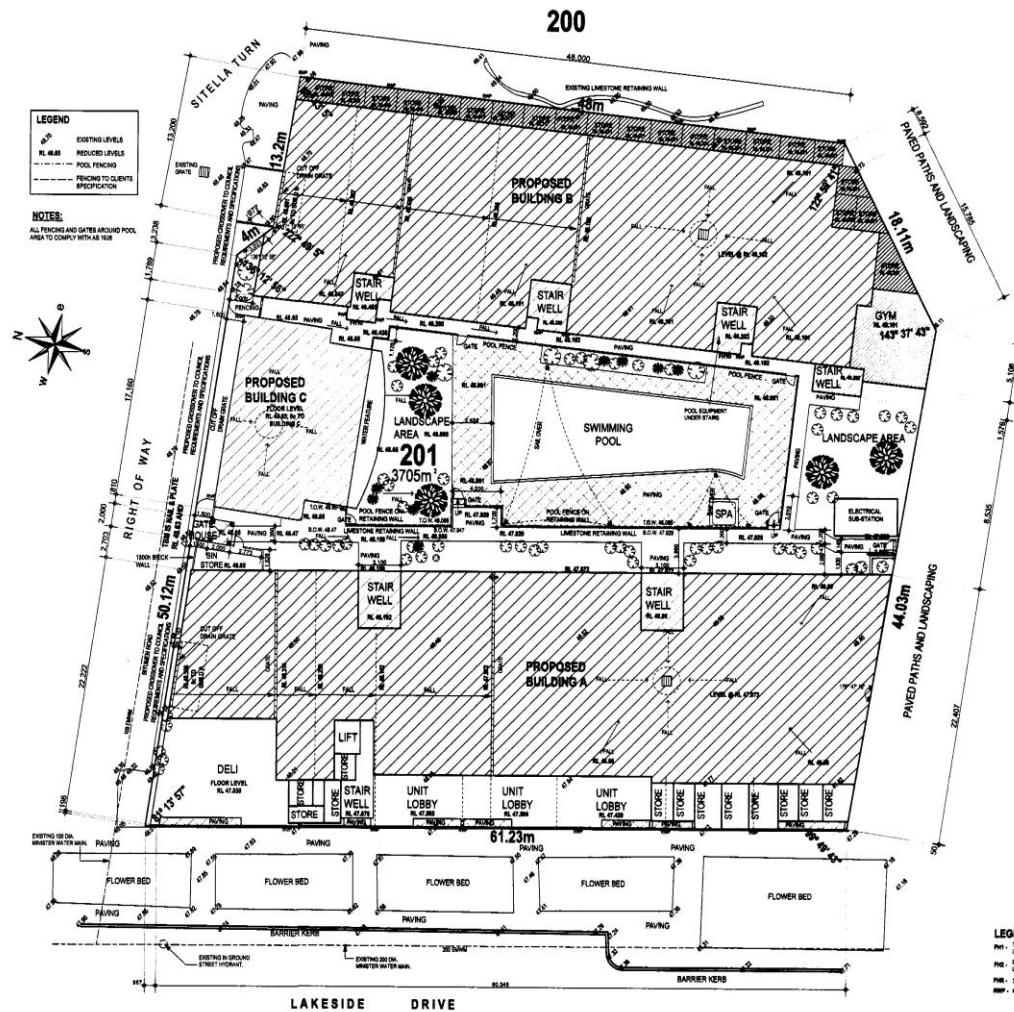




09/06/2016



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REVISION DESCRIPTION	DATE	REVISION DESCRIPTION	DATE	SITE PLAN

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THE ARCHITECT AND ENGINEER TO CONFIRM THAT THE
DRAWING IS IN ACCORDANCE WITH THE REQUIREMENTS
OF THE ACT AND REGULATIONS.

APARTMENT DEVELOPMENT
LOT 201 LAKESIDE DV
JOONDALUP

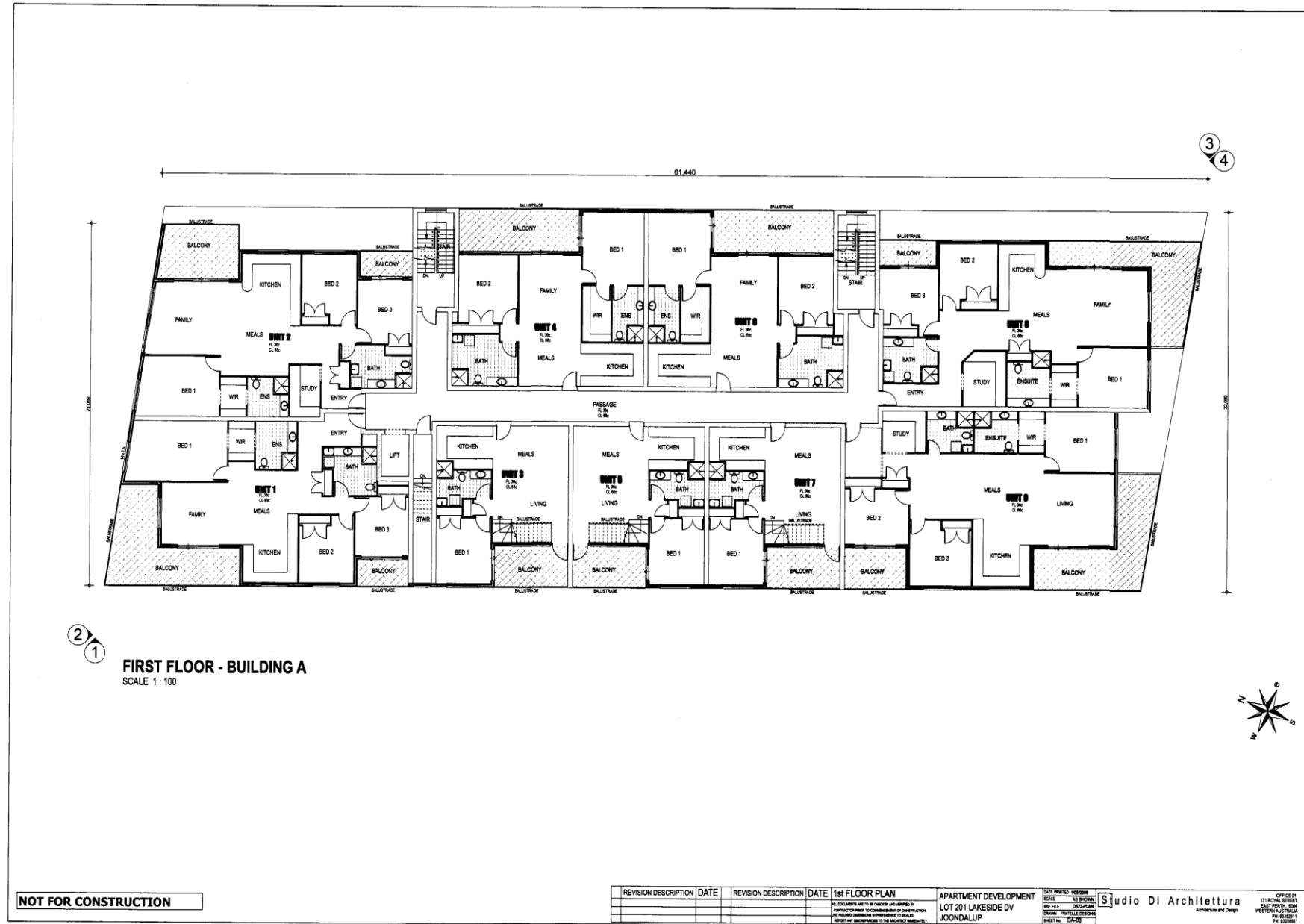
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DRAWN: PAVELLE DESIGN
CHECKED: PAVELLE DESIGN

