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PROJECT AUTHORITY
BY

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**Development Design
Guidelines For
Structures Above or
Adjacent to the
Graham Farmer
Freeway Tunnel
Northbridge**

Issue 18/07/2002

MAJOR PROJECTS DIRECTORATE

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1. Introduction

Main Roads Western Australia (MRWA) is responsible for the Graham Farmer Freeway bypass from Mitchell and Kwinana Freeways in the west, to Great Eastern Highway and Orrong Road in the east.

The Graham Farmer Freeway passes through a tunnel in Northbridge, which has been designed to allow for future re-development on land above it. To protect the structural integrity and operation of the tunnel, development has to meet certain design and construction requirements.

The requirements effecting development or modifications to buildings over and adjacent to the tunnel are incorporated as either covenants or easements on land titles or as planning conditions. The following guidelines describe these requirements and apply whenever a Development Application is required to be submitted to a planning approval authority. Implementation of these guidelines ensures that the integrity of the tunnel and its operation is maintained and that there is minimum impact on developers.

1.1 The Tunnel

The tunnel is located wholly within its own land lot and is held on a crown land title. The boundaries of the tunnel lot are generally 250mm on top and two metres on either side of the tunnel structure. The depth of fill above the tunnel varies along its length from 0.7m to 4.5m. Land above the tunnel therefore has a boundary limiting its depth, which has the same legal implications as the surface boundaries. See Figure 1.

In setting the requirements for the design of the tunnel MRWA has taken into account the redevelopment over the tunnel and the type of vehicle use the tunnel will accommodate. For example the tunnel has been built to meet a minimum design life of 150 years. This means that the durability of the elements in the construction of the tunnel has have been taken into consideration in their selection. To provide assurance that the durability aspects of the design were adequately addressed the Contractor was required to prepare a Durability Plan and obtain independent verification of his design.

The tunnel has been designed to allow for the passage of vehicles carrying dangerous goods and loads of explosives in risk category 1 as defined by the Department of Minerals and Energy even though these vehicles are prohibited from using the tunnel. The tunnel structure has therefore been designed and built to withstand an explosion involving these types of vehicles. The primary tunnel structure has a fire rating of not less than four hours and is supported by a fire deluge sprinkler system that will limit the intensity of any fire. The thickness of the walls of the tunnel is between 600 and 800 mm and the roof almost 1 metre thick.

The tunnel has been designed to ensure that noise and air quality requirements of the Department of Environmental Protection are met. A program to regularly monitor air quality and noise has been established to ensure compliance with the standards. The tunnel is fully covered by video monitors and the tunnel control centre is manned 24 hours per day.

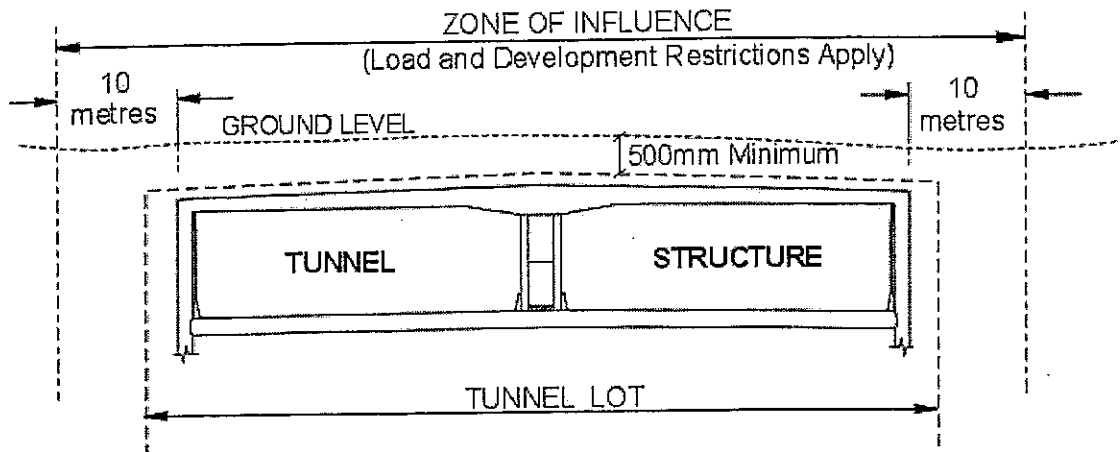


Figure 1

1.2 Development over the Tunnel

Development either above or within 10 metres laterally of the tunnel walls may impact the tunnel. This area is described as the "Zone of Influence" and is illustrated in Appendix A. Within this zone MRWA will allow the construction of properties with building loads equivalent to three-storey commercial or residential buildings, subject to the approval of design and construction techniques.

Development applications will be assessed on merit against the guidelines described in section three. MRWA will also consider issues that may not have been foreseen when these guidelines were developed.

Developers must take the structural capacity and function of the cut and cover structure of the tunnel into account. Assurances must be given that the function and safety to road traffic or structure is not compromised. During development MRWA may monitor construction to ensure compliance with these guidelines.

Associated with the tunnel operation there are a number of structures above the tunnel. These include ventilation buildings located at each end of the tunnel, escape stairs located east of William Street and a ventilation pipe from a sump located west of William Street. A control building is also located adjacent to the eastern ventilation building, west of Lord Street, in Newcastle Street. There are easements associated with these facilities to ensure that the operation of the tunnel is maintained.

1.3 Disclaimer

This document is only a guide. Legal aspects relating to development on or adjacent to the tunnel are being managed by the use of covenants and easements on the individual land titles and therefore do not form part of this document.

2. Explanation of Terms

These guidelines have been developed to protect the integrity of the tunnel. The requirements are also being implemented through Positive and Restrictive Covenants and Easements, which have been placed on each individual land title located directly over and adjacent to the Tunnel.

The following provides a brief explanation of the terms used in these Guidelines and the Covenants and Easements. The actual requirements are detailed in Section 3.

2.1 Zone of Influence

This is the surface area above the tunnel and adjacent area within a notional line 10 metres either side of the tunnel walls which may be impacted by development. The Restrictive and Positive covenants generally apply to the whole of this area. The Zone of Influence is shown in Appendix A.

2.2 Ventilation Area

This is the surface area within the redevelopment area adjacent to the east and west ventilation buildings and mid tunnel sump ventilation pipe. The ventilation areas are shown in Appendix B.

2.3 Restrictive Covenants

Restrictive covenants define the restrictions on development, for example the maximum height of a building or the maximum load that can be placed on the tunnel.

2.4 Positive Covenants

Positive covenants require the developer to undertake some action such as providing certain building certificates or indemnity to MRWA.

2.5 Easements

The easements are provided to allow access by MRWA to inspect development during construction and to allow for the effective operation of the tunnel and the environmental effects of these operations around the ventilation buildings.

2.6 Ventilation Easements

The purpose of the Ventilation Easement is to give notice to any occupier that MRWA can emit fumes in the ventilation area but only to the approved Department of Environmental Protection standards as described below.

The Tunnel structure and air extraction facilities have been specifically designed to ensure that Environmental Standards on air quality are adhered to. Air quality is monitored to ensure that vent emissions comply with these Standards.

Exhausted fumes from the ventilation buildings have to be less than the following standards:

- maximum one-hour average pollution levels of 25-parts per million carbon monoxide and
- 160-parts per billion nitrogen oxide.

2.7 Mid-Tunnel Sump Ventilation Easement

The purpose of the mid-tunnel sump ventilation easement is to give notice to any occupier that a vent pipe from the sump constructed below the tunnel is located west of William Street. The sump is vented to the atmosphere similar to most drainage systems.

An easement has been placed on the certificate of title for the land around the vent pipe to ensure that development is in accordance with the Sanitary and Plumbing Drainage Code. This code prohibits any building, or any part of a building, to be constructed within 3m of the Mid-Tunnel Sump Ventilation Shaft or any air duct or air intake to be within 5m of the Ventilation Shaft.

3. Design Guidelines

3.1 Loadings

The Northbridge tunnel has been designed with load limits to typically allow for the support of three storey commercial or residential buildings. The load limits apply at the roof level of the tunnel and typically accommodates the backfilling over the tunnel to natural surface plus the load associated with a three storey building structure.

3.1.1 Building Loads

The Developer must engage a structural engineer experienced in bridge design to confirm that design loads from the building onto the tunnel do not exceed those specified in the design drawings in Appendix C.

The structural engineer must provide an accurate 'run-down' of the building loads to the foundation level and check that the resulting bearing pressure does not exceed the allowed design loads at tunnel roof level.

There is some scope for the distribution of loads to an area of the tunnel larger than the area of the footing when the tunnel roof adjacent is not loaded. Such assessment can only be undertaken by the structural engineer.

If the foundation system is spread over the boundary of the tunnel structure, differential settlement issues must be taken into account.

If a piling system is proposed, it must be assessed by the structural engineer to determine if the impact on the tunnel is acceptable. Systems should be non-displacement, bored piling systems, as driven piles induce significant stresses resulting in soil heave and vibration that might affect the tunnel structure or function.

3.1.2 Adjacent Excavation / Compaction

The Developer must fully detail any excavation or compaction adjacent to the tunnel lot, as these will change the applied forces from the surrounding soil envelope and may affect strength or stability of the tunnel.

If excavation is required, temporary works to reduce impact on the tunnel structure must be used. Compaction methods must minimise changes in soil stress around the tunnel.

3.1.3 Construction Methods

Construction loadings must be checked by an engineer. For example the storage of construction materials, or the use of heavy vehicles, must be considered when ensuring design loads are satisfied. The building designer must be aware of such limitations to construction procedures.

3.1.4 Dynamic Loading

If vibration machinery is used, vibration isolation and dampening must be ensured. The design and construction techniques should also consider fatigue loading to the tunnel structure and its associated operating systems.

3.2 Protecting the Tunnel Structure

To ensure the components of the tunnel are not compromised in any way from corrosion, water seepage, etc, the following requirements must be met:

3.2.1 Soil Cover / Clearance from Tunnel

The soil 250mm above the tunnel roof is part of the tunnel 'lot' and must not be breached. This precludes the removal of soil fill and direct fixing to the tunnel in normal circumstances. Such fixation could compromise waterproofing membranes or finishes and result in a reduction in cover to reinforcement for the concrete tunnel.

In special circumstances, MRWA **may** consider direct attachment to the tunnel structure but penetration of the tunnel roof or walls is not allowed. A direct approach to MRWA outlining all the details of the proposal should be made in the first instance if loading direct to the tunnel is being considered.

3.2.2 Services

All services to the building or development must be isolated from the tunnel structure beneath. Due to the shallow soil cover, services must be protected to ensure there is no danger to the tunnel structure or the community.

3.2.3 Building Use

Materials that could damage the tunnel cannot be used or stored. This includes corrosive substances that may damage the concrete structure, water-proofing membrane or finishes.

3.2.4 Tunnel Function

The operation or function of the tunnel must not be compromised. This includes the control building, ventilation building, escape exits and vent for the mid tunnel sump located approximately 80 metres west of William Street.

As part of this requirement, the height of buildings in the ventilation areas cannot exceed the height of the existing ventilation buildings. This limits buildings around the western ventilation building to a AHD of 32.5m (ground level approximately AHD 16.9m) and to a AHD of 25.9m within the Eastern Ventilation Area (ground level approximately AHD 10.5m).

No building, or any part of a building, can be constructed within 3 metres of the Mid-Tunnel Sump Ventilation Area, and any air duct intake within 5 metres of the Mid-Tunnel Sump Ventilation Shaft.

3.2.5 Drainage

Due to the limited cover over the tunnel all stormwater must be disposed of into the regional drainage system. To reduce the risk of pipe failure affecting the tunnel, the extent of drainage piping adjacent to the tunnel should be minimised.

Landscaped areas should incorporate drainage systems to draw rainfall and irrigation water away from the tunnel structure.

3.2.6 Imported Soils

Imported soils must be non-aggressive to the satisfaction of the structural engineer.

3.2.7 Original Temporary Works

Removing temporary works from the original tunnel may cause adverse effects. Temporary propping or piling within the tunnel lot that was used for construction and which has been left in situ will require MRWA's approval before removal.

3.2.8 Inspection During Construction

The structural engineer must monitor construction regularly to certify the above conditions have been met.

To verify compliance, MRWA can inspect a building at any time throughout construction, in order to determine whether its requirements are being met. The building inspection will be undertaken in a manner that causes minimum disruption. Except in an emergency, seven (7) days notice of the inspection will be given by MRWA

3.2.9 Indemnity

The land owner shall indemnify MRWA for any damage arising out of activities undertaken either during or after development.

If damage to the tunnel occurs as a result of the developer breaching the guidelines then the developer is responsible for costs associated with the repair..

3.3 Indemnification of Main Roads WA from Tunnel Operational Impacts

The tunnel is a unique operating environment. It is a "live" operating entity and makes some imposition on the area immediately around it.

3.3.1 Acoustic / Vibration Isolation

Noise and vibration testing along the tunnel was taken prior to and following opening of the tunnel to traffic. The testing indicated that vibration levels from road traffic in the tunnel have made negligible difference to the existing vibration levels in the area. The vibration levels were extremely low and the land above the tunnel is acceptable for either residential or commercial development.

As a precaution however the Developer must ensure the building meets the current Statutory Guidelines for noise and vibration.

4. Application Process

All applications for development within the zone of influence on the tunnel structure must be forwarded to MRWA for consideration as part of the approval process for development.

Information required by MRWA includes the following:

- Plans certified by an engineer or with appropriate qualifications of the development stating that:
 - The work required to construct the building including earthworks, compaction, storage etc will not exceed the load limits;
 - The building when constructed in accordance with the plans will not exceed the load limits; and
 - Any works carried out for the construction of the building will not impose dynamic loadings which exceed the load limits.

- Plans certified by an engineer :
 - Showing the location of drainage services;
 - Describing design features to contain and collect stormwater run-off and divert into the drainage system;
 - Certifying that the building development or the works undertaken during construction will not encroach into the tunnel lot; and
 - Certifying that the building complies with all written laws and applicable standards and guidelines relating to noise and vibration.

MRWA is required to respond within 42 days to satisfy statutory requirements. Approval from MRWA is required before development can proceed.

Appendix A

***Zone of Influence for the Graham Farmer Freeway
Tunnel***

NEWCASTLE

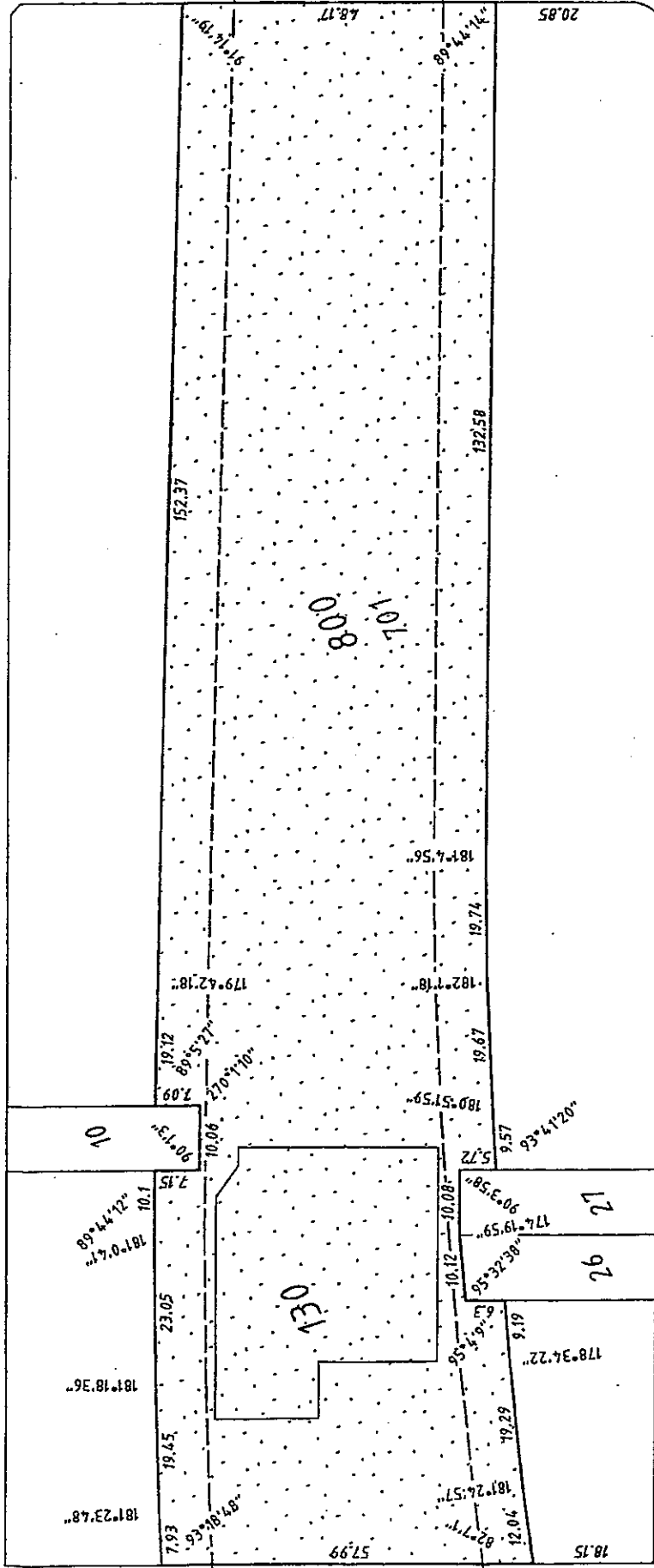
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STREET

