CITY OF GREATER DANDENONG

DEVELOPMENT PLAN FOR THE KEYSBOROUGH SOUTH LOCAL PLANNING POLICY AREA – STAGE 1

Watsons Pty. Ltd.
ABN: 47 637 509 613

CHELTENHAM ROAD, SPRINGVALE ROAD & CHAPEL ROADS, KEYSBOROUGH

Development Plan prepared by Watsons Pty Ltd

On behalf of landowners within the Development Plan Area

October 2002 Revision

(Supersedes May 2002 version)

Watsons Ref: 32291

Pursuant to Clause 43.04 Schedule 2 of the Greater Dandenong Planning Scheme this is a copy of the Development Plan (Amended) for part of the land defined as Stage 1 of the Keysborough South Local Planning Policy Area Development Plan - Greater Dandenong Planning Scheme. The Development Plan approved on the 31st ~~December~~ 2002 has been amended in accordance with Council resolutions of the 9th December 2002 and the 14th April 2003. This Development Plan has been prepared to the satisfaction of the Responsible Authority.

Signed _____ and dated 14th May 2003
by Manager Strategic and Statutory Planning,
City of Greater Dandenong

Contents

Appendices

Figures

1.0 Introduction

This Development Plan is the approved plan required by Schedule 2 to the Development Plan Overlay (Clause 43.04 – See Appendix 1), of the Greater Dandenong Planning Scheme.

The Plan outlines the way in which the various land holdings within the Plan area will be developed to ensure the coordinated delivery of a new residential community based around the delivery of a network of high quality linear open space and open water bodies that delivers genuine water quality improvements. The community will incorporate elements of environmental sustainable development while providing access opportunities to the wider non-urban area from which the Development Plan area once formed part of.

Applications for subdivision of the various parcels of land in the Plan area must demonstrate accordance with the Plan in order to be approved by the Council. There is scope for minor departures from the requirements of the Plan however these must be justified and not prejudice the orderly development of open space or adjoining development. More significant departures from the Development Plan will require Council approval prior to the issue of a planning permit.

The Development Plan revisits much of the work undertaken and presented to the Panel and Advisory Committee considering Amendment C2 which rezoned the Development Plan area. However, this has been included in order to make this Development Plan a stand-alone guide for subdivision in the Plan area. For this reason, the Plan identifies site and locality constraints/opportunities, road network issues, drainage system requirements, Planning Scheme requirements and matters arising from the Urban Design Guidelines forming part of the Plan. From this information a Subdivision Concept Plan has been prepared that reflects the various influences on the Plan. Detailed issues affecting the Plan are described as matters to be identified and addressed as part of planning applications for subdivision or permit conditions.

2.0 Land to which the Plan Applies

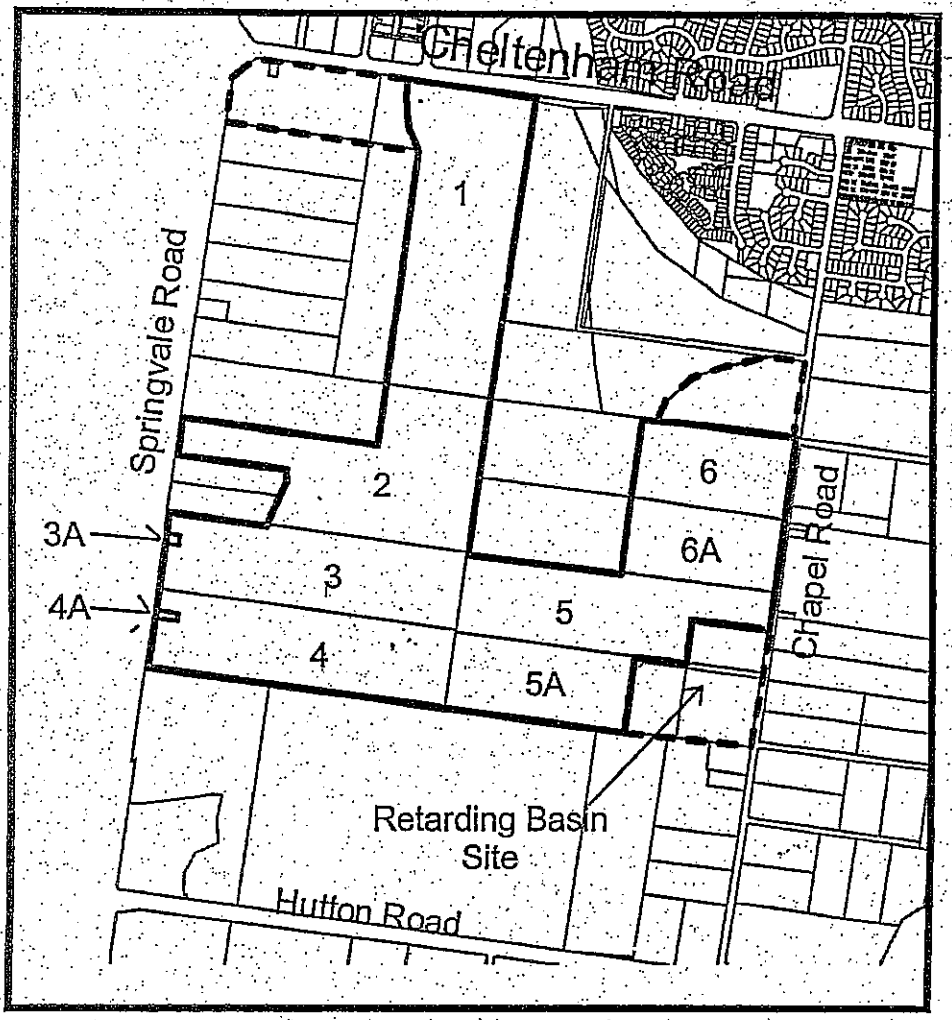
Figure 1 shows the total extent of the Development Plan required by Schedule 2 to Clause 43.04, and it also shows that part of the area to which this Development Plan specifically applies.

The areas not subject to this Development Plan (but within the Development Plan area) are separable from this Plan area either because of the significantly different uses to which they will eventually be put or because the development of these areas will not occur within the foreseeable future. Prior to the issue of a planning permit for the development of these areas, it will be necessary to prepare a separate Development Plan that demonstrates compliance with the Schedule at Appendix 1, and consistency with the surrounding development.

Development Plan Area

200 0 200 400 600 800 Meters

N



Extent of this Development Plan

Area excluded from this Development Plan

Property 1	- Part CA 54A
Property 2	- CP 154740
Property 3	- Lot 1 LP 90270
Property 3a	- Lot 1 LP 55163
Property 4	- Lot 2 LP 90270
Property 4a	- Lot 3 LP 55164
Property 5	- Lot 2 LP 51597
Property 5a	- Lot 3 LP 123597
Property 6	- Part CA 54D
Property 6a	- Part CA 54D

Development Plan Area

FIGURE 1

3.0 Objectives of the Development Plan

- Ensure the orderly development of all the land in the Development Plan area;
- Ensure that road, open space and pedestrian links between the landholdings in the Plan area are coordinated and will be delivered without prejudicing adjoining developments;
- Achieve consistency between the development of the lots in the Plan area;
- Achieve an integrated open space and linear open water body system that provides recreation opportunities and water quality improvements to stormwater entering the Plan area from upstream and from residential areas within the Plan;
- Create a logical and legible road network that integrates easily between the lots and with the broader area beyond the boundaries of the Development Plan;
- Create a road network that includes a series of single sided roads abutting open spaces to create a visual and physical connection to the open space from residential areas;
- Provide a street configuration that maximizes the opportunities of dwellings on lots within the Plan to achieve a VICHERS 5 star energy rating;
- Incorporate some Environmentally Sustainable Development principles across the Development Plan area;
- Provide a subdivision concept plan that recognizes the various objectives for the Development Plan area while maximizing the retention or re-use of significant remnant vegetation on the land;
- Provide a gateway entry to the non-urban area on Chapel Road;

4.0 Opportunity and Constraint Mapping for the Development Plan Area.

The Planning Scheme Amendment (Amendment C2) that facilitated the zoning of the Development Plan area included a number of processes and studies that examined the physical and environmental values of the land. The following section builds on that work by mapping and describing specific opportunities and constraints that have been considered in the preparation of the overall Subdivision Concept Plan included at Section 5.0.

4.1 Significant Remnant Vegetation

The majority of the Development Plan area has been cleared of vegetation, reflecting the long agricultural landuse history of the area. However, Biosis Research Pty Ltd as part of an assessment of the Flora and Fauna values of the Development Plan area, did identify three (3) stands of significant remnant vegetation that should be retained, protected and incorporated into the Subdivision Concept Plan. These stands (ie. Stand no. 1, Stand No. 2 and Stand No. 3) are identified at Figure 2.

KEY

STAND # — EXISTING, SIGNIFICANT REMNANT VEGETATION TO BE RETAINED WHERE POSSIBLE.

EXISTING, NATIVE VEGETATION

EXOTIC VEGETATION

VEGETATION IN ADJOINING PROPERTIES

1:7500 AT A2

0 50 100 150 200 400 600 METERS

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TOWN PLANNERS
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LEVEL 2 470 ST.KILDA RD. MELBOURNE PH.(03) 9820 8144

SIGNIFICANT REMNANT VEGETATION

FIGURE 2

Stand 1 comprises 13 River Red Gums and Biosis have recommended that the trees be retained in a neighbourhood park, and if possible, the park should achieve a ratio of open grass to canopy of 2:1. The location of the primary East-West collector road through the Development Plan area has been determined on the basis of safe traffic engineering practice and the location of this road will result in some of the trees in this stand to be removed.

Stand 2 comprises a stand of Red Gums that extends from part of the Development Plan area into a wider stand of trees located within the Council owned Tatterson Park. Again the trees should be retained (where possible) within a park with a ratio of open grass to tree canopy of 2:1.

Stand 3 comprises a single veteran (pre European Settlement) tree that must be protected. The tree is on the banks of an open drain that provides an opportunity to be converted into a linear open space park.

There are scattered individuals and stands of eucalypts and other exotic vegetation across the Development Area and they are identified on Figure 2.0. Many of these trees are located along lot boundaries which makes it problematic to retain them due to sewers and stormwater drains being located at the rear boundaries of lots. Similarly, where remnant trees are located along the central drainage corridor, there is little or no scope to retain them because of the large extent of earthworks required to shape open water bodies, wetlands and drainage paths.

As a means of ensuring that trees removed for development retain a connection to the locality, trees with a trunk diameter of 350mm or greater must be identified as part of the planning application process. Once removed, these trees must be trimmed of foliage leaving the trunk and heavy boughs to be then re-used within open water bodies as habitat for aquatic fauna and avifauna. The plans for the removal, storage, protection and re-use for these trees must be detailed as part of a Report accompanying each application to subdivide.

In addition to the tree retention areas discussed above, the stand of trees on Property 2 on the western side of the existing drain must be retained if possible. If the retention of some of these tress is not possible, the application for planning permit must detail why the retention of these trees cannot be achieved.

4.2 External Road Connections

In most respects the road connections from the Development Plan to the surrounding and wider road network have been determined as part of the rezoning of the land. Figure 3.0 shows the locations of the intersections to the external road network and other properties.

4.2.1 Cheltenham Road

Access to Cheltenham Road must be provided via a signalized intersection with Five Ways Boulevard. Signalisation of the intersection is to occur either by Council via levies collected as part of the subdivision within the Development Plan or where a Subdivider of Property 1 provides the works in lieu of levies to be paid. It is preferable that the subdivider provide the signals.

4.2.2 Springvale Road

Springvale Road has three roads intersecting from the Development Plan. The primary intersection at Property 3 is to be a signalized intersection at Springvale Road opposite Gardenworld. The location of the signalised intersection has been negotiated between Council, VicRoads, the landowner of Property 3 and Gardenworld.

The two other minor connecting streets come from the northern part of the Plan (at Property 2) and this intersection is to be a left in-left out turn arrangement while the southern intersection at Property 4 is left out with left in movements facilitated by a service lane originating at the signalized intersection described above.

4.2.3 Chapel Road

The main road connection to Chapel Road (through Property 5) is determined by the east-west road connector shown on the Keysborough South Planning Policy area Framework Plan. This has been shown on the Development Framework plan at Clause 22.06 of the Planning Scheme. Traffic Engineers have determined the intersection of the collector with Chapel Road to be a point north of the Keysborough CFA Fire Station (see Traffic Management Plan forming part of this Development Plan – Appendix 2).

This intersection is to become the Gateway entry into the Keysborough South Non-Urban area and accordingly requires a significant urban design/landscape treatment to fulfil this role.

There is also a minor intersecting road to Chapel Road from Property 6 and this will be a small roundabout.

4.2.4 Connections to Adjoining Sites

Both Haileybury College and the Lighthouse Christian Community Centre and School have access to Springvale Road. Both institutions find that vehicle speed and traffic volumes on Springvale Road create significant traffic hazards.

Through direct negotiations a road connection from Property 1 to the northeast corner of Haileybury College is to be facilitated to enable vehicle movements to Cheltenham Road from the Senior School. A connection from the junior school south to Property 2 will enable traffic movements to Springvale Road via the new signalized intersection on Property 3 (particularly for right turns from the Plan area to Springvale Road) and via the left in/left out intersection to Springvale Road from Property 2.

A road connection to the Lighthouse Christian Centre from Property 3 is proposed in the vicinity of the Centre's existing car park in order to facilitate vehicle access to Springvale Road via the traffic signals on Property 3.

The current access from Springers to Cheltenham Road must be closed and re-directed to the Cheltenham Road traffic signals through part of Property 1. The current access to Springers will clash with the off ramp from the Dingley Freeway to Cheltenham Road once the Freeway is constructed.

4.3 Elements of Schedule 2: Keysborough South Local Planning Policy Area Development Plan – Stage 1.

Figure 3.0 illustrates other requirements of Schedule 2 to the Development Plan and the Local Policy of the Planning Scheme that must be reflected on the Subdivision Concept Plan, namely:

- 15m wide tree reserves to Springvale Road, Cheltenham Road, Chapel Road and the Keysborough Golf Course;
- A general layout of 20% of each lot as POS;
- A linear open space network generally aligned along the major overland stormwater flow paths on the land;

Figure 3.0 also shows:

- The extent of the 'Dog Buffer' being a 500m buffer to mutually protect existing dog related uses in the Homeleigh/Tyers Lane area. The buffer originates from Clause 22.06 of the Planning Scheme and is taken as being 500m from the boundaries of existing dog related activities and it precludes any residential subdivision or housing from occurring within the buffer;
- The key arterial road layouts north-south and east-west through the Development Plan and beyond to the east;
- Intersection improvements for Cheltenham, Springvale and Chapel Roads;
- A diagrammatic representation of the range of long axis' for lots that maximizes the opportunities for lots to be created to accommodate housing designs that achieve maximum passive solar access.

4.4 Existing Drainage Network

Figure 3.0 also shows the location of the existing drainage features that are located within the Development Plan area. The central drain (No. 1) is a deeply channelised drain that receives water from upstream of Cheltenham Road which then passes through the Plan area before exiting through the Keysborough Golf Club. It then discharges into a concrete culvert drain along Springvale Road before entering into the Mordialloc Creek and eventually Port Phillip Bay. The Keysborough Golf Club relies on the water in the drain for irrigation of the course and so the quality and quantity of water entering the Course cannot be reduced.

The Eastern Drain (No. 2) is an incised drain collecting stormwater from the urban areas of Keysborough north of the proposed Dingley Freeway. Water passing through this drain exits the Development Plan area and flows along Chapel Road before discharging into another open drain on the east side of Chapel Road.

Drain No 1 provides the opportunity to be redeveloped into a series of open water bodies, wetlands and connecting streams. Around this is the opportunity for open space with passive and active recreation and linear parklands integrated with the adjoining Tatterson Park.

Drain No. 2 provides similar opportunities but they are more limited to a linear open space network with passive open space opportunities.

Figure 3.0 also identifies the location of retarding basins proposed to be constructed by Melbourne Water at a future date. The detailed development of the retarding basins does not form part of this Development Plan however it is important to note that the land is required for that purpose. The Basins will be constructed by Melbourne Water Corporation via levies collected from the subdivisions in the Development Plan area.

The deflection flow shown on Figure 3.0 represents a design parameter for the conversion of Drain No. 1 into the open water body/wetland system. The deflection is intended to carry 1 in 20 year A.R.I. storm events to the above Retarding Basins. The deflection path must still allow the development of Tatterson Park to its' greatest potential.

4.5 Tatterson Park & Springers Leisure Centre

Tatterson Park is a major recreational facility for the City of Greater Dandenong and it is currently under utilized. The Park will ultimately develop into a major active and passive recreation facility for Keysborough and beyond.

Tatterson Park and in particular Springers currently have direct access to Cheltenham Road however this is a temporary arrangement as the access conflicts with the off ramp of the proposed Dingley Freeway. As a result, access to Springers Leisure Centre will be redirected to Cheltenham Road via a road connection to the subdivision in the Development Plan. Refer Figure 3.0.

The conversion of Drain No. 1 (See Figure 3) into the water body and linear open space network must integrate with Tatterson Park with the boundary between the two imperceptible on the ground. The waterway system must meander up to 10m into the Park and must include pedestrian trails and open space developed on both sides of the central waterway.

The deflection flow path discussed in Section 4.4 above must also pass through Tatterson Park. The deflection must occur originate 260m north of the southern boundary of the Park and pass through to the southeast corner of the park to the future Retarding Basins.

The other issue for Tatterson Park is the stand of Red Gums located in the northeast corner of the Park where they extend into the Development Plan area. These trees have been identified as being of high local significance and their retention and enhancement is paramount.

4.6 Keysborough Golf Club

The Keysborough Golf Club is an established 18-hole golf course that has four holes abutting the southern boundary of the Development Plan. There is a requirement within the Planning Scheme for a 15m wide tree reserve to be established abutting this boundary to assist in providing a buffer to errant golf balls from the course. In order to ensure that the issue of errant golf balls does not pose a significant danger to residential properties, the Subdivision Concept Plan at Figure 4 shows the 15m tree reserve and a notation that the Tree Reserve must be in accordance with the reference book for Golf Course layout and design: 'Golf Course Architecture, Design, Construction and Renovation' by Michael J. Hurdzan Sleeping Bear Press, 121 South Main Road, Chelsea, MI 48118).

4.7 Urban Design Guidelines

The Urban Design Guidelines at Appendix 3 reflect the requirements of Section 3.0 of Schedule 2 to the Development Plan Overlay. The Guidelines are intended to provide guidance in the preparation of the Subdivision Concept Plan (See Section 5.0 below) and discusses several other mechanisms that should or could be employed across the Development Plan area. The Guidelines are based upon a subdivision concept plan that has since been refined and designed to a finer degree of detail. The Subdivision Plan in the Guidelines should not be regarded as anything other than a guide of what the overall subdivision concept plan could involve.

The Guidelines are also an effective tool that Council and subdividers will use to assess finer grain detail of individual subdivision layouts and landscape design.

The Subdivision Concept Plan at Figure 4.0 has been designed to satisfy the objectives set down in the Guidelines. Throughout the balance of this Development Plan, other detailed elements of the Guidelines are achieved or at the very least, addressed as matters that must be provided to Council prior to the approval of individual subdivision applications. This provides some flexibility for Council and subdividers should circumstances preclude the adoption of one part of the Guidelines, yet there still remains an imperative for subdividers to attempt to achieve all that the Guidelines describe.

Where details are raised in the Guidelines that are not broad issues for the Subdivision Concept Plan, they have either been added to other elements that comprise the plan or are details to be addressed with applications for permits to subdivide.

5.0 Subdivision Concept Plan

The Subdivision Concept Plan (see Figure 4.0) for the Keysborough South Local Planning Policy Area – Stage 1 comprises the following elements:

- Primary north-south and east-west collector roads;
- Central Public Open Space and water body network developed around the existing drainage corridors;
- 15m wide Tree Reserves along the external road boundaries and to the Keysborough Golf Club;
- Signalised intersections to Springvale and Cheltenham Roads;
- Road connections to Tatterson Park, Haileybury College (northern and southern) and to the Lighthouse Community Centre;
- Road layout that maximizes the potential for lots to be orientated with their long axis either north-south or east-west for best passive solar access. This is critical to assist dwelling owners to achieve the 5 Star VICHERS rating required by the Design and Development Plan overlay in the Planning Scheme;
- An opportunity for some overland flow road drainage directly into the central drainage corridor;
- Recognition of the 500m Dog Buffer and its effect on residential development within the Buffer area;

PROPOSED ACCESS FOR SPRINGERS & TATTERSON PARK

RETARDING BASIN

EXISTING ACCESS TO BE CLOSED

SWANS BLVD.

CHELTENHAM ROAD

ACCESS FOR HAILEYBURY

HAILEYBURY COLLEGE

DINGLEY FREEWAY RESERVE

SPRINGERS LEISURE CENTRE

DRAIN No. 1

TATTERSON PARK

DRAIN No. 2

ROAD

ACCESS FOR HAILEYBURY

LEFT IN LEFT OUT

LIGHTHOUSE CHRISTIAN CENTRE

HALL

LOCATION OF ACCESS TO LIGHTHOUSE CHRISTIAN CENTRE & SCHOOL

1:20 YEAR ARI STORM SURCHARGE ROUTE

CHURCH ROAD

GARDEN -WORLD

JV MARINE

LEFT IN/ LEFT OUT

NOTE: INCREASE TREE RESERVE TO GOLF COURSE (30m) FOR (90m) SO NO LOT WITHIN 50m. OF MIDDLE OF GREEN

14th GREEN

FLAVIA ROAD TO BE CLOSED

ALIGNMENT OF COLLECTOR INTO STAGE 2 OF POLICY AREA

FIRE STATION

500m. DOG BUFFER

FLAVIA ROAD

RETARDING BASIN AREA

CHAPEL

TYERS LANE

500m. DOG BUFFER

KEYSBOROUGH GOLF CLUB

ACES

HOMELEIGH ROAD

HUTTON ROAD

KEY

ROAD & LOT ORIENTATION - ROAD LAYOUT MUST ACCOMMODATE MAXIMUM No. LOTS WITH LONG AXIS' IN SHADED AREA.

ACCESS TO SITES OUTSIDE DEVELOPMENT PLAN AREA

15M. TREE RESERVE (UNLESS NOTED OTHERWISE)

GENERAL LAYOUT OF 20% P.O.S. FOR EACH LOT.

KEY PROPOSED ARTERIAL ROADS (& EXTENSION DASHED)

SIGNALIZATION REQUIRED

ROUNDABOUT & GATEWAY ENTRY TREATMENT REQUIRED.

ROUNDABOUT

EXISTING DRAIN

1:20 YEAR ARI DEFLECTION

EXTENT OF STAND No. 1 REMNANT VEGETATION

DEVELOPMENT PLAN AREA

DEVELOPMENT PLAN AREA NOT INCLUDED

LEFT IN / LEFT OUT ROAD INTERSECTION

RETARDING BASIN AREA

1:7500 AT A2

0 50 100 150 200 400 600 METERS

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PLANNING CONSTRAINTS PLAN

VERSION : AUGUST 2002

FIGURE 3

- Recognition that the Chapel Road intersection with the east-west collector road is to be developed as a key gateway to the south;
- Shows the primary shared cycle/footpath system throughout the Open Space within the Development Plan area;
- Retention of the significant stands of Red Gums identified in Section 4.1.

It is important to note that while the Subdivision Concept Plan shows the layout of local internal streets, the layout of these streets is not absolutely fixed. Where subdividers seek to depart from the Concept Plan, they must demonstrate to Council that the revised layout does not unreasonably affect the volumes and movements of traffic in adjoining streets and does not affect the opportunity of neighbouring landowners to subdivide.

6.0 Detailed Elements of the Development Plan

6.1 Urban Stormwater Management

There are two levels of stormwater management involved within the Development Plan; firstly, the central water body system that collects stormwater from a broader catchment, and secondly the local stormwater collected from area within the Development Plan area.

Figures 5.1-5.5 are diagrammatic representations of the central water body system from Cheltenham Road through to the exit at the Keysborough Golf Club. The figure shows the location of the open water bodies, rock beaching/riffles, wetlands and connecting channels. The layout of the network has been based upon a system that:

- Occupies up to 20% of the relevant land holding;
- Allows the system to meander up to 10m in to Tatterson Park;
- Meets all criteria set down by Melbourne Water for water volumes, water quality, system management and hold times for water;
- Allows space for active and passive recreation around the water features;
- Connects with the adjoining landowner so that the system can be developed either as a whole or as separate units as landowners develop;

The local stormwater management system (ie. within the residential areas) is somewhat limited to a traditional engineering design with house and road drainage collected via underground pipes that generally discharge into the central drainage network. Melbourne Water have indicated that they do not want several points of discharge into the water body system and therefore residential areas will be drained to a large diameter pipe that will discharge immediately up stream of the wetland to be constructed in Property 4.

The Retarding Basins in the southeast corner of the Development Plan are intended to have a significant role within the open space system as well as fulfilling a stormwater retardation role. Drainage Line No.2 on Figure 3.0 will be diverted to flow into the Basin. A deflection flow from the water body system developed around Drainage line No. 1 across Tatterson Park

NOTE :

- COLLECTOR ROADS MUST HAVE A MINIMUM 4·0m. VERGE BETWEEN BACK OF KERB & ROADSIDE EDGE OF FOOTPATH FOR STREET TREES.
- THIS PLAN REFLECTS ROAD NETWORK ALTERATIONS SHOWN ON FIG. 27 OF TTM CONSULTING'S TRAFFIC MANAGEMENT PLAN DATED 28 MARCH 2002 (NOW SUPERSEDED, SEE APPENDIX 2)

PATH TO LINK TO CHELTENHAM ROAD FOOTPATH WHICH LINKS TO PARKMORE SHOPPING CENTRE (EAST) & POTENTIAL TO LINK WEST TO BRAESIDE PARK.

RETARDING BASIN

ACCESS TO BE CLOSED

5 WAYS BLVD.

CHELTENHAM ROAD

30m

NORTHERN ROAD ACCESS FOR HAILEYBURY - SENIOR SCHOOL ONLY

DINGLEY FREEWAY RESERVE

PROPOSED ACCESS

HAILEYBURY COLLEGE

SENIOR CAMPUS

JUNIOR CAMPUS

SPRINGERS LEISURE CENTRE

LINK PATH TO SPRINGERS & TO CHAPEL ROAD & TO CHELTENHAM ROAD

TATTERSON PARK

SOUTHERN ROAD ACCESS FOR HAILEYBURY (JUNIOR SCHOOL ONLY)

NOTE: COLLECTOR ROADS MUST HAVE A MINIMUM UNPAVED RADIUS OF 4m BETWEEN BACK OF KERB & EDGE OF FOOTPATH.

CHURCH ROAD

ROAD

LIGHTHOUSE CHRISTIAN CENTRE & SCHOOL

ACCESS

GARDEN - WORLD

JV MARINE

FUTURE EXTENSION TO EAST-WEST COLLECTOR

FIRE STATION

PATH TO LINK TO EXISTING FOOTPATH WHICH TERMINATES AT HUTTON ROAD. POTENTIAL IS TO LINK TO BRAESIDE PARK, WATERWAYS ESTATE & TO PORT PHILLIP BAY.

14th

13th

11th

6th

SPRINGVALE

500m DOG BUFFER

TYERS LANE

CHAPEL

HOMELEIGH ROAD

KEYSBOROUGH GOLF CLUB

NOTE: TREE RESERVE ALONG THE BOUNDARY TO GOLF CLUB MUST BE IN ACCORDANCE WITH THE DESIGN SAFETY ELEMENTS DEFINED IN "GOLF COURSE ARCHITECTURE, DESIGN CONSTRUCTION & RENOVATION" (Hurdzan Michael J., Sleeping Bear Press, 121 South Main Road, Chelsea, MI 48118)

HUTTON ROAD

PATH TO LINK TO CHAPEL ROAD FOOTPATH WITH POTENTIAL TO LINK TO DANDENONG CREEK TRAIL & WIDER NON-URBAN AREA.

KEY

- COLLECTOR ROAD
- MINOR ROAD
- LINEAR OPEN SPACE & WATERBODY (REFER FIGURES 5·1 - 5·5 & 7·1 - 7·8 FOR DETAILED WATERBODY LAYOUT)
- NON-PERMANENT WATERBODY BASED OPEN SPACE
- TRAFFIC SIGNALS
- ROUNDABOUT & GATEWAY TREATMEN
- ROUNDABOUT
- LEFT IN / LEFT OUT
- TREE RESERVE - 15M UNLESS OTHERWISE NOTED
- VEGETATION TO BE RETAINED
- RESIDENTIAL (NOTE : NO SUBDIVISION TO OCCUR WITHIN DOG BUFFER UNTIL SUCH USE CEASES)
- OFFROAD CYCLE / TRAIL PATH SYSTEM (NOTE : ALL ROADS TO CONTAIN FOOTPATH TO AT LEAST ONE SIDE
- ROAD & LOT ORIENTATION - ROAD LAYOUT MUST ACCOMMODATE MAXIMUM No. LOTS WITH LONG AXIS IN SHADED AREA.
- DRAINAGE DEFLECTION ROUTE.
- RESIDENTIAL AREA NOT TO BE DEVELOPED UNTIL ALL DOG-RELATED USES WITHIN 500m OF THIS AREA HAVE CEASED TO OPERATE.
- BUFFER PLANTING WITHIN OPEN SPACE - MINIMUM 15m WIDTH.

20° N 30° 20° E 30° S 20° W 30°

1:7500 AT A2

0 50 100 150 200 400 600 METERS

* MPORTANT NOTE : MINOR ROAD SYSTEM AS SHOWN IS INDICATIVE & BY NO MEANS BINDING OR ABSOLUTEY FINAL.

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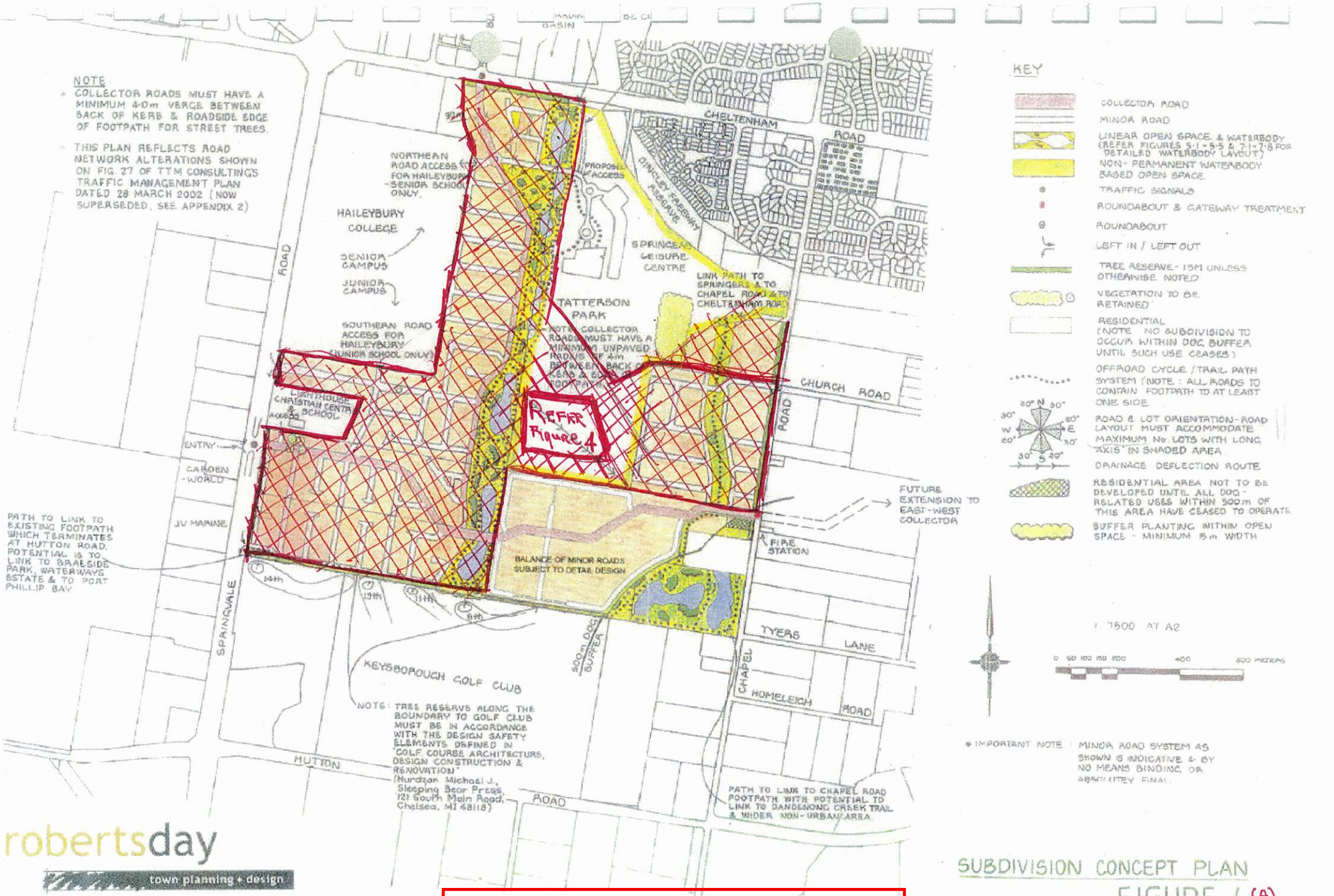
PLAN No. 02045 D
Ref. 32291

SUBDIVISION CONCEPT PLAN

VERSION: MAR.2003 FIGURE 4



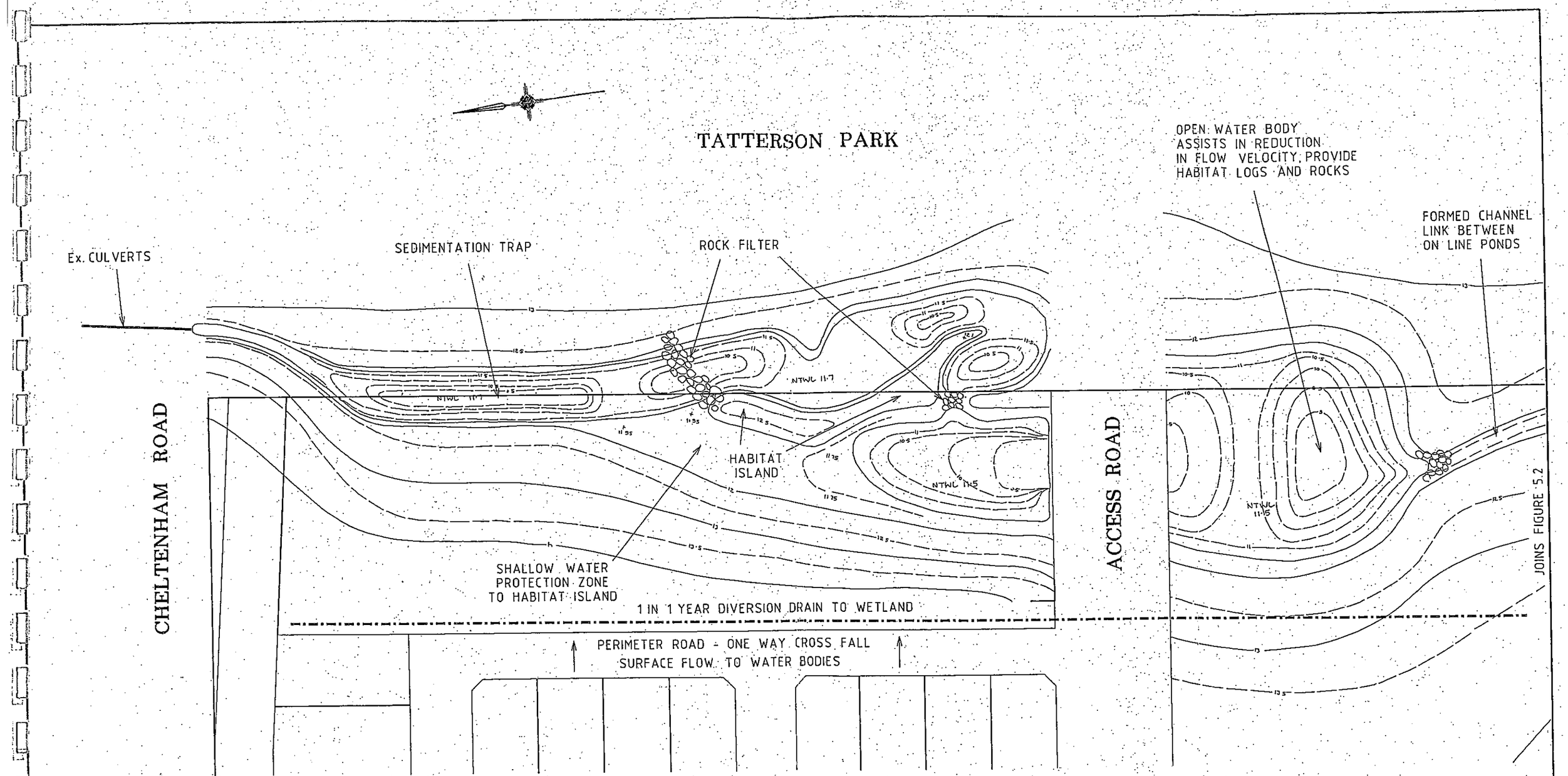
robertsday

town planning + design

base plan by WATSONS PTY.LTD

SUBDIVISION CONCEPT PLAN

FIGURE 4(A)



NOTE:
ALL OPEN WATER BODIES TO BE MAXIMUM DEPTH OF 2.50m TO AVOID THERMAL AND DISSOLVED OXYGEN STRATIFICATION.

ALL WATER BODY EPHEMERAL ZONES TO BE PLANTED WITH AQUATIC SPECIES TO PROVIDE WATER TREATMENT AND PROVIDE FOOD AND SHELTER FOR AQUATIC ORGANISMS.

DEEP PONDS AND WETLANDS TO BE PROVIDED WITH HABITAT LOGS, ROCKS ETC.

FIGURE 5.1

TATTERSON PARK

OPEN WATER BODY
ASSISTS IN REDUCTION
IN FLOW VELOCITY, PROVIDE
HABITAT LOGS AND ROCKS

FORMED CHANNEL
LINK BETWEEN
ON LINE PONDS

ROCK FILTER

FORMED CHANNEL
LINK BETWEEN
ON LINE PONDS

OPEN WATER BODY
ASSISTS IN REDUCTION
IN FLOW VELOCITY, PROVIDE
HABITAT LOGS AND ROCKS

FORMED CHANNEL
LINK BETWEEN
ON LINE PONDS

NTWL 11.0

NTWL 10.25

ROCK FILTER

ROCK FILTER

1 IN 1 YEAR DIVERSION DRAIN TO WETLAND

PERIMETER ROAD - ONE WAY CROSS FALL
SURFACE FLOW TO WATER BODIES

JOINS FIGURE 5.1

JOINS FIGURE 5.3

PROPERTY 1

10 0 20 40 60m
Scale 1:10,000

NOTE:
ALL OPEN WATER BODIES TO BE MAXIMUM DEPTH OF 2.50m
TO AVOID THERMAL AND DISSOLVED OXYGEN STRATIFICATION

ALL WATER BODY EPHEMERAL ZONES TO BE PLANTED WITH
AQUATIC SPECIES TO PROVIDE WATER TREATMENT AND PROVIDE
FOOD AND SHELTER FOR AQUATIC ORGANISMS.

DEEP PONDS AND WETLANDS TO BE PROVIDED WITH HABITAT
LOGS, ROCKS ETC

FIGURE 5.2

TATTERSON PARK

OPEN WATER BODY ASSISTS IN REDUCTION IN FLOW VELOCITY, PROVIDE HABITAT LOGS AND ROCKS

FORMED CHANNEL LINK BETWEEN ON LINE PONDS

FORMED CHANNEL LINK BETWEEN ON LINE PONDS

1 IN 20 YEAR DIVERSION DRAIN TO RETARDING BASIN

SHALLOW WATER PROTECTION ZONE TO HABITAT ISLAND

HABITAT ISLAND

ROCK FILTER

ROCK FILTER

ROCK FILTER

JOINS FIGURE 5.2

JOINS FIGURE 5.4

NTWL 9.5

NTWL 9.0

NTWL 8.5

1 IN 1 YEAR DIVERSION DRAIN TO WETLAND

PERIMETER ROAD - ONE WAY CROSS FALL SURFACE FLOW TO WATER BODIES

PROPERTY 1

PROPERTY 2

10 0 20 40 60m

Scale 1:1000

NOTE:
ALL OPEN WATER BODIES TO BE MAXIMUM DEPTH OF 2.50m TO AVOID THERMAL AND DISSOLVED OXYGEN STRATIFICATION

ALL WATER BODY EPHEMERAL ZONES TO BE PLANTED WITH AQUATIC SPECIES TO PROVIDE WATER TREATMENT AND PROVIDE FOOD AND SHELTER FOR AQUATIC ORGANISMS.

DEEP PONDS AND WETLANDS TO BE PROVIDED WITH HABITAT LOGS, ROCKS ETC.

FIGURE 5.3

NOTE:
ALL OPEN WATER BODIES TO BE MAXIMUM DEPTH OF 2.50m TO AVOID THERMAL AND DISSOLVED OXYGEN STRATIFICATION

ALL WATER BODY EPHEMERAL ZONES TO BE PLANTED WITH AQUATIC SPECIES TO PROVIDE WATER TREATMENT AND PROVIDE FOOD AND SHELTER FOR AQUATIC ORGANISMS.

DEEP PONDS AND WETLANDS TO BE PROVIDED WITH HABITAT LOGS, ROCKS ETC

TATTERSON PARK

PROPERTY 5a

WETLAND AREA
SHALLOW AND DEEP
MARSH AQUATIC PLANTING
TO STRIP 80% OF INCOMING
SEDIMENTS AND 45% OF INCOMING
PHOSPHORUS AND NITROGEN

HABITAT ISLAND

HABITAT ISLAND

JOINS FIGURE 5.3

JOINS FIGURE 5.5

NTWL 8·0

NTWL 8·5

FORMED CHANNEL LINK BETWEEN ON LINE PONDS

ROCK FILTER

NTWL 8·0

NTWL 7·5

FORMED CHANNEL LINK BETWEEN ON LINE PONDS

1 IN 1 YEAR DIVERSION DRAIN TO WETLAND

PERIMETER ROAD - ONE WAY CROSS FALL
SURFACE FLOW TO WATER BODIES

PROPERTY 2

PROPERTY 3

10 0 20 40 60m
Scale 1:1000

FIGURE 5.4

PROPERTY 5/5a

WETLAND AREA
SHALLOW AND DEEP
MARSH AQUATIC PLANTING
TO STRIP 80% OF INCOMING
SEDIMENTS AND 45% OF INCOMING
PHOSPHORUS AND NITROGEN

RESIDENTIAL DRAINAGE
SEDIMENT POND

JOINS FIGURE 5.4

FORMED CHANNEL
LINK BETWEEN
ON LINE PONDS

NTWL 7.0

NTWL 8.0

ACCESS ROAD

KEYSBOROUGH GOLF COURSE

PERIMETER ROAD - ONE WAY CROSS FALL
SURFACE FLOW TO WATER BODIES

FORMED CHANNEL

1 IN 1 YEAR DIVERSION DRAIN TO WETLAND

ROCK FILTER, DISCHARGE POINT
TO EXISTING KEYSBOROUGH DRAIN
IN GOLF COURSE

PROPERTY 3

PROPERTY 4

RESIDENTIAL DRAINAGE
SEDIMENT POND

NOTE:
ALL OPEN WATER BODIES TO BE MAXIMUM DEPTH OF 2.50m
TO AVOID THERMAL AND DISSOLVED OXYGEN STRATIFICATION

ALL WATER BODY EPHEMERAL ZONES TO BE PLANTED WITH
AQUATIC SPECIES TO PROVIDE WATER TREATMENT AND PROVIDE
FOOD AND SHELTER FOR AQUATIC ORGANISMS.

DEEP PONDS AND WETLANDS TO BE PROVIDED WITH HABITAT
LOGS, ROCKS ETC.

10 0 20 40 60m
Scale 1:1000

FIGURE 5.5

will cater for storm events that exceed a 1 in 20 year ARI. The basins will not be more than 1.5m deep and they will be permanent water bodies out of storm events. They will be contoured and vegetated to perform a stormwater cleansing role in addition to retardation to relieve downstream flooding pressures.

Figures 5.1-5.5 also indicate the potential for stormwater to enter the main system via overland flows from the roads that abut the main drainage system. This is a passive stormwater design element that is overviewed in the Urban Design Guidelines (P.19) at Appendix 3.0. The use of grassed overland stormwater flows from the residential areas into the central water body system was examined but with the gentle grades across the site, and Melbourne Water's position on stormwater from the residential areas, this was found not to be a feasible option for the Development Plan area.

At the individual home owner level, each lot owner will be provided with a Residents Information Kit that among other things, outlines a number of mechanisms through which they can re-use stormwater. Actions such as domestic rainwater harvesting tanks for garden watering and car washing, maximizing pervious surfaces around homes, native plants and shrubs that require less watering all contribute to the reduction in volume and velocity of stormwater entering the drainage system and reducing water consumption.

6.2 Landscape Concept Plans for Water-Based Open Space

The Development Plan area is in different ownerships and because of the highly interconnected nature of the Subdivision Concept Plan there is the need for the Development Plan to specify in finer detail the configuration of open space areas. It is essential that the open space areas appear to be part of one whole system rather than several smaller parts developed in isolation from one another.

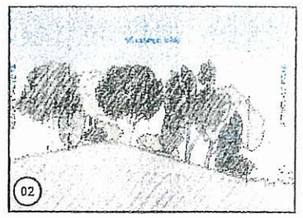
Figure 6.0 is an overall Landscape Concept plan for the Development Plan. It contains broad indicative planting and design themes for the various landscape settings within the Plan area. Figures 7.1 to 7.8 are landscape concept plans that have been developed for the linear open space and waterway areas within each of the land holdings. The Concepts indicate the planting associations along with passive and active recreation areas. Concepts also suggest the types and locations of park furniture such as seating, paths, rotundas and cross-over points for paths along the water body.

Planting within the central open space system will require ratification from Melbourne Water Corporation in conjunction with Council since this area will be jointly maintained by Council and MWC. Planting species are all to be in accordance with the lists of native and indigenous tree species listed in the Urban Design Guidelines (Appendix 3).

As a further means to ensure the uniformity of the open space and roads through the Development Plan area, Appendix 4 provides details of the park furniture and street lights required for the Plan area. Items such as the seating has been chosen because of it's aesthetic appeal along with the fact that the aluminium frames are recyclable and the Jarrah timber is hard wearing and sourced from regrowth forestry not old growth. Items such as the timber bollard are the same as those used at the Springers Leisure Centre and have been chosen to achieve uniformity and connection between the Park and the central open space area.

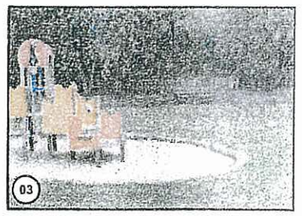
PRECINCT ENTRY

Integration of urban design elements such as signage, water features, special paving treatments together with subtle planting combinations will create distinctive entry statements. Precinct entries to reflectthe level of access provided from boundary roads and access points.



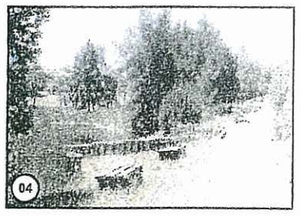
BUFFER ZONES

Elevated mounds landscaped with native and indigenous vegetation to provide visual and acoustic separation between major boundary roads and the new residential development areas. Landscaped buffers (without mounding) to be provided adjacent to existing school sites.



POCKET PARKS

Internal 'pocket-parks' are to be scaled appropriately to the surrounding urban structure. These smaller parklands provide opportunities for casual play areas, meeting places and opportunities for passive recreation within the residential area.

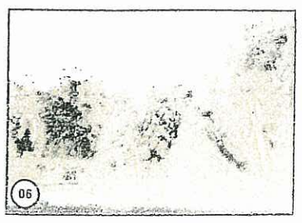


LINEAR PARKLAND

The linear parkland system incorporates services corridors, pedestrian paths and cycleways. Planting along the linear parkland system is of an informal nature with a mix of native and indigenous trees and understorey - aquatic and wetland plants would also be included where appropriate.

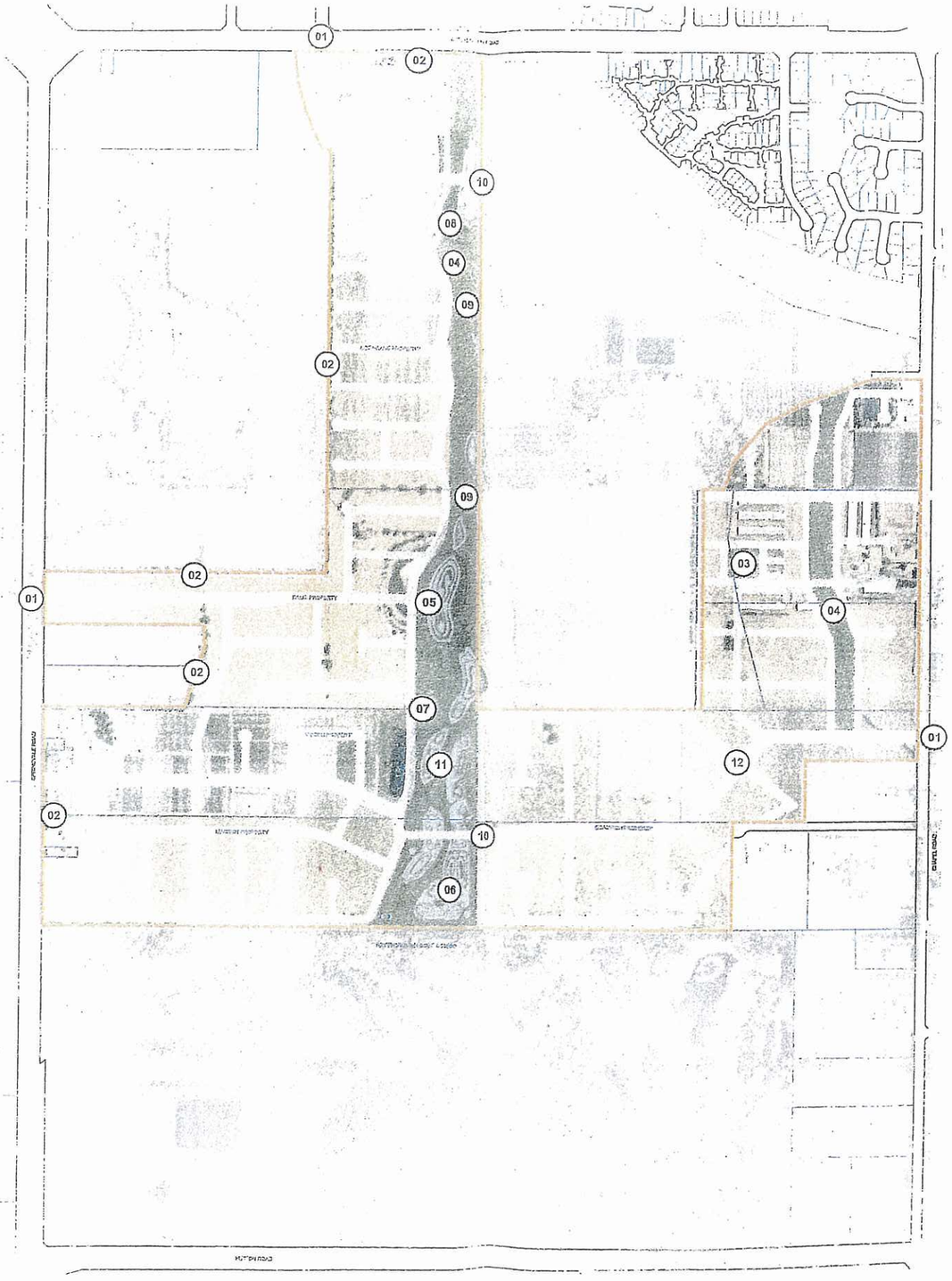
WETLAND / PARKLAND

The scenic quality and amenity of wetland areas to be utilised as a backdrop to public parkland for mostly passive recreational activities. Facilities such as seating, shelter and barbecues to be provided where applicable. Links to pedestrian access networks to form an integral part of the design of these dynamic parkland opportunities. Planting to be predominantly indigenous with appropriate aquatic & wetland plants to riparian buffer zones.



WETLANDS

Wetlands form the spine to the open space systems and in turn help to define the urban structure of the development. Indigenous vegetation as well as aquatic and sedge plantings provide enhanced water quality control systems that will significantly contribute to public amenity, scenic quality and ecological diversity throughout the development.

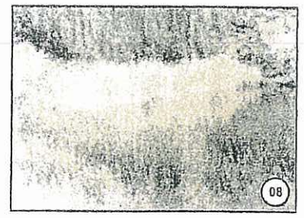


PEDESTRIAN ACCESS

Pedestrian pathways through the wetland and lakeside areas of the site provide opportunities for passive recreation, environmental appreciation and access to all areas of the development and to activity facilities, play areas and all the differing types of open space and parkland.

PLANTED LAKE EDGE

Where appropriate waterways will be planted with aquatic and wetland species compatible with the local ecosystem. Softer materials like sands and grasses are to be utilised where access is provided to water for passive recreation, fishing and other activities.

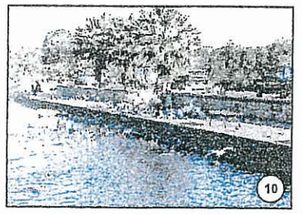


REINFORCED LAKE EDGE

Reinforced edges will provide stability where deep water edges are appropriate and where banks and flows have the potential for erosion. Materials may include sleepers, rough habitat logs, boulders and coarse gravels interplanted with indigenous wetland and aquatic species.

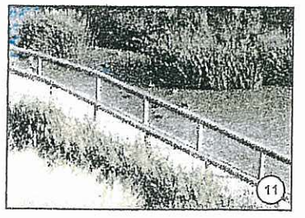
BRIDGES

Land bridges crossing water bodies provide special opportunities to reinforce the experience of water and to take advantage of a broad perspective of the wetland systems. There is also the opportunity to provide intimate access to the water and separate pedestrian movement from vehicular traffic.



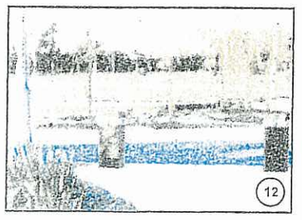
JETTIES & BOARDWALKS

Timber jetties and boardwalks provide special viewing platforms to appreciate the surrounding ecosystem. They can also be used to provide access to the water bodies for passive recreation, bird watching as well as providing tranquil relaxation areas.



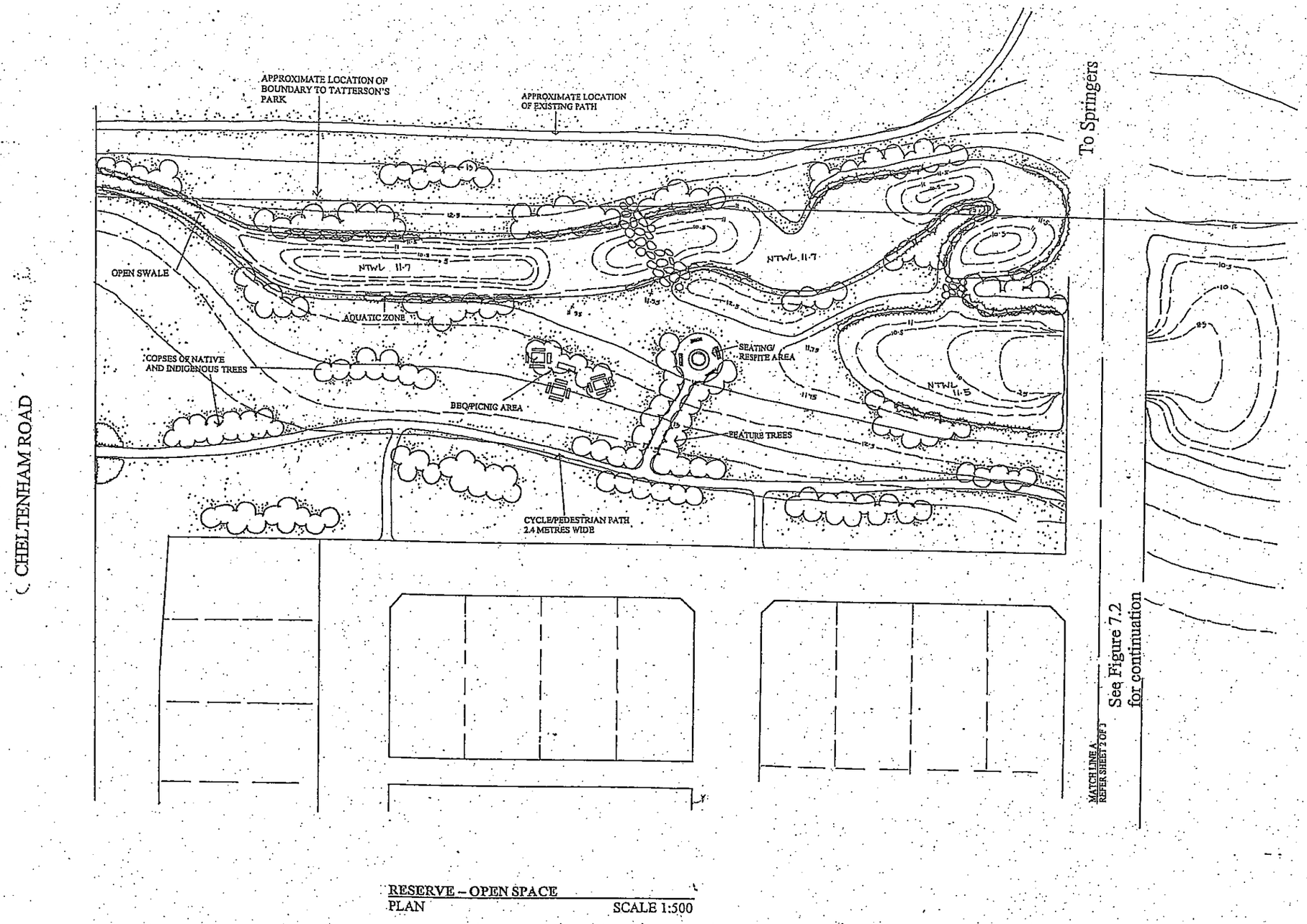
URBAN FURNITURE

Thematic design elements act as markers between paths, roads, water bodies, planting, special ecological zones, etc and help to reinforce overall design character and general legibility of the estate development.



Note: Road Layout Indicative Only

FIGURE 6.0



RESERVE – OPEN SPACE
PLAN SCALE 1:500

LEGEND

- PROPOSED TREE PLANTING
- WETLAND & AQUATIC PLANTING
- ORNAMENTAL GRASSES
- GRASS AREAS
- CYCLE/PEDESTRIAN PATHS
- CONTOURS
- SEATING
- PICNIC TABLES
- ROCK EDGE TREATMENT

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• CIVIL ENGINEERS
• SURVEYORS
• Urban Designers
• Project Managers
• Structural Engineers
Watsons Pty. Ltd.

PLAN NO. 01198/L2
SHEET 1 OF 3
REF: 34680

SCALE 1:500 @ A1

PROPERTY 1

CHELTENHAM ROAD, KEYSBOROUGH

LANDSCAPE CONCEPT

FIGURE 7.1

See Figure 7.1 for continuation

See Figure 7.3 for continuation

EXACT LOCATION OF OPEN SWALE TO BE DETERMINED FOLLOWING DETAILED ENGINEERS ANALYSIS

APPROXIMATE LOCATION OF BOUNDARY TO TATTERSON'S PARK

PEDESTRIAN GRAVEL PATH – 1.8 METRES WIDE

COPSES OF NATIVE/ INDIGENOUS TREES

AQUATIC ZONE ALONG DRAINAGE CHANNEL

GRASSED AREA

WATER BODY

NTWL 11.5

OPEN SWALE

WATER BODY NTWL 11.0

OPEN SWALE

MULCHED GARDEN BED

AQUATIC ZONE ALONG DRAINAGE CHANNEL

WATER BODY NTWL 10.25

OPEN SPACE KICK-ABOUT-ZONE

AQUATIC ZONE

CYCLE/PEDESTRIAN PATH 2.4 METRES WIDE

ROTUNDA

OPEN SPACE KICK-ABOUT-ZONE

LAKE VIEW BOULEVARD

LAKE EDGE DRIVE

MATCH LINE A REFER SHEET 1 OF 3

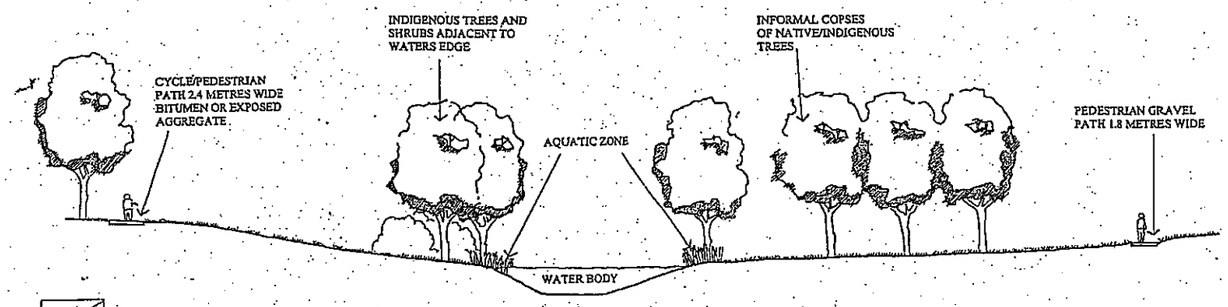
MATCH LINE B REFER SHEET 3 OF 3

RESERVE – OPEN SPACE
PLAN SCALE 1:500

LEGEND

- PROPOSED TREE PLANTING
- WETLAND & AQUATIC PLANTING
- ORNAMENTAL GRASSES
- GRASS AREAS
- CYCLE/PEDESTRIAN PATH
- CONTOURS
- SEATING
- PICNIC TABLES
- ROCK EDGE TREATMENT

SCALE 1:500 @ A1



RESERVE – OPEN SPACE
SECTION A SCALE 1:200

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• Urban Designers
• Project Managers
• Structural Engineers
Watsons Pty. Ltd.