Studio Di Architettura
Architecture and Design

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SUITE 10/11, 6004
WESTERN PARK, WA
6103
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FX: 0800 661 111



REVISION DESCRIPTION	DATE	REVISION DESCRIPTION	DATE	GROUND FLOOR PLAN	APARTMENT DEVELOPMENT LOT 201 LAKESIDE DV JOONDALUP	SITE PREPARED BY: ARCHITECTURE SCALE: AS SHOWN DWG FILE: STUDIO.DWG CLIENT: PRACTICE DESIGN PROJECT: D-0002	Studio Di Architettura <i>Architecture and Design</i>	OFFICE: 131 ROYAL STREET EAST PERTH WESTERN AUSTRALIA PER 60007 TEL: 9487 0000
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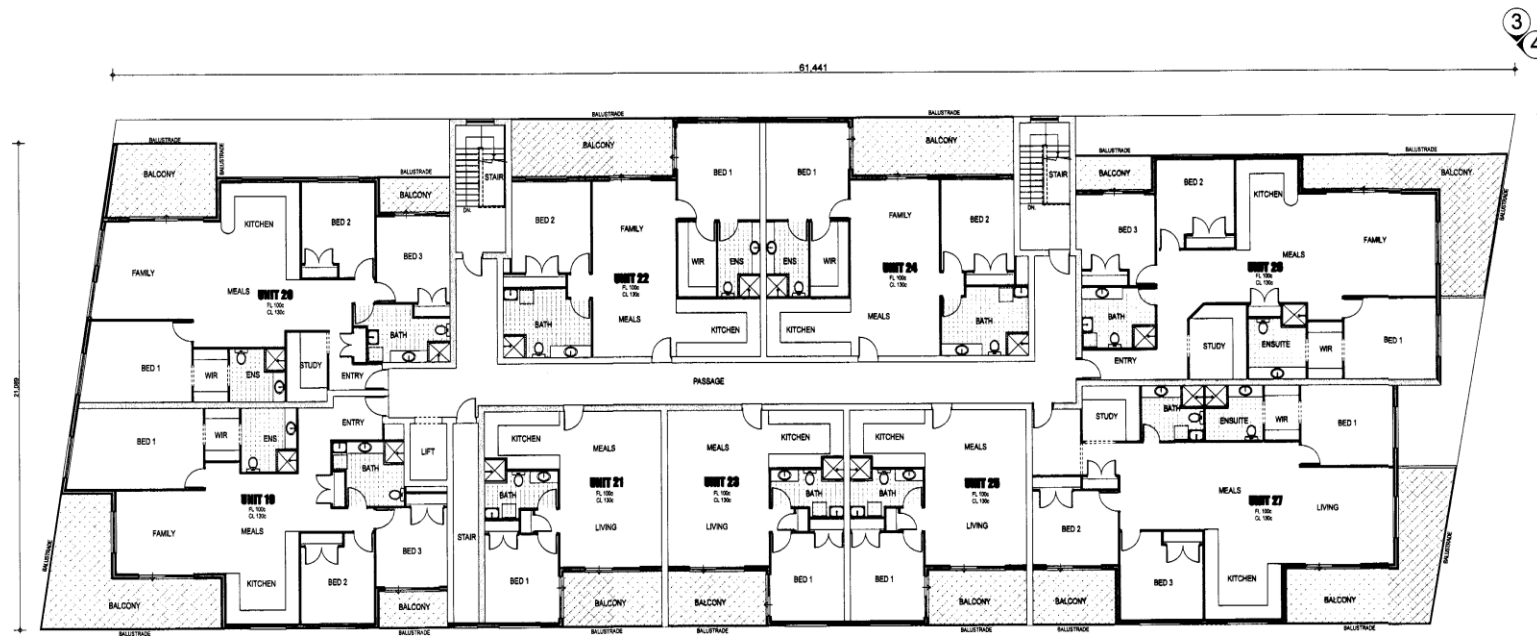


SECOND FLOOR - BUILDING A
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				ARE REQUIRED IN ADDITION TO THOSE REQUIRED BY THE	OWNER: FRANKLIN DESIGN	
				LOCAL ORDINANCES. SEE THE CITY OF CHICAGO FOR A COMPLETE	SHEET NO. 02-00	
					JOONDALUP	