STREET

FITZGERALD

PALMERSTON

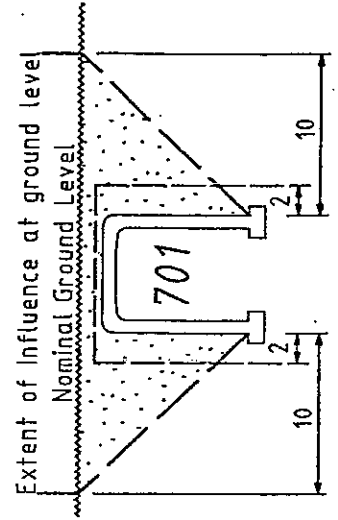


ABERDEEN

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**ZONE OF INFLUENCE
OVER LOTS 130 & 800
ON PLAN 22580**

800



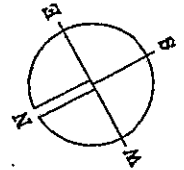
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M²Mullen Nolan
 E PARTITION SURVEYORS PTY LTD
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2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
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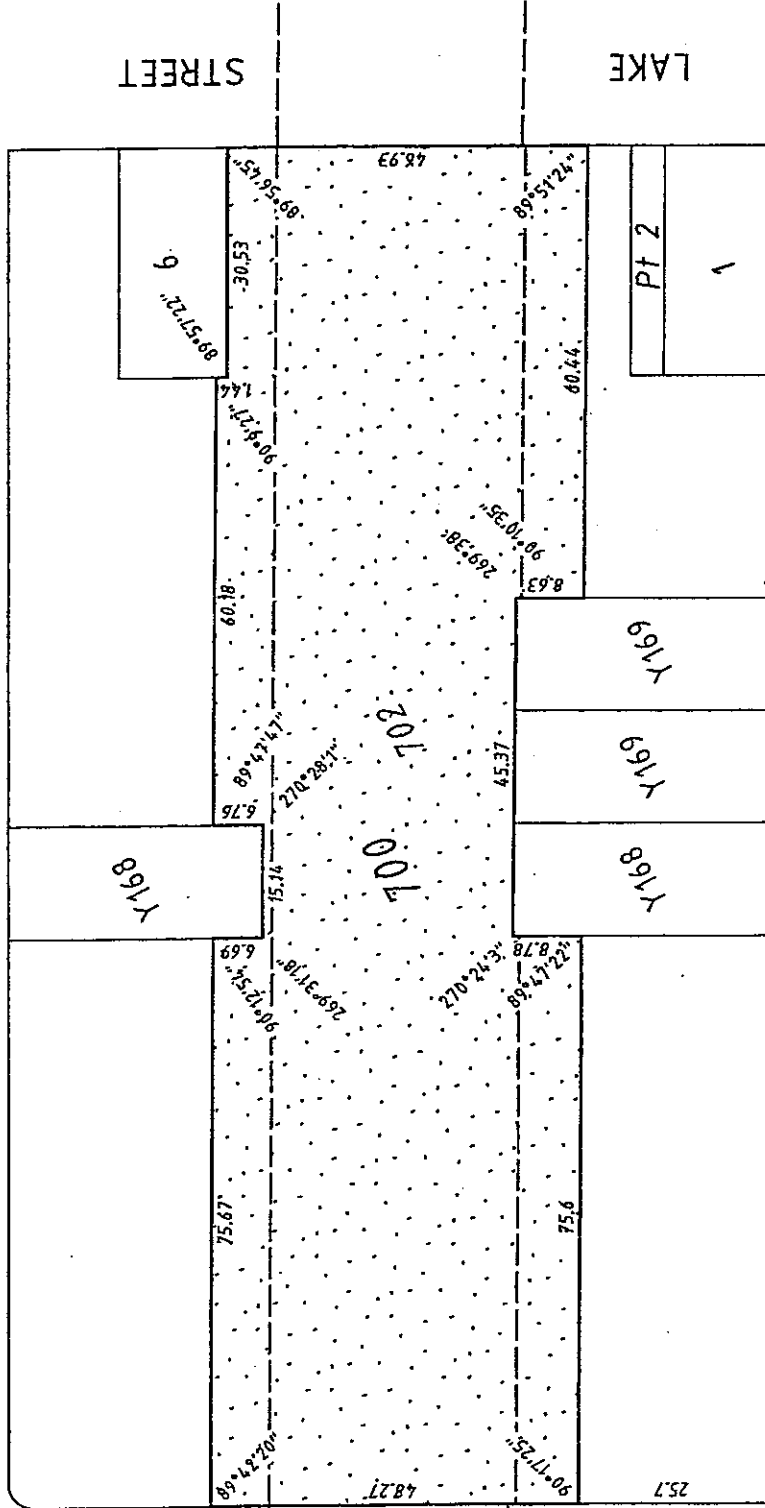
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NEWCASTLE

STREET



STREET

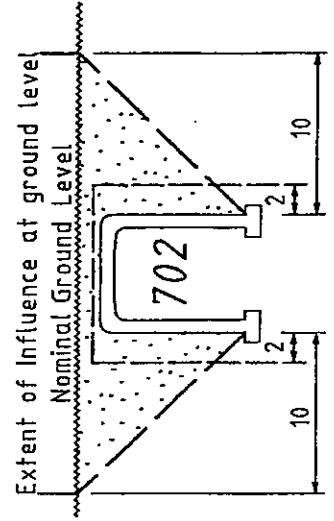
LAKE

ABERDEEN

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**ZONE OF INFLUENCE
OVER LOT 700
ON DIA 96312**

700



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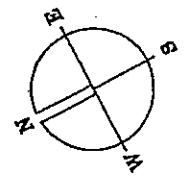
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**Mullen Nolan
Parters Surveyors Pty Ltd**
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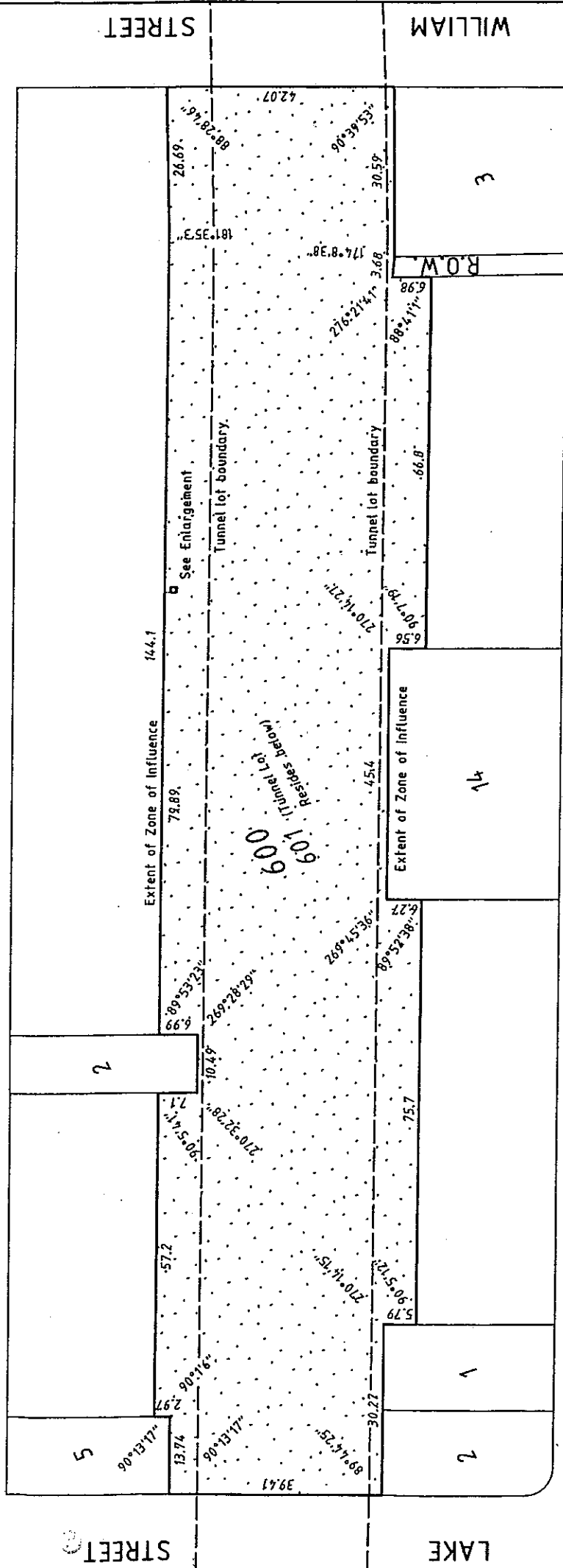
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NEWCASTLE

STREET



STREET

WILLIAM

STREET

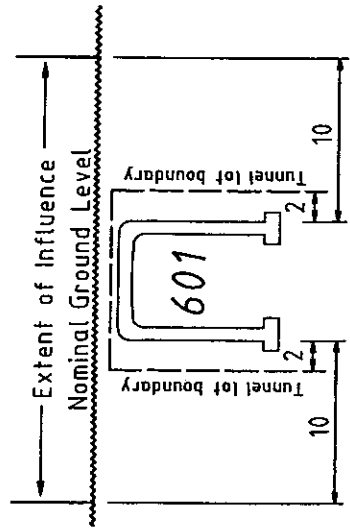
LAKE

ABERDEEN

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**ZONE OF INFLUENCE
OVER LOT 600
ON DIA 96311**

600



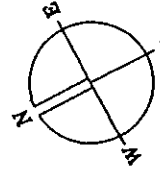
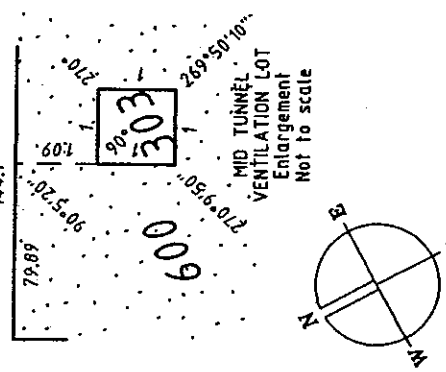
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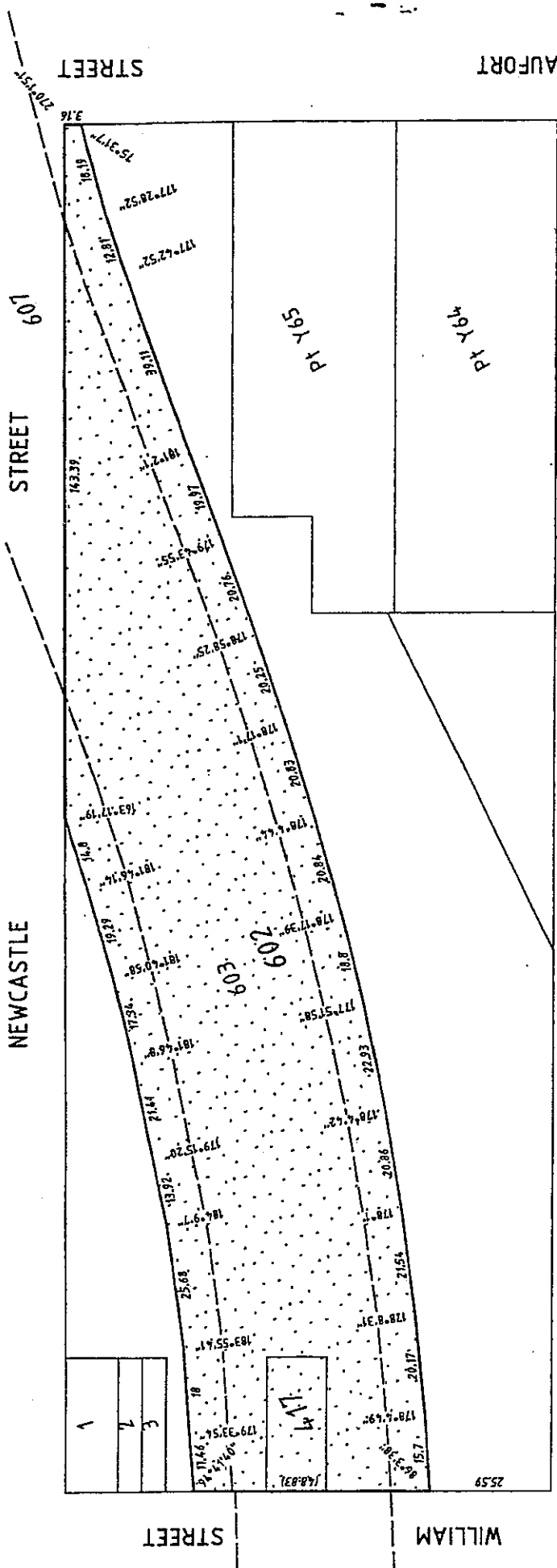
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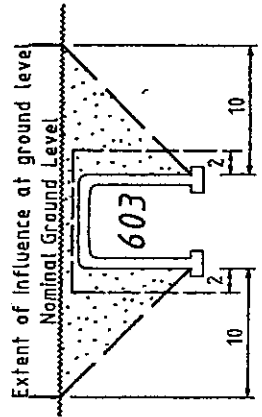


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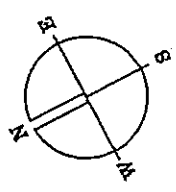
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 BEAUFORT STREET
 ABERDEEN STREET
 WILLIAM STREET

602



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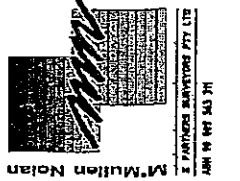


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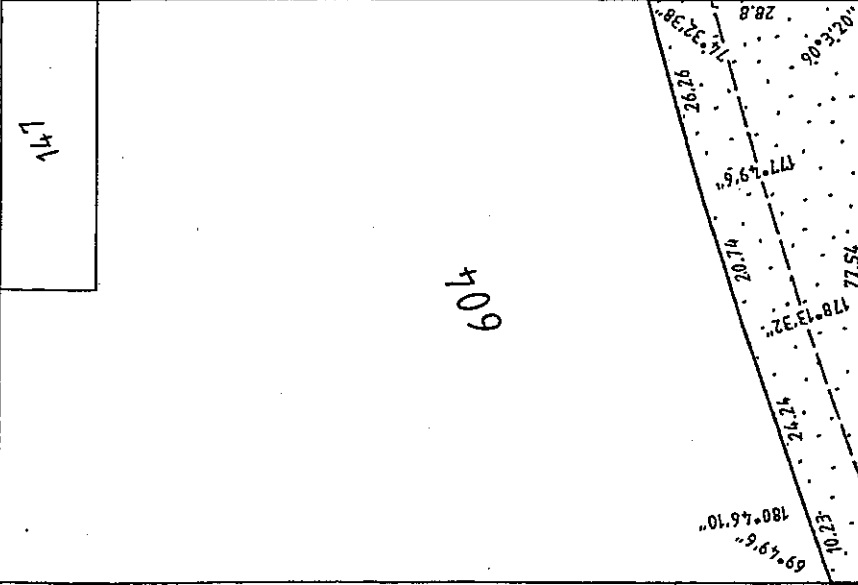
ZONE OF INFLUENCE
 OVER LOTS 417 & 602
 ON DIA 97345