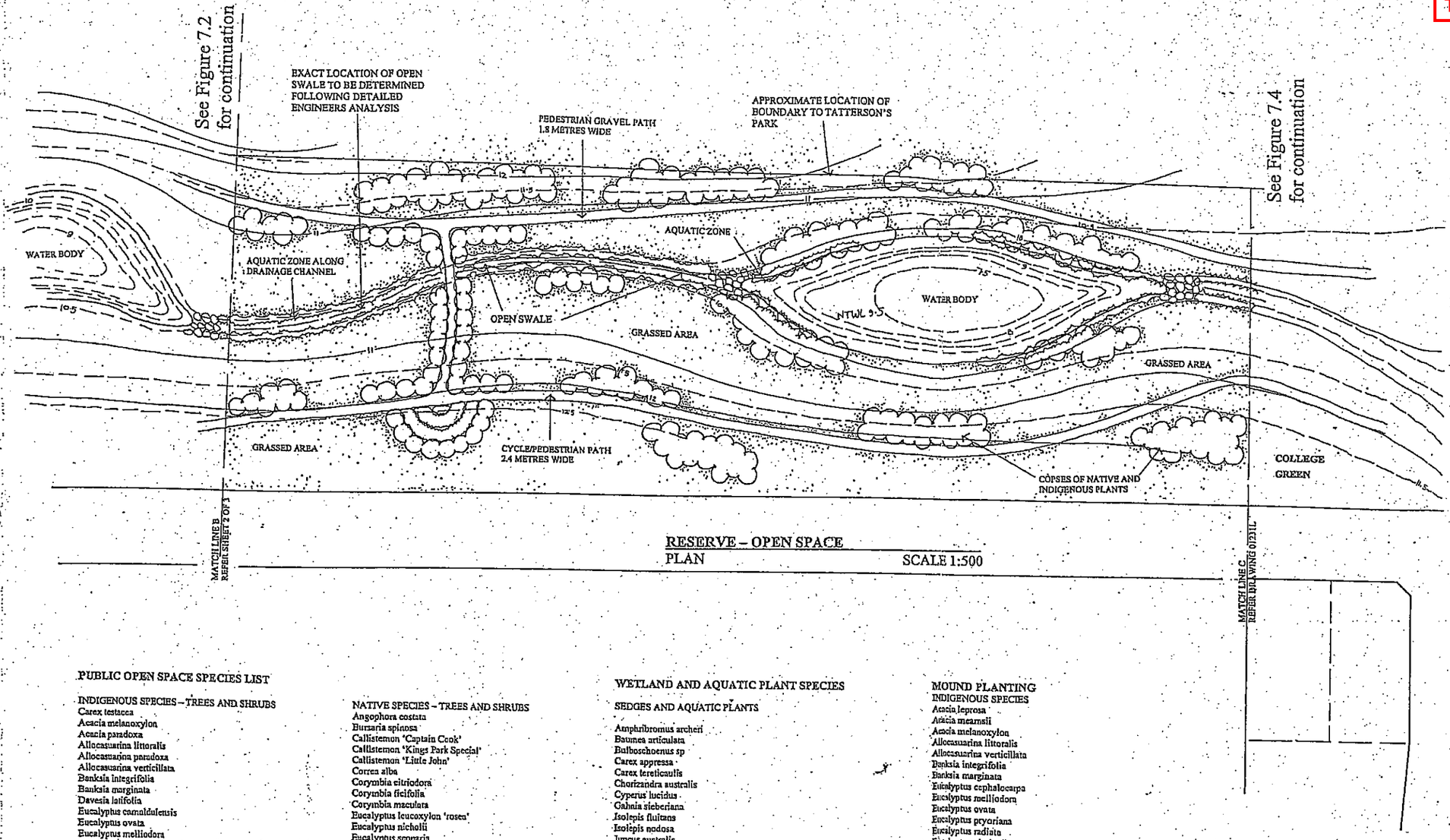
PLAN NO. 01198/L2
SHEET 2 OF 3
REF: 34680

PROPERTY 1

CHELTENHAM ROAD, KEYSBOROUGH

LANDSCAPE CONCEPT

FIGURE 7.2



RESERVE – OPEN SPACE
PLAN SCALE 1:500

LEGEND

- PROPOSED TREE PLANTING
- WETLAND & AQUATIC PLANTING
- ORNAMENTAL GRASSES
- GRASS AREAS
- CYCLE/PEDESTRIAN PATHS
- CONTOURS
- SEATING
- PICNIC TABLES
- ROCK EDGE TREATMENT

PUBLIC OPEN SPACE SPECIES LIST

INDIGENOUS SPECIES – TREES AND SHRUBS
Carex testacea
Acacia melanoxylon
Acacia paradoxa
Allocasuarina littoralis
Allocasuarina paradoxa
Allocasuarina verticillata
Banksia integrifolia
Banksia marginata
Davesia latifolia
Eucalyptus camaldulensis
Eucalyptus ovata
Eucalyptus melliodora
Eucalyptus pauciflora
Eucalyptus radiata
Eucalyptus viminalis
Goodenia ovata
Hakea nodosa
Kunzea ericoides
Leptospermum continentale
Leptospermum myrsinoides
Melaleuca ericifolia

NATIVE SPECIES – TREES AND SHRUBS
Angophora costata
Bursaria spinosa
Callistemon 'Captain Cook'
Callistemon 'Kings Park Special'
Callistemon 'Little John'
Correa alba
Corymbia citriodora
Corymbia ficifolia
Corymbia maculata
Eucalyptus leucoxylon 'rosea'
Eucalyptus nichollii
Eucalyptus scoparia
Grevillea 'Robyn Gordon'
Grevillea rosmarinifolia
Lophostemon confertus
Westringia fruticosa
Westringia 'Wynabbie Gem'

WETLAND AND AQUATIC PLANT SPECIES

SEDGES AND AQUATIC PLANTS
Amphibromus archeri
Baumea articulata
Bulboschoenus sp
Carex appressa
Carex tereticaulis
Chorizandra australis
Cyperus lucidus
Gahnia sieberiana
Isolepis fluitans
Isolepis nodosa
Juncus australis
Juncus pallidus
Lobelia pratoides
Lomandra longifolia
Melaleuca ericifolia
Patersonia occidentalis
Persicaria decipiens
Phragmites australis
Ranunculus amphitricus
Ranunculus papulentis
Selliera radicans
Triglochin procera
Triglochin striata
Vimenarea juncea

MOUND PLANTING

INDIGENOUS SPECIES
Acacia leprosa
Acacia mearnsii
Acacia melanoxylon
Allocasuarina littoralis
Allocasuarina verticillata
Banksia integrifolia
Banksia marginata
Eucalyptus cephalocarpa
Eucalyptus melliodora
Eucalyptus ovata
Eucalyptus pryoriana
Eucalyptus radiata
Eucalyptus viminalis
Hakea nodosa
Kunzea ericoides
Leptospermum continentale
Melaleuca ericifolia

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• SURVEYORS
• Urban Designers
• Project Managers
• Structural Engineers
Watsons Pty. Ltd.
ABN 63 150 570 710

PLAN NO. 01198/L2
SHEET 3 OF 3
REF: 34680

SCALE 1:500 @ A1

PROPERTY 1

CHELTENHAM ROAD, KEYSBOROUGH

LANDSCAPE CONCEPT

FIGURE 7.3

SUGGESTED LIST OF SUITABLE SPECIES FOR PUBLIC OPEN SPACE

INDIGENOUS TREES/SHRUBS
Acacia melanoxylon
Acacia paradoxa
Allocasuarina littoralis
Allocasuarina paludosa
Allocasuarina verticillata
Banksia marginata
Bursaria spinosa
Eucalyptus camaldulensis
Eucalyptus ovata
Eucalyptus pauciflora
Eucalyptus pryoriana
Eucalyptus radiata
Goodenia ovata
Leptospermum continentale
Leptospermum myrsinoides
Melaleuca ericifolia
Melaleuca squarrosa

NATIVE TREES/SHRUBS
Acacia pycnantha
Acacia suaveolens
Agonis flexuosa
Angophora costata
Banksia integrifolia
Corymbia citriodora
Corymbia ficifolia
Eucalyptus leucoxylon 'rosea'
Eucalyptus macrohyncha
Eucalyptus mannifera
Eucalyptus nicholii
Eucalyptus scoparia
Eucalyptus sideroxylon
Hakea nodosa
Kunzea ericoides
Tristaniopsis laurina

WETLAND AND AQUATIC PLANT SPECIES

SUGGESTED LIST OF SUITABLE SPECIES FOR LAKE EDGE PLANTING

INDIGENOUS SPECIES
Allocasuarina species
Acacia melanoxylon
Banksia integrifolia
Banksia marginata
Eucalyptus camaldulensis
Eucalyptus ovata
Eucalyptus radiata
Kunzea ericoides
Leptospermum continentale
Melaleuca ericifolia

NATIVE SPECIES
Corymbia citriodora
Corymbia ficifolia

AQUATIC PLANTS
Carex appressa
Carex gaudichaudiana
Cyperus lucidus
Dianella tasmanica
Gahnia sieberiana
Isolepsis nodosa
Juncus amabilis
Triglochin striata
Vimenarea juncea

MOUND PLANTING
INDIGENOUS/NATIVE SPECIES
Acacia leprosa
Acacia melanoxylon
Acacia parodoxa
Allocasuarina littoralis
Allocasuarina paludosa
Allocasuarina verticillata
Banksia integrifolia
Banksia marginata
Eucalyptus cephalocarpa
Eucalyptus melliodora
Eucalyptus ovata
Eucalyptus pauciflora
Eucalyptus pryoriana
Eucalyptus radiata
Eucalyptus viminalis
Hakea nodosa
Kunzea ericoides
Leptospermum continentale
Leptospermum myrsinoides
Melaleuca ericifolia
Westringia fruticosa

See Figure 7.3 for configuration

See Figure 7.5 for continuation
MATCH LINE D
REFER DWG 0202467

MATCH LINE C
REFER DWG 0119802

APPROXIMATE LOCATION OF BOUNDARY TO TATTERSON'S PARK

EXACT LOCATION OF OPEN SWALE TO BE DETERMINED FOLLOWING DETAILED ENGINEERS ANALYSIS

OVERLAND FLOW DIVERSION PATH

COPSES OF INFORMAL TREES

GRASS AREA

OPEN SWALE

WATER BODY

NTWL 9.0

AQUATIC ZONE

NTWL 8.5

NTWL 8.0

ELEVATED WALKWAY ACROSS DRAINAGE CHANNEL

OPEN SPACE

PEDESTRIAN PATH

SEATING

CHILDREN'S PLAYGROUND

ROTUNDA

FEATURE TREES

ORNAMENTAL GRASSES IN MULCHED GARDEN BED

LAKE VIEW BOULEVARD

PRINCETON DRIVE

WESLEY COURT

LEGEND

- Proposed Tree Planting
- Seating
- Wetland and Aquatic Planting
- Ornamental Grasses
- Grass Areas
- Pedestrian Path (Coloured concrete) (Gravel – secondary path)
- Contours
- Rock Edge Treatment

RESERVE – OPEN SPACE
PLAN SCALE 1:500

SCALE 1:500 @ A1

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• SURVEYORS
• Urban Designers
• Project Managers
• Structural Engineers

Watsons Pty. Ltd.

PLAN NO. 01231L

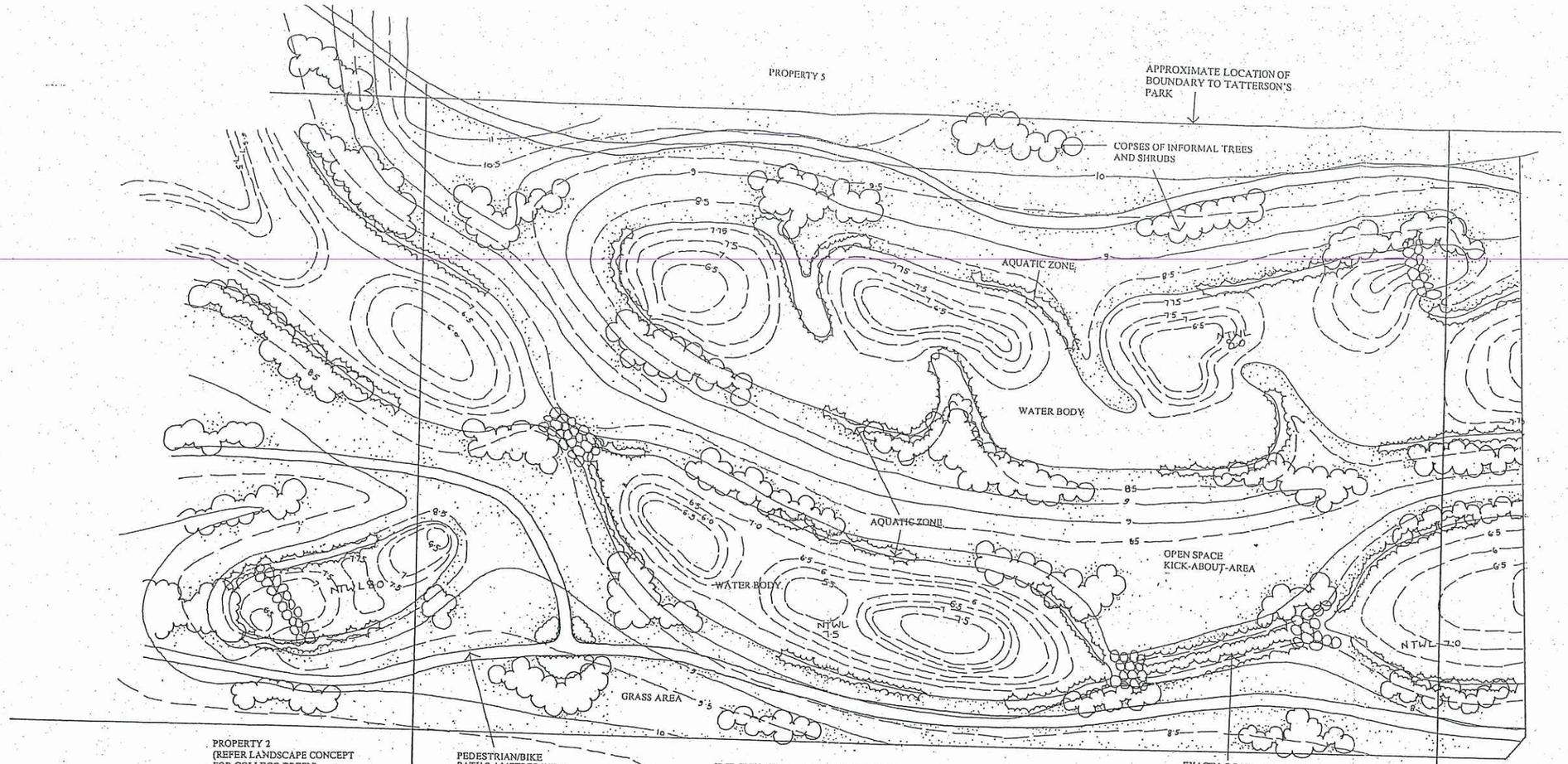
SHEET 3 OF 3

REF: 34609

PROPERTY 2

SPRINGVALE ROAD, KEYSBOROUGH

FIGURE 7.4



RESERVE – OPEN SPACE
PLAN SCALE 1:500

LEGEND

- PROPOSED TREE PLANTING
- SHRUBS AND GRASSES
- GRASS AREAS
- PEDESTRIAN/BIKE PATH 2.4 METRES WIDE
- SEATING
- WETLAND AND AQUATIC PLANTING

SCALE 1:500 @ A1

PUBLIC OPEN SPACE SPECIES LIST

INDIGENOUS SPECIES – TREES AND SHRUBS
Carex testacea
Acacia melanoxylon
Acacia paradoxa
Allocasuarina littoralis
Allocasuarina paradoxa
Allocasuarina verticillata
Banksia integrifolia
Banksia marginata
Davesia latifolia
Eucalyptus camaldulensis
Eucalyptus ovata
Eucalyptus melliodora
Eucalyptus pauciflora
Eucalyptus radiata
Eucalyptus viminalis
Goodenia ovata
Hakea nodosa
Kunzea ericoides
Leptsopermum continentale
Leptospermum myrsinoides
Melaleuca ericifolia

NATIVE SPECIES – TREES AND SHRUBS
Angophora costata
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Callistemon 'Kings Park Special'
Callistemon 'Little John'
Correa alba
Corymbia citriodora
Corymbia ficifolia
Corymbia maculata
Eucalyptus leucoxylon 'rosea'
Eucalyptus nicholii
Eucalyptus scoparia
Grevillea 'Robyn Gordon'
Grevillea rosmarinifolia
Lophostemon confertus
Westringia fruticosa
Westringia 'Wynabbie Gem'

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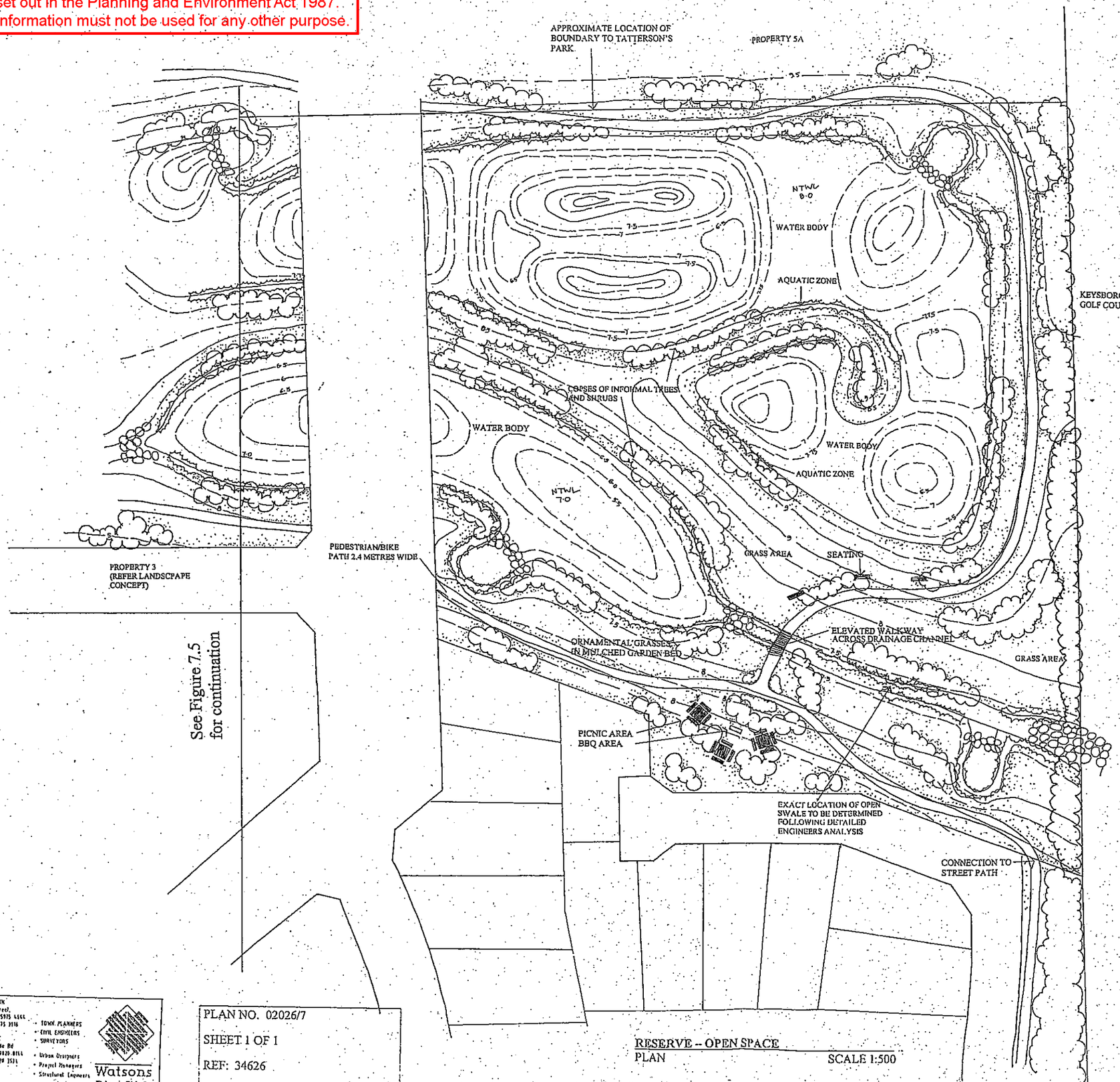
Fax (03) 9820 3574
• Town Planners
• Civil Engineers
• Surveyors
• Urban Designers
• Project Managers
• Structural Engineers
Watsons Pty. Ltd.

PLAN NO. 02026/7
SHEET 1 OF 1
REF: 34677

PROPERTY 3
SPRINGVALE ROAD, KEYSBOROUGH
CITY OF GREATER DANDENONG

RESERVE – OPEN SPACE
LANDSCAPE CONCEPT
FIGURE 7.5



RESERVE – OPEN SPACE PLAN SCALE 1:500

PUBLIC OPEN SPACE SPECIES LIST

INDIGENOUS SPECIES – TREES AND SHRUBS
Carex testacea
Acacia melanoxylon
Acacia paradoxa
Allocasuarina littoralis
Allocasuarina paradoxa
Allocasuarina verticillata
Banksia integrifolia
Banksia marginata
Davesia latifolia
Eucalyptus camaldulensis
Eucalyptus ovata
Eucalyptus melliodora
Eucalyptus pauciflora
Eucalyptus radiata
Eucalyptus viminalis
Goodenia ovata
Hakea nodosa
Kunzea ericoides
Leptospermum continentale
Leptospermum myrsinoides
Melaleuca ericifolia

NATIVE SPECIES – TREES AND SHRUBS
Angophora costata
Bursaria spinosa
Callistemon 'Captain Cook'
Callistemon 'Kings Park Special'
Callistemon 'Little John'
Correa alba
Corymbia citriodora
Corymbia ficifolia
Corymbia maculata
Eucalyptus leucoxylon 'rosea'
Eucalyptus nicholii
Eucalyptus scoparia
Grevillea 'Robyn Gordon'
Grevillea rosmarinifolia
Lophostemon confertus
Westringia fruticosa
Westringia 'Wynabbie Gem'

LEGEND

- PROPOSED TREE PLANTING
- SHRUBS AND GRASSES
- GRASS AREAS
- PEDESTRIAN/BIKE PATH 2.4 METRES WIDE
- SEATING
- WETLAND AND AQUATIC PLANTING

SCALE 1:500 @ A1

HORNINGTON
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HILLBRIDGE
420 St Kilda Rd
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Fax (03) 9820 3534
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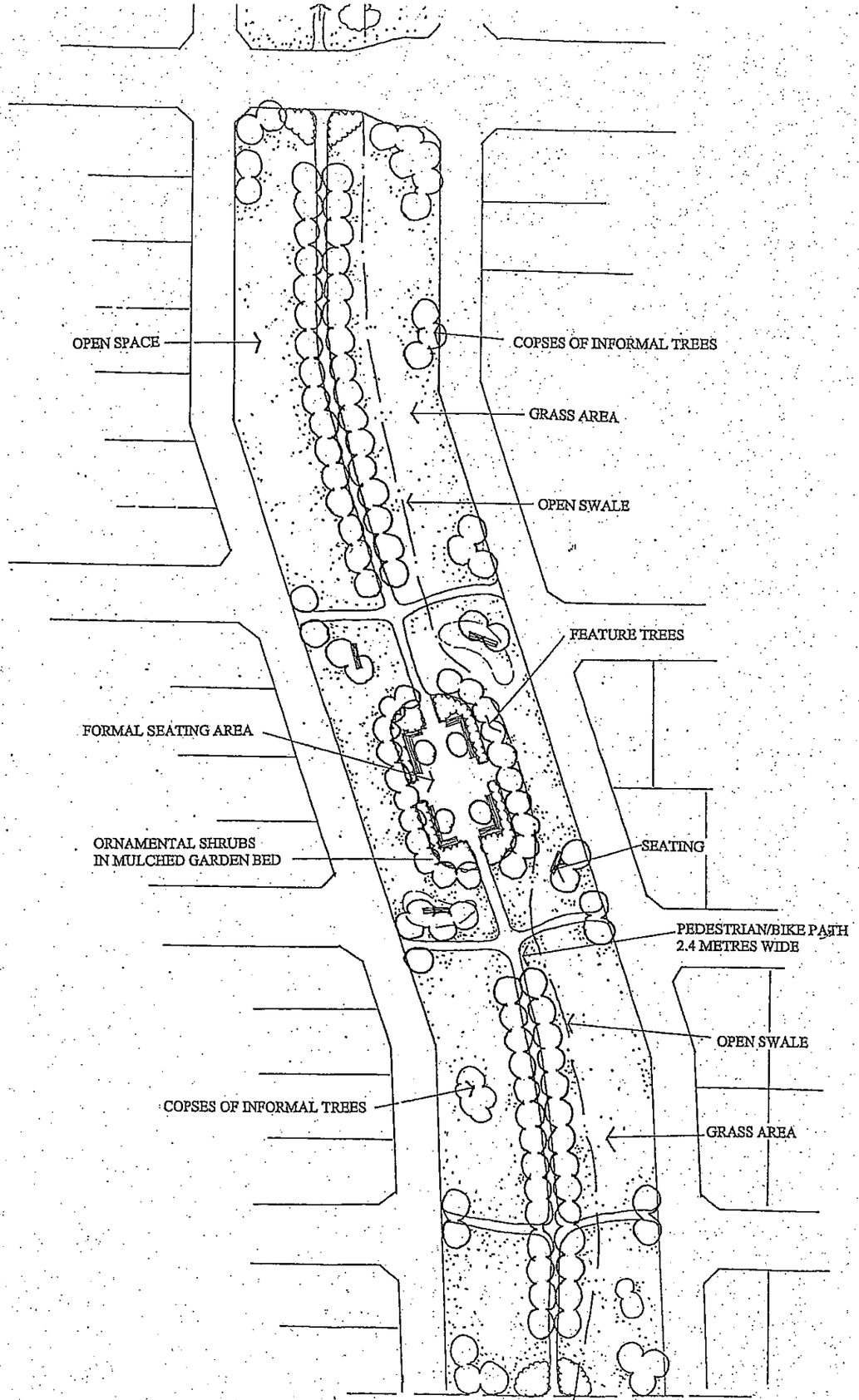
• CIVIL ENGINEERS
• SURVEYORS
• Urban Designers
• Project Managers
• Structural Engineers
Watsons Pty. Ltd.

PLAN NO. 02026/7
SHEET 1 OF 1
REF: 34626

PROPERTY 4
SPRINGVALE ROAD, KEYSBOROUGH
CITY OF GREATER DANDENONG

RESERVE – OPEN SPACE LANDSCAPE CONCEPT

FIGURE 7.6



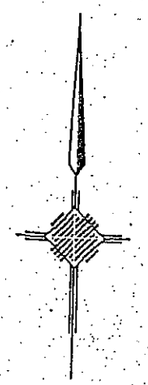
See Figure 7.8
for continuation

PUBLIC OPEN SPACE SPECIES LIST

INDIGENOUS SPECIES – TREES AND SHRUBS
Acacia mearnsii
Acacia melanoxylon
Acacia paradoxa
Allocasuarina littoralis
Allocasuarina paradoxa
Allocasuarina verticillata
Banksia integrifolia
Banksia marginata
Eucalyptus camaldulensis
Eucalyptus ovata
Eucalyptus pauciflora
Eucalyptus radiata
Goodenia ovata
Kunzea ericoides
Leptsopermum continentale
Leptospermum myrsinoides
Melaleuca ericifolia

NATIVE SPECIES – TREES AND SHRUBS
Angophora costata
Bursaria spinosa
Callistemon 'Captain Cook'
Callistemon 'Kings Park Special'
Callistemon 'Little John'
Correa alba
Corymbia citriodora
Corymbia ficifolia
Corymbia maculata
Eucalyptus leucoxylon 'rosea'
Eucalyptus melliodora
Eucalyptus nicholii
Eucalyptus scoparia
Eucalyptus viminalis
Grevillea 'Robyn Gordon'
Grevillea rosmarinifolia
Lophostemon confertus
Westringia fruticosa
Westringia 'Wynabbie Gem'.

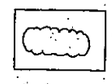
EXOTIC SPECIES
Fraxinus 'Raywood'
Platanus 'Digitata'
Pyrus 'Redspire'
Pyrus ussuriensis
Robinia pseudoacacia 'Frisia'
Ulmus parvifolia



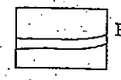
SCALE AS SHOWN

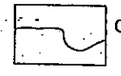
LEGEND


Proposed Tree Planting


Shrubs and groundcovers


Grass Areas


Pedestrian/Bike Path


Contours


Seating

HORNINGTON
5 Main Street,
Phone (03) 5975 4644
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MELBOURNE
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Fax (03) 9820 3575

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• Urban Designers
• Project Managers
• Structural Engineers

Watsons Pty. Ltd.
ABN 47 631 589 633

PLAN NO. 02029

SHEET 1 OF 1

REF: 34679

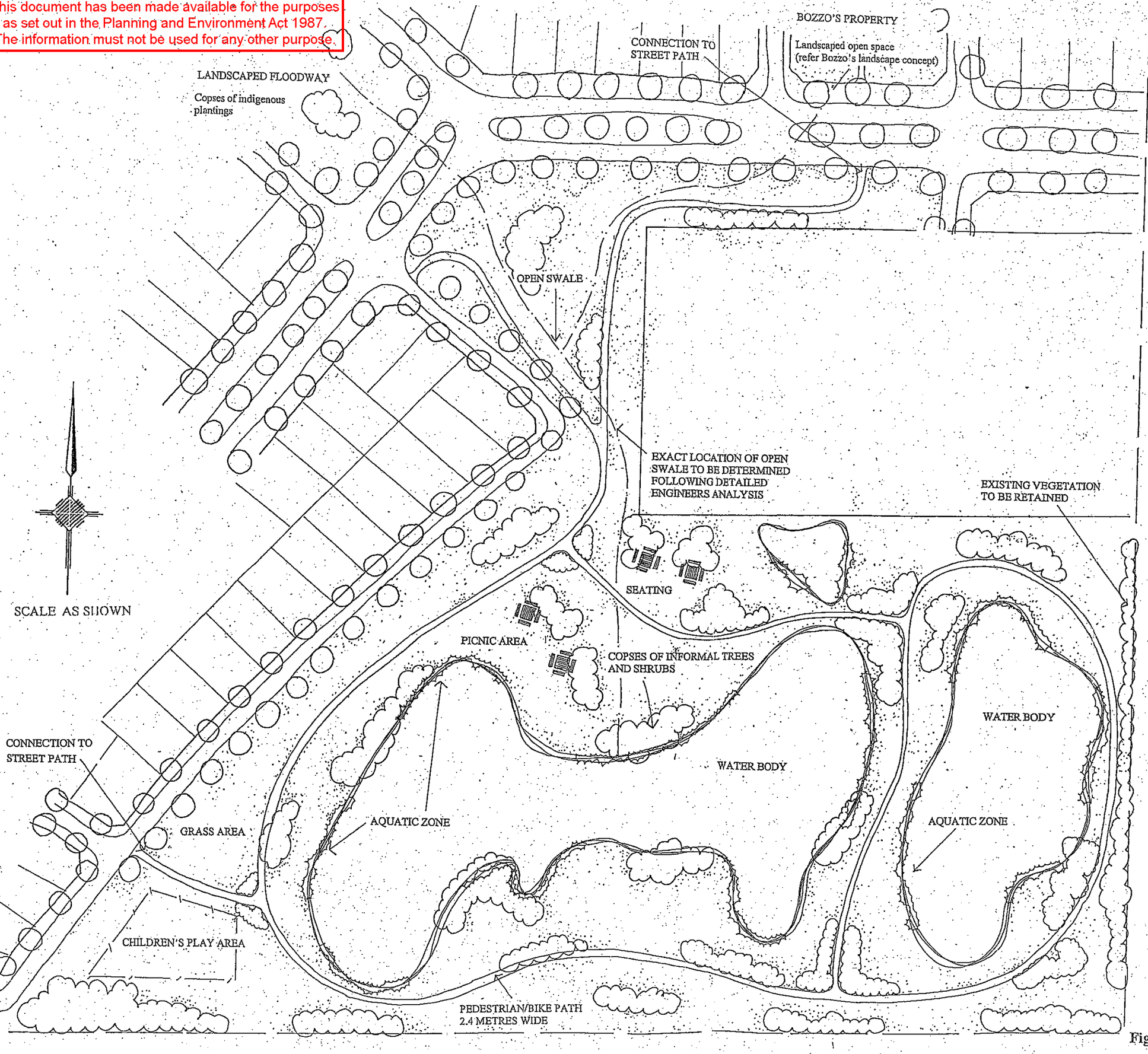
CITY OF GREATER DANDENONG

PROPERTY 6 & 6A

CHAPEL ROAD, KEYSBOROUGH

RESERVE – OPEN SPACE
LANDSCAPE CONCEPT

Figure 7.7



LEGEND

- Proposed Tree Planting
- Shrubs and grasses
- Grass Areas
- Pedestrian/Bike Path 2.4 metres
- Secondary path 1.8 metres
- Seating
- Wetland and Aquatic Planting

PLAN NO. 02028

SHEET 1 OF 1

REF: 34678

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• SURVEYORS
• Urban Designers
• Project Managers
• Structural Engineers

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CITY OF GREATER DANDENONG

PROPERTY 5 & 5a

CHAPEL ROAD, SPRINGVALE

RESERVE – OPEN SPACE LANDSCAPE CONCEPT

Figure 7.8

In line with the Environmentally Sustainable Development principles discussed in the Urban Design Guidelines, subdividers must attempt to use materials that are from sustainable industries, or use recycled materials provided that the quality of the product in terms of appearance and maintenance are acceptable. For this reason, Section 7.0 (Permit Application Requirements) includes a requirement that Landscape Concept Plans submitted with subdivision applications must include a report detailing where materials etc are to be sourced with a description of whether or not the source is considered to be sustainable. Where materials are to be sourced from non-renewable materials, an explanation must be provided as to why other alternatives are not appropriate.

6.3 Traffic Management Plan

The Traffic Management Plan at Appendix 2.0 is a requirement of the Schedule 2 to the Development Plan Overlay. The function of the Plan is to provide detailed analysis of the proposed road layout and connections with the broader road network outside the Development Plan. It provides detailed designs for internal intersections, bus bays, road reserve widths, pavement widths, and local street volumes. The Plan also designates the triggers at which the signals to Cheltenham and Springvale Roads must be provided and the works for the intersection of Chapel Road and the East-West collector road.

The Traffic Management Plan serves as an assessment tool for the road layout in the Subdivision Concept Plan and suggests some minor road alignment changes that are required once detailed design plans and Plans of Subdivision are prepared. Council will use the Traffic Management Plan as a guide for detailed intersection and road design.

The Traffic Management Plan allows for some elements of the Subdivision Concept Plan to vary without the need to completely revise the entire Management Plan. These opportunities are primarily limited to altering the configuration of local streets. Where an application for a subdivision departs from the Subdivision Concept Plan, the application must be accompanied by a report from a traffic engineer confirming that the change does not create unsafe traffic conditions or detrimentally affect traffic volumes on other local streets.

6.4 Energy Efficiency in the Development Plan

6.4.1 Public Area Lighting

Gird connected solar powered street lights have been extensively researched as an option for street lighting within the Development Plan. The lights run from mains electricity during the night but during the day the solar panel diverts electricity into the power grid. This is advantageous for summer days where the load on the electricity network is greatest (output form the solar panels is also greatest at these times). Being grid connected there is no risk of a battery failure during extended periods of no sun. Based on this approach, the energy consumption for the lights over 12 months is likely to be nil.

The prime difficulty with these lights is that the relevant electricity provider will not assume responsibility for the maintenance of these lights under the normal street light maintenance regime. Furthermore, because the energy usage and production outputs for the lights fluctuates depending upon the weather, this lighting system must be metered supply to determine the energy use/production over a quarterly billing period. Under these conditions the lights are an unacceptable maintenance burden and potential

cost liability for Council, and as such 'normal' non-standard fitting lights will be installed throughout the subdivision in accordance with the details at Appendix 4.

As an alternative to grid connected solar street lighting, Council has agreed that an equivalent number of photovoltaic cells (ie. the solar collector panels on the streetlight) be installed on the roofs of Council owned buildings in order to offset the energy usage costs of normal street lighting in the development plan area. The 'array' of cells on Council owned buildings will generate electricity that is then fed into the power grid. The amount of supply will be metered and Council will claim this as a credit against energy usage costs of the building. Council's maintenance liability will be reduced to a single array of well-protected Photovoltaic cells with much greater reduced maintenance and operational liability.

The costs of supplying and installing the Array of solar panels will be borne by the development of subdivisions within the Development Plan area. Upon collection of all levies, Council will install the array of PV cells on a Council owned building.

The estimated costs of erecting the Array on the roof of Springers Leisure centre (as an example) is $415 000 (as at July 2002). Based on a per hectare of site area basis the apportionment of costs is as follows:

Total Development Area 120.97Ha

Per Hectare apportionment of cost - $3430.60/Ha

Property 1	-	(22.9Ha)	$78560.80
Property 2	-	(20Ha)	$68 612
Property 3 & 3A	-	(16.1Ha)	$55 232.66
Property 4 & 4A	-	(16.1Ha)	$55 232.66
Property 5 & 5A	-	(24Ha)	$82 334.4
Property 6 & 6A	-	(16.67Ha)	$57 188.10
Property north of 6	-	(5.2Ha)	$17 839.12

Payment of the above amounts may proceed on a stage by stage pro rata basis and actual figures shall be indexed to C.P.I. from July 2002.

LED (Light Emitting Diode) cluster lamps can be fitted to existing standard access street lights providing sufficient illumination for the street but with energy consumption savings of 70% or more. LED lamps can also be used in conjunction with solar powered lamps in open space areas for even greater energy savings. The use of LED lamps in street lighting is desirable in the Development Plan and where applicable, LED lamps should be used in conjunction with solar powered lamps in the open space areas. The use of this technology will ultimately depend on the power company agreeing to an appropriate maintenance schedule for the LED cluster lamps, and confirmation that the lamps are a feasible technology for public area lighting. These requirements must be addressed as part of a planning application (See Section 7.0).

6.4.2 Residential Lot Layout & 5 Star Energy Ratings for Houses

The Subdivision Concept Plan has been developed to maximize the number of allotments with north-south or east-west long axis'. This maximizes the opportunity for dwellings to be constructed so as to capitalize on warmer winter sun (save on heating costs) and reduce hot summer sun (reduce cooling costs). Dwellings in the Development Plan will be expected to achieve a 5 Star VICHERS energy rating. While this will be achieved

through a number of means including energy efficient white goods, solar water heating, double glazing etc, maximizing the use of passive solar energy will be a critical consideration to achieve the rating.

Subdivisions should aim to achieve in excess of 80% of allotments with the long axis aligned within N20 degrees west to N30 degrees east or E20 degrees north to E30 degrees south (See Figure 3.0) and an explanation of how this is achieved is a permit application requirement at Section 7.0).

6.5 Aboriginal Heritage Matters

The Development Plan area has been thoroughly studied by Archaeologists (Austral Heritage Consultants) and has been determined as unlikely to contain Aboriginal artefacts. Despite this conclusion, there is the need for detailed sub-surface testing to occur prior to the issue of a planning permit. It is therefore a requirement for a planning application to subdivide to be accompanied by a report from a qualified Archaeologist confirming the presence or otherwise of Aboriginal artefacts. If artefacts or sites of significance are located, then the disturbance of the artefact of site must be resolved with the traditional landowners prior to the Council issuing a permit for a subdivision. This is an application requirement at Section 7.0.

6.6 Accessibility Issues

Accessibility to open space within the Development Plan area is an important issue. Accessibility to enjoy the open space and water bodies must be available to the widest section of the community, including ages and physical challenges. For this reason, Landscape Concept Plans must detail how persons of limited mobility will be able to access the open space areas, and engineering design plans must acknowledge the need for tactile paving at pram crossings to warn vision impaired persons of grade changes and roadways. Engineering design plans must show tactile pavers in accordance with the relevant legislation.

6.7 Public Open Space

Each of the properties within the Development Plan (excluding the Retarding Basins) must provide a minimum of 20% of the site as open space generally in a linear interconnected manner with adjoining sites. For most of the Properties this is obvious, however Properties 4 and 5A provide a very long section of Tree Reserve along the boundary of the Keysborough Golf Course which will contain a shared cycle/pedestrian path that leads to recreation opportunities beyond the Plan area. For this reason, the 15m wide tree reserve is to be included in the 20% open space contribution for these properties.

While the 500m dog buffer indefinitely does preclude some areas of residential land from being developed, those areas constrained by the buffer must still be considered in the calculation of the total area of open space for that lot.

Several of the Properties in the Plan area comprise 2 or more titles. Provided that the resultant configuration of Public open space is considered to be more effective and usable, the 20% open space contribution will be considered across the land holding not the individual lot. The exemption to this approach is the land zoned Mixed Use Zone along Cheltenham Road. Because this land is likely to be split into residential and non-residential uses, the 20% Public Open Space contribution will be on a per lot basis or other arrangement agreed to with the Council.

6.8 Environmental Sustainable Development Principles

The rezoning of the Development Plan area seeks to create the City of Greater Dandenong's leading edge residential development embracing many Environmental Sustainable Development principles (ESD). The sum total of elements of the Development Plan does go a long way towards achieving this but it is acknowledged that the purest definitions of ESD are not met. While the rezoning was not approved on the basis of ESD principles, the Urban Design Guidelines and good Planning Practice does mandate attempts to incorporate ESD principles into the development.

The Development Plan, achieves some broad ESD principles through the following:

- Maximises passive solar design potential for dwellings through road and lot configuration. This results in lower electricity consumption particularly for heating and cooling;
- 5 Star VICHERS energy ratings for new dwellings again to reduce electricity consumption;
- Creation of extensive linear open space areas to encourage residents to recreate and exercise at home or within Tatterson Park thereby reducing the need to use motor vehicles to travel to open space and active recreation areas;
- Creation of urban wetlands and water bodies that provide stormwater retention, cleansing and habitat creation that creates broader catchment-wide and downstream benefits;
- Incorporate, protect and regenerate existing significant remnant vegetation and propagate local vegetation seed stocks;

There is opportunity for the implementation of ESD principles at the detail design and domestic level. The Development Plan is not intended to specify such details but there is the opportunity to itemize the opportunities and make them matters that must be addressed at the Planning Application level where the finer grain of detail is required.

Section 7.0 specifies the matters that must be provided to Council with an application to subdivide land. The requirements specified in this section are an important mechanism to ensure that matters such as ESD principles are addressed at the detail level where appropriate to particular tracts of land.

6.9 Land affected by the 500m Dog Buffer

Parts of Property 5 and 5A are within the 500m buffer denoted around the existing dog related establishments in Homeleigh Road and Tyers Lane. Where these properties are affected by the buffer, these areas are noted on Figure 4 as open space except for one small portion of Property 5 abutting Chapel Road. This area is shown on Figure 4 and must not be developed for residential purposes until all dog related establishments within 500m of this land have ceased. Furthermore, this Development Plan must not be altered to facilitate this land developing for residential purposes until all dog related uses within 500m of the land have ceased.

7.0 Planning Applications for Subdivisions

Any application to Council for the subdivision of land must be accompanied by the following information unless otherwise agreed to by the Council:

- A Site and Context Description describing the following as appropriate:
  - Site shape, dimensions and size;
  - Orientation and Contours;
  - Trees and other significant vegetation;
  - Siting and use of existing buildings on the site;
  - Street frontage features such as poles, trees and kerb cross-overs;
  - Access points;
  - Drainage and infrastructure connections;
  - Easements;
  - Significant natural features including drainage lines, watercourses, habitat areas and corridors;
  - Significant views from the site;
  - Soil conditions including areas affected by contamination, fill or salinity;
  - Noise and odour sources or external influences;
  - Any other notable features of characteristics of the site;
  - The pattern of subdivision in the area;
  - Existing landuses on adjoining sites;
  - Siting and use of buildings on adjoining sites;
  - Location and type of significant vegetation;
  - Street and footpath widths, materials and detailing;
  - Location, distance and characteristics of nearby open space;
  - Direction and distance to shops, schools, community and recreational facilities;
  - Directions and distances to public transport routes and stops;
  - Direction and distances to existing neighbourhood and regional activity centres and major employment nodes;
  - Existing transport routes;

- Local street network;
- Traffic volumes and movement on adjacent roads;
- Pedestrian and cycle paths;
- Any places of natural or cultural significance.

- A Landscape Concept Plan generally in accordance with the relevant plans at Figures 7.1-7.8 including an overview of the types of tree selections to be planted throughout the subdivision and open space, and the location of pedestrian/cycle paths. The landscape concept plan must only show native and indigenous vegetation;

- A report detailing the sources of raw materials to be used for landscaping. All reasonable efforts must be made to use sustainable, renewable or recycled materials. Where traditionally sourced materials are to be used, the Report must explain why the alternatives have not been used;

- Details regarding the use of LED cluster lamps in the street lights which must comply with the details at Appendix 4 (subject to maintenance agreement with the electricity company);

- A plan and budget confirming that at least 80% of the lots in the subdivision have long axis within the range N20 degrees west to N30 degrees east or E20 degrees north to E30 degrees south;

- A land budget including total site area, total area of public open space (which includes the water bodies), total area of reserves, total area of roads, total area of residential lots, total number of lots, average lot size, and the number of dwellings per hectare of site area;

- A report from a qualified and experienced Archaeologist confirming that appropriate ground surveys have been undertaken across the site in conjunction with a representative of the Wurrundjeri People and that any aboriginal sites of artefacts found on the site have been resolved with the Wurrundjeri or a statement confirming that there is no Aboriginal sensitivity that requires further testing;

- Where a subdivision results in the removal of native vegetation the following must be submitted:

  - A Plan prepared by a Licensed Land Surveyor locating the trunks and drip lines of all indigenous and trees on the site along with the diameter of the tree measured at chest height;
  - Where trees with a trunk diameter in excess of 350mm are to be removed, a report must be provided explaining how the trees will be stripped of foliage, stored and protected during construction and then placed as habitat within the waterway system once completed;

- An application for the subdivision of Property 4 and 5A must be accompanied by a report from a suitably qualified person confirming that the Tree Reserve along the boundary to the Keysborough Golf Club complies with 'Golf Course Architecture, Design, Construction and Renovation, Michael J. Hurdzan, Sleeping Bear Press, 121 South Main Road, Chelsea MI 48118);

- An application for the subdivision of Property 5 must include details of the Gateway treatment for the intersection works on Chapel Road;

- A road safety audit for each subdivision including an analysis of impacts resulting in any road layout changes that differ from the Subdivision Concept plan. The effectiveness and appropriateness of proposed traffic claming devices must be assessed as part of the audit and the Auditor must be mutually agreed upon by Council and the developer;

- A report demonstrating the compliance of the subdivision to the relevant objectives and standards of Clause 56 of the Planning Scheme including a section explaining the design response of the subdivision to matters identified on the Subdivision Concept Plan and the Site and Visual Analysis plan;

- An application for any subdivision that creates an access to either Cheltenham Road or Springvale Road (ie. Properties 1, 2, 3 & 4) must include a statement that the land owner/subdivider agrees to prepare and execute an Agreement pursuant to Section 173 of the Planning and Environment Act 1987 between the landowner, VicRoads and the City of Greater Dandenong that will cover all mitigating works including street lighting and associated conditions required by VicRoads in any response made to the referral of any plans for subdivision.

These requirements for applications to subdivide are in addition to those requirements at 2.0 Schedule 2 to Clause 43.04 Development Plan Overlay in the Greater Dandenong Planning Scheme.

8.0 Staging Plan

The staging plan at Figure 8 provides a description and demonstration of how the wetlands and open water bodies forming part of the central linear open space will be sequentially constructed between differently owned development lots.

The development of the central drainage network requires developers to undertake all necessary earthworks to form the open water bodies, wetlands and drainage connection between these features within their own land. However, the final configuration of the network results in the alignment of the existing drain shifting to the west, and therefore once a developer has completed the works within their land the is a need to re-direct exiting or entering water flows to or from the alignment of the existing drain.

This necessitates the need to perform earthworks (including temporary stabilization measures) within the adjoining property over a distance of not more than 25m to connect to or from (depending on whether the upstream or downstream property has been developed into the final configuration of the drainage network) the existing drain.

In order to ensure that this can occur, the owners of Properties 1, 2, 3 & 4 on Figure 1 must enter into an agreement pursuant to Section 173 of the Planning & Environment Act 1987 to allow the abutting landowner to enter their property and undertake works within 25m of the abutting land to redirect the drainage network to or from the existing drain. This Agreement must be registered on the title of Properties 1, 2, 3 & 4 prior to the issue of a Statement of Compliance for any stage of development of a property that requires works to be undertaken on an adjoining

FIGURE 8

STAGING ARRANGEMENTS
FOR CONSTRUCTION OF
WATERBODIES & DRAINAGE NETWORK

File k:\34680\Town Planning\dgn\Staging Plan.dgn

FIGURE 8

In order to ensure that this can occur, the owners of Properties 1, 2, 3 & 4 on Figure 1 must enter into an agreement pursuant to Section 173 of the Planning & Environment Act 1987 to allow the abutting landowner to enter their property and undertake works within 25m of the abutting land to redirect the drainage network to or from the existing drain. This Agreement must be registered on the title of Properties 1, 2, 3 & 4 prior to the issue of a Statement of Compliance for any stage of development of a property that requires works to be undertaken on an adjoining property, and which provides for the transfer of the open space/drainage reserve to Melbourne Water Corporation and Council.

Watsons Pty. Ltd.
ABN: 47 637 509 613

9.0 Altering the Development Plan

This Development Plan may, with the approval of the responsible authority, be altered or amended. In seeking to do so, it must be demonstrated that the amendments or alterations accord with the objectives of Schedule 2 to Clause 43.04 of the Greater Dandenong Planning Scheme (see Appendix 1).

- : End of Development Plan : -

Prepared by:

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Mornington 3931
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Appendix 1

Development Plan Overlay and Schedule 2 Keysborough South Local Planning Policy Area Development Plan – Stage 1.

Source: Greater Dandenong Planning Scheme

43.04 DEVELOPMENT PLAN OVERLAY

Shown on the planning scheme map as DPO with a number.

Purpose

To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.

To identify areas which require the form and conditions of future use and development to be shown on a development plan before a permit can be granted to use or develop the land.

To exempt an application from notice and review if it is generally in accordance with a development plan.

43.04-1 Requirement before a permit is granted

A permit must not be granted to use or subdivide land, construct a building or construct or carry out works until a development plan has been prepared to the satisfaction of the responsible authority.

This does not apply if a schedule to this overlay specifically states that a permit may be granted before a development plan has been prepared to the satisfaction of the responsible authority.

A permit granted must:

- Be generally in accordance with the development plan.
- Include any conditions or requirements specified in a schedule to this overlay.

43.04-2 Exemption from notice and appeal

An application under any provision of this scheme which is generally in accordance with the development plan is exempt from the notice requirements of Section 52(1)(a), (b) and (d), the decision requirements of Section 64(1), (2) and (3) and the review rights of Section 82(1) of the Act.

43.04-3 Preparation of the development plan

The development plan may consist of plans or other documents and may, with the agreement of the responsible authority, be prepared and implemented in stages.

The development plan must describe:

- The land to which the plan applies.
- The proposed use and development of each part of the land.
- Any other requirements specified for the plan in a schedule to this overlay.

The development plan may be amended to the satisfaction of the responsible authority.

Notes: *Refer to the* State Planning Policy Framework *and the* Local Planning Policy Framework, *including the* Municipal Strategic Statement, *for strategies and policies which may affect the use and development of land.*

Check the requirements of the zone which applies to the land.

Other requirements may also apply. These can be found at Particular Provisions.

SCHEDULE 2 TO THE DEVELOPMENT PLAN OVERLAY

Shown on the planning scheme map as **DPO2**

KEYSBOROUGH SOUTH LOCAL PLANNING POLICY AREA DEVELOPMENT PLAN – STAGE 1

This development plan affects land in Stage 1 of the Keysborough South Local Planning Policy Area as described in Clause 22.06. Once part of the south east non-urban area, the conversion of the land into residential development has been based around the delivery of a range of beneficial environmental, landscape and recreation outcomes through a pattern of development which is complementary to Council's objectives for the area. Development of the land must deliver an integrated series of wetlands and open water bodies in the form of a linear open space network, while improving urban stormwater quality, providing flood storage capacity, external and internal landscape improvements, and gateway treatment for entry to the non-urban area.

1.0 Requirement before a permit is granted

A permit may be granted before a development plan has been prepared to the satisfaction of the responsible authority:

- For any building or works associated with the use of the land for agriculture.
- For extensions or alterations to an existing building or works.

2.0 Conditions and requirements for permits

Application requirements

An application to subdivide land must be accompanied by:

- A Site and Visual Analysis including:
  - Site boundary dimensions.
  - Contours.
  - Existing easements.
  - The location of existing buildings and accesses.
  - Key internal and external views.
  - The location, species and condition of existing vegetation.
  - Significant landforms and slopes.
  - Noise and visual intrusions.
  - Significant features on adjoining land.
  - Site context information such as distances to local community facilities.
  - Public transport routes and stops.
- An Environmental Management Plan (EMP), to the satisfaction of the responsible authority and Department of Natural Resources and Environment, for the subdivision which covers the following matters:
  - Protection and enhancement of tree retention areas during and after construction periods.
  - Erosion and siltation control during construction.

- An overview of the operation and construction of wetlands within the lot, including consideration of the upstream and downstream drainage conditions of adjoining lots.
- Monitoring and review periods for elements of the EMP.
- A Residents Information Kit covering issues such as preferred tree planting lists, domestic animal responsibilities, water conservation, the role of urban wetlands, the sensitivity of re-constructed natural areas, energy efficient building requirements and any issues covered by Section 173 agreements.
- Designation of areas (if any) where human access to open space areas will not be allowed, including descriptions of the systems to be established and the means of precluding human access.
- An overview of the design details proposed for wetlands and open water bodies, including different edge treatments, vegetation associations, habitat areas, perching areas and underwater habitat.
- Construction and maintenance requirements for water bodies and wetlands, to the satisfaction of the Melbourne Water Corporation.
- Integration of stormwater management measures.

- A Landscape Concept Plan for all areas of public open space, street trees and buffers, including the interface with landscaping on adjoining lots.

Permit conditions

A permit to subdivide land which creates an additional lot must include conditions providing for the following, if appropriate:

- Design of open space areas must be in accordance with a landscape, open space and cycle/pedestrian trail plan to the satisfaction of the responsible authority.

- If a subdivision abuts Cheltenham Road, Springvale Road, Chapel Road or the Keysborough Golf Club, landscape plans to the satisfaction of the responsible authority must be submitted showing details of buffer tree planting generally in accordance with the Urban Design Guidelines forming part of the development plan within tree reserves not less than 15m wide or otherwise approved by the responsible authority.

- Subdividers must enter into an agreement with the responsible authority under Section 173 of the Act to provide for:
  - A contribution of $4,725/ha of developable land towards the upgrade and improvement of facilities within Tatterson Park. (All contributions are indexed to CPI from August 2000.)
  - A contribution of $7,220/ha of developable land for the provision of community facilities within the development plan area. (All contributions are indexed to CPI from August 2000.)
  - A contribution of $29,833/ha of developable land towards the upgrade and improvement of roads and intersections within the Keysborough South Local Planning Policy Area. (All contributions are indexed to CPI from August 2000.)
  - The value of any works external to a subdivision undertaken by the subdivider and completed to the satisfaction of the responsible authority that deliver community benefits, upgrades to Tatterson Park or the upgrade of the Keysborough South road network which would otherwise be funded by the money contributions described above will be offset against the above contribution requirements.
  - If land to be subdivided abuts Tatterson Park, the agreement must provide for the subdivider to construct appropriate landscaping, paths and wetland areas within the verges of Tatterson Park (up to 10 metres inside the Park) to ensure connectivity between the open space and the Park.
  - Maintenance of open spaces, including water bodies and wetlands, are to be the responsibility of the subdivider for a period of 3 years from the completion of works.
- Subdividers must enter into an agreement with the responsible authority under Section 173 of the Act that provides for the owners of each residential lot created to pay an

annual special charge levy for parks and open space maintenance (in additional to Council rates) to the responsible authority. The special charge will be an ongoing annual charge to owners of residential lots (charged as part of the annual rates collection process) and will assist Council's maintenance of the open space network. Payment of the levy is to commence from the first rate collection period after a lot is sold. This will create a pool of funds to be available to the Council which can be used for Council works and maintenance, noting that the Council will not assume this responsibility until the end of the subdividers' three year works maintenance liability period.

3.0 Requirements for development plan

The development plan must comprise:

Subdivision concept plan

- A Subdivision Concept Plan generally in accordance with the Development Concept Map at Clause 22.06 identifying, as appropriate:
  - A linear open space network generally aligned along existing major overland storm water flow paths, including areas of re-vegetation, wetlands/open water bodies and multi purpose trails.
  - At least 20% of the land shown as public open space incorporating stormwater storage and water quality improvement devices such as wetlands and open water bodies forming part of the linear open space network.
  - A 15 metre wide tree reserve along all frontages to Springvale Road and Chapel Road and along the abuttal to the Keysborough Golf Club.

Urban design guidelines

- Urban Design Guidelines to create a development which minimises resource use and re-creates, protects and enhances natural systems on the land. The guidelines must include:
  - Design objectives – detailing the physical, environmental, visual and social outcomes intended for the land.
  - Planning principles – incorporating a design concept based upon the Subdivision Concept Plan approved as part of the development plan, along with site analysis and site context requirements for each subdivision application. These principles should also encourage the integration of existing trees into the subdivision where assessed as safe and practicable.
  - Subdivision patterns – incorporating preferred orientation of streets and lots to maximize opportunities for Environmentally Sustainable Development and 5 star (VICHERS) energy rating for dwellings.
  - Vehicular networks – incorporating the trunk collector road network shown on the approved Subdivision Concept Plan and collector road network. The guidelines should detail suggested treatments for key intersections and street trees.
  - Pedestrian networks – detailing pedestrian and/or bicycle paths through the open space and road network, and identifying potential links to external areas. The guidelines should also discuss materials, widths and construction.
  - Open space network – incorporating the means by which there will be interconnected development of the open space corridors, including suggested treatments for elements of the open space, mounding, landscape buffers, interface details between Tatterson Park and the proposed open space spine and neighbourhood parks incorporating remnant trees.
  - Environmental protection – providing the means by which remnant trees will be incorporated into the development and regrowth will be encouraged, and providing for good urban stormwater management.
  - Landscape establishment – detailing an establishment program for hard and soft landscaping to be provided at the time of subdivision. The guidelines should also

detail the extent of Melbourne Water's responsibilities with wetlands/open water bodies and Council's responsibilities within the open space.
- Landscape maintenance – incorporating the means to reduce maintenance obligations on Council and establishing a framework for maintenance which can be used by developers and then Council when it assumes responsibility for the open space.
- Energy efficient forms of infrastructure – including street lighting and drainage systems.

Traffic management plan

- A Traffic Management Plan to the satisfaction of the responsible authority and Roads Corporation detailing:
  - Intersection treatment types for all road connections to Cheltenham Road and Springvale Road.
  - Timing for the provision of signalized intersection works to Cheltenham Road and Springvale Road.
  - Suggested intersection treatment and timing for the provision of works at Chapel Road and the intersection with the key east-west collector road running through the development plan area.

Staging plan

- A Staging Plan demonstrating the anticipated sequence of development detailing how the wetland system will function during and between development stages.

Cheltenham Road gateway treatment

- Design Guidelines for the land in this area west of the intersection with the Fiveways Boulevard providing for a future pattern of development that recognises the 'gateway' role of the site to the Keysborough South area. The guidelines must include:
  - Direction for the site's subdivision layout.
  - Landscaping.
  - Building form.

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Appendix 2

Traffic Management Plan

Prepared by TTM Consulting Pty Ltd

KEYSBOROUGH SOUTH LOCAL PLANNING POLICY
AREA DEVELOPMENT PLAN STAGE 1
TRAFFIC MANAGEMENT PLAN

Prepared By

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1. INTRODUCTION AND SCOPE

This report describes the Keysborough South Local Planning Policy, Area Development Plan Stage 1, Traffic Management Plan. The Traffic Management Plan (TMP) is required as a consequence of the provisions of Schedule 2 to the Development Plan Overlay, which sets out that the TMP must detail to the satisfaction of Council and VicRoads, the following :-

- Intersection treatment types for all road connections to Cheltenham Road and Springvale Road,
- Timing for the provisions of signalised intersection works to Cheltenham Road and Springvale Road,
- Suggested intersection treatment and timing for the provision of works at Chapel Road and the intersection with the key East-West Collector Street running through the development area.

In addition to the above, it has been agreed with Council that other traffic management related issues will be addressed. These include :-

- The design and traffic implications of the Bunnings traffic lights to Cheltenham Road for the 5-Ways Boulevard traffic lights and a further access into the Mixed Use Zone,
- An additional traffic lane for Springvale Road across the frontage of the Development and the Lighthouse Christian School,
- Possible bus routes and bus stop treatments for the development area,
- Assessment of main elements comprising the internal road network and discussion of recommended treatments i.e. pavement widths and designated intersection treatment e.g. Roundabouts.

Section 3.0 of Schedule 2 to the Development Plan Overlay also includes a requirement for Urban Design Guidelines (i) that must include :-

- Vehicular networks – incorporating the collector road network shown on the approved Subdivision Concept Plan and collector road network. The guidelines should detail suggested treatments for key intersections and street trees.
- Pedestrian networks – detailing pedestrian and/or bicycle paths through the open space and road network, and identifying potential links to external areas. The guidelines should also discuss materials, widths and construction.

Clause 22.06 of the Greater Dandenong Planning Scheme sets out requirements for a Development Plan to be prepared to the satisfaction of the responsible authority that includes :-

- Integrated planning of roads, including access to major roads and across the future Dingley Freeway. Linkages including pedestrian access be provided to existing urban infrastructure in Keysborough.
- Urban Design Guidelines that provide for roads, tree reserves, buffers and open space detailing :-
  - Typical road widths, materials, and kerbside treatments and planting.
  - Key intersection treatments.
- A Traffic Management Plan to the satisfaction of the responsible authority and Roads Corporation and in accordance this policy that includes :-
  - Detailed intersection treatments for all arterial road connections.
  - The timing for the provision of all works as required.

Clause 22.06 also has requirements for **Development Contributions** that contribute to the provisions of facilities and in a manner described by the following :-

Arterial Roads

- Upgrade existing arterial roads in the area to cater for existing and projected traffic increases generated within the region and to provide suitable access to the future Dingley Freeway and Scoresby Integrated Transport Corridor .
- Require additional traffic lanes on Springvale Road and Cheltenham Road to cater for overall traffic volumes.

Distributor roads

- Upgrade Chapel Road to act as a gateway to the precinct and function as a main north/south road link (taking into account down-grading of Perry Road outlined in this policy).
- Upgrade the distributor roads to assist access and traffic movement within the development area.

Traffic management works

- Require traffic management works in addition to arterial and distributor road works, which have the function of improving the efficiency of those roads. These works will consist of traffic signals and roundabouts.

Playing fields

- Construct three playing fields, including shared changing rooms and related amenities, on the southern portion of the existing public open space within Tatterson Park. These playing fields are intended to enhance this existing under-developed open space asset. The playing fields are considered to be the facilities required, in part to satisfy the needs of the anticipated population.

Neighbourhood centre

- Require the Neighbourhood Centre to comprise a community hall, infant welfare centre, pre-school (capacity for 2 classes) and child-minding centre located adjacent to Chapel Road within Tatterson Park.
- Require the community hall, in addition to its normal function, to provide meeting rooms and an interim aged care facility.
- Locate the facilities on existing Council land within Tatterson Park that will be accessed via the external road network complemented by the existing network within that facility.

Traffic management

- Provide for a range of road network options to service the precinct and accommodate the impact on Springvale Road, Cheltenham Road, the future Dingley Freeway and the future Scoresby Integrated Transport Corridor.
- Achieve the following road network outcomes :-
  - Contain the traffic on Kingsclere Avenue to existing or lower levels (10, 000 vehicles per day).
  - Provide a series of evenly spaced north/south access points onto Cheltenham Road. Contain the north/south through traffic to the Corrigan Road/Chapel Road link. Minimise access to Springvale Road to provide for minimal impact on traffic flows. Provide for appropriate access to nearby freeways for residential and industrial development.
  - Discourage the use of the internal road network for 'rat running'.
  - Provide an internal road network that allows a continuous bus route to service the area.
  - Provide an internal road network that has minimal impact on the adjoining arterial roads.

- Achieve these outcomes through the following road network arrangements :-

  - Retain the Chapel Road link across the Dingley Freeway. The preferred intersection arrangement is to bury the freeway at this point to allow a grade-separated crossing. A major constraint to this arrangement is the location and depth of the existing underground drainage outlet that serves the residential area to the north. Further investigations are required to resolve this constraint.

  - Provide primary north/south access along Chapel Road, connecting with Corrigan Road. Chapel Road is to be upgraded to the same standard as Corrigan Road. The development of this intersection could impact existing traffic operations in Springvale Road. Additional traffic lanes may be required in Springvale Road to reduce this impact.