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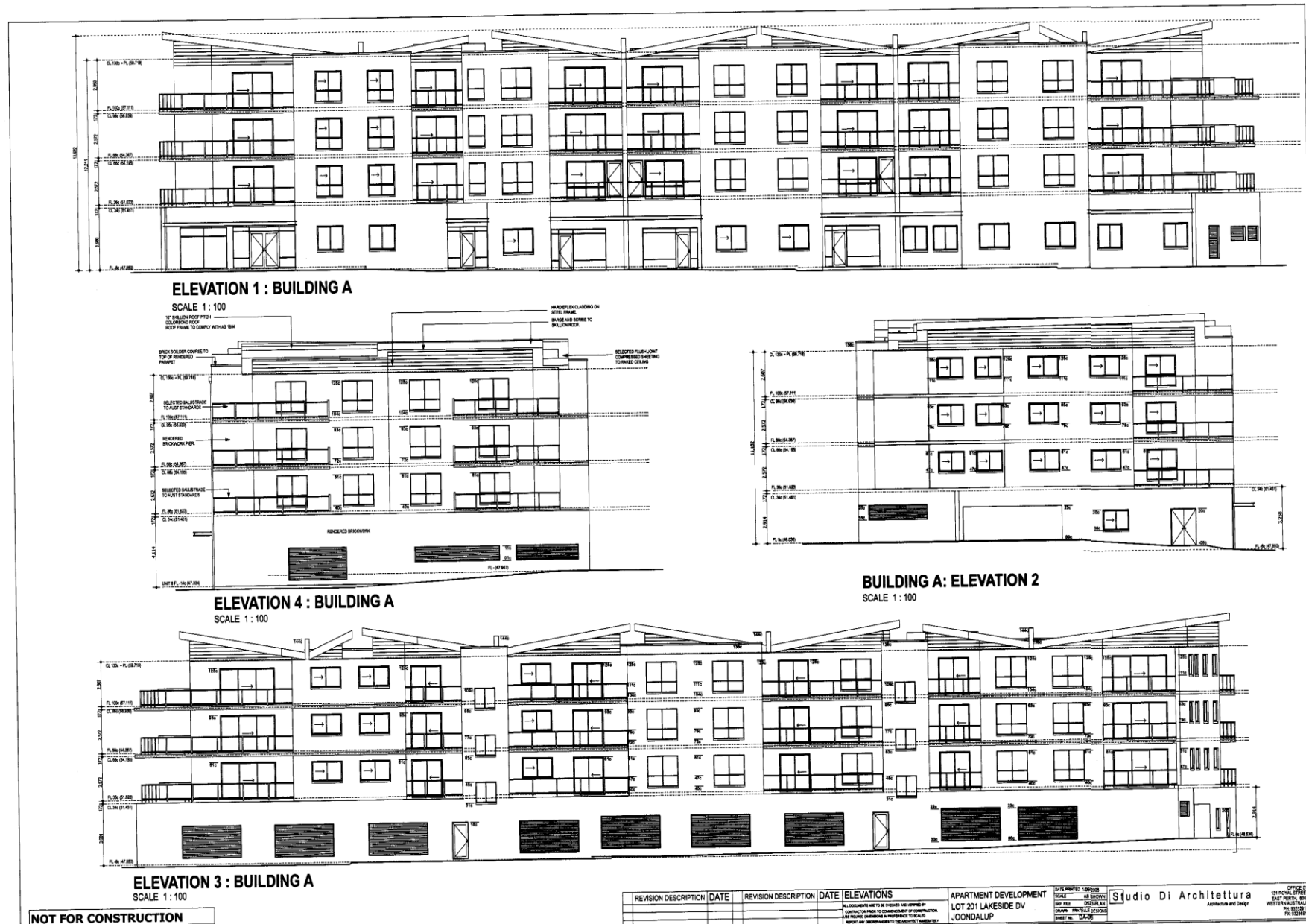


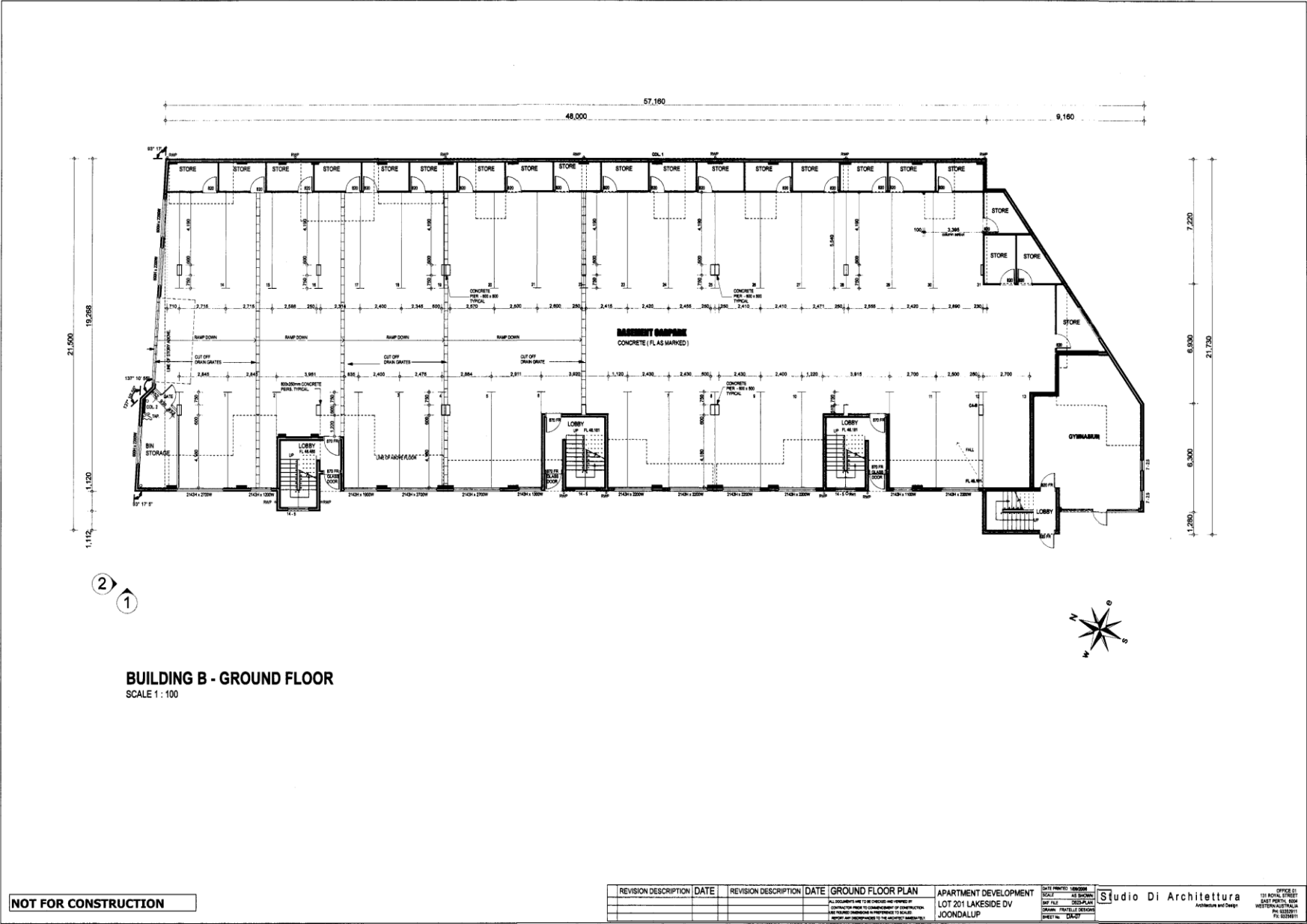
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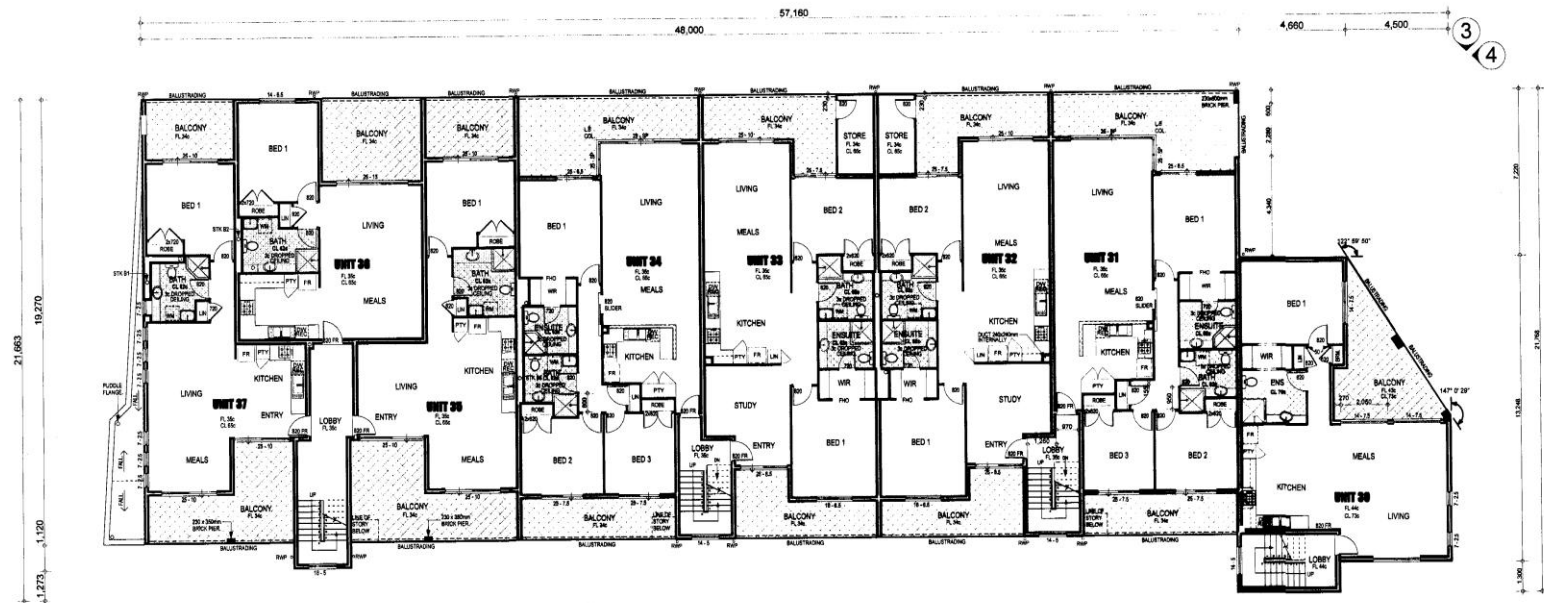