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 DWG : EPRA-4-52a



LITTLE PARRY STREET



LINDSAY STREET

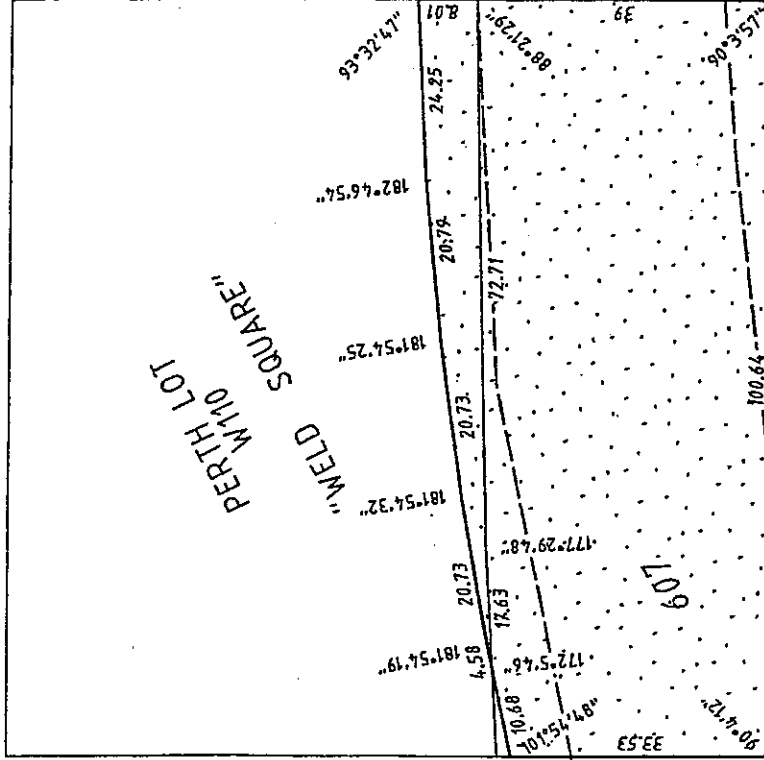
LINDSAY STREET

PARRY STREET

PARRY STREET

STREET

STIRLING STREET



STREET

604

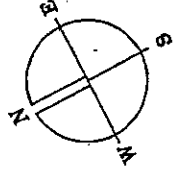
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OVER LOT 604 ON DIA. 97344 &
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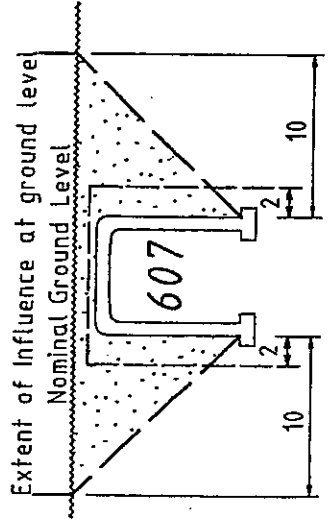
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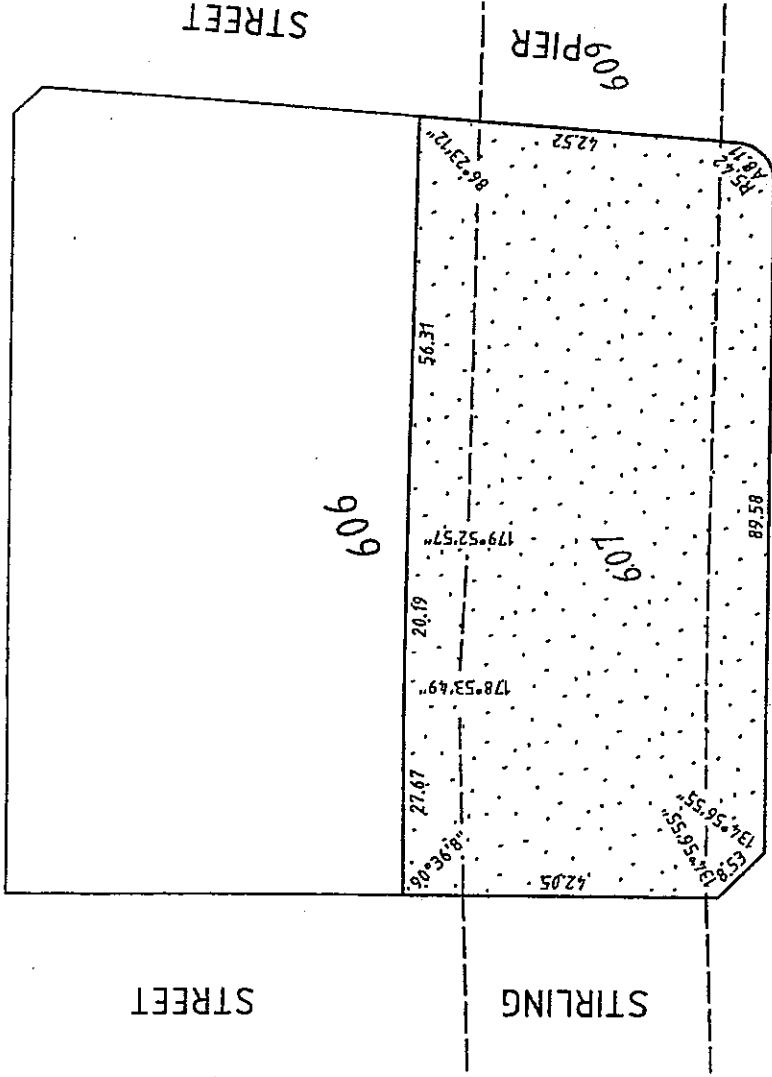


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PARRY STREET

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STREET



STIRLING

NEWCASTLE

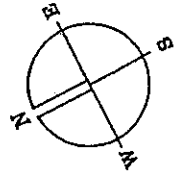
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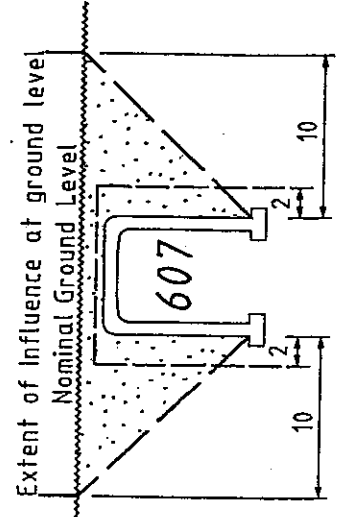
**ZONE OF INFLUENCE
OVER LOT 606 ON
DIA. 97343**

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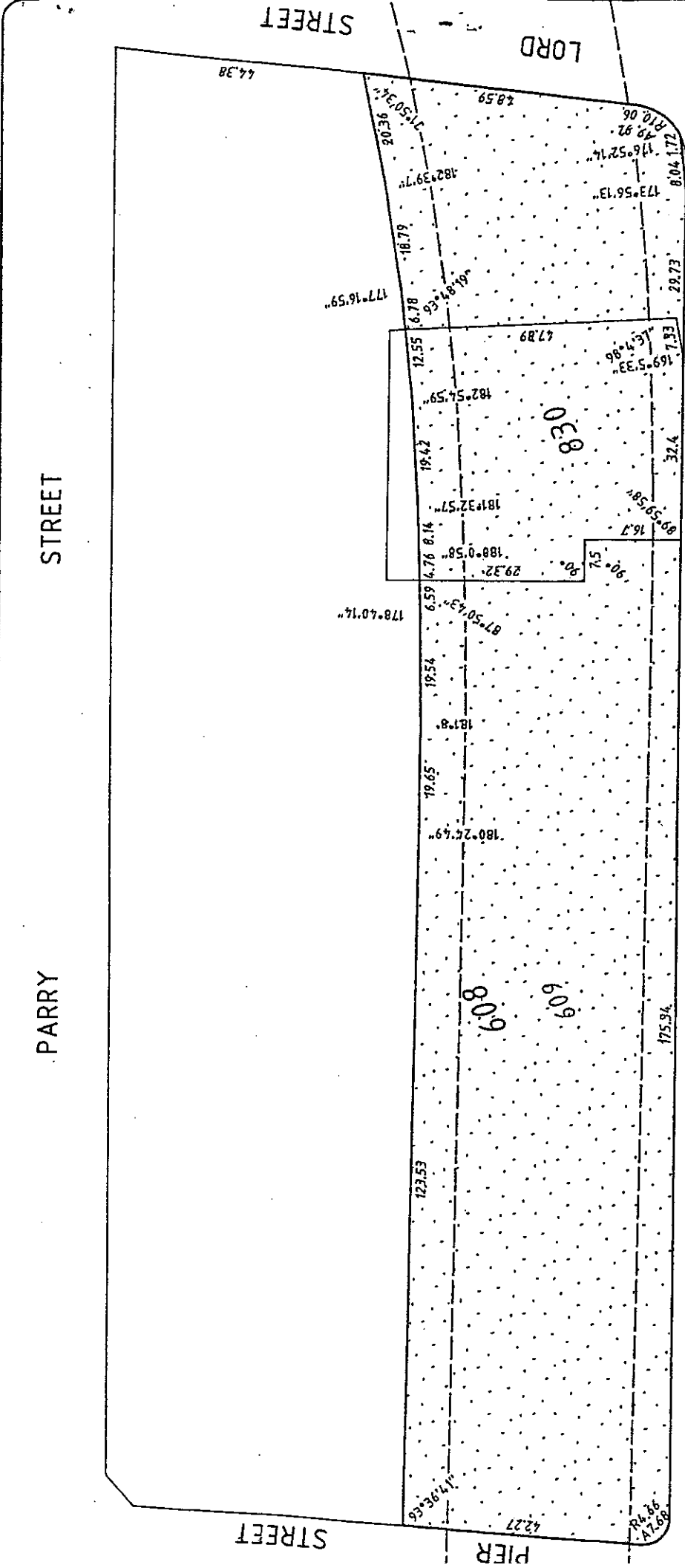


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NEWCASTLE

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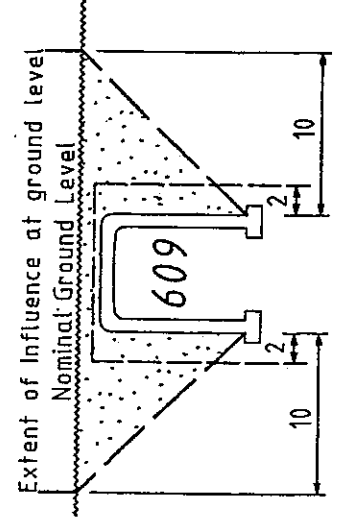
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**ZONE OF INFLUENCE
OVER LOTS 608 & 830
ON DIA. 97342**



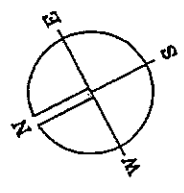
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Appendix B

Ventilation Areas for the Graham Farmer Freeway Tunnel

NEWCASTLE STREET

NEWCASTLE STREET

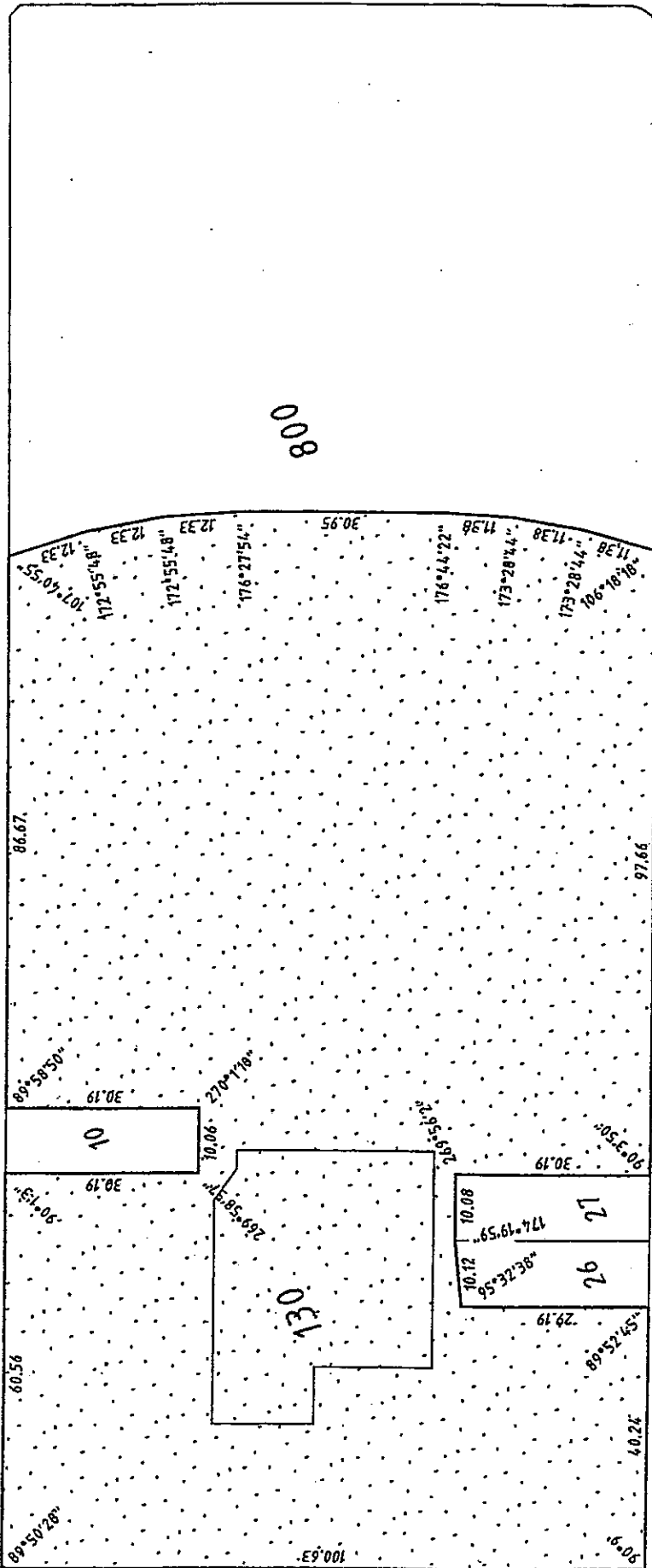
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FITZGERALD STREET

PALMERSTON STREET

ABERDEEN STREET

ABERDEEN STREET

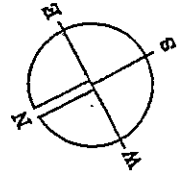


Mullen Nolan
 PARTERS SURVEYORS PTY LTD
 100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000

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 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

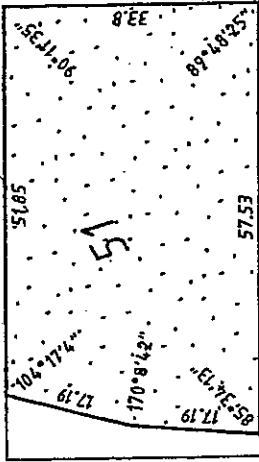
MAPS Ref: 92370 Date: 17/10/2000
 DWG: EPRA-1-54a

VENTILATION AREA
 OVER LOTS 130 & 800
 ON PLAN 22580



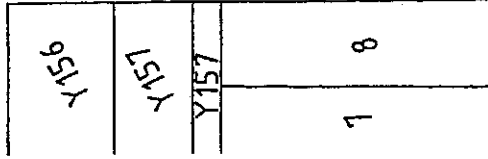
SCALE 1:1000

NEWCASTLE STREET



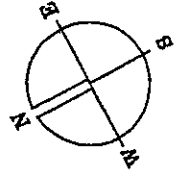
STREET

FITZGERALD



ABERDEEN STREET

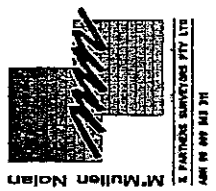
VENTILATION AREA OVER LOT 51



SCALE 1:1000

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 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

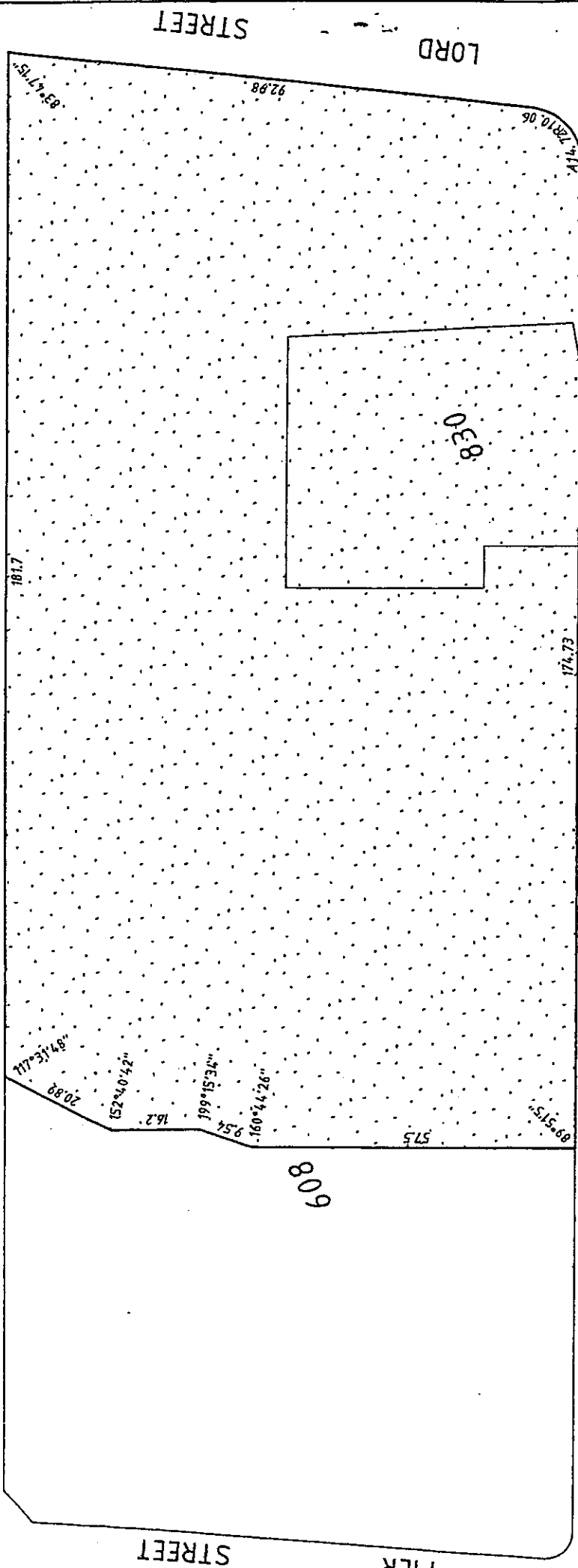
MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-0-52a



M. Mullen Nolan
 S. PARTON SURVEYING PTY LTD
 400 W 400 301 301

PARRY STREET

PIER STREET



NEWCASTLE STREET

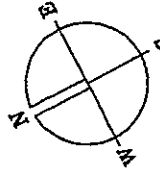
STREET



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 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-8-55a