  - Discontinue Perry Road at Island Road. This will require provision of appropriate traffic measures to guide and encourage traffic to use other, preferred routes. Possible modifications include the Hutton/Perry Road intersection to encourage traffic to turn left to use Chapel Road, through provision of left turn lanes to encourage this movement.

  - Discontinue Chandler Road and Stanley Road at the Dingley Freeway. This is to be undertaken as part of subdivision works to establish the desired traffic movement as development occurs.

  - Discontinue and/or down grade a number of existing roads in the precinct.

  - Provide northbound ramp access to the Scoresby Integrated Transport Corridor at Hutton Road in consultation with the Roads Corporation.

  - Remove or relocate the proposed on/off access ramps to the Dingley Freeway at Perry Road in consultation with the Roads Corporation.

  - Provide an additional intersection(s) at Springvale Road in consultation with the Roads Corporation.

This report sets out a response to each of the above listed requirements, wherever relevant to the Stage 1 Development.

2. THE DEVELOPMENT FRAMEWORK AND PROPOSED STAGING

Figure 1 and Figure 2 are reproduced from the Greater Dandenong Planning Scheme, Clause 22.06.

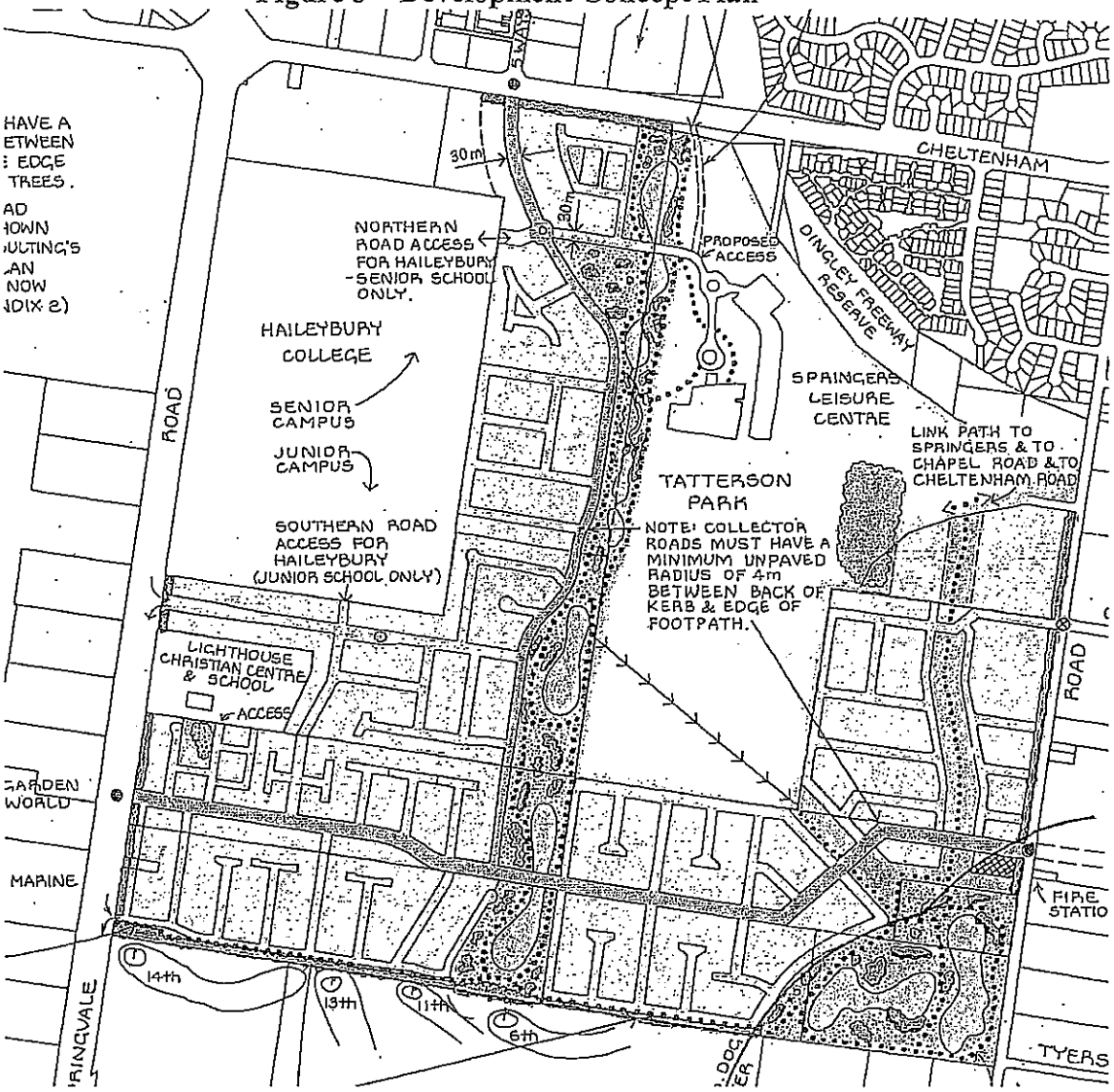
These Figures respectively show the Development Framework and the Staging Plan. As can be seen from Figure 2, Stage 1 wraps around Tatterson Park, and is located between Haileybury College, Keysborough Golf Club, and Chapel Road. Stage 1 is the principal subject of this report.

3. THE STAGE 1 DEVELOPMENT PLAN

Figure 3 is reproduced from the drawing entitled "Keysborough – Concept Plan" prepared by Watsons Pty. Ltd. This plan shows the Stage 1 area. Features and inclusions in the plan are :-

- 1,022 residential lots,
- Average lot area 619 square metres,
- Mixed use or neighbourhood facilities of 0.6ha land area, on Chapel Road
- Connection for vehicular access to "Springers" Leisure Centre at Tatterson Park,
- Street connections to Springvale Road, Chapel Road and Cheltenham Road.

Figure 3 – Development Concept Plan



4. RELEVANT TRANSPORT PLANNING ISSUES

4.1 Cheltenham Road

East of Springvale Road Cheltenham Road has a 5-lane cross-section in a reservation of approximately 40 metres width. The median is 10 metres in width, and there are 3 lanes eastbound from Springvale Road to a point just west of the western boundary of Springers Leisure Centre.

VicRoads planning allows for an additional westbound lane on Cheltenham Road in this area, to ultimately create a 6-lane divided road in this area.

4.2 Springvale Road

Currently Springvale Road is generally a 4-lane divided road between Cheltenham Road and Hutton Road. Ancillary lanes are present at several locations along each side. VicRoads planning also envisages an ultimate 6-lane cross section through this area.

4.3 The Dingley Freeway

The Dingley Freeway reservation allows for the construction of this roadway, should a decision be made to so do. Key impacts of the Dingley Freeway in respect of the subject Stage 1 development are :-

- Retention of Chapel Road in the street network, as set out in the Planning Scheme, and
- The terminal intersection for the northbound off-ramp at Cheltenham Road.

Chapel Road would ideally continue at grade over the Dingley Freeway, with the freeway set well into the ground. Technical difficulties for drainage will need to be solved if the freeway is to proceed with the so described Chapel Road crossing.

The ramp terminal intersections will serve only southerly ramps, but the Springers access will be removed as a consequence of the western ramp terminal intersection. This, in turn, leads to a requirement that alternative access be available to Cheltenham Road for Springers Leisure Centre.
The 5-Ways Boulevard intersection (see Section 4.5 of this report) is located sufficiently clear of where the ramp terminal intersection would logically be placed, to allow satisfactory operation of both intersections.

4.4 Bunnings Access, Cheltenham Road

A signal controlled access for a proposed Bunnings Store on the north side of Cheltenham Road, west of Carson Avenue, has been approved in principle. This intersection will require road widening on Cheltenham Road, which will effectively create 6 lanes over part of the length of the road between Springvale Road and the Dingley Freeway reservation.

Further, this intersection provides an access opportunity for the Mixed Use Zone on the south side of Cheltenham Road, which may also afford an additional connection into the Haileybury College site.

4.5 5-Ways Boulevard : Intersection at Cheltenham Road

5-Ways Boulevard is the main southern connection of the 5-Ways Industrial Park on the south-eastern corner of Cheltenham Road and Springvale Road. Signal control has been planned for many years at this point, and the Stage 1 development plan responds to that by providing the main northern street connection at 5-Ways Boulevard.

4.6 Chapel Road

Chapel Road, pursuant to the part of Clause 22.06 of the Planning Scheme that relates to development contributions, is to be "upgraded to the same standard as Corrigan Road".

Corrigan Road has a 20.12 metre reservation containing a single centrally located carriageway of 12.2 metres (40 feet).

The existing Chapel Road reservation is 20.12 metres, and the sealed pavement is approximately 7 metres in width.

Compliance with the Planning Scheme can be achieved through the provision of the parking/manoeuvring lane on either side of the existing pavement. This is perhaps a little unfortunate given that much of Chapel Road will have no requirement for kerbside parking and accordingly a carriageway of 9 metres width will allow adequately for both through traffic and on-pavement cycling.

5. EXISTING TRAFFIC VOLUMES AND CARRIAGEWAY/RESERVATION PROVISIONS

Table 1 shows the form of roads about the site, giving approximate pavement widths, reservations, and traffic volumes where appropriate. Estimated current AM peak hour volumes are shown in Figure 4.

TABLE 1
EXISTING ROAD CONDITIONS

Road Element	Current Aadt	Reserve	Pavement
Springvale Road, between Hutton Road and Cheltenham Road	34,000	37.0	2 x 7.0 typ.
Cheltenham Road east of Springvale Road	25,000	34.0	2 x 7.0 typ.
Chapel Road	6,000	20.12	1 x 7.0 typ.

6. TRAFFIC GENERATED WITHIN THE STAGE 1 AREA

6.1 Basis of Estimates

Traffic generation can be expected to be in the order of 10 vehicle movements per day per dwelling, or less. For the purposes of this evaluation 10 vehicles per day will be used, together with the following characteristics of traffic generation. These peak period rates are in excess of typically measured generation rates and will lead to a conservative approach to intersection design and impact assessment.

- Total daily traffic generation — 10 vpd per dwelling i.e. 10,220 vpd
- Trips "internal" to area — 10% of total i.e. 1,000 vpd
- Outbound AM peak hour vehicle trips leaving area — 0.6 per dwelling i.e. 600 vph
- Inbound AM peak hour vehicle trips to area — 0.2 per dwelling i.e. 200 vph

Leisure Centre trips will be additional to the above, and are estimated at 1,150 vehicle movements per day.

6.2 Methodology for Assignment of Generated Traffic onto the Street Network

To determine the traffic volumes which are likely to occur on streets within the Concept Plan area and at the intersections with external roads the "Traffikplan" model was used. The modelling was carried out on the basis of a directional distribution of traffic to and from external areas as follows :-

North west (Cheltenham Road west of Springvale Road)	20%
North (Springvale Road north of Cheltenham Road)	30%
North east (Cheltenham Road east of Chapel Road)	26%
South east (Hutton Road east of Chapel Road)	8%
South (Springvale Road south of Hutton Road)	8%
South west (Hutton Road west of Springvale Road)	8%

6.3 Traffikplan Modelling Outputs

Figure 5 and Figure 6 respectively provide AM and PM peak hour development related turning movements at all external intersections.

Figure 7 provides the combination of AM peak hour generated at the site, and the existing AM peak hour traffic on the road network. These values have been used in the analysis of the needs for signal control, as described in Section 12 of this report. It has been previously agreed with VicRoads that the AM peak period would be used for analysis of the staging of signal installation, because of the higher volume of traffic entering the external arterial roads when compared with the PM peak periods.

6.4 Daily Traffic Volumes on Streets

Daily traffic volumes on streets are typically used as a guide for design type selection and also for assessing traffic related amenity.

Typically daily traffic in residential streets is between 10 times and 12 times the peak hourly volumes. Accordingly, Figure 7 has been associated with estimated daily flows on key street sections.

7. A TRAFFIC MANAGEMENT PLAN FOR STAGE 1

Figure 8 provides the Stage 1 Development Traffic Management Plan. This plan shows the recommended street reservation and carriageway designs, intersection treatments proposed for the internal streets, details of any other traffic management proposals, and also the concept plans for intersections with the external road network.

8. STREET TYPES AND DESIGN

8.1 Outline of Principles for Choice of Street Design

The principles of ResCode have been followed in the choice of street type and design, with the key influence being :-

- The function of streets as strategic connectors to the arterial roads about the site,
- Estimated future traffic volume,
- Likely demand for on-street parking, and
- Potential requirements for on-pavement cycling, or shared, off-pavement paths that connect with a wider network of such paths.

8.2 Cycle Network

A shared path network has been commenced in the subject area. Council has provided linkages along Springvale Road (2 metre wide path, eastern side) and Chapel Road (2 metre wide path, eastern side). Consequently a shared path along the East-West Collector Street, to link these paths, is appropriate. There is also a wide footpath on the south side of Cheltenham Road, west of Springers Leisure Centre. This should be connected into the new traffic signals at Cheltenham Road, and to the proposed open space corridor bike path network that to the southern tree reserve at the Keysborough Golf Club.

The street network is such that traffic volumes will only exceed 3,000 vehicles per day on the section of the Northern Collector Street north of the proposed new connection to Springers, and on the East-West Collector Street close to Springvale Road.

North of the connection to Springers Leisure Centre, a shared off-pavement path is proposed in the eastern naturestrip of the Collector Street. Northern, ad the East-West Collector Street includes the shared path previously described.

8.3 Future Bus Routes and General Legibility

If a bus route passes through the Stage 1 area using the Northern Collector Street north of the main East-West Collector, and the East-West Collector to Chapel Road east of the Northern Collector, then about 890 lots (81% of the total of 1,022) will be within about 400 metres safe walking distance of the bus route. The balance is within 200 metres of Springvale Road, along which bus routes 888 and 889 already travel.

For general legibility through the area it is proposed that the East-West and Northern Collector Streets have a slightly different character from the other streets, and that character be continued over much of the length of these streets. Because these streets are likely bus routes, Clause 52.07-4 of the Planning Scheme calls up Table C6, which requires carriageway widths at the wider end of the ranges provided. Specifically, the Northern Collector Street will have 7.5 metre wide carriageways, and the East-West Collector Street affectively a divided carriageway with 3.5 metre wide travel lanes and separate parking at 2 metres width. This is a design issue rather than response to future traffic volumes, because the capacity of this form of roadway is many times the estimated demand.

8.4 East-West Collector Street

Figure 9 shows the design for this street. Features include :-

- Travel/parking lanes combined width 5.5 metres,
- South side includes 2 metre wide shared path, set 1 metre off the southern building line in accordance with Table C7 to Clause 56.07-4 of Planning Scheme,
- Intermittent 3 metre wide median, including tree planting,

The overall reservation width proposed is 24 metres.

Care should be taken to locate property side boundaries opposite each other along the street, as far as is practical, and also to have vehicle crossings at the end of street blocks where full carriageway form is present. This is to allow turns across the median whilst minimising the amount of median opening, and to permit U-turns around the end of median sections, giving a full 14 metre diameter clear part circle in which to execute the movement.

8.5 Northern Collector Street

North of the Connection to Springers Leisure Centre

The northern part of the connection street has a road reservation width of 30 metres. The original proposal was 24 metres and this was widened to 30 metres following the Council Resolution. Figure 9a shows the adopted cross section. The shared path is proposed on the western side because the traffic signals at Cheltenham Road will afford all pedestrian crossing movements, which may reduce the need for pedestrians and cyclists to cross the collector street (without signal control) to gain access to/from the Leisure Centre.

South of Connection to Springers Leisure Centre

This street will have property access and frontage only on the western side, and therefore a wide verge is not needed along the eastern side.

Traffic volumes will be less than 3,000 vehicles per day at all points south of the Springers Leisure Centre connection, and thus no specific cycling facilities are needed.

The design proposed includes the following features :-

- 7.5 metre wide carriageways, (7.2 metres is adequate, but Table C6 to Clause 56.07-4 of the Planning Scheme requires 7.5 metres where bus use is anticipated)
- 5.5 metres, from building line to kerb face,
- 3 metres, from face of kerb to open space reserve boundary,
- Median and platforms at bus stops to prevent vehicles overtaking the bus when it is stopped, and also to introduce a speed control measure.

The total reservation proposed is 16 metres (Figure 10), except at the bus stops where the typical design is detailed on Figure 24 and Figure 25.

8.6 Other "Two Sided" Streets Throughout Stage 1

All streets with reservation abuttal on both sides, and except for the collectors described above and the link to Springers Leisure Centre are proposed at 7.2 metres carriageway in a reservation of 16 metres. This allows 4.4 metre verges on each side. In these streets the daily traffic volumes will be less than 1,000 vehicle movements, and no specific cycling facilities are needed.

Figure 12 shows the typical details of the design proposed.

8.7 Park-Edge Streets

These streets include all "one sided" streets fronting to park, tree reserve or the "squares". Features of the design proposed are :-

- Carriageway width of 5.5 metres, with upright kerbs,
- Verge of 4.5 metres minimum on side where residential properties abut,
- Verge of 1 metre minimum on reserve or "park" side.

The total reservation width proposed is 14 metres minimum, as shown in Figure 11.

9. BUS ROUTES AND STOPS

Figure 13 shows the proposed location of bus routes and stops. Other Figures depicting "Intersection Details" show the proposed layout of the bus stops, which also have a traffic management objective as a "slow point" in accordance with Table C3 to Clause 56.03-4 of the Planning Scheme.

10. TRAFFIC SPEED CONTROL AND INTERNAL INTERSECTIONS

Unfortunately the Planning Scheme includes Section 56.03-4, which effectively sets out spacings or separations for speed control "devices". Strict adherence to the planning scheme would mean that new residential areas are inundated with speed control devices that cannot all be located at intersections, and that will significantly reduce accessibility and streetscape values. Mostly, these things are "solutions" that are far worse than any problem they may solve.

In response to Clause 56.06-4, Figure 8 designates a suite of "slow points" and intersection treatments that create a state of "close to compliance" with the ridiculous Table C3 to the subject Clause. Broadly there are five types of intersection control/slow point shown, as follows :-

Intersection Deflections, to be used at T-intersections on very minor streets. These give priority to going around the corner, rather than straight through the head of the T. Although inelegant, they do not have a major impact on parking, access or streetscape.

A larger than usual splay corner is required on the properties at the intersection. Figure 17 shows a typical design.

Pavement Narrowings/Bus Stops on Northern Collector Street

Figure 24 shows a typical design, with Figure 22 and Figure 25 also showing specific examples.

Carriageway Transitions Narrowings and Bus Stops on East-West Collection

Figure 18, Figure 19, Figure 25, Figure 16, Figure 21 and Figure 14 all show examples of specific treatment proposals, in concept form.

Mid-Block Slow Points Created by Using Chicanes and Narrowing Pavement Width to 3.5 Metres

There is no applicable location that would have noticeable volumes of traffic other than locally generated, and maximum leg length is about 300 metres without the "slow point". The only benefit these are likely to create is compliance with the ridiculous Clause 56.03-4. Residential care about where cars are parked on the street is likely to be a much more appropriate method of speed control. The design proposed is a simple platform 90mm above the ambient pavement, with surface paved in 'faux brick' or similar, and ramping from the ambient pavement level in concrete over 600mm width.

Other Intersection Treatments

Figure labelled "Intersection Details" show concept intersection treatments in specific cases not previously described.

Intersection or Street Layout Modifications

In some areas the Concept Plan needs minor modification to achieve intersection functionality, or compliance with other requirements from Council. In so far as matters relevant to the facilities for traffic are concerned, these minor modifications will include :-

- Allowance for 15 metre wide Tree Reserves along Springvale Road, Cheltenham Road (but not the Mixed Use Zone), and Chapel Road,
- Allowance for a 15 metre wide Tree Reserves along the abuttal to Keysborough Golf Club,
- Allowance for the Springvale Road service road to be in a reservation of 12 metres to the immediate east of the Tree Reserve,
- The northern service road terminal on Springvale Road will need to be connected directly to the main carriageway, in the manner set out in AustRoads Guide to Traffic Engineering Practice Part 5, as shown in Figure 18.

12. INTERSECTIONS AT ARTERIAL ROADS

12.1 Intersections Requiring Traffic Signal Control

12.1.1. Cheltenham Road and Northern Collector Street

The intersection at Cheltenham Road will require signal control at an early stage of development of the northern part of the Concept Plan.

Once the demand for right turn out of the northern collector (or straight across to 5-Ways Boulevard) reaches an average of about 2 vehicles per signal cycle at Springvale Road or Chapel Road, the capacity of the median to store vehicles making a staged movement will be challenged. This is equivalent to a right turn exit volume of about 50 movements per hour in the morning peak. Allowing for random arrivals, and the presence of 5-Ways Boulevard, appropriate safety levels are likely to be challenged at around 30 vehicles per hour right turning from the south. This will be at a stage of development when around 40 vehicles per hour will be the left turning AM peak hour volume from the Northern Collector Street, a total of 70 vehicles per hour.

If Springers Leisure Centre is connected to the Northern Collector Street as is ultimately proposed, additional pressure will be placed on the level of safety and service at the intersection if signals are not in place.

Consequently, it is recommended that the signal be installed at or before the occupation of 100 dwellings in the northern part of the Stage 1 development, and that Springers Leisure Centre be disconnected from its existing access to Cheltenham Road only after the signals have been installed.

When signals are installed the intersection will operate satisfactorily as is shown in the appended SIDRA analysis. Two SIDRA runs have been completed for this scenario. Both have a cycle time of 125 seconds. The difference is the number of eastbound movements on Cheltenham Road that turn right into Fiveways Boulevard. The first option shows the likely existing volume of about 100 movements during the peak hour. The second option tests the sensitivity by adopting 250 movements in the peak hour. In both cases the intersection has a satisfactory degree of saturation.

Allowance for future growth in Cheltenham Road traffic can readily be made by adding a lane onto each side of the existing carriageway where there are only two lanes present. Figure 26 shows a preliminary signal installation layout, which includes the third westbound lane on Cheltenham Road.

12.1.2. Springvale Road and the East-West Collector Street

A new signalised intersection is proposed at the intersection of Springvale Road and the East-West Collector Street.

Figure 18 shows the conceptual layout for this intersection. The intersection does not align with either of the existing accesses into Garden World. However following negotiations with the proprietor of Garden World, the location proposed is preferred. This intersection will require remodel of the Garden World access to suite the new location.

As with the Northern Collector Street intersection, this intersection will require signal control when the development of around 100 lots in the western section of the Concept Plan has occurred, and the connection is in place.

The ARRB SIDRA analysis package was used, with results for key analyses appended to this report showing satisfactory operation at full development. U-turn movements will be permitted at this intersection and will occur at the traffic signals. The majority of U-turn movements will be generated by the schools to the north of this signalised intersection. The majority of U-turn movements will occur during the school peak periods on Monday to Friday. Therefore the higher frequency of U-turn movements will not occur during the typical AM and PM peak periods nor the peak period for the Garden World.

12.2 Other Intersection Along Springvale Road

There are two other intersections along Springvale Road. These are to be left in/left out only, and should have a left turn deceleration lane or the third lane on Springvale Road southbound should be constructed. The preferred treatment is for the third lane to be provided across the frontage of the site, which allows the verges, shared path and landscaping to be completed with kerb and proper drainage.

12.3 Chapel Road Intersections

There are two connections proposed to Chapel Road, including the East-West Collector Street, and the more northerly link that will coincide with the Church Road intersection. The East-West Collector Street will form a cross-intersection with a new street to the east of Chapel Road, north of the Fire Station.

Both of these intersections are proposed to be roundabout controlled in future. The southern intersection will initially be a simple T-intersection at Chapel Road, until development occurs on the eastern side of Chapel Road.

13. ACCESS FOR HAILEYBURY COLLEGE AND CHRISTIAN COLLEGE

13.1 Access at Haileybury

Two access points are proposed into Haileybury College from within the development.

The first access is located in the north eastern section of the Haileybury College site. Access onto the site from within the development is via the Northern Collector Street (Section 8.5). At the first intersection south of Cheltenham Road and the Northern Collector Street, a roundabout is proposed. Access into Haileybury College at this roundabout is proposed.

The second access is on the southern boundary of the Haileybury College site. This access is located approximately 300 metres east of Springvale Road in the Baldi's property. This southern access connects to an east - west road located approximately 40 metres south of the Haileybury College southern boundary. A left in and left out access is provided at the intersection of the East-West Road and Springvale Road. The section of East-West Road between Springvale Road and the Haileybury College access has a 10.4 metre carriageway.

Alternatively signalised access is available from Springvale Road on the southern side of the Lighthouse Christian College. Vehicle movements from Haileybury College will be able to access this signalised intersection by the road to the rear of the Lighthouse College and then onto the East-West Collector Road.

13.2 Access at Christian College

Current access for the Lighthouse Christian College is via a single access point on the southbound carriageway of Springvale Road. Left in and left out access only is permitted onto the site.

Currently median breaks are available approximately 120 metres to the south and 460 metres north of the Lighthouse Christian College. These median breaks provide sufficient opportunities for vehicles to complete U-turn movements. However the U-turn movements do conflict with the drop-offs and pick-ups from Haileybury College.

The Concept Plan proposes a change of access for the Lighthouse Christian College. The Concept Plan has an access from the school carpark to the East-West Collector Road. This will provide the Lighthouse Christian College with fully directional signalised access on Springvale Road.

14. SUMMARY AND CONCLUSIONS

Subject to the modifications described in this report, and to the details also described, the "Concept Plan" can be implemented such that compliance with the relevant sections of the Planning Scheme can be achieved.

Key external works requirements, with timings for each are :-

- Signal controlled intersection at Northern Collector Street and Cheltenham Road, prior to occupation of 100 dwellings in the northern part of the Stage 1 area.
- Access to Springers Leisure Centre from Cheltenham to remain in current form at least until spinal control is in place at 5-Ways/Northern Collector intersection.
- Third westbound lane on Cheltenham Road to be "infilled" between intersections at the Northern Collector, Bunnings and Springvale Road with development of abutting land and after or with those intersection works.
- Signal controlled intersection at East-West Collector Street and Springvale Road prior to occupation of 100 dwellings in the eastern part of the Stage 1 development area.
- "Infill" of third southbound lane as follows :-
  - from Haileybury Gates 5/6 to the hightower entrance with the development of the Buskas Road intersection.
  - from hightower entrance to the completion of the downstream merge distance from the signal controlled intersection at the East-West Collector, and
  - from the above southern limit to the Keysborough Golf Club northern boundary, with the construction of the southern Access Street connection to Springvale Road.
- Roundabouts on Chapel Road at Church Road and the East-West Collector Street in conjunction with the connections of those streets respectively to Chapel Road, provided that land on the eastern side is available and development on the east side is also proceeding.

  The cost of intersection works should be shared between east and west (Stage 1) sides of Chapel Road, but a simpler approach may be to require the Church Road intersection roundabout as a works requirement for Stage 1, and the East-West Collector intersection to be with the eastern side development. An appropriate Section 173 Agreement is needed.
- Widening of Chapel Road to provide cycle lane and kerbed edge along the western side in conjunction with development of abutting land.

A Section 173 Agreement can be used to ensure appropriate timing and execution of the above works.

APPENDIX

```
                Akcelik & Associates Pty Ltd - aaSIDRA 1.0.2
               ------------------------------------------------
               TTM Consulting Pty Ltd
               Jim Higgs                  Registered User No. A0029
               *** UNREGISTERED VERSION ***

               Time and Date of Analysis   12:36 PM, 28 Mar 2002

Filename: C:\My Documents\4357cham.OUT

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID:


RUN INFORMATION
---------------
* Basic Parameters:
  Intersection Type: Signalised - Fixed Time
  Driving on the left-hand side of the road
  Input data specified in Metric units
  Default Values File No.  1
  Peak flow period (for performance): 60 minutes
  Unit time (for volumes): 60 minutes (Total Flow Period)
  Delay definition: Control delay
                    Geometric delay included
  Delay formula: aaSIDRA standard
  Level of Service based on: Degree of saturation
  Queue definition: Back of queue, 95th_Percentile

* No. of Main (Timing-Capacity) Iterations =  1
  Comparison of last two iterations:
    Difference in intersection degree of satn =  0.0 %
    Difference in total vehicle capacity      =  0.0 %
    Largest difference in eff. green times =  0 secs
    (max. value for stopping = 0 secs)
```

```
CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID:          *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125


Table S.3 - INTERSECTION PARAMETERS
-----------------------------------------------------------
   Critical Movements: 6, 5, 3

   L=    41  Y=  0.497  U=  0.552  T=    110.0

   Cycle Time:
     Minimum   Maximum   Practical   Chosen
        65       140         92        125
     (Cycle time specified by the user)

   Intersection Level of Service              =         A
   Worst movement Level of Service            =         B
   Average intersection delay (s)             =      21.7
   Largest average movement delay (s)         =      73.4
   Largest back of queue, 95% (m)             =       226
   Performance Index                          =    265.83
   Degree of saturation (highest)             =     0.747
   Practical Spare Capacity (lowest)          =        21 %
   Total vehicle capacity, all lanes (veh/h)  =      9410
   Total vehicle flow (veh/h)                 =      4808
   Total pedestrian flow (ped/h)              =       200
   Total person flow (pers/h)                 =      7412
   Total vehicle delay (veh-h/h)              =     28.33
   Total pedestrian delay (ped-h/h)           =      1.90
   Total person delay (pers-h/h)              =     44.39
   Total effective vehicle stops (veh/h)      =      3283
   Total effective pedestrian stops (ped/h)   =       140
   Total effective person stops (pers/h)      =      5065
   Total vehicle travel (veh-km/h)            =    5479.0
   Total cost ($/h)                           =   3192.77
   Total fuel (L/h)                           =     540.0
   Total CO2 (kg/h)                           =   1346.75
```

```
CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID:          *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125


Table S.4 - PHASE INFORMATION
```

```
------------------------------------------------
   Phase Change Times: 0,  15,  94
   Phase Green Times: 10,  74,  26
------------------------------------------------
  Current Phase Sequence No.: 1
  Input phase sequence: A  B  C
  Output phase sequence: A  B  C
```

```
CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID:           *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125
```

Table S.6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Total Delay (veh-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Perf. Index	Aver. Speed (km/h)
PEDESTRIANS:						
200	1.90	34.1	0.702	0.70	7.68	2.9
ALL VEHICLES:						
4808	28.33	21.2	0.733	0.68	258.15	45.8
INTERSECTION:						
5008	30.22	21.7	0.732	0.68	265.83	43.5

```
CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID:           *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125
```

Table S.7 - LANE PERFORMANCE

Lane No.	Mov No.	Effective Green Times (sec) R1	G1	R2	G2	Arv Flow (veh /h)	Cap (veh /h)	Deg. Satn x	Aver. Delay (sec)	Eff. Stop Rate	Queue 95% Back (vehs)	Queue 95% Back (m)	Shrt Lane (m)
South:	South Approach												
1 L	1	45	49	6	25	124	246	0.505	19.5	0.71	4.6	28	30
2 T	2	99	26	0	0	11	383	0.029	42.0	0.57	0.8	5	
3 R	3	99	26	0	0	85	309	0.275	54.6	0.78	5.9	37	
East:	East Approach												
1 LT	4, 5	51 1	74 6	0	0	844	1131	0.747	20.0	0.74	36.5	226	
2 T	5	51	74	0	0	845	1132	0.747	19.7	0.73	36.6	226	
3 T	5	51	74	0	0	845	1132	0.747	19.7	0.73	36.6	226	
4 R	6	115	10	0	0	100	145	0.687	73.4	0.83	8.0	49	
North:	North Approach												
1 L	7	28	66	7	24	51	707	0.072	13.6	0.72	1.2	7	
2 T	8	99	26	0	0	11	383	0.029	42.0	0.57	0.8	5	
3 R	9	99	26	0	0	51	309	0.165	53.5	0.75	3.7	23	
West:	West Approach												
1 LT	10, 11	51 1	74 14	0	0	594	1122	0.529	17.7	0.62	21.7	134	
2 T	11	51	74	0	0	599	1132	0.529	16.0	0.58	21.9	135	
3 T	11	51	74	0	0	599	1132	0.529	16.0	0.58	21.9	135	
4 R	12	115	10	0	0	47	146	0.321	70.2	0.74	4.0	24	

```
CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID:           *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125
```

Table S.10 - MOVEMENT CAPACITY AND PERFORMANCE SUMMARY

Mov No.	Mov Typ	Arv Flow (veh /h)	Total Cap. (veh /h)	Lane Util (%)	Deg. Satn x	Eff. Grn 1st Grn	Eff. Grn 2nd Grn	Aver. Delay (sec)	Eff. Stop Rate	95% Back of Queue (veh)	Perf. Index
South:	South Approach										
1 L	(Und)	124	245<	100	0.505	49	25	19.5	0.71	4.6	5.58
2 T		11	383	100	0.029	26		42.0	0.57	0.8	0.70

3	R	85	309	100	0.275	26*		54.6	0.78	5.9	6.01
East:	East Approach										
4	L	22	30	100	0.743	74		20.0	0.87	36.5	1.24
5	T	2513	3366	100	0.747*	74*		19.8	0.73	36.6	139.23
6	R	100	145	100	0.688	10*		73.4	0.83	8.0	8.32
North:	North Approach										
7	L	51	707	100	0.072	66	24	13.6	0.72	1.2	1.84
8	T	11	383	100	0.029	26		42.0	0.57	0.8	0.70
9	R	51	309	100	0.165	26		53.5	0.75	3.7	3.53
West:	West Approach										
10	L	100	189	100	0.530	74		17.7	0.82	21.7	5.05
11	T	1693	3198	100	0.529	74		16.5	0.58	21.9	82.21
12	R	47	146	100	0.321	10		70.2	0.74	4.0	3.75
Pedestrians											
51	(Ped)	50	10880	100	0.005	68		13.0	0.46	0.8	1.56
53	(Ped)	50	1280	100	0.039	8		54.8	0.94	1.6	2.27
55	(Ped)	50	10240	100	0.005	64		14.9	0.49	0.8	1.59
57	(Ped)	50	1440	100	0.035	9		53.8	0.93	1.6	2.26

< Reduced capacity due to a short lane effect
* Maximum degree of saturation, or critical green periods

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

Mov No.	Fuel Total L/h	Cost Total $/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h	Lead Total kg/h
INTERSECTION:	540.0	3192.77	1.786	58.81	2.476	1346.7	0.04320

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel ($/L)	=	0.850
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	5.0
Average income ($/h)	=	20.00
Time value factor	=	0.60
Average occupancy (persons/veh)	=	1.5
Light vehicle mass (kg)	=	1200
Heavy vehicle mass (kg)	=	8000

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Arrival Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	95% Queue (m)	Shrt Lane (m)
South:	South Approach											
1 L	124			124	3	1950	49	25	0.505	19.5	28	30
2 T		11		11	9	1950	26		0.029	42.0	5	
3 R			85	85	4	1950	26		0.275	54.6	37	
	124	11	85	220	4				0.505	34.2	37	
East:	East Approach											
1 LT	22	822		844	3	1950	74		0.747	20.0	226	
2 T		845		845	3	1950	74		0.747	19.7	226	
3 T		845		845	3	1950	74		0.747	19.7	226	
4 R			100	100	3	1950	10		0.687	73.4	49	
	22	2513	100	2635	3				0.747	21.9	226	
North:	North Approach											
1 L	51			51	4	1950	66	24	0.072	13.6	7	
2 T		11		11	9	1950	26		0.029	42.0	5	
3 R			51	51	4	1950	26		0.165	53.5	23	

	51	11	51	113	4			0.165	34.4	23
West:	West Approach									
1 LT	100	494		594	3	1950	74	0.529	17.7	134
2 T		599		599	3	1950	74	0.529	16.0	135
3 T		599		599	3	1950	74	0.529	16.0	135
4 R			47	47	2	1950	10	0.321	70.2	24
	100	1693	47	1840	3			0.529	17.9	135
Pedestrians										
Across S approach			50				68	0.005	13.0	0.8
Across E approach			50				8	0.039	54.8	1.6
Across N approach			50				64	0.005	14.9	0.8
Across W approach			50				9	0.035	53.8	1.6

ALL VEHICLES	Tot Arv.	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	4808	3	125	0.747	21.7	226

Total flow period = 60 minutes. Peak flow period = 60 minutes.

Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Values printed in this table are back of queue.

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.15 - CAPACITY AND LEVEL OF SERVICE (HCM STYLE)

Mov No.	Mov Typ	Green Ratio 1st grn	Green Ratio 2nd grn	Time (g/C)	Total Flow (veh /h)	Total Cap. (veh /h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS
South:	South Approach								
1 L	(Und)	0.392	0.200		124	245<	0.505	19.5	A
2 T		0.208			11	383	0.029	42.0	A
3 R		0.208*			85	309	0.275	54.6	A
					220	937	0.505		A
East:	East Approach								
4 L		0.592			22	30	0.743	20.0	B
5 T		0.592*			2513	3366	0.747*	19.8	B
6 R		0.080*			100	145	0.688	73.4	B
					2635	3541	0.747		B
North:	North Approach								
7 L		0.528	0.192		51	707	0.072	13.6	A
8 T		0.208			11	383	0.029	42.0	A
9 R		0.208			51	309	0.165	53.5	A
					113	1399	0.165		A
West:	West Approach								
10 L		0.592			100	189	0.530	17.7	A
11 T		0.592			1693	3198	0.529	16.5	A
12 R		0.080			47	146	0.321	70.2	A
					1840	3533	0.530		A
Pedestrians									
51	(Ped)	0.544			50	10880	0.005	13.0	A
53	(Ped)	0.064			50	1280	0.039	54.8	A
55	(Ped)	0.512			50	10240	0.005	14.9	A
57	(Ped)	0.072			50	1440	0.035	53.8	A
					200	23840	0.039		A
ALL VEHICLES:					4808	9410	0.747		A
INTERSECTION:					5008	9410	0.747		A

Level of Service calculations are based on
v/c ratio,
independent of the current delay definition used.
For the criteria, refer to the "Level of Service" topic in the

aaSIDRA Output Guide or the Output section of the on-line help.
Intersection capacity is calculated considering vehicle movements only.
< Reduced capacity due to a short lane effect
* Maximum v/c ratio, or critical green periods

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CHAM
AM PEAK HOUR DEVELOPMENT RTRAFFIC + 5% + BASE TRAFFIC
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table D.5 - PROGRESSION FACTORS & ACTUATED SIGNAL PARAMETERS

Mov No.	Control	Coord.	Arrival Type	Delay Prog. Factor	Queue Prog. Factor	Disp. Grn. Settings 1st Grn Gmin	Gmax	2nd Grn Gmin	Gmax
South:	South Approach								
1	FT	No	3	1.000	1.000	6	NA	6	NA
2	FT	No	3	1.000	1.000	6	NA		
3	FT	No	3	1.000	1.000	6	NA		
East:	East Approach								
4	FT	No	3	1.000	1.000	6	NA		
5	FT	No	3	1.000	1.000	6	NA		
6	FT	No	3	1.000	1.000	6	NA		
North:	North Approach								
7	FT	No	3	1.000	1.000	6	NA	6	NA
8	FT	No	3	1.000	1.000	6	NA		
9	FT	No	3	1.000	1.000	6	NA		
West:	West Approach								
10	FT	No	3	1.000	1.000	6	NA		
11	FT	No	3	1.000	1.000	6	NA		
12	FT	No	3	1.000	1.000	6	NA		
Pedestrians									
51	FT	No	3	1.000	1.000				
53	FT	No	3	1.000	1.000				
55	FT	No	3	1.000	1.000				
57	FT	No	3	1.000	1.000				

--- End of aaSIDRA Output ---

```
                Akcelik & Associates Pty Ltd - aaSIDRA 1.0.2
              ------------------------------------------------
              TTM Consulting Pty Ltd
              Jim Higgs                  Registered User No. A0029
              *** UNREGISTERED VERSION ***

              Time and Date of Analysis    2:05 PM, 28 Mar 2002

Filename: C:\My Documents\4357spam.OUT

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR                              * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID:

RUN INFORMATION
---------------
Variable cycle time run: "Optimum" cycle time = 125 s

* Basic Parameters:
  Intersection Type: Signalised - Fixed Time
  Driving on the left-hand side of the road
  Input data specified in Metric units
  Default Values File No.  1
  Peak flow period (for performance): 60 minutes
  Unit time (for volumes): 60 minutes (Total Flow Period)
  Specified performance measure for "best" cycle time in variable run -
     Degree of saturation
  Delay definition: Control delay
                    Geometric delay included
  Delay formula: aaSIDRA standard
  Level of Service based on: Degree of saturation
  Queue definition: Back of queue, 95th_Percentile

* No. of Main (Timing-Capacity) Iterations =  1
  Comparison of last two iterations:
    Difference in intersection degree of satn =  0.0 %
    Difference in total vehicle capacity      =  0.0 %
    Largest difference in eff. green times =  0 secs
    (max. value for stopping = 0 secs)

* Cycle time is at maximum and short lanes exist.
  A shorter cycle time may give better results..

* The lower limit specified for this program-determined
  variable cycle time run was less than the minimum cycle time.
  The lower limit was increased accordingly.

* If an "optimum" cycle time solution is adopted for actuated signal purposes
  ensure that vehicle-actuated settings reflect this solution in real life.
  Consider using the "sensitivity analysis" facility to optimise maximum
  green settings for actuated signals.

-------------------------------------------------------------------------------

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR                              * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID:          *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125

Table S.3 - INTERSECTION PARAMETERS
-----------------------------------------------------------

   Critical Movements: 2, 6

   L=   38  Y=  0.609  U=  0.677  T=    122.6

   Cycle Time:
     Minimum   Maximum   Practical   Chosen
        64       125        118        125
     (Variable cycle times: Program-determined)

   Cycle time is at maximum and short lanes exist.
   A shorter cycle time may give better results.

   Intersection Level of Service              =         A
   Worst movement Level of Service            =         C
   Average intersection delay (s)             =      19.1
   Largest average movement delay (s)         =      75.1
   Largest back of queue, 95% (m)             =       343
   Performance Index                          =    210.77
   Degree of saturation (highest)             =     0.875
   Practical Spare Capacity (lowest)          =         3 %
   Total vehicle capacity, all lanes (veh/h)  =      7904
   Total vehicle flow (veh/h)                 =      3768
   Total pedestrian flow (ped/h)              =       200
   Total person flow (pers/h)                 =      5852
   Total vehicle delay (veh-h/h)              =     19.30
   Total pedestrian delay (ped-h/h)           =      1.76
   Total person delay (pers-h/h)              =     30.71
```

```
   Total effective vehicle stops (veh/h)      =      2672
   Total effective pedestrian stops (ped/h)   =       134
   Total effective person stops (pers/h)      =      4141
   Total vehicle travel (veh-km/h)            =    4290.9
   Total cost ($/h)                           =   2455.91
   Total fuel (L/h)                           =     420.0
   Total CO2 (kg/h)                           =   1047.52
```

```
SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR                          * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID:            *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125

Table S.4 - PHASE INFORMATION
-------------------------------------------------
   Phase Change Times: 0,  11,  92
   Phase Green Times:  6,  76,  28
-------------------------------------------------
  Current Phase Sequence No.: 1
  Input phase sequence: A  B  C
  Output phase sequence: A  B  C
```

```
SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR                          * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID:            *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125

Table S.6 - INTERSECTION PERFORMANCE
-----------------------------------------------------
 Total     Total  Aver.  Prop.  Eff.     Perf.   Aver.
 Flow      Delay  Delay Queued  Stop     Index   Speed
(veh/h) (veh-h/h)(sec)          Rate             (km/h)
-----------------------------------------------------
PEDESTRIANS:
  200      1.76   31.6  0.668  0.67      7.50     3.0
-----------------------------------------------------
ALL VEHICLES:
 3768     19.30   18.4  0.749  0.71    203.27    47.3
-----------------------------------------------------
INTERSECTION:
 3968     21.06   19.1  0.745  0.71    210.77    44.2
-----------------------------------------------------
```

```
SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR                          * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID:            *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125

Table S.7 - LANE PERFORMANCE
-------------------------------------------------------------------------------
             Effective Red and   Arv                          Q u e u e
             Green Times (sec)   Flow  Cap  Deg.  Aver.  Eff.  95% Back   Shrt
Lane   Mov   ----------------    (veh (veh  Satn  Delay  Stop  ---------- Lane
No.    No.    R1  G1   R2  G2     /h)  /h)  x     (sec)  Rate  (vehs) (m)  (m)
-------------------------------------------------------------------------------
South:  South Approach
1 L     1    49  76    0   0      11  274 0.040   19.8  0.69   0.4    3   30
2 T     2    38  87    0   0    1179 1347 0.875   17.1  0.81  55.4  343
3 T     2    38  87    0   0    1179 1347 0.875   17.1  0.81  55.4  343
4 R     3   119   6    0   0      25   88 0.285   75.1  0.71   2.3   15
-------------------------------------------------------------------------------
East:  East Approach
1 L     4    16  76    5  28      26  472 0.055   10.0  0.63   0.3    2   30
2 TR    5,   97  28    0   0     113  406 0.279   52.3  0.78   7.4   46
        6     1   6
3 R     6    97  28    0   0     114  407 0.279   52.7  0.78   7.4   46
-------------------------------------------------------------------------------
North:  North Approach
1 LT    7,   49  76    0   0     370 1156 0.320   13.8  0.50  12.3   76
        8     1  10
2 T     8    49  76    0   0     372 1163 0.320   12.6  0.46  12.4   76
3 T     8    49  76    0   0     372 1163 0.320   12.6  0.46  12.4   76
4 R     9    97  28    0   0       6   81 0.074   54.0  0.71   0.5    3
-------------------------------------------------------------------------------
```

```
SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR                          * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID:            *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125

Table S.10 - MOVEMENT CAPACITY AND PERFORMANCE SUMMARY
-------------------------------------------------------------------------------
 Mov     Mov  Arv   Total  Lane  Deg.  Eff. Grn  Aver.  Eff.    95%    Perf.
```

No.	Typ	Flow (veh /h)	Cap. (veh /h)	Util (%)	Satn x	1st Grn	2nd Grn	Delay (sec)	Stop Rate	Back of Queue (veh)	Index
South:	South Approach										
1	L	11	274<	100	0.040	76		19.8	0.69	0.4	0.47
2	T	2358	2694	100	0.875*	87*		17.1	0.81	55.4	135.85
3	R	25	88	100	0.285	6		75.1	0.71	2.3	2.07
East:	East Approach										
4	L (Und)	26	472<	100	0.055	76	28	10.0	0.63	0.3	0.79
5	T	6	22	100	0.279	28		52.3	0.70	7.4	0.41
6	R	221	791	100	0.279	28*		52.5	0.78	7.4	15.32
North:	North Approach										
7	L	47	147	100	0.321	76		13.8	0.78	12.3	2.13
8	T	1068	3335	100	0.320	76		12.9	0.46	12.4	45.81
9	R	6	81	100	0.074	28		54.0	0.71	0.5	0.42
Pedestrians											
51	(Ped)	50	1280	100	0.039	8		54.8	0.94	1.6	2.27
53	(Ped)	50	11040	100	0.005	69		12.5	0.45	0.8	1.55
55	(Ped)	50	2240	100	0.022	14		49.3	0.89	1.5	2.18
57	(Ped)	50	12000	100	0.004	75		10.0	0.40	0.7	1.50

< Reduced capacity due to a short lane effect
* Maximum degree of saturation, or critical green periods

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

Mov No.	Fuel Total L/h	Cost Total $/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h	Lead Total kg/h
INTERSECTION:	420.0	2455.91	1.383	46.57	1.948	1047.5	0.03360

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel ($/L)	=	0.850
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	5.0
Average income ($/h)	=	20.00
Time value factor	=	0.60
Average occupancy (persons/veh)	=	1.5
Light vehicle mass (kg)	=	1200
Heavy vehicle mass (kg)	=	8000

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Arrival Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	95% Queue (m)	Shrt Lane (m)
South:	South Approach											
1 L	11			11	9	1973	76		0.040	19.8	3	30
2 T		1179		1179	3	1973	87		0.875	17.1	343	
3 T		1179		1179	3	1973	87		0.875	17.1	343	
4 R			25	25	4	1973	6		0.285	75.1	15	
	11	2358	25	2394	3				0.875	17.8	343	
East:	East Approach											
1 L	26			26	4	1950	76	28	0.055	10.0	2	30
2 TR		6	107	113	4	1950	28		0.279	52.3	46	
3 R			114	114	3	1950	28		0.279	52.7	46	
	26	6	221	253	4				0.279	48.1	46	
North:	North Approach											
1 LT	47	323		370	3	1950	76		0.320	13.8	76	
2 T		372		372	3	1950	76		0.320	12.6	76	
3 T		372		372	3	1950	76		0.320	12.6	76	
4 R			6	6	17	1950	28		0.074	54.0	3	

47	1068	6	1121	3		0.320	13.2	76
Pedestrians								
Across S approach		50		8		0.039	54.8	1.6
Across E approach		50		69		0.005	12.5	0.8
Across N approach		50		14		0.022	49.3	1.5
Across W approach		50		75		0.004	10.0	0.7

ALL VEHICLES	Tot Arv.	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	3768	3	125	0.875	19.1	343

Total flow period = 60 minutes. Peak flow period = 60 minutes.

Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Values printed in this table are back of queue.

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.15 - CAPACITY AND LEVEL OF SERVICE (HCM STYLE)

Mov No.	Mov Typ	Green Time Ratio 1st grn	Green Time Ratio 2nd grn	Total Flow (veh /h)	Total Cap. (veh /h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS
South:	South Approach							
1	L	0.608		11	274<	0.040	19.8	A
2	T	0.696*		2358	2694	0.875*	17.1	C
3	R	0.048		25	88	0.285	75.1	A
				2394	3056	0.875		C
East:	East Approach							
4	L (Und)	0.608	0.224	26	472<	0.055	10.0	A
5	T	0.224		6	22	0.279	52.3	A
6	R	0.224*		221	791	0.279	52.5	A
				253	1285	0.279		A
North:	North Approach							
7	L	0.608		47	147	0.321	13.8	A
8	T	0.608		1068	3335	0.320	12.9	A
9	R	0.224		6	81	0.074	54.0	A
				1121	3563	0.321		A
Pedestrians								
51	(Ped)	0.064		50	1280	0.039	54.8	A
53	(Ped)	0.552		50	11040	0.005	12.5	A
55	(Ped)	0.112		50	2240	0.022	49.3	A
57	(Ped)	0.600		50	12000	0.004	10.0	A
				200	26560	0.039		A
ALL VEHICLES:				3768	7904	0.875		A
INTERSECTION:				3968	7904	0.875		A

Level of Service calculations are based on
v/c ratio,
independent of the current delay definition used.
For the criteria, refer to the "Level of Service" topic in the aaSIDRA Output Guide or the Output section of the on-line help.
Intersection capacity is calculated considering vehicle movements only.
< Reduced capacity due to a short lane effect
* Maximum v/c ratio, or critical green periods

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID: *** UNREGISTERED VERSION ***

Table S.21 - VARIABLE CYCLE TIME RESULTS

Performance Measure	Smallest Value	Cycle Time

Degree of Satn	0.875	125
Average Delay	19.1	125
Stop Rate	0.71	125
Max. Queue for Any Movement	55.4	125
Perf. Index	210.8	125
Cost	2455.9	125

Performance Measure	Largest Value	Cycle Time
Total Vehicle Cap.	7904	125
Prac. Spare Cap.	3	125

The lower limit specified for this program-determined variable cycle time run was less than the minimum cycle time. The lower limit was increased accordingly.

If an "optimum" cycle time solution is adopted for actuated signal purposes ensure that vehicle-actuated settings reflect this solution in real life. Consider using the "sensitivity analysis" facility to optimise maximum green settings for actuated signals.

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table D.5 - PROGRESSION FACTORS & ACTUATED SIGNAL PARAMETERS

Mov No.	Control	Coord.	Arrival Type	Delay Prog. Factor	Queue Prog. Factor	Disp. Grn. Settings 1st Grn Gmin	1st Grn Gmax	2nd Grn Gmin	2nd Grn Gmax
South:	South Approach								
1	FT	No	3	1.000	1.000	6	NA		
2	FT	No	3	1.000	1.000	6	NA		
3	FT	No	3	1.000	1.000	6	NA		
East:	East Approach								
4	FT	No	3	1.000	1.000	6	NA	6	NA
5	FT	No	3	1.000	1.000	6	NA		
6	FT	No	3	1.000	1.000	6	NA		
North:	North Approach								
7	FT	No	3	1.000	1.000	6	NA		
8	FT	No	3	1.000	1.000	6	NA		
9	FT	No	3	1.000	1.000	6	NA		
Pedestrians									
51	FT	No	3	1.000	1.000				
53	FT	No	3	1.000	1.000				
55	FT	No	3	1.000	1.000				
57	FT	No	3	1.000	1.000				

SPRINGVALE ROAD/MAIN EAST-WEST COLLECTOR * 4357SPAM
AM PEAK HOUR, FULL STAGE 1 DEVELOPMENT, CURRNET TRAFFIC PLUS 5%
Intersection ID: *** UNREGISTERED VERSION ***

Table V.21 - INTERSECTION SUMMARY FOR VARIABLE CYCLE TIME

Cycle Time (sec)	Total Veh. Cap.	Intersn Deg. of Satn	Prac. Spare Cap.	Aver. Delay (sec)	Stop Rate	Longest Queue (veh)	Perf. Index	Cost Total $/h
64	5731	1.499	-40	568.9	4.69	360.2	1284.5	16493.5
70	6095	1.333	-32	390.1	3.72	287.7	972.8	12133.8
80	6592	1.160	-22	209.9	2.48	195.4	632.1	7596.7
90	6987	1.054	-15	106.0	1.61	131.7	419.4	4853.9
100	7306	0.982	-8	51.7	1.10	92.8	300.3	3361.4
110	7577	0.931	-3	30.3	0.88	70.8	245.0	2766.6
120	7804	0.891	1	21.7	0.75	59.4	219.2	2527.9
125	7904	0.875	3	19.1	0.71	55.4	210.8	2455.9

--- End of aaSIDRA Output ---

```
                Akcelik & Associates Pty Ltd - aaSIDRA 1.0.2
              ------------------------------------------------
              TTM Consulting Pty Ltd
              Jim Higgs                  Registered User No. A0029
              *** UNREGISTERED VERSION ***

              Time and Date of Analysis    2:12 PM, 28 Mar 2002

Filename: C:\My Documents\4357chama.OUT

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CH~1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID:


RUN INFORMATION
---------------
* Basic Parameters:
  Intersection Type: Signalised - Fixed Time
  Driving on the left-hand side of the road
  Input data specified in Metric units
  Default Values File No.  1
  Peak flow period (for performance): 60 minutes
  Unit time (for volumes): 60 minutes (Total Flow Period)
  Delay definition: Control delay
                    Geometric delay included
  Delay formula: aaSIDRA standard
  Level of Service based on: Degree of saturation
  Queue definition: Back of queue, 95th_Percentile

* No. of Main (Timing-Capacity) Iterations =  1
  Comparison of last two iterations:
    Difference in intersection degree of satn =  0.0 %
    Difference in total vehicle capacity      =  0.0 %
    Largest difference in eff. green times =  0 secs
    (max. value for stopping = 0 secs)

* Cycle time is at maximum and short lanes exist.
  A shorter cycle time may give better results.
```

```
CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR                          * 4357CH~1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID:           *** UNREGISTERED VERSION ***
            Fixed-Time Signals, Cycle Time = 125


Table S.3 - INTERSECTION PARAMETERS
-----------------------------------------------------
   Critical Movements: 6, 5, 3

   L=   41  Y=  0.580  U=  0.645  T=    121.6

   Cycle Time:
     Minimum   Maximum   Practical   Chosen
        65       125        115       125
     (Cycle time specified by the user)

   Cycle time is at maximum and short lanes exist.
   A shorter cycle time may give better results.

   Intersection Level of Service              =         A
   Worst movement Level of Service            =         C
   Average intersection delay (s)             =      32.4
   Largest average movement delay (s)         =      74.0
   Largest back of queue, 95% (m)             =       292
   Performance Index                          =    324.28
   Degree of saturation (highest)             =     0.864
   Practical Spare Capacity (lowest)          =         4 %
   Total vehicle capacity, all lanes (veh/h)  =      8897
   Total vehicle flow (veh/h)                 =      4959
   Total pedestrian flow (ped/h)              =       200
   Total person flow (pers/h)                 =      7639
   Total vehicle delay (veh-h/h)              =     44.36
   Total pedestrian delay (ped-h/h)           =      2.04
   Total person delay (pers-h/h)              =     68.58
   Total effective vehicle stops (veh/h)      =      4126
   Total effective pedestrian stops (ped/h)   =       148
   Total effective person stops (pers/h)      =      6338
   Total vehicle travel (veh-km/h)            =    5654.5
   Total cost ($/h)                           =   3623.62
   Total fuel (L/h)                           =     593.7
   Total CO2 (kg/h)                           =   1480.53
```

AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.4 - PHASE INFORMATION

Phase Change Times: 0, 25, 94
Phase Green Times: 20, 64, 26

Current Phase Sequence No.: 1
Input phase sequence: A B C
Output phase sequence: A B C

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CH-1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Total Delay (veh-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Perf. Index	Aver. Speed (km/h)
PEDESTRIANS:						
200	2.04	36.7	0.742	0.74	7.86	2.8
ALL VEHICLES:						
4959	44.36	32.2	0.866	0.83	316.42	40.8
INTERSECTION:						
5159	46.40	32.4	0.861	0.83	324.28	39.0

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CH-1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.7 - LANE PERFORMANCE

Lane No.	Mov No.	Effective Green Times (sec) R1	G1	R2	G2	Arv Flow (veh/h)	Cap (veh/h)	Deg. Satn x	Aver. Delay (sec)	Eff. Stop Rate	Queue 95% Back (vehs)	Queue Back (m)	Shrt Lane (m)
South: South Approach													
1 L	1	53	41	6	25	124	249	0.498	22.3	0.71	4.9	30	30
2 T	2	99	26	0	0	11	383	0.029	42.0	0.57	0.8	5	
3 R	3	99	26	0	0	85	309	0.275	54.6	0.78	5.9	37	
East: East Approach													
1 LT	4, 5	61 1	64 6	0	0	844	978	0.863	33.5	0.93	47.2	292	
2 T	5	61	64	0	0	845	979	0.863	33.2	0.92	47.3	292	
3 T	5	61	64	0	0	845	979	0.863	33.2	0.92	47.3	292	
4 R	6	105	20	0	0	251	291	0.864	74.0	1.00	17.9	111	
North: North Approach													
1 L	7	32	62	7	24	51	815	0.063	14.5	0.72	1.3	8	
2 T	8	99	26	0	0	11	383	0.029	42.0	0.57	0.8	5	
3 R	9	99	26	0	0	51	309	0.165	53.5	0.75	3.7	23	
West: West Approach													
1 LT	10, 11	61 1	64 14	0	0	594	971	0.612	24.6	0.72	25.6	158	
2 T	11	61	64	0	0	599	979	0.612	23.0	0.69	25.8	159	
3 T	11	61	64	0	0	599	979	0.612	23.0	0.69	25.8	159	
4 R	12	105	20	0	0	47	293	0.161	58.4	0.74	3.6	22	

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CH-1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.10 - MOVEMENT CAPACITY AND PERFORMANCE SUMMARY

Mov No.	Mov Typ	Arv Flow	Total Cap.	Lane Util	Deg. Satn	Eff. Grn --------	Aver. Delay	Eff. Stop	95% Back of	Perf. Index

		(veh /h)	(veh /h)	(%)	x	1st Grn	2nd Grn	(sec)	Rate	Queue (veh)	
South:	South Approach										
1 L	(Und)	124	249<	100	0.498	41	25	22.3	0.71	4.9	5.83
2 T		11	383	100	0.029	26		42.0	0.57	0.8	0.70
3 R		85	309	100	0.275	26*		54.6	0.78	5.9	6.01
East:	East Approach										
4 L		22	26	100	0.859	64		33.5	0.96	47.2	1.51
5 T		2513	2911	100	0.863	64*		33.3	0.92	47.3	171.43
6 R		251	291	100	0.864*	20*		74.0	1.00	17.9	21.76
North:	North Approach										
7 L		51	815	100	0.063	62	24	14.5	0.72	1.3	1.90
8 T		11	383	100	0.029	26		42.0	0.57	0.8	0.70
9 R		51	309	100	0.165	26		53.5	0.75	3.7	3.53
West:	West Approach										
10 L		100	163	100	0.612	64		24.6	0.85	25.6	5.70
11 T		1693	2766	100	0.612	64		23.5	0.69	25.8	93.95
12 R		47	293	100	0.161	20		58.4	0.74	3.6	3.39
Pedestrians											
51	(Ped)	50	9280	100	0.005	58		18.0	0.54	0.9	1.65
53	(Ped)	50	1280	100	0.039	8		54.8	0.94	1.6	2.27
55	(Ped)	50	8640	100	0.006	54		20.2	0.57	1.0	1.69
57	(Ped)	50	1440	100	0.035	9		53.8	0.93	1.6	2.26

< Reduced capacity due to a short lane effect
* Maximum degree of saturation, or critical green periods

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CH~1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.12A - FUEL CONSUMPTION, EMISSIONS AND COST - TOTAL

Mov No.	Fuel Total L/h	Cost Total $/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h	Lead Total kg/h
INTERSECTION:	593.7	3623.62	2.025	68.18	2.742	1480.5	0.04749

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel ($/L)	=	0.850
Fuel resource cost factor	=	0.50
Ratio of running cost to fuel cost	=	5.0
Average income ($/h)	=	20.00
Time value factor	=	0.60
Average occupancy (persons/veh)	=	1.5
Light vehicle mass (kg)	=	1200
Heavy vehicle mass (kg)	=	8000

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CH~1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Arrival Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	95% Queue (m)	Shrt Lane (m)
South:	South Approach											
1 L	124			124	3	1950	41	25	0.498	22.3	30	30
2 T		11		11	9	1950	26		0.029	42.0	5	
3 R			85	85	4	1950	26		0.275	54.6	37	
	124	11	85	220	4				0.498	35.8	37	
East:	East Approach											
1 LT	22	822		844	3	1950	64		0.863	33.5	292	
2 T		845		845	3	1950	64		0.863	33.2	292	
3 T		845		845	3	1950	64		0.863	33.2	292	
4 R			251	251	3	1950	20		0.864	74.0	111	

	22	2513	251	2786	3				0.864	36.9	292
North:	North Approach										
1 L		51		51	4	1950	62	24	0.063	14.5	8
2 T			11	11	9	1950	26		0.029	42.0	5
3 R			51	51	4	1950	26		0.165	53.5	23
	51	11	51	113	4				0.165	34.8	23
West:	West Approach										
1 LT	100	494		594	3	1950	64		0.612	24.6	158
2 T		599		599	3	1950	64		0.612	23.0	159
3 T		599		599	3	1950	64		0.612	23.0	159
4 R			47	47	2	1950	20		0.161	58.4	22
	100	1693	47	1840	3				0.612	24.4	159
Pedestrians											
Across S approach				50			58		0.005	18.0	0.9
Across E approach				50			8		0.039	54.8	1.6
Across N approach				50			54		0.006	20.2	1.0
Across W approach				50			9		0.035	53.8	1.6

ALL VEHICLES	Tot Arv.	% HV	Cycle Time	Max X	Aver. Delay	Max Queue
	4959	3	125	0.864	32.4	292

Total flow period = 60 minutes. Peak flow period = 60 minutes.

Note: Basic Saturation Flows (in through car units) have been adjusted for grade, lane widths, parking manoeuvres and bus stops.

Values printed in this table are back of queue.