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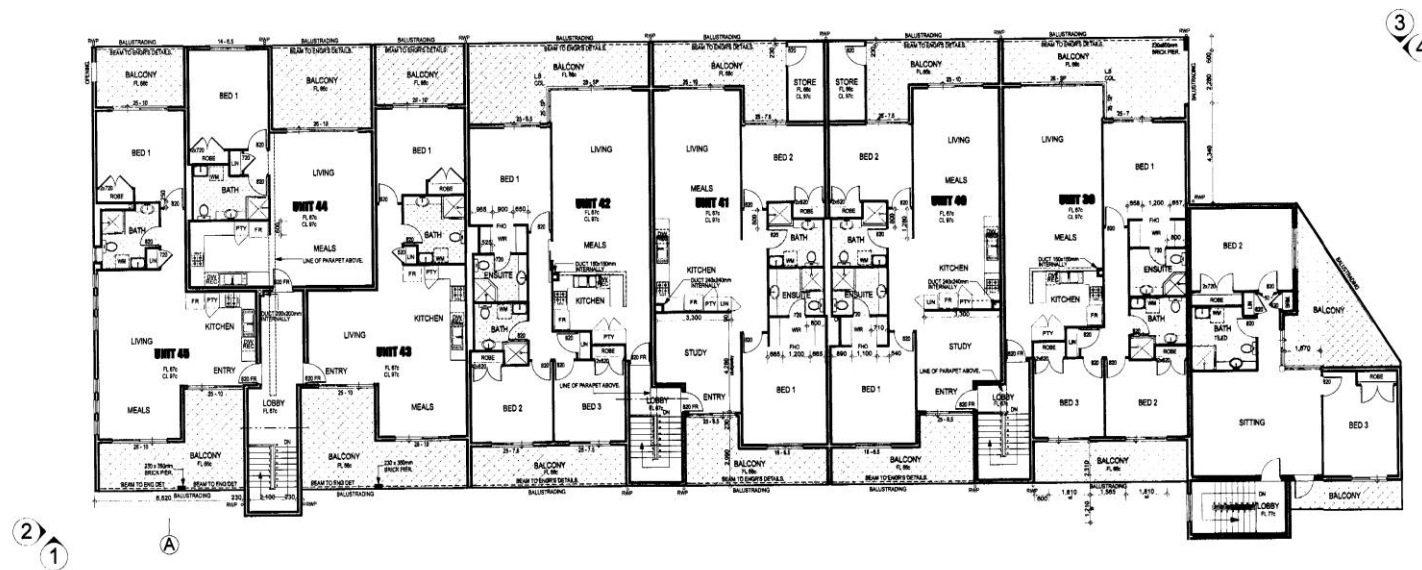




