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## REPORT ON FLOOD IMPACTS OF THE PROPOSED LIGHT INDUSTRIAL DEVELOPMENT ON LAND ADJACENT TO ALBION PARK AIRPORT.

for Delmo Pty. Ltd.

Contact Glenn Mealey 0412425907

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## GLOSSARY

Abbreviation	Description
AEP	Annual Exceedance Probability; The probability of a rainfall or flood event of given magnitude being equaled or exceeded in any one year.
AHD	Australian Height Datum: National reference datum for level
ALS	Air-borne Laser Scanning; aerial survey technique used for definition of ground height
ARI	Average Recurrence Interval; The expected or average interval of time between exceedances of a rainfall or flood event of given magnitude.
FPDM	Floodplain Development Manual; Guidelines for Development in Floodplains published by the N.S.W. State Government, 2005.
LGA	Local Government Area; political boundary area under management by a given local council. Council jurisdiction broadly involves provision of services such as planning, recreational facilities, maintenance of local road infrastructure and services such as waste disposal.
SCC	Shellharbour City Council
PMF	Probable Maximum Flood; Flood calculated to be the maximum physically possible.
PMP	Probable Maximum Precipitation; Rainfall calculated to be the maximum physically possible.
km	Kilometre; (Distance = 1,000m)
m <sup>2</sup>	Square Metre; (Basic unit of area)
m <sup>3</sup>	Cubic Metre; (Basic unit of volume)
m <sup>3</sup> /s	Cubic Metre per Second; (Flowrate)
m	Metre; (Basic unit of length)
ha	Hectare; (Area =10,000 m <sup>2</sup> )
m/s	Metre per Second; (Velocity)
s	Second; (basic unit of time)

## TECHNICAL TERMS

Term	Description
Catchment	Area draining into a particular creek system, typically bounded by higher ground around its perimeter.
Culvert	An enclosed conduit (typically pipe or box) that conveys stormwater below a road or embankment.
Discharge	The flowrate of water.
Flood	A relatively high stream flow which overtops the stream banks.
Flood storages	Those parts of the floodplain important for the storage of floodwaters during the passage of a flood.
Floodways	Those areas where a significant volume of water flows during floods. They are often aligned with obvious naturally defined channels and are areas which, if partly blocked, would cause a significant redistribution of flow.
Flood Fringes	Those parts of the floodplain left after floodways and flood storages have been abstracted.
Hydraulic	A term given to the study of water flow, as relates to the evaluation of flow depths, levels and velocities.
Topography	The natural surface features of a region.
Urbanisation	The change in land usage from a natural to developed state.
Watercourse	A small stream or creek.

Thursday, May 10, 2007

## **1. INTRODUCTION**

### **1.1 BACKGROUND INFORMATION**

Jordan Mealey and Partners has been contracted by Delmo Pty Ltd to provide a flood analysis of the existing catchment and effects of a proposed sub division located on land near Albion Park Airport. Jordan Mealey and Partners in turn contracted Rienco Consulting to provide the pre-development and post-development flood reports.

This report will provide recommendations for the proposed development of the site based on the analysis provided by Rienco. This report will also address the impacts of flooding, the flood hazards, the safety of users of the development, access and evacuation issues.

This report will also address existing flood studies and their relevance to the proposed development.

### **1.2 OBJECTIVES**

The objectives of this report are to:

- Obtain all necessary data to allow the determination of flood flow in the area of proposed development.
- Determine the flood hazards at the site.
- Determine the level of hydraulic risk.
- Make recommendations for safe development of the site.

### **1.3 REPORT LIMITATIONS:**

This report by Jordan Mealey and Partners is based solely on available data, and pertain only the site and the land adjoining site or that land directly noted by the post development report is not to be used to justify or condemn another development. Written permission permission will be required to use information contained in this report.

Data has been drawn from a number of sources listed below including information from Shellharbour Council, Government departments, new data, and existing studies.

### **1.4 AVAILABLE DATA**

To compile this report Jordan Mealey have used the two Flood Modeling Reports (Existing Conditions<sup>1</sup>) and (Post Development Conditions<sup>2</sup>) by Rienco Pty Ltd, Extension To Albion Park Flood Study<sup>3</sup>, Final Report, prepared by Kinhill Engineers (1993). The Albion Park Flood Study Report<sup>4</sup> prepared by Water Resources Commission of NSW January 1986. A detailed survey of the site and surrounding area has been undertaken. ALS data for the study area was also obtained from AAM Hatch.

