2000) and Development Control Plans in the future: Land in Industrial Zones (Gloucester Shire Council 1996).

FIGURE 4: Structure Plan

STRATFORD INDUSTRIAL PARK

STRUCTURE PLAN (ZONE 2 AREA)



- SALES OFFICE / INFORMATION CENTRE / CAFE
- MAIN AVENUE PLANTING AT 15m SPACINGS
- STREET TREES AT 10m SPACINGS
- VEGETATION / SCREEN PLANTING BUFFER
- DRAINAGE SWALE
- RAIL EASEMENT
- POSSIBLE RAILWAY FRONTAGE

SCHEDULE OF LOT SIZES	NUMBER OF LOTS
1100 - 1899	12
2000 - 2599	30
3000 - 3999	0
4000 - 6000	3
> 5100	2
TOYAL	67

NOTE: Sales Office / Information centre / Cafe (Lot) has not been included in the table above.

The plan was prepared by Renaissance Planning Services Inc. based on the information provided by the applicant. Renaissance Planning Services Inc. is not responsible for the accuracy of the information provided by the applicant.



Renaissance Planning Services Inc.
 2000 Highway 10 West
 Cambridge Ontario N3H 2Y1
 Tel: 519-241-1111

SCHEDULE OF LOT SIZES	NUMBER OF LOTS
100 - 199	1
200 - 299	30
300 - 399	4
400 - 499	2
500 - 599	5
600 - 699	3
TOTAL	57

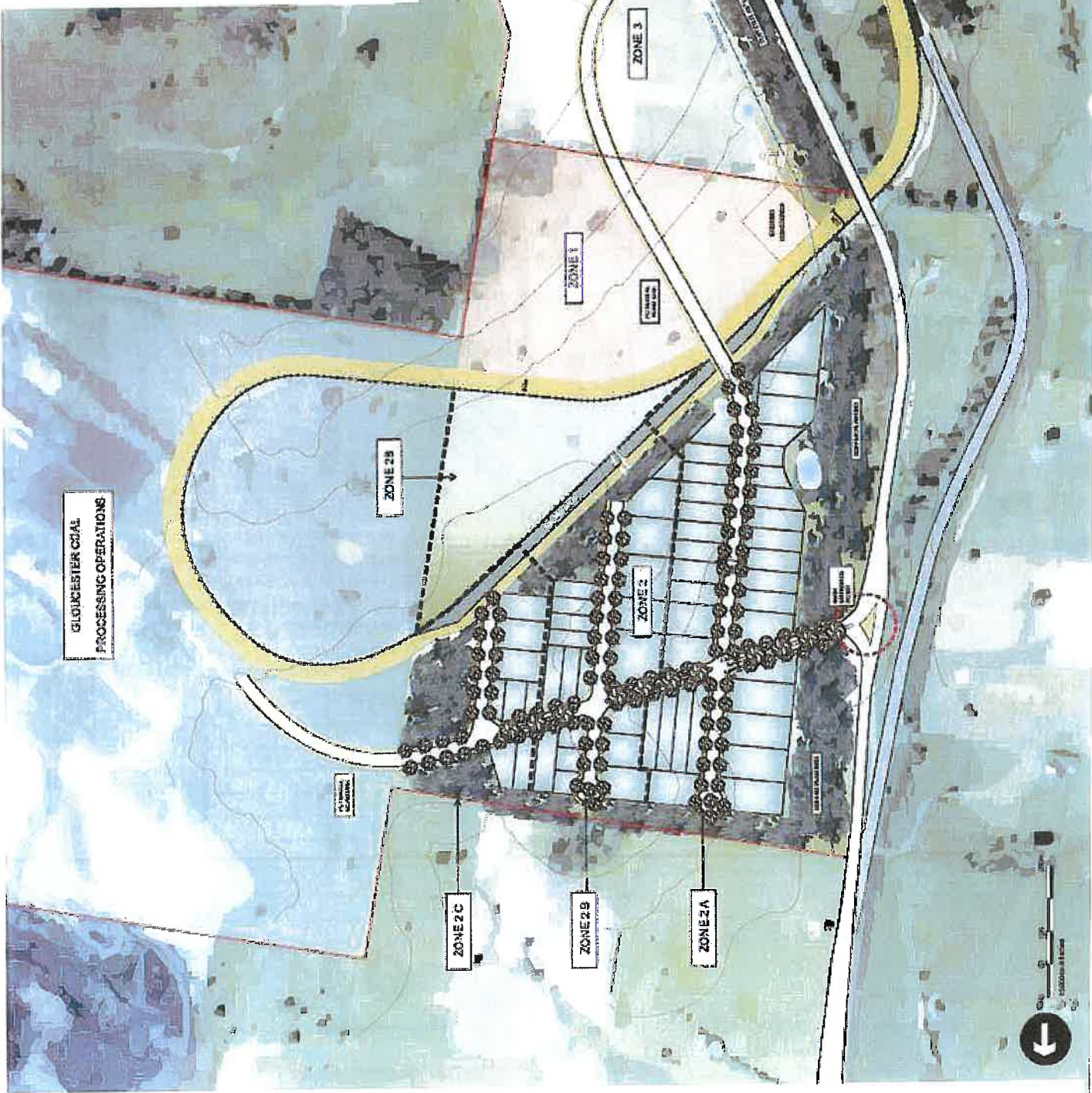
NOTE: Other zones & miscellaneous details - 2016-2017
 This map shows the proposed lot sizes for the development.

The area shown on this map is not to be used for any other purpose.
 It is not to be used for any other purpose.
 It is not to be used for any other purpose.



Scale: 1:10000
 0 100 200 300 400 500 600 700 800 900 1000

ZONE 1 ZONE 2 ZONE 3 ZONE 4



9.1 The Local Environment.

The planning and design guidelines have been prepared to serve as a practical reference for businesses seeking to establish operations in the Stratford Industrial Park. The guidelines, and landscape principles have been prepared so that the Gloucester Shire in conjunction with industry park occupants can, together, create and maintain an attractive park-like setting in the context of the overall master plan. This will ensure that industry and commerce within the park is provided within a sequence of landscaped areas complemented by a built environment to exemplify quality.