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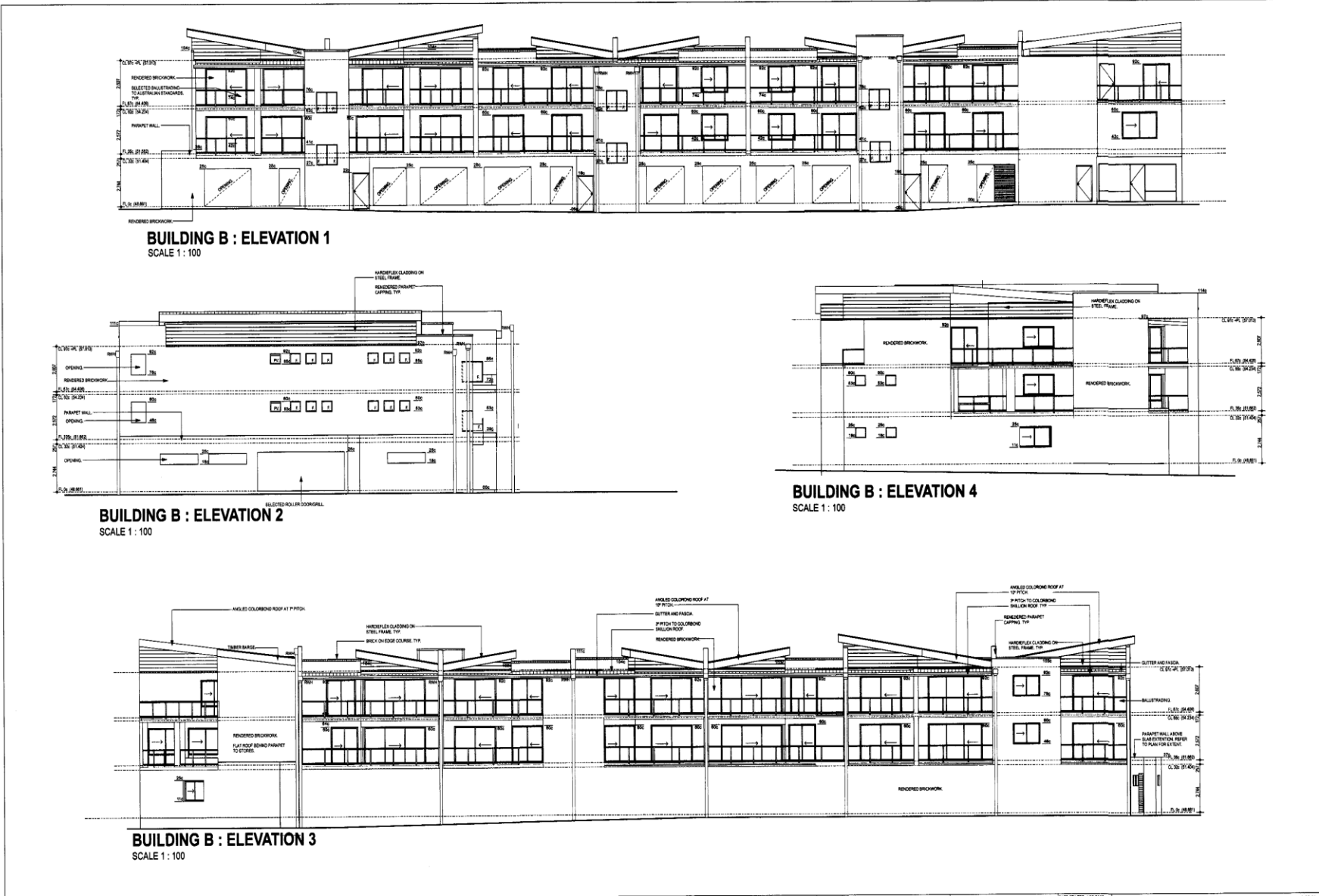


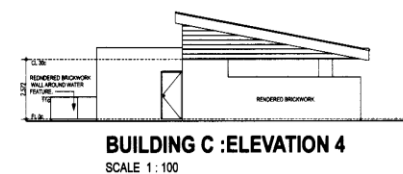
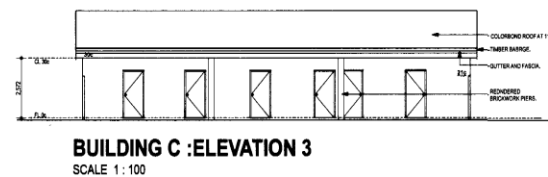
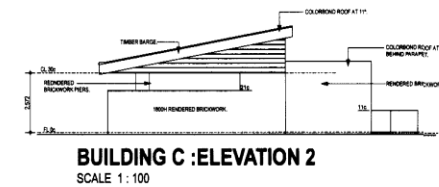
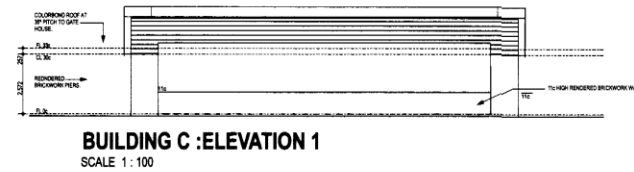
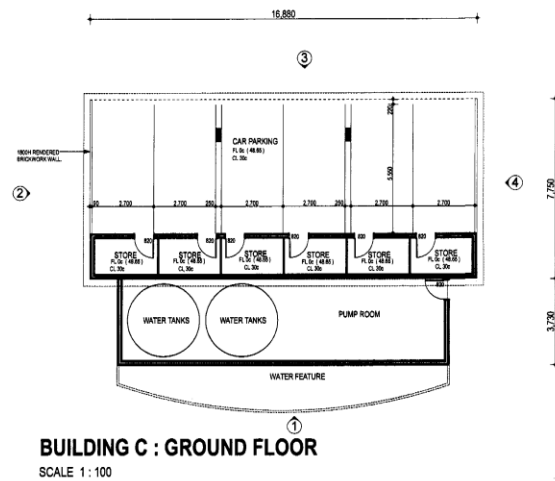
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SCALE 1 : 100



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**TRAFFIC AND SAFETY REVIEW OF THE
PROPOSED RESIDENTIAL APARTMENT
DEVELOPMENT AT LOT 201 LAKESIDE
DRIVE, JOONDALUP**

CITY OF JOONDALUP

27 September 2006

Revision 0

Document Control			Traffic & Transport Solutions			
Rev No	Date	Revision Details	Typist	Author	Verifier	Approver
0	27 September 2006	Draft	GM	GM		GM

**Traffic and Safety Review
(Residential Apartment Development, Lot 201 Lakeside Dr)**

City of Joondalup

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1. Introduction

1.1 Background

Traffic and Transport Solutions has been commissioned by the City of Joondalup to undertake a Traffic and Safety Review of the proposed residential apartment development at Lot 201 Lakeside Drive, Joondalup.