**VENTILATION AREAS
 OVER LOTS 608 & 830
 ON DIA. 97342**

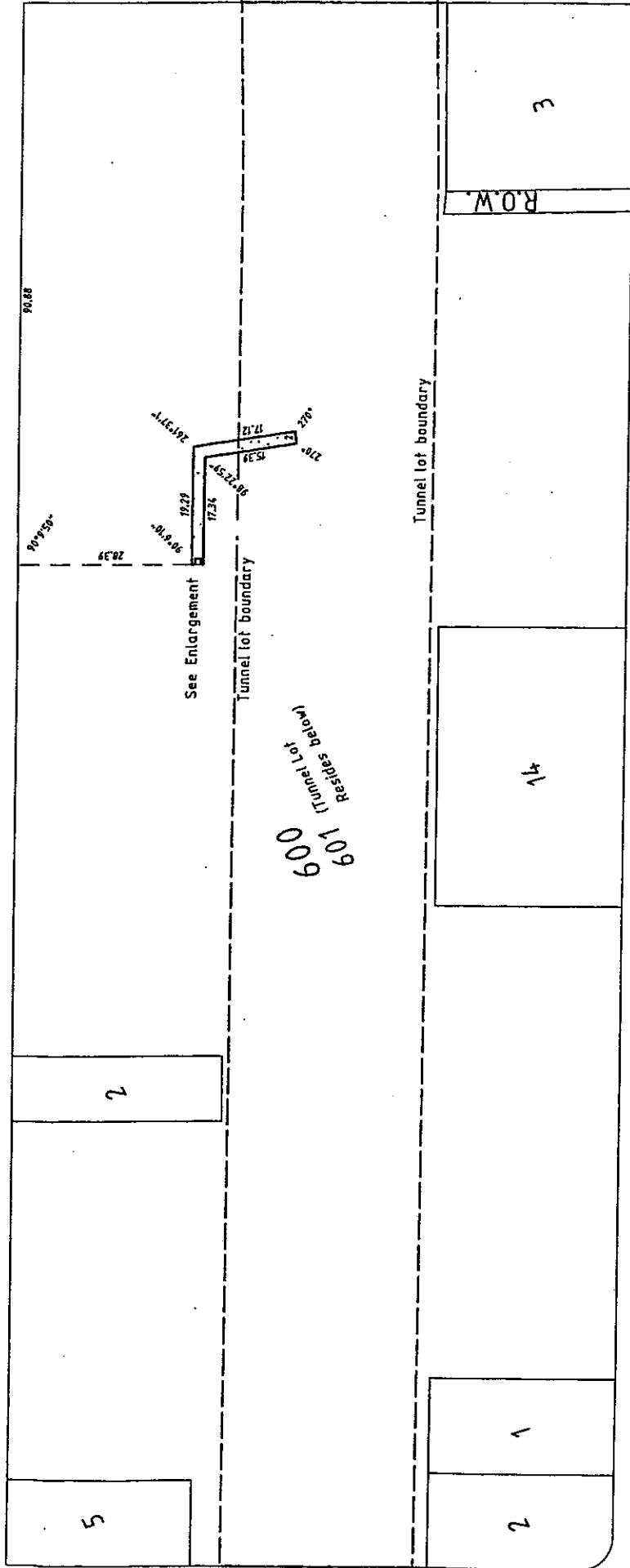


SCALE 1:1000

M'Mullen Nolan
 Pritchard Surveyors Pty Ltd
 100 W 4th St 3rd Fl

NEWCASTLE

STREET



STREET

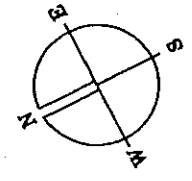
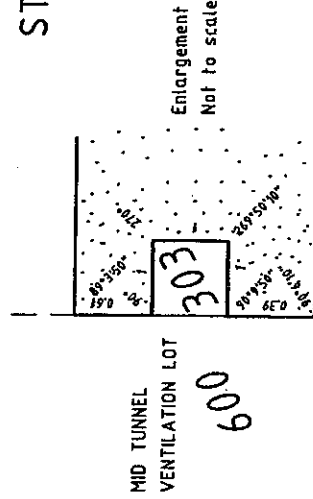
WILLIAM

STREET

LAKE

STREET

ABERDEEN



SCALE 1:1000

**MID TUNNEL VENT PIPE EASEMENT
OVER LOT 600
ON DIA 96311**

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 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

Date: 12/9/2001

MAPS Ref: 92370

DWG : EPRA-3-61b

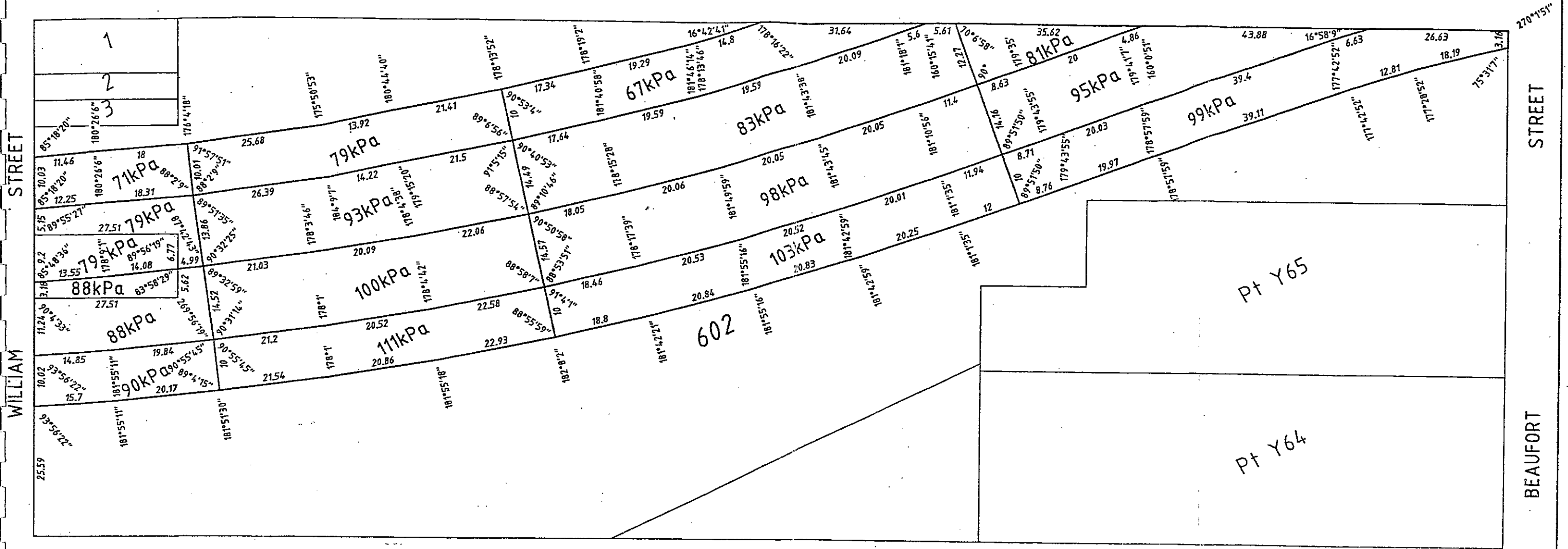


M. Mullien Nolan
 S. PARTNERS SURVEYORS PTY LTD
 401 W WY 343 21

Appendix C

***Roof Slab Design Loadings for the Graham Farmer
Freeway Tunnel***

NEWCASTLE STREET



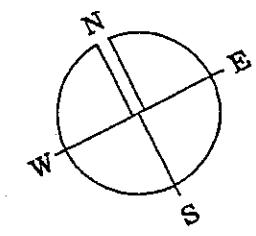
ABERDEEN STREET



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 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-4-53a

LOAD LIMITS
 OVER LOTS 417 & 602
 ON DIA 97345



SCALE 1:750

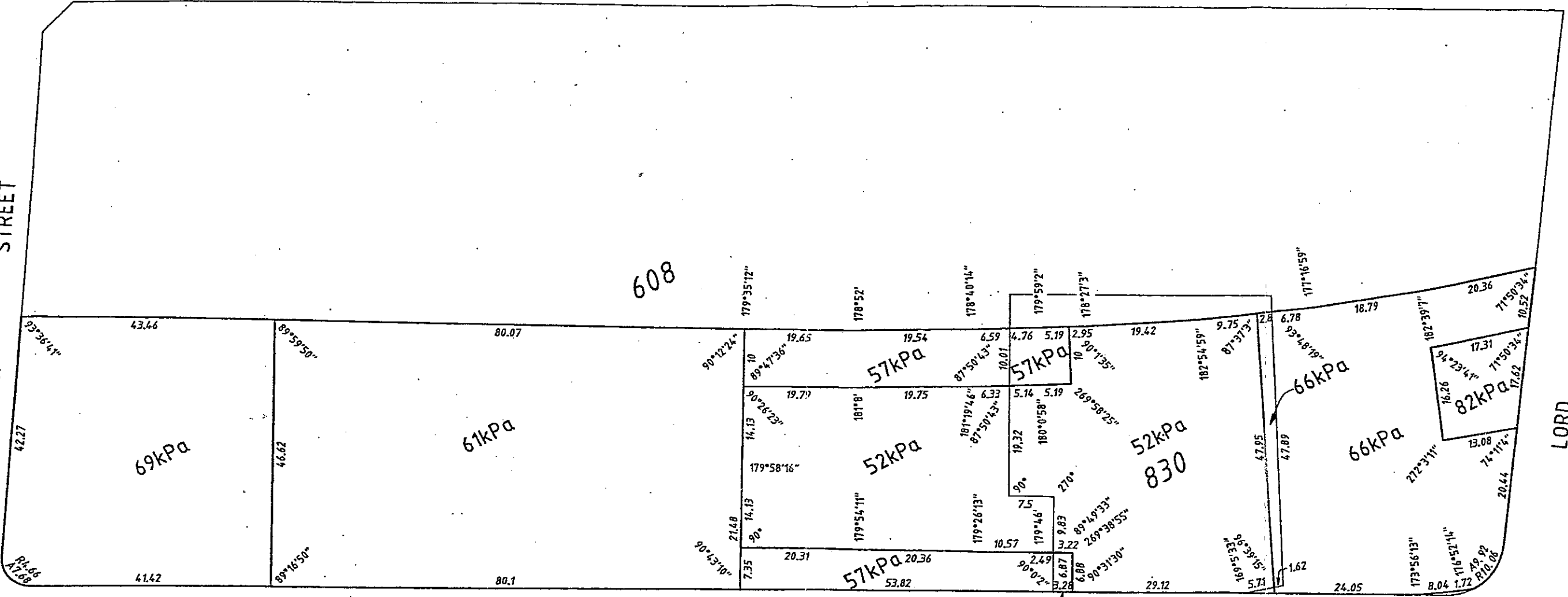
PARRY STREET

STREET

PIER STREET

LORD STREET

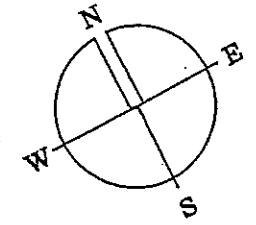
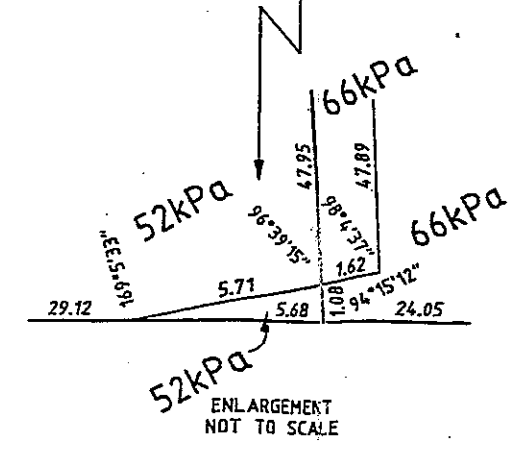
608



NEWCASTLE STREET

STREET

**LOAD LIMITS
OVER LOTS 608 & 830
ON DIA. 97342**



SCALE 1:750

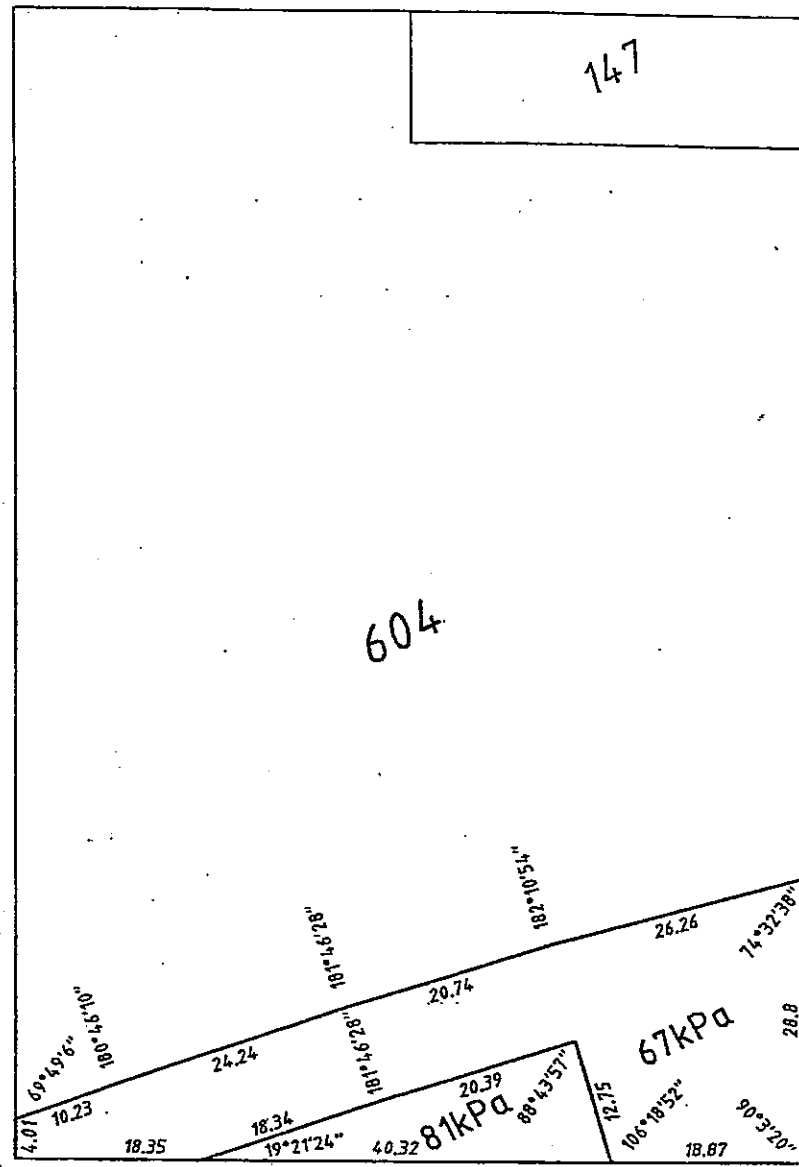


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 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-8-54a

LITTLE PARRY STREET

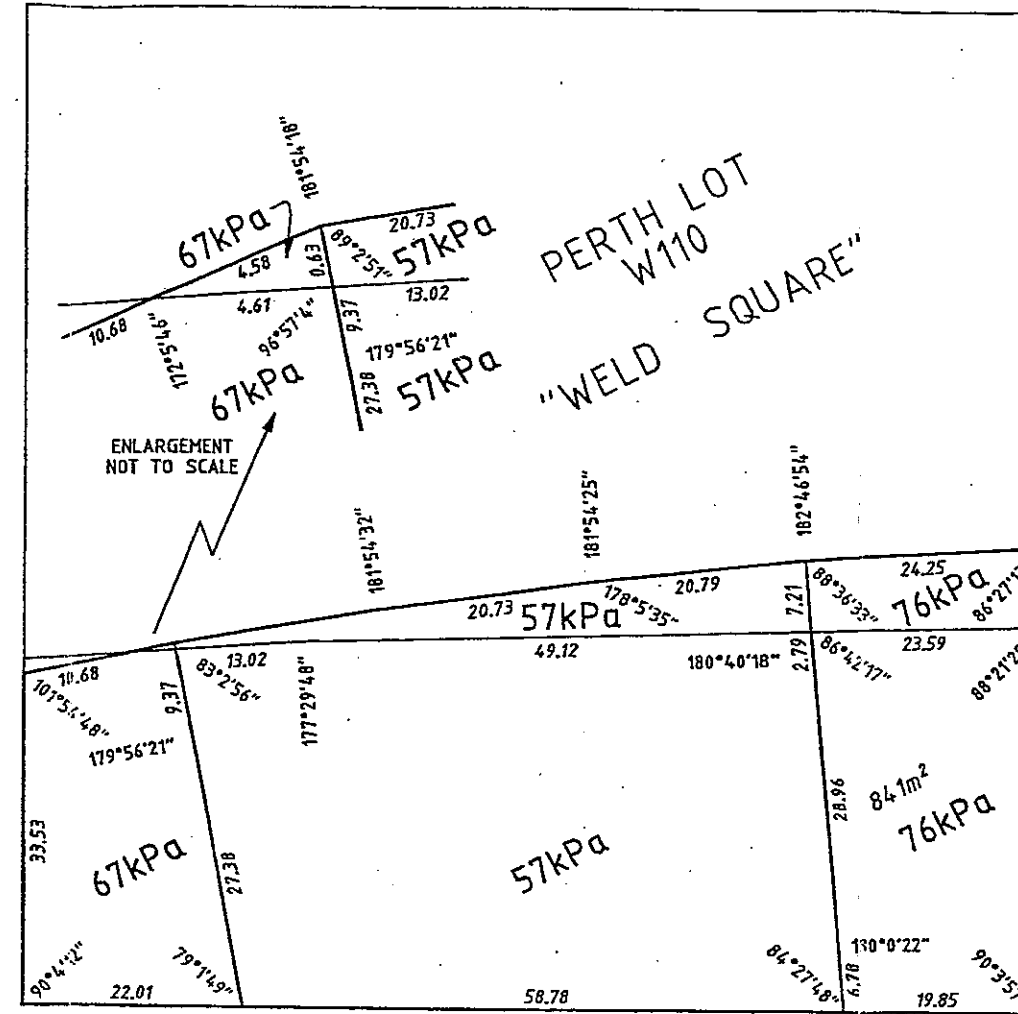
LINDSAY STREET



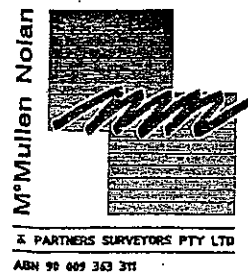
NEWCASTLE STREET

PARRY STREET

BEAUFORT STREET



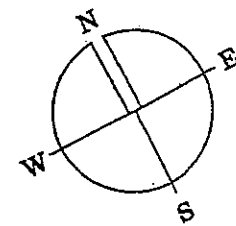
STIRLING STREET



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 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-6-53a