The landscape of the park in terms of streetscape and entry zones has been predicated upon a comprehensive landscape master plan which co-ordinates species type, arrangement and hard landscape materials. Establishing and maintaining a consistently high quality industry/business environment to a co-ordinated theme will help protect and enhance the investment of all those choosing to locate and work within the park.

Local Vegetation Character

The ambition of the planting design approach is to ensure that the long term landscape screening reflects the surrounding landscape. The landscape buffers will celebrate the local indigenous flora and allow for a succession of the major eucalypts over time which will provide an alternative to a dense wall of shrubs and smaller species. Ultimately the perimeter screening will celebrate a sense of continuity and provide partial screening. The strength of the design approach is to ensure that clear defined sight lines within the estate, careful site planning of individual lots, and the surrounding buffers will establish

a consistent and co-ordinated composition that is intrinsic to locale and site.

Species Selection Stratford Industrial Estate

Considerable thought has been given to celebrating the local plant community by establishing extensive screening buffer plantations around the site. Within these plantations considerable scope will be given to establishing a succession plant community. The principle being to ensure that over time the smaller shrubs and woody species, (acacias, hakeas and callistemons) will give way to a climax community of indigenous eucalypts. Ultimately this transition will lead to a developed landscape theme which reflects in some respects the open woodland of indigenous trees. Our aim is not to hide the industrial estate behind a vegetative wall of planting, rather to give partial screening in the long term and provide an adjunct to the surrounding landscape. Key to this is the quarantining of plantings behind agricultural fencing and plant establishment to ensure the success of plant establishment.

Core Local Plant Species

Illustrated in the text are a core plant listing of local species that would be ideally suited to infill and buffer planting. The core tree species, *Eucalyptus microcorys*, Tallow wood and *Eucalyptus moluccana* Grey Box are the climax species with smaller trees, Casuarinas spp and Blackwood, (*Acacia melanoxylon*) as secondary species. Although significant plantings of Hakea and Callistemon are prevalent, the most favoured infill and shelter belt shrub species is the *Callistemon Viminalis* which offers both sturdy form and striking foliage (see illustrations).



Eucalyptus microcorys



Callistemon viminalis



Eucalyptus moluccana



Casuarina torulosa



Acacia melanoxylon

Principal Street Trees

Some effort has been made to ensure that although the core plantings within the streetscape are not local, the trees have been provided to provide consistency and utility of form. The streetscape vegetation has been selected from native non-indigenous trees. The reasoning is to ensure a reliable and consistent planting with durability and hardiness as the criteria for establishment.

The principal street trees are as follows:

Angophora costata



Corymbia maculata



Design Criteria

Although this is an industrial estate, there is no reason why it shouldn't evoke the spirit of this part of New South Wales. The illustrations suggest typical planting for shelter belts and roadways. The main axis is designed to direct traffic and follow view lines to distant hills.

Development Setbacks

Critical to the identification of the estate is the establishment of basis uniform setbacks to determine scale and open space relationships. The standardisation of setbacks will ensure clear and defined edges, a consistency of treatment and clean appearance for individuals within the site. It will also develop wayfinding and site location.

All lots are required to have a minimum front setback from a road as follows:

<i>Minimum Setback</i>	<i>Distance</i>
Front Boundary (except main roads)	10 metres
Front Boundary (main roads)	15 metres
Side Boundary	3 metres
Rear Boundary	3 metres
Corner Allotments (except main roads)	8 metres
• if necessary these setbacks may be reduced to 3 metres on a corner lot;	
• if necessary, these setbacks may be reduced to 3	

metres where a lot has an area small than 1750 square metres;

- these minimum front setbacks have been designed to establish a co-ordinated streetscape image and will ensure adequate distances between a road and any new buildings and car parking;
- with the exception of access aisles established for the purpose of site access and exit, the front setback should be fully landscaped (refer sections and elevations).

Side and Rear Setbacks

- buildings may be constructed to side boundaries. If buildings are not built to the boundary they should be set back from the relevant boundary a minimum of 3 metres or other minimum distance required under relevant fire regulations;
- this setback must be appropriately landscaped and maintained.

Preferred Vegetation Shelter Belts and Screening

- the plant schedule indicates species suitable for growing in these hardy conditions. Wherever possible, the planting of shelter belts and screening should be derived from local indigenous species. The location and choice of vegetation should take account of the existing landscape theme, as well as local soil conditions and prevailing weather;
- species should usually be chosen to minimise long-term watering requirements;
- fast growing, screening plants are preferred

between properties (along side boundaries), however, species having a reputation for short life-span, unstable structure or messy configuration are discouraged;

- massed plantings of single species are preferred rather than a mixture of various species.

Preferred Vegetation Streetscape Planting Centre Median

Two hardy, reliable and durable street trees have been selected for the central median. The central median is envisaged as the principal access spine, the scale character and definition of the park is intrinsically tied to the sense of order and avenue effect established by this strong planting. The planting consists of either Spotted Gum (*Corymbia maculata*) or Lemon Scented Gum (*Corymbia citriodora*) within a 4 metre wide bed.

Corymbia citriodora



Within the bed the surface will be planted with a hardy native grass, *Dianella revoluta*, (the black anther flax lily), thus establishing a viable low-maintenance centre planting of durable grasses.

Dianella revoluta



The site shall be prepared with topsoil to a depth of 300 mm, and a covering of suitable organic mulch to a depth of 100 mm. It is our experience that the centre median should also be prepared with an appropriate weed retardant mat prior to planting to ensure long-term suppression of weeds and invasive grasses.

Preferred Vegetation Secondary Streetscapes

There is a minor variation in the selection of trees for secondary streetscapes (any street other than the main entry axis). Included in the listing is the Water Gum (*Lophostemon conferta*) and the Wallangarra-White gum (*Eucalyptus scoparia*).

