LANDS PLANNING ENVIRONMENT

DALY RIVER COMMUNITY

FLOOD STUDY

Report 24 / 2000D

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Darwin

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Synopsis

In this report a flood frequency analysis of peak discharges at the Daly River community has been carried out, and the frequency of major flood related effects (Table 2) on the Daly River community have been determined using hydrological records available to date.

Also, the flood forecasting and warning system for the Daly River Community and its current upgrade and capability have been described.

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Daly River Community - Flood Study

Introduction

January 1998 saw the largest floods yet recorded in many catchments, including the Daly, in the Katherine region. In Katherine itself, it was the worst floods in living memory. The flood waters from Katherine washed down the Katherine-Daly river system into the Daly River and devastated the Daly River (Nauiyu Nambiyu) community. The residents of Daly River had to be evacuated by helicopter. The river peaked at 16.25 m at the Daly River Police Station gauge. Like Katherine, the Daly River community had also experienced the worst flood in memory. The damage caused to property in the Daly River community was extensive.

In March 2000, the Daly River community was again flooded and the residents had to be again evacuated. The river peaked at 14.43 m at the Daly River Police Station gauge. However, this time, the community was well prepared and the flood damage caused was relatively small.

Subsequent to the 1998 Australia Day Katherine/Daly Flood, cabinet allocated funds in 1997/98 and 1998/1999 for the conduct of a major flood study for Katherine and similar associated flood studies for Beswick, Mataranka, Daly River and Binjari communities. The major flood study for Katherine which also includes the Binjari community is nearing completion. The consultancy for the Beswick Flood Study which also includes a flood forecasting system for Beswick/Mataranka/Djilkminggan and Elsey is in progress.

For Daly River, studies carried out in 1987 by the then Department of Lands and Housing indicated that much of the community area would be inundated in a 10 year average recurrence interval (ARI) flood. A Land Use Planning Study carried out by Willing and Partners (1989) determined planning levels with regard to flood hazard.

A Serviced Land Availability Plan (SLAP) of scale 1:2,500 of the Daly River Community, with 1 m contours is available. This plan was last updated on 15/06/1998 and displays some flood information[1].

A Community Development Plan (1998 – 2003) was prepared for the Nauiyu Nambiyu Community Government Council by Delahay and Finch (1999). The plan, among other issues,

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[1] The flood information displayed in SLAP as follows: sewerage system is operational to flood level RL 13.8 m AHD, airstrip is operational to flood level RL 14.0 m AHD, minimum building level is RL 15.0 m AHD, the average recurrence intervel for flood waters to reach or exceed RL 15.0 m AHD is approx. once every 10 years.

The sewerage system capabilty was improved after the 1998 flood, and is now operational to flood level RL 14.5 m AHD

also looked at the effect and frequency of flooding on the Daly River Community. The plan recommended that any future developments at Nauiyu Community must take into account the possible frequency of major effects of future flooding. The plan set out an action plan to relocate and or improve (with respect to the flood levels), the infrastructure, namely, the access roads both the section of Daly River Road subject to flooding (lowest point at Tommy's Creek) and the access road to the community, the electrical supply, sewerage, the water treatment plant, Telstra communications and the airstrip. A flood refuge situated above 20 m AHD was recommended for the purpose of future development/relocation of essential services and short term resident evacuation. Location of areas above 20 m AHD have been identified in the plan.

The Daly River flood warning system is currently being upgraded with part funding from the Natural Heritage Trust (NHT). This upgrade is scheduled to be completed in September 2000.

The purpose of this report is to determine the frequency of flooding and the frequency of major effects on the Daly River Community, using hydrological records available to date. This report will also describe the current Daly River flood forecasting and warning system and its upgrade which is now nearing completion

Daly River Catchment

The Daly River is formed by the confluence of the Katherine and Flora Rivers to the south-west of Katherine, and drains into the Timor Sea at Anson Bay. The catchment (Figure 1) is some 51,800 square kilometres in area, of which 48,400 square kilometres lies upstream of the Daly River Community.

The Daly River (and the Katherine River) catchment falls within the climate zone classified by the Bureau of Meteorology as 'Summer Rainfall – Tropical'(Bureau of Meteorology 1986). This zone is characterized by heavy periodic rains (heavier in coastal areas), generally hot and humid in coastal areas during the summer (November – March). The winter months (May – September) are generally rainless, mild to warm and dry. The months April and October represent transition periods of change from one season to the other. The rainfall is seasonal and 80 – 90% of the annual rainfall occurs in the four months from December to March. Although a substantial portion of the rainfall is caused by thunderstorm activity, flood producing rainfalls in the catchment mainly result from monsoonal depressions or cyclonic activity.