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CH~1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

Table S.15 - CAPACITY AND LEVEL OF SERVICE (HCM STYLE)

Mov No.	Mov Typ	Green Ratio 1st grn	Green Ratio 2nd grn	Time (g/C)	Total Flow (veh /h)	Total Cap. (veh /h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS
South:	South Approach								
1 L	(Und)	0.328	0.200		124	249<	0.498	22.3	A
2 T		0.208			11	383	0.029	42.0	A
3 R		0.208*			85	309	0.275	54.6	A
					220	941	0.498		A
East:	East Approach								
4 L		0.512			22	26	0.859	33.5	C
5 T		0.512*			2513	2911	0.863	33.3	C
6 R		0.160*			251	291	0.864*	74.0	C
					2786	3227	0.864		C
North:	North Approach								
7 L		0.496	0.192		51	815	0.063	14.5	A
8 T		0.208			11	383	0.029	42.0	A
9 R		0.208			51	309	0.165	53.5	A
					113	1507	0.165		A
West:	West Approach								
10 L		0.512			100	163	0.612	24.6	B
11 T		0.512			1693	2766	0.612	23.5	B
12 R		0.160			47	293	0.161	58.4	A
					1840	3222	0.612		B
Pedestrians									
51	(Ped)	0.464			50	9280	0.005	18.0	A
53	(Ped)	0.064			50	1280	0.039	54.8	A
55	(Ped)	0.432			50	8640	0.006	20.2	A
57	(Ped)	0.072			50	1440	0.035	53.8	A
					200	20640	0.039		A
ALL VEHICLES:					4959	8897	0.864		A

```
     INTERSECTION:           5159    8897    0.864            A
-------------------------------------------------------------
     Level of Service calculations are based on
     v/c ratio,
     independent of the current delay definition used.
     For the criteria, refer to the "Level of Service" topic in the
     aaSIDRA Output Guide or the Output section of the on-line help.
     Intersection capacity is calculated considering vehicle movements only.
  <  Reduced capacity due to a short lane effect
  *  Maximum v/c ratio, or critical green periods
```

CHELTENHAM ROAD/5 WAYS/ NORTHERN COLLECTOR * 4357CH-1
AM PEAK HOUR DEVELOPMENT TRAFFIC + 5% + BASE TRAFFIC + E/B R turn 250 mvmts
Intersection ID: *** UNREGISTERED VERSION ***
Fixed-Time Signals, Cycle Time = 125

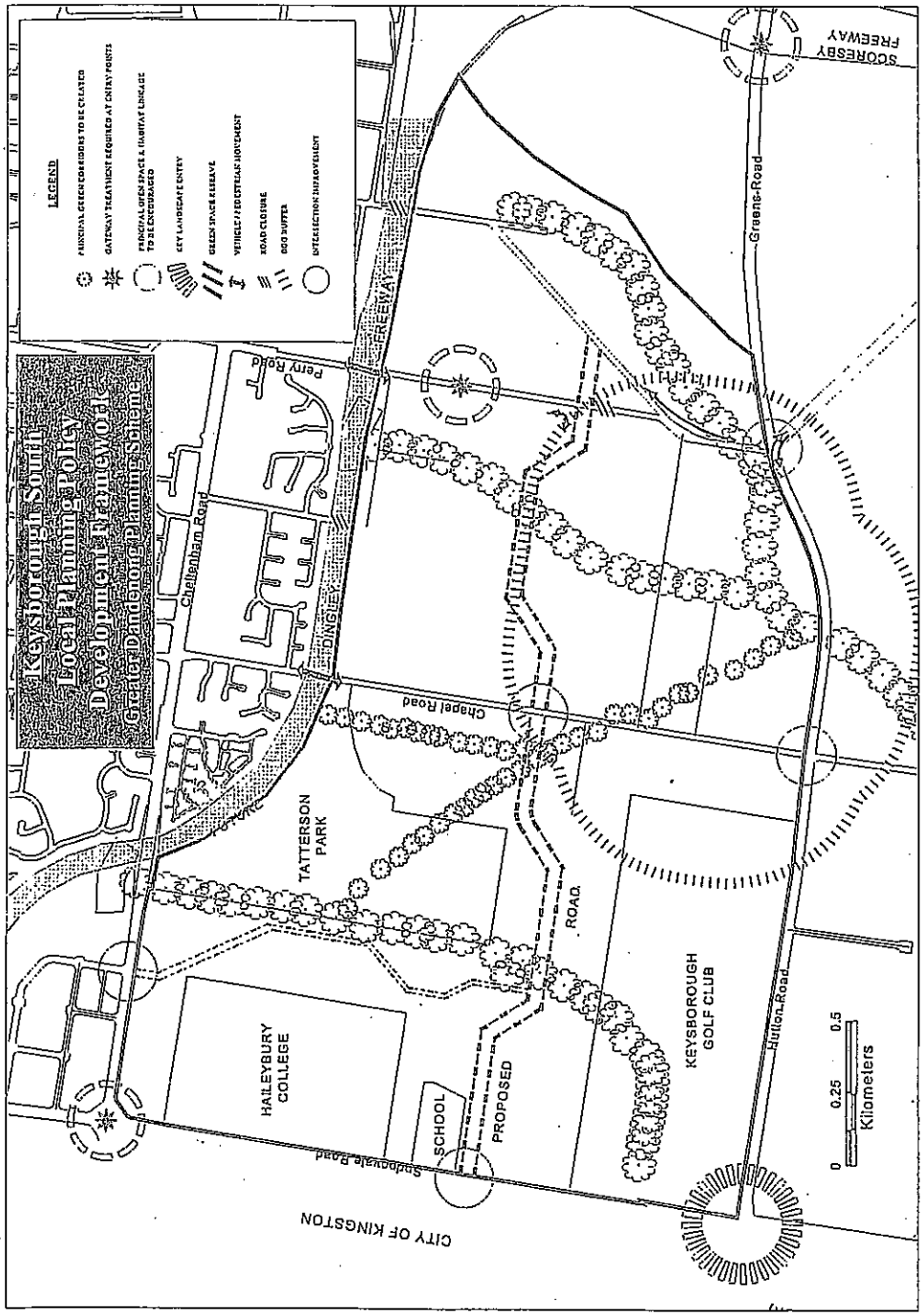
Table D.5 - PROGRESSION FACTORS & ACTUATED SIGNAL PARAMETERS

Mov No.	Control	Coord.	Arrival Type	Delay Prog. Factor	Queue Prog. Factor	Disp. Grn. Settings 1st Grn Gmin	1st Grn Gmax	2nd Grn Gmin	2nd Grn Gmax
South:	South Approach								
1	FT	No	3	1.000	1.000	6	NA	6	NA
2	FT	No	3	1.000	1.000	6	NA		
3	FT	No	3	1.000	1.000	6	NA		
East:	East Approach								
4	FT	No	3	1.000	1.000	6	NA		
5	FT	No	3	1.000	1.000	6	NA		
6	FT	No	3	1.000	1.000	6	NA		
North:	North Approach								
7	FT	No	3	1.000	1.000	6	NA	6	NA
8	FT	No	3	1.000	1.000	6	NA		
9	FT	No	3	1.000	1.000	6	NA		
West:	West Approach								
10	FT	No	3	1.000	1.000	6	NA		
11	FT	No	3	1.000	1.000	6	NA		
12	FT	No	3	1.000	1.000	6	NA		
Pedestrians									
51	FT	No	3	1.000	1.000				
53	FT	No	3	1.000	1.000				
55	FT	No	3	1.000	1.000				
57	FT	No	3	1.000	1.000				

--- End of aaSIDRA Output ---

KEYSBOROUGH SOUTH DEVELOPMENT STAGE 1
GREATER DANDENONG CITY COUNCIL

LOCAL POLICY PROVISION



GREATER DANDENONG PLANNING SCHEME

LOCAL PLANNING POLICIES – CLAUSE 22.06
DATE TO BE INSERTED BY DOI

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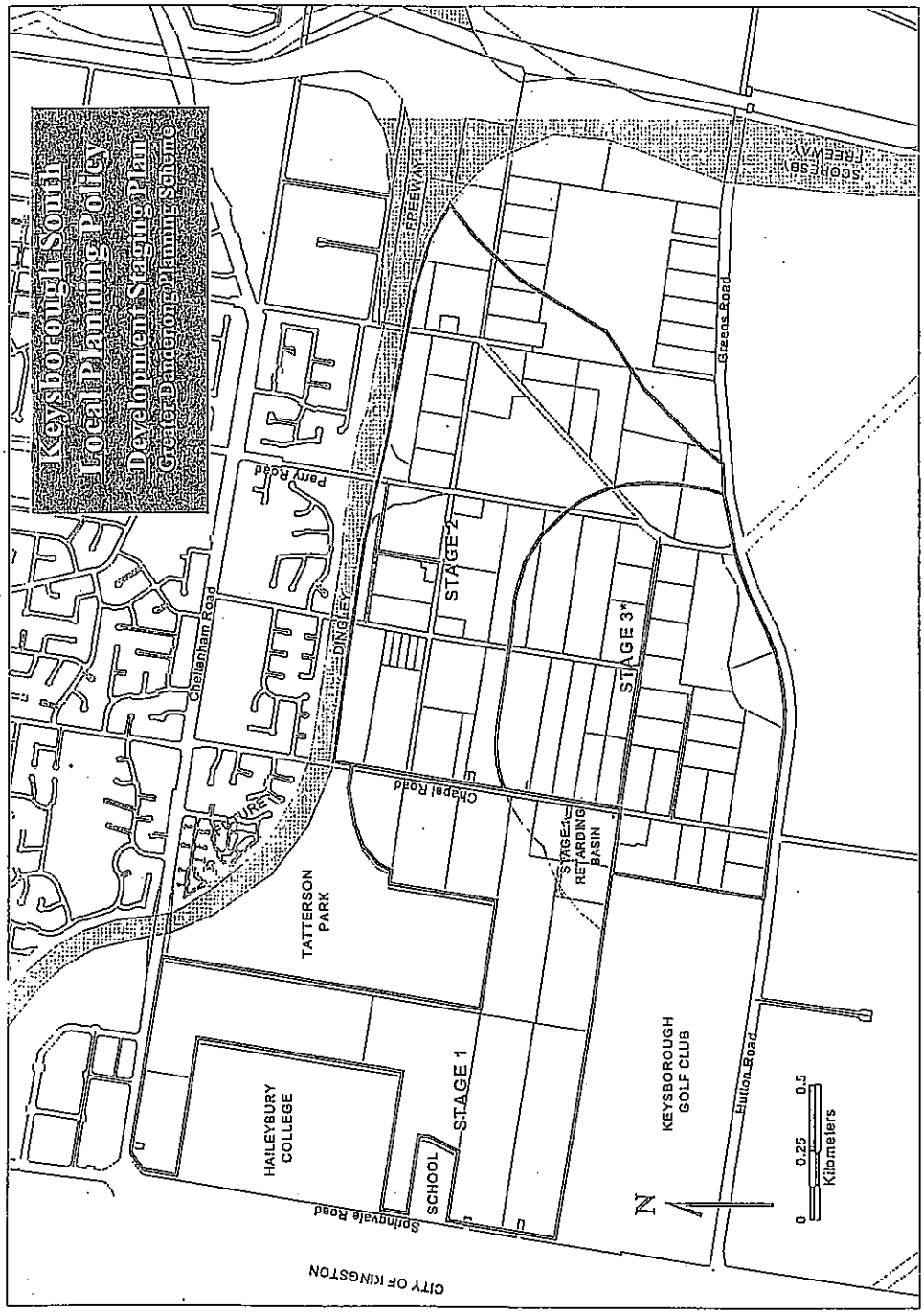
FIGURE 1
DEVELOPMENT FRAMEWORK

KEYSBOROUGH SOUTH DEVELOPMENT STAGE 1
GREATER DANDENONG CITY COUNCIL

LOCAL PROVISION

KEYSBOROUGH SOUTH
LOCAL PLANNING POLICY
DEVELOPMENT STAGING PLAN
GREATER DANDENONG PLANNING SCHEME



GREATER DANDENONG PLANNING SCHEME

N

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FIGURE 2
DEVELOPMENT STAGING PLAN

KEYSBOROUGH SOUTH DEVELOPMENT STAGE 1
GREATER DANDENONG CITY COUNCIL

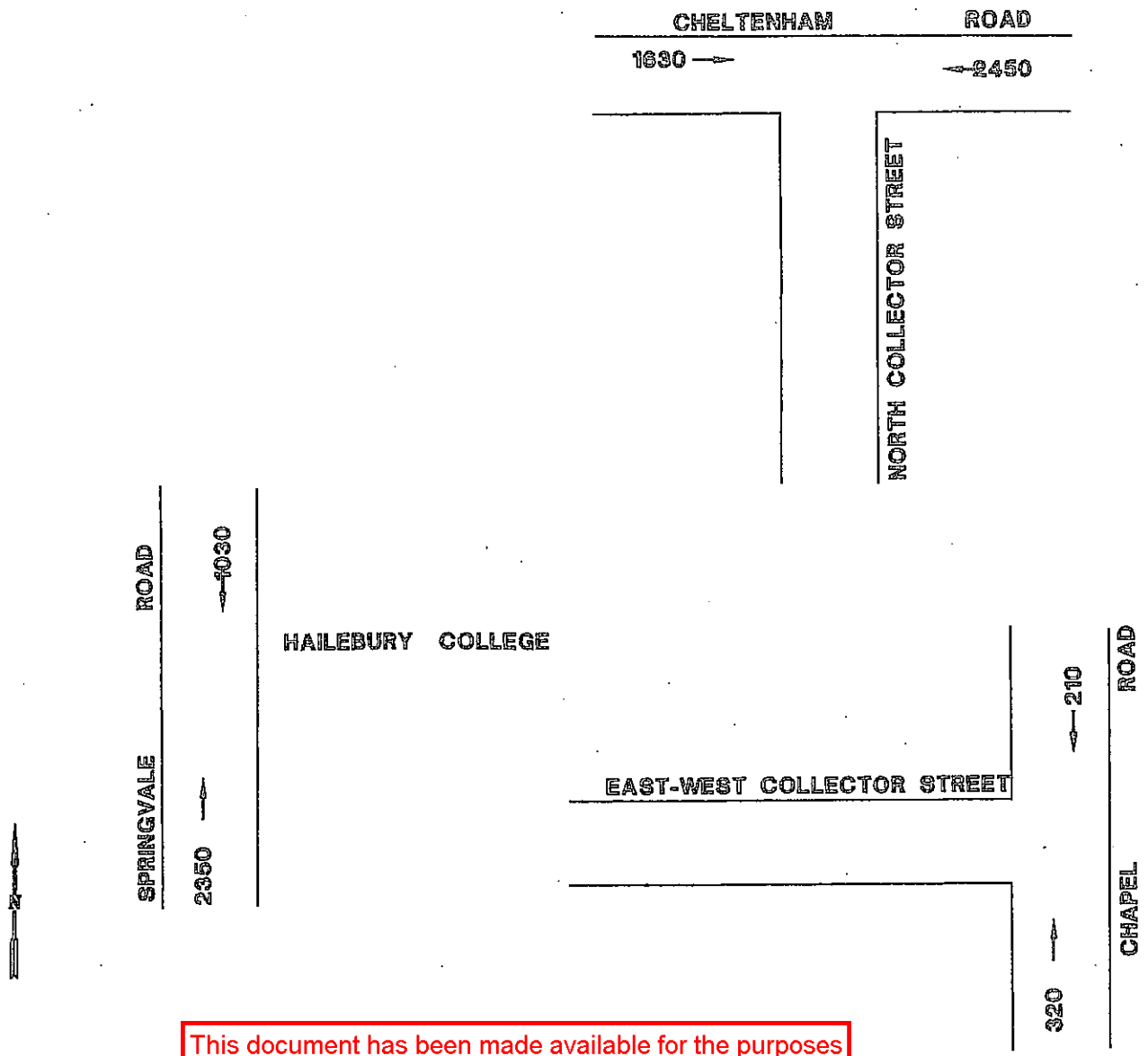

FIGURE 4
ESTIMATED CURRENT TRAFFIC VOLUMES
AM PEAK HOUR

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KEYSBOROUGH SOUTH DEVELOPMENT STAGE 1
GREATER DANDENONG CITY COUNCIL

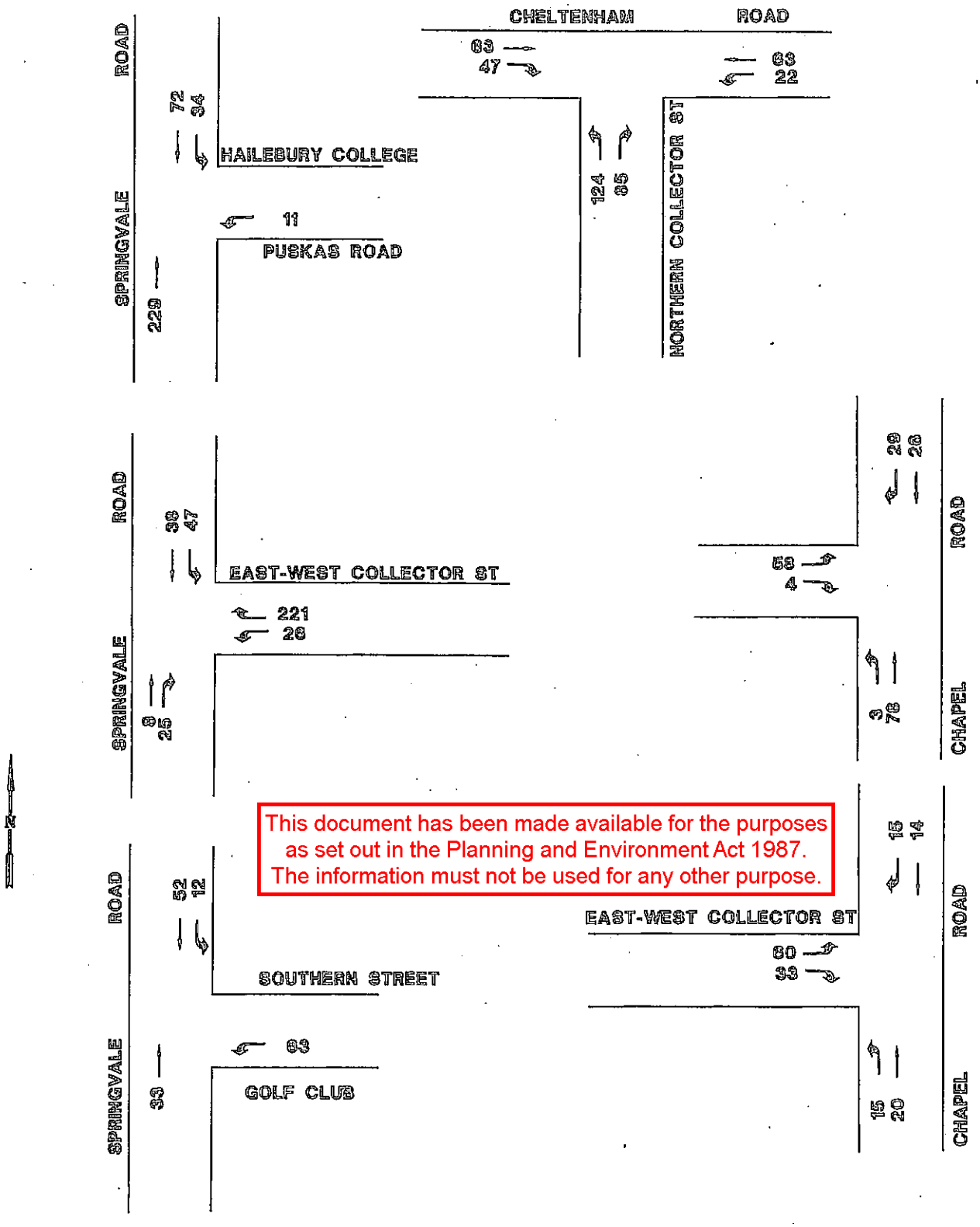

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FIGURE 5
ESTIMATED DEVELOPMENT TRAFFIC VOLUMES
AM PEAK HOUR, DEVELOPMENT COMPLETE

KEYSBOROUGH SOUTH DEVELOPMENT STAGE 1
GREATER DANDENONG CITY COUNCIL

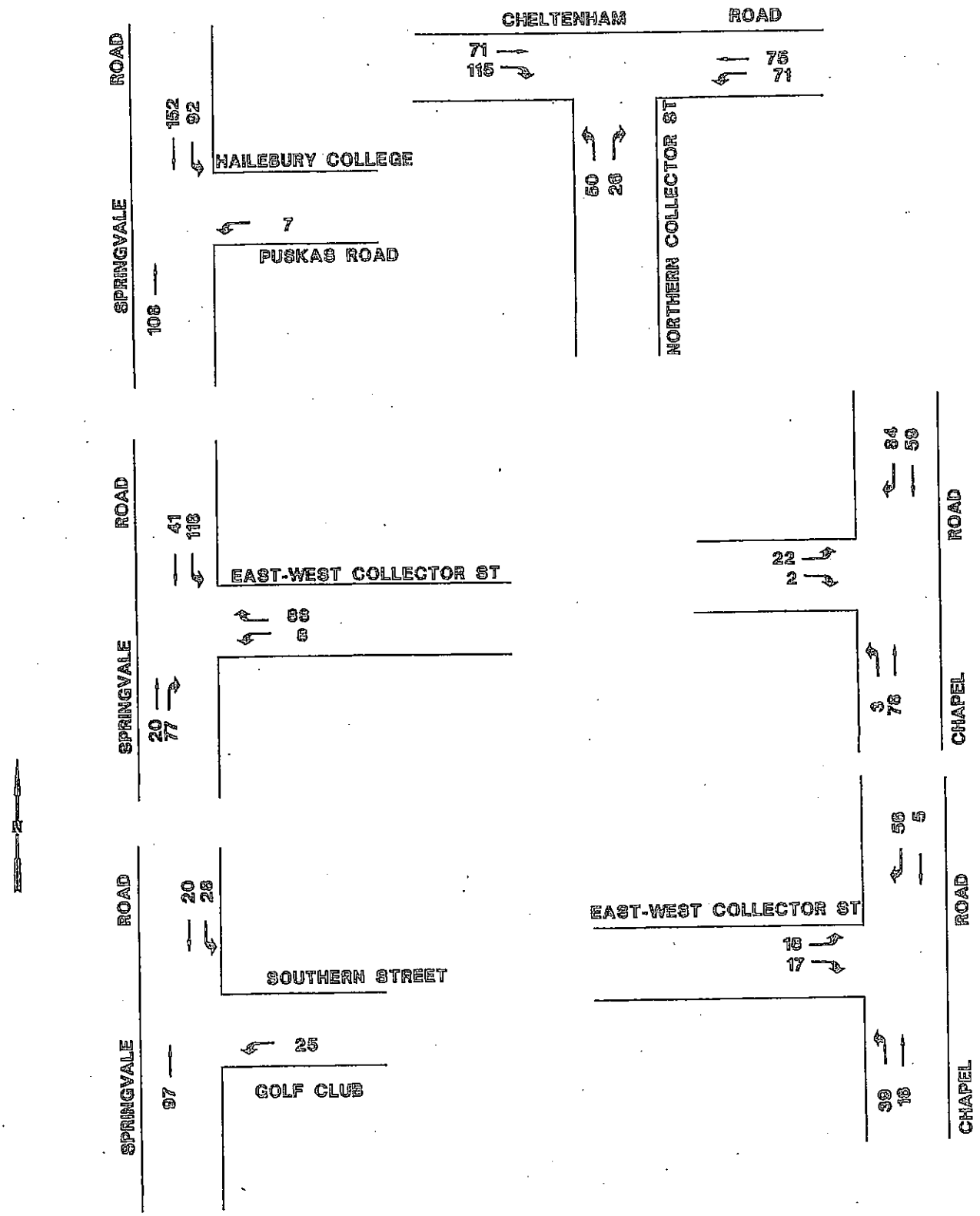

FIGURE 6
ESTIMATED DEVELOPMENT TRAFFIC VOLUMES
PM PEAK HOUR, DEVELOPMENT COMPLETE

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KEYSBOROUGH SOUTH DEVELOPMENT STAGE 1
GREATER DANDENONG CITY COUNCIL

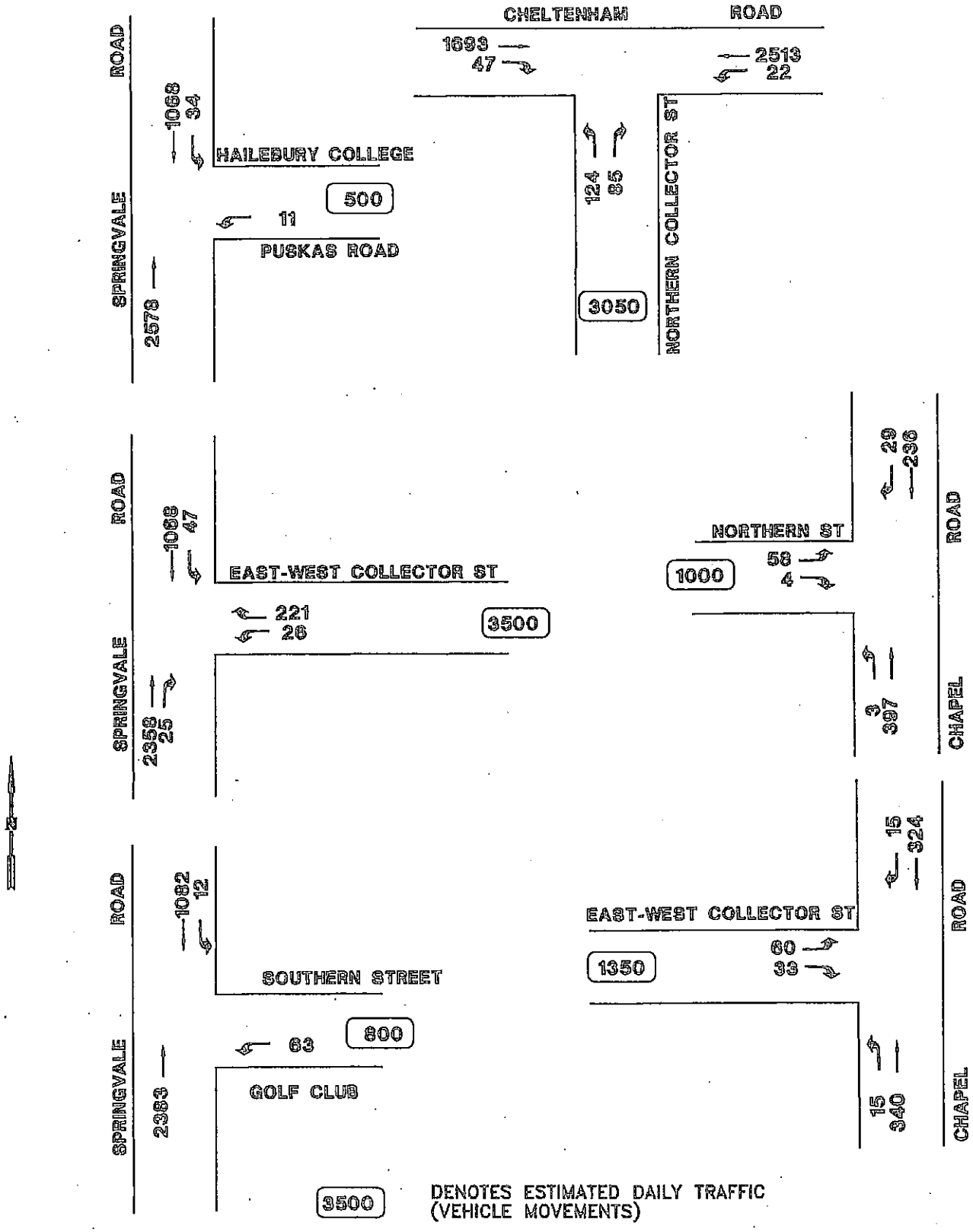

FIGURE 7
BASE + DEVELOPMENT TRAFFIC VOLUMES
AM PEAK HOUR, DEVELOPMENT COMPLETE

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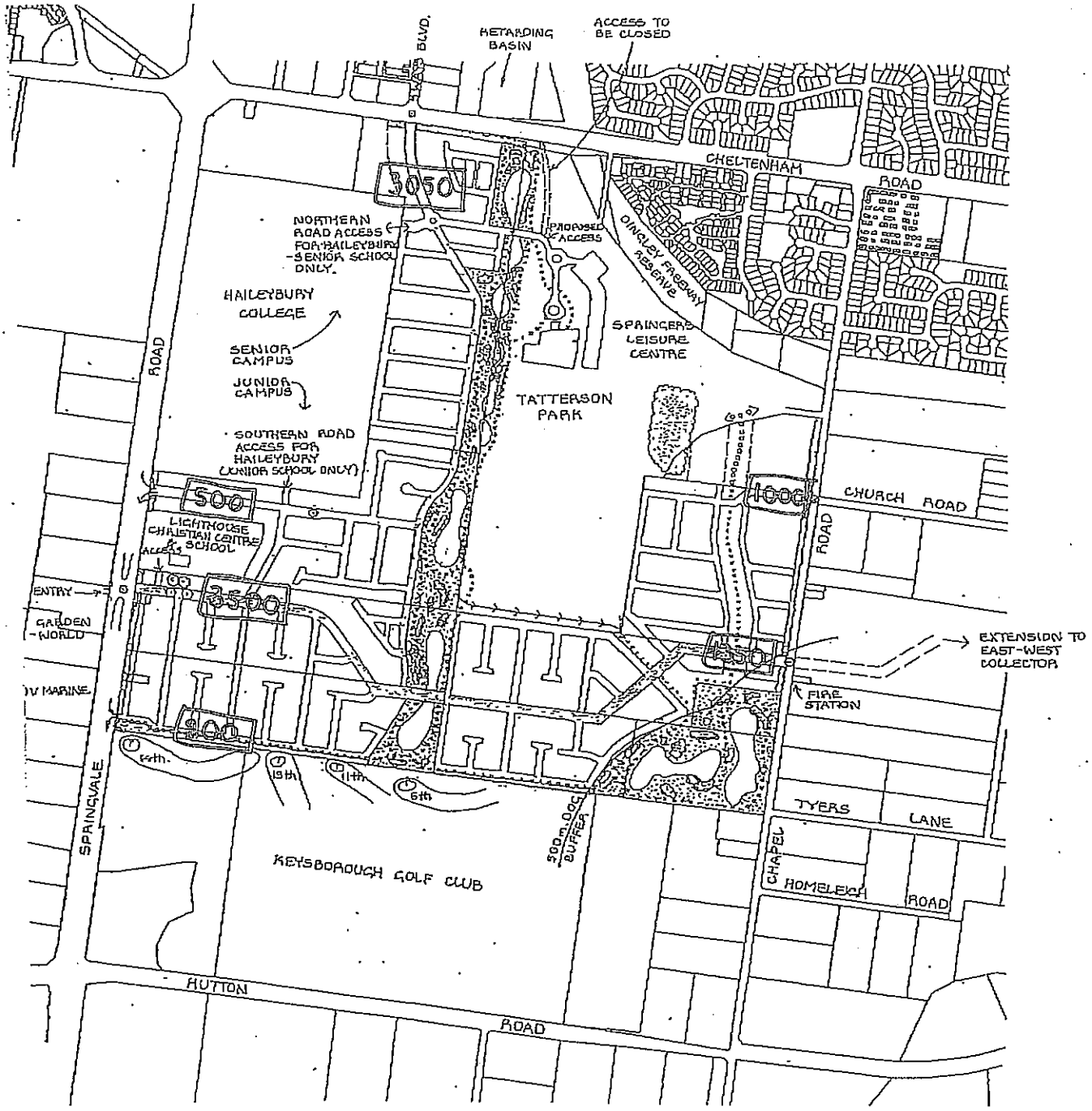
KEYSBOROUGH SOUTH DEVELOPMENT STAGE 1
GREATER DANDENONG CITY COUNCIL



3500 DENOTES ESTIMATED DAILY TRAFFIC (VEHICLE MOVEMENTS)

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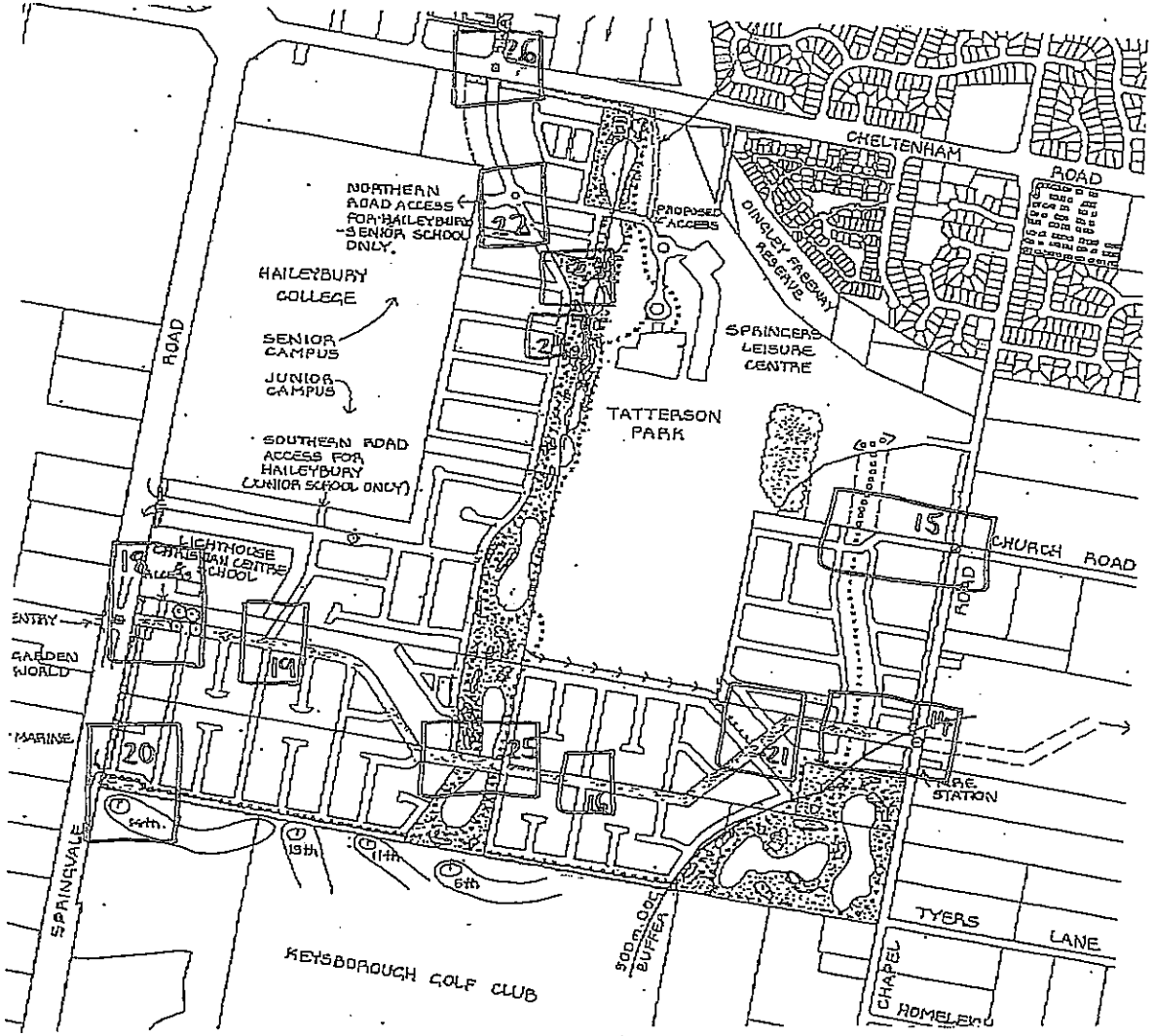
FIGURE 7a
ESTIMATED DAILY TRAFFIC VOLUMES
DEVELOPMENT COMPLETE

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT



DENOTES PARK EDGE STREET .....

DENOTES MID-BLOCK PLATFORM

DENOTES NORTHERN COLLECTOR STREET — · — · —

DENOTES EAST-WEST COLLECTOR — · · — · · —

DENOTES T INTERSECTION DEFLECTION

ALL STREET NOT MARKED IS ACCESS STREET

DENOTES REFERENCE TO SEPARATE FIGURE 16

FIGURE 4

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FIGURE 8
STREET TYPES AND TRAFFIC MANAGEMENT

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

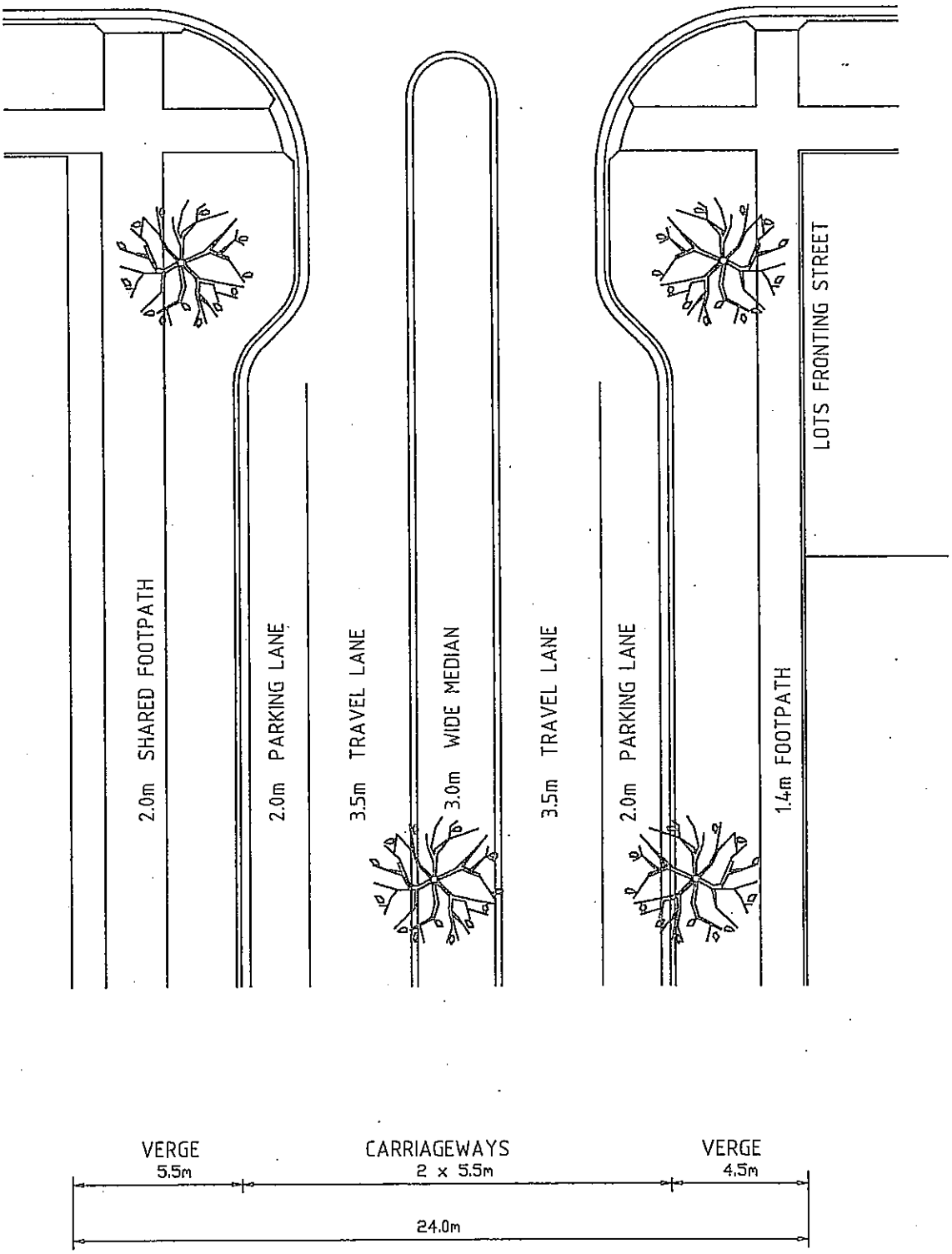

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FIGURE 9
EAST-WEST COLLECTOR STREET

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

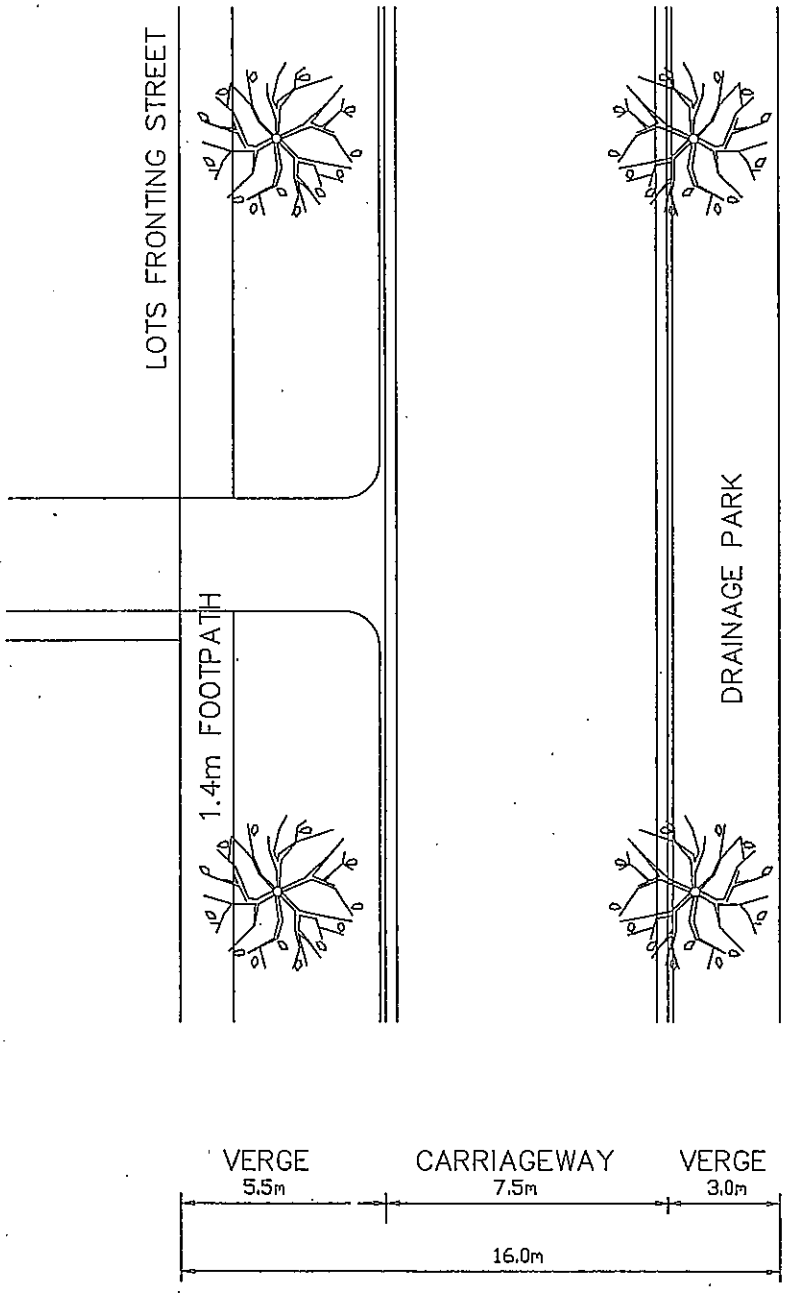

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FIGURE 10
NORTHERN COLLECTOR STREET

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

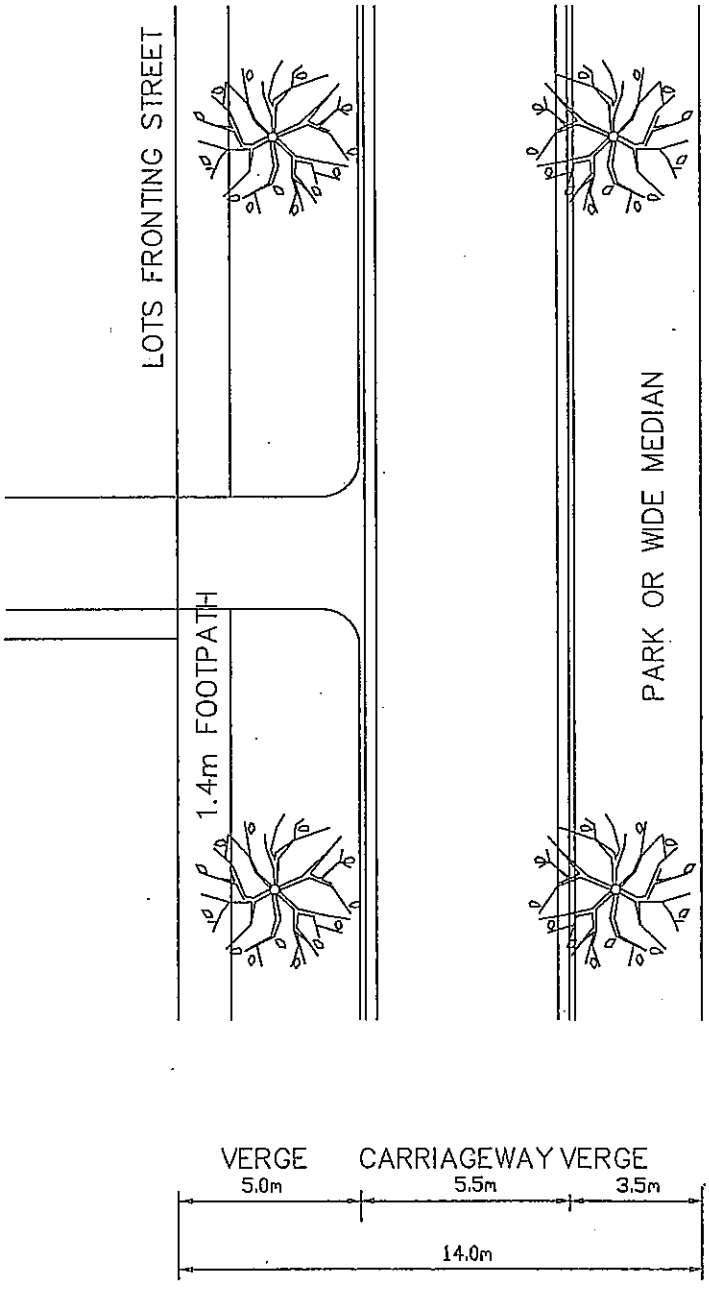

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FIGURE 11
PARKLAND EDGE STREET

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

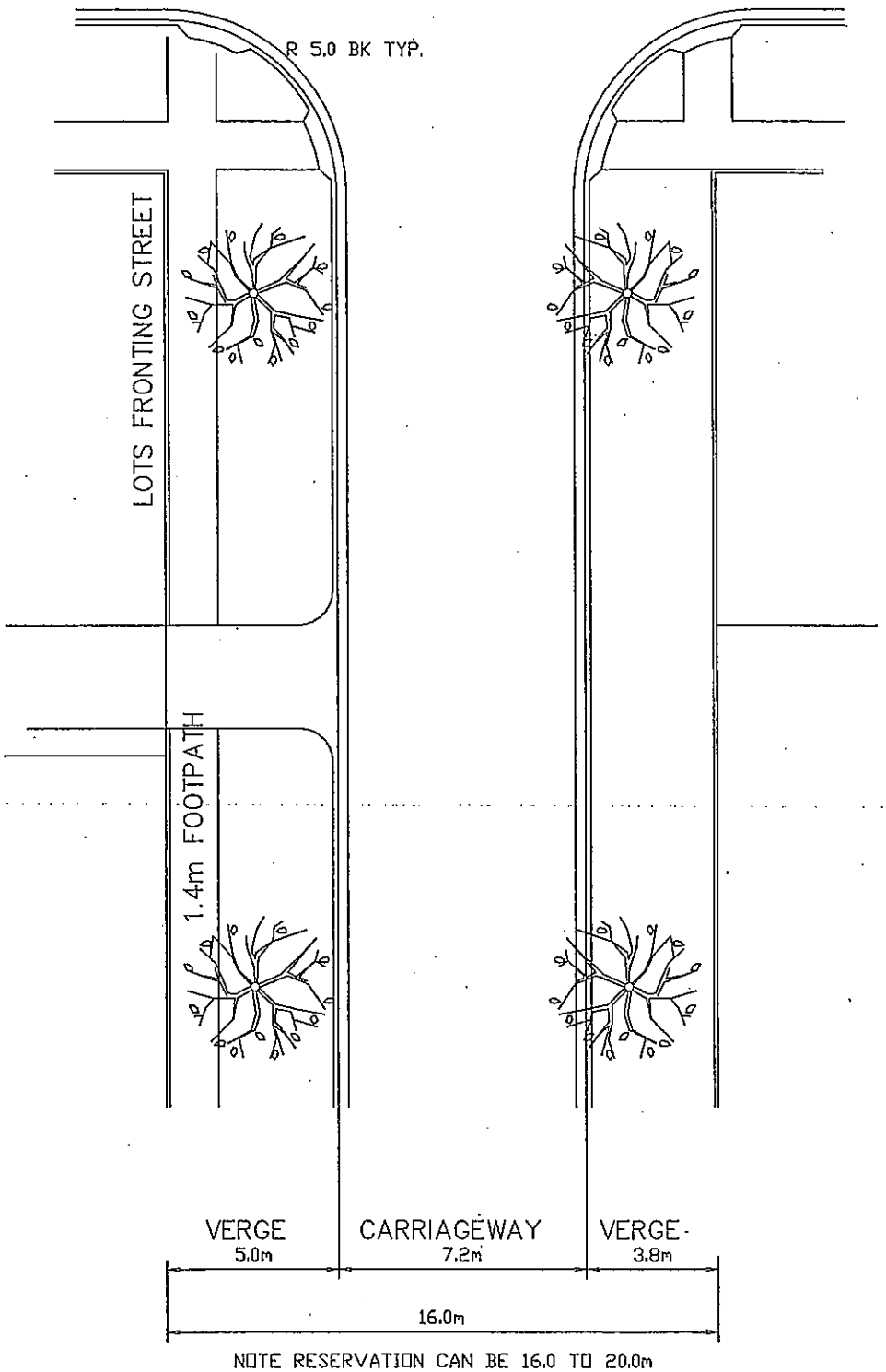

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FIGURE 12
ACCESS STREET

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

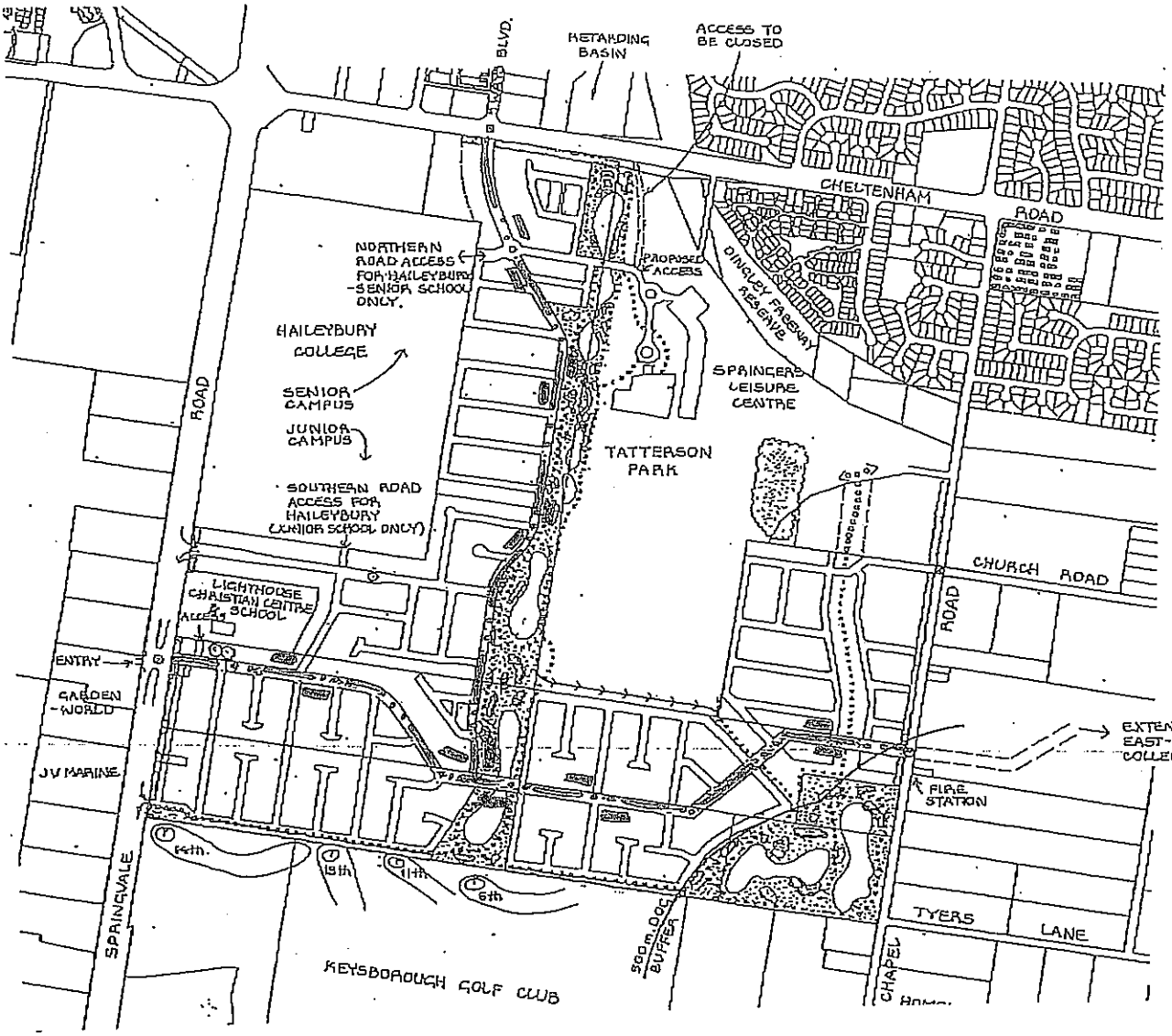

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FIGURE 13
BUS ROUTES AND STOPS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

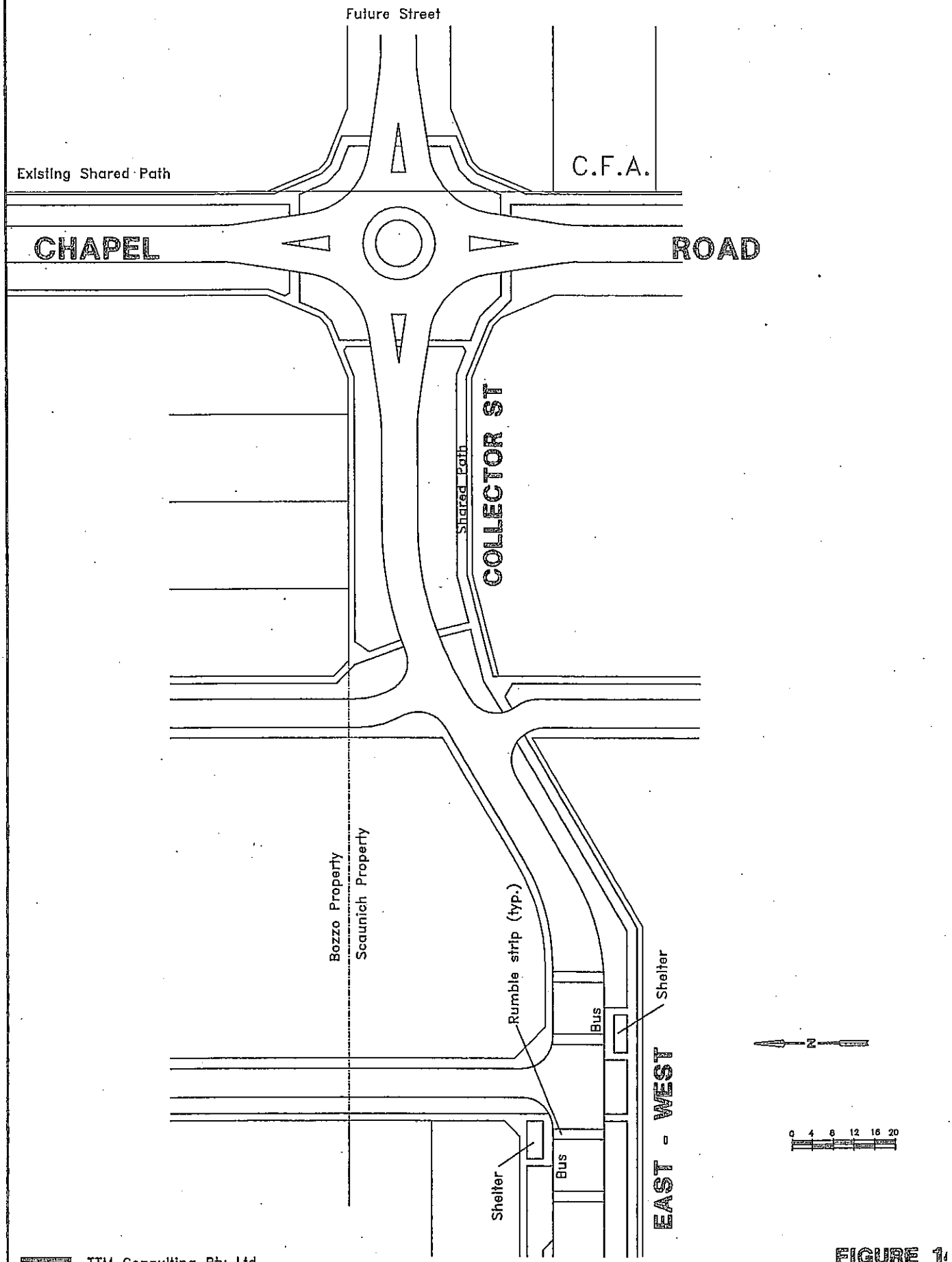

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FIGURE 1
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

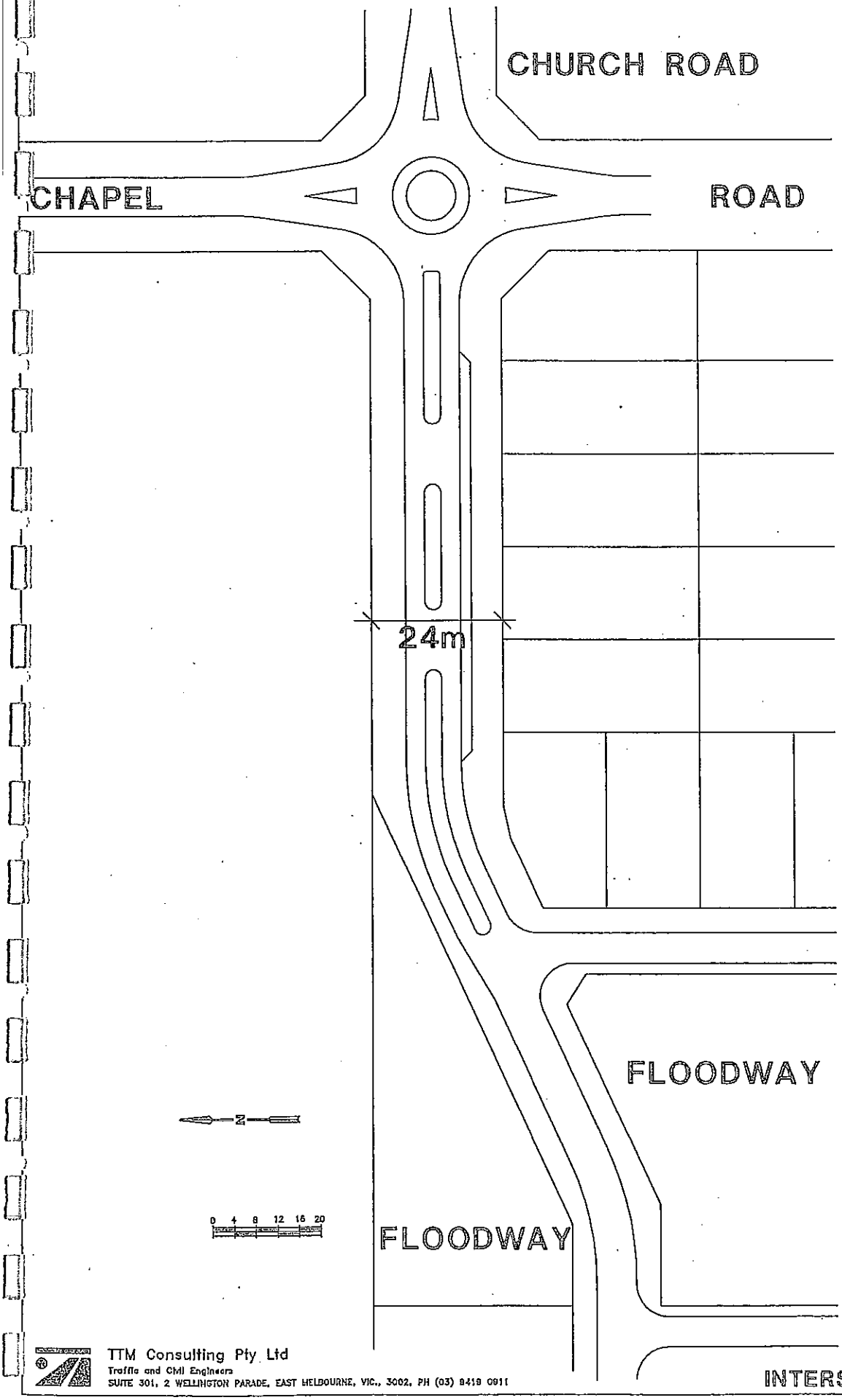

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FIGURE 15
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

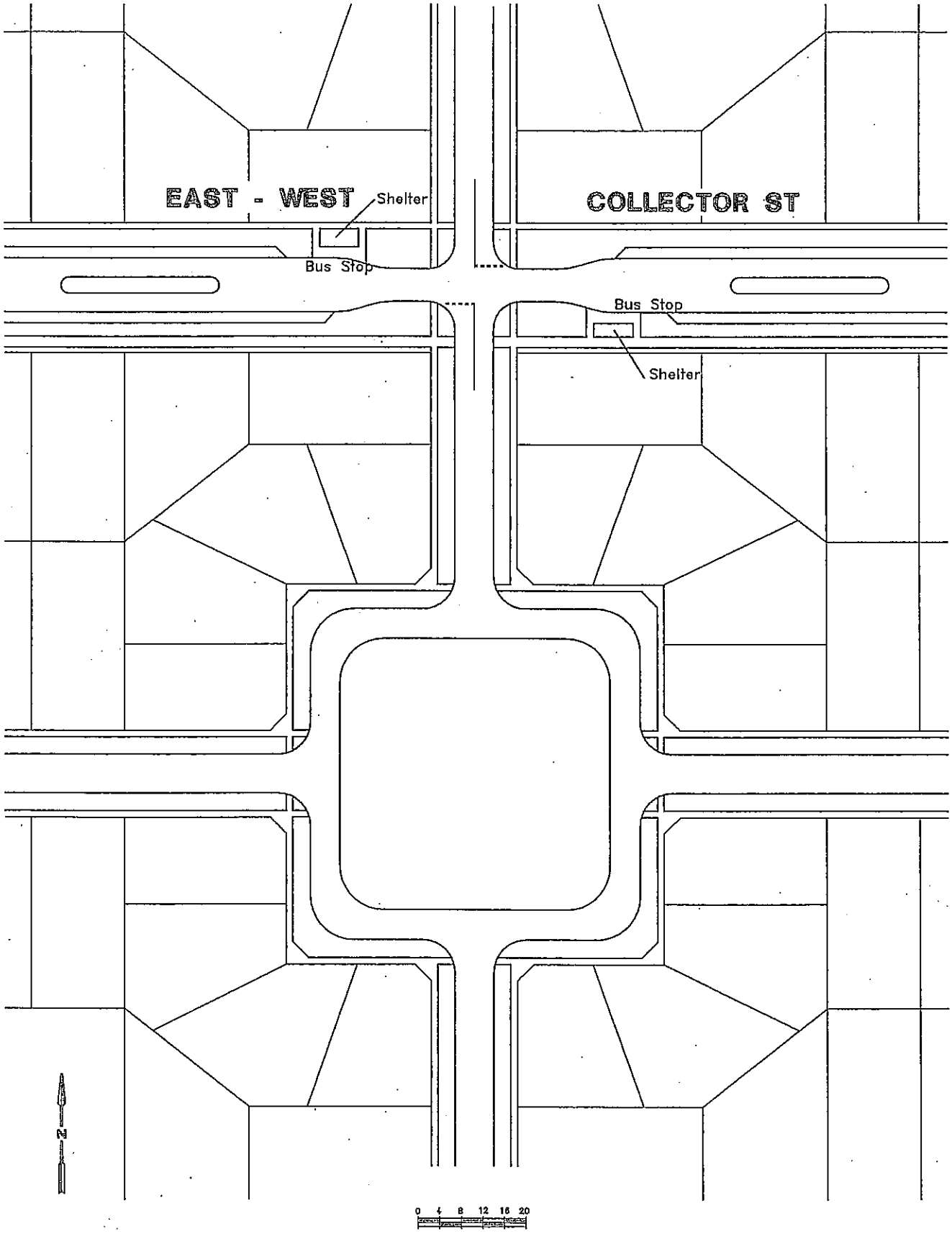

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FIGURE 16
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