Lophostemon conferta



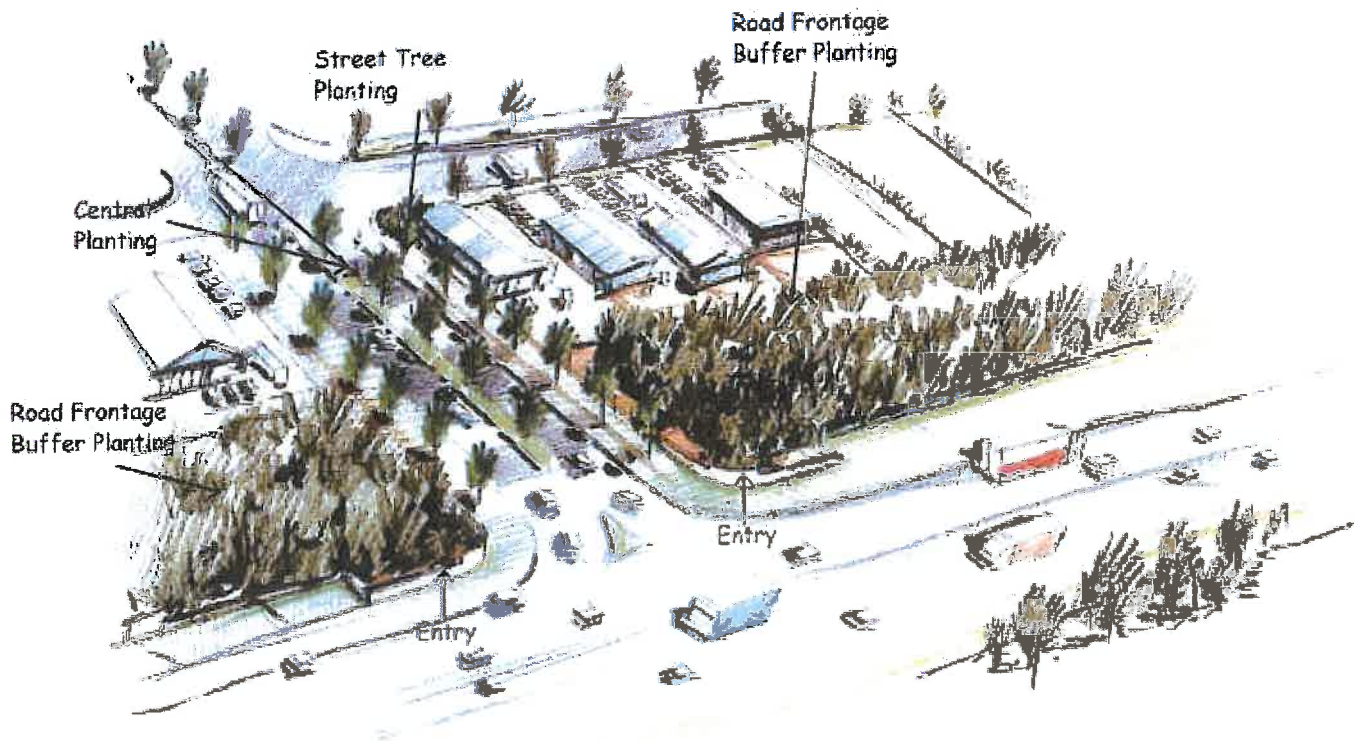
Eucalyptus scoparia



Both trees, though not local, will be well suited to local conditions and provide a durable and reliable secondary tier planting. The scale of these trees (being smaller) will allow the principal access spine to predominate, thus establishing some basic wayfaring and site identification principles.

Figure 5 Main Entry Perspective

This sketch depicts the general layout of the entry spine at the junction of Bucketts Way. Of particular interest is the entry wall treatment flanking the main spine and the displacement of the screening planting along the frontage. The illustration depicts the central median planting of groundcovers and native grasses, (*dianella* spp.) with a central planting of Spotted Gum (*E. maculata*). The illustration also represents the setback of the buffer planting from the road edge, and the mown strip, (approx 15 metres wide) along the main road and central spine axis.



Sketch Perspective
Entry Sequence

Figure 6 Context Sketch Elevations Main Entry

This sketch depicts the scale and materials proposed for the entry point from Bucketts Way. The entry "gateway" consists of a central section of concrete pillar with the name of the estate inscribed. The flanking arms are a gabion wall, (approx 1 metre high) constructed of local stone. The main peripheral fence beyond the gabion wall, (main road frontage) is an agricultural fence with ring-lock. This has been designed as a low maintenance but durable frontage to the industrial estate.

The lower elevation details the typical placement of trees adjacent the main spine plantation. The Water Gums, (*L.conferta*) are planted at 12 metre centres set back approximately 5 metres from the roadway. An option of introducing a 3 metre shrub planting has been proposed to soften the edge of plantation and provide partial screening of industrial buildings.