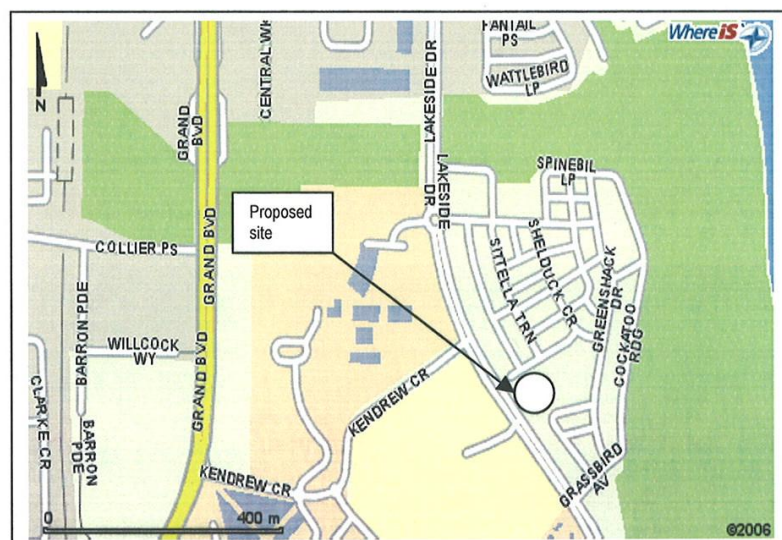
The proposed development comprises three separate buildings of one, three and four stories in height on the eastern side of Lakeside Drive and south of the Kendrew Crescent intersection. The proposal includes 42 multiple dwelling units and a 75m² convenience store fronting Lakeside Drive.

Access to the proposed development is via a laneway on the northern side of the development lot and connected to Sittella Turn and another laneway, which provides access to properties fronting both Lakeside Drive and Sittella Turn.

Lakeside Drive is classified as a District Distributor "B" road in the Perth Metropolitan Functional Road Hierarchy and Sittella Turn is classified as an Access Street. Both roads are under the care and control of the City of Joondalup.

The planning by the City of Joondalup for Lakeside Drive is for it to ultimately become a four lane divided carriageway and that vehicle access from adjacent residential properties be via intersections and not crossovers. This is to preserve the function and purpose of Lakeside Drive as a significant traffic carrier within the Joondalup CBD.

The posted speed limit on Lakeside Drive is 60 Km/hr and the General Urban Speed limit of 50 Km / hr applies on Sittella Turn and adjacent residential streets.



Source: (www.wheris.com)

Site Location

2. Existing Conditions

2.1 Existing Situation

Lot 201 Lakeside Drive is currently vacant land adjacent to a residential area and is located between Lakeside Drive and Lake Joondalup.

Access to this development site and the adjacent residential area from Lakeside Drive is via Shoveler Terrace to the north and via Grassbird Avenue to the south connecting to Sittella Turn and then into an existing laneway. There is no direct access permitted from the development site to Lakeside Drive.

Sittella turn is an unmarked two way Access Road with embayed parking and footpaths on both sides. The pavement width is 5.55 metres (kerb to kerb and not including the embayed parking bays). There is no vehicle access to the adjacent properties from Sittella Turn as this is provided via the rear laneways.

The laneway located between and parallel to Sittella Turn and Lakeside Drive and the laneway off Sittella turn adjacent to the proposed development is designated as Public Access Way and not Road Reserve. Both are sealed to 5.8 metres in width. However at regular spacings there are bollard mounted light fittings, which reduces the effective pavement width for through traffic to 4.8 metres.

A Public Access Way is a strip of land available either for use by the general public, or a restricted section of the community and may be created by subdivision, specific transfer or continued use over a period of years.

Rubbish collection for these residential properties is via the rear laneways.

All intersections in the vicinity are T-junctions without regulatory sign control as the operation is covered by the requirements of the Road Traffic Code.

There are no traffic volumes available from the City of Joondalup for Sittella Turn, Shoveler Terrace or the adjacent laneways. However, from the on site inspection and the review of the road system in the area it is considered that vehicular traffic on these roads is local with some delivery and building construction traffic. Certainly it is expected that the existing traffic volumes are well within the maximum traffic volumes considered appropriate for these Access Streets.

There have been no reported crashes for these roads over the past five years to December 31 2005.

The Department for Planning and Infrastructure's Liveable Neighbourhoods guide for subdivision planning is currently used by industry and government as the principle guide.

Liveable Neighbourhoods considers that laneways should generally be used as follows:

- *To provide rear parking access for small lots;*
- *Where lot widths are narrow;*
- *For medium density housing;*
- *For retail/commercial areas;*
- *To provide rear access to lots on busy streets;*
- *For development fronting open space in some circumstances.*

The indicative maximum daily traffic volume for a laneway is 300 vpd and a design speed of 15 km/hr.

Access Streets are provided to support short trips for local traffic moving in and between neighbourhoods.

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For Access Streets the indicative maximum daily volume is between 1000 and 3000 vpd depending on the road cross-section and layout.

3. Consultation and Site Inspection

The City of Joondalup briefed Mr Garry Mason of Traffic and Transport Solutions on September 25 2006 outlining what had occurred to date and provided him with a copy of the Planning Report to Council and the associated, proposed development plans.

Also on September 25 Mr Mason met separately with Mr Alan Stewart of Greg Rowe and Associates representing the developers to be briefed on the development proposal with regard to access for vehicles, pedestrians and rubbish collection.

Mr Mason and Mr Murray Ralph of the City of Joondalup met with Mr Greg Hall and two others representing the adjacent landowners on September 25 also. They outlined their concerns regarding traffic access to and from the development and these included:

- Additional volume of traffic in the laneway that runs parallel to Lakeside Drive.
- The additional traffic that would use Sittella Turn and Greenshank Drive.
- Safety for children crossing the local streets to Greenshank Park.
- Additional demand for on street parking in the vicinity due to visitors to the development.
- Currently all day parking occurs in Sittella Turn and this is considered to be related to the Police Academy and the Tafe College.
- Construction vehicle impact
- Servicing of the convenience store.
- Want to maintain the character and amenity of the area.

Mr Mason undertook a site inspection of the proposed development site and the adjacent road system on Monday September 25 and Tuesday September 26 2006.

4. Proposed Development

4.1 Site Vehicular Access

Access to the proposed development is via two crossovers from an existing laneway off Sittella Turn to service the two residential apartment blocks. In addition there are 6 car bays accessed directly from the laneway to building C, which is located between the two apartment blocks and opposite the laneway running parallel to Lakeside Drive.

4.2 Site Pedestrian Access

Pedestrian access for building A which fronts Lakeside Drive is via access points on Lakeside Drive, from the car park under the building or from the central area between the apartment buildings.

Pedestrian access to building B is from the laneway on the northern end of the site, from the central area between the two apartment blocks and the car park below the building.

4.3 Rubbish Collection

Rubbish bin waste disposal is proposed to require the individual bins to be wheeled out to the laneway for the garbage truck to empty. This will then require the garbage truck to enter the laneway alongside the development to access the rubbish bins and in turn the truck will then require an exit route either by reversing back out of the laneway into Sittella Turn, using the laneway running parallel to Lakeside Drive or via a new access onto Lakeside Drive.