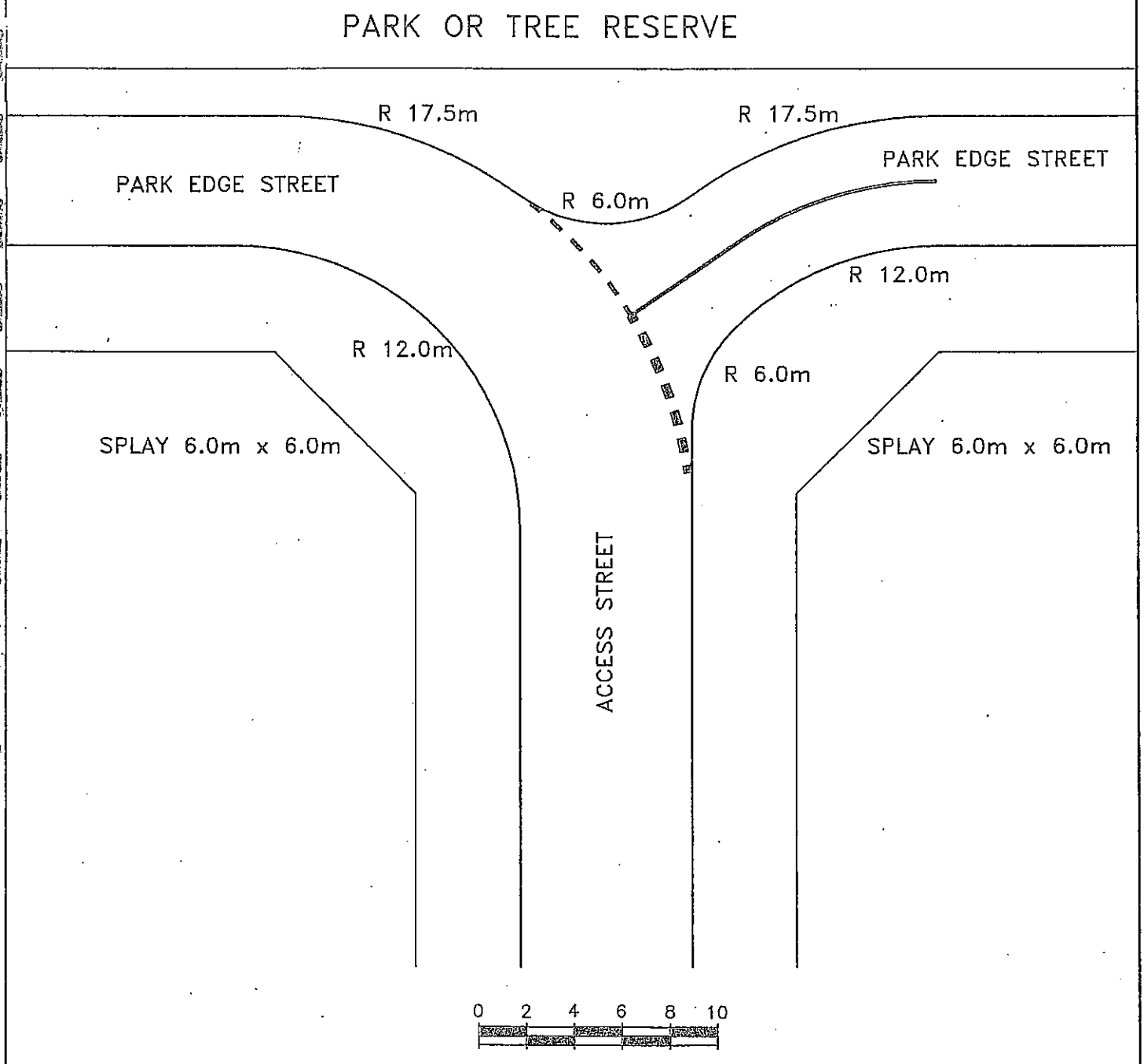

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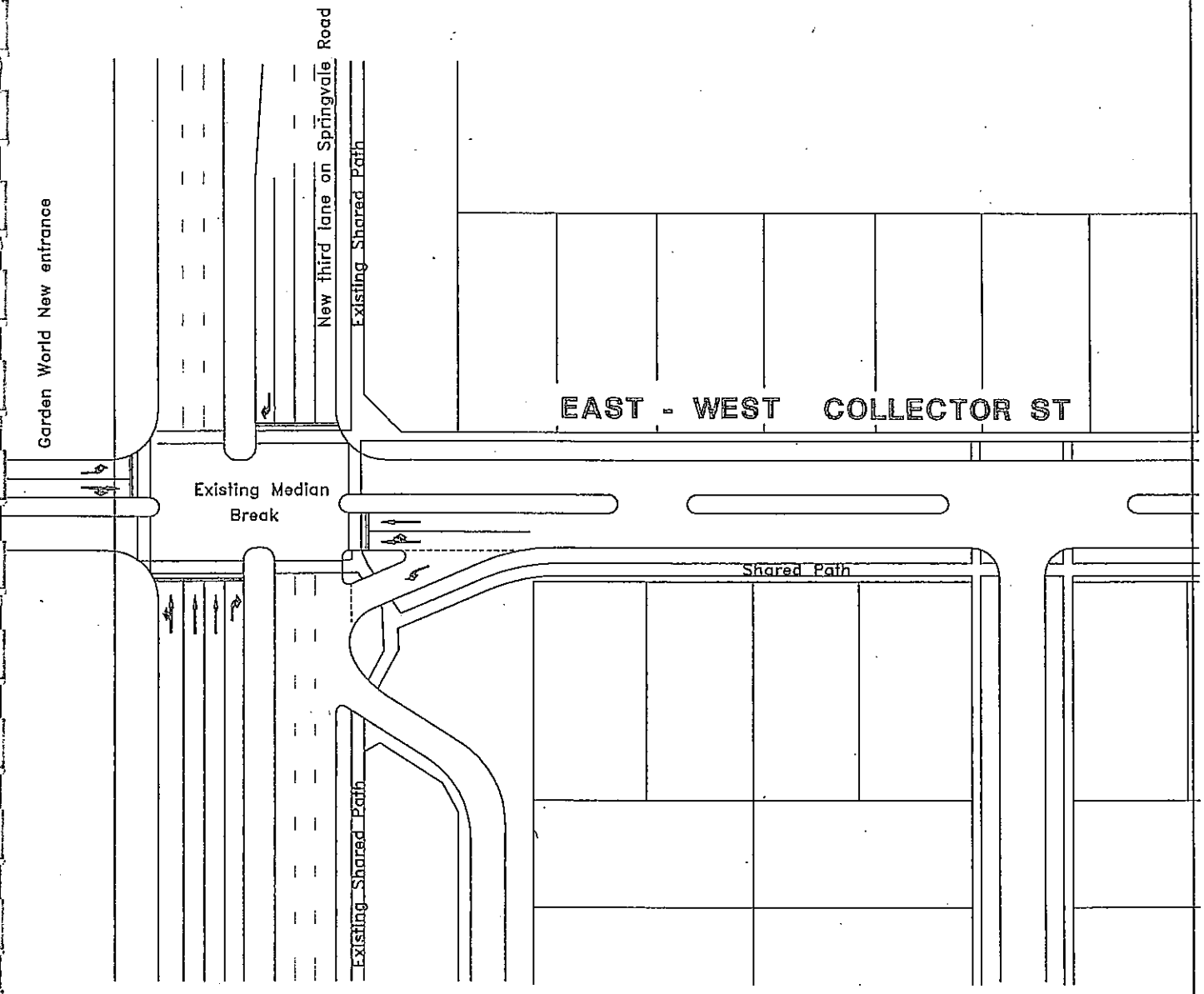
FIGURE 17
T INTERSECTION DEVIATION

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT



N

0 4 8 12 16 20

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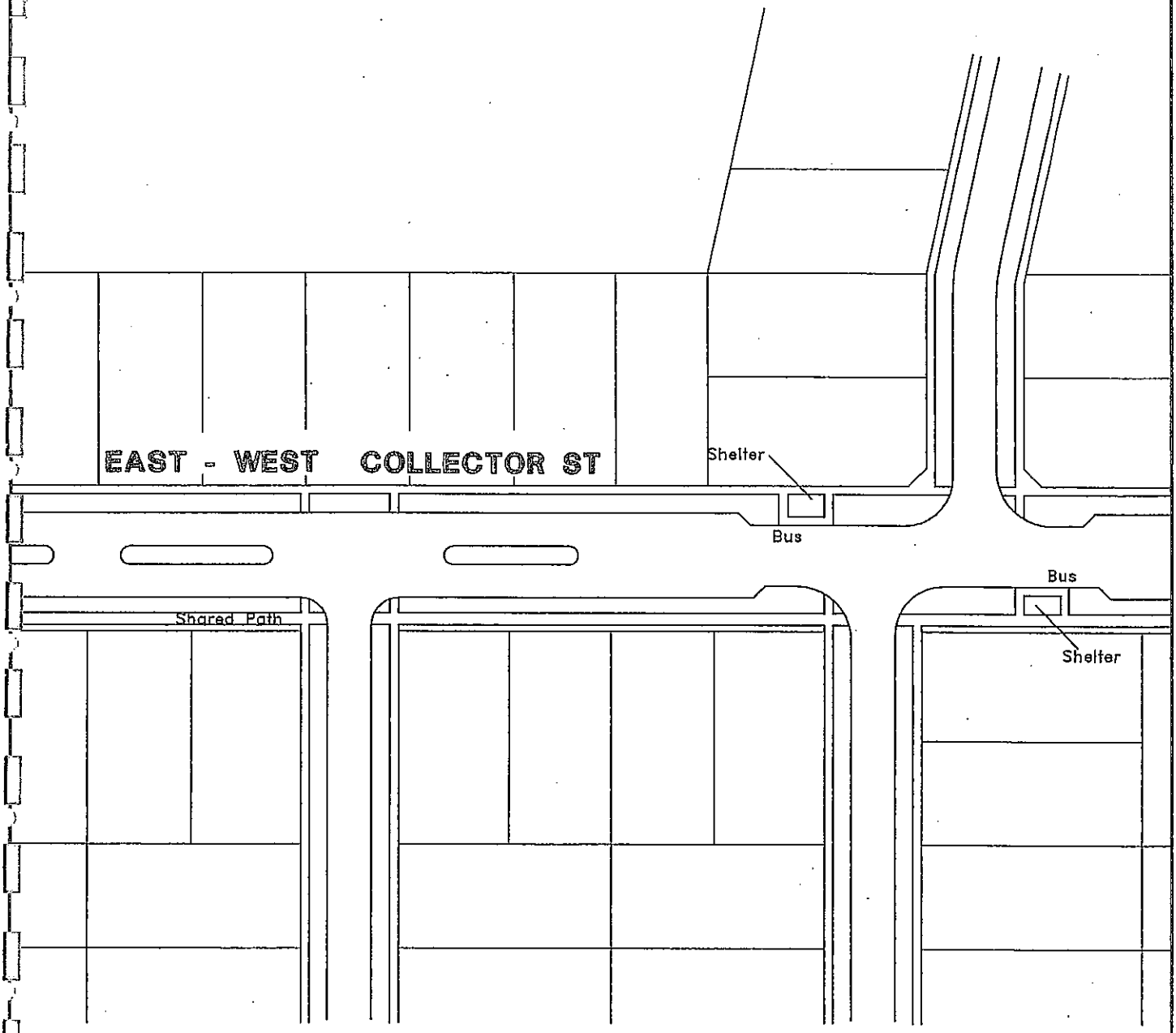
FIGURE 18
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT



N

0 4 8 12 16 20

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FIGURE 19
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

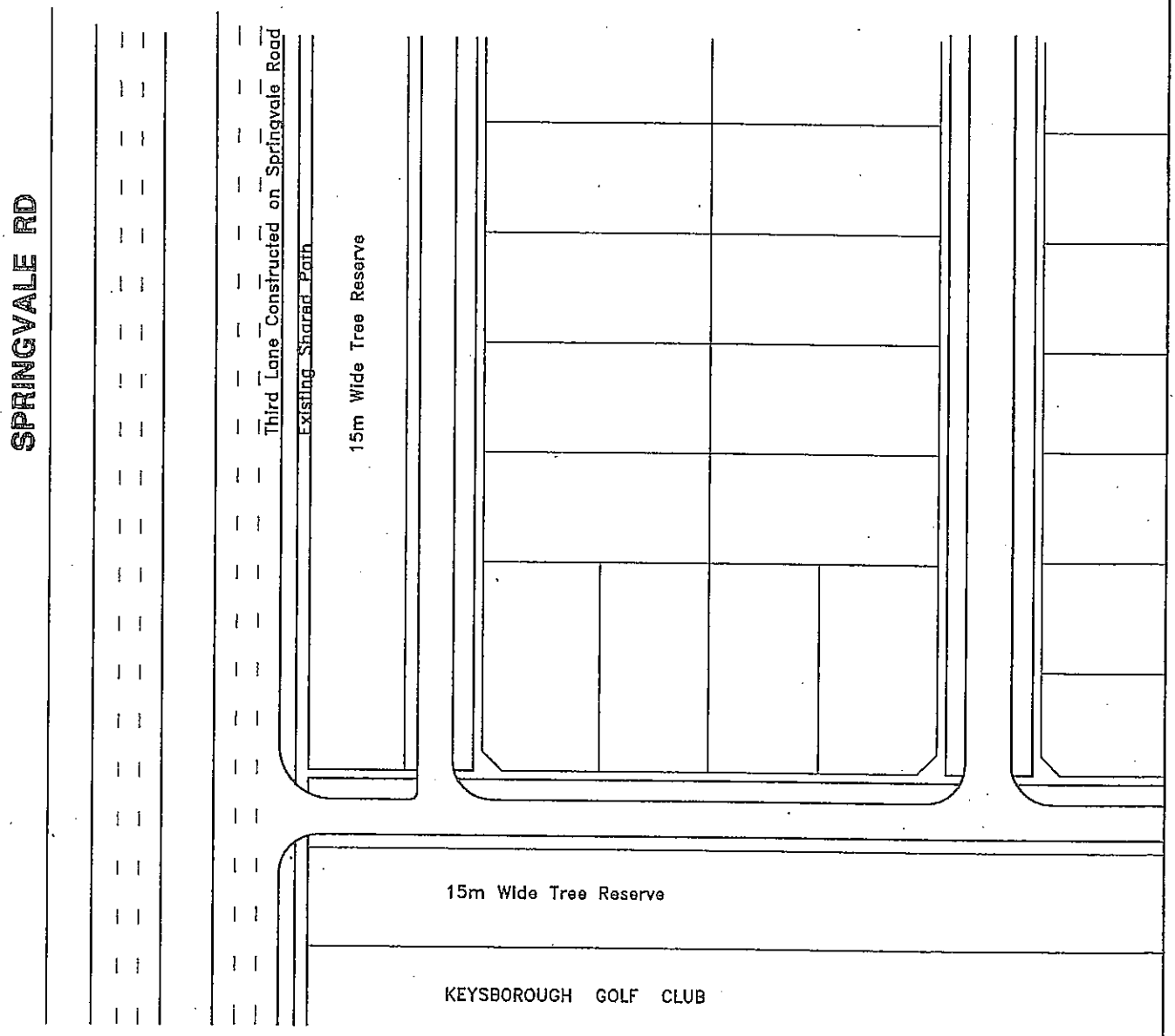

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FIGURE 20
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

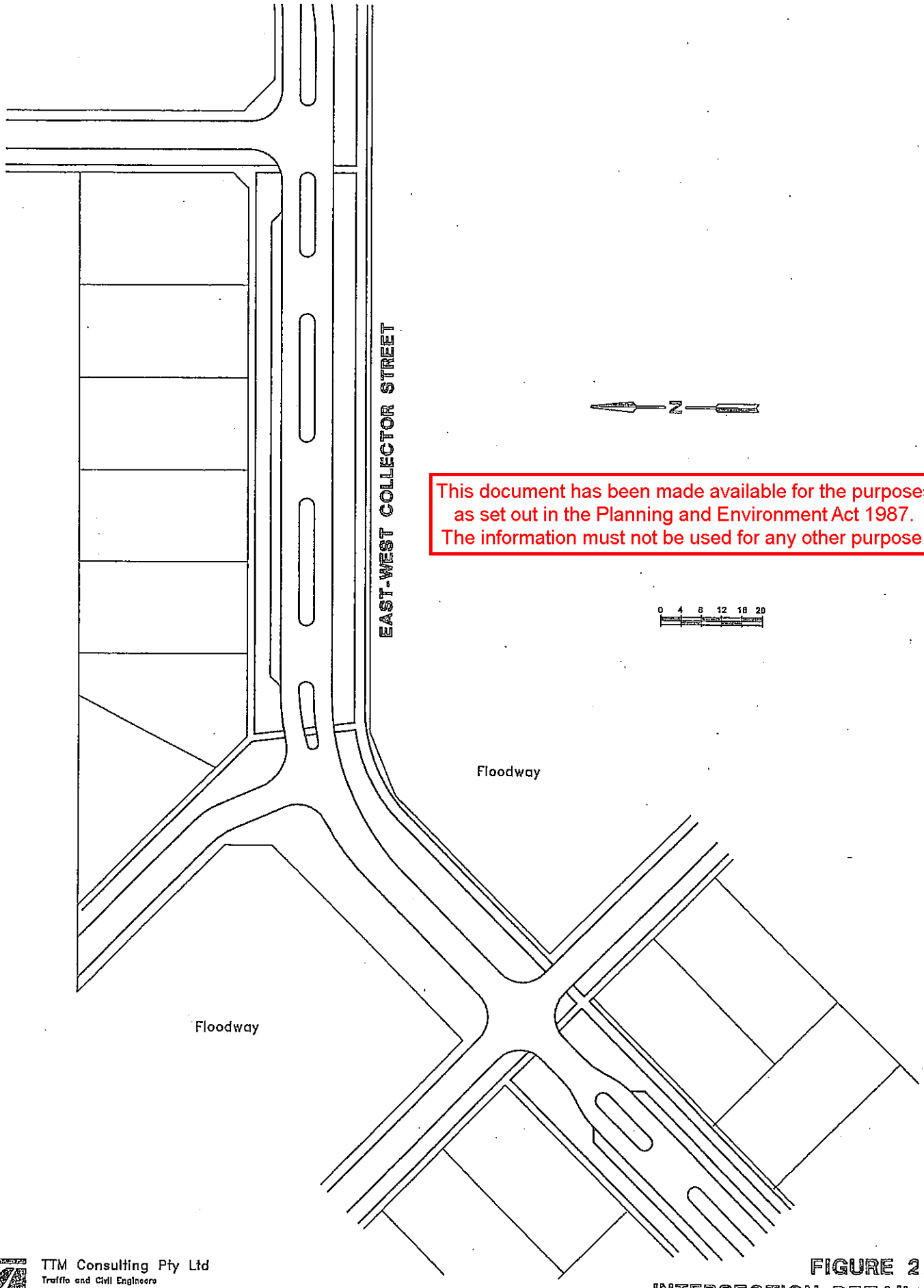

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FIGURE 2
INTERSECTION DETAIL

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

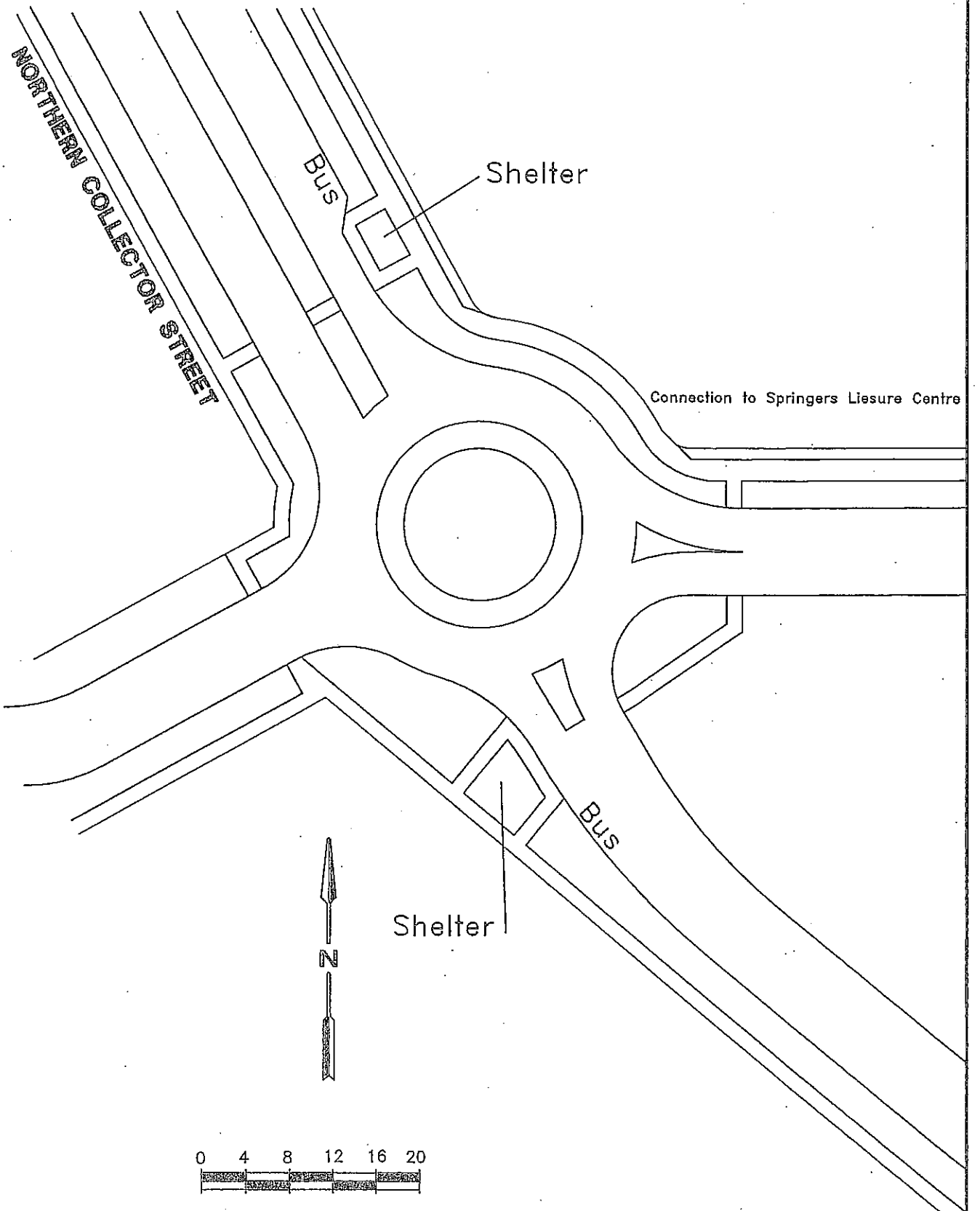

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FIGURE 22
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT

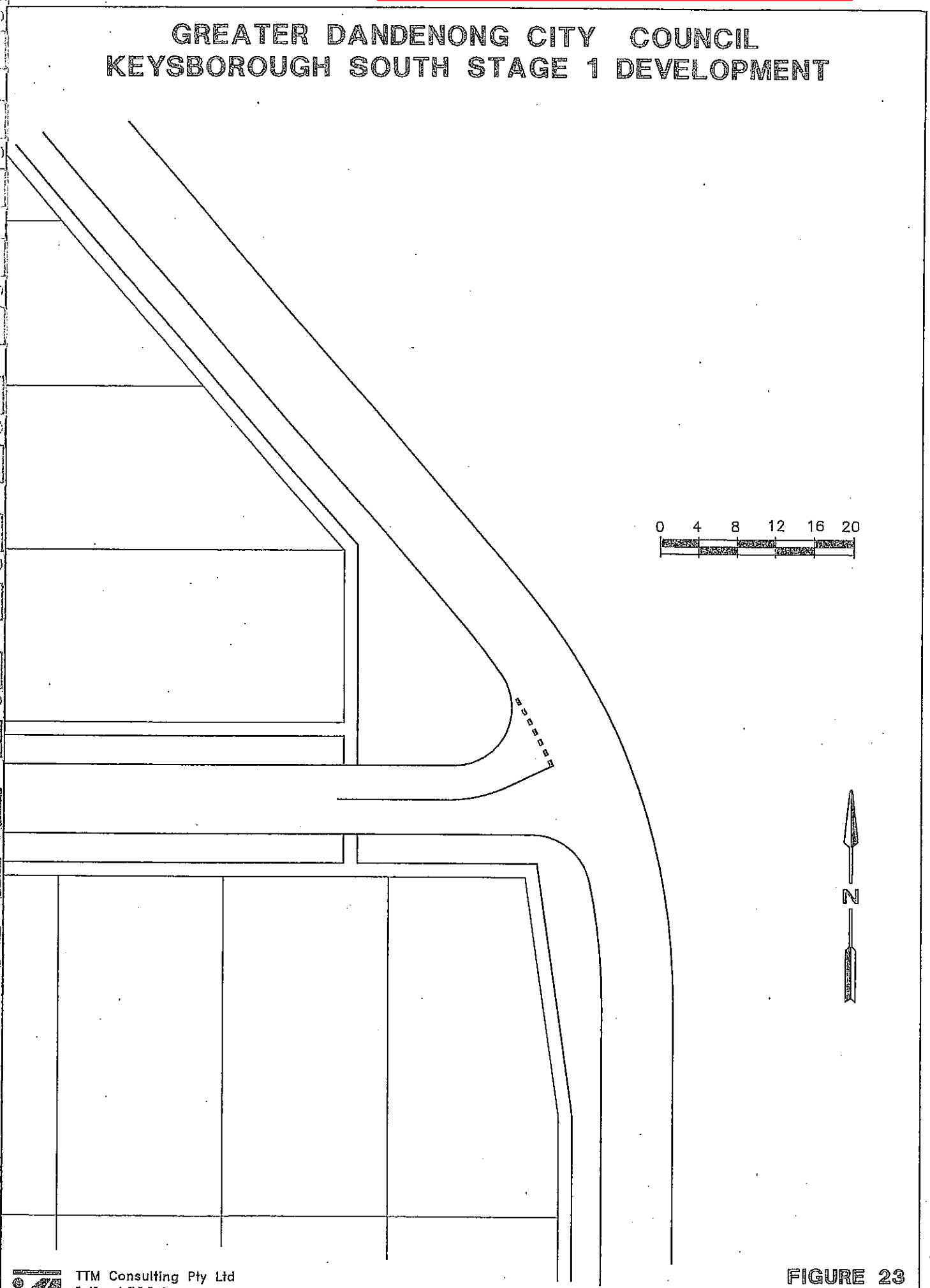

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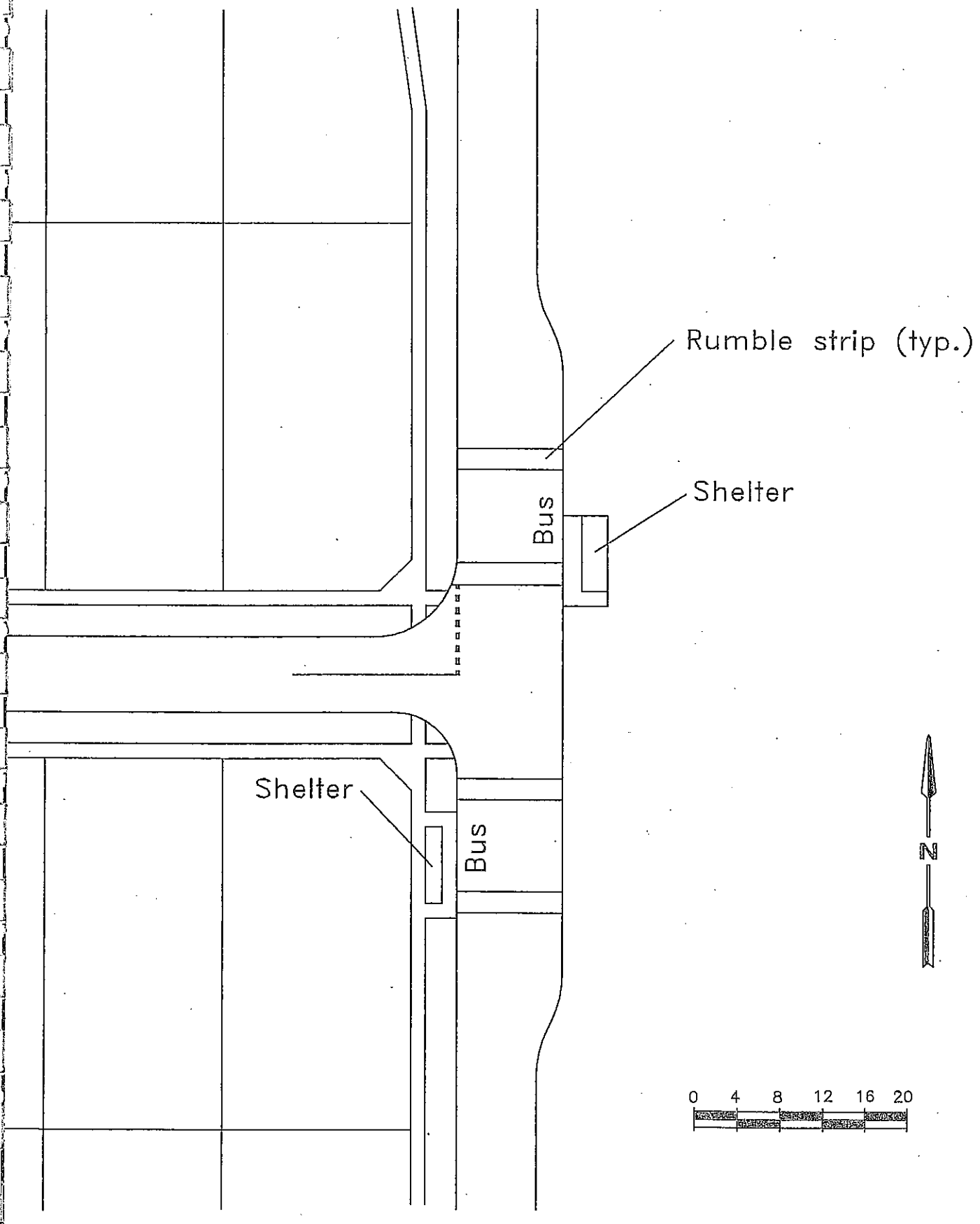
FIGURE 23
INTERSECTION DETAILS

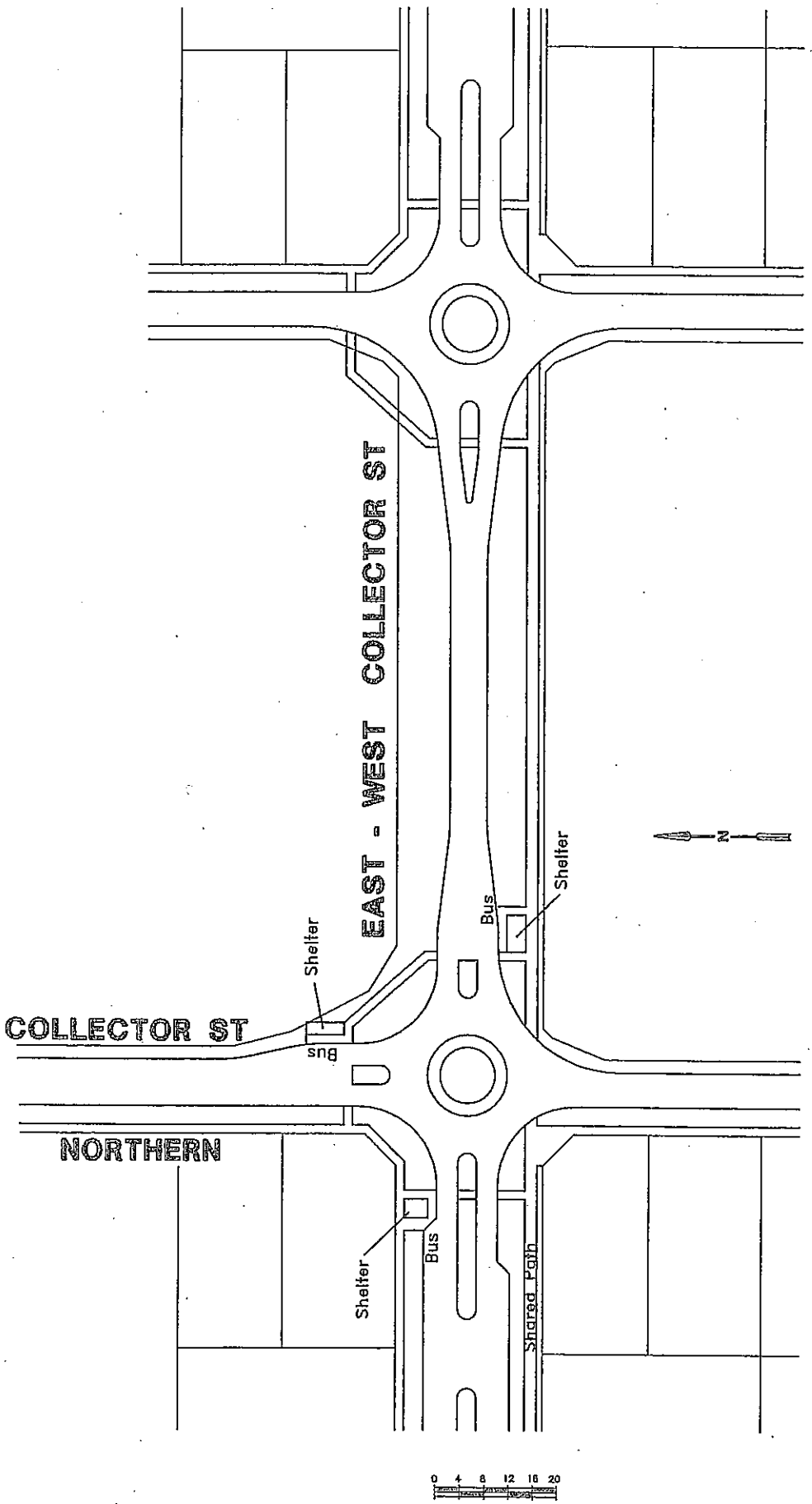
GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT



TTM Consulting Pty Ltd
Traffic and Civil Engineers
SUITE 301, 2 WELLINGTON PARADE, EAST MELBOURNE, VIC., 3002, PH (03) 9419 0911

FIGURE 24
INTERSECTION DETAILS

GREATER DANDENONG CITY COUNCIL
KEYSBOROUGH SOUTH STAGE 1 DEVELOPMENT



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Traffic and Civil Engineers
SUITE 301, 2 WELLINGTON PARADE, EAST MELBOURNE, VIC., 3002, PH (03) 9419 0911

FIGURE 25
INTERSECTION DETAILS

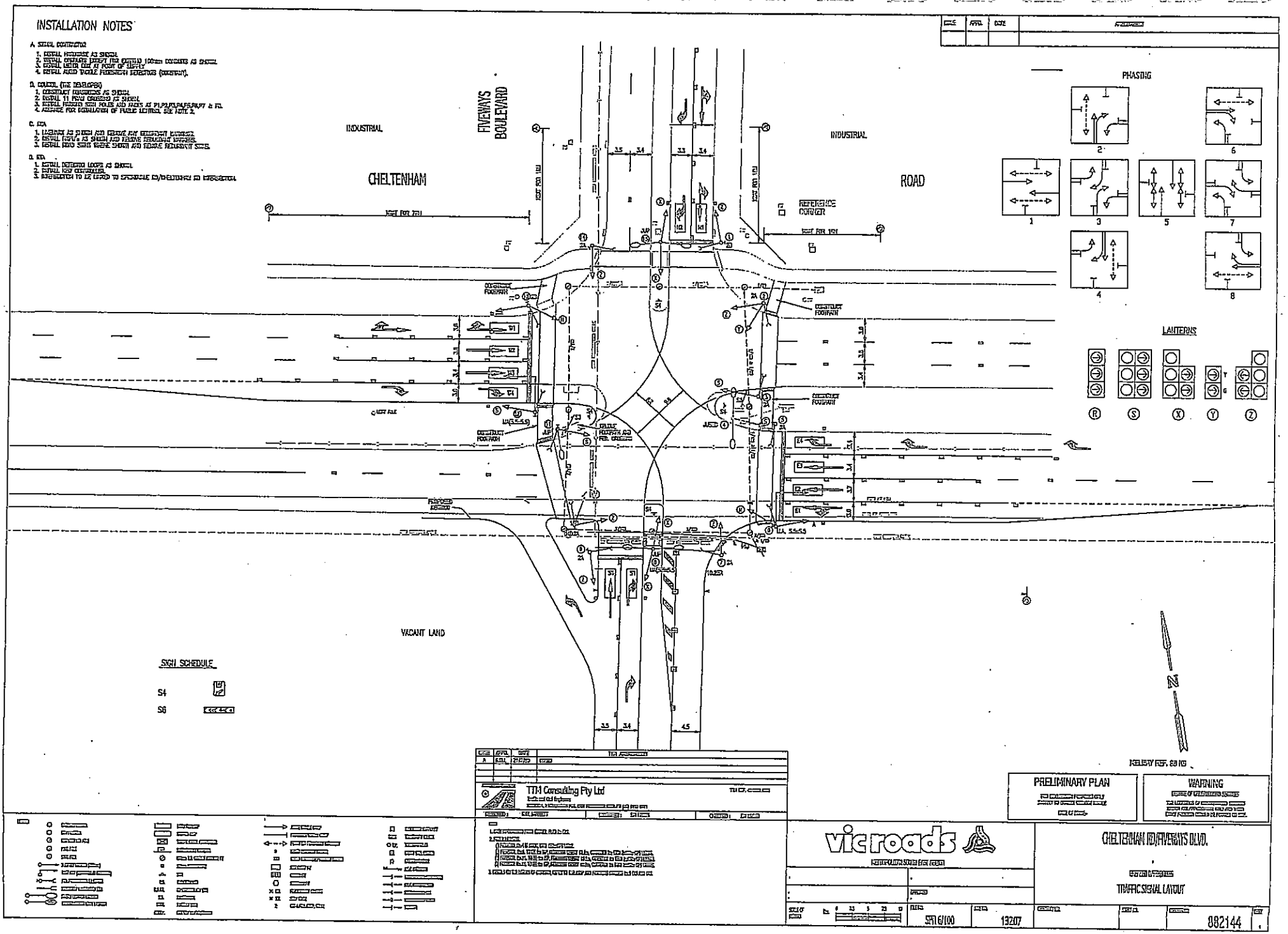

FIGURE 26

TraffixGroup
Traffic Engineers and Transport Planners

Directors:
Henry H Turnbull
Charmaine C Dunstan
William D de Waard
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Telephone 03 9822 2888
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Our Ref.: 5169L0620

24th April, 2003

Watsons Pty Ltd
PO Box 171
MORNINGTON VIC 3931

Attention: Michael Ritchie

Dear Michael,

AMENDED SUBDIVISION LAYOUT
WILBOW CORPORATION 'VIECELI'S PROPERTY', SPRINGVALE RD, KEYSBOROUGH
ADDENDUM TO DEVELOPMENT ROAD SAFETY AUDIT REPORT

In response to your facsimile dated 23rd April 2003, we have reviewed the amended subdivision layout for 'Vieceli's Property' in Springvale Road, Keysborough. In particular, we note that the central median along the East-West Collector Street near Springvale Road is no longer proposed to provide a median break into the service road and lots 124 & 125 have been re-orientated from north-south to east-west (i.e. front service road).

In our October 2002 report (Our Reference: 5169R0120), we identified a concern related to access into the service road, particularly the situation of vehicles propping to turn right into the service road, effectively within the signalised intersection at Springvale Road. We have reproduced the particular part of the previous report below for your information.

<u>Item 5.1: Intersections - Springvale Road service road & East-West Collector Street</u>

- *'The intersection of the Springvale Road service road (provides access to properties in 'Property 4') and the East-West Collector Street is considered to be too close to the proposed traffic signals at Springvale Road. The proposed arrangement is likely to result in the right turn into the service road being quite hazardous.'*

  Recommendation:

  'Service road entry should connect directly from Springvale Road (similar to the proposed layout prepared by TTM Consulting (Figure 18) provided in Appendix B). This would also facilitate one-way movement from north to south.'

Having regard for the amended layout which removes the median break (and right turn into the service road), we are satisfied that the amended layout resolves any safety concerns related to vehicles propping to turn right into the service road. In addition, we are of the view that there is no particular requirement for the service road to connect directly to Springvale Road as previously recommended.

As a result of the proposed change to the service road access, we believe that the service road should allow for two-way vehicular movements to provide adequate access to adjacent properties. However, we are concerned about vehicular movements from the service road into the East-West

Collector Street, particularly vehicles wishing to head northbound along Springvale Road. This particular manoeuvre is likely to be somewhat hazardous with vehicles having to cross the left turn slip lane and then immediately turning right into Springvale Road or alternatively blocking the left turn slip lane as they wait till vehicles turning right into Springvale road have cleared.

Consequently, we are of the view that vehicular movements from the service road into the East-West Collector Street should be restricted to left out into Springvale Road southbound only (i.e. via the left turn slip lane).

Accordingly, we recommend that appropriate signage be installed to restrict all vehicle movements to left into Springvale Road from the service road.

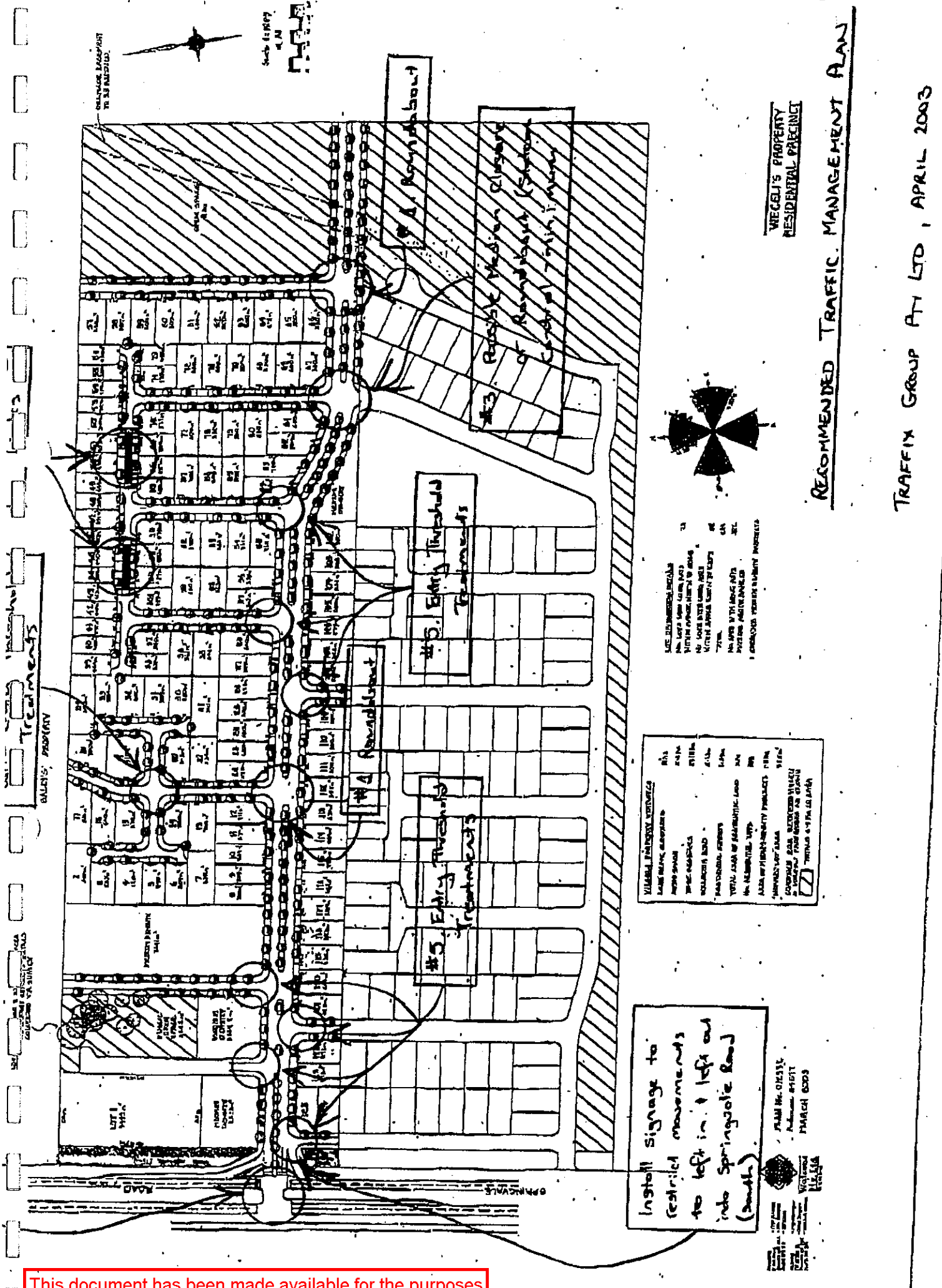
The recommended traffic management plan has been amended to incorporate the above recommendation whilst removing the requirement for the service road entry to connect directly to Springvale Road as outlined in the previous audit report. A copy of the amended plan is attached.

We wish to emphasis that this advice should be read in conjunction with the Development Road Safety Audit report for 'Property 3' dated 29 October 2002 as other audit findings and recommendations remain relevant to the amended plan.

Should you have any queries regarding this matter, please do not hesitate to contact Will de Waard on 9822 2888.

Yours faithfully,
TRAFFIX GROUP PTY LTD

WILL DE WAARD
Director



TTM Consulting Pty Ltd

FLAVIA PARK CHAPEL ROAD, KEYSBOROUGH
PROPOSED RESIDENTIAL SUBDIVISION
TRAFFIC ENGINEERING ASSESSMENT AND
STAGE 1 ROAD SAFETY AUDIT

Prepared By

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For

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Melbourne Vic 3004

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1. INTRODUCTION AND SCOPE

This report described the traffic engineering impacts and implications of a proposed residential development at Chapel Road in Keysborough. The report also includes a Stage 1 Road Audit of the design prepared by Roberts Day for Stockland Group Pty. Ltd.

2. THE SITE IN TRANSPORT AND PLANNING CONTEXT

2.1 Site Location

The site is located on the western side of Chapel Road, about the former Flavia Road, as shown in Figure 1. The site area is 30.33 hectares.

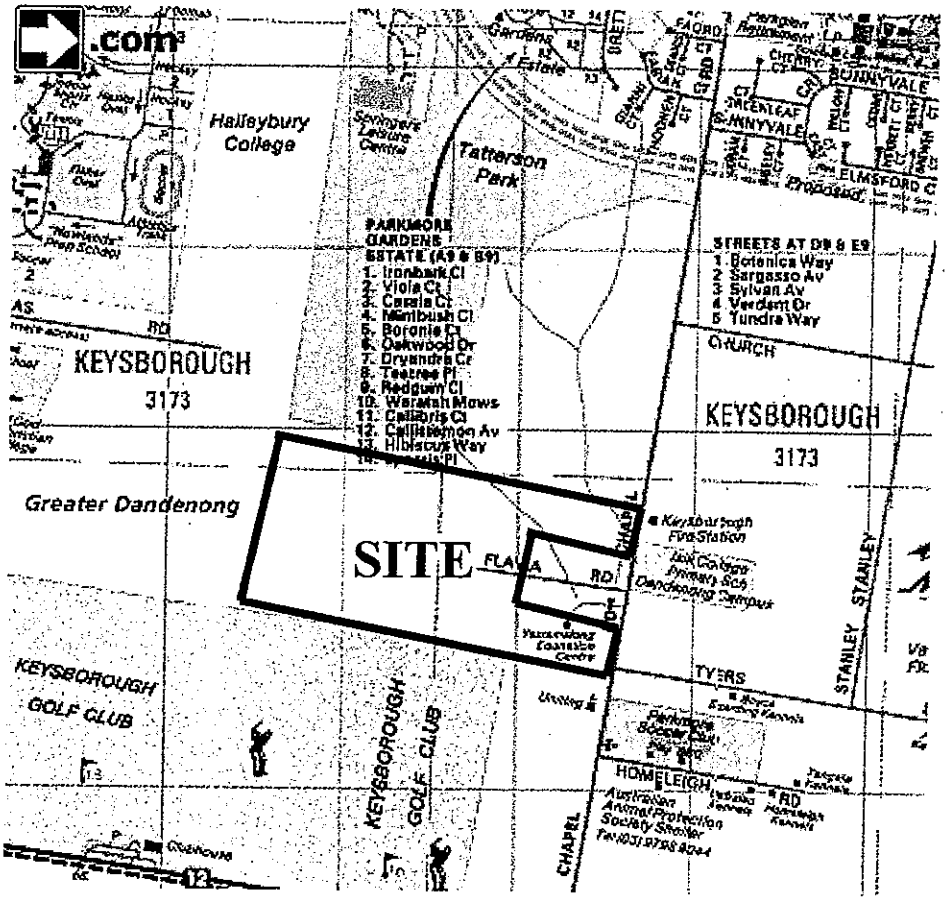


FIGURE 1
SITE LOCATION

2.2 Keysborough South Local Planning Policy

The site is located within the area of land encompassed by the Keysborough South Local Planning Policy, Area Development Plan Stage 1, as shown in Figure 2 to this report.

The design has been prepared in consideration of the Development Framework, for the Keysborough South Local Planning Policy, copied as Figure 3 to this report. This framework includes no specific requirement for the subject site in respect of transport facilities, with the only impact on accessibility being the required "Principal Green Corridor" inclusion.

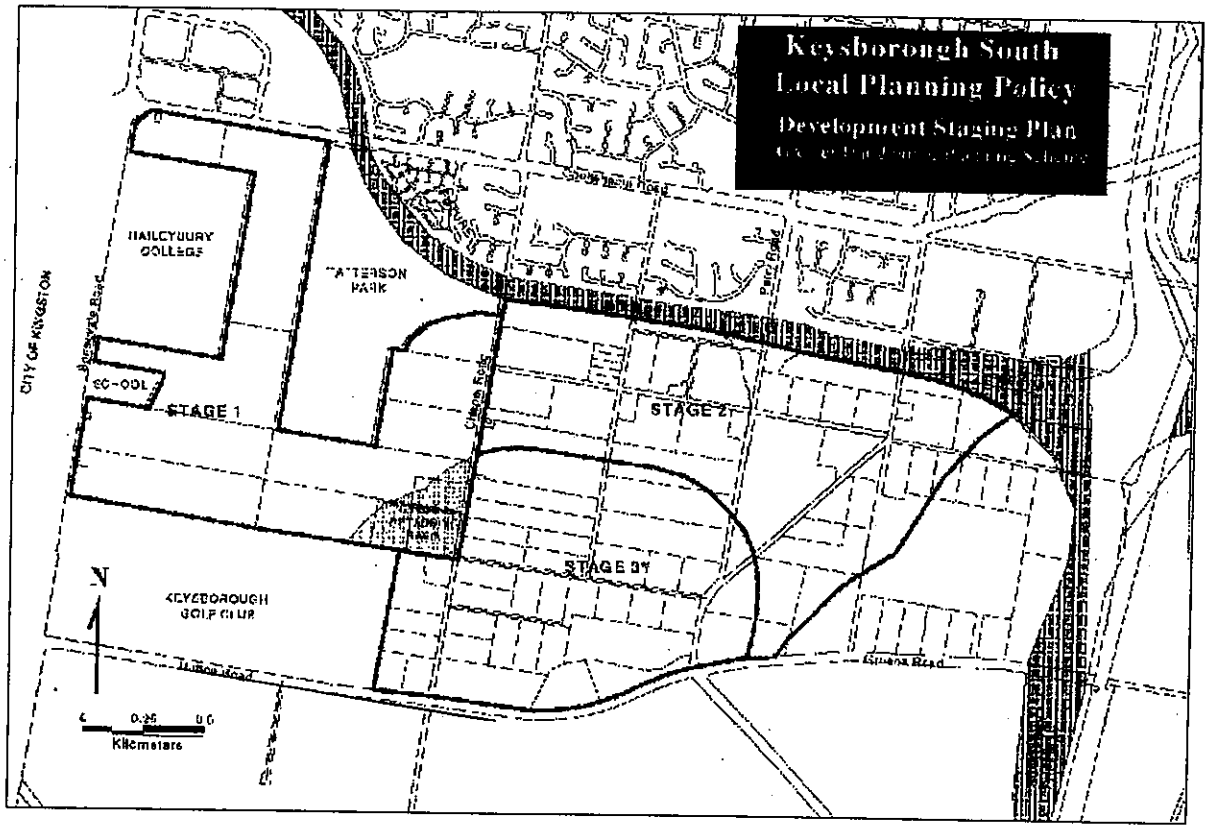


FIGURE 2
KEYSBOROUGH SOUTH LOCAL PLANNING POLICY
DEVELOPMENT STAGING PLAN

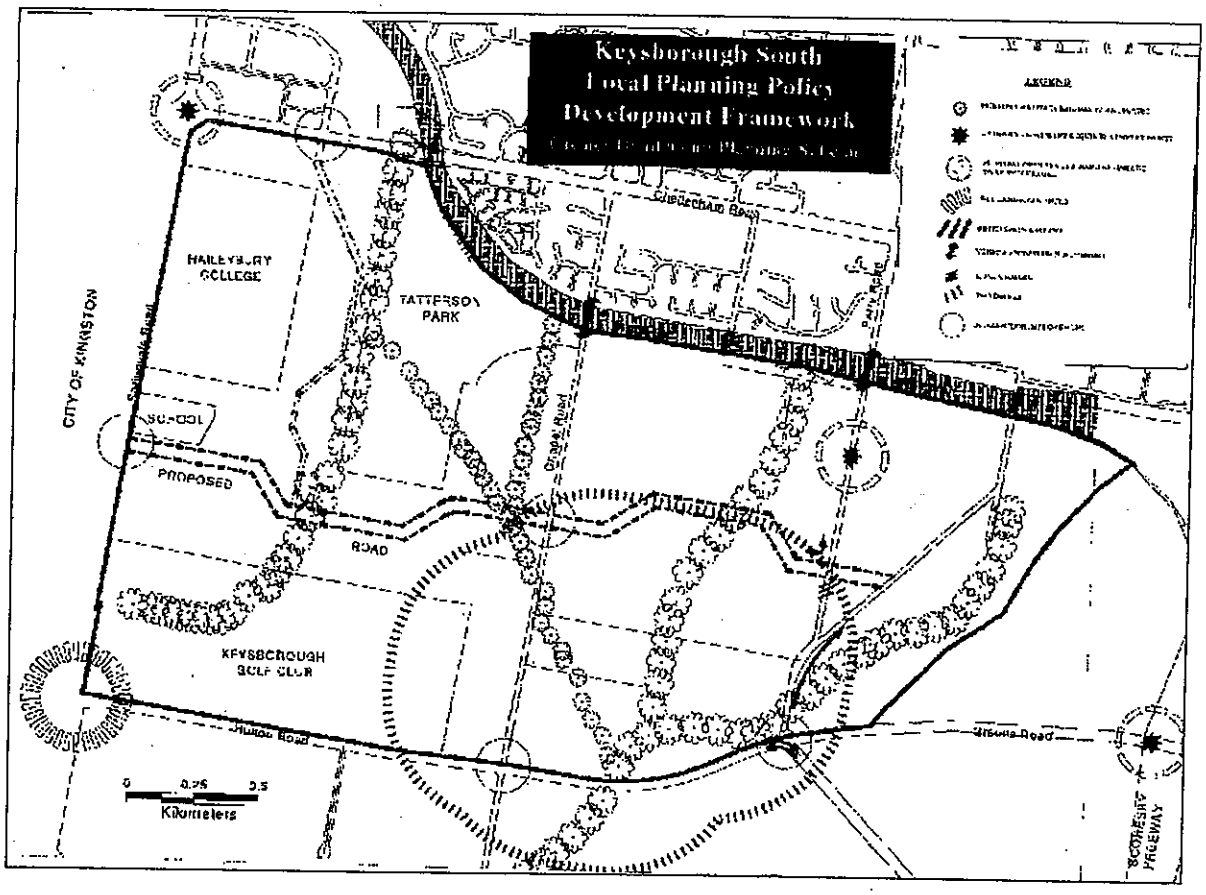


FIGURE 3
KEYSBOROUGH SOUTH LOCAL PLANNING POLICY DEVELOPMENT FRAMEWORK PLAN

2.3 Keysborough South Local Planning Policy Area Development Plan Stage 1 Traffic Management Plan

Schedule 2 of the Development Plan Overlay for the Keysborough South Local Planning Policy sets out that a Traffic Management Plan must be prepared for each stage of the development.

These requirements have been satisfied by the provision of the report prepared by TTM Consulting Pty. Ltd., entitled "Keysborough South Local Planning Policy, Area Development Plan Stage 1, Traffic Management Plan".

That report as amended was submitted to the Greater Dandenong City Council in September 2002. The report applies to the whole of Stage 1, which includes the land that is the subject of this report.

Strategic transport provisions described in that report that are of relevance to the land at 126 Chapel Road are :-

- A roundabout is proposed at the intersection of Chapel Road and East-West Collector Street, at the north-eastern corner of the subject land,
- The "Development Concept Plan" copied as Figure 4 to this report, included the residential potential of the subject land, which was subsequently used to estimate traffic generation and impacts.

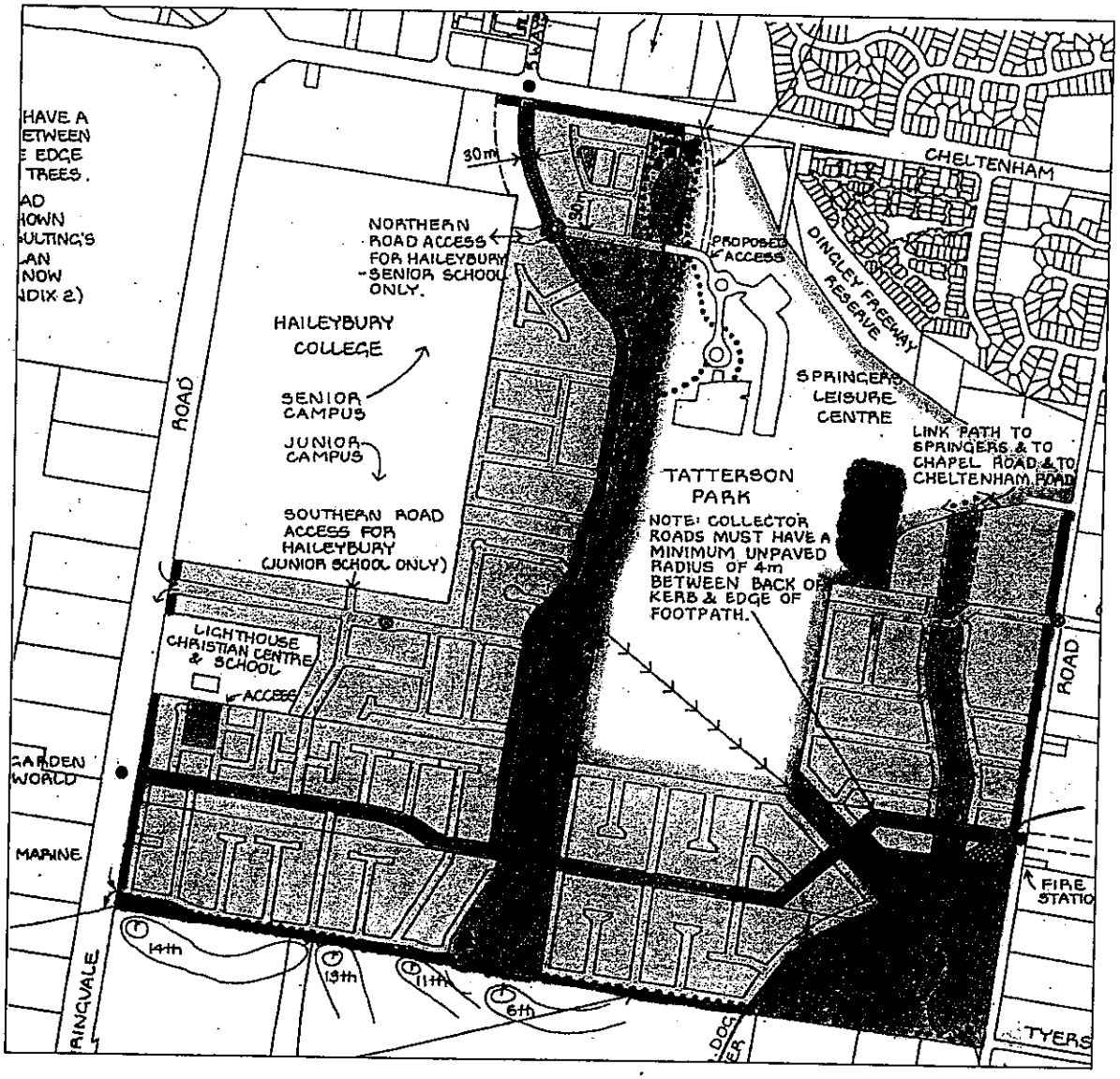


FIGURE 4
DEVELOPMENT CONCEPT PLAN

- Chapel Road, pursuant to Clause 22.06 of the Planning Scheme, is to be "upgraded" to the same standard as Corrigan Road. Corrigan Road has a 20.12 metres wide reservation containing a single, centrally located carriageway of 12.2 metres width.

The existing Chapel Road reservation is 20.12 metres wide, and the sealed pavement width is approximately 7 metres.

Compliance with the planning scheme can be achieved within the existing reservation. A strict copy of Corrigan Road would be unfortunate because Chapel Road will have no requirement for kerbside parking because of the Tree Reservations that are required along its edge, whereas Corrigan Road has parking as a result of direct abuttals.

The "trafficable standard" of Corrigan Road could be achieved by providing a carriageway of about 9 metres width, which is likely to provide a better environmental speed control outcome than simply copying the Corrigan Road geometry.

These geometric requirements have no impact on the development of the subject land, and need to be determined at a more strategic level than in relation to the development of just one part of the Stage 1 area.

3. THE SUBDIVISION PROPOSED

The plan, prepared by Roberts Day, is copied as Figure 5 to this report.