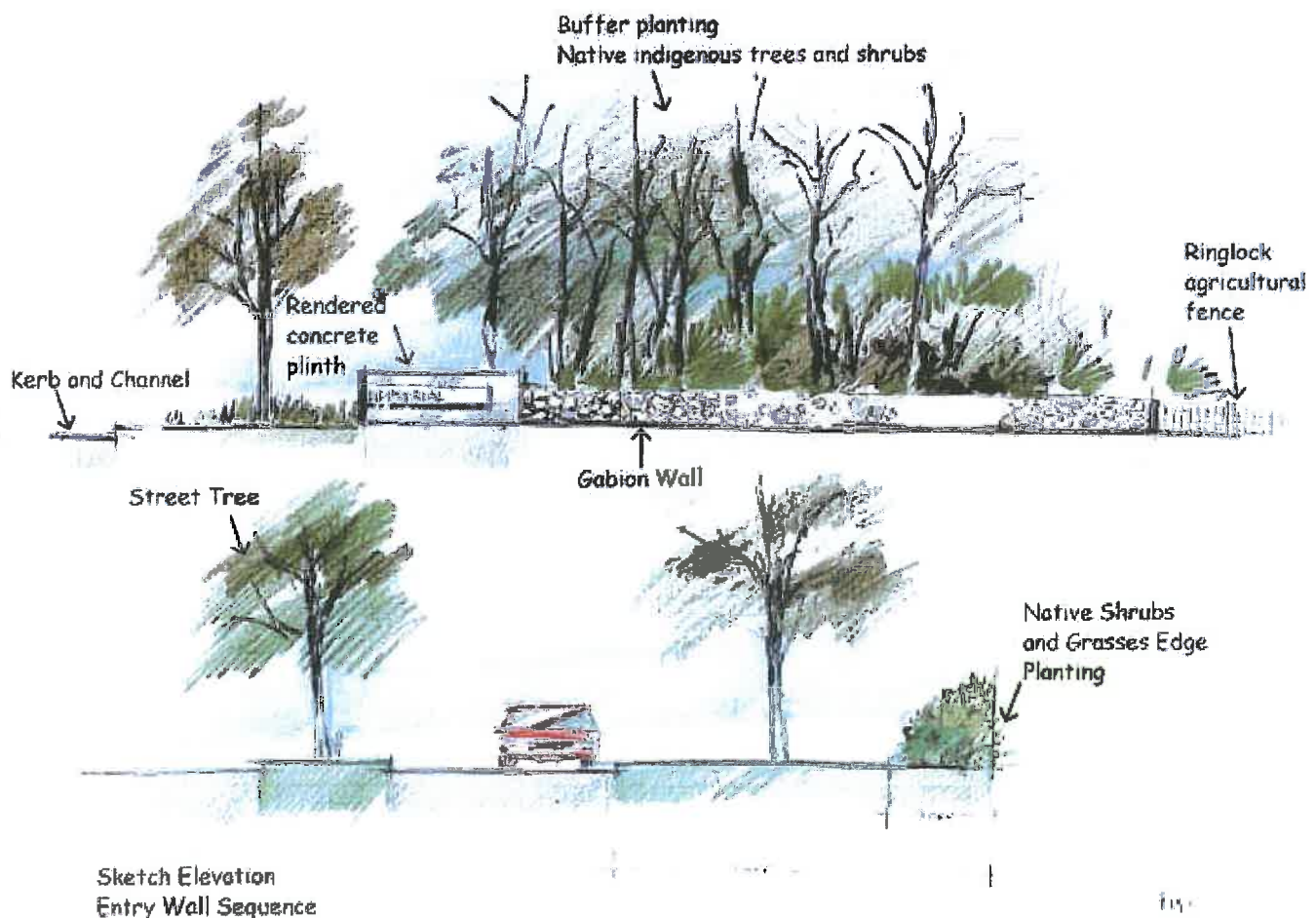
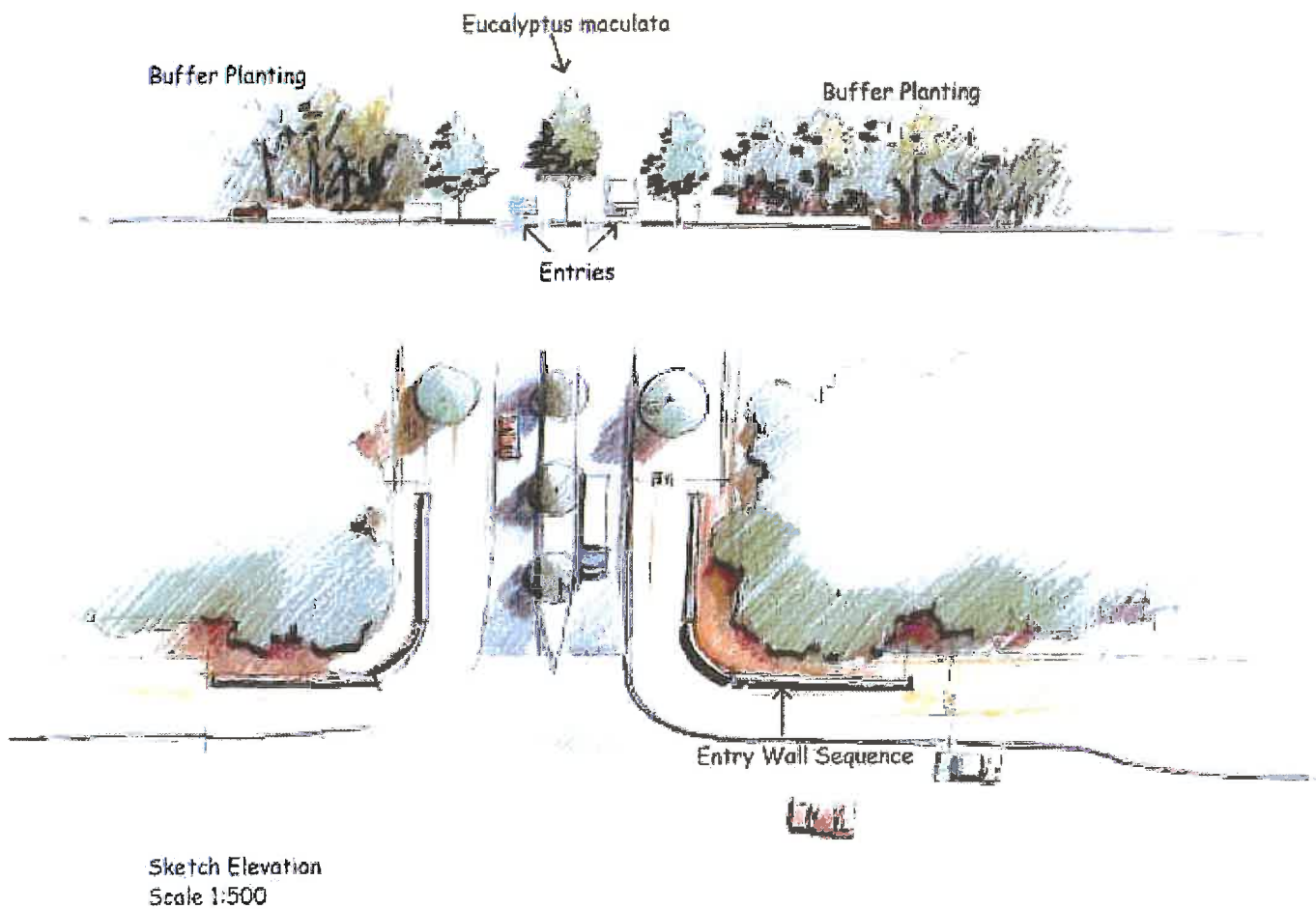


Figure 7 Context Sketch Plan and Elevation Main Entry

This sketch depicts the relative scale and dimension of the proposed planting design. It details the relationship of the screening buffer to the street tree planting, and the relative scale of the entry treatment flanking walls



34

Figure 8 Sketch Plan, Typical Planting theme for Larger Industrial lot

This sketch depicts the type and scale of planting proposed for a larger building, (upwards of 1600 square metres) and the manipulation of landscape materials and setback. Key to the Landscape design is the continuation of street tree planting into the site and arrangement of screening planting to the sides and rear. A 1 metre crushed rock access path is indicated in the sketch elevation, enabling access and ease of maintenance.