## 1.5 PREVIOUS FLOOD STUDIES

At the beginning of this process Jordan Mealey and Partners began collecting the available flood studies and reports that were available. Some of these flood studies were referred to in the initial feedback provided by the Department of Planning from Shellharbour City Council SCC and DNR. From the DNR letter dated the 23/10/06:

### ***Flood Risk Management Planning***

*The DOP should also be aware that in this area, Shellharbour City Council has identified a need to improve its understanding of flood behaviour and to develop an appropriate flood risk management strategy in order to fulfill its flood related statutory obligations.*

*Shellharbour City Council (Council) has recently sought and obtained an offer of financial assistance from the Government's Floodplain Management Program to commence the preparation of a flood study for the Macquarie Rivulet catchment. Council is currently advancing the preparation of a consultant brief for the flood study being the first stage prior to preparing a floodplain risk management study and plan, consistent with the principles in the Manual. Given the range and scale of land use planning processes occurring in this catchment, the DNR suggests that DOE' also liaise with Council regarding DOP's membership and planning roles on Council's Floodplain Management Committee to assist in the preparation of Council's Macquarie Rivulet Floodplain Risk Management Plan.*

### ***Local Flood Information***

*With regard to the flood information provided in the referral, the DNR notes that section "3.5 Flooding" of the preliminary information supplied by the applicant indicates that "A flood study has identified the 100 year ARI flood level at approximately RL 7.0." It is noted that the source of this estimate has not been cited. The DOP as approval authority however should be aware that a report prepared by Water Resources Commission (WRC) of New South Wales titled "Albion Park Flood Study Report" January (1986 estimates 100year ARI design flood levels at this site in 1986 to be in the range of RL 9.26*

*AHD at Tongarra Road to **RL 9.20m AHD** near the east west runway of the aerodrome. This is a significant difference.*

*The WRC 1986 flood study was prepared prior to the gazettal of the former 1988 Floodplain Development Manual and a copy of the WRC 1986 flood study is attached for consideration by the approval authority. In considering the WRC 1986 flood study, the approval authority should also be aware that the following issues, since this study was prepared, are likely to increase design flood estimates in the area and should, be considered:*

- *significant development has occurred in the Fyazers Creek and Macquarie Rivulet catchments that may affect flooding on the site,*
- *the Bureau of Meteorology has also amended the rainfall data used for design flood estimation since 1986.*

At this point no brief has been released by SCC and therefore work has not even begun on this project. It should be noted then that there is no "Floodplain Risk Management Plan" (FRMP), as required by the Floodplain Development Manual (FDM) released in April 2005, available for this catchment nor is there one currently being prepared. It is therefore necessary for the developer to provide their own flood study and analysis and produce a risk management plan based on this information, as this work will not be complete until 2010 at least. As noted in the letter to the DoP dated the 19/12/06 from SCC:

*Council is required to manage all flood prone land in accordance with the NSW Government's Flood Prone Land Policy. The procedures for the management of flood prone land are detailed in the NSW Government's Floodplain Development Manual 2005 which requires a 4 step process as follows.*

- i. *Flood Study – Determines the nature and extent of the flood problem.*
- ii. *Floodplain Risk Management Study – Evaluates management options for the floodplain in respect of both existing and proposed development.*
- iii. *Floodplain Risk Management Plan – Involves formal adoption by Council of a plan of management for the floodplain.*
- iv. *Implementation of the Plan – Construction of flood mitigation works to protect existing development. Use of Local Environment Plans to ensure new development is compatible with the flood hazard.*

*Whilst Council recognises that the proposal is being processed outside of the Local Environment Plan process, it notes that the Director General Requirements require the proponent's studies to include demonstrating consistency with the aims and intent of the Floodplain Development Manual and relevant local and regional policies.*

*The property is affected by flooding from Macquarie Rivulet. Flood studies for the lower reaches of Macquarie Rivulet and for Albion Park were completed in 1993. These studies show design 1% Annual Exceedance Probability (AEP) flood levels at this site to vary from 7.25m to **7.63m AHD**. These studies indicate that approximately 83% of the portion of the site north of the east west runway would be inundated by floodwaters up to 4.25m deep. Approximately 55% of the site south of the east west runway would be inundated by floodwaters up to 3.5m deep. The 1993 studies did not assess flooding for the Probable Maximum Flood (PMF) event. In the past Council has sought funding assistance from the NSW government for the construction of a levy embankment in this area to protect the airport from bypass flooding*

through the subject property. Funding assistance is not likely to be obtained until the floodplain management plan for Macquarie Rivulet has been completed.