4.4 Adjacent Road System

The adjacent laneway has an effective through traffic width of 4.8m, which is consistent with the requirements of the Department for Planning and Infrastructure's Liveable Neighbourhood Guidelines used to guide subdivisional development.

This laneway is connected to Sittella Turn and a second laneway running parallel to Lakeside Drive, however, there is no vehicular connection to Lakeside Drive.

4.5 Visitor Parking

It is not clear from the documents available what provision has been made for visitor parking. As the laneway is required for vehicular access to the development it is not appropriate for vehicles to park in the laneway.

4.6 Traffic Generation

The proposed development consists of 42 multiple dwellings including 15 single bedroom dwellings. In addition a 75m² convenience store fronts Lakeside Drive. On street parking is available on Lakeside Drive for drive-by customers for the convenience store, however, it is likely that most customers will be from this development and the adjacent residential area who would be expected to walk or cycle.

In assessing the likely impact of the proposed development it is necessary to assess the expected traffic generation that could be expected to occur.

There are no readily available traffic generation figures for proposed developments in Western Australia and therefore it is the industry practice to use the Roads and Traffic Authority NSW Guide to Traffic Generating Developments.

Section 3.3.2 of this Guide relates to traffic generated for Medium Density Residential Flat Buildings. For units up to 2 bedrooms it is expected that 4 to 5 vehicle trips per day would be generated per unit. For units of 3 or more bedrooms the number of daily vehicular trips per dwelling is expected to be between 5.0 to 6.5 trips.

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(Residential Apartment Development, Lot 201 Lakeside Dr)**

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Note: a vehicle trip relates to an outward or an inward journey, i.e. leaving the apartment complex is one trip and then entering it later is a second trip.

Considering the level of housing density, the availability of public transport on Lakeside Drive and the fact that some of the residents would be attending one of the academic institutions opposite it is likely that the lower end of the expected traffic generation rates would be appropriate.

Therefore the expected number of daily vehicle trips due to the apartments is expected to be in the order of 185 trips per day. Typically the morning or afternoon peak hour trips is 10% of the daily trips and therefore the peak hour vehicle trips would be expected to be in the order of 19 trips.

By way of comparison, if the upper limits of traffic generation were used then the total daily vehicle trips would be expected to be in the order of 236 trips.

Regarding the convenience store, it is expected that the main customers would be people from the apartment complex and the adjacent residential area. On this basis it is expected that these people would walk or cycle. Any passing trade would be generated via Lakeside Drive and therefore these vehicles would not enter the residential area. Commercial vehicles servicing the convenience store could either use Lakeside Drive or the under cover parking area under building A. Whilst the RTA, NSW guide does not have traffic generation figures for a convenience store it is not expected that there would be more than say 3 deliveries per day or 6 vehicle trips on average.

4.7 Traffic Assignment

There are three principle routes for people to access the parking areas associated with the development :

- Sittella Turn
- Greenshank Drive
- Laneway running parallel to Lakeside Drive.

The laneway running parallel to Lakeside Drive is designed for local traffic access to the abutting properties and not as through access. The abutting residential developments have their garage access directly onto the street with limited visibility when exiting and restricted turning facilities. Therefore, it is important from a traffic, road safety and amenity point of view to not have through traffic on this laneway. Ways to address this issue will be discussed further in the report.

Therefore the traffic accessing the car parks in the proposed development would be required to use Shoveler Terrace / Sittella Turn or Grassbird Avenue / Greenshank Dr / Sittella Turn to connect to and from Lakeside Drive.

Which route people will take depends on a number of factors but the principle one is where they are arriving from or where they are going to.

Assuming the split is 50 : 50 then an additional 96 vehicles per day would be expected on both routes. If the split were to be say 70% to the south and 30% to the north then the additional traffic volumes would be in the order 134 vehicles per day for the Grassbird Avenue route and 57 for the Shoveler Terrace route.

5. Traffic Issues and Considerations

5.1 Access and egress to the development

Vehicular access to the proposed development is to be via Shoveler Tce / Sittella Turn / Laneway or Grassbird Ave / Greenshank Dr / Sittella Turn / Laneway. These are all Access Streets with abutting residential properties and Greenshank Park. The local residents indicated that children frequently use Greenshank Park as a playground due to the small residential lot sizes precluding any significant play areas.

The proposed development is likely to generate in the order of 190 vehicle trips per day (including the convenience store deliveries) and these are likely to be split over the above two routes depending on where vehicles are coming from or going to. Although no traffic counts are available for these roads, it is considered from the on site observations that the additional traffic would not result in these streets being required to carry traffic volumes in excess of the limits specified in the "Liveable Neighbourhoods" Guide.

The layout of the development is such that off the laneway there are two crossovers servicing the two apartment block car parks and separate crossovers servicing the six individual car bays as part of building C. These crossovers in a short distance and onto a laneway could result in some traffic congestion at peak times. However, this is considered reasonable in that the laneway is short and has little other use.

Two vehicles would be able to pass comfortably at low speed except in the vicinity of the lighting bollards where one vehicle would need to give way to the other. Consideration should be given to alternative roadway lighting arrangements to remove the possibility of these bollards being damaged and becoming a maintenance issue.

5.2 Additional traffic using the laneway running parallel to Lakeside Drive

This laneway currently extends from the laneway adjacent to the proposed development northwards to Shoveler Terrace. As a result, there is the potential for some traffic travelling to and from the proposed development using this laneway rather than Sittella Turn. This would be an inappropriate use of the laneway and could create a safety hazard for people entering and leaving their residential properties and garages. Due to the proximity of the garage openings to the edge of the laneway people backing out are not able to see oncoming traffic until well out into the laneway. This is a major reason for laneways being designed for low traffic volumes and very low operating speeds.

In addition the property on the northeast corner of the intersection of the two laneways has a 2.1 metre high colourbond fence on its boundary. This fence restricts the available sight distance for a driver travelling south on the laneway and turning left into the laneway adjacent to the proposed development. This means that the left turning driver is not able to readily see an approaching vehicle until well into the left turn. This is currently not an issue due to the low vehicle usage of the laneway and lack of development on the southern side. However, it does require addressing with the increased vehicle use of this laneway.

These issues can be addressed in a number of ways such as speed humps, closure of the laneway at some point to prevent through access, changing of intersection configurations to prevent some movements or reconfiguring the access points to the proposed development to preclude the use of this laneway by those residents.

In considering the various options access for rubbish collection would need to be taken into account.

On the basis of the current development proposal it is considered that this laneway should have its connection to the laneway adjacent to the proposed development severed for vehicles either with

**Traffic and Safety Review
(Residential Apartment Development, Lot 201 Lakeside Dr)**

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kerbing or bollards. Pedestrian and bicycle access should be retained. Rubbish collection would require review. In this way the poor sight distance issue and the potential for through traffic in the laneway would be resolved.