LOAD LIMITS
 OVER LOT 604 ON DIA. 97344 &
 Pt PERTH LOT W110 ON DIA. 90589



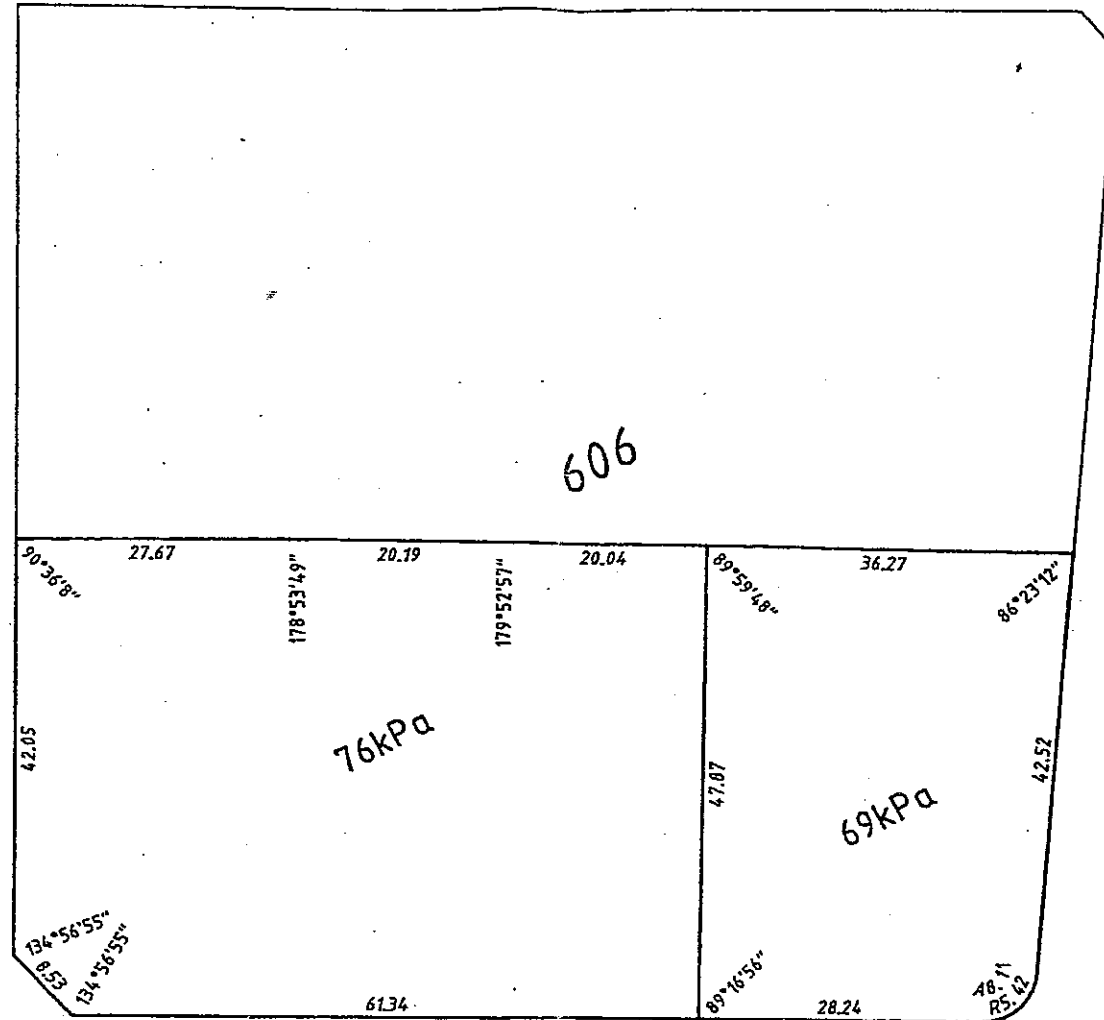
SCALE 1:750

PARRY STREET

STIRLING STREET

PIER STREET

606



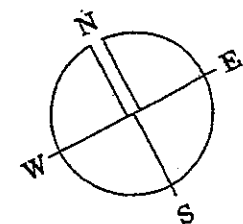
NEWCASTLE STREET



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 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-7-53a

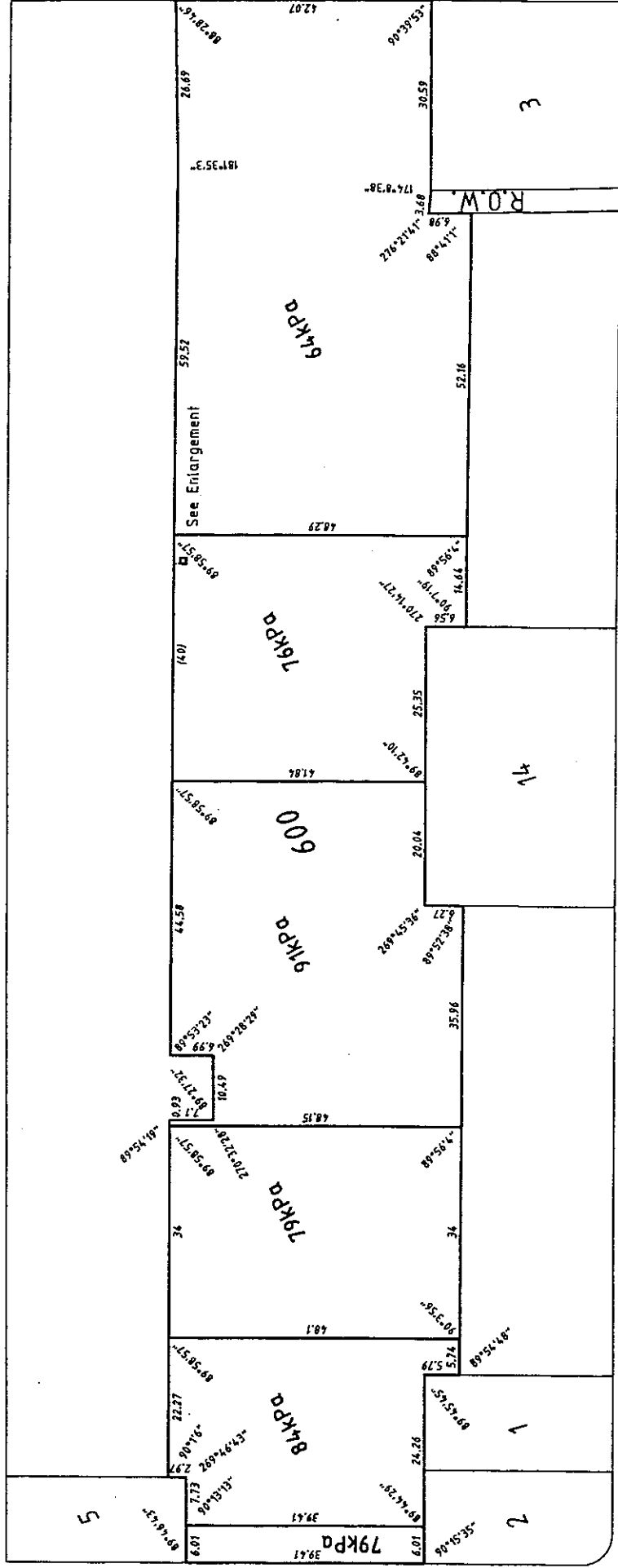
LOAD LIMITS
 OVER LOT 606 ON
 DIA. 97343



SCALE 1:750

NEWCASTLE STREET

LAKE STREET



WILLIAM STREET

ABERDEEN STREET

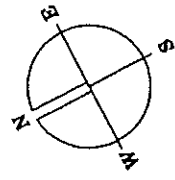
LAKE STREET

LAKE STREET

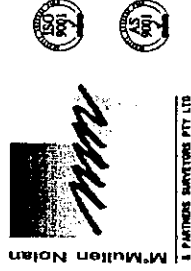
**LOAD LIMITS
OVER LOT 600
ON DIA 96311**

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MAPS Ref: 92370 Date: 17/10/2000
DWG : EPRA-3-55a



SCALE 1:750



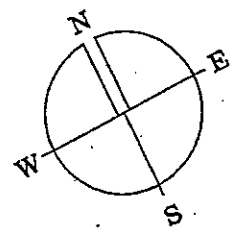
STREET

STREET

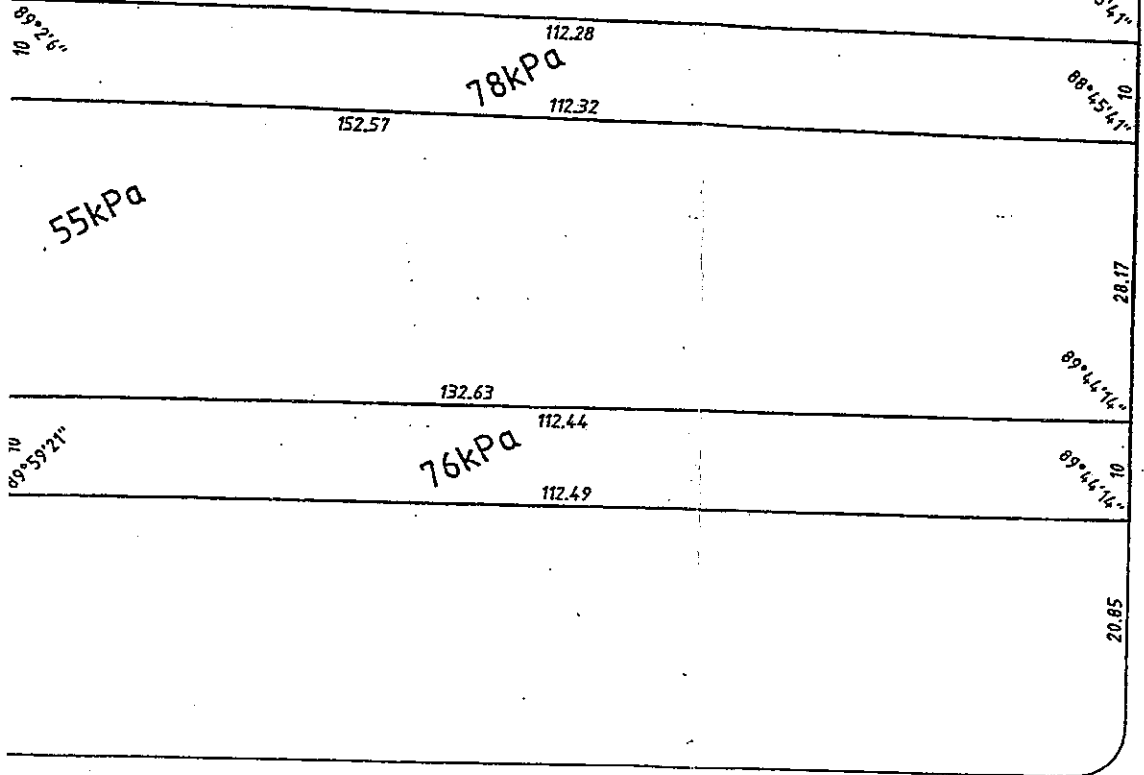
PALMERSTON STREET

PALMERSTON STREET

**LOAD LIMITS
OVER LOTS 130 & 800
ON PLAN 22580**



SCALE 1:750

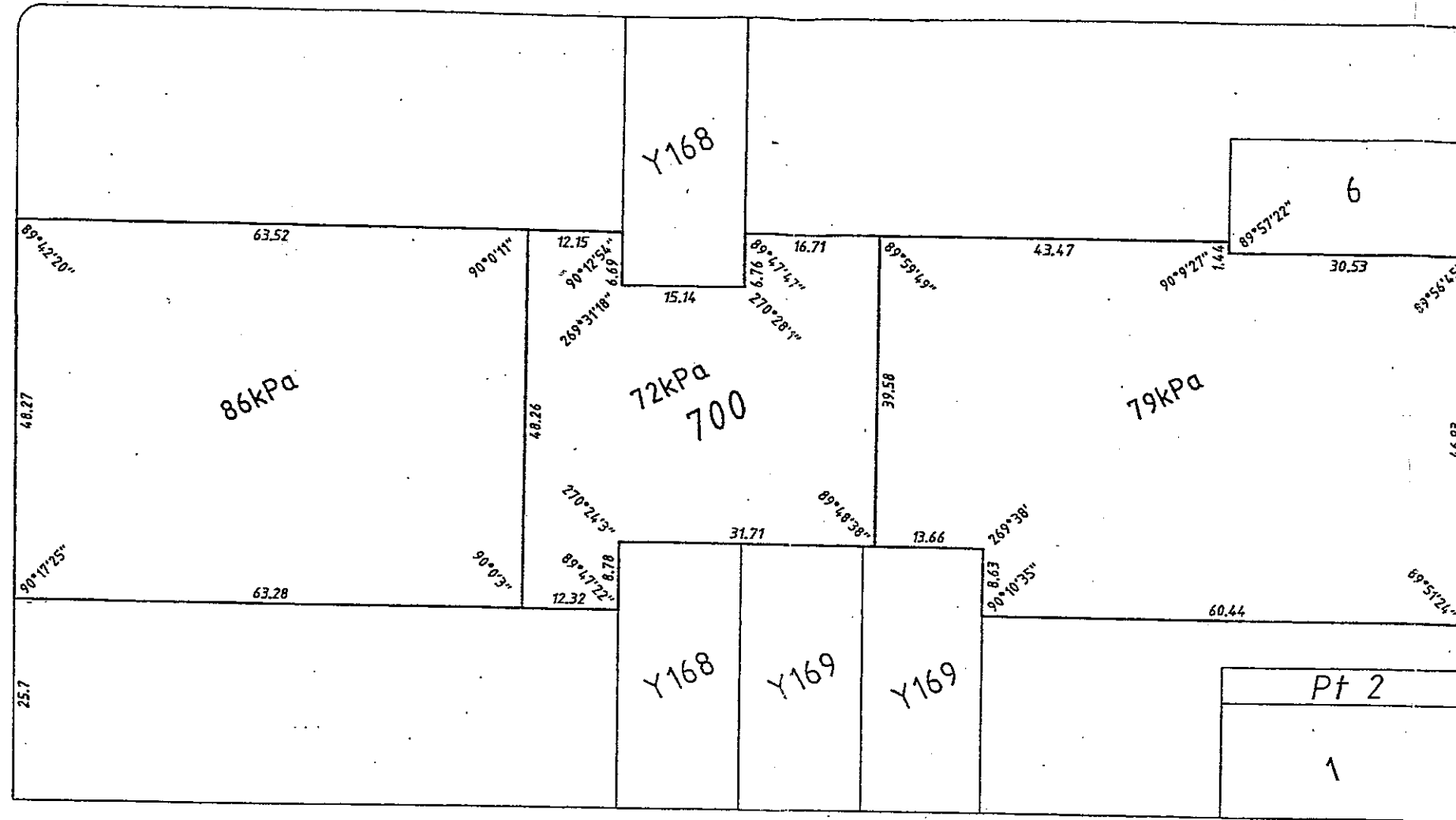


PALMERSTON STREET

NEWCASTLE STREET

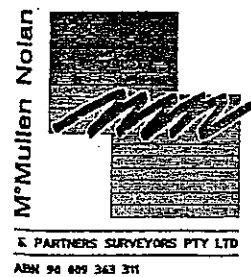
STREET

LAKE STREET



ABERDEEN STREET

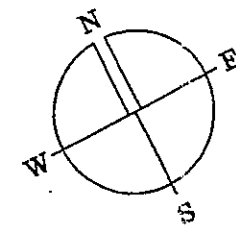
STREET



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 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-2-53a

LOAD LIMITS
 OVER LOT 700
 ON DIA 96312



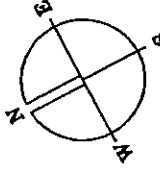
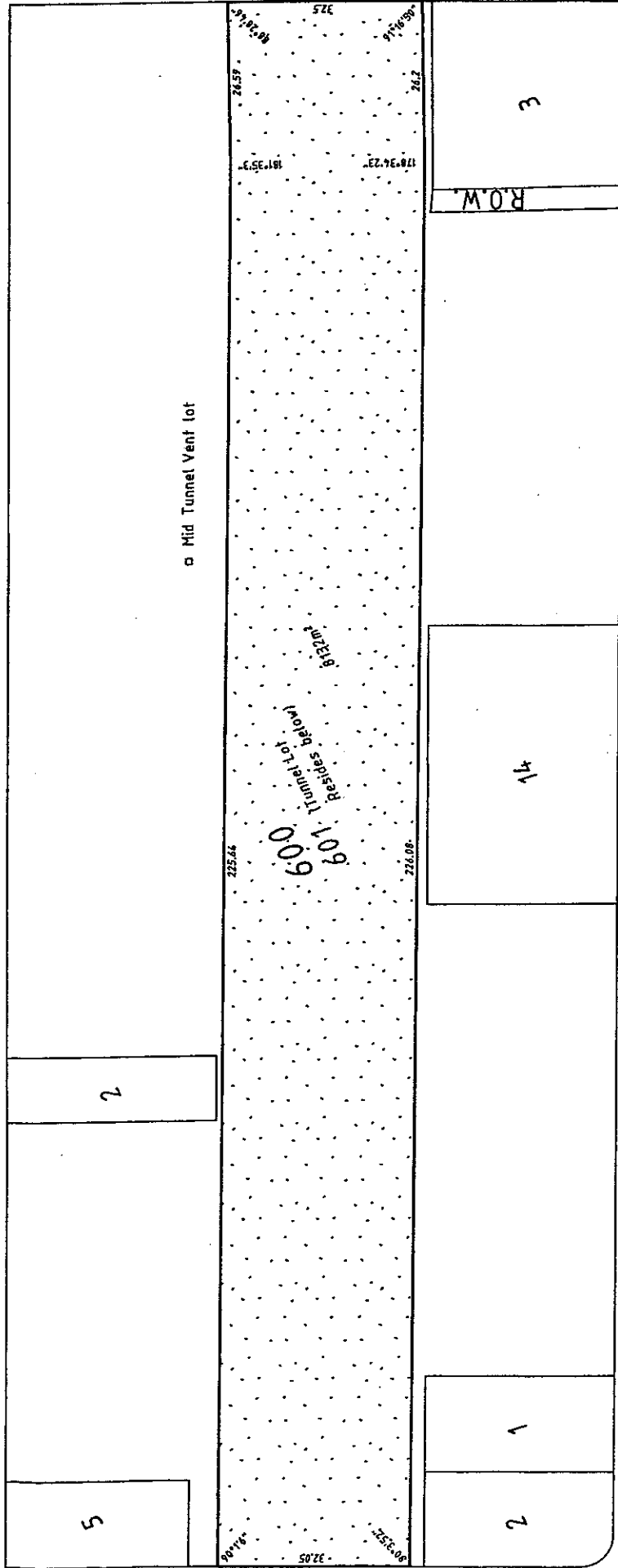
SCALE 1:750