*The full extent of flood affectation of the property due to flooding from Macquarie Rivulet will be determined when the Macquarie Rivulet Flood Study is completed. Council will be commencing the new Macquarie Rivulet Flood Study in 2007 however the floodplain management plan is not expected to be complete before 2010.*

The level of 7.63m AHD is taken directly from the Kinhill Study which uses the WRC report as a starting point. The Albion Park Flood Study Report prepared by Water Resources Commission (WRC) of NSW January 1986 is a 1D study using information and methods available at this time. Flooding records were incomplete and unreliable this is clearly stated in the Kinhill report section 4.3.2, 4.3.3 below:

#### 4.3.2 MODEL CALIBRATION

*In order to gain confidence in a hydraulic model, it should be calibrated and verified. However, there is a general lack of flood records available for the Albion Park Study area. The original DWR model was calibrated to 1984 flood levels, but there was no gauge data available for this event and no records for downstream water levels. Flood levels were also estimated from survey. Therefore, the validity of this calibration should be questioned.*

#### 4.3.3 STARTING WATER LEVELS

*The downstream starting water levels for HEC 2 modeling are usually provided by historical flood levels. No flood levels were available for the Macquarie Rivulet and a starting level of 9.20 m 'AHD was adopted for the 1% AEP flood level in the DWR report. At this level the Albion Park aerodrome would be under 3 m of water for the 1% AEP event, although there has been no record of flooding in the last sixty years. This level is also inconsistent with recent work by Forbes Rigby & Associates which indicates that a level of 7.5 m AHD may be more realistic. This level was determined using a two-dimensional finite element model for the downstream floodplain of the Macquarie Rivulet.*

*A 1% AEP flood level of 7.5 m AHD for the Macquarie Rivulet was therefore adopted in this study and the flood levels for the more frequent events determined from a normal depth analysis. Flood levels in Frazers Creeks were found to be drowned out by the Macquarie Rivulet flood levels and so the same starting water level was used for both streamflows. The starting water levels adopted in this study are tabulated in Table 4.8.*

Both reports start with cross section opposite the airport with the WRC starting at 9.20AHD, see map appendix A1, A2. With the Kinhill report selecting a level which was not based on a completed study of 7.5 AHD, see map from Kinhill appendix A3. Neither of these levels are based on flood studies or calibrated data and neither study addresses the development site.

## 2.0 PROPOSED DEVELOPMENT

The light industrial development is proposed on land in Albion Park adjacent to the Albion Park airport. This proposed development is located on two parcels of land to the immediate west of the north-south runway and to the immediate north and south of the east-west runway. Lot 6 DP 1100435 is located to the immediate south of the east west runway and Lot B DP109816, to the immediate north. See plan appendix A4.

The proposed development contains a street entering the site from Tongarra Road adjacent to the southern end of Albion Park Airport. This street circulates through the site providing access to several small cul-de-sacs and a concrete access road. All traffic enters and leaves the site at the one point. See Appendix A for an overview plan of the site. See plan appendix A4.

## 2.2 FLOOD BEHAVIOUR AT THE SITE

The flood behaviour is taken from the two Rienco Flood Studies (existing conditions and post development). These studies have generally established the flood levels as 6.6m AHD for the 1% and as 8.2m AHD for the PMF.

The full site has an area of 74 hectares. The Developable area of the site is 43.53 hectares.

In the 1% flood pre-development more than 44.6 ha of 74 ha is inundated. In the post development study the developable more than 30.57 ha of 74 ha is inundated which is all the developable area of 43.53 ha i.e. the developed site is free of flooding in the 1%.

In the PMF pre-development more than 51.6 ha of 74 ha is inundated. In the post development study 52.1 ha of 74 ha is inundated although this is at very shallow depths.

See appendix A8 for the impact in flood elevation on the existing flooding levels for the 1% and the PMF.

## 2.3 FLOOD IMPACTS & RISK MANAGEMENT.

Generally development of flood prone land can lead to adverse impacts of the development and adjacent properties. These impacts are considered as follows.