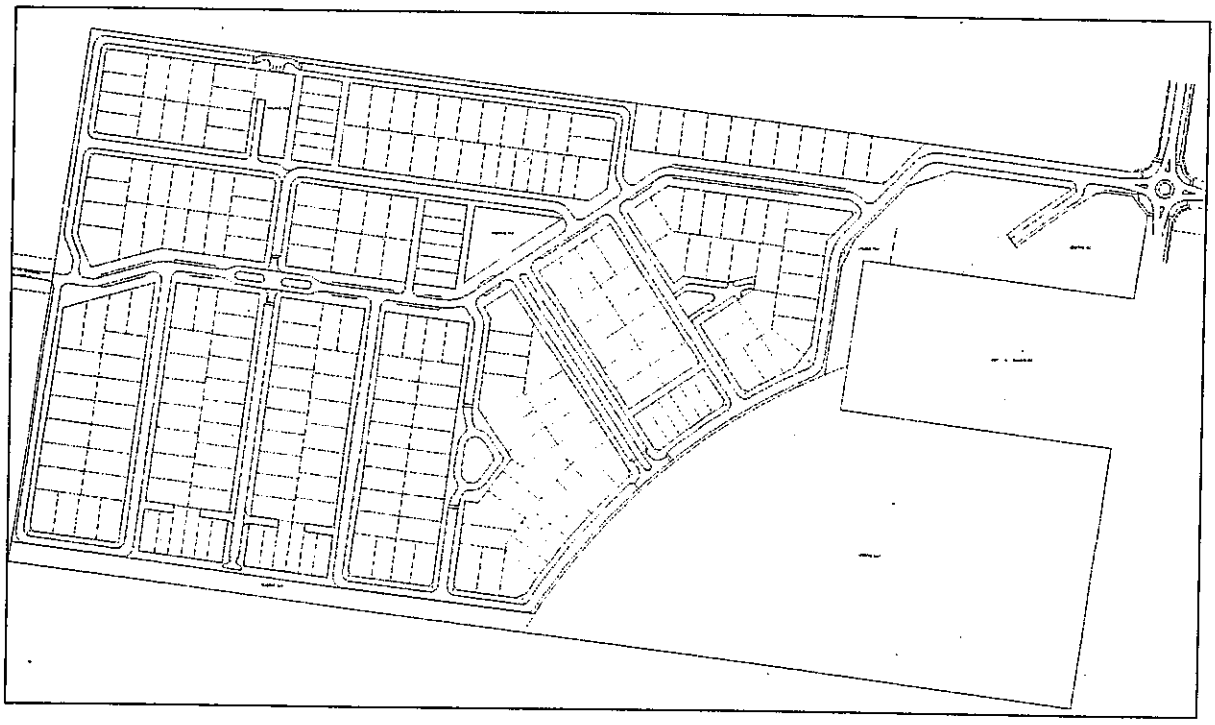


FIGURE 5
THE CONCEPT PLAN OF SUBDIVISION

Features of the plan relevant to traffic engineering and traffic impacts are :-

- 257 lots are shown in the plan, with area upwards of 300 square metres,
- One "Integrated Housing" site is included in the lot yield at 5,965 square metres. For the purposes of estimating traffic loadings we are assuming that up to 23 dwellings may be achieved on this site at a density of about 260 square metres of site per dwelling,
- Design provides for street connections to the Bozzo property to the immediate north generally in accordance with the "Development Concept Plan" prepared by Watsons and copied as Figure 4 above in this report,
- Design provides a connection using the East-West Collector Street to the land to the west,
- Design provides for a roundabout at Chapel Road on the alignment of the East-West Collector Street, just to the north of the existing Fire Station.

The required Tree Reservation ("15 metres planting buffer") along Chapel Road should be shown on the plan, and no direct vehicular access to Chapel Road is proposed from any lot on the plan.

4. TRAFFIC GENERATION AND IMPACTS

4.1 Total Vehicular Traffic Generation

280 dwellings can be expected to generate about 2,200 vehicle movements per day onto the external road network. For assessment purposes, and to avoid arguments about traffic generation rates, a total traffic generation of 2,800 vehicle movements per day is assumed in the following analysis.

Peak period traffic generation is estimated as follows :-

• AM Peak Hour	Outbound	0.6 trips/dwelling	=	168
	Inbound	0.2 trips/dwelling	=	56
• PM Peak Hour	Outbound	0.3 trips/dwelling	=	84
	Inbound	0.6 trips/dwelling	=	168

An allowance of 15% is made for "through" traffic, that is traffic that will be generated from land to the west of the site.

4.2 Directional Distribution and Assignment of Traffic to the Street Network

The traffic generation from the whole of the Keysborough South Stage 1 development area was modeled in the report that accompanied the development plan. The densities assumed in that exercise were similar to those now proposed in the subject application, and peak period traffic generation at the important external linkages are shown in Figure 5 and Figure 6.

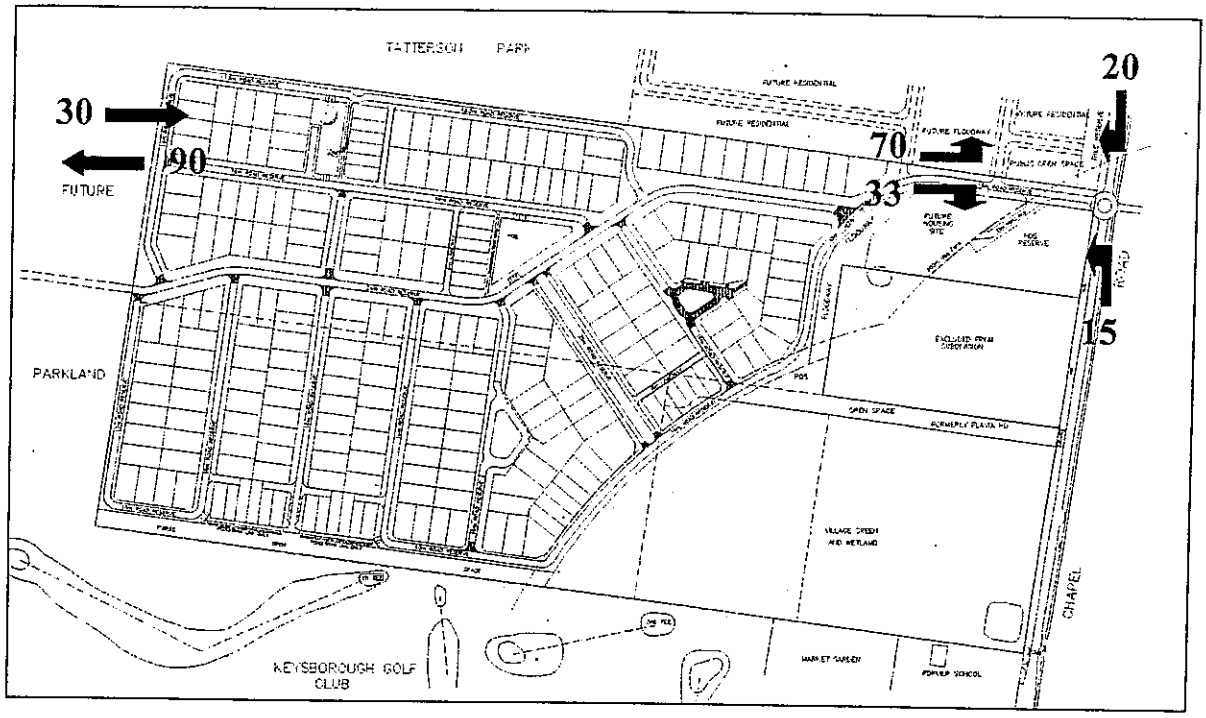


FIGURE 6
AM PEAK HOUR TRAFFIC GENERATION

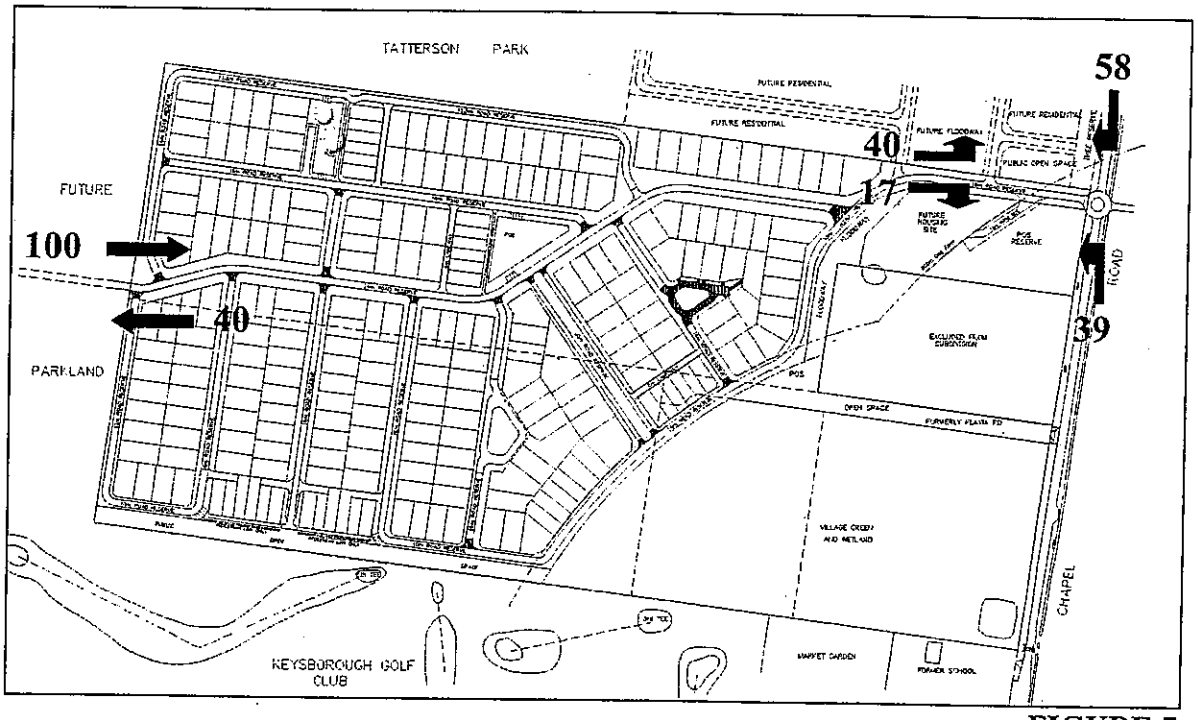


FIGURE 7
PM PEAK HOUR TRAFFIC GENERATION

Daily traffic estimates for all streets in the subject development plan are provided at Figure 8 below.

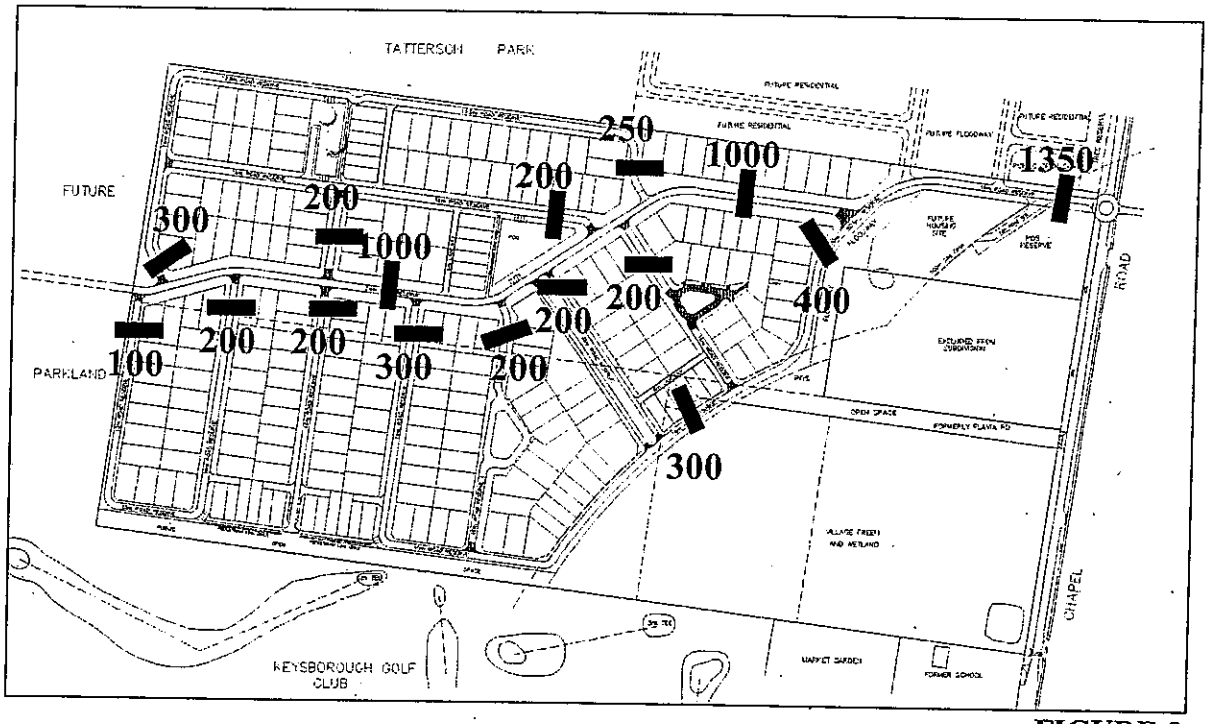


FIGURE 8
DAILY TRAFFIC VOLUMES

The East-West Collector Street will carry traffic at up to 1,350 vehicle movements per day. Apart from this street, all others will carry less than 400 vehicle movements per day.

4.3 Traffic Impacts at Chapel Road

Chapel Road traffic volumes during the peak periods, at full development of the Stage 1 Area, have been estimated at :-

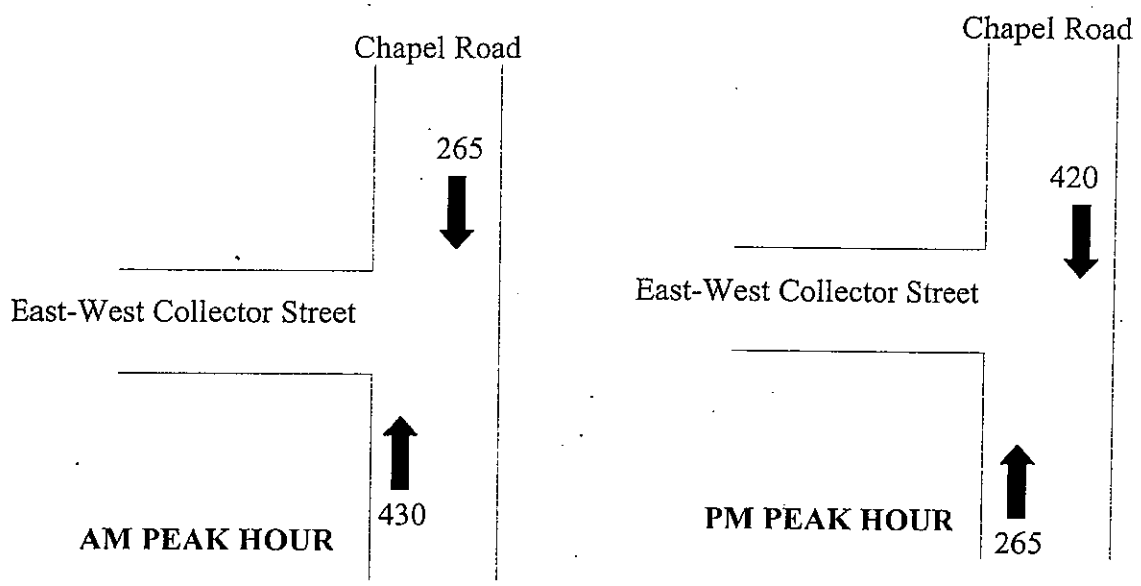


FIGURE 9
EXISTING TRAFFIC VOLUMES AT CHAPEL ROAD

This gives a "Design" traffic movement condition for the intersections at each of the peak periods as follows :-

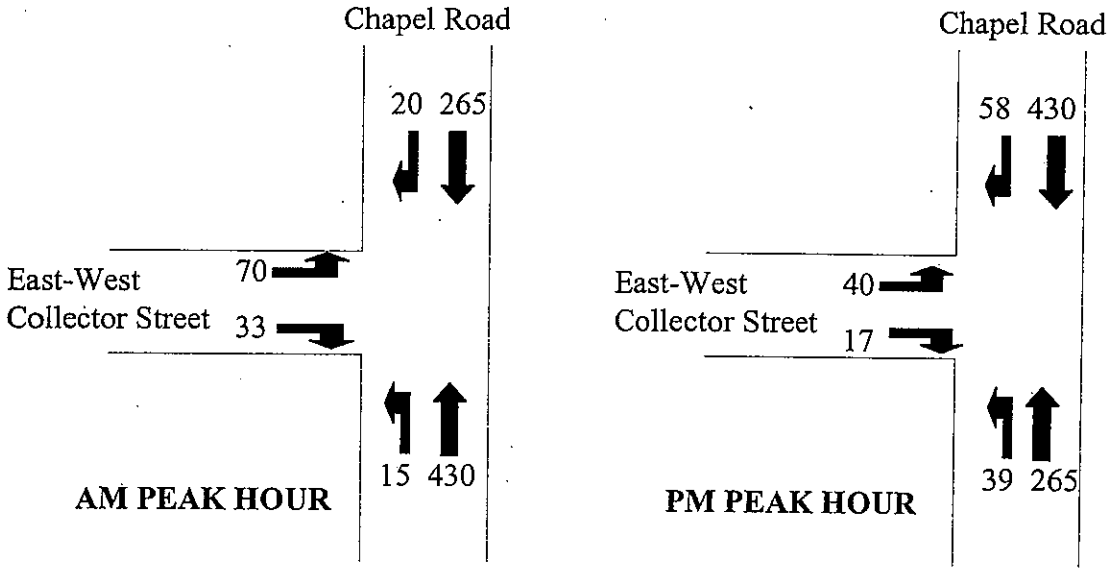
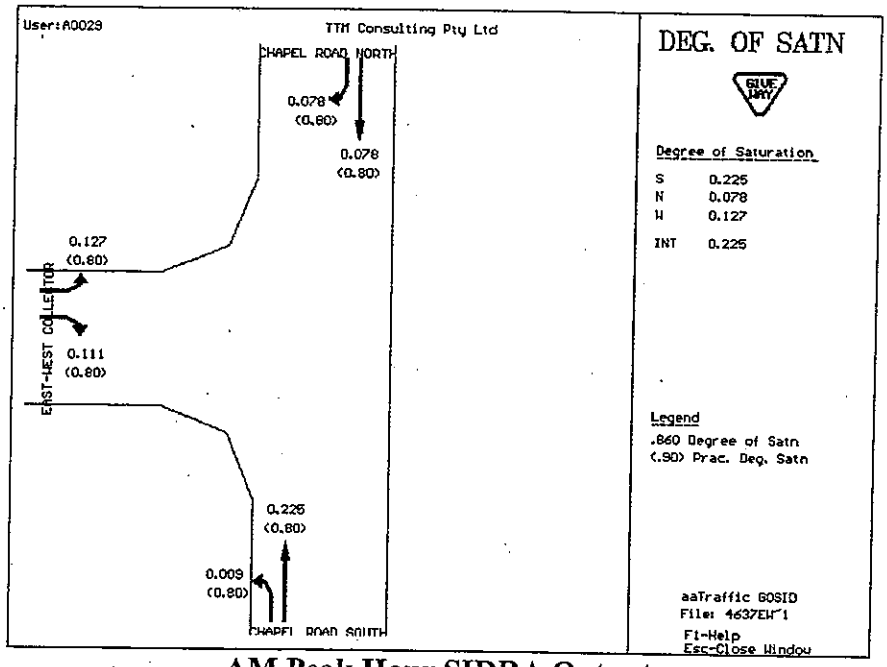


FIGURE 10
"DESIGN" TRAFFIC VOLUMES AT CHAPEL ROAD

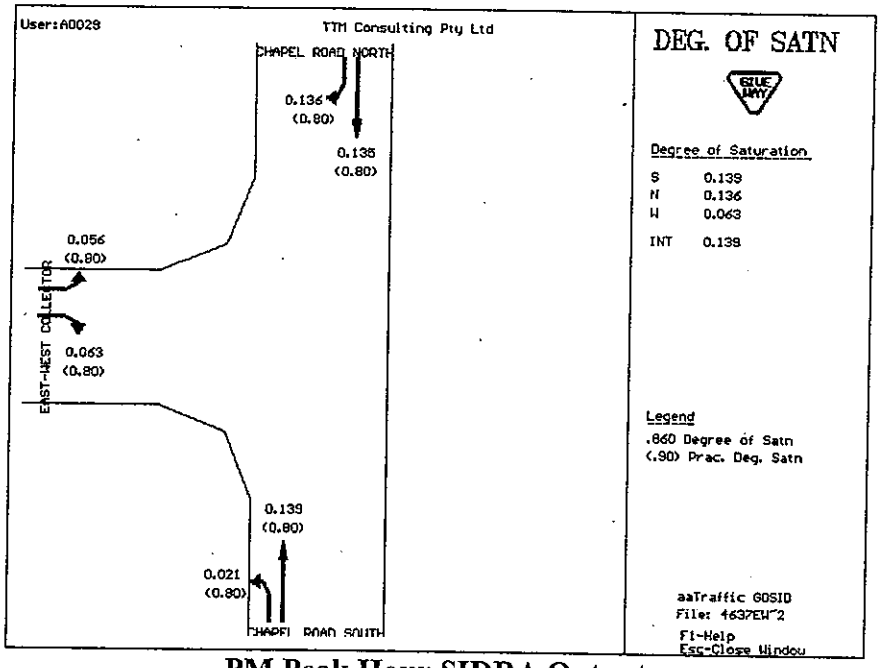
The "ultimate" plan for Chapel Road includes a roundabout at the East-West Collector Street intersection, with an easterly extension into the development of the Stage 3 part of the land encompassed by the Keysborough South Local Planning Policy.

The roundabout will not be able to be built prior to land within Stage 3 becoming available, and consequently we are providing an analysis of intersection performances based up an assumption of a T-intersection with Give-Way control being in place.

Assuming that Chapel Road allows southbound traffic to pass by a propped right turner waiting to enter the East-West Collector Street, the analysis of the intersection performance under the above loading is provided using SIDRA, as follows :-



AM Peak Hour SIDRA Output



PM Peak Hour SIDRA Output

Performance is satisfactory, as indicated by the Degree of Saturation of 0.136 for the highest critical movement in either peak period.

When the roundabout is constructed, which will be when the Stage 2 development to the east of Chapel Road is implemented, the intersection performance will still be adequate as set out in the Stage 2 "Traffic Engineering Assessment" report.

5. STAGE 1 ROAD SAFETY AUDIT

On the basis of the Subdivision Concept Plan prepared by Roberts Day, the following audit of elements that relate to road safety is provided :-

Item	Issue	Comment	Recommended Action
1.	Environmental traffic speed control	Because much of the internal street system will be one sided, and the majority of lots are proposed to be of sufficient dimension that on-site parking will be provided, the expected parking density will be low. Consequently one sided streets, except for the street fronting the Village Green, are recommended at 5.5 metres carriageway width. Other streets should be 7.2 metres carriageway width, not more. The exception is the East-West Collector Street, which will be a bus route and which will be required to maintain two clear travel lanes. Parking on this street will be within indented bays, and thus no traffic management benefits will result. Accordingly speed control will need to be assisted by segmentation of the street into discreet "legs" as described under Item 2 below.	Provide street carriageway widths per Figure 11 and as described at Section 6 of this report.
2.	Environmental traffic speed control : street leg length	Street "leg length" in the Roberts Day plan are excessive in some places. These should be broken down into "legs" of generally less than 200 metres in length, and preferably less than 150 metres. A range of "threshold" and other intersection treatments is generally a satisfactory approach to street segmentation. Care is needed about being too rigid with actual leg lengths, because often the solution (a "slow point" of some sort) can have detrimental impacts on streetscape, freedom of access for public transport if a bus route, and the capacity to suitably locate and use driveways. As a result of these considerations there are several recommendations for treatment of intersections within the Roberts Day plan, as shown in Figure 12.	Provide deviation slow point per Figure 12 at the location marked on Figure 11. Priority should be as shown. Provide slowing treatments as referenced in Figure 12 and detailed in Figure 13-18.

Item	Issue	Comment	Recommended Action
3.	Safe intersection designs internally Kerb return radii	All T-junctions should have a maximum kerb return radius of 6 metres, measured to the face to the kerb. This is to keep the speed at which vehicles can pass around corners to sensibly low levels, and to ensure that crossing distances for pedestrians are not excessive. Section 56.07-6 of the Planning Scheme reinforced this position. No splitter islands are needed. The exception is the intersection at Chapel Road.	Provide intersections in accordance to planning scheme
4.	Safe intersection design Intersection at Chapel Road	At Chapel Road the projected traffic volumes warrant a passing lane (AustRoads Type B or similar) treatment. This is achievable in either of two ways :- (a) If Chapel Road is widened "to the same standard as Corrigan Road", then the passing space will be available, or (b) As an isolated treatment the pavement on the eastern side could be widened such that there is 6 metres width of sealed roadway on the eastern side of the centreline. This treatment should have taper lengths of 70 metres, and a straight, full length section of 70 metres length centered on the centreline of the East-West Collector Street, if it is to meet the AustRoads Guide to Traffic Engineering Practice Part 5 Guidelines. Edge linemarking should be provided as well as the standard markings and delineation for shared right/through movements. The eastern edge will need to be kerbed because of lack if right of way to allow drainage and the shared path along Chapel Road. No left turn deceleration is warranted, but the kerb returns should align with the future kerb lines in Chapel Road. A short section of full width streets, say 30 metres long, on the southern side of the East-West Collector Street intersection will allow some left turn facility for the small volume of traffic that will use it, and also establish the general appearance of the intersection. A splitter island in the East-West Collector Street will assist with intersection recognition, and this should be supported with a chevron sign behind the exit lane on or near the fenceline on the eastern side of Chapel Road.	Provide passing lane as discussed, with kerbed edge where this is on "ultimate" alignment. Complete intersection returns to "ultimate", with 10 metres long full width pavement on southern approach. Splitter island in East-West Collector Street at Chapel Road, with terminal chevron signage behind. Edge lines to new pavement where deviation from straight occurs. Street lighting per Australian Standard.

Item	Issue	Comment	Recommended Action
5	Safe intersection design Corner splays and sight distance	Corner splays have little impact on intersection sight distance where inside verge width is 4 metres or more. These do improve footpath amenity in some locations, and those proposed at 3 metres x 3 metres are at least adequate for this purpose.	Note, and amend plan where needed.
6.	Safe turning provisions cul-de-sac ends	There is only one cul-de-sac shown in the proposed development plan. The design proposed allows vehicles up to the size of a "light-rigid" truck, which includes an ambulance, to make a three-point turn at the T-head arrangement. Larger vehicles, up to the dimensions of a "large rigid" truck at 11.0 metres length, would be able to make a three-point turn using the right of way intersections short of the cul-de-sac terminal point. Between the cul-de-sac terminal and the right of way access points, there is space for three cars to park on each side of the short section of street, in a clearly dedicated parking area to serve those properties that front the public open space adjacent to the Keysborough Golf Club. Figure 19 shows a detail of this layout, inclusive of the truncation to separate the three-point turning area from the balance of the street.	Provide T-head per Figure 19, and located as shown in Figure 12.

Item	Issue	Comment	Recommended Action
7.	Right Angled Bends	The Subdivision Concept Plan contains several of these bends. Design objectives should include creation of low speed passage and pavement area minimization. In this case each will be at the end of quite short street "leg-lengths" and approach speed should not be a major issue. Splitter or median islands should be avoided because of the need for signs, which are invariably demolished, and these also create the need for trucks to manoeuvre through the bend left of the centreline. This is inefficient in respect of pavement area requirements, and has the unfortunate outcome that cars can traverse the bend at higher speed than desirable. Parking is shown in a "fan-shaped" configuration at the two right angled bends on the Keysborough Golf Club boundary. This parking is intended to provide for visitors to the 12 terrace style lots that front the open space, either side of the cul-de-sac, in conjunction with the parking in the end of the cul-de-sac. The configuration of these parking spaces is less than ideal in the context of the street design, and the spaces are not necessary anyway, given that the streets either side of the cul-de-sac will be 7.2 metres wide and have only sideages in the area close to the terraced housing lots.	Use 6 metres radius on inside of bend, 8 metres radius on outside of bend. Delete the fan-shaped parking from the two right-angled bends on the southern boundary of the subject land, all as shown in Figure 12.
8.	Provide for Ultimate Chapel Road/East-West Collector Street intersection	There needs to be a splay on the northeastern corner of the subject land to provide for the future roundabout at this intersection. Figure 21 shows the general arrangement.	Provide splay as shown on northeastern corner of property. Nominate land as road.

6. STREET FORMS TO BE USED IN THE DEVELOPMENT

6.1 Overview

There are several distinctively different street forms that are needed in the plan to appropriately manage traffic and parking demands. These street forms are chosen in consideration of the combination of likely traffic loadings and demands for on-street parking, and also in consideration of the speed control environment that is being sought.

The following sections of the report describe each of the street forms indicated in Figure 11, and shown in the traffic management detail configurations in Figures 13-20.

FIGURE 11
FLAVIA PARK, KEYSBOROUGH
TRAFFIC MANAGEMENT PLAN

Not marked

EAST - WEST COLLECTOR STREET
5.5 metre CARRIAGEWAY STREET
7.2 metre CARRIAGEWAY STREET
"THE AVENUE"
SHARED ZONE
6m WIDE RIGHT OF WAY
PEDESTRIAN STREET

0 50 100

TTM Consulting Pty Ltd

DRAWING NO. 463705, 28/02/03

6.2 East-West Collector Street

This street is proposed as generally a 6 metres wide roadway plus parking lanes where these are needed. The parking lanes are 2.1 metres wide. There are variations to this form of street, including the following :-

- Use of 2 x 4 metres wide carriageways with a central median of 6 metres width, to form a landscape feature and speed control (horizontal movement deflection) device as shown in Figure 15, and
- Use of 7.2 metres wide carriageway where there will be minimal, if any, parking demand. This is only the section of the street that is close to Chapel Road.

The parking bay layouts shown in Figure 12 must be regarded as a preliminary concept only, because the locations of driveways to individual lots need to be determined before a final design solution can be adopted. The reservation for the east west collection street is generally 24 metres. A shared path 2m wide is proposed along the south side.

6.3 Access Street with 7.2 Metres Carriageway

This street form is to be used where housing will abut both sides of the street, other than in the East-West Collector Street, "The Avenue", and the individually designed "Shared Zones". It is also proposed to be used along the edge of the open space at the eastern end of the development site, where traffic volumes will be higher than in the case of the typical "park edge" streets around the balance of the subject land.

The Keysborough South Local Planning Policy requires footpath on at least one side.

Generally verge width, including footpath, is 4.4 metres, and minimum reservation is 16 metres where housing will abut both sides. 14 metres is at least adequate for the reserve along the edge of the open space.

6.4 Park Edge Street With 5.5 Metres Carriageway

Along the edges of open space, other than as described at **Section 6.3** above, 5.5 metres carriageway width is adequate. Reservation width varies from 10 metres upwards, with 4 metres minimum verge width , including footpath, proposed on the side of the housing.

6.5 "The Avenue"

This street is proposed to provide a landscaped linkage between the central open space and the south-eastern open space. A central median of 5.2 metres is proposed, with carriageways each 5.5 metres wide. A reservation width of 25 metres will allow the almost standard 4.4 metres wide verges, including footpath.

6.6 Shared Zone

Two sections of Shared Zone or "Access Place" pursuant to the ResCode provision of the Planning Scheme are proposed. These will be typically 5.5 metres wide where parking is to be allowed, and 3.5 metres wide otherwise. Driveways will be integrated with the street paving.

6.7 Right of Way

At the rear of lots for terraced housing a 6 metres wide right of way is proposed. This will be fully paved, with a central invert generally being used for drainage.

6.8 Pedestrian Street

These reservations are 6 metres wide and are intended to include only landscaping and a footpath of 2 metres wide.

7. INTERSECTIONS AND OTHER TRAFFIC MANAGEMENT

Figure 12 provides a "key plan" showing locations of proposed intersection treatments and other forms of environmental speed management that are needed within the plan area. Concept plans for the treatments proposed at each location are described in the following sections of the report. Footpaths are not shown unless a specific treatment is necessary.

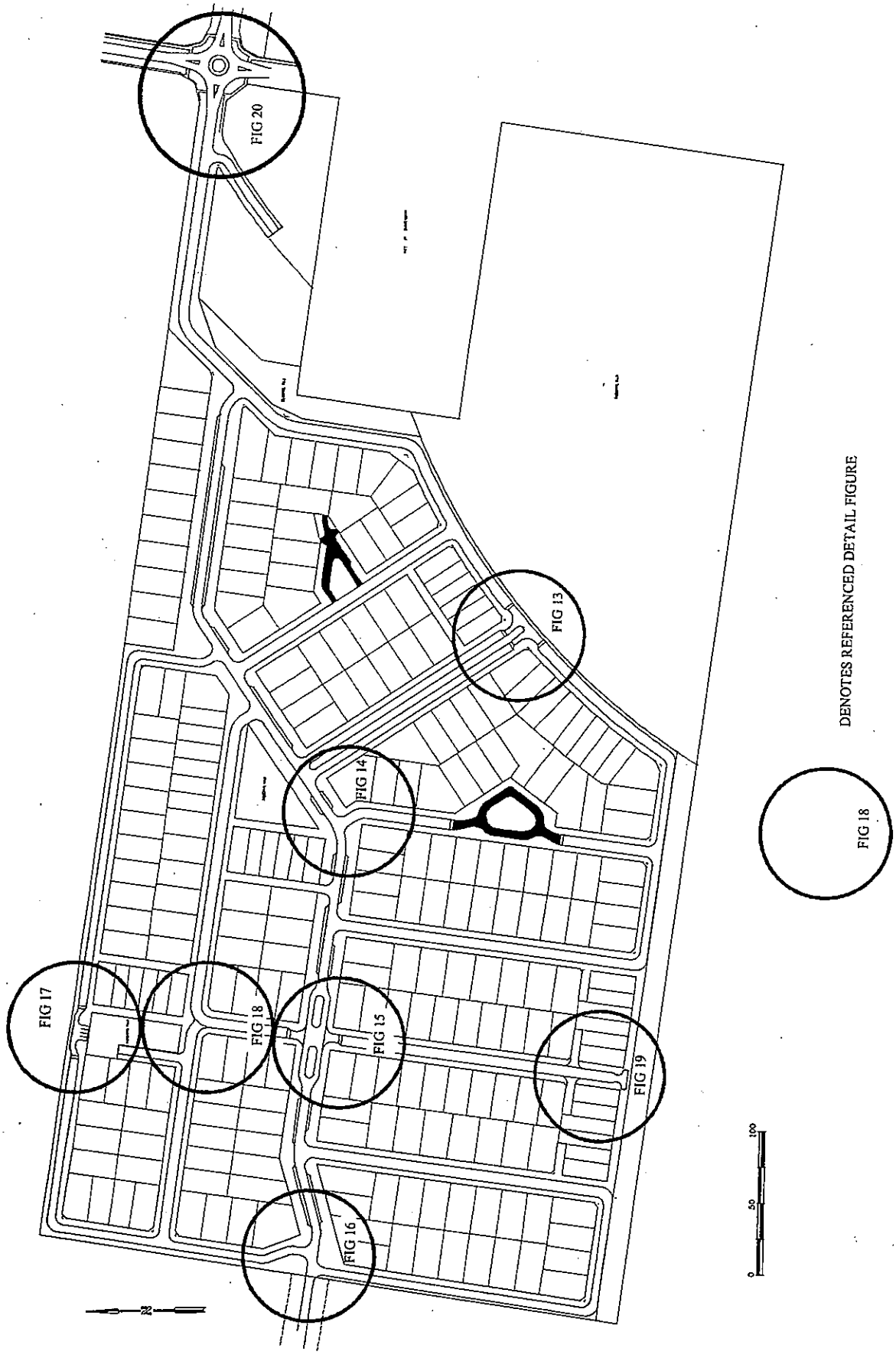


FIGURE 12
FLAVIA PARK, KEYSBOROUGH
INTERSECTION MANAGEMENT KEY PLAN

TTM Consulting Pty Ltd
DRAWING NO. 4637D5, 28/02/03

Figure 13 shows a "platformed T-intersection" where the pavement within the intersection are narrowed and ramped up slightly from the general surface level, and a variation in surface texture is used.

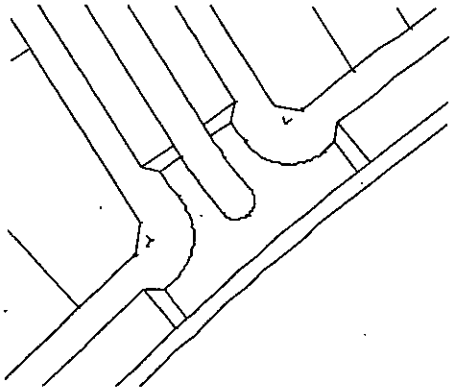


FIGURE 13

Figure 14 shows a relatively sharp bend on the East-West Collector Street is combination with a T-intersection from the connecting street. The bend provides speed control on the East-West Collector Street.

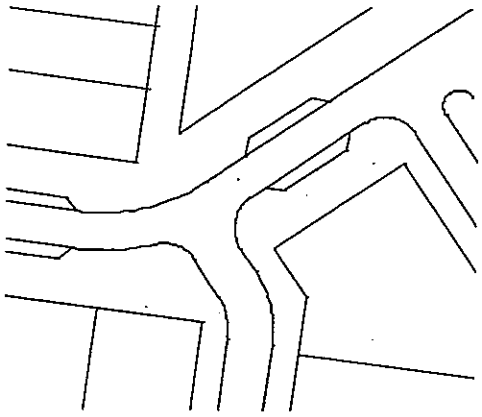


FIGURE 14

Figure 15 shows the use of a divided section of street for the East-West Collector Street, with quite sharp transitions (still trafficable by the design "large rigid" 11 metres truck) to generate speed control along the East-West Collector Street. Property sideages are such that parking is not needed close to the intersection.

On the approach streets the carriageway is narrowed and ramped, with an offset to highlight the presence of the intersection. Traffic speeds are well managed in both directions through the intersection.

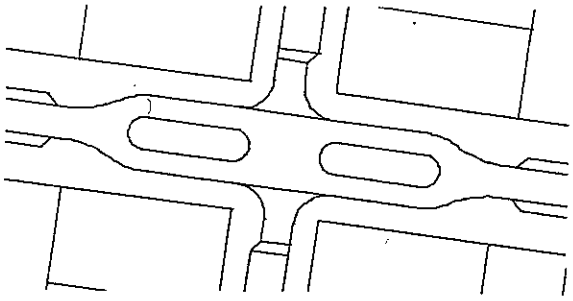


FIGURE 15

Figure 16 shows another relatively sharp bend in the East-West Collector Street, and a separation of the opposite park edge streets. It should be noted that the separation or "stagger" is such that the right turners do not overlap.

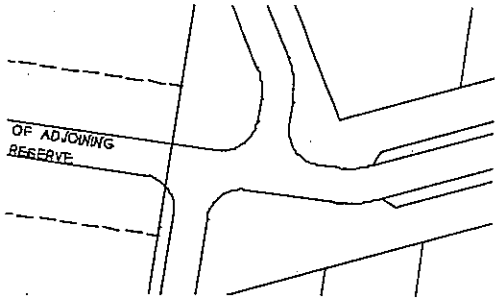


FIGURE 16

Figure 17 shows carparking at the interface of the small, treed open space with Tatterson Park. This carparking (only 4 spaces) provides a horizontal alignment change in the street along Tatterson Park, an interruption to street "leg length".

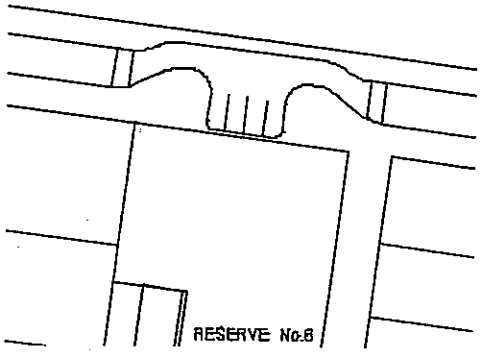


FIGURE 17

Figure 18 shows a deflected T-intersection used as a speed control device in an otherwise over-long straight section of street.

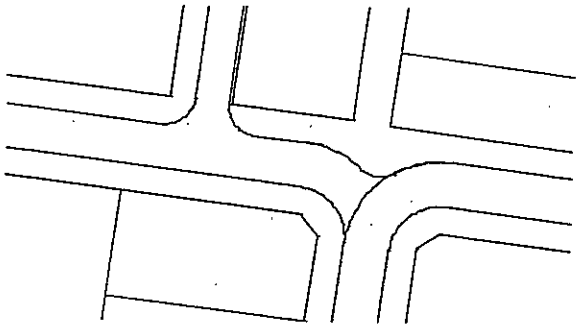


FIGURE 18

Figure 19 shows a 3-point turn provision for cars at the very end of the cul-de-sac, together with a provision for trucks (including the garage truck) to make a 3-point turn at the intersection of the cul-de-sac with the right of way.

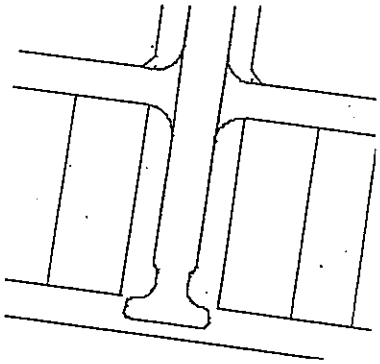


FIGURE 19

Figure 20 shows the roundabout configuration required at Chapel Road, and in particular indicates the necessary future boundaries and road reservation that will be needed to accommodate it.

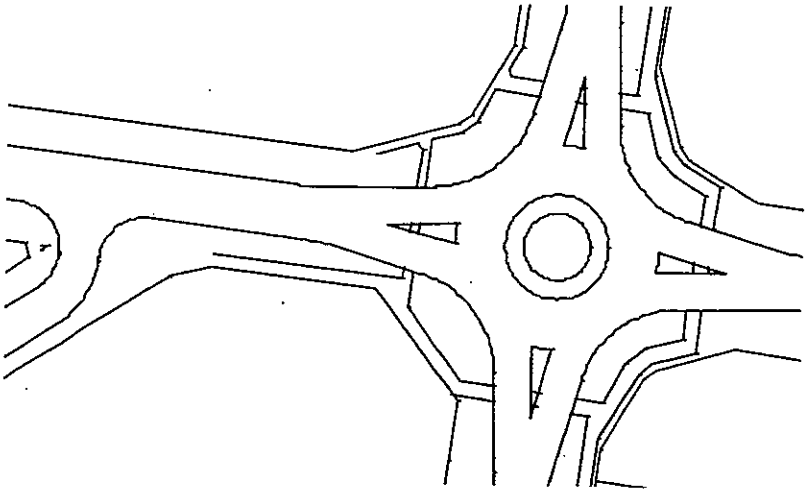


FIGURE 20

8. PROVISIONS FOR PUBLIC TRANSPORT

The only street that may be used as a bus route is the East-West Collector Street. If there is a bus route along this street the stops will be "hail only", with no layovers or mandatory stops. No indented bus bays are proposed because these would be totally inappropriate within what is a residential environment with very low traffic volumes. If a pausing bus holds up traffic for a few moments, so be it.

9. SUMMARY AND CONCLUSIONS

There are no traffic or related reasons to withhold the planning approval that has been sought for the "Flavia Park" development concept plan.

The recommendations of the Stage 1 Road Safety Audit should be included in the next level of design detail.

TTM Consulting Pty. Ltd.

J. D. Higgs

Watsons Pty. Ltd.
ABN: 47 637 509 613

Appendix 3

Urban Design Guidelines

Prepared by LFA (Aust) Pty Ltd

keysborough

urban design guidelines

produced for Watsons Pty Ltd PO Box 171 Mornington 3031
ph +613 9820 3574.

produced by LFA (Pacific) Pty Limited Suite 4 / 2 New McLean St. Edgecliff 2027
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CONTENTS

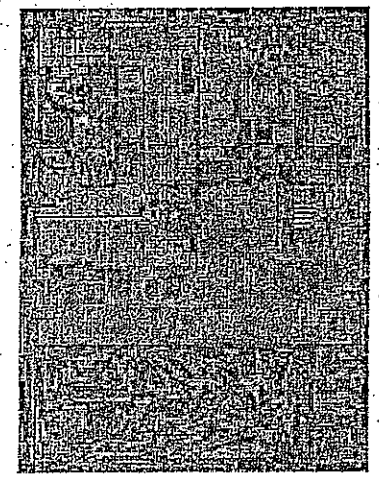
SITE LOCATION IN RELATION TO THE CITY OF MELBOURNE

The development precinct will be a fully planned residential development closely integrating quality housing and community facilities with open water bodies, ecologically rich wetland systems, wildlife corridors and passive and active recreational parkland systems. The project aims to improve water quality entering downstream catchment areas and Port Phillip Bay as well as providing an accessible and regionally significant open space area integrated with Tatterson Park. It also aims to maximise the quality of life for residents through adopting Environmentally Sustainable Development (ESD) principles for the estate development, housing and landscaping. The estate will promote awareness of environmentally responsible urban development to government, authorities, residents and visitors.

Guiding principles include:

- minimising the use of resources;
- minimising the negative impacts of development;
- the re-creation and protection of sensitive natural systems; and
- promoting awareness of natural systems.

The guiding performance criteria have been based on the principles and criteria outlined in - AMCORD - 'A National Resource Document For Residential Development' (Dept. of Housing & Regional Development 1995).



The aerial photograph indicates the current status of the site as predominantly cleared for small scale intensive agriculture that was once part of Melbourne's market gardening precinct. The Golf Course to the south of the site and the schools in the western sector reflect institutional uses in the non-urban area.

The design objectives that need to be met in the pattern of subdivision within the development precinct include the following:

- The provision of 29 hectares of continuous linear parkland incorporating a wetland system with open water bodies which forms a central community focus and recreation resource.

- The main site entry roads into the development precinct are linked by a central boulevard and linear road skirting the open water body system. The development of the landscaped boulevard and linear park will define a series of residential zones as well as linking the vegetated frontages of the Keysborough Golf Club and Haileybury College.

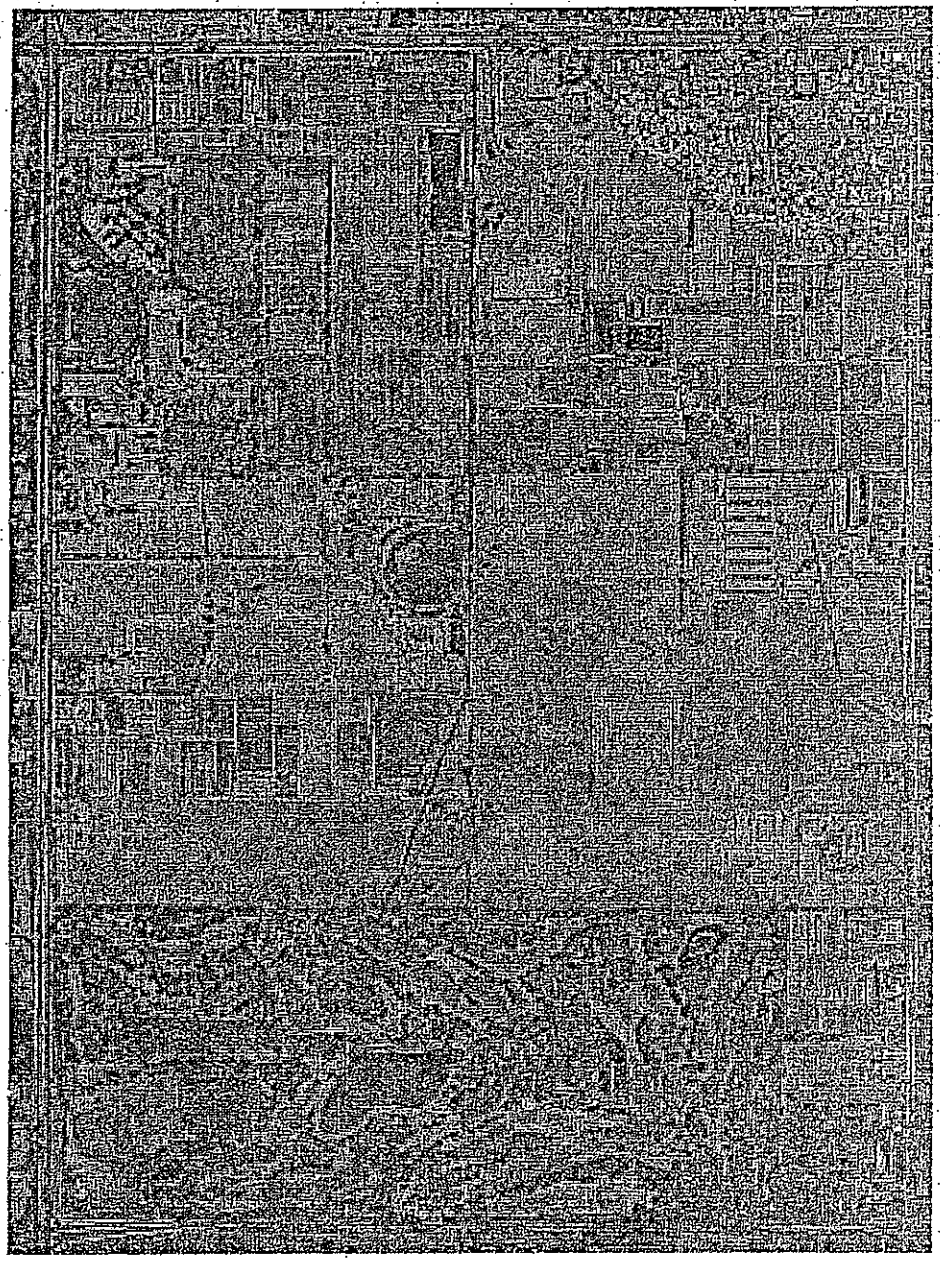
- The provision of 15m wide landscape buffers along the boundary of Chapel and Springvale Roads that minimises visual and acoustic impacts and also provide a strong landscape link with Braeside Park to the west.

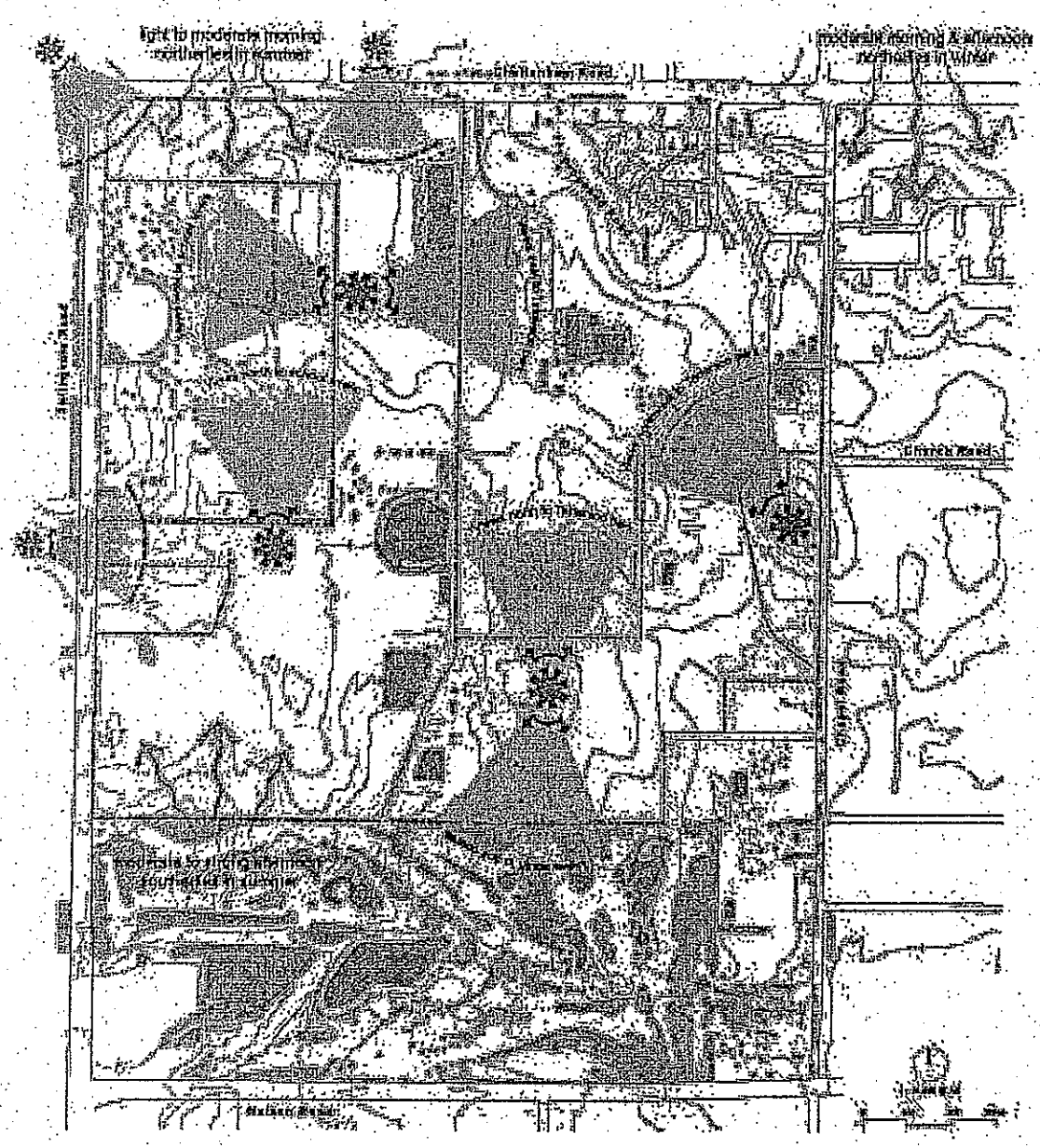
- The provision for pedestrian systems which link the development precinct with Tatterson Park and traverse the various wetland cells to link up with the Keysborough Golf Club and proposed retention basin and wetlands to the south east of the site as they are progressively developed.

- Visual access to the parklands, open water bodies and access to a complex wetland system that will include a range of marshland niches and open water bodies.

Design Objectives (continued)

- The provision of approximately 91.7 hectares of land suitable for residential development (a total of 1000 to 1100 fully serviced, conventional sized residential lots plus areas of medium density allotments as well).
- The provision of residential areas that encourage community development through neighbourhood focal points.
- Facilitate an ecologically sustainable approach to urban development.
- The provision of residential areas that meet the the projected needs of the community, encourage a mix of densities and incorporate a diversity of housing options.
- The provision of a movement network that maximises public safety, promotes pedestrian friendly environments, helps to reduce reliance on vehicular transport and allows appropriate access to open space and recreational zones.
- The provision of residential allotments that assist dwellings to be constructed to achieve a 5 star 'VICHERS' energy rating.





SITE AND CONTEXT DESCRIPTION

A detailed study and description of the site and its context is the starting point for all site design considerations. The site analysis to the left and following has been included to ensure that the subdivision layout considers the existing site characteristics, opportunities and constraints and the immediate surrounds to create a high quality design that is sensitive to its environment.

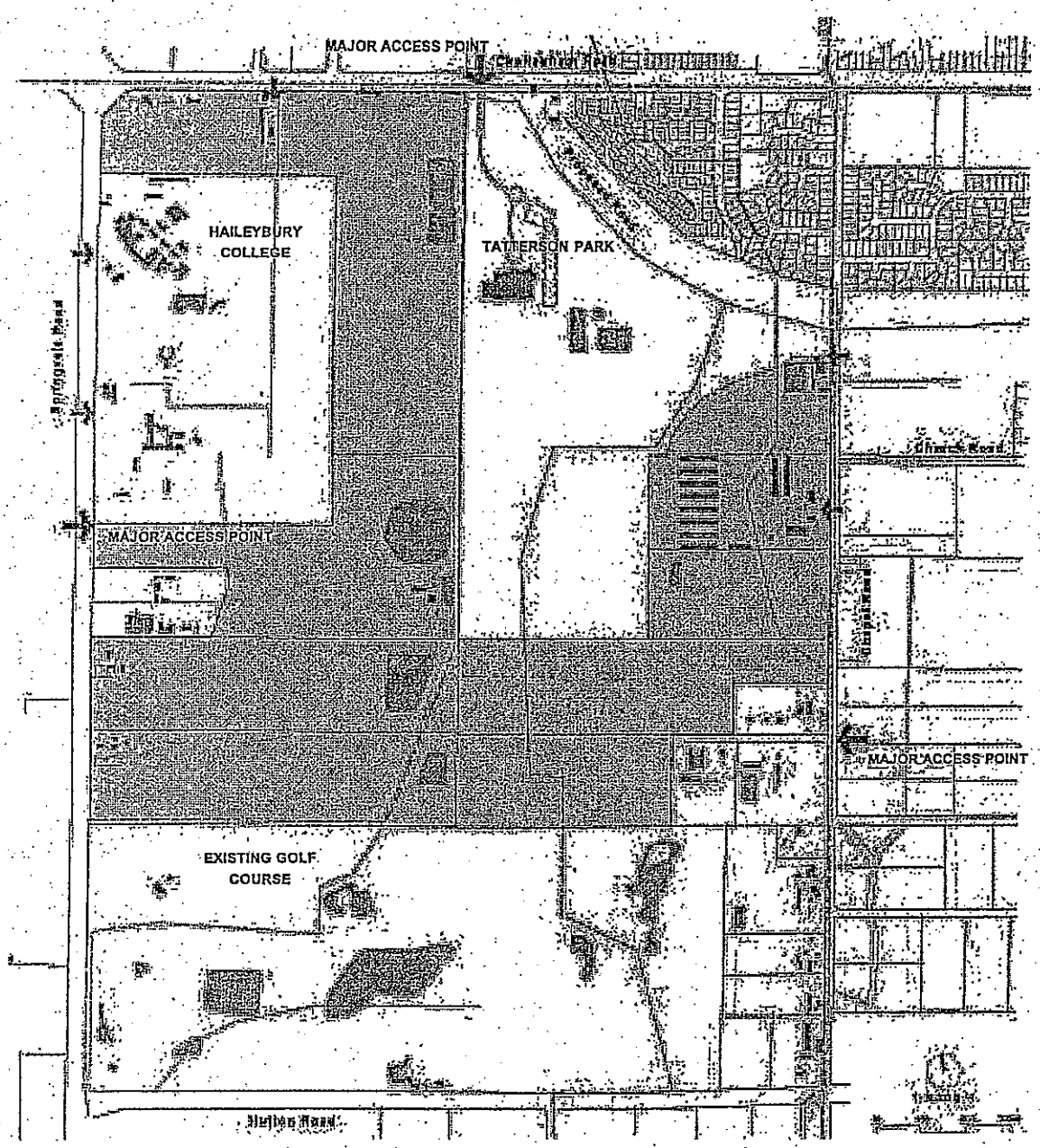
Site Environmental Conditions

Much of the original vegetation on this site has been cleared for agricultural purposes, although some stands of trees and single tree specimens remain as indicated in green on this plan. Tree planting programmes have been adopted by neighbouring properties, namely the golf course (to the south) and by Halleybury College (to the west).

There are several dams (indicated in blue) located mainly along the drainage corridors flowing in a southerly direction through the middle and to the east of the site.

Local prevailing winds are shown for winter and summer months and views from within and outside the site are also shown and described on the adjoining plan.

An indication of the general flatness of the site can be gained from the contours shown and slopes do not generally exceed a 1:10 gradient.



Site Infrastructure

The bulk of the site (shown here in cream) is somewhat fragmented in terms of ownership and the boundaries of each block are shown here as blue linework. buildings on each of these properties are shown in red.

Surrounding landuses include:

- Small scale intensive agriculture such as flower farms, market gardens & horse studs
- Residential subdivisions to the north
- Light industrial landusues to the north west
- Recreational facilities such as Tatterson Park and the Keysborough Golf Course to the south
- Commercial and retail developments opposite the site on the northern side of Cheltenham Road

Entrances to the site (both private and public) are indicated on the adjoining plan by red arrows, the larger arrows represent proposed major entry points where-as the smaller arrows represent exiting private entrances to the site.

Major stormwater infrastructure (shown in aqua) consists of large (800-900mm diam) stormwater pipes and open drains running along Cheltenham & Chapel Road and also through the central axis of the site. Easements are shown on the adjoining plan in orange and range from electricity easements through to sewer easement

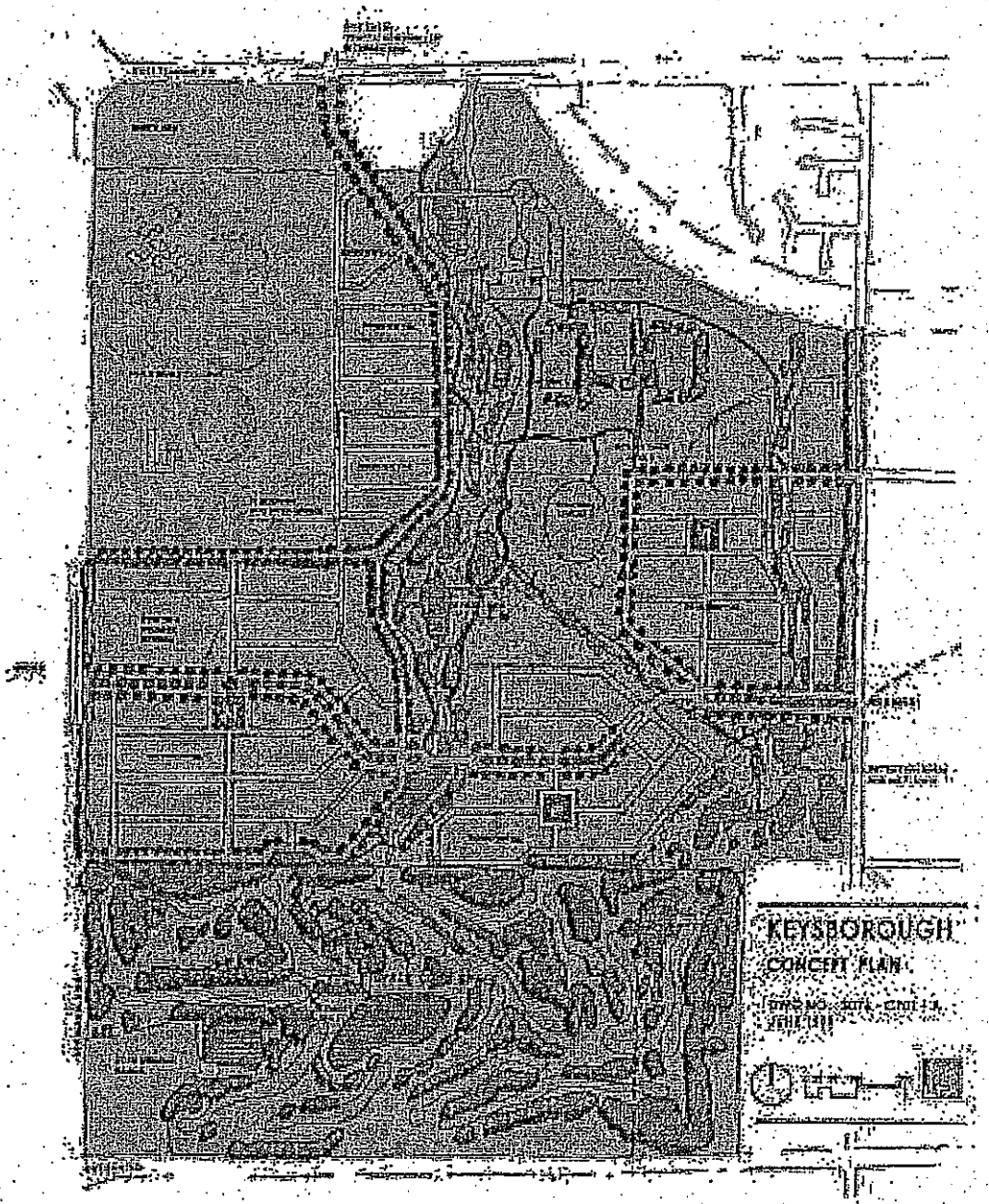
DESIGN CONCEPT

The design concept shown here provides the planning framework for the urban development of the subject area.