Catchment characteristics vary from high relief sandstone escarpment country in the north-east to arid plains of denuded skeletal soils in the south. The escarpments yield high run-off flows following thunderstorms and cyclonic rains, the southern arid areas contribute turbid flows of variable volume.

The response time of the Daly River at Daly River Township to rainfall in the upper catchment is of the order of one week. Flooding normally occurs below Mt Nancar on an annual basis and may

comprise both local and riverine flooding. Above Mt Nancar the main river channel is contained within deeper banks, as a result of which, overbank flooding is less frequent than is the case on the floodplains around Daly River Community.

Tidal influences can extend to Mt Nancar gauging station at times of moderate flows, however at higher flows tidal effects are drowned out some distance downstream of the Daly River Community. There are no significant tidal effects present during flows of significant magnitude.

The community is situated on the northern bank of the river on a natural levee, some 2 kilometres downstream of the Daly River Police Station.

Streamflow Data

The Daly River is gauged at the Police Station gauging station (G8140003) (Figure 1). The catchment area at the gauging station is 48,400 square kilometres. The gauging station was opened in 1952 and continuous stage gauging is being carried out. Twenty current meter measurements have been carried out at this station since 1973 up to a discharge of 732 cumecs at a gauge height of 8.72 m. The gauge height of the maximum stage recorded to date is 16.25 m (03/02/98).

Upstream of the Police Station gauge the Daly River is gauged at Mt Nancar (G8140040), Beeboom Crossing (G8140042) and Claravale (G8140067) (Figure 1). The catchment area at Mt Nancar is 46,600 square kilometres. The gauging station was opened in 1967 and continuous stage gauging is being carried out. 273 current meter gaugings have been carried out at this station up to a discharge of 7,700 cumecs at a gauge height of 19.54 m. The gauge height of the maximum stage recorded to date is 19.56 m (02/02/98).

Flood Rating

The current meter measurements available for the Police Station gauge (G8140003) are insufficient to derive a flood rating curve. The current meter measurements at Mt Nancar, however, are sufficient to develop a flood rating curve. The rating curve at Mt Nancar (G8140040) for gauge heights above 4.0 m is shown in Figure 2.

Floods at the Daly River Police Station and at Mt Nancar are caused by rain in the upper Daly River catchment, and the inflows to Daly River between the 2 stations are insignificant. There is also very good linear correlation between the annual peak flood heights at the Police Station gauge (G8140003) and Mt Nancar (G8140040) (Figure 3).

The flood rating at the Police Station gauge (G8140003) was therefore derived by plotting the flood discharges from the Mt Nancar rating curve against the corresponding flood height at the

Police Station derived from the peak flood height correlation (Figure 3) between Mt Nancar and the Police Station.

The derived flood rating at the Police Station is shown in Figure 4.

Flood Frequency Analysis

The annual peak flood heights at the Police Station gauge (G8140003) are available for the period 1952/53 - 1999/00 (Table 1)

The annual peak discharges were derived from the flood rating curve (Figure 3) using the annual peak gauge heights. The annual peak discharges are shown in Table 1.

A flood frequency analysis of the annual peak flows was carried out. A Log Pearson Type 3 distribution was fitted to the series (1952/53 - 1999/00) of the derived annual peak flows. The results of the frequency analysis (Appendix 2) are as follows

STATISTICS OF LOGS OF FLOWS

MEAN	3.2807
S.D.	0.3574
SKEW	-0.5678

LOG PEARSON TYPE 3 DISTRIBUTION

PROBABILITY %	FLOW	5% C.L.	95% C.L.
0.2	11724	22856	6014
0.5	10277	17724	5959
1.0	9147	14405	5809
2.0	7980	11527	5525
5.0	6392	8370	4881
10.0	5146	6422	4124
20.0	3864	4762	3135
50.0	2062	2606	1631
80.0	986	1309	743
90.0	640	923	444
95.0	438	709	270
99.0	201	457	89

Table 1

Annual Peak Gauge Heights and Annual Peak Flows at Daly River Police Station (G8140003)