The FPDM 2005 categorises land in the following way:

**Floodways** are those areas where a significant volume of water flows during floods and are often aligned with obvious natural channels. They are areas that, even if only partially blocked, would cause a significant increase in flood levels and/or a significant redistribution of flood flow, which may in turn adversely affect other areas. They are often, but not necessarily, areas with deeper flow or areas where higher velocities occur.

**Flood storage** areas are those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. If the capacity of a flood storage area is substantially reduced by, for example, the construction of levees or by landfill, flood levels in nearby areas may rise and the peak discharge downstream may be increased. Substantial reduction of the capacity of a flood storage area can also cause a significant redistribution of flood flows.

**Flood fringe** is the remaining area of land affected by flooding, after floodway and flood storage areas have been defined. Development in flood fringe areas would not have any significant effect on the pattern of flood flows and/or flood levels.

In this development we have relocated part of the eastern arm of the Frasers Creek floodway and filled some flood storage/flood fringe area. The impact of this work is contained in the appendix A5 to A14. Risk management planning should consider the following from the FPDM 2005.

Property Modification Measures	Response Modification Measures	Flood Modification Measures
Zoning	Community Awareness	Flood Control Dams
Voluntary Purchase	Community Readiness	Retarding Basins
Voluntary House Raising	Flood Prediction and Warning	Levees
Building and Development Controls	Local Flood Plans	Bypass Floodways
Flood Proofing Buildings	Evacuation Arrangements	Channel Improvements
Flood Access	Recovery Plans	Flood Gates

TABLE 2.1 - Typical Floodplain Risk Management Measures



We do not consider the impacts to be significant especially when the economic value of the development is considered.

## 2.4 IMPACT OF FLOODING ON THE DEVELOPMENT.

The impact of flooding on the development can be categorized as follows. As the site is significantly above the 1% there is no impact at the site in this event apart from that occurring naturally within the site during such a rain event (i.e. localized flooding). The site is generally free of the 1% event. In the PMF however the middle third of the site is inundated with a shallow layer of water.

## 2.5 REGULATORY CONSIDERATIONS.

The site is located within the Shellharbour City LGA as such the flooding issues for site should be considered with regard to the SCC DCP Floodplain Risk Management Development Control Plan April 2006 and the NSW Floodplain Development Manual (FPDM) released in April 2005.

## 2.6 KEY ISSUES – DoP KEY ISSUES REPORT.

The sections relating to flooding from this report is as follows

*The EA must address the following key issues:*

*Flooding*

(1) *A comprehensive flood analysis report should include, but not be limited to:*

- (a) *The impact of flooding on the development including the estimation of the extent of flood prone land (i.e. PMF), high hazard areas and floodways, the implications of the full range of floods and the safety of users of the development*

The attached flood modeling reports & analysis consider the 100 year (1%) and the PMF floods for the site for both the pre-developed or existing conditions and the post development condition. The full range of floods, such as the 5% and 10% floods, were not considered as the development site is above the 100 year (1%) flood level. There are minimal problem with the safety of users of the site for floods up to and including the 100 year (1%) as the site is above the 6.6 AHD flood level. In the PMF and floods large than the 100 year the central part of the site is inundated to a level of 8.2 AHD (see Appendix C.2 of the Post Development flood modeling report). Even in the extreme event of the PMF there are adequate escape routes all around the site. This is not a residential development and therefore there is no danger of people being asleep on the site, there is plenty of site access and egress available during all flood events.

- (b) *The impact of the development on flood behaviour on and off site, include existing and planned development in the wider area.*

The development has a minimal impact on flood behaviour. The impacts are shown in Appendix D of the Flood Report. These impacts in the 100 year (1%) amount to a raising of the flood level in the northern part of the flood plain of between 32 to 34 mm and a change in level in the southern part of the catchment around the EDGES of between 40 to 60 mm. No existing



residences are affected in the 1% flood in the village as the impacts do not raise the flood level above existing floor levels. This is due to resend developments being forced to comply with flood heights drawn from the WRC study which gave very conservative flood heights. We have consulted with the Roads & Traffic Authority and the local Council to determine the impact on existing and planned development. No impact from these existing and planned development been identified to date. It is our understanding that the future RTA work will seek to not have serious impact on flood levels. However, how this is to be achieved is unknown as planning barely at the conceptual stage.