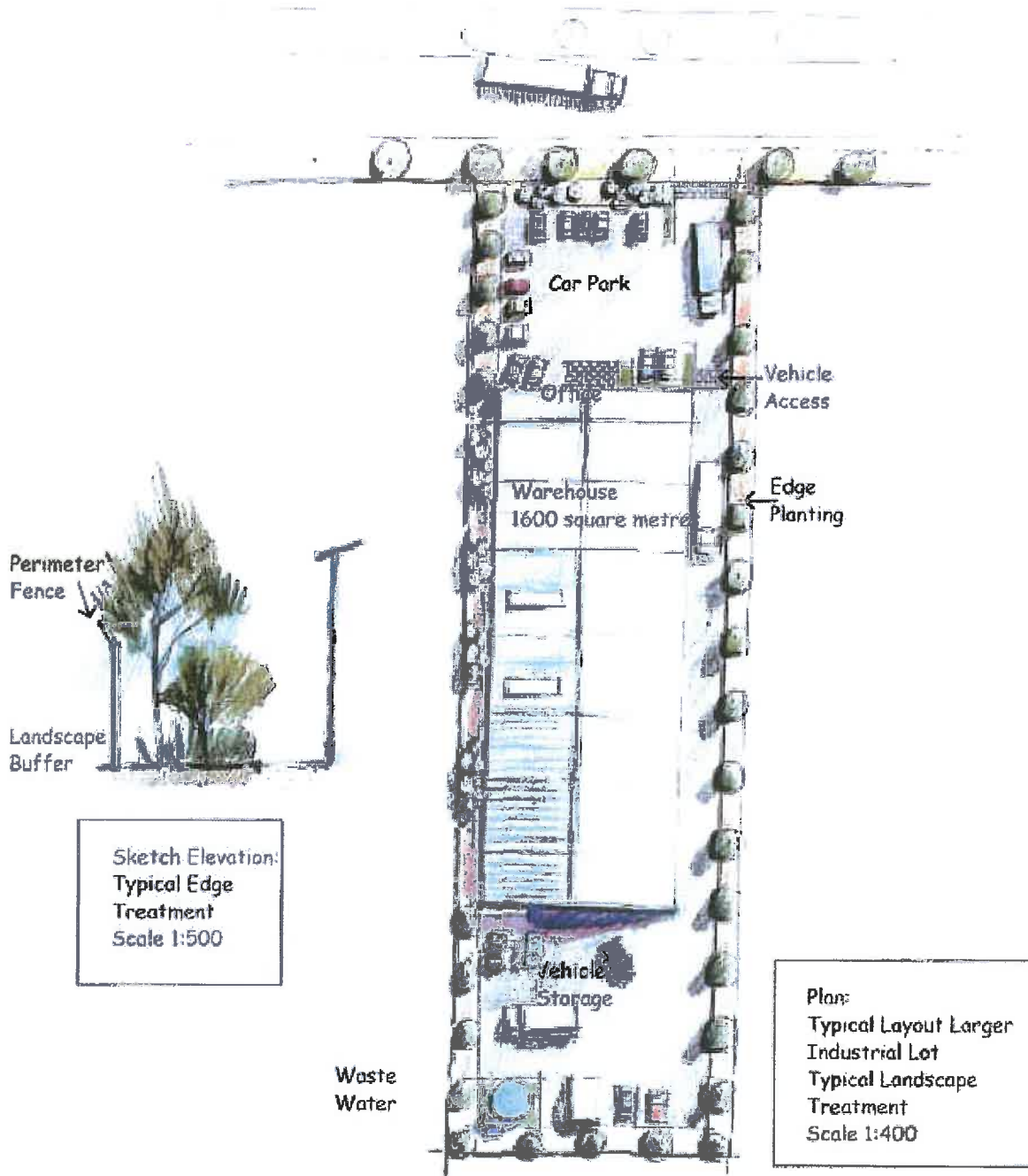


Figure 9 Sketch Plan, Typical Planting theme for Smaller Industrial lot

This sketch depicts the type and scale of planting proposed for a smaller building, (less than 900m²) and the manipulation of landscape materials and setback. Key to the Landscape design is the continuation of street tree planting into the site and arrangement of screening planting to the sides and rear. A 1metre crushed rock access path is indicated in the sketch elevation, enabling access and ease of maintenance.

The sketch also indicates the entry into each site. The proposal is to implement WSUD principles in the grading and management of surface water. It also ensures some limited protection for street trees and definition of access points