5.3 Additional traffic on Sittella Turn and Greenshank Drive

As the proposed development has no direct access onto Lakeside Drive, vehicles are required to use the adjacent residential streets. It is estimated that in the order of 190 vehicle trips per day would be generated by the proposed development and that this would be distributed across the two routes available from the development site to Lakeside Drive. Although no traffic counts are available for the residential streets in question it is considered from site observations that the additional development traffic would not result in daily traffic volumes exceeding the maximum volumes expected of Access Streets. Therefore from a road hierarchy perspective the existing traffic volume together with the additional traffic generated by the development is within the intended design capacity and function of these roads.

5.4 Intersections of Shoveler Tce / Lakeside Dr and Grassbird Ave / Lakeside Dr

No traffic counts are available for these two intersections and no modelling analysis of the operation of these two intersections has been undertaken. However, it is clear from the site inspection that there is considerable spare capacity here and that the additional development traffic would be able to be readily absorbed without adverse impacts.

5.5 Visitor and convenience store parking

The local residents have identified a current issue of all day or longer term parking occurring in residential streets such as Sittella Turn. It is not clear from the proposed development plans provided as to what provision has been made for visitor parking. Whilst some embayed parking is available on Lakeside Drive there is the potential for visitors to the residential apartments to use streets such as Sittella Turn for parking. This situation would need to be monitored to ensure that the local residents and their visitors are adequately catered for regarding on street parking.

Whilst it is anticipated that the majority of the customers to the convenience store would walk or cycle consideration may need to be given to some short-term parking on Lakeside Drive to accommodate this if required. Parking for vehicles servicing the convenience store is provided under building A with a rear access door into the store.

The existing laneway adjacent to the proposed development site does not connect to Lakeside Drive but terminates just short of it. There is no provision for vehicles to turn around at the end of this laneway and there is also the potential for it to be used as defacto visitor or all day parking. This could be addressed by appropriate signage or removal of that section of road pavement whilst still retaining pedestrian and cycle access.

5.6 Garbage truck access

Rubbish trucks currently use the laneway running parallel to Lakeside Drive to collect the residential rubbish. Also it is intended in the proposed development to place the rubbish bins on the laneway adjacent to the development to be collected by the same garbage truck. Any closure of vehicle access between these two laneways would require an assessment of how this rubbish collection service could be then accommodated. This may require the use of drop down bollards, reversing of the garbage truck or manual collection of some garbage bins.

**Traffic and Safety Review
(Residential Apartment Development, Lot 201 Lakeside Dr)**

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5.7 Direct access to Lakeside Drive

Direct access to Lakeside Drive is not permitted from the development site or the adjacent laneway. This is to preserve the purpose and function of Lakeside Drive as a traffic carrier and reduce the potential for conflict. This is a strategic decision of Council and appropriate for a Distributor Road of the nature of Lakeside Drive. Any changes to this practice should only be done in special circumstances.

The laneway is designated as a Public Access Way rather than as road reserve and there are no truncations on the corner properties to improve sight distance for drivers and to facilitate the correct intersection design.

The provision of such an access raises a number of issues. A "left turn in" access would have an impact on the operation of Lakeside Drive as those left turning vehicles have to slow down in order to turn left and hence impact on following vehicles in Lakeside Drive. There is less impact for a left turn out access because those vehicles have to wait for a suitable gap in the traffic stream before they can enter Lakeside Drive.

Also some on-road parking bays in Lakeside Drive would have to be removed and with any additional access point there is always the potential for crashes to occur.

Any access provided is likely to also be used by residents in the immediate area rather than use Shoveler Terrace or Grassbird Avenue.

5.8 Servicing of the Convenience Store

The convenience store is proposed to be serviced from the carpark in Building A. In this situation this would require these vehicles to use the adjacent street system to access the convenience store. It is likely that some would use the embayed parking bays on Lakeside Drive to achieve their deliveries and therefore it is not considered that the few delivery vehicles per day to service the convenience store would have a significant impact on the traffic movements in the area.

5.9 Change of access to the proposed development.

As currently proposed, the development has a number of accesses onto the adjacent laneway and this then creates an issue of conflicting movements on the laneway and the potential for some vehicles to use the adjacent laneway. Much of this could be overcome if all vehicular access to the development site was in the vicinity of the northeast corner of the site near Sittella Turn. This would allow closure of the laneway adjacent to the site immediately west of a new access point and prevent vehicle connection to the laneway running parallel to Lakeside Drive.

However, this would require redesign of the proposed development to achieve this as there is no internal connection between the various car-parking areas on the site.

5.10 Construction vehicle access.

During construction of this development there will be many delivery and construction vehicles as well as workers vehicles associated with this project. It is envisaged that without access to Lakeside Drive these vehicles would have a significant impact on the adjacent residential street system for the duration of the project. On this basis it is recommended that a temporary construction access be provided for the duration of the construction period from Lakeside Drive.

6. Conclusion

The traffic and road safety evaluation of the access to and from the proposed development on Lot 201 Lakeside Drive has shown that there are a number of possible issues and options that need to be considered in order to improve the safety and amenity in the vicinity of this development.

There is a strong potential for some development traffic to use the laneway parallel to Lakeside Drive for access to Lakeside Drive. In addition the colourbond fence on the property on the northeast corner of the intersection of this laneway and the laneway adjacent to the development severely restricts sight distance and creates a safety issue with the increased traffic volumes. To overcome this, a vehicle closure of the laneway running parallel to Lakeside Drive at its junction with the laneway adjacent to the development is recommended. Pedestrian and bicycle access should be retained. However, this will require rubbish collection practices to be addressed as this impacts on the current route of the garbage truck.

The section of the laneway adjacent to the proposed development closest to Lakeside Drive does not have provision for vehicles to turn around and has the potential to become an unintended parking area. Consideration should be given to removal of the road pavement in this area to prevent parking here whilst at the same time maintaining pedestrian and cycle access.

The lighting bollards in the laneway adjacent to the development should be reviewed to consider options that have less impact on the available laneway width.

A temporary access for construction vehicles to the development site should be considered off Lakeside Drive for the duration of the construction period in order to minimise the impact on the adjacent residential area.

The potential for visitors to park in the adjacent street system will require consideration along with the all day parking from students at the education complexes on the other side of Lakeside Drive.

Direct access from the laneway onto Lakeside Drive was raised by the local residents as a means to reduce traffic impact on the residential area. Council has quite rightly prevented property access onto Lakeside Drive to preserve its purpose and function as a traffic carrier.