- (c) *The flood hazard in the area (including the hydraulic hazard, flood readiness, flood warning time, rate of rise of floodwater, flood duration and type of development) and access and evacuation issues;*

The provisional hydraulic hazard for the pre & post development models has been mapped and is included in the reports. Pre development is in Appendix G.9 and G.10 and post development Appendix C.9 and C.10. Flood hazard during the 1% flood adjacent to the site is unchanged although the amount of low hazard area has been reduced due the steepening of the banks of the development site. A low hazard area has been introduced to the central part of the site during the PMF but the high hazard area has been reduced to the filling of the site. The design floods for the site for the PMF and 1% are for very long duration events giving ample time for flood warning and with ample escape routes and the availability of higher ground, evacuation issues are minimal. We have reviewed factors effecting the provisional flood hazard and the true hazard.

- (d) *Detail viable strategies to manage any adverse impacts of the development on flood behaviour; and*

The development does not cause unmanageable impacts on flood behaviour. Most existing developments, especially new residential developments, have been constructed with floor levels well above the flood levels demonstrated in these flood studies. These levels were obtained from unrealistic flood heights produced in previous studies. See section 1.5.

- (e) *Demonstrate consistency with the aims and intent of the Floodplain Development Manual, 2005 and relevant local and regional policies.*

The primary objective of the New South Wales Flood Prone Land Policy, as outlined below, recognises the following two important facts:

Flood prone land is a valuable resource that should **not be sterilised** by unnecessarily precluding its development; and

If all development applications and proposals for rezoning of flood prone land are assessed according to rigid and prescriptive criteria, some appropriate proposals may be unreasonably disallowed or restricted, and equally, quite inappropriate proposals may be approved.

The proposal is entirely in accordance with the Floodplain Development Manual 2005 and the relevant local policies. This land which the subject of this development proposal is very valuable land with great economic potential.

It is well known that a major freeway will be constructed through the centre of the catchment there is little need for minor flood mitigation measures when there will be dramatic changes in the characteristics of the catchment when this occurs.

As there is no adopted “Floodplain Risk Management Plan” (FRMP) for this catchment then Council’s Flooding DCP states

***If no such study or plan exists, a site specific flood study / flood risk report may be required to be submitted to Council by a suitably qualified civil engineer with appropriate experience and expertise in hydrology and hydraulics in order to determine the risk precinct and controls specifically for the subject property. This form of study will require modeling of storm events up to and including the Probable Maximum Flood (PMF). Flood modeling must include a sensitivity analysis and assume the riparian land is fully vegetated.***

In accordance with the requirements of the Draft Floodplain Risk Management DCP Am 1 - Jan 2006 and the preliminary Flooding data provided. I wish to make the following comments. I have consulted the above Flood Study document and the proposed site, shown above, is as follows:

Appendix C.2 of the Post Development study shows the PMF flood level to be 8.2m AHD at the central part of the site.

Appendix C.2 of the Post Development study shows the 1% flood level to be 6.6mAHD at the eastern end of the building envelope and 17.5mAHD at the central part of the site.

Appendix A1 of this report shows no hazard level in the developable area in the 1% flood.

As there is no flooding during the 1% on site then the hydraulic category and only adjoins a floodplain therefore the site could be classified at worst as flood fringe.

In accordance with the NSW FDM 2005 the site is classified as Low hazard-Flood Fringe. In accordance with the SCC Flood DCP the site is classified as Low Risk- Industrial/Subdivision. See appendix A15 for the Schedule 1 matrix from the SCC DCP.

### ***From Schedule 1:***

*For a Subdivision use the following Planning Considerations.*

### ***LOW FLOOD RISK – SUBDIVISION***

#### ***Flood Affection***

2. *The impact of the development on flooding elsewhere to be considered in assessment. Engineers report may be required.*

Flooding impacts have been considered see section 2.3 of this report and the appendix A5 to A12. The two flood studies and this report may be used as this requirement.

#### ***Evacuation***

5. *Applicant to demonstrate that in the event of a flood, the development will have timely, orderly and safe access for emergency personnel to the site.*

Emergency personnel can gain access to the site from Tongarra road and there is ample high ground around the perimeter of the site and the majority of the site stays free of flood including the PMF.