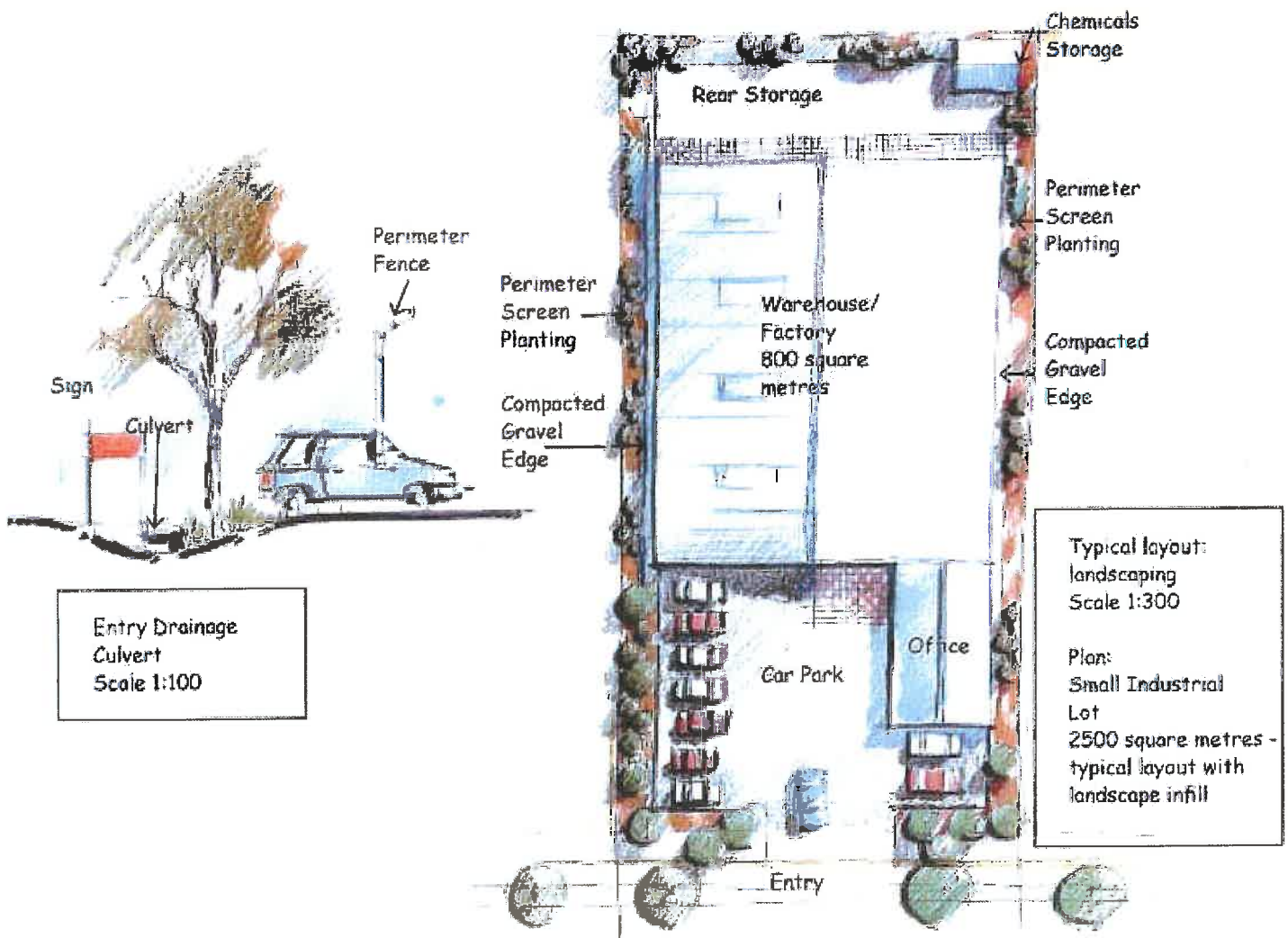
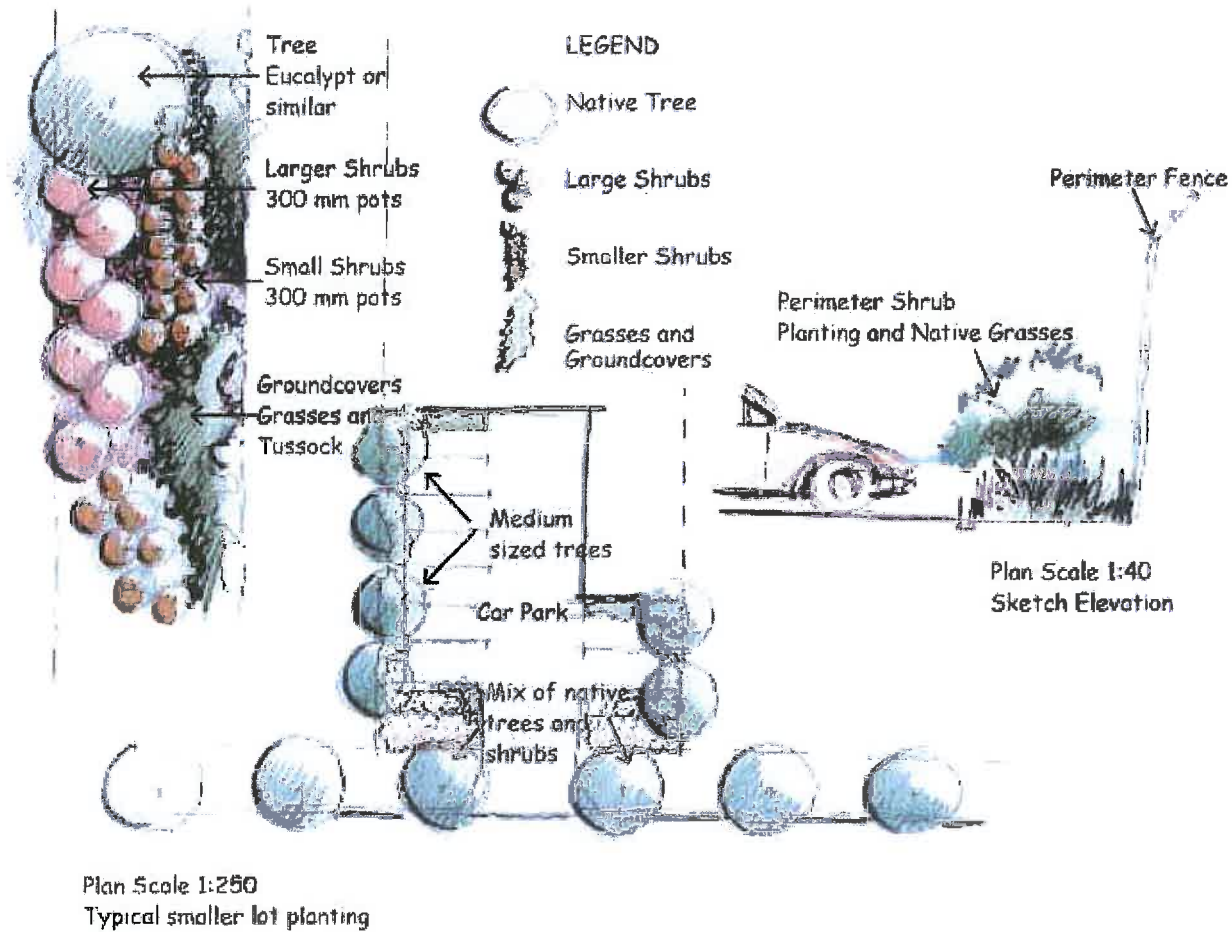