NEWCASTLE STREET

WILLIAM STREET

ABERDEEN STREET

LAKE STREET



SCALE 1:1000

TUNNEL LOT
WITHIN LOT 600
ON DIA 96311

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 Email: maps@mapsurvey.com.au

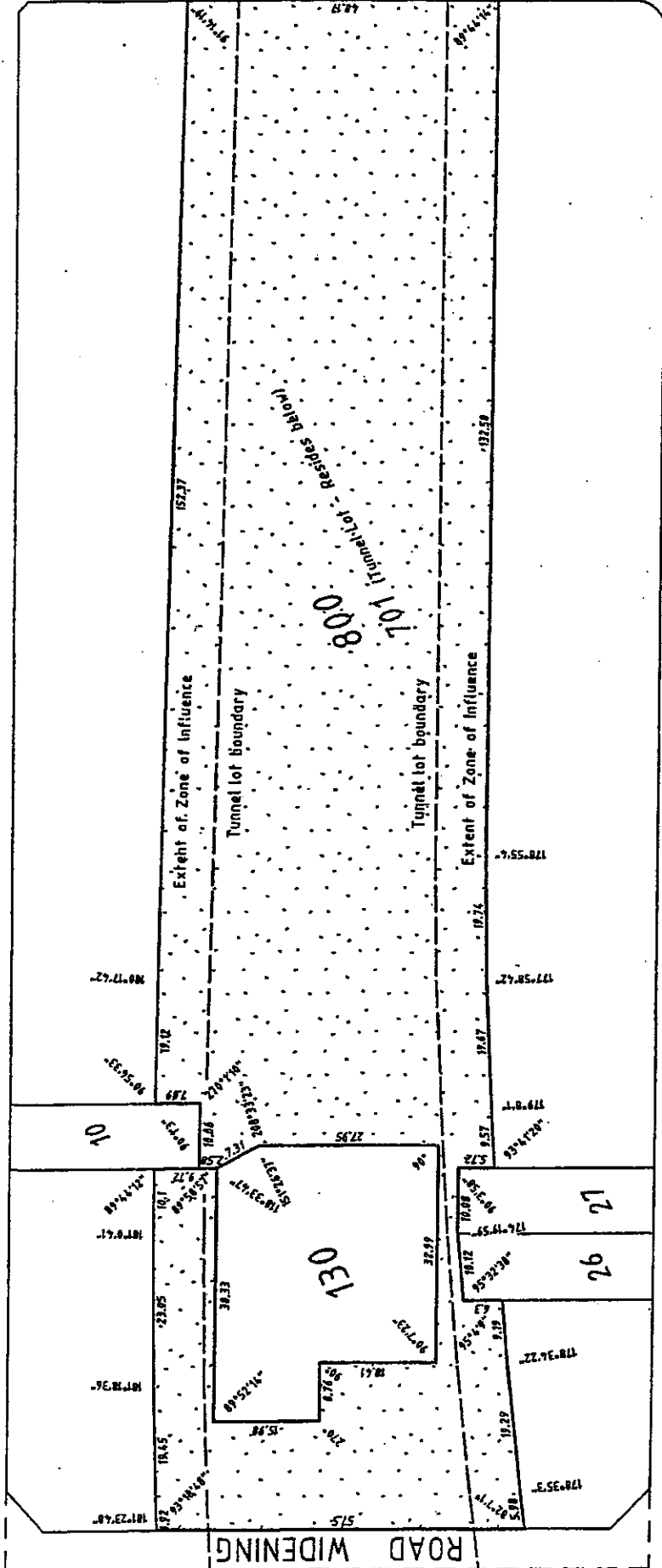
MAPS Ref: 92370 Date: 16/8/2001
 DWG : EPRA-3-62a



MULLIEN NOLAN PTY LTD
 100 WYNDHAM ST
 PERTH WA 6000

NEWCASTLE STREET

STREET



FITZGERALD STREET

ROAD WIDENING

PALMERSTON STREET

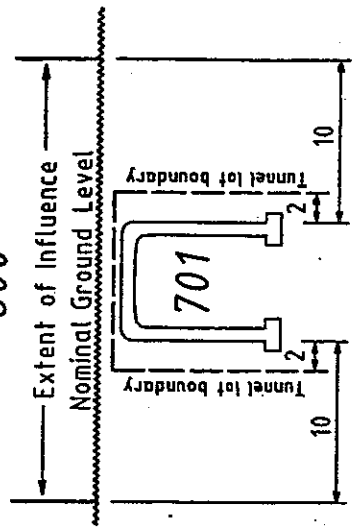
18"

ABERDEEN

**ZONE OF INFLUENCE
OVER LOT 800
ON PLAN 22580**

STREET

800



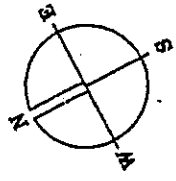
TYPICAL CROSS-SECTION

Not to scale



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MAPS Ref: 92370 Date: 16/8/2001
 DWG : EPRA-1-52d



SCALE 1:1000

NEWCASTLE

STREET

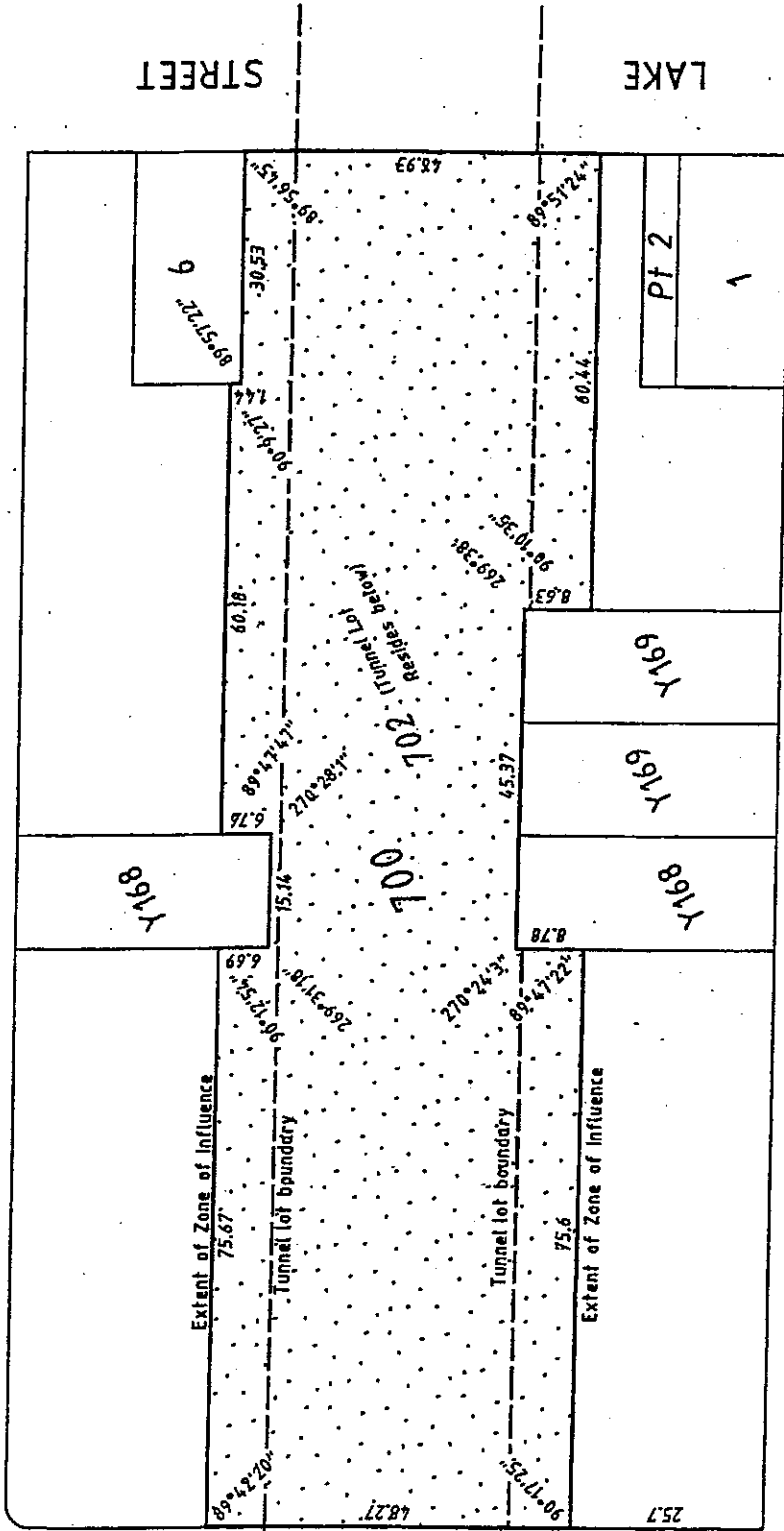
STREET

STREET

PALMERSTON

LAKE

"B2"

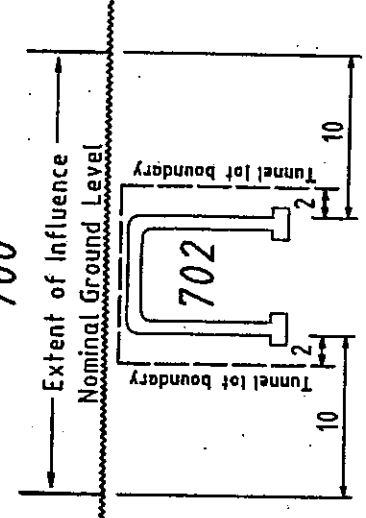


ABERDEEN

STREET

**ZONE OF INFLUENCE
OVER LOT 700
ON DIA 96312**

700



TYPICAL CROSS-SECTION

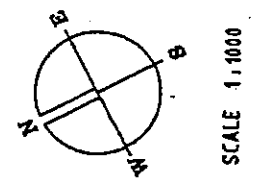
Not to scale



M. Mullien Nolan
 2 PARSONS SURVEYORS PTY LTD
 400 00 000 300 300

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 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 16/0/2001
 DWG : EPRA-2-52d

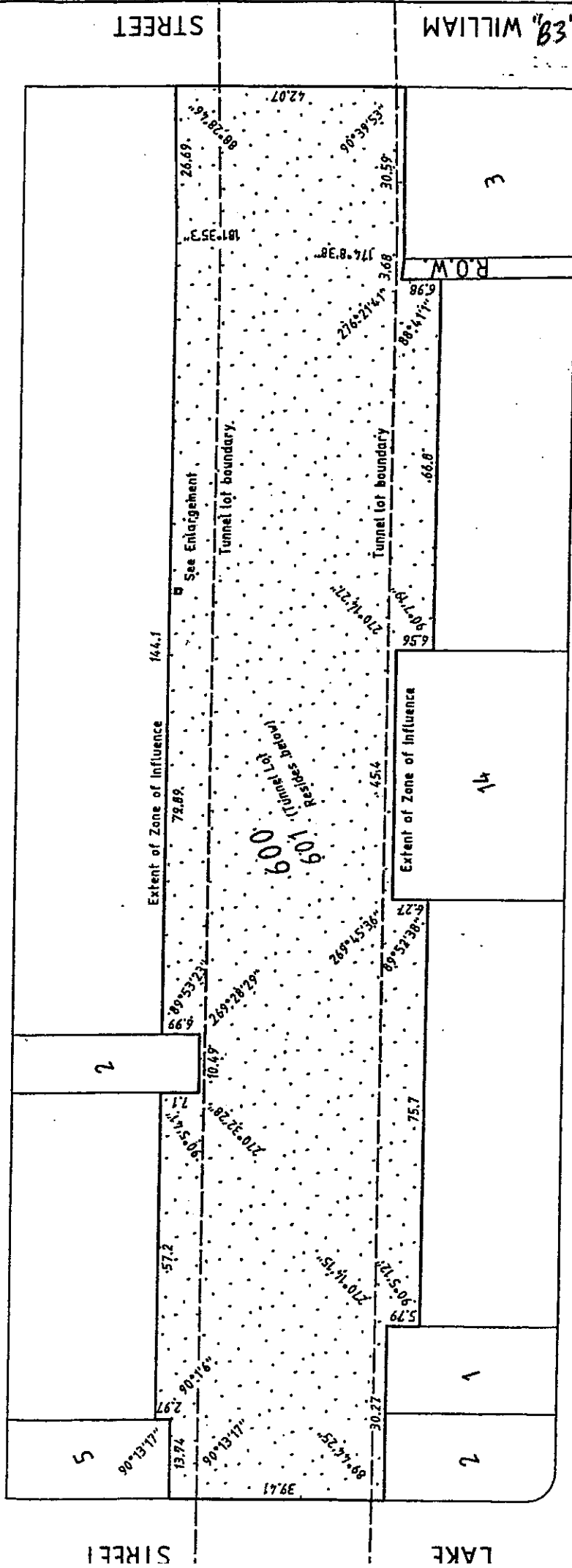


NEWCASTLE

STREET

STREET

WILLIAM "B3"

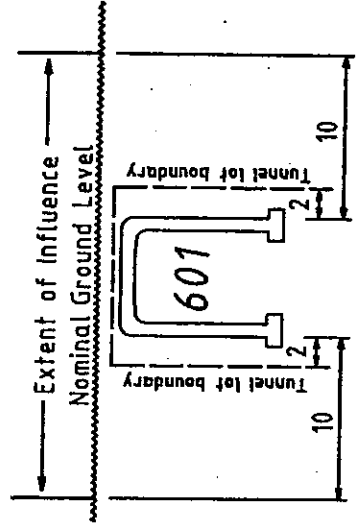


ABERDEEN

STREET

600

**ZONE OF INFLUENCE
OVER LOT 600
ON DIA 96311**



TYPICAL CROSS-SECTION

Not to scale

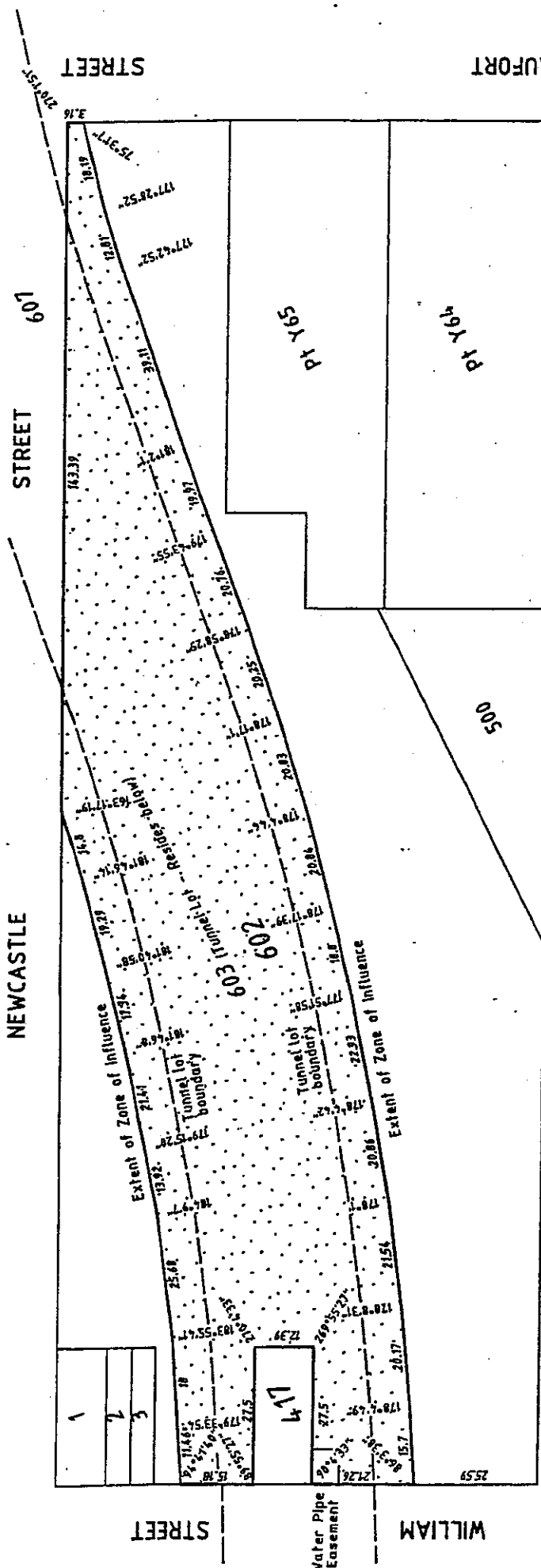
SCALE 1:1000

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 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