## *Management and Design*

1. *Applicant to demonstrate that potential development as a consequence of a subdivision proposal can be undertaken in accord with this Plan.*

When the subdivision is approved and constructed, the industrial developments contained on the individual lots making up the subdivision can be safely developed as I have demonstrated above the flood hazard is low. In future the RTA will construct an elevated roadway across the floodplain which will allow the occupants, via Tongarra road, access to the highway allowing traffic to move up and down the coast even during peak flood events

## **2.7 CONCLUSIONS**

With respect to the proposed subdivision. Sections of the pre-developed site are flood prone as defined by the FPDM 2005. The developed however site can at worst be described as flood fringe with most of the site remaining free of trunk flooding. There is very low hazard to buildings on the site however all buildings should have habitable floorlevels set to 0.5m above the 1% flood. The buildings in the PMF flood zone should also have an area of escape such as a mezzanine set above the PMF level. The hazard to occupants is very low as there are generally few bedrooms on industrial sites and therefore less danger to sleeping occupants.

Although the site will have minor effects of the flood heights of both the PMF and 1% flood this is considered minor compared to the effect that the RTA highway through the centre of the catchment may have on the flood events. As part of the council development of the FPRMP some flood mitigation work will probably be recommended and carried out. These measures will have the effect in future of lowering the flood plain levels. Another factor effecting flood heights albeit to a lesser degree will be the permanent opening of the lake which will require a further Lake flood study and this new study will probably result in lowered flood levels in the lake itself and therefore in dependant catchments. This study is dependant on flood heights given in the Lake Illawarra Report.

If you have any further queries please contact the undersigned.

Yours faithfully,

**Mr. G. A. Mealey.**

## 3.0 REFERENCES

The following documents are cited in this report.

Water Resources Commission (1986) Albion Park Flood Study, Report dated January 1986.

Kinhill Engineers (1995), Extension to Albion Park Flood Study, Final Report for Shellharbour Municipal Council, Kinhill Engineers Reference SE 2158 dated June 1995

Rienco Consulting (2007) 'Flood Modeling Report – Land Adjacent to Albion Park Airport – Existing Conditions', for Jordan Mealey Partners, February 2007.

Floodplain Development Manual; Guidelines for Development in Floodplains published by the N.S.W. State Government, 2005.

Shellharbour City Council (2004), DCP 04/1 - Flood Risk Management", Shellharbour City Council, Shellharbour NSW.