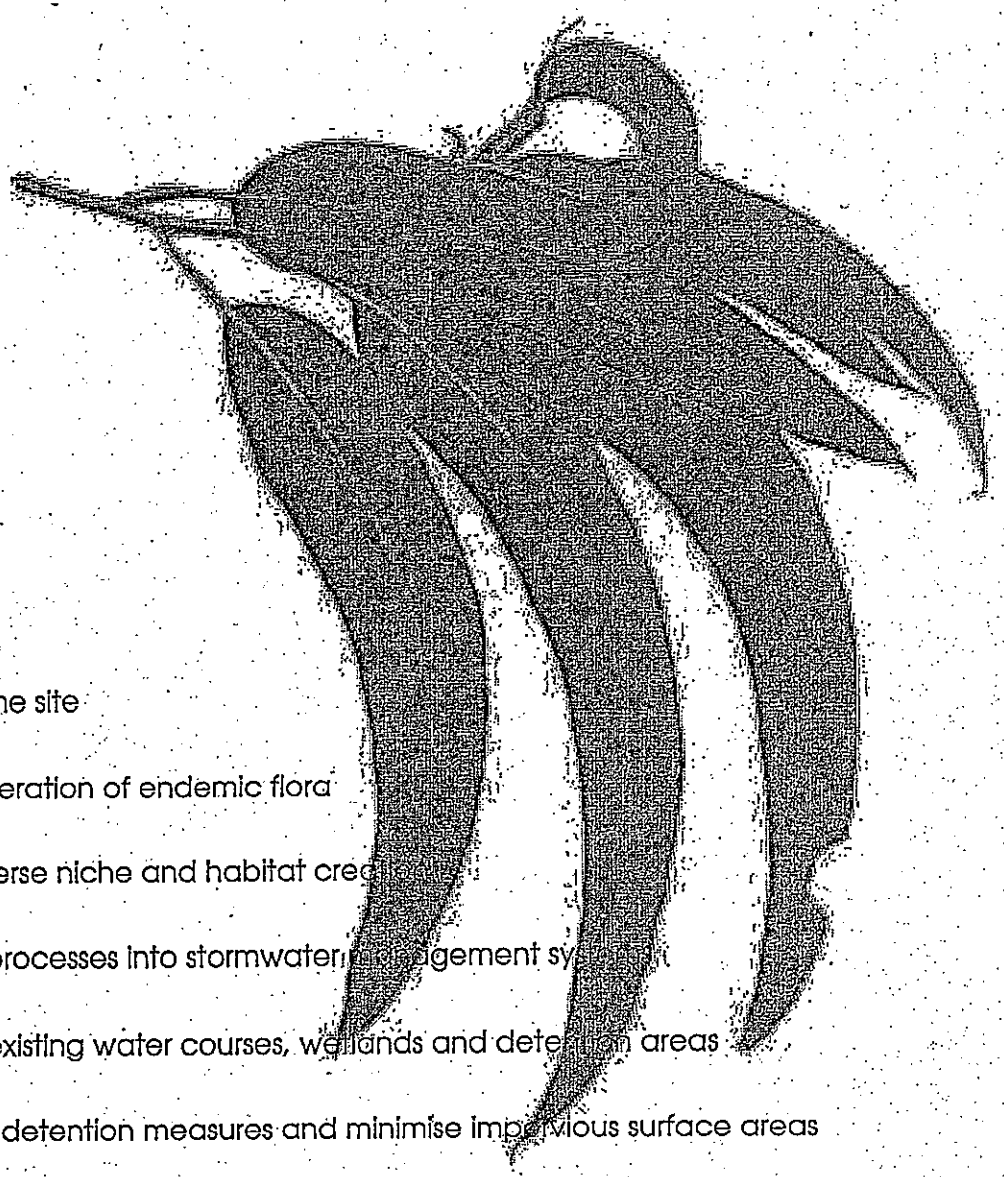
The planning framework defines:

- the major linear open space system,
- the indicative structure of open water and wetland elements,
- integration with the existing Tatterson Park,
- the retention of any significant existing vegetation,
- the major networks and connection to the external road system and,
- the indicative pattern of subdivision.

NOTE: The principles demonstrated in this section have been used in the formulation of the Subdivision Concept Plan at Figure 4 of the Keysborough South Local Planning Policy Area – Stage 1 Development Plan, May 2002.

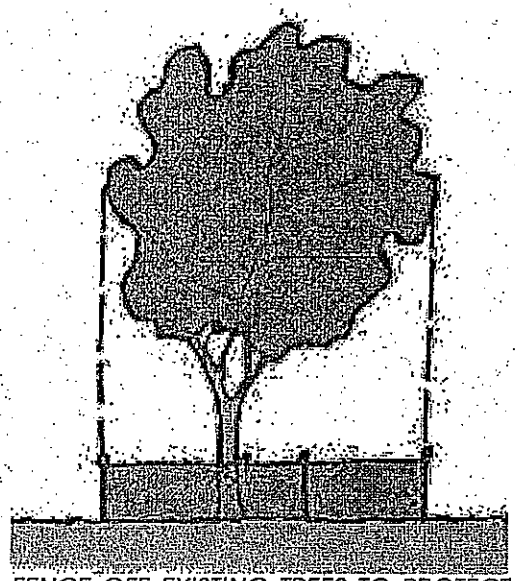


There are still valuable remnant natural features that can be maintained, protected and enhanced as a future resource at Keysborough, although many of the natural features of the site have been degraded by existing land-uses over many years. The protection and management of the natural resources on site are clearly set out in the Biosis Research Report (no.1948)Extract : Appendix 6

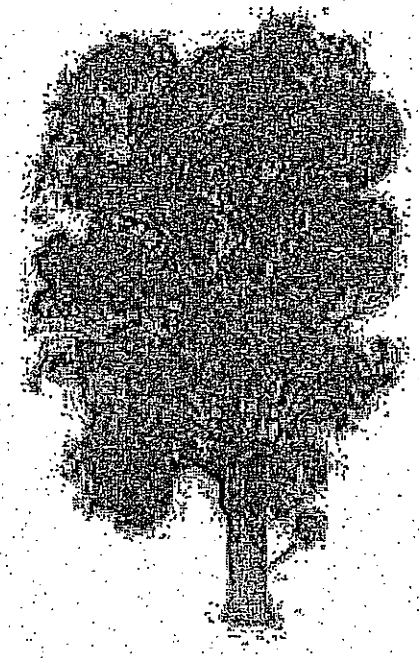


The key principles of environmental protection for this site are included in the Biosis Research Report (no.1948) "Environmental Management Plan: Amendment Area C2, Keysborough, Victoria." and outlined below:

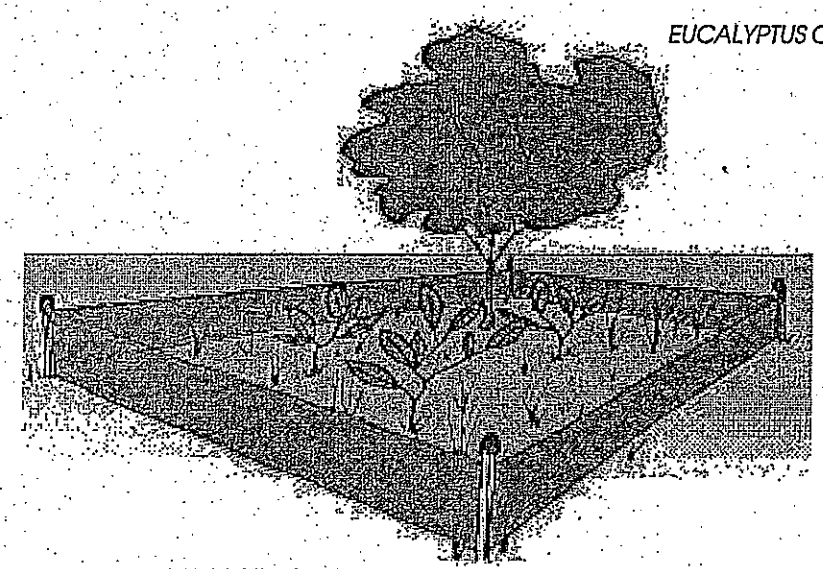
- protect existing key natural resources of the area
- preserve key visual assets and natural vistas to and from the site
- retain existing remnant vegetation and encourage regeneration of endemic flora
- facilitate native fauna habitation through provision of diverse niche and habitat cre
- maintain hydrological balance by incorporating natural processes into stormwater ... agement sy
- improve water quality through sensitive development of existing water courses, wetlands and dete ... on areas
- reduce peak flows from urban development by localised detention measures and minimise imp ... vious surface areas
- integrate stormwater treatment into the landscape by way of multiple use corridors that maximise visual and recreational amenity



FENCE OFF EXISTING TREES TO PROTECT ROOTS FROM PARKING, CONSTRUCTION ACTIVITIES AND EXCAVATION



EUCALYPTUS CAMALDULENSIS



ALLOW SEEDBANK IN SOIL TO REGENERATE NATURALLY - REMOVE FENCE ONCE ESTABLISHED

TREE PROTECTION

There are several locations throughout the site that support remnant stands of eucalypts, largely consisting of River Red Gums *(Eucalyptus camaldulensis)* - Refer to Biosis Report No. 1948 for locations.

These remaining trees are important to the local character because they represent the original dominant canopy species and the last of the major bio-structural elements in the existing natural habitat. In addition, all remaining indigenous trees that contribute to the local habitat should be protected and regenerated where ever possible using the local seed stock available to maintain the gene pool represented by these tree specimens.

Protection

The ground area below a tree's canopy is called its 'drip-line' and to adequately protect the tree's root system any excavation, stockpiling or compaction should not occur within this area. This is easily enforced with a robust fence enclosing the drip-line of each protected tree or group of trees.

Regeneration

Similarly, fencing off areas to lie un-slashed for around 5 years will see seed stock stored in the soil regenerate to produce seedlings/saplings of locally indigenous tree species.

URBAN STORMWATER MANAGEMENT

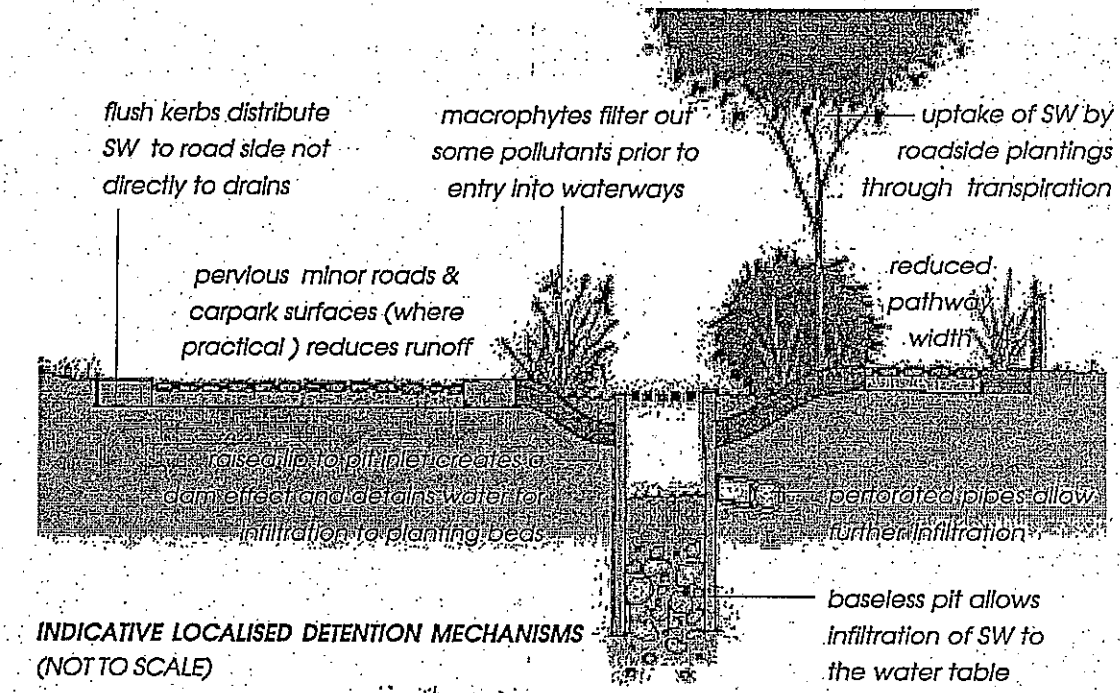
Management of stormwater has traditionally been considered an expense creating nuisance, but an alternative view is that stormwater can provide benefits to natural waterways as a resource and as a visual asset in particular.

Good stormwater management provides design opportunities that can help to enhance both social, economic and environmental amenity in the urban domain. Integration of stormwater flow paths into the landscape and water sensitive design techniques can significantly reduce the financial commitment of developers to stormwater infrastructure.

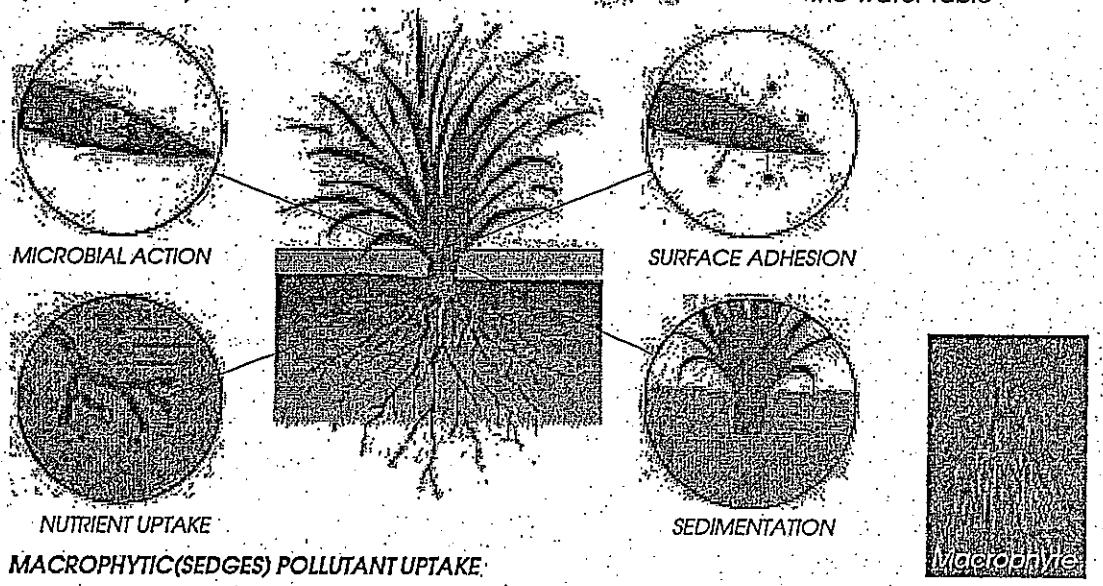
Some of the primary objectives associated with water sensitive urban stormwater management are:

- detention of water locally to reduce peak flows
- infiltration of stormwater into the water table
- retention of storm water on site
- filtration of pollutants from stormwater
- capitalisation of stormwater as a resource
- minimisation of negative impacts on waterways

Following are some examples of water sensitive urban stormwater management techniques. For more detailed information refer to "Urban Stormwater - Best Practice Environmental Management Guidelines" Stormwater Committee, Victoria, CSIRO(1999).



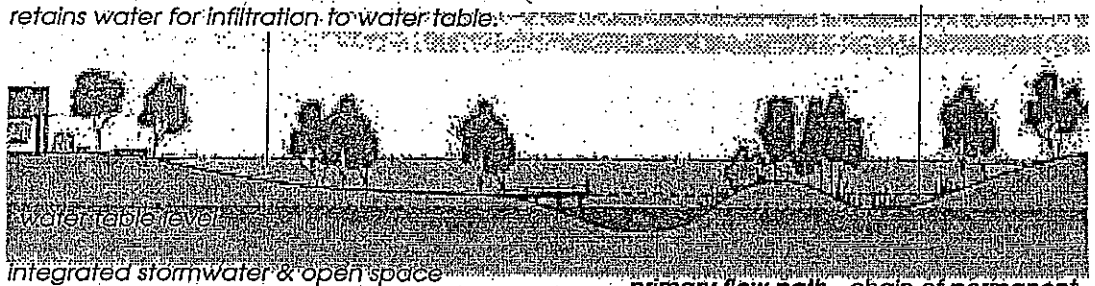
INDICATIVE LOCALISED DETENTION MECHANISMS (NOT TO SCALE)



MACROPHYTIC(SEDGES) POLLUTANT UPTAKE

tertiary flow path - 1:100 ARI innundation extended surface area to flow path reduces velocity/erosive force of flood waters & retains water for infiltration to water table.

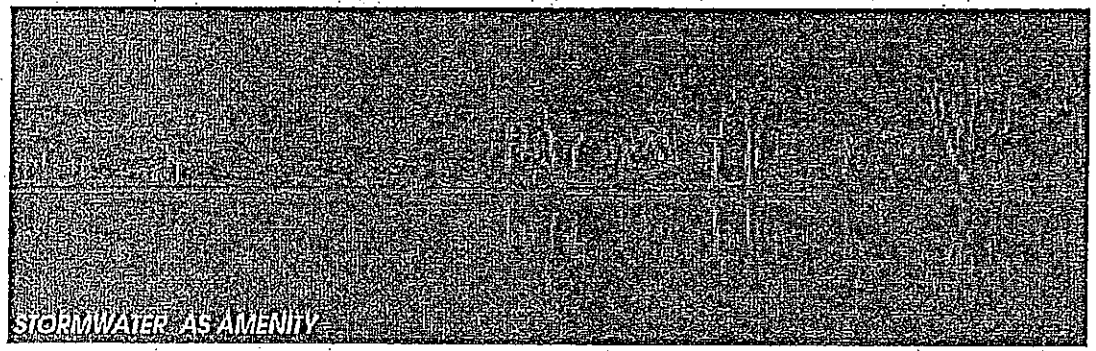
***secondary flow path - 1:20 ARI innundation** water velocity and erosion reduced by bends, obstructions and macrophyte beds.*



integrated stormwater & open space provides habitat and amenity

***primary flow path** - chain of permanent water bodies & ephemeral wetlands.*

TYPICAL FLOODWAY / RETARDING BASIN
NOT TO SCALE



Consideration should be given to techniques of removing gross pollutants such as litter and sediments from stormwater prior to entry of that stormwater into the local waterways. There are several measures on primary, secondary and tertiary treatment levels that can be adopted such as:

- grates to drain inlets;
- trash racks and gross pollutant traps;
- self cleaning screens;
- floating traps and inline traps;
- sediment traps;
- swales and infiltration devices;
- sand filters and gravel beds;
- and constructed wetland systems.

All of the above should be researched thoroughly prior to stormwater design - the References section of this report contains some publications that describe these mechanisms in detail.

The stormwater management principles covered by this report are by no means exhaustive and are intended to give an indication of how water sensitive stormwater management could be incorporated. This section of the report should be read in conjunction with the Biosis Research (Report No. 1948) Environmental Management Plan and Appendix 6.

SOLAR POWERED LIGHTING

There are numerous advantages in adopting a solar powered street and parkland lighting scheme at Keysborough. The benefits are an investment in time and also present imediate benefits to both the subdivider and council. Benefits include:

- Minimal excavation and trenching required for installation
- No electrical tranformers required
- No electricity meters or electricity supply required
- Applicable to a wide variety of situations
- Immune to power outages
- Minimal and simple maintenance requirements.

SOLAR POWERED IRRIGATION

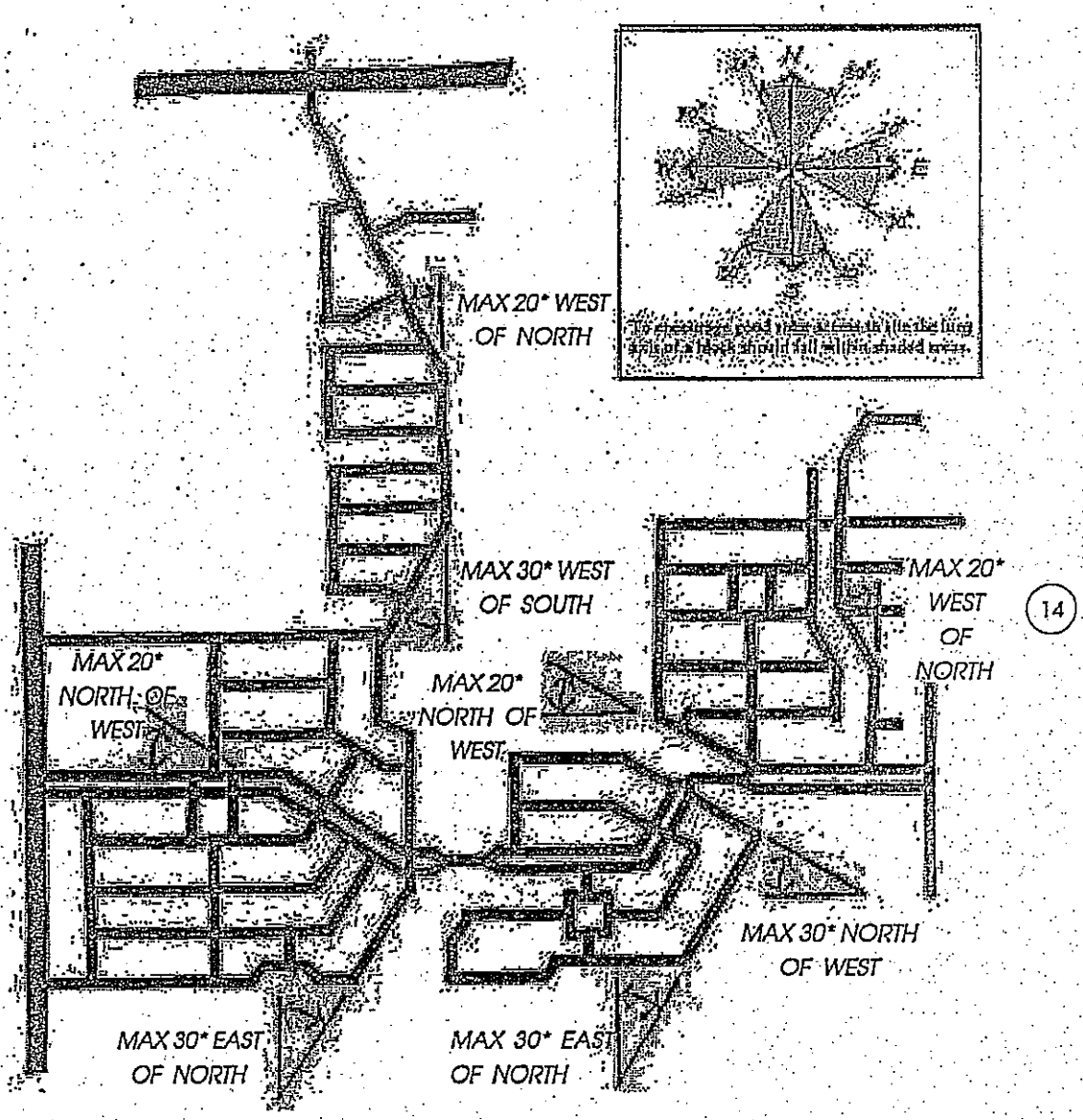
There are also opportunities to adopt a 'green' approach to parkland management in the form of solar powered irrigation pumps. Savings on electricity to council in the future are not the only advantage, by making ESD principles visible to the public the project is encouraging the residents to adopt a 'green' lifestyle that is becoming increasingly relevant in todays social climate.

RESIDENTIAL PATTERN

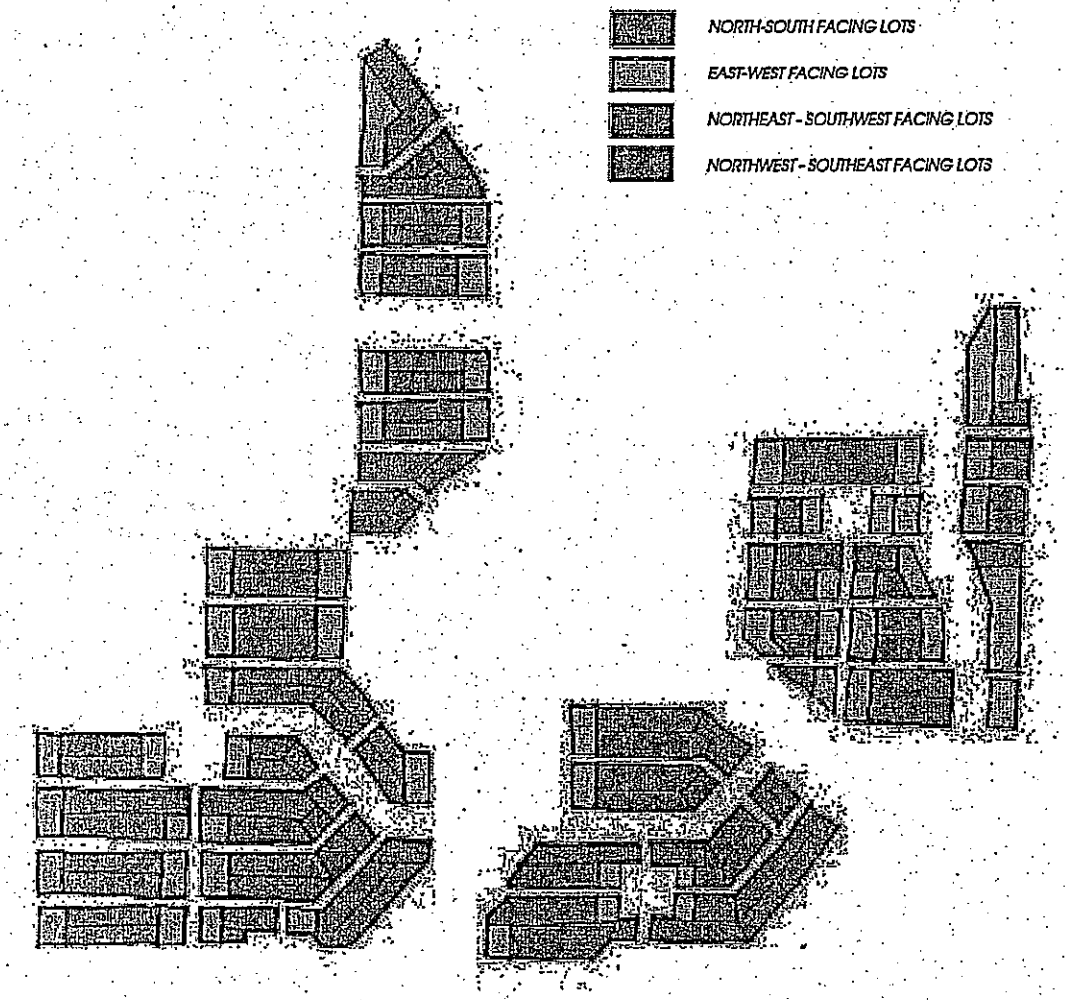
The layout of road networks, housing and community facilities will help to define the character of the development precinct. Design will be with climate in mind to produce a more livable environment. The pattern of subdivision will seek to meet ESD principles by:

- Minimising street widths and maximising usable verges by designing efficient service alignments.
- Maximising suitable solar orientation of residential lots in the pattern of subdivision design. The pattern will need to be tempered where easements and committed open space traverse the site.
- A mix of lot sizes to cater for a broad range of lifestyles
- Maximising solar energy access to facilitate a 5 star VICHERS.rating for dwellings

NOTE: The principles demonstrated in this section have been used in the formulation of the Subdivision Concept Plan at Figure 4 of the Keysborough South Local Planning Policy Area – Stage 1 Development Plan, May 2002.



ROAD ORIENTATION PLAN



LOT ORIENTATION PLAN

- Where possible the majority of streets shall have the long axis aligned between 20° west and 30° east of true north for north south streets or 20° south and 30° north of true north for east west streets
- Lots with their long axis oriented east-west can minimise solar heat gain in summer and maxim lse solar heat gain in winter
- The careful use of planting to provide summer shade and allow for winter sun penetration.
- Planting can be used to block harsh, undesi- able winds such as the hot northerly breezes in Keysborough but allow penetration of desirable southerly breezes.

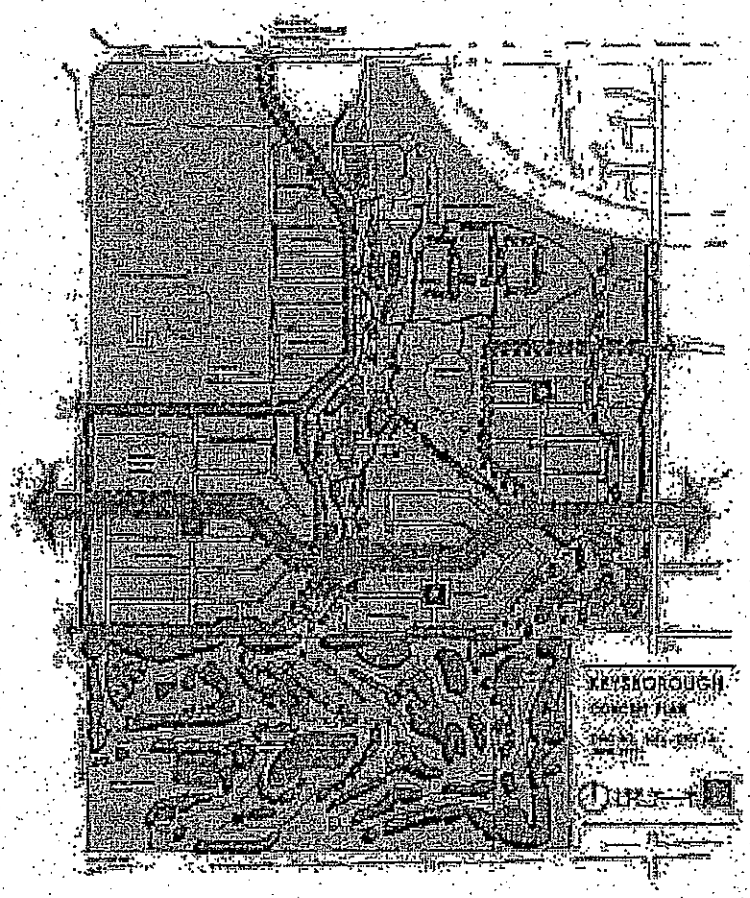
NOTE: The principles demonstrated in this section have been used in the formulation of the Subdivision Concept Plan at Figure 4 of the Keysborough South Local Planning Policy Area – Stage 1 Development Plan, May 2002.

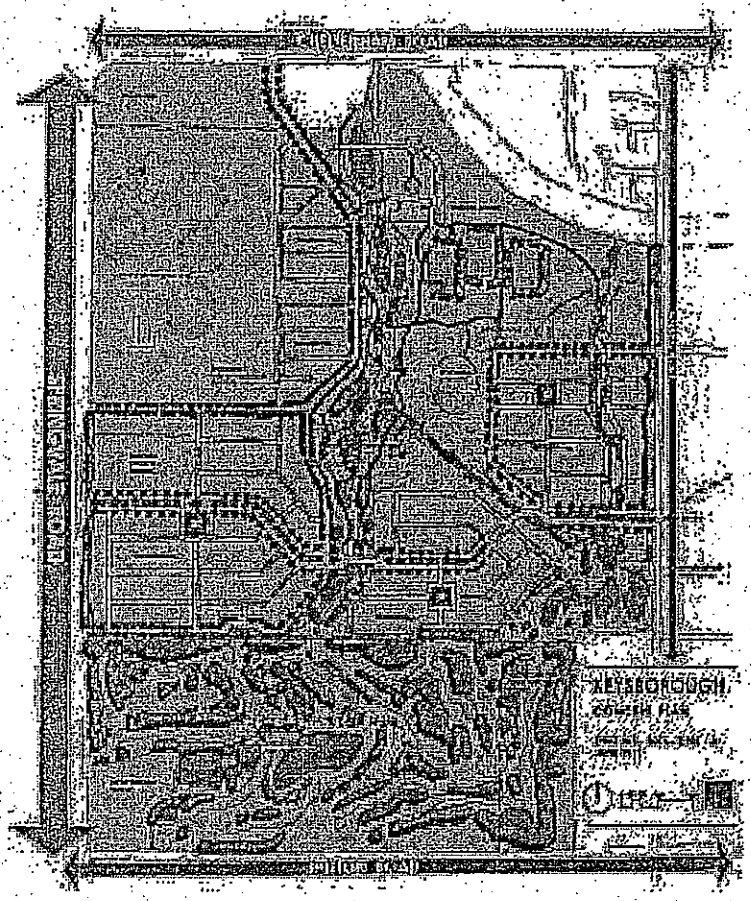
The vehicular network for the development precinct should be designed to enhance access to the open space and residential systems of the development. In addition to the access and transport functions the road systems around the central open water body define the urban / non-urban edge.

The road network should also encourage public transport use by ensuring there is a maximum walking distance of 500m from any one dwelling to the proposed public transport system.

VEHICULAR CIRCULATION

Vehicular circulation should be safe, efficient and legible. Internal roads and driveways should be designed to reinforce the importance of pedestrians and their safety. The development precinct should support a legible road hierarchy that caters for traffic levels both short term and long term. A typical urban/residential





road hierarchy system is outlined following:

EXISTING ROADS

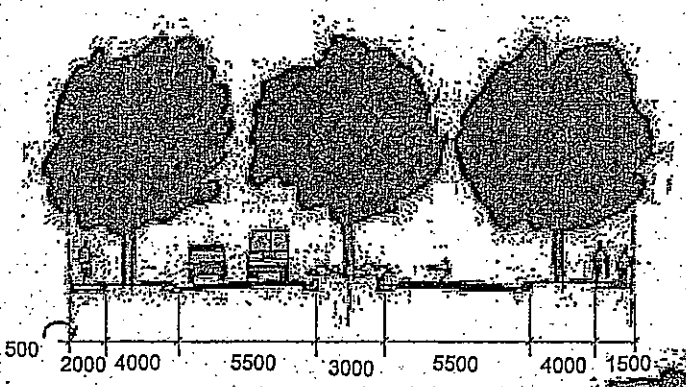
Main Arterial (Springvale Rd/Cheltenham Rd)
2-way
4-6 lane asphalt road
Central planted median
Pull off space only (no parking)

Main Collector (Hutton Road)
2-way
2-lane asphalt road (to be upgraded to 4 lane)
Pull off space only (no parking)

Minor Collector (Chapel Road)
2-way
2-lane asphalt road
Gravel shoulder, no kerb

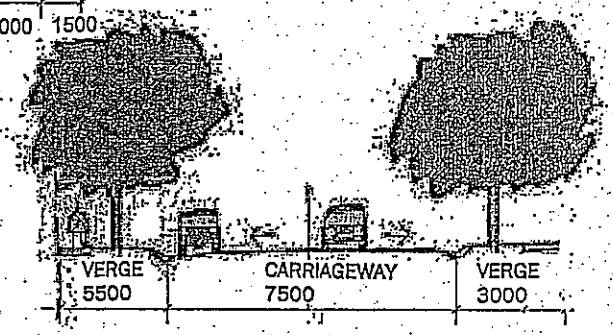
PROPOSED ROADS

East/west Entry Boulevards off Springvale Rd
2-way
2-lane asphalt road
Roadside parking available
Central median



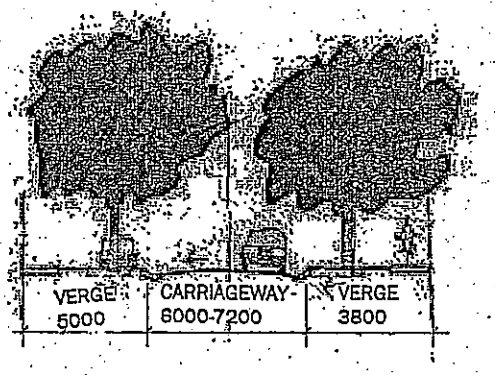
ENTRY BOULEVARD (26M)

North/south Entry Avenues off Cheltenham Rd
2-way
2-lane asphalt road
Roadside parking



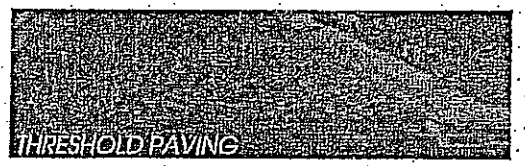
NORTH-SOUTH COLLECTOR (16M)
(EXCEPT FROM CHELTENHAM RD TO SPRINGERS WHERE RESERVE IS 30M)

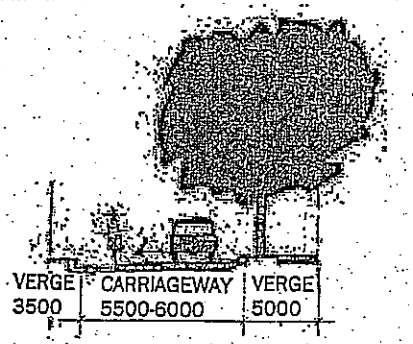
Local Streets Internal streets
2-way
2-lane asphalt road
Limited roadside parking



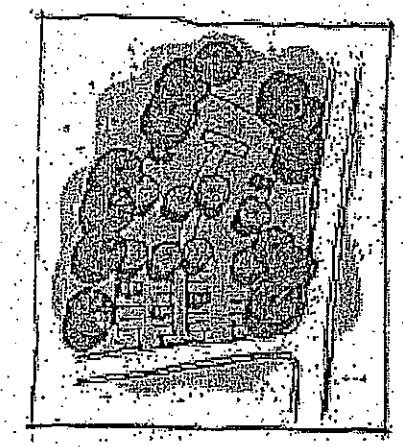
ACCESS/LOCAL STREET (16M)

Service Roads & Local Streets
Adjacent to Tree Reserves
No through roads, pedestrian crossovers,
Internal thresholds
2-way, or one-way
2-lane
no parking
Special paving treatment i.e. Cobbled or paved

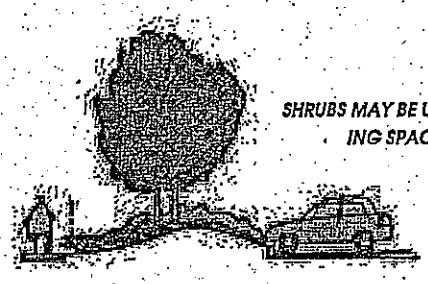




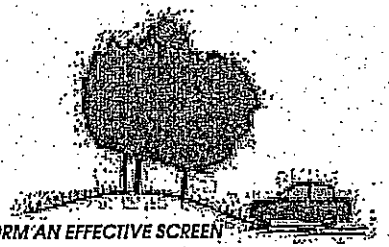
SERVICE RD/PARKLAND EDGE ROAD (14M)



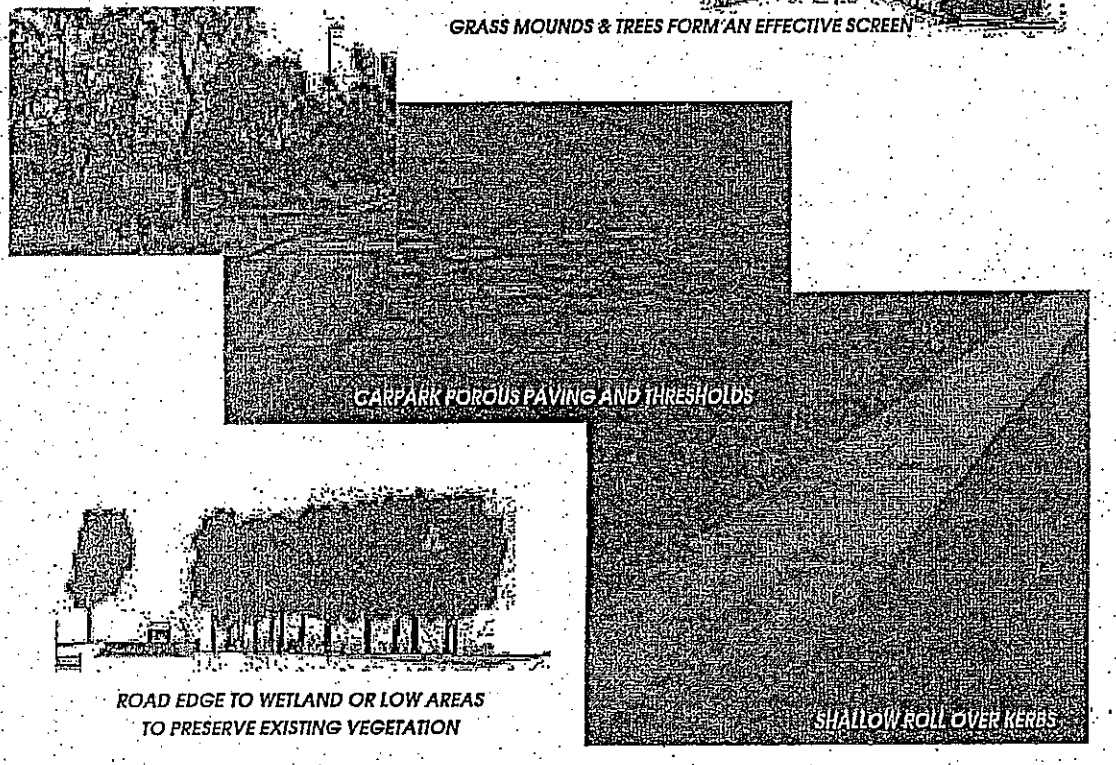
SHRUBS & TREES IN LARGER GROUPS TO CREATE A LESS FORMAL PLANTING ARRANGEMENT



SHRUBS MAY BE USED WHERE SCREENING SPACE IS LIMITED.



GRASS MOUNDS & TREES FORM AN EFFECTIVE SCREEN



ROAD EDGE TO WETLAND OR LOW AREAS TO PRESERVE EXISTING VEGETATION

PARKING

Parking areas can be visually intrusive and can be a source of considerable reflected glare.

Canopy trees planted in or near parking lots will help reduce the glare from cars, provide visual relief from the expanse of paving and will help to keep the vehicles cool in summer.

Low planting will help to screen parking areas at eye level.

Low planting can be more effective if the parking surface is lower than the level of the surrounding land.

Parking bays should be at 90 degrees to the kerb.

Dimensions should be 2. 6m wide x 4. 9 m long

There should be a 6.4 m backing space behind parking bays.

KERBING AND DRAINAGE

The traditional concrete kerb and gutter serves four main functions.

- It contains the granular sub-base of the road,
- prevents water penetration to the subgrade
- protects the road edge from disintegration,
- and carries stormwater runoff.

Roll-over kerbs and gutters provide opportunities for selective driveway locations into lots. This type of kerb is recommended. They can be partly permeable (e.g. bluestone pitchers), to direct the stormwater to infiltration zones along the roadside.

INTERSECTION TREATMENTS /MATERIALS

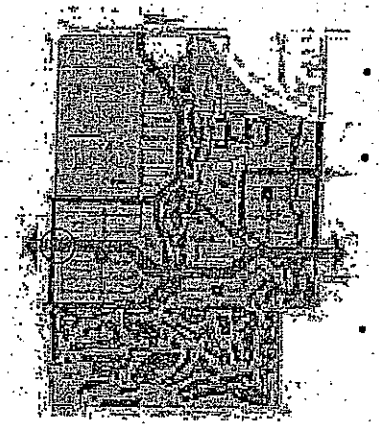
The careful choice and design of an integrated set of landscape and streetscape elements for use across the site is essential in establishing the right character for the development. A range of materials will be required to reflect different patterns and intensity of use.

ENTRY GATEWAYS

In particular, clearly define the major entry points into the estate and to showcase the development. Distinctive and memorable entry gateways are proposed at the main site entries along Springvale and Chapel Roads and a gateway smaller in size at the Cheltenham Road entry.

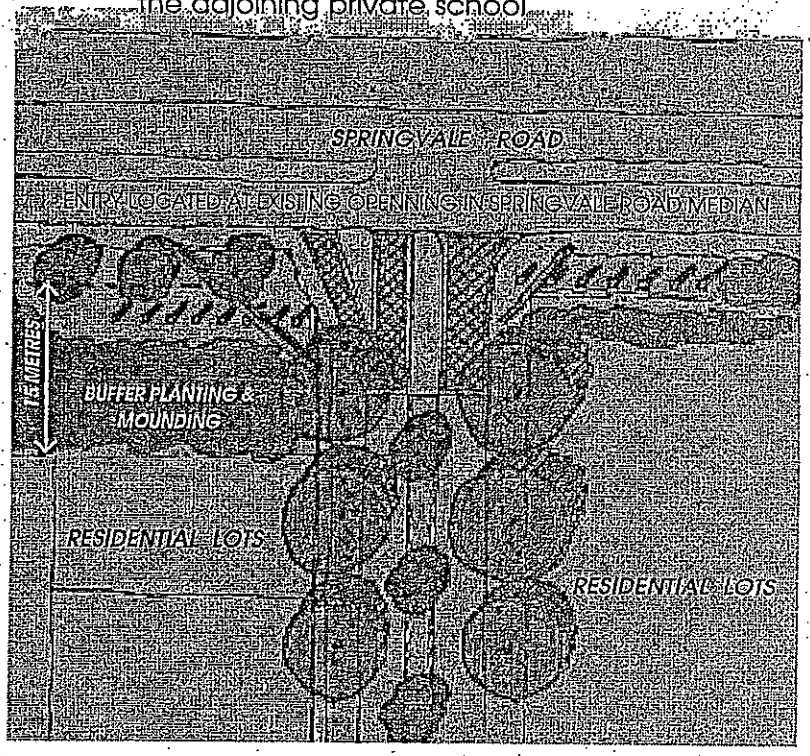
It is proposed to create this entry character by using the following design elements:

- Earth mounding to each side of the carriageway to provide a backdrop
- Entry markers i.e. Banners, pillars, or coloured steel structures lined up to create rhythm and draw the eye to the signage walls
- Low entry walls that will incorporate the development precincts residential community signage and be lit for night-time impact

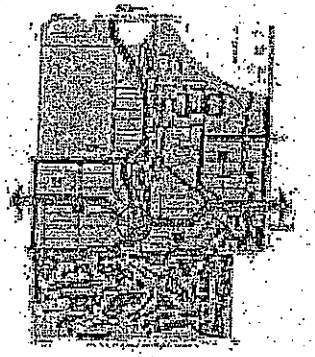


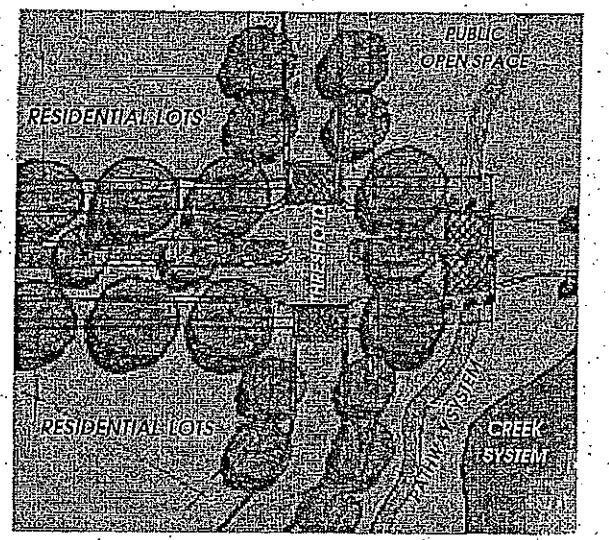
- Mature feature trees and landscaped treatment
- Change in material for entry threshold. Bluestone is the traditionally used material for pavements in Victoria. Bluestone cobbles could be used or contrasting unit pavers
- A double avenue of mature feature trees with landscaped median strip between lanes

On Springvale Road the entry must also consider the adjoining private school



NOTE: TRAFFIC SIGNALS OR LEFT-IN / LEFT-OUT CONTROLS MAY APPLY

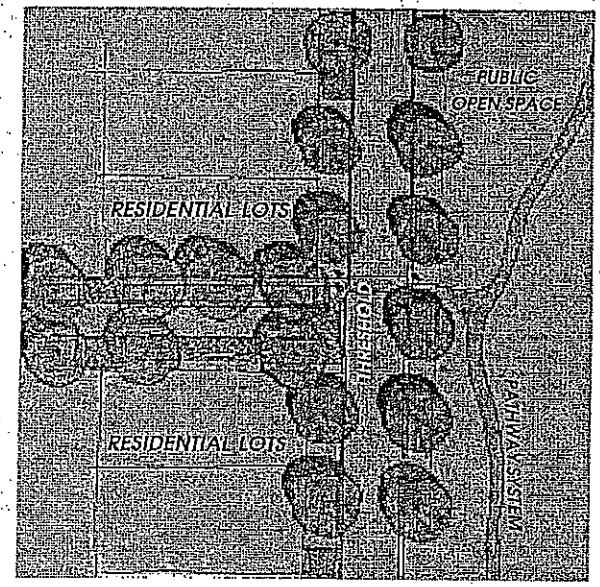


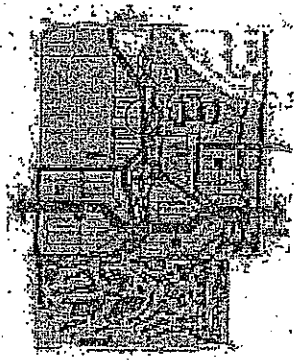


BOULEVARD INTERSECTION

Where the Main Boulevard intersects with other streets and crosses over the open space it is proposed that the following design elements are used;

- Change in material for entry thresholds into new streets and to signal the entry to a bridge. This may be achieved by using bluestone cobbles or contrasting unit pavers
- A double avenue of mature feature trees with landscaped median strip between lanes
- Bollards and a change in paving material to delineate main pedestrian crossings





MINOR ROAD INTERSECTION

Where the minor roads intersect and meet open space the following design elements are used;

- Change in material for entry threshold
- Change in material to indicate parking bays and driveways
- Bollards and a change in paving material to delineate pedestrian crossings

STREET TREE PLANTING

Street trees contribute significantly to the visual appearance, unity, character and livability of streets and neighbourhoods. The significance of different types of streets can be reinforced by the type and location of street trees. A consistent use of one type of tree can impart a sense of unity to a street. Some points to consider when choosing street trees are outlined below:

Native Australian vegetation that provides year-round dappled shade may be ideal to use in areas where houses are well set back from the street.

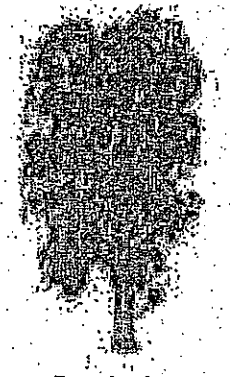
Deciduous trees may be more appropriate in areas where houses are closer to the road and where winter sun penetration is desirable.

Environmental conditions can be extremely harsh for street trees - this needs to be considered in the selection of species and where possible existing trees should be retained. Indigenous species are proven exemplars of trees that will cope under harsh on-site conditions and locally collected seed stock should reinforce the survival the street tree stock selected.

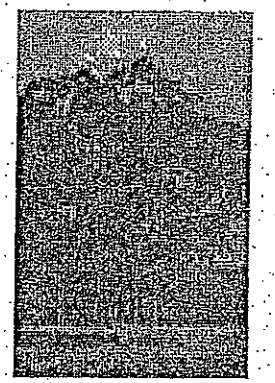
The proposed hierarchy of street types will be reinforced by a system of differential tree planting utilizing both native and in some circumstances exotic species.

There is potential to use exotics around squares and neighbourhood parks and to use native species to the major entry roads, link roads and all local streets.

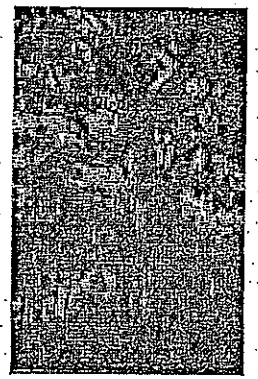
Refer to Appendix 1 for indicative street tree planting list.



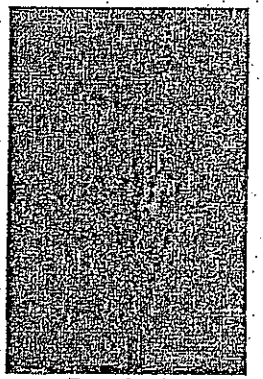
Eucalyptus camaldulensis



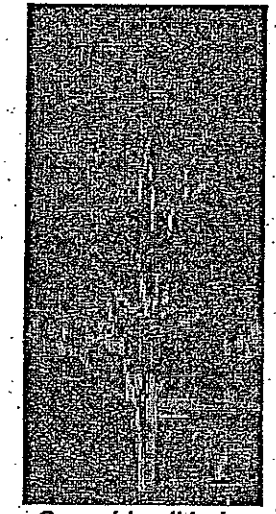
Eucalyptus ovata



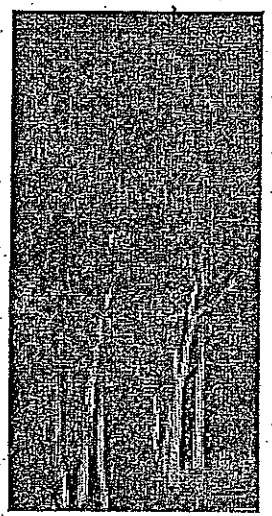
Angophora costata



Eucalyptus sideroxylon

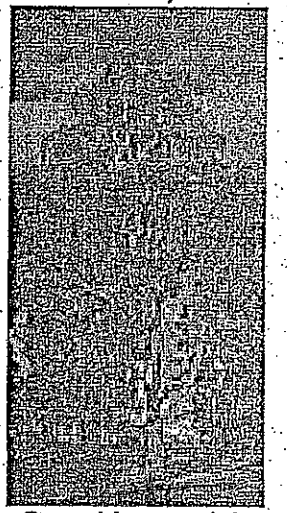


Corymbia citriodora

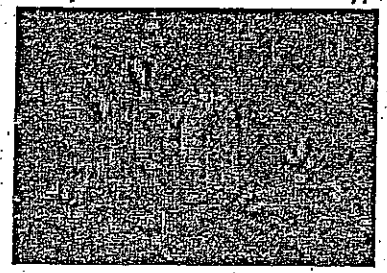


Eucalyptus mannifera

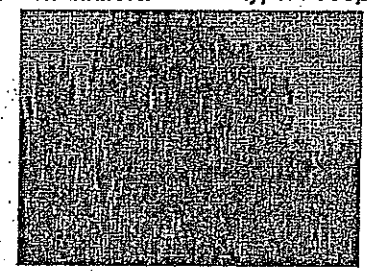
Eucalyptus scoparia



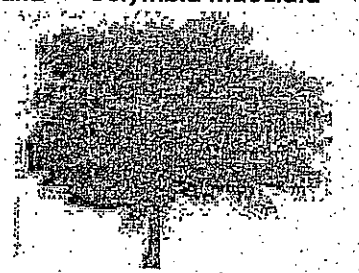
Corymbia maculata



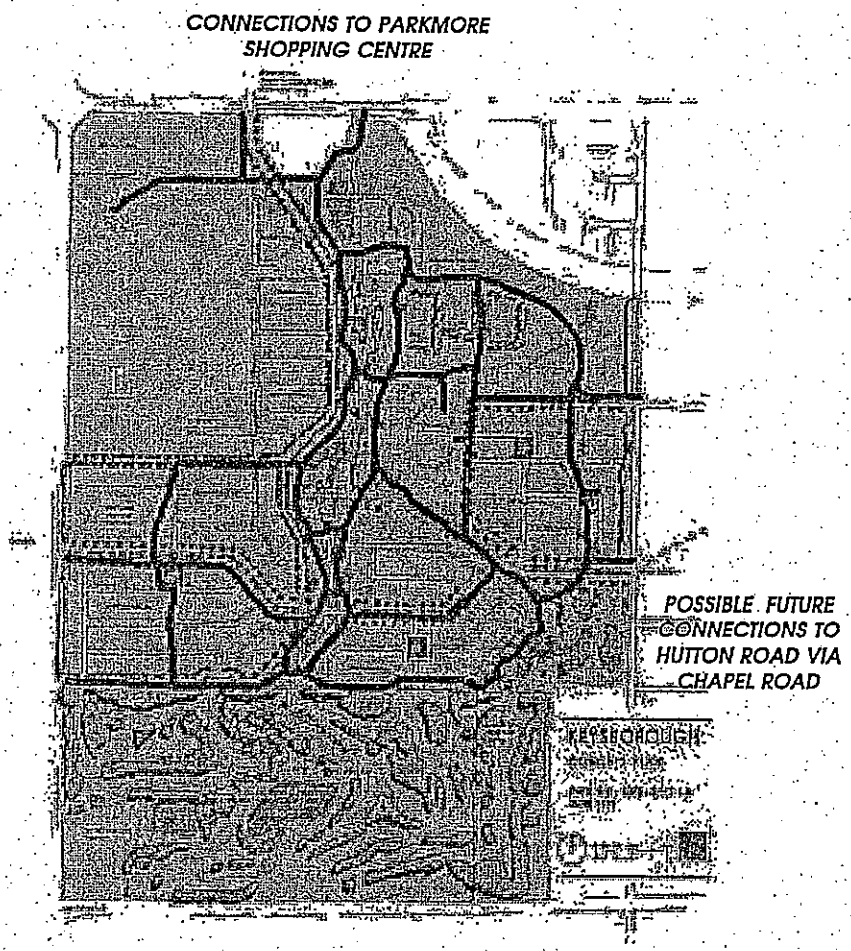
Banksia integrefolia



Corymbia ficifolia



Tristaniopsis laurina



The reinforcement of public safety, pedestrian convenience and scenic amenity through high quality pedestrian/cycling networks.

Thoughtfully designed networks for pedestrians and cyclists are essential to establish a vibrant, active and safe community with a reduced dependence on the car.

The pedestrian movement networks for the development precinct will be designed to enhance access to the open space systems. The footpaths and cycle ways are to be integrated and provide for a continuous network throughout the estate and encourage use of the developments unique setting. The design will provide for:

- Safe and legible movement networks for pedestrians and cyclists that are integrated, cost effective and environmentally acceptable and maximise access opportunities to the local and regional parklands and wetlands.
- Pedestrian and cycle priority to be encouraged by providing access, where possible, through open space systems to public transport, recreation, social and community facilities and amenities including Tatterson Park and Braeside Park.
- A highly legible pedestrian circulation system with planting and distinctive paving to identify the external pedestrian paths links and significant points along the journey. Internal path systems will lead people directly to their destination and have orientation points either in the form of distinctive spaces, nodes or features which people can refer to.

PATH TREATMENT / MATERIALS / ORIENTATION

It will be necessary to establish a hierarchy of paths with differing materials to reflect location and function. Construction materials and design options should be examined and assessed against issues such as privacy, safety, travel experience, terrain, existing vegetation, views and aesthetics.

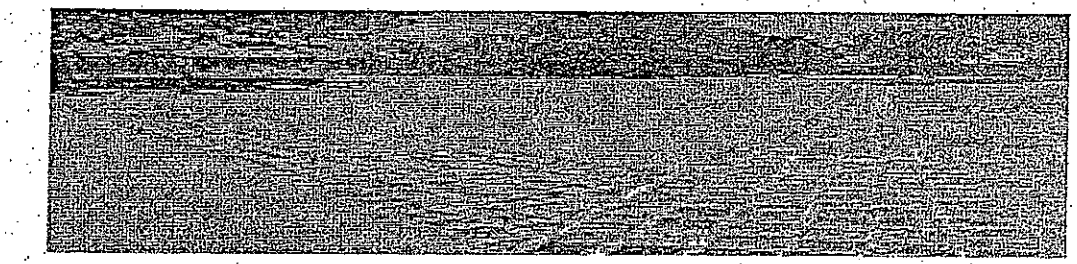
Porous pathways and road pavements are encouraged to channel oil and rubber residue from the road surface through to the sub-base in order to minimise polluted runoff entering water bodies on site.

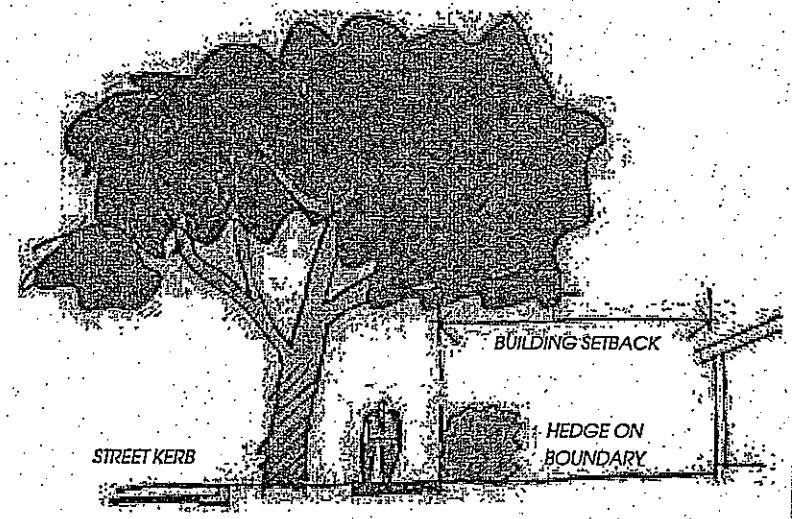
Where porous paving is not suitable, materials that reflect elements within the site (e.g.) soil colour, exposed aggregate paving derived from materials during site excavations are recommended.

The four principle path types will be;

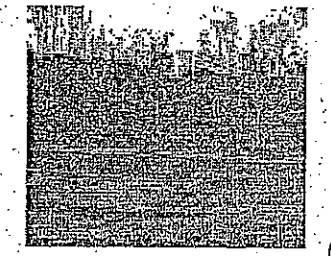
PEDESTRIAN PATHS – RESIDENTIAL STREETS

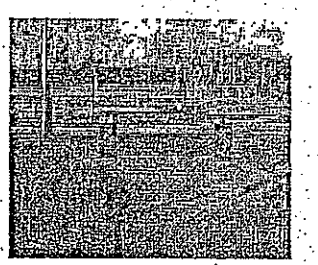
- Located on one side of Internal streets
- Concrete footpath 1.5m width
- Unit pavers, bluestone or timber sleeper bands at main focal/ linkage points.

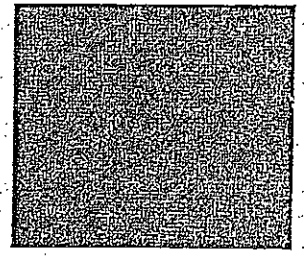




STREET FOOTPATHS WITH COLOURED OR EXPOSED AGGREGATE CONCRETE FINISH







CYCLEPATHS/PEDESTRIAN PATHS – OPEN SPACE AREAS

Located roughly parallel to the linear residential road skirting the open space.

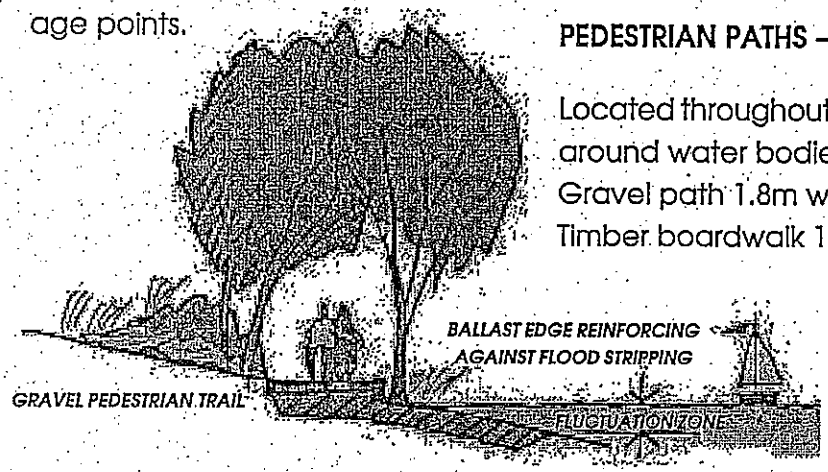
Bitumen or exposed aggregate path

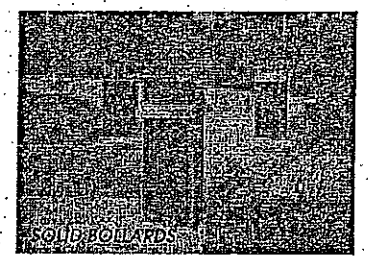
Unit pavers, bluestone or timber sleeper bands at main focal/ linkage points.