Figure 10 Sketch Elevation and Plan, Typical Planting Theme Screen Planting

This sketch depicts the type and scale of planting proposed within the screen planting. The illustration depicts the breakdown between plant types and relative sizes. Key to the Landscape design is the continuation of street tree planting into the site and arrangement of screening planting to the sides and rear. A 1 metre crushed rock access path is indicated in the sketch elevation, enabling access and ease of maintenance.



9.2 Signage

General Signage

All signage in the Park will need to comply with the provisions of the local planning scheme and the specific guidance provided in the overall design strategy.

Directional Signage

Each business established within the Park is encouraged to provide appropriate directional signage to assist with the movement of pedestrian and vehicular traffic.

In general signage should explain

- site entries;
- staff and visitor car parking;
- goods delivery and pick-up;
- reception and office areas;
- directional signage should be of a consistent type and style throughout out the site.

Business Signage

- Business signs should be sensitive to the style, scale and development. Visual clutter, created by too many or inappropriate sign types is strongly discouraged;
- business signs should be integrated and conform to the architectural design of the building.

9.3 Soil and Water Management and Sediment and Erosion Control

It is envisaged that there will be some disturbance of soil on site during construction and development of the site. It is important that all operators and owners understand the principles of basic soil management and ensure that local soils are protected and effort are made to reduce soil dispersal and wastage from site.

Basic fundamentals include the following:

- connection of roof water to the stormwater system;
- equipment cleaning and sediments retained within site;
- solid wastes to be stored on site;
- capacity to contain chemical and industrial waste spills on site;
- entry points located to minimise sediment tracking from site;
- sediment fences for rear of site;
- sediment control at all drainage inlets;
- retention and stockpiling of existing soils during development and construction period.

9.4 Water sensitive Urban Design (WSUD)

Critical to the long-term viability of the site is the implementation of WSUD Principles. In this report specific reference has been made to the incorporation of wider drainage swales in streetscapes and the distribution of storm water off site and into the shelter belts and screening plantings. It is to be anticipated that all storm water drainage be collected and articulated to the shelter belts and existing water bodies, (dams). The articulation of street design and surface flow have been to maximize cross contour runoff. Ultimately with the adoption of WSUD principles the retention and durability of both street trees and plantings will be ensured in the long term, thus obviating the requirement for irrigation beyond the minimum plant maintenance and establishment period.

Intrinsic to this is the establishment of a drainage swale system linked to the streetscapes. A cross flow across the streets and the insertion of shallow kerb and channel to ensure collection and reticulation to street trees and dispersal towards the shelter belt plantings. It is envisaged, (see Figure 9) that this will provide the two fold effect of maximising collection of storm water flows, reticulating water to planting areas, and dispersal of sediments within the drainage process. The basic principle is to establish a 1 metre wide drainage swale on the higher side of the streetscape and reticulate this flow to planting areas and existing drainage retention systems, (dams).

Landscape Master Plan

The master plan indicates the principal layout and circulation details. The principal elements are summarized:

- main screening of native indigenous vegetation along Buckets Way, (minimum depth 70 metres);
- main access spine - planting of street trees;
- indicative lot layout;
- rail and setbacks;
- existing features and associated landmarks.

Preferred Plant Species/Landscape Buffers, (screening)

The intent is to reinforce the road as primary entry into the site. To this end the planting will need to strongly identify the sense of arrival through ordered and uniform planting that is bold, simpler and elegant. Landscape Buffer Planting will exist in two tiers.

Roadside screening vegetation within the 70 metre setback and peripheral planting between the development envelopes.

The roadside screening vegetation consists of plantation-scale plantings of indigenous trees and shrubs, with native grasses and mulched beds contained and protected within a stock-proof protective fence. The aim of these wide planting areas is to reflect the local indigenous vegetation and provided strong screening and reserve for native indigenous flora and fauna. It is also envisaged that drainage within the site will be directed into these landscape reserves to ensure maximum viability.

Landscape Buffer Planting within site

One row of native evergreen trees, offset from the midpoint of the Avenue Trees. Under planting with 2 rows of large shrub planting at 1.5 minimum spacings, to screen views and create a leafy landscape. Front row of lower singular shrub species and back row of taller singular shrub species to maintain uniformity. Alternatively achieve well maintained grass, opening glimpses through the tree avenues..

Tree Selection Tree Hardiness

The trees and plants listed have been selected upon the criteria of providing hardy and reliable cover with minimum maintenance. There are well proven varieties, drought tolerant and resistant to disease and insect attack. They have also been proven as reliable in hard wearing industrial estates. The provenance, (9 origin) is not strictly to the local area, but it is felt that for the avenue planting, (as distinct from the buffer plantings), reliability and maintenance of natives trees is pre eminent. The stature and form of the principal avenue trees will contribute to and overall effect of clarity, realizing the potential of vistas and sightlines, and establishing a personality consistent with the broad pastoral landscape of the locale

As the secondary road within the estate and with car park frontages, the intent is to reinforce the hierarchy through a strong co-ordinated garden environment to maintain a sense of order and business.