# APPENDIX





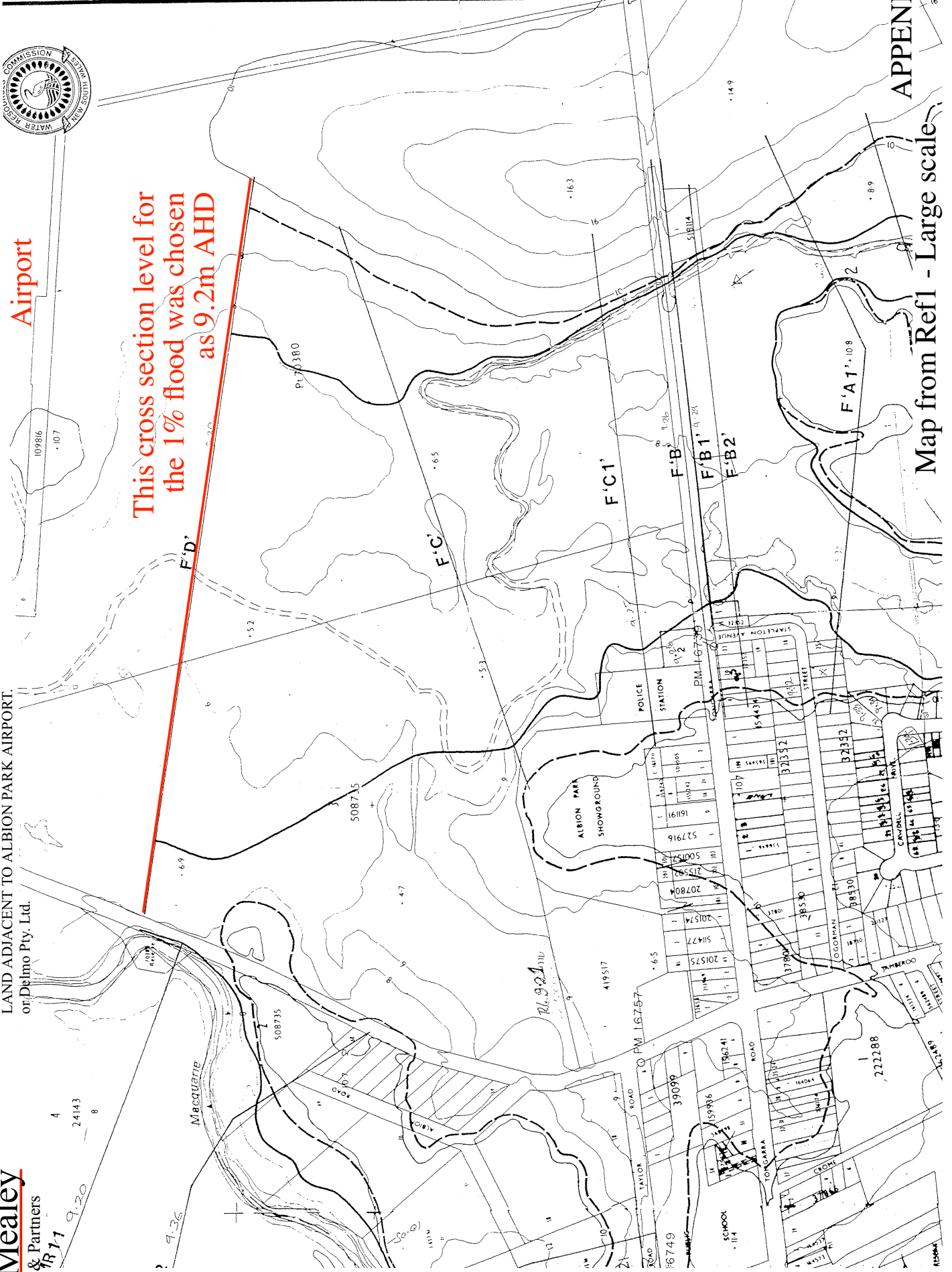


This cross section level for  
the 1% flood was chosen  
as 9.2m AHD

Peter Marrey  
32 Torgon  
-92568447

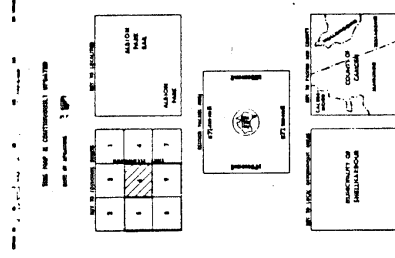
APPENDIX A2

Map from Ref1 - Large scale





ALBION PARK W7370-6  
 N.S.W. AUSTRALIA  
 1:4000 URBAN CADASTRAL SERIES



**Airport**

This cross section level for  
 the 1% flood was chosen  
 as 7.5m AHD

1. Flood Extents	2. Section Locations
3. Flood Levels	4. Flood Extents
5. Flood Levels	6. Flood Extents
7. Flood Levels	8. Flood Extents
9. Flood Levels	10. Flood Extents
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91. Flood Levels	92. Flood Extents
93. Flood Levels	94. Flood Extents
95. Flood Levels	96. Flood Extents
97. Flood Levels	98. Flood Extents
99. Flood Levels	100. Flood Extents

1% AEP FLOOD INUNDATION LIMIT

C.S. 10 CROSS SECTION AND NUMBER

1. FLOOD EXTENTS HAVE BEEN CALCULATED AT CROSS
2. SECTION LOCATIONS ONLY
3. FLOOD LEVELS AND FLOOD EXTENTS BETWEEN CROSS
4. LOCATIONS HAVE BEEN INTERPOLATED
5. FLOOD EXTENTS DEPICT APPROXIMATE WIDTHS OF
6. FLOODING ONLY. FLOOD UNLIMITED SHOULD BE
7. VERIFIED BY GROUND SURVEY
8. FLOOD LEVELS ARE GIVEN IN METRES TO AUSTRALIAN
9. MEAN SEA LEVEL
10. SIZES SHOWN ON THIS PLAN ARE APPROXIMATE ONLY
11. AND DETAILS SHOULD NOT BE SCALED FROM THIS
12. DRAWING FOR DETAILED DESIGN PURPOSES

FIGURE 5.6 APPENDIX A3  
 ALBION PARK  
 1% AEP FLOOD INUNDATION MAP

Map from Ref2 - Kinhill study 1993