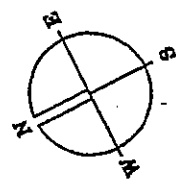
MAPS Ref: 92370 Date: 16/8/2001
 DWG: EPRA-3-54c



M. Nolan & J. Nolan
 2 PARTNERS SURVEYING PTY LTD
 401 W 100 3RD ST



"B4"



SCALE 1:1250

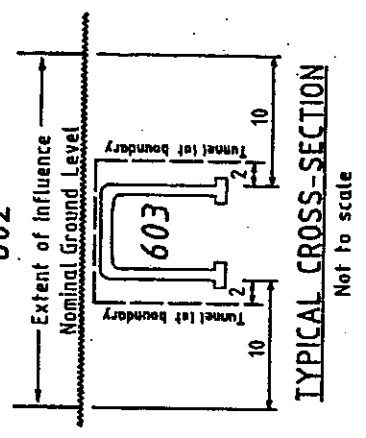
**ZONE OF INFLUENCE
OVER LOT 602
ON DIA 97345**

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 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 16/8/2001
 DWG : EPRA-4-52c



M. MULLER NOLAN
 2 PARKSIDE MANLY NSW 1585
 AMI W 949 341 24

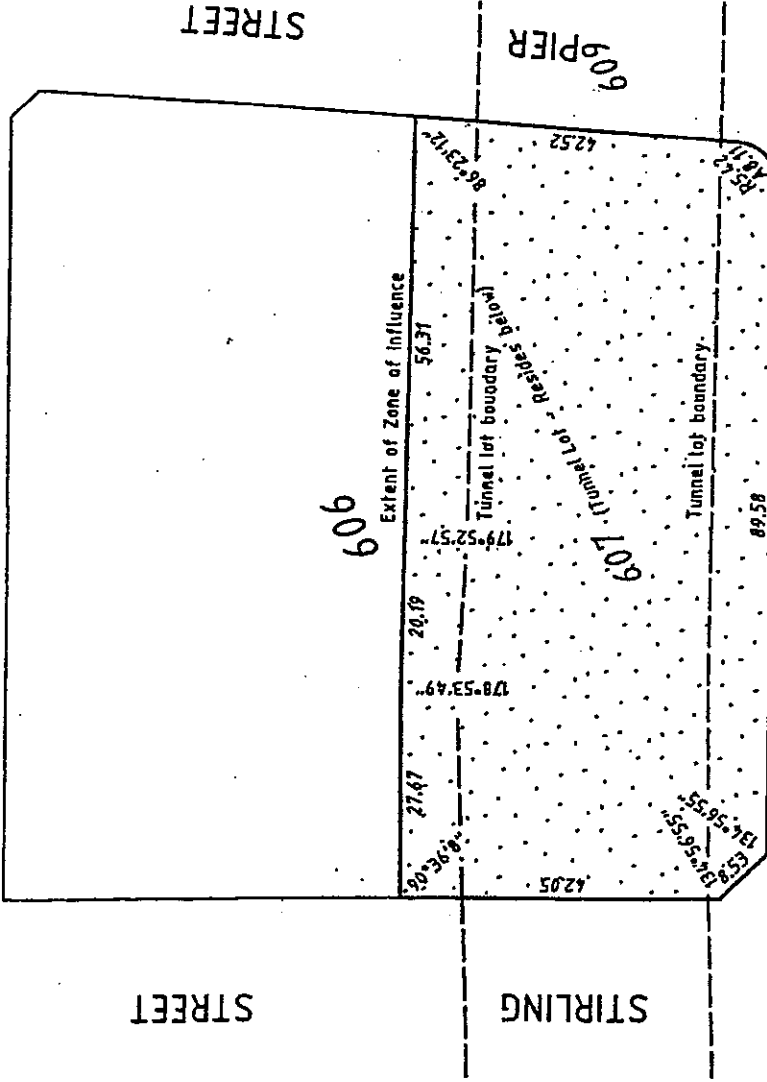


TYPICAL CROSS-SECTION
 Not to scale

PARRY STREET

STREET

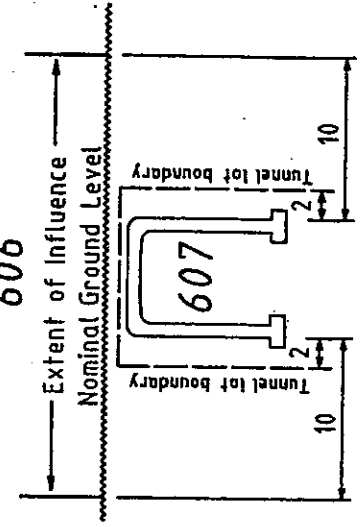
STREET



NEWCASTLE

STREET

606



TYPICAL CROSS-SECTION

Not to scale

SCALE 1:1000

**ZONE OF INFLUENCE
OVER LOT 606 ON
DIA. 97343**

2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

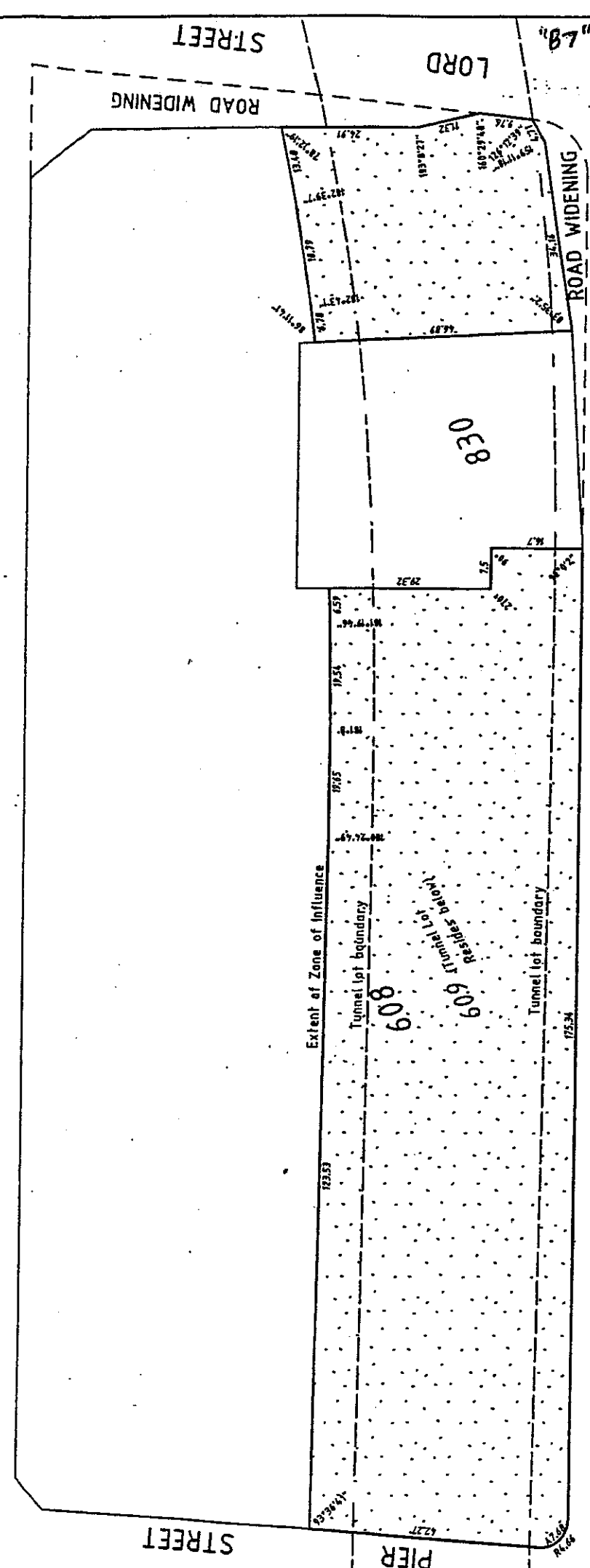
MAPS Ref: 92370 Date: 16/8/2001
 DWG : EPRA-7-52c



Muller Nolan
 2 PARTRIDGE BARRINGTON PTY LTD
 ABN 99 007 343 371

PARRY STREET

STREET



NEWCASTLE

**ZONE OF INFLUENCE
OVER LOT 608
ON DIA. 97342**

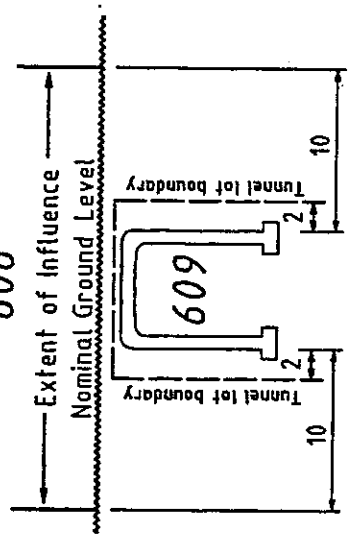


2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 16/6/2001
 DWG : EPRA-8-53c

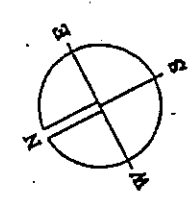
STREET

608



TYPICAL CROSS-SECTION

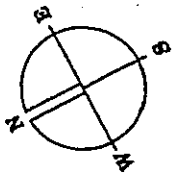
Not to scale



SCALE 1:1000

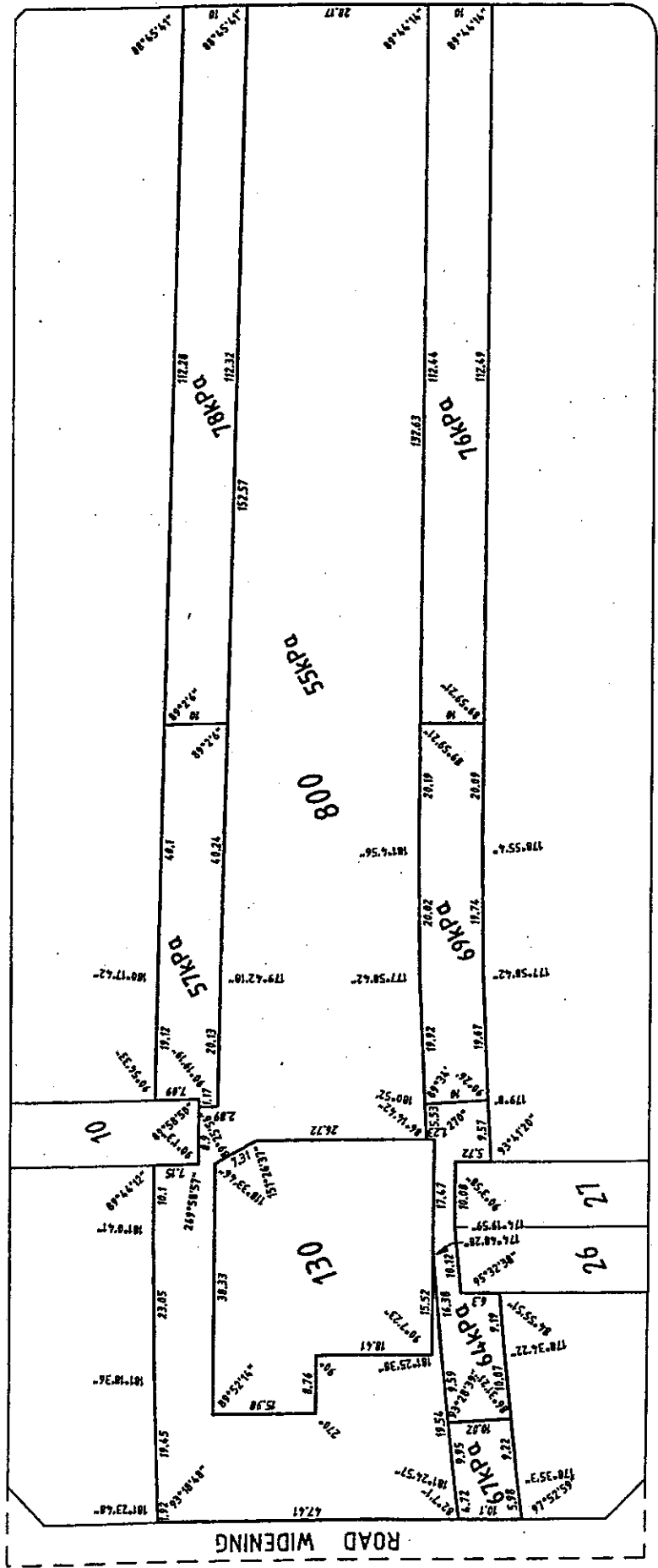
"A1"

PALMERSTON STREET



SCALE 1:1000

NEWCASTLE STREET



ABERDEEN STREET

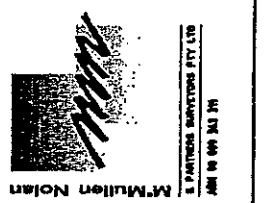
NEWCASTLE STREET

FITZGERALD STREET

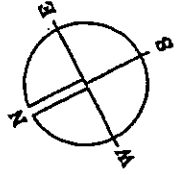
**LOAD LIMITS
OVER LOTS 800
ON PLAN 22580**

2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 16/8/2001
 DWG: EPRA-1-53b



"A2"



SCALE 1:1000

NEWCASTLE STREET

NEWCASTLE STREET

PALMERSTON STREET

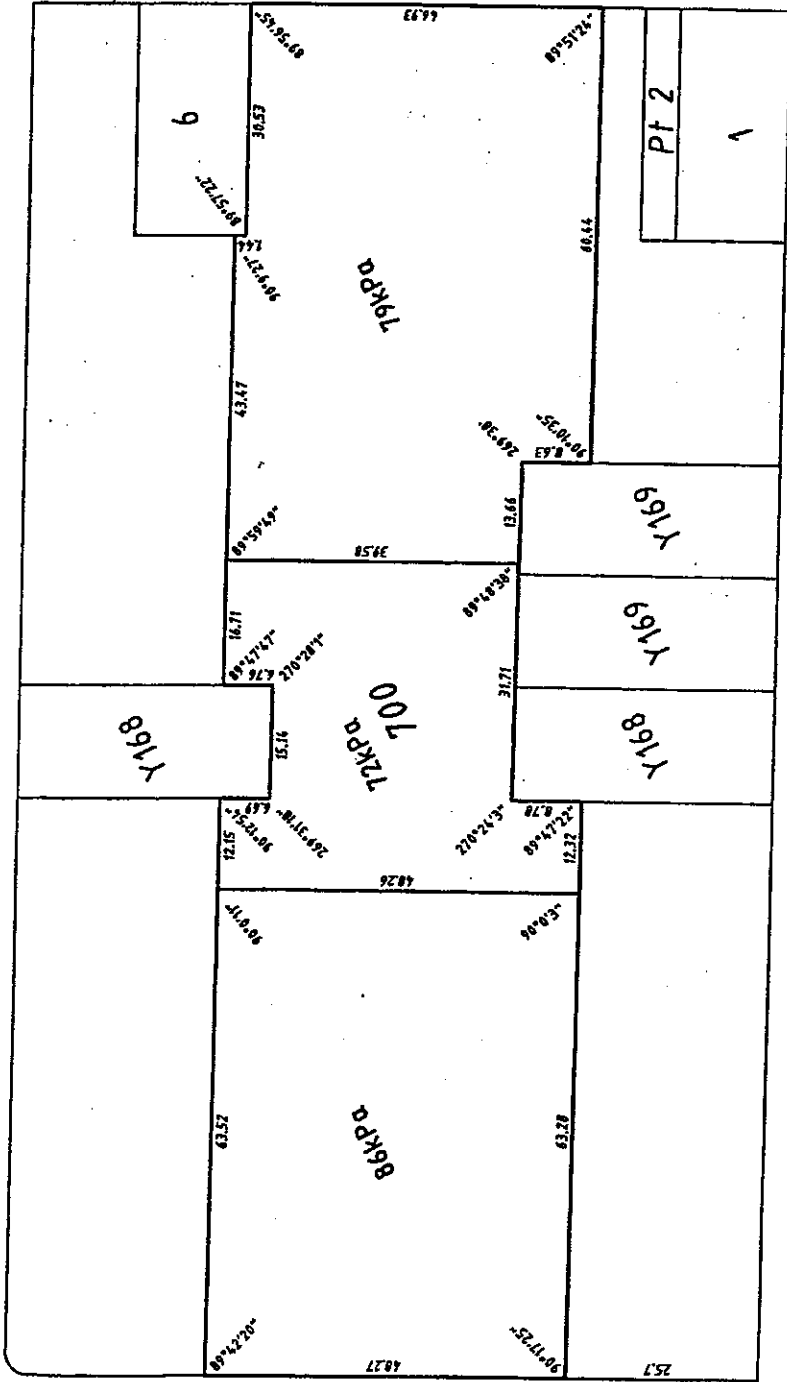
PALMERSTON STREET

LAKE STREET

LAKE STREET

ABERDEEN STREET

ABERDEEN STREET



**LOAD LIMITS
OVER LOT 700
ON DIA 96312**

2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-2-53a



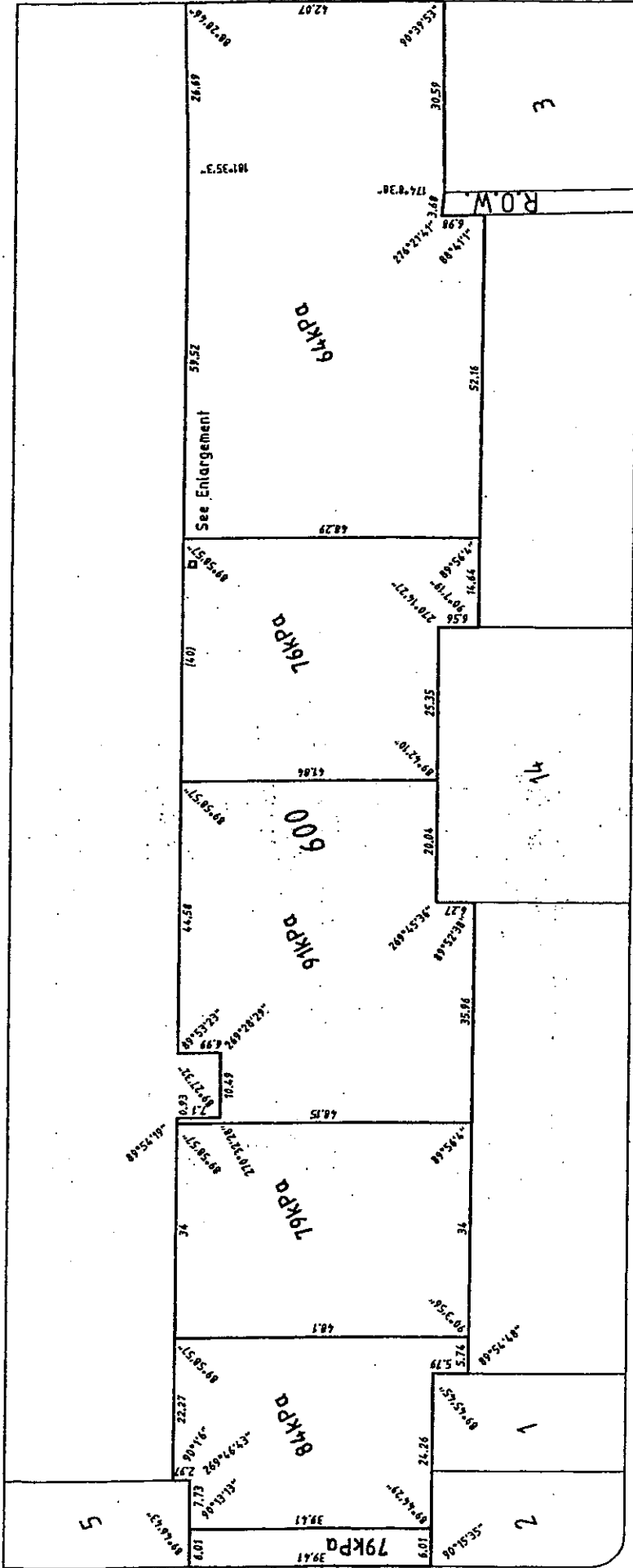
M'Mullen Nolan
 A PARTNERS SURVEYING PTY LTD
 INC 08 008 000 24