Botanical Name	Common Name	Minimum size	Mature Height and Spread
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	1.8 - 2.2 metres	15 -20 x 10 -14 metres
<i>Angophora costata</i>	Smooth Bark Apple Gum	1.8 - 2.2 metres	10-15 x 5 - 10 metres
<i>Westringia fruticosa</i>	Coastal Rosemary	250 mm pot	1.5-2 x 2-4 metres
<i>Callistemon cilrinus</i>	Scarlett Bottlebrush	250 mm pot	1.5-3 x 1-2 metres

Landscape Buffer Planting

Occurring between the front lot boundary and building car park, shrub planting at 1.5 metre minimum spacings, to minimise the impact and soften the views towards the buildings and the car parks. The planting should be of a singular species to maintain uniformity or alternatively an area of well maintained grass.

Car Park Median Planting

To incorporate natural elements into the hard landscape, small native shade trees planted at minimum 5 metre spacings. Where the median is shared, co-ordinate planting with adjacent property owner to achieve this spacing, that is 10 metre spacing each. Plant with an under storey of native shrub and tussock at a minimum of 4 metres plants per square metres. Plant with single shrub and tussock species.

	Botanical Name	Common Name	Minimum size	Mature Height and Spread	
Trees	Car Park Trees				
	Melia azedarach	White Cedar	1.5 - 1.8 metres	4-8 x 2.2 metres	
	Eucalyptus maculata	Spotted Gum	1.5 - 1.8 metres	10-12 x 8-10 metres	
Buffer Planting	Eucalyptus scoparia	Wallangara White Gum	1.8 - 2.2 metres	15-20 x 10-14 metres	
	Westringia fruticosa	Coastal Rosemary	250 mm pot	1.5-2 x 2-4 metres	
	Callistemon citrinus	Scarlett Bottlebrush	250 mm pot	1.5-3 x 1-2 metres	
Shrubs	Car Park Median Planting				
	Atriplex semibaccata	Berry Saltbush	150 mm pot		
	Grevillea rosmarinifolia	Rosemary Grevillea	150 mm pot		
	Mycoporum parvifolium	Creeping Boobiala			
	Olearia ramulosa	Twiggy Daisy Bush	150 mm pot		
	Tussocks	Dianella revoluta	Black Anther Flax Lily	150 mm pot	
		Lomandra longifolia	Spiny Headed Mat Rush	150 mm pot	
Poa labillardieri		Common Tussock Grass	150 mm pot		

Buffer Planting

The purpose of the buffer planting is to soften the impact of buildings in the natural landscape and provide a vegetated environment with its own identity while incorporating natural elements of the site and also to provide screening between business lots and from public areas.

At the front of side of lots facing roads, there needs to be provision for groups of 3 to 5 of the same species of native trees, with 5 metres spacings at maximum 1.5 metre spacings. The front row is to be of a single lower species and the back row of a single taller species to create uniform movement along the road. Alternatively, achieve well maintained grass.

The side and back of lots adjoining other lots, there needs to be a landscape that is incorporated into distant views that provides screening between lots. Tree groupings and underplantings should be as per front and side lots noted above.

	Botanical Name	Common Name	Minimum size	Mature Height and Spread
Trees	<i>Corymbia maculata</i>	Scented Gum	1.8 - 2.2 metres	15-30 x 10-20 metres
	<i>Eucalyptus melliodora</i>	Yellow Box	1.8 - 2.2 metres	15-25 x 10-20 metres
	<i>Eucalyptus polyanthemos</i>	Red Box	1.5 - 2.0 metres	15-30 x 6-10 metres
	<i>Westringia fruticosa</i>	Crested Rosemary	250 mm pot	1.5-2 x 2-4 metres
Shrubs	<i>Acacia paradoxa</i>	Hedge Wattle	250 mm pot	1.3 x 2.5 metres
	<i>Leptospermum lanigerum</i>	Woolly Tea Tree	200 mm pot	2-5 x 1-3 metres

Trees for Open Sites and Reserves

To reinforce the 'native parkland' setting of the 'Gloucester Estate', open sites and reserves must be well maintained with regularly mown grass and natural groupings of 3 - 5 trees of same species throughout the site. Where screening is required or an area is to be defined, plant with 1 or 2 rows of trees.

Botanical Name	Common Name	Minimum size	Mature Height and Spread
<i>Angophora costata</i>	Smooth Bark Apple Gum	1.8 - 2.2 metres	10-15 x 5-10 metres
<i>Casuarina cunninghamii</i>	River She-Oak	1.8 - 2.2 metres	12-30 x 10-20 metres
<i>Corymbia maculata</i>	Spotted Gum	1.8 - 2.2 metres	15-25 x 10-20 metres
<i>Eucalyptus melliodora</i>	Yellow Box	1.8 - 2.2 metres	15-25 x 10-20 metres
<i>Eucalyptus ovata</i>	Swamp Gum	1.8 - 2.2 metres	20-30 x 10-15 metres
<i>Eucalyptus polyanthemos</i>	Red Box	1.5 - 2.0 metres	15-30 x 8-10 metres

9.5 Plant Establishment

The success of all landscape planting themes, the integration of streetscape and shelter belt planting will depend upon a minimum twelve months maintenance period. It is envisaged that all plantings will be suitable to local soil and climatic conditions and the maintenance period will ensure replacement and management of defective plants and accommodate plant losses. The maintenance regime also ensures adequate preparation of sites and appropriate mulching and weed control for shelter belts, (screening) and streetscape plantings.

The Stratford Industrial Park Structure Plan provides a clear physical framework for the sustainable development of a diversified energy-based industrial estate at the Stratford Coal Mine located on Bucketts Way in Gloucester Shire, New South Wales.

The Plan takes full account of the physical setting and climatic considerations and provides for extensive buffers consistent with the current environmental protection zone and development requirements set out in the Council's Development Control Plan (1996) for land in industrial zones.

A significant focus of the Plan has been the establishment of a framework that utilises water sensitive urban design (WSUD) and the application of extensive native and indigenous trees and shrubs in buffers, avenue planting, local access streets and on-site landscaping.

The Stratford Industrial Park Structure Plan recognises the need for a flexible approach to accommodate future development and provides for the application of different site size options to meet future demand requirements.

In summary the Structure Plan provides a consistent framework for an attractive high quality industrial park in harmony with its rural setting and environment.