BIKE PATH WITH BITUMEN OR EXPOSED AGG.

PEDESTRIAN PATHS – OPEN SPACE AREAS

Located throughout open space system, around water bodies/cross site links
Gravel path 1.8m wide
Timber boardwalk 1.8m wide





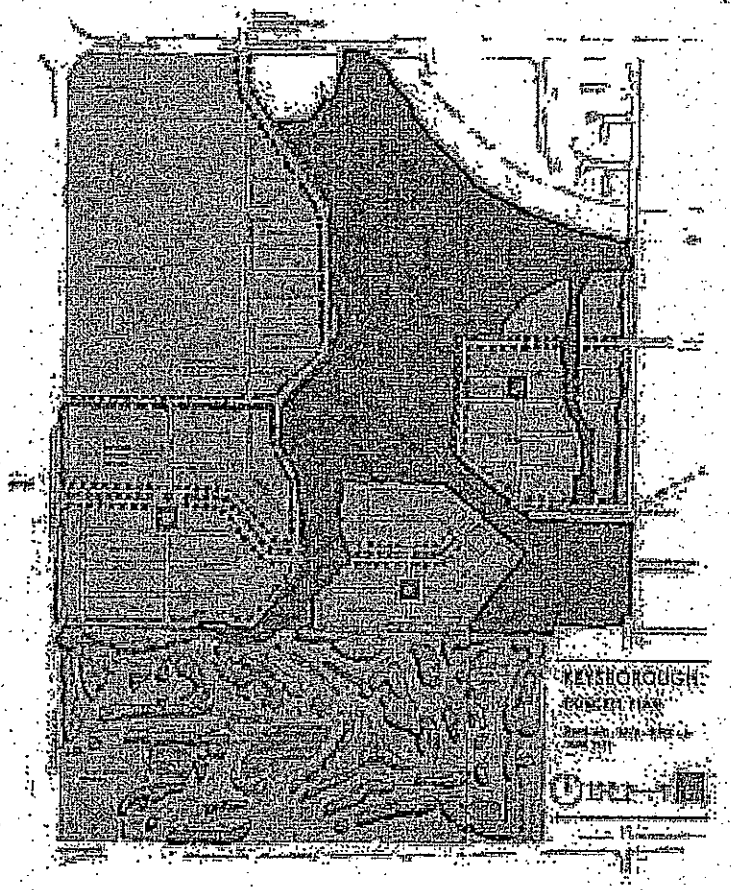
DECKING AND BOARDWALKS

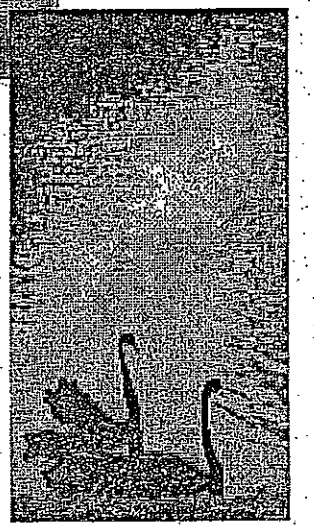
The design of boardwalks and viewing decks adjoining water bodies in public open space areas should reflect the following criteria:

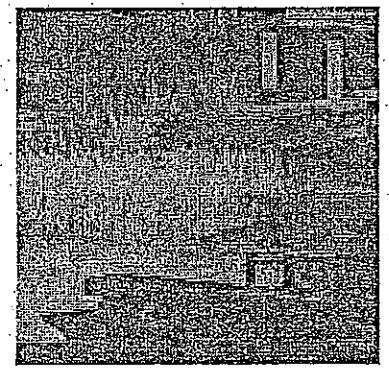
- Timber used should be plantation, recycled, or regrowth timbers or sourced from Australian tree farms or from State Forest plantations
- No rainforest timbers or timbers from old growth forest should be used
- Decking should be constructed with highly durable or treated timbers
- Detailing should remain simple and free from ornate decorations/carvings
- Decking and boardwalks should be robustly scaled in keeping with broad open space considerations

The development framework should provide path system networks for a substantial provision of public open space and access to a dynamic living wetland system. Detailed design should promote interaction, awareness and stewardship of natural systems and the recreational open space resources by:

- Integrating continuous interconnected public open space systems into the residential zones;
- Provision of direct pedestrian access to the major parkland and wetland zones;
- Providing open space that caters for a variety of recreation uses;
- Providing a major open space wildlife corridor linking Braeside Metropolitan Park, Tatterson park and The Keysborough Golf Course;
- Developing an indigenous landscape framework that will be augmented by appropriate native understorey species together with native grasses. Within the indigenous species framework the potential for exotic planting within selected







zones and in locations where solar access to residential zones will be enhanced, should be explored;

- Providing public open space systems designed to projected user needs, personal safety and security and informal surveillance, providing a clear delineation of public and private space and contributing to energy efficiency.

Ensuring that dwellings are within 300-400m of open space, and within 800m of the major open space areas.

Private Open Space

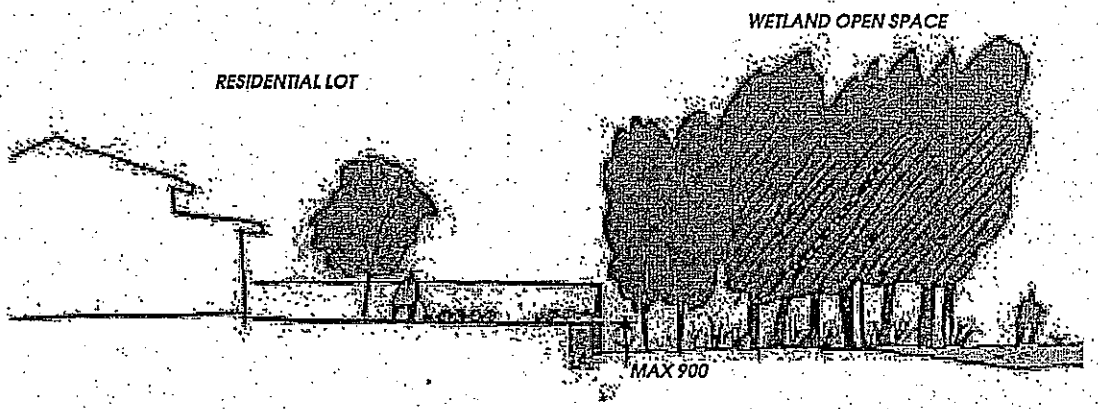
The private open space adjacent to a dwelling forms the link between public domain and the interior of the dwelling.

Planting selection and design in private open space should reflect the precinct... A suggested planting list by the developer is advisable to catalyse activity from the householders and to avoid the initial bareness so typical of many new housing areas. Refer to Appendix 4.

Neighbourhood Parks

Neighbourhood parks are proposed in central locations within the residential areas. These will be highly visible, relatively formal and directly linked to the open space circulation system.

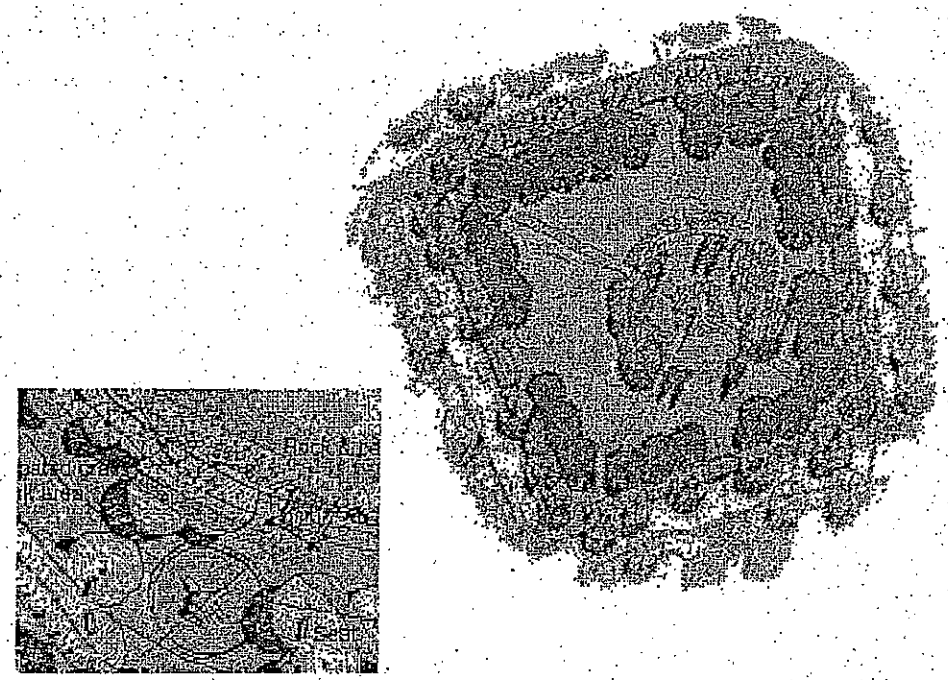
They will include playgrounds, community recreation facilities or simply be left as open areas where games can be played.

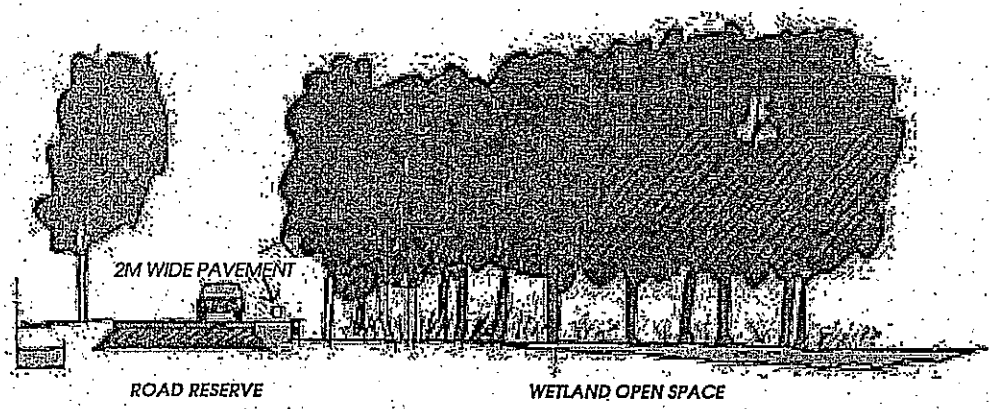


Major Open Space Corridors

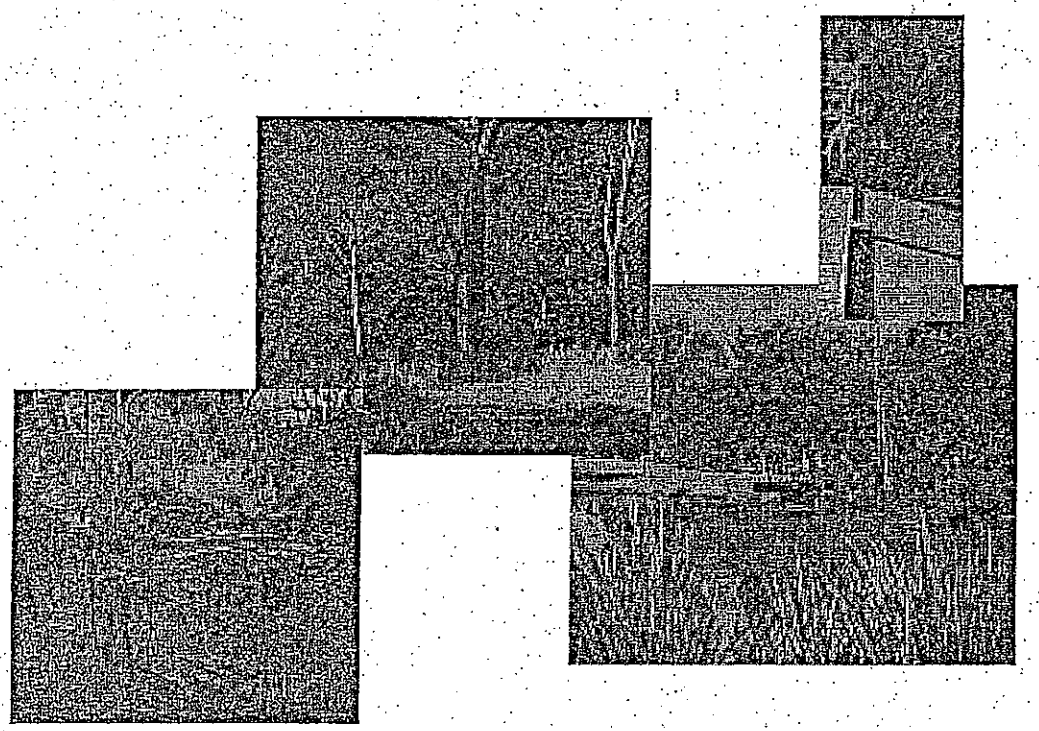
The major open space corridor represents an environmental buffer, with the potential to promote indigenous vegetation communities, increase fauna habitat value and increase its capacity to cope with riparian processes (e.g.. Flood inundation).

The corridor also contains extensive parkland areas which will be planned in conjunction with the open water bodies and wetland areas. These will be essentially native or indigenous landscape areas with an informal, natural character. The exception may be where the main entry boulevard crosses over the open space corridor.





ROAD EDGE TO WETLAND OR LOW AREAS TO PRESERVE EXISTING VEGETATION



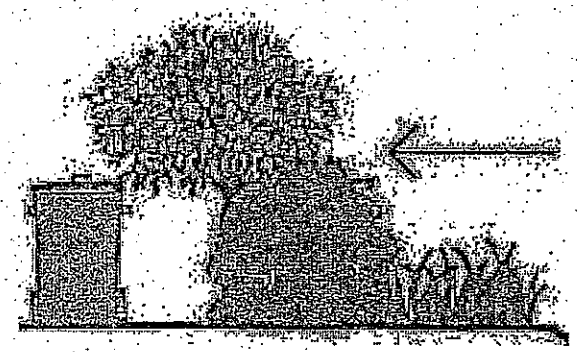
The bridge and associated landscape character may have a more structured character, within the broader native landscape.

Key visual, environmental and recreational opportunities include;

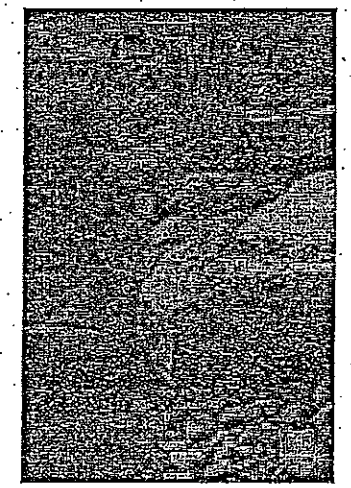
- Maintain relevance of existing vegetation through choice of new planting. Refer to Appendix 2 for indicative planting schedule. Existing vegetation is to be retained and should be enhanced where necessary with further planting of the same nature.
- Provide an accessible waters edge at key points eg. Beach, jetty, canoe access interlinked with the greater open space network.
- Provide for a variation of recreational pursuits eg.
- Kick-about zones, playgrounds, picnics etc.
- Variation of revetment edge.
- Medium level of maintenance
- Provide for amenities such as shelters, seats, picnic tables benches and bins

The open space buffer is also important in a visual sense as it presents an opportunity to create a pleasant outlook from residential areas and filtered views through to water.

EXAMPLE OF PLANTED ACOUSTIC BUFFER



PLANTED SCREENS CAN BE USED TO BLOCK OUT UNDESIRABLE VIEWS



Mounding

Regraded land and slopes should relate to the scale of the site and the amount of cut and fill should be balanced to reduce site development costs. Re-graded slopes steeper than 1 in 3 should be avoided due to stablisation difficulties.

Grading and mounding can be used to:

- soften building lines and to add interest to sites in a topographically flat context,
- visually screen undesirable aesthetics,
- act as sound barriers,
- define outdoor areas such as playgrounds and meeting places.

Significant changes in grade can be controlled with built elements and planting can blend major level changes into a more appropriate human scale.

Landscape Buffers

These areas are characteristically long narrow strips of land mounded up to 3m high and 15m in width that occur at the development site boundaries. The main buffers will be located along the boundary of Chapel and Springvale Roads to visually and acoustically screen the residential development. For indicative planting to these landscape buffer mounds refer to Appendix 5.

Establishment Period

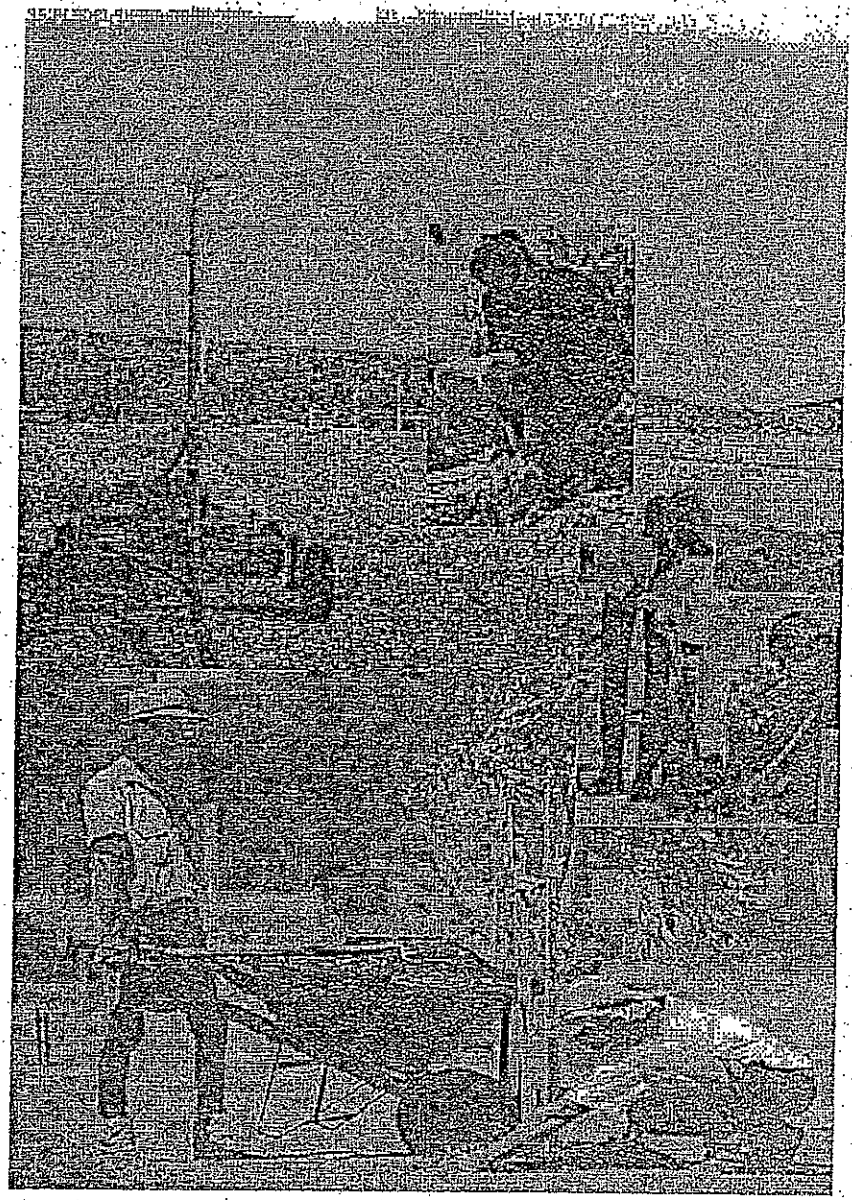
The establishment of the built landscape at Keysborough is the responsibility of the builder or contractor. The contractor will be required to maintain the landscape works to the level deemed appropriate as at certification of practical completion for the period specified in the contract.

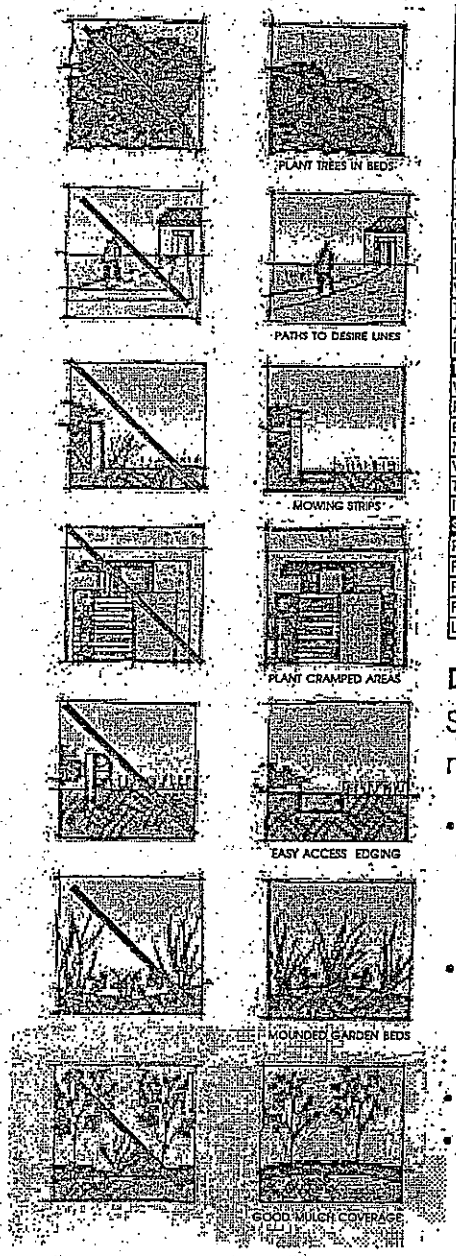
Soft Landscape Establishment

The soft landscape generally refers to planting, garden beds and mulch. The period of time a plant takes to be considered 'established' is variable, therefore the plants that take the longest to become 'established' should be the deciding factor (within reason) as to how long the Contractor can be expected to maintain the landscape works following practical completion. Establishment period maintenance may include tasks such as watering, mowing, weeding, rubbish removal, fertilising, pest & disease control, plant replacement, cultivation, mulch reinstatement and generally keeping the site neat and tidy. The 'Planting Establishment Period' is usually in the order of 12 months, following this period a new contract for continued maintenance will need to be formed.

Hard Landscape Establishment

The hard landscape generally refers to all the elements not included in the soft landscape such as pathways & paving, mowing strips & edging, boardwalks, fences & railings, seats, lights, bollards, bins, public art, etc. The hard landscape is generally 'established' once installed according to the construction specifications and finishes schedule. The specified 'establishment' time period for soft landscape elements should apply to all hard landscape elements to ensure that at the end of the contract 'establishment period' the specified finish at practical completion is maintained at an appropriate level.





MAINTENANCE TASK	FREQUENCY
GRASS	
Mowing lawn	WEEKLY / AS REQUIRED / WEEKLY
Slashing dryland grass	FORTNIGHTLY
Watering lawn	TWICE WEEKLY / AS REQUIRED / TWICE WEEKLY
Watering dryland grass	IF RESEEDING
Fertilising lawn	
Fertilising dryland grass	
Weed control	
Topdressing	
Aerating	PRIOR TO RESEEDING
Reseeding	
TREES AND SHRUBS	
Watering	WEEKLY / AS REQUIRED / WEEKLY
Fertilising	
Pruning	
Mulching	
Weed control	
Thinning	
Insect and disease control	
SITE ELEMENTS	
Paving	MONTHLY INSPECTION
Furniture	MONTHLY INSPECTION
Play equipment	FORTNIGHTLY INSPECTION
Fences and vechicle barriers	MONTHLY INSPECTION
Lighting	FORTNIGHTLY INSPECTION

Design with maintenance in mind

Some simple design principles can help to minimise maintenance expenditure:

- Plant trees in garden beds, provide garden edging and mowing strips wherever possible to minimise mowing tasks
- Provide adequate mounding and mulch to garden beds to reduce the likelihood of weed invasion and waterlogging..
- Provide pathways to suit desirelines
- Formulate a schedule of maintenance tasks based on an annual time frame.

A simplified example of this is indicated above:

RESPONSIBILITIES OF MAINTENANCE CONTRACTOR

- Maintenance of all defined landscape assets shall be provided in a highly effective, efficient and responsible manner to the standard deemed appropriate by local council.
- The established landscape quality, character and identity of the municipality shall be upheld and enhanced whilst achieving maximum value for expenditure on maintenance services.
- Maintenance contractors shall work in a co-operative manner with the local council and community to ultimately develop, manage, operate and enhance community facilities and services.
- Maintain an aesthetically pleasing, healthy and safe environment.

Contractors Report

To ensure maintenance contractors are aware of and accountable for their responsibilities and that regular maintenance is provided :

- the contractor shall submit a monthly report of maintenance actions performed to the superintendent,
- a schedule of all accidents, damages and or defects to the defined assets shall be submitted to the superintendent.

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Acacia binervia
Acacia melanoxylon
Angopora costata
Corymbia citriodora
Corymbia ficifolia
Eucalyptus ovata
Eucalyptus mannifera
Eucalyptus radiata
Eucalyptus scoparia
Eucalyptus sideroxylon
Tristaniopsis laurina

NOTE: There is limited potential for use of deciduous trees.

Acacia binervia
Acacia implexa
Acacia melanoxylon
Acacia paradoxa
Acacia pendula
Acacia pycnantha
Acacia suaveolens
Agonis flexuosa
Allocasuarina littoralis
Allocasuarina paludosa
Allocasuarina paradoxa
Allocasuarina verticillata
Angophora costata
Anigozanthos flavidus
Baeckea linifolia
Baeckea virgata 'Miniature'
Banksia integrifolia
Banksia marginata
Banksia spinulosa
Bauera rubioides
Billardiera scandens
Bossiaea cinerea
Brachycome multifida
Bursaria spinosa
Callicoma serratifolia
Cassinia arcuata
Casuarina cunninghamiana
Clematis aristata
Clematis microphylla
Comesperma volubile
Correa alba
Correa reflexa
Corymbia citriodora
Corymbia ficifolia
Corymbia maculata
Cotula coronopifolia
Danthonia caespitosa
Danthonia sp.
Dianella longifolia
Dianella revoluta
Dianella tasmanica
Dichondra repens
Dillwynia glaberrima
Dodonea viscosa 'purpurea'
Einadia nutans
Epacris impressa
Eragrostis brownii
Eriostemon myoporoides
Eucalyptus botryoides
Eucalyptus caesia
Eucalyptus camaldulensis
Eucalyptus leucoxylon 'rosea'
Eucalyptus macrohyncha
Eucalyptus mannifera
Eucalyptus nicholii
Eucalyptus obliqua
Eucalyptus ovata
Eucalyptus pauciflora
Eucalyptus pryoriana
Eucalyptus radiata
Eucalyptus scoparia
Exocarpus cupressiformis
Festuca glauca
Gahnia sieberiana
Goodenia ovata
Hakea coriacea
Hakea nodosa
Hardenbergia violacea
Helichrysum bracteatum
Helichrysum scorpoides
Hibbertia procumbens
Hibbertia scandens
Hibbertia sericea
Hymenosporum flavum
Kennedia prostrata
Kunzea ericoides
Leptospermum 'Cardwell'
Leptospermum 'Red Damask'
Leptospermum continentale
Leptospermum horizontalis
Leptospermum myrsinoides
Leucophyta brownii
Linum marginale
Lomandra longifolia
Lophostemon confertus
Melaleuca ericifolia
Melaleuca linariifolia
Melaleuca squarrosa
Melaleuca thymifolia
Microlaena stipoides
Olearia ramulosa
Ozothamnus ferrugineus
Pandorea pandorana
Patersonia occidentalis
Pennisetum aloepercuroides
Poa labillardieri
Poa poiformis
Pomaderris oraria
Solanum laciniatum
Themeda australis
Themeda triandra
Thryptomene saxicola 'Paynei'
Thymus x citriodora
Tristaniopsis laurina
Villarsia exaltata
Villarsia reniformis
Viminaria juncea
Viola hederacea
Westringia 'Wynyabbie Gem'
Westringia fruticosa

Alisma plantago-aquatica
Amphribromus archeri
Amphribromus fluitans
Amphribromus nervosus
Amphribromus neesii
Azolla filicubides
Baumea arthrophylla
Baumea articulata
Baumea juncea
Baumea rubignosa
Baumea tetragona
Bolboschoenus caldwelli
Bolboschoenus fluviatilis
Carex appressa
Carex fascicularis
Carex gaudichaudiana
Carex inversa
Carex tereticaulis
Centella cordifolia
Chorizandra australis
Craspedia paludicola
Crassula helmsii
Cyperus lucidus
Danthonia nivicola
Dawsonia superba
Dianella caerulea
Dianella tasmanica
Eleocharis acuta
Eleocharis sphacelata
Eryngium vesiculosum
Gahnia sieberiana
Goodenia humilis
Gratiola peruviana
Isolepis fluitans
Isolepis nodosa
Isotoma fluviatilis
Juncus amabillis
Juncus pallidus
Juncus kraussii

Lepidosperma longitudinale
Ranunculus papulentis
Restio letraphyllus
Restio tetraphyllus ssp meiostachyus
Schoeneplectus validus
Schoenus apagon
Selliera radicans
Triglochin aff. procerum (Broad-leafed emergent form)
Triglochin procera
Triglochin striata
Utricularia australis
Vallisneria gigantea
Villarsia exaltata
Villarsia reniformis
Vimenarea juncea

Acacia binervia
Acacia implexa
Acacia paradoxa
Acacia pendula
Acacia suaveolens
Agave attenuata
Allocasuarina littoralis
Allocasuarina paludosa
Allocasuarina paradoxa
Allocasuarina verticillata
Angophora costata
Aotus ericoides
Banksia integrifolia
Banksia marginata
Billardiera scandens
Bossiaea cinerea
Bursaria spinosa
Callicoma serratifolia
Cassinia arcuata
Cerastium totemosum
Clematis microphylla
Clematis aristata
Convovulus cneorum
Convovulus erubescens
Convovulus mauriticanus
Correa reflexa
Corymbia ficifolia
Cotula coronopifolia
Danthonia sp.
Dianella longifolia
Dianella revoluta
Dichondra repens
Dietes bicolor
Dietes grandiflora
Dietes robinsoniana
Dillwynia glaberrima
Dillwynia serica
Dodonea viscosa 'purpurea'
Echium fastuosum
Einadia nutans
Epacris impressa
Eragrostis brownii
Erica sp.
Erigeron karvinskianus
Eriostemon myoporoides
Escallonia macrantha
Eucalyptus botryoides
Eucalyptus caesia
Eucalyptus macrohyncha
Eucalyptus mannifera
Eucalyptus obliqua
Eucalyptus ovata
Eucalyptus pauciflora
Eucalyptus pryoriana
Eucalyptus radiata
Eucalyptus scoparia
Exocarpus cupressiformis
Festuca glauca
Gahnia sieberiana
Goodenia ovata
Guara lindheimeri
Hakea coriacea
Hardenbergia violacea
Hebe 'Autumn Glory'
Hebe 'Blue Gem'
Hebe veronica 'Inspiration'
Helichrysum bracteatum
Helichrysum scorpoides
Hemerocallis aurantiaca
Hibbertia procumbens
Hibbertia scandens
Hibbertia sericea
Kennedia prostrata
Kunzea ericoides
Leptospermum 'red damask'
Leptospermum continentale
Leptospermum myrsinoides
Linum marginale
Lomandra longifolia
Melaleuca ericifolia
Melaleuca linariifolia
Melaleuca squarrosa
Melia azedarach
Microlaena stipoides
Murraya paniculata
Myoporum parvifolium
Nyssa sylvatica
Olearia ramulosa
Osmanthus fragrans
Ozothamnus ferrugineus
Patersonia occidentalis
Pennisetum aloepercuroides
Poa labillardieri
Poa poiformis
Raphiolepis 'Springtime'
Raphiolepis indica
Santolina chamaecyparissus
Solanum laciniatum
Themeda triandra
Thymus x citriodora
Villarsia exaltata
Villarsia reniformis
Viminaria juncea
Viola hederacea
Westringia fruticosa

Acacia dealbata
Acacia implexa
Acacia melanoxylon
Acacia paradoxa
Acacia pycnantha
Acacia suaveolens
Allocasuarina littoralis
Allocasuarina paludosa
Allocasuarina paradoxa
Allocasuarina verticillata
Banksia integrifolia
Banksia marginata
Billardiera scandens
Bossiaea cinerea
Bursaria spinosa
Cassinia arcuata
Clematis arista
Clematis microphylla
Correa reflexa
Danthonia caespitosa
Dianella longifolia
Dianella revoluta
Dichondra repens
Dillwynia glaberrima
Dodonea viscosa 'purpurea'
Einadia nutans
Epacris impressa
Eragrostis brownii
Eriostemon myoporoides
Eucalyptus camaldulensis
Eucalyptus macrohyncha
Eucalyptus ovata
Eucalyptus pauciflora
Eucalyptus radiata
Eucalyptus viminalis var. pryoriana
Exocarpus cupressiformis
Gahnia sieberiana
Goodenia ovata
Hakea nodosa
Hardenbergia violacea
Helichrysum scorpoides
Hibbertia procumbens
Hibbertia sericea
Kennedia prostrata
Kunzea ericoides
Leptospermum 'Red Damask'
Leptospermum continentale
Leptospermum myrsinoides
Linum marginale
Lomandra longifolia
Melaleuca ericifolia
Melaleuca squarrosa
Microlaena stipoides
Olearia ramulosa
Ozothamnus ferrugineus
Patersonia occidentalis
Poa labillardieri
Solanum laciniatum
Themeda australis
Themeda triandra
Viminaria juncea
Viola hederacea
Westringia fruticosa

PROTECTION OF REMNANT TREES

GENERAL PRINCIPLES

A considerable number (50-100) of River Red Gums and a small number of Manna Gums occur within the area and have conservation value. These trees need to be preserved and protected where possible. Linking these remnant habitat trees with each other and/or with other areas of habitat or open space will enhance their value.

River Red Gums grow into large trees at maturity, and with their habit of shedding limbs, which is shared by many eucalypts, they should not have buildings, seats, tables or the like placed below them. They are compatible with passive recreation and Parks Victoria has many parks in which River Red Gums occur in visitor facility areas. However, due to the constraints that the trees impose, public open space needs to have ample room for the public to spend time away from below tree canopies. These potentially large, spreading trees need to be set in a spacious environment. A ratio of one part tree canopy to at least one part treeless lawn is required for open space supporting eucalypts. In some cases this EMP requires a greater ratio.

In general red gums are not compatible with residential allotments.

Planting of additional trees within public open space will be an important part of realising the environmental goals of this EMP. Use of locally collected seed is essential for genetic conservation.

General Requirements for Development Applications

Future development applications for development areas within Amendment Area C2 should incorporate the following actions and principles:

* Survey the indigenous trees for precise location in relation to proposed public open space and wetland areas.
* Maximise the retention of indigenous eucalypts within public open space.
* Quantify the number of indigenous eucalypts that will not be retained.
* Provide sufficient space for (1) maturation of River Red Gums, (2) possible recruitment of more trees to the existing population, (3) placement of infrastructure and passive recreation areas away from trees.

Regeneration of Indigenous Trees

There is opportunity for natural regeneration of red gums to provide for natural expansion of existing stands of trees. This is preferable to planting trees. For regeneration of trees:

* Areas for regeneration of red gums should be earmarked in the Development Application and there should be no plantings of trees or shrubs within the regeneration areas.
* Fence off the existing trees and surrounding grassed areas.
* Allow grass to grow unmown for 4-5 years. Red gum seedlings will grow within the fenced areas.
* After 5 years, remove the fence, select the new saplings to be retained according to location and health, remove unwanted saplings, and resume slashing regime.

NEIGHBOURHOOD PARK 1: SW RED GUMS

Neighbourhood Park 1: SW Red Gums comprises the small stand of thirteen trees in the south-west (Viecelli's property).

Design

* Neighbourhood park with central stand of red gums surrounded by open grassed areas and landscape plantings where appropriate.
* Ratio of open grass to tree canopy of at least 2:1.
* Passive recreation provided for separate from the tree canopy.

Goals

* Long term preservation of all existing trees.
* Neighbourhood Park 2: NE Red Gums

NEIGHBOURHOOD PARK 2: NE RED GUMS

Neighbourhood Park 2: NE Red Gums comprises the small stand of trees within the proposed development area forming part of a much larger remnant area in Tatterson Park.

Design

* Neighbourhood park with central stand of red gums surrounded on three sides by open grassed areas, and continuous with adjacent red gums in Tatterson Park.

* Landscape plantings located away from the red gum canopy where appropriate.

* Ratio of open grass to tree canopy of at least 2:1.

* Passive recreation provided for separate from the tree canopy.

Goals

* Long term preservation of all existing trees.

NEIGHBOURHOOD PARK 3: VETERAN TREE

Neighbourhood Park 3 to the East is set aside to protect a veteran red gum that predates European settlement. Under appropriate management, this tree is likely to survive for hundreds more years.

Design

* Neighbourhood park with central veteran red gum surrounded by open grassed areas and landscape plantings located away from the red gum canopy where appropriate.
* Ratio of open grass to tree canopy of at least 2:1.
* Passive recreation provided for separate from the tree canopy.

Goals

* Long term preservation of the existing tree.

STREET TREES

Design

* Retention of individual remnant red gums or Manna Gums as mature specimens in new avenues or streets were practical.
* Selection of appropriate trees must be consistent with design principles in the Urban Design Guidelines.
* Selected trees must be assessed by a qualified arborist to ensure the practicability of survival of the tree given the proposed street construction and other changes that will take place during development.

Goals

* Retain as many existing trees as practical by incorporation into avenues and streets.

WETLAND CORRIDOR

The corridor of wetlands and lakes runs north-south through the area and will have a multiplicity of functions: hydrological, landscape and recreational, and environmental. Craigie (2000) presents specifications for the hydrological requirements of wetland design. The actions below are all recommended on the proviso that the hydrological requirements are also met.

Goals

* Develop the existing corridor of dams, channel and wetlands to become chain of wetlands and open water bodies.
* Provide a wetlands to support a diversity of native vegetation.
* Provide a diversity of habitats for native fauna, including waterbirds, amphibians, birds from riparian habitats, and woodland birds.
* Meet the passive recreation needs of the community.

Balancing Environment and Landscape/Open Space Needs

A mixture of natural wetlands (eg marshlands, freshwater meadows, freshwater marshes, swamps etc) and open water bodies is required. The open water bodies will be landscape features, and recreation focus areas within the open space corridor. The natural wetlands will provide habitat for native flora and fauna. Detailed design and management plans for the area need to balance these uses.

* The ratio of manicured open space and passive recreation areas to natural wetland and open water body areas should be no greater than 2:3.

Recreation and Access Issues

Active recreation for the local residents will be provided for in Tatterson Park which will be further developed into a major regional recreational facility for the City of Greater Dandenong (Ernst 1999). There is a trade-off between recreation for people and the habitat values for wildlife. In general, the more people, the less wildlife. Therefore, even passive recreation needs to be controlled in such a way as to provide adequate refuge, breeding sites etc for wildlife. This is a critical consideration in wetland and open space design if the goals of the EMP and Urban Design Guidelines are to be met.

* Restrict recreation within the wetland open space corridor to passive recreation activities.
* At least a proportion of the natural wetland areas should be designed to prohibit access to people and their pets. This should include appropriate fencing in some areas.
* Maximise the continuity (connectivity) of natural wetlands for the length of the corridor. Minimise the number and width of any barriers transecting the north south corridor.

Tree Retention

The number of remnant native trees retained within the wetland open space corridor should be maximised. Development plans and wetland design need to accommodate this requirement. This should include any remnant Black Wattle and Blackwood.

DESIGN OF NATURAL WETLANDS

The following principles should be adhered to when creating natural wetlands:

* Create complexity in the shape of the edges of the wetlands. This will include a range of edge gradients from steep to almost flat as well as increasing the complexity and convolutions of the wetland boundaries.
* Create some underwater habitat complexity (logs, rocks, depth variations). The types of substrates present could also vary from sand to mud to clay.
* Create complexity in the riparian and wetland vegetation surrounding wetlands. This could include areas of reeds, shrubs, grasses and open areas.
* Provide tall trees (alive or dead) or other structures as necessary perches for birds such as herons, cormorants, ducks and ibis.
* Ensure connectivity of wetlands by careful design of native vegetation plantings. Group wetlands to reduce the isolation and vulnerability of individual wetlands. This also gives birds the safety to move short distances but remain in the area when disturbed.
* Create areas of refuge. This will include islands or areas of dense vegetation such as reeds to encourage shy birds such the significant

Baillon's Crake or Latham's Snipe. It should also include areas that cannot easily be disturbed by humans or their pets. Any natural wetland over 0.5 ha in surface area should be designed to include island habitat.

* Incorporate a variety of floating, submerged and emergent aquatic plant species. This should include extensive areas of relatively shallow (<1 metre) water. Few aquatic species are able to grow in permanent water of greater than one metre depth.
* Create some ephemeral wetland areas. These will attract a different group of fauna and flora species.

Revegetation

* Use exclusively indigenous vegetation in all revegetation works in the wetland corridor. Locally indigenous wetland species are listed in Appendix 3 of the Urban Design Guidelines. This list should be regarded as a starting list from which appropriate species could be selected based on specific site conditions.
* Species proposed for plantings in the wetland corridor must be selected or approved by an appropriately qualified ecologist.

PRE-CONSTRUCTION

Development Application

Development Applications for the Amendment C2 Area should include:

* Detailed wetland and open space design specifications conforming to principles outlined in this EMP and the Urban Design Guidelines.
* Clear delineation of areas set aside for passive recreation and areas to be set aside for conservation.
* Designation of any interim management responsibility for all open space areas covering a five year period, and designation of permanent management responsibility.
* An Action Plan of ecological management actions required in the first 12 months following development, prepared by an appropriately qualified ecologist.

As previously stated, Development Applications within the Amendment C2 Area should:

* Survey the indigenous trees for precise location in relation to proposed public open space and wetland areas.
* Maximise the retention of indigenous eucalypts within public open space.
* Quantify the number of indigenous eucalypts that will not be retained.
* Provide sufficient space for (1) maturation of River Red Gums, (2) possible recruitment of more trees to the existing population, (3) placement of infrastructure and passive recreation areas away from trees.

Expertise

* Development of wetland design specifications must be done in consultation with appropriate expertise with a proven track record in successful establishment of natural wetlands.

FLOODWAY

An open space floodway will be constructed in the south-east quarter of the Amendment Area C2 providing floodwater runoff to retarding basins to be developed in the south-east corner.

Design and Goals

* Open woodland of red gums providing woodland habitat link for birds.

RETARDING BASINS

Melbourne Water proposes future development of retarding basins in the south-east of the area on Chapel Road. Although outside the scope of Amendment C2, the following recommendations are made for consideration by Melbourne Water:

* Maximise retention of remnant trees.
* Maximise the habitat values of retarding basins.

TATTERSON PARK

The best example of remnant red gum woodland in the Amendment Area C2 is within the boundary of Tatterson Park. These woodlands are important within the City of Greater Dandenong and are not replaceable. The City of Springvale Nature Conservation Strategy (1992) states that 'Remnant vegetation on Council reserves will be retained and reinforced.'

In the development plan for Tatterson Park Ernst (1999) outlines a 'precinct concept' for development of the park. The future layout of the park, and the facilities and services likely to be included are as yet unconfirmed. Specific recommendations for the future development of Tatterson Park are outside the scope of this EMP. However, it is hoped that a balance between intensive uses, and preservation of existing natural features can be achieved. The following recommendations are made for consideration by City of Greater Dandenong:

* Preserve the three major stands of red gums in the south of Tatterson Park.
* Connect these three remnants with open space.
* Provide for the natural regeneration of red gums within the open space between these three remnants to create a single red gum woodland.

REFERENCES

City of Springvale 1992, Nature Conservation Strategy of the City of Springvale.

Craigie N.M. (2000). "The Keysborough Concept Plan" - Hydrologic Impacts of Development in the Chapel Road Area: Submission to the Panel Hearing for Amendment C2. Neil M Craigie Pty Ltd, Waterway Management Consultants, Victoria.

Ernst J. (1999). Tatterson Park Development Plan for the New Millenium. City of Greater Dandenong.

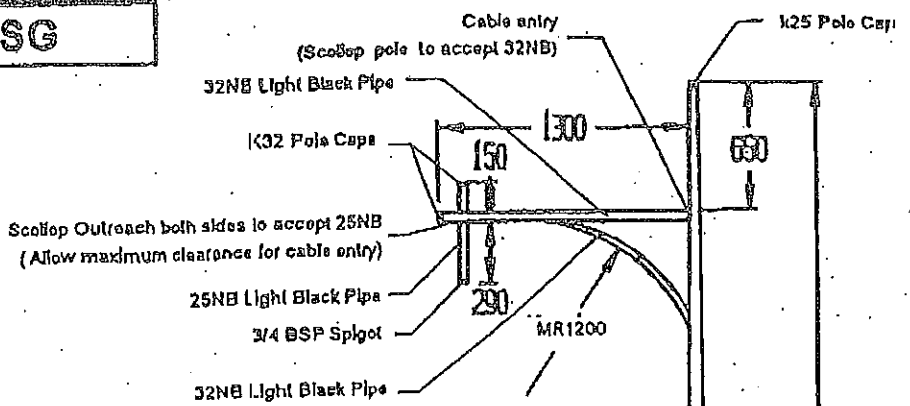
Yugovic J. & Delaney R. (2000). Flora and fauna assessment of Planning Scheme Amendment Area C2, Keysborough, Victoria. Biosis Research Pty Ltd, Victoria.

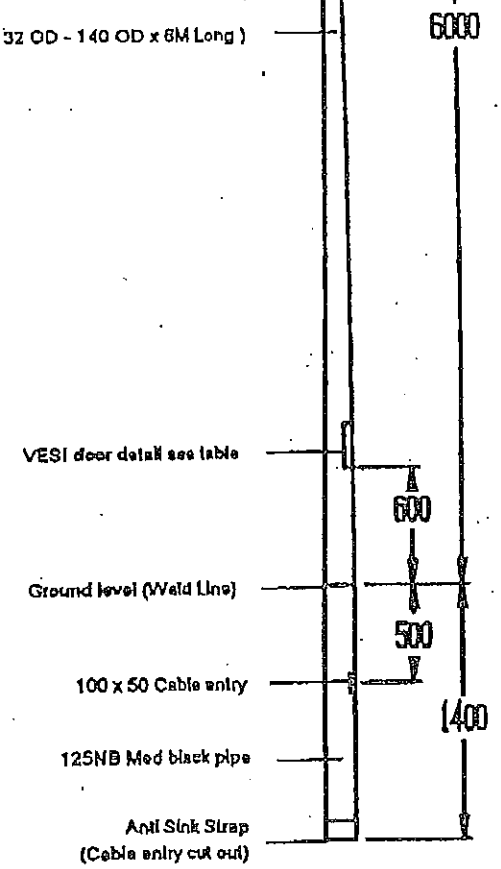
Watsons Pty. Ltd.
ABN: 47 637 509 613

Appendix 4

Standard Park Seating, Bollards and Street Light Fittings

DATA SHEET
VPTCM 5.0SG





JIGS: USE JIG VPTCM-OR TO ASSEMBLE OUTREACH TO POLE

NOTES:

1.ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

2.DRAWING IS NOT TO SCALE.

3.COLUMN DESIGN TO COMPLY WITH AS 1170 AND AS1796.

4.ALL WELDING TO CONFORM TO AS 1554.

5.GALVANIZING TO CONFORM TO AS 1650.

6.PAINT FINISH TO AS.2312
\TEGORY :LONG TERM.

DOOR DETAIL	QTY	DESCRIPTION
DOOR SIZE		320 x 80
DOOR JIG		DJ - CT - 18
DOOR TRIM	2	25 x 3 FLAT 310 LONG
DOOR TUNG	1	V.D.T.
DOOR LIP	1	V.D.L.
GEAR STRAP	2	V.D.G.S.-80
DOOR SOCET	1	V.D.S.
SCREWS		
DOOR	1	M6 Vesi Interrupter Hd
GEAR STRAP	1	M6 x 12 BR/CH HD
EARTH	1	M6 x 25 S/S BTN HD
	1	M6 S/S NUT
	1	M6 S/S 1/2 NUT
	1	M6 S/S SPRING WASER

CLIENT | QUANTITY | JOB/DRG NO | ISSUE DATE

SPIGOT/FITTING TYPE | EXTRA DRAWINGS REQUIRED | ISSUE NO

FINISH | COLOUR

SPECIAL NOTES

AMENDMENTS

A

DATE | SIGNED

VICPOLE PTY LTD

BOSTON

HERITAGE STYLE LUMINAIRE

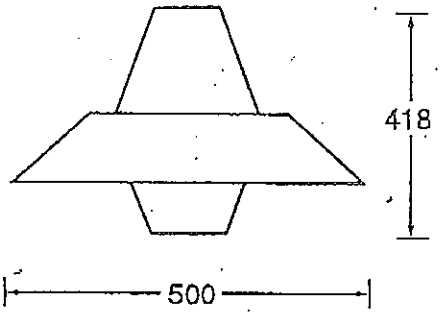
GEC LIGHTING

Specification

- Spun aluminium canopy
- Acrylic light-stabilised clear enclosure
- Borosilicate asymmetric glass refractor
- Integral control gear
- Choice of mounting arrangements – Boston 1 side entry, Boston 2 top entry
- Photo-electric switch operation. Acrylic threaded cover fully seals PE cell from weather
- Exterior finished G11 green
- Complies with AS1158.1-1986 Table 4.2 as a Type 4 luminaire
- Lamp HQL80W Mercury

Physical Data

All Dimensions in millimetres



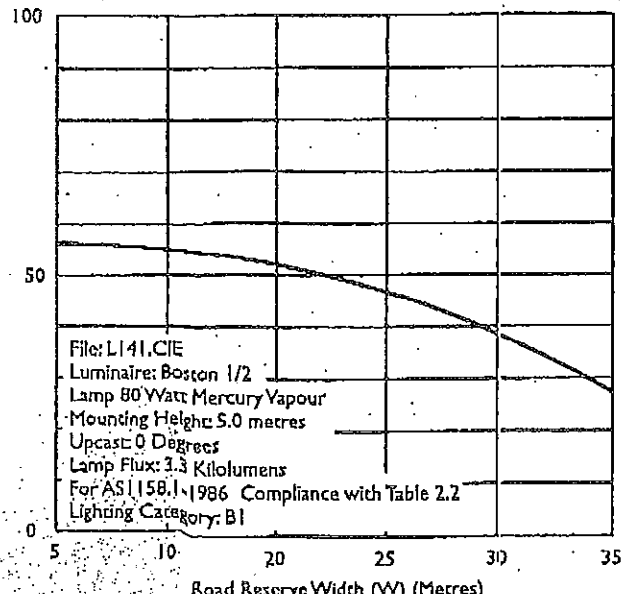
Made in Australia

Ordering Data

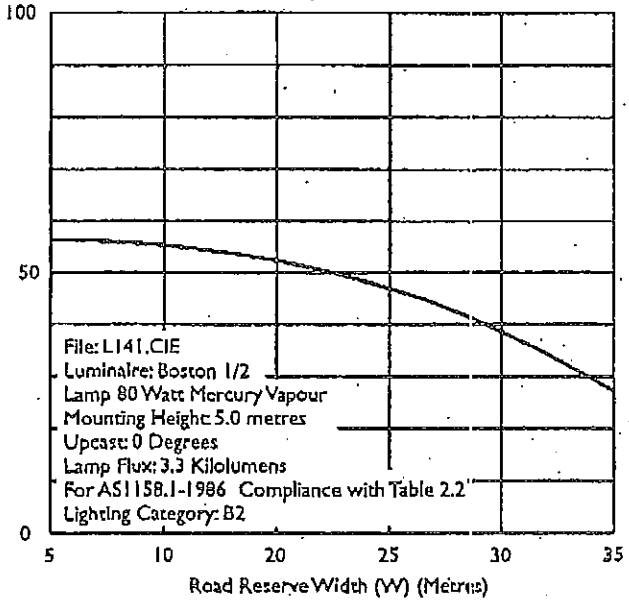
Note: Lantern is Top Entry

BOS2-80MPE (Top entry)

GEC Lighting Local Road Luminaire Spacing Graph Program
Maximum Spacing (Metres)



GEC Lighting Local Road Luminaire Spacing Graph Program
Maximum Spacing (Metres)



Victorian Regional Head Office
366 Boundary Road, Dingley 3172. Fax (03) 9558 2117

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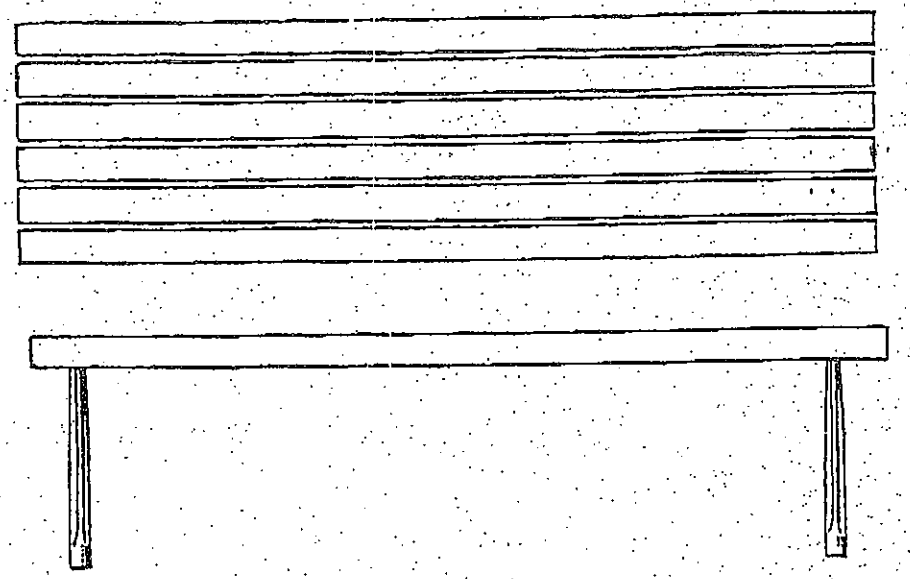
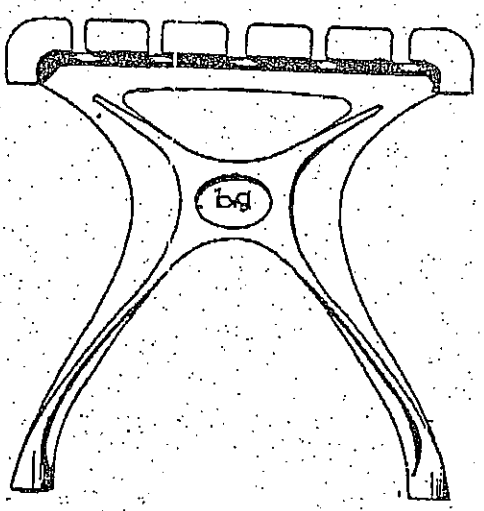
With our policy of continuous product development, we reserve the right to modify designs without notice.

Bench Seat Detail



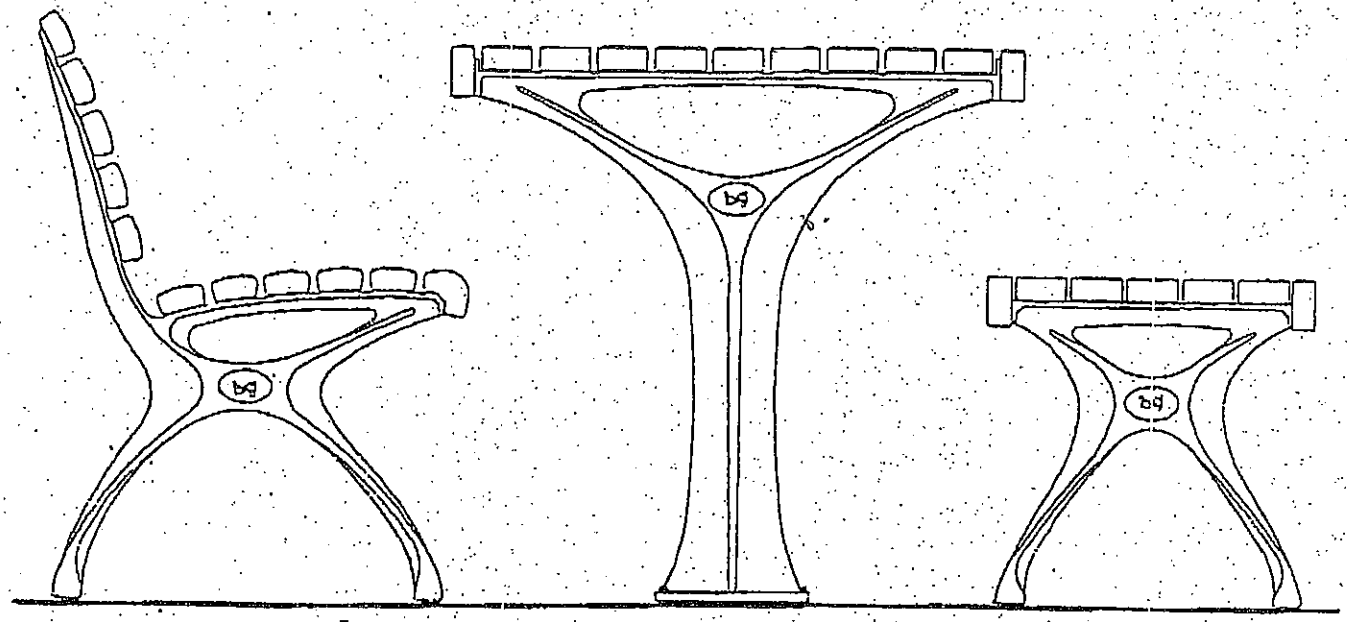


PRODUCT	BENCH SEAT
CODE BS1 X	Standard bench seat External with Concealed Fixing
Dimensions	1600 x 420 x 435mm high
Timber	Jarrah, Victorian Ash or selected hardwood
Finish	Clear Polyurethane (internal) Oil (external)
Base	Cast Aluminium, Polished or Powdercoated

Not to Scale

Timber: Jarrah Timber
Frames: Powder Coated Aluminium - Black

Picnic Table Detail

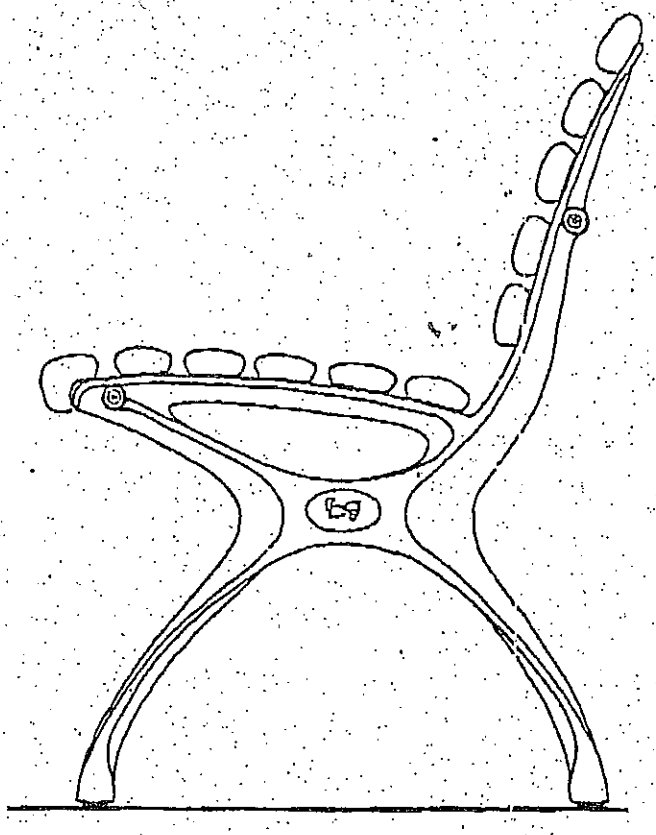


PRODUCT	PICNIC TABLE
CODE UT11X	Timber slatted table on Aluminium frame
Dimensions	1800 x 740 x 720 high
Timber	65 x 30 Pencil round Jarrah
Finish	Exterior grade oil
Frame	Cast aluminium- polish or powdercoat

Not to Scale

Timber: Jarrah
Frame: Powder Coates Aluminium – Black

Urban Bench Seat Detail

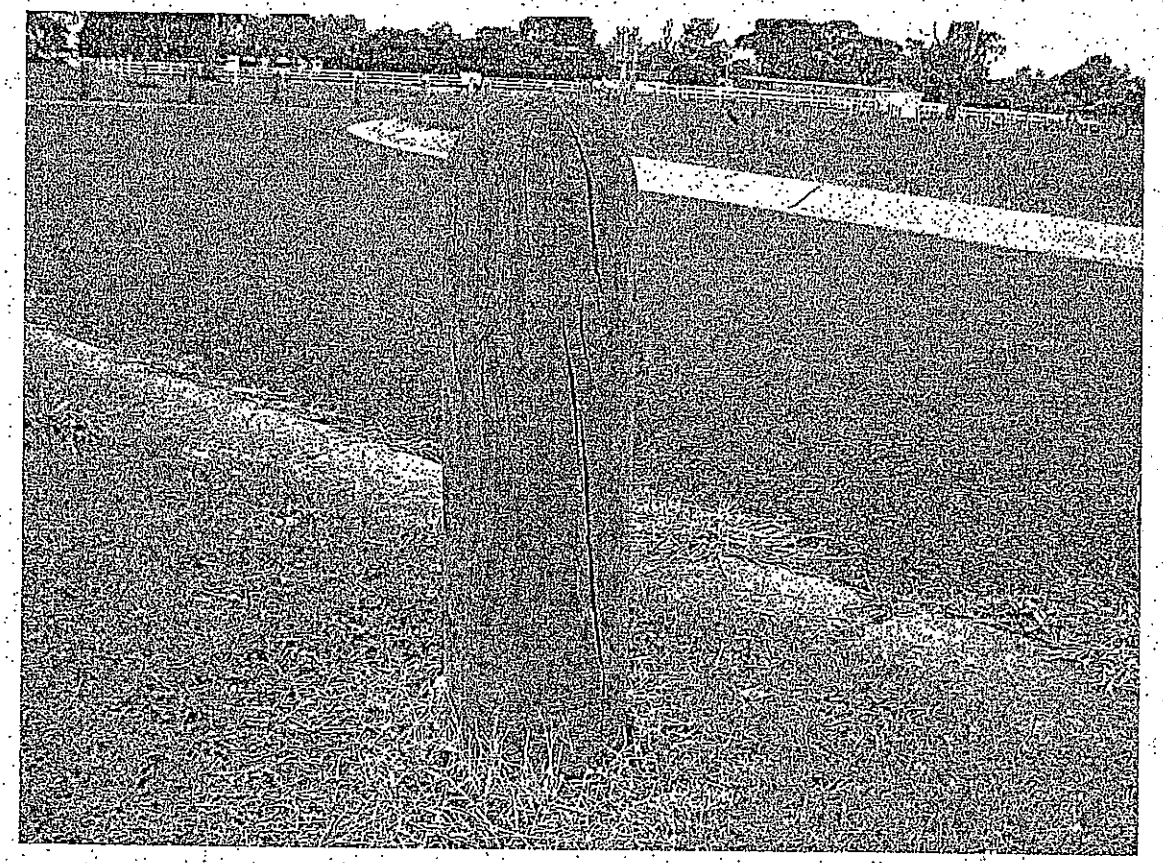


PRODUCT		URBAN SEAT - Timber and Aluminium
CODE	UST ....a X	Standard seat, no armrests with Armrests External, concealed fixing
Dimensions		1800 long x 570 deep x 770 high
Timber Battens		60 x 30 Jarrah, Vic Ash or selected Hardwood
Timber Finish		Clear Polyurethane
Frames & Armrests		Cast Aluminium, Polished or Powdercoated

Not to Scale

Timber: Jarrah
Frame: Powdercoated Aluminium - Black

Timber Bollard Detail



Material: Treated Pine
Height: 600mm