NEWCASTLE STREET

NEWCASTLE STREET

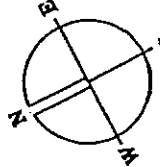
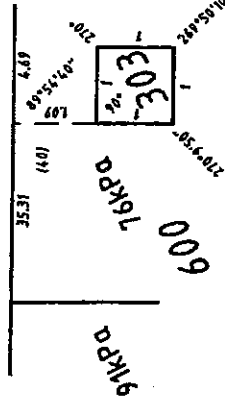
WILLIAM STREET

WILLIAM STREET



ABERDEEN STREET

ABERDEEN STREET



SCALE 1:750

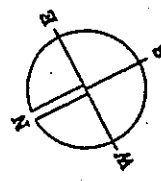
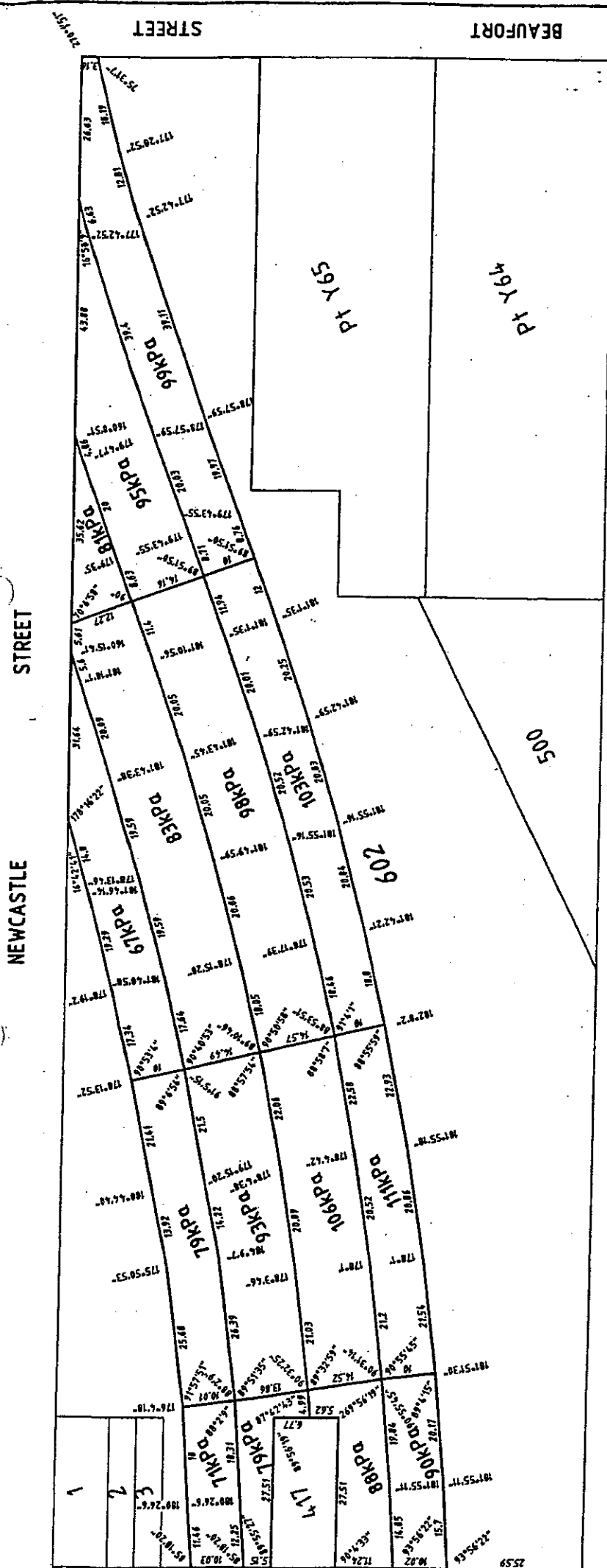
**LOAD LIMITS
OVER LOT 600
ON DIA 96311**

2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-3-55a



M. Mullion Nolan
 11 LANTERN BUILDINGS PTY LTD
 2001 10 100 100 100

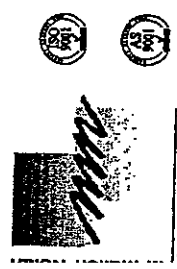


SCALE 1:1000

**LOAD LIMITS
OVER LOT 602
ON DIA 97345**

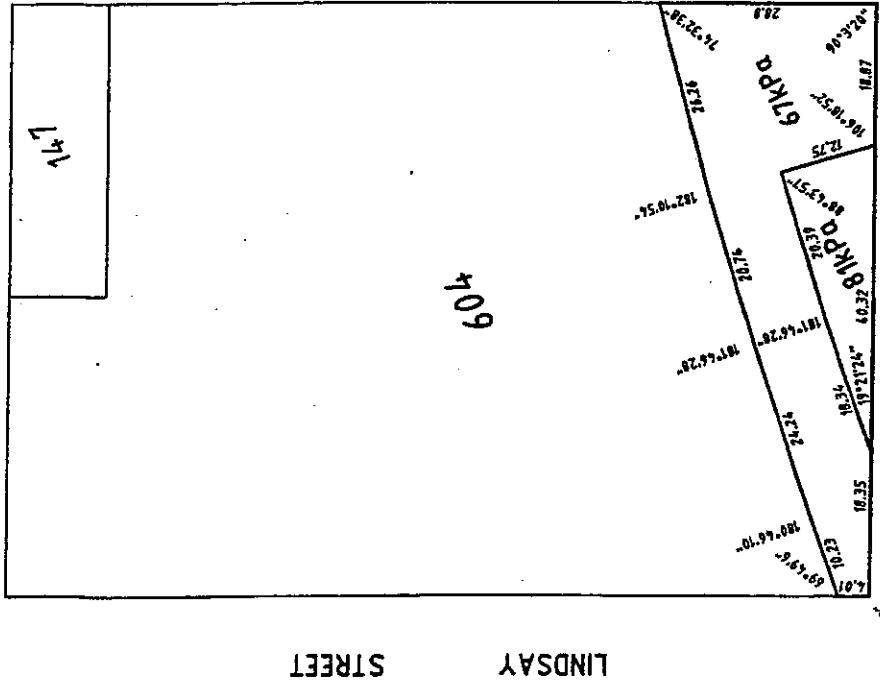
2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 16/8/2001
 DWG : EPRA-4-53b



PASTORAL MAPS SURVEYING PTY LTD
 100 WARD ST W PERTH WA 6150

LITTLE PARRY STREET

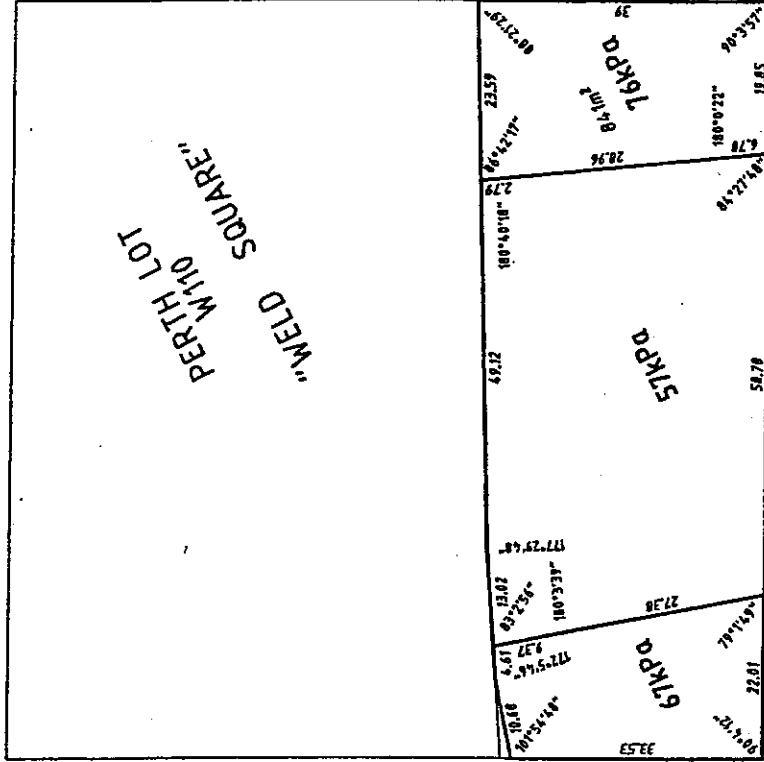


LINDSAY STREET

NEWCASTLE STREET

PARRY STREET

STREET



BEAUFORT STREET

STREET

STIRLING STREET

"A5"

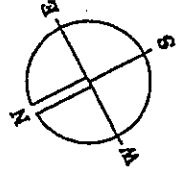


M. Mullien Nolan
 J. PARTRIDGE SURVEYING PTY LTD
 4001 94 000 343 311

2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

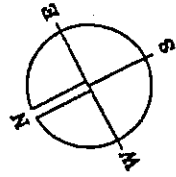
MAPS Ref: 92370 Date: 16/8/2001
 DWG : EPRA-6-53b

LOAD LIMITS
OVER LOT 604 ON DIA. 97344 &
Pt PERTH LOT W110 ON DIA. 90589



SCALE 1:1000

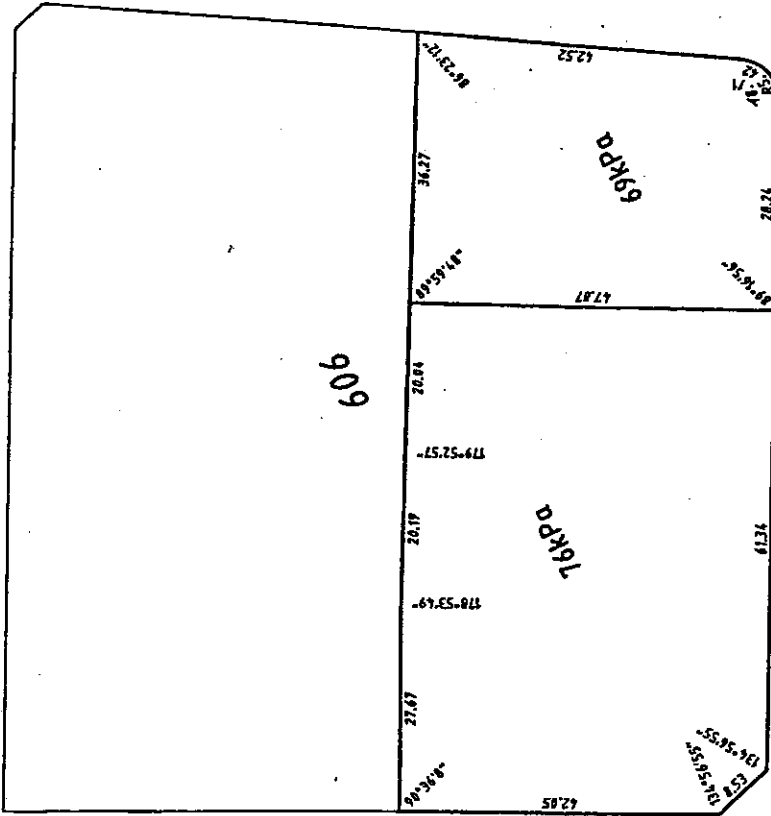
"A6"



SCALE 1:1000

PARRY STREET

PIER STREET



NEWCASTLE STREET

STIRLING STREET

STIRLING STREET

**LOAD LIMITS
OVER LOT 606 ON
DIA. 97343**

2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

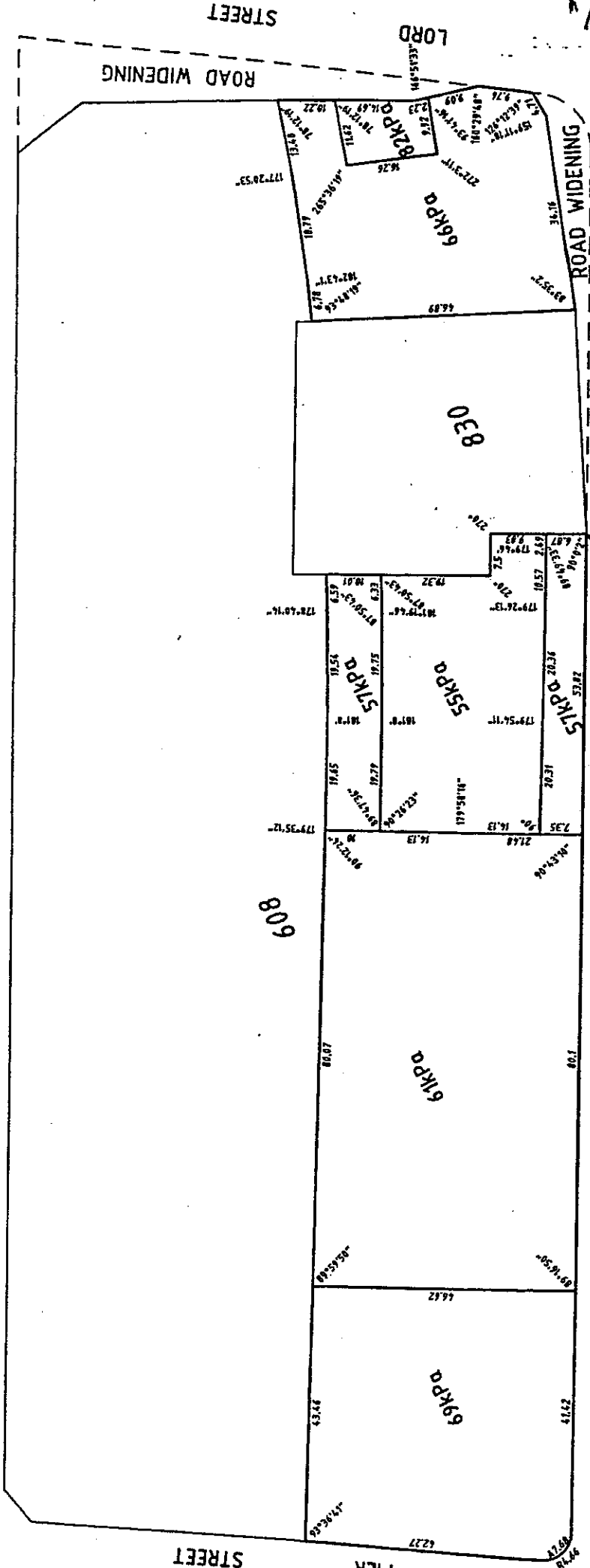
MAPS Ref: 92370 Date: 17/10/2000
 DWG : EPRA-7-53a



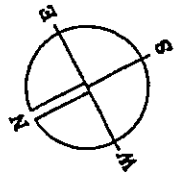
Mullen Nolan
 PARTNERS SURVEYORS PTY LTD
 100 WILSON ST
 PERTH WA 6000

PARRY STREET

STREET



"A7"



SCALE 1:1000

**LOAD LIMITS
OVER LOT 608
ON DIA. 97342**

2nd Floor, 2 Hardy Street, South Perth, W.A. 6151
 P.O. Box 117, South Perth, W.A. 6951
 Phone: 9474 1099 - Fax: 9474 1093
 Email: maps@mapsurvey.com.au

MAPS Ref: 92370 Date: 20/8/2001
 DWG: EPRA-8-54c