Year	Peak Gauge Height (m)	Peak Flow in cumecs	Rank of top 10 Floods
52/53	10.19	1208	
53/54	9.53	1012	
54/55	12.47	2399	
55/56	12.04	2034	
56/57	15.19	6883	2 (between ARI 24 & 26)
57/58	9.96	1133	
58/59	12.55	2491	
59/60	10.16	1196	
60/61	5.72	202	
61/62	8.23	601	
62/63	8.61	734	
63/64	8.46	685	
64/65	7.47	407	
65/66	13.06	3143	
66/67	12.28	2229	
67/68	13.17	3284	9
68/69	12.18	2144	
69/70	7.07	348	
70/71	-	-	
71/72	-	-	
72/73	-	-	
73/74	14.91	6394	3
74/75	11.40	1652	
75/76	14.29	5155	6
76/77	14.78	6171	4
77/78	11.21	1577	
78/79	11.32	1620	
79/80	12.72	2694	
80/81	12.66	2622	
81/82	10.30	1245	
82/83	10.70	1386	
83/84	13.39	3582	8
84/85	11.46	1676	
85/86	-	-	
86/87	12.80	2795	
87/88	-	-	
88/89	-	-	
89/90	-	-	
90/91	12.92	2948	
91/92	10.16	1196	
92/93	12.64	2596	
93/94	12.22	2174	
94/95	13.17	3284	10
95/96	9.84	1100	
96/97	13.56	3824	7
97/98	16.25	8619	1 (between. ARI 95 &105)
98/99	12.70	2407	
99/00	14.43	5464	5

- denotes missing record

ARI - average recurrence interval (years)

Frequency of Major Effects on the Daly River Community

From the flood frequency analysis the average recurrence interval in years of major effects on the Daly River community were estimated, and are shown in Table 2.

Table 2

Flood Frequency of Major Effects on the Daly River Community

Effect	Police Station Gauge Water Level m GD (m AHD)	Community Gauge near Sewerage Pumping Station[1] m AHD	Average Annual Recurrence Interval Yrs
Tommy's Creek goes under water – road passable. Western end of Airstrip under water	**11.5** (12.9)		1-2
Community cut off. Tommy's Creek causeway impassable	**13.0** (14.4)		5-6
Community sewerage system off	14.3 (15.7)	**14.5**	9-10
Airstrip flooded	14.3 (15.7)	**14.6**	10-11
Current Minimum Building Level of floor for a Habitable Room	14.8 (16.2)	**15.3**	16-18
1998 flood	**16.3** (17.7)		95-105
2000 flood	**14.4** (15.8)	14.8	12-13

[1] After the 1998 flood, a community flood water level gauge, reading in m AHD, was installed near the sewerage pumping station PS1 (see Daly River Land Use Plan Figure 5).

When the water level on the community flood gauge was 14.5 m AHD and 14.6 m AHD, the corresponding water level at the police station gauge was recorded by the Daly River Police to be 14.25 m GD and 14.32 m GD, respectively.

The Flood Forecasting and Warning System for Daly River

The Natural Resources Division of DLPE holds the responsibility for forecasting river flood heights at selected towns and communities in the Northern Territory.

Forecasting of rainfall likely to cause flooding and indications of the general likelihood of flooding are forwarded to DLPE in the form of a flood threat advice by the Bureau of Meteorology (BOM). Using rainfall and river height from rainfall and river gauging stations in the catchment, DLPE prepares river height forecasts in real time and forwards these to the Police Fire and Emergency Services (PFES). PFES holds the responsibility for the issue of flood warnings to the community concerned, through the media or directly, based on DLPE forecasts of river heights, and to organise evacuations if required.

The flood forecasting system for the Daly River uses as a data base the peak flood stage heights at Claravale (G8140067), Beeboom Crossing (G8140042), Mt Nancar (G8140040) and Daly River Police Station (G8140003) (Figure 1). The basis of the forecasting system is the prediction of flood levels at the Daly River Police Station and therefore the Daly River Community. Multiple regression equations have been developed to predict the rising stage at the Daly River Police Station using rising stage heights at the upstream stations Claravale, Beeboom Crossing and Mt Nancar (Appendix 1). About 8 hours warning between the stage at Mt Nancar and the predicted stage at the Daly River Police Station can be provided. The gauging stations at Claravale, Beeboom Crossing, Mt Nancar and Daly River Police station are all telemetered and gauge heights can be interrogated by telephone.

Watch points have been selected from PFES experience and through the regression relationships developed for each of the gauging stations used in the study. Should the water level in the river reach these watch points at any of the stations, a flood forecasting program is initiated. The watch points are:

G8140067	Claravale	13.0 m gauge datum
G8140042	Beeboom Crossing	12.0 m gauge datum
G8140040	Mt Nancar	13.0 m gauge datum
G8140003	Daly River Police Station	11.5 m gauge datum

DLPE issues flood height forecasts for the Police Station as m GD (metres gauge datum).

Except when Tommy's Creek goes under water at 11.5 m GD (Table 2) and when the community is cut off at 13.0 m GD (Table 2), significant effects in the community are understood in terms of m AHD at the community as indicated by the community flood level gauge.

Upgrade of the Katherine/Daly Flood Warning System

The Katherine and Daly River flood warning networks are currently being upgraded with partial funding from the Natural Heritage Trust. All the flood warning stations on the Daly River, namely, Claravale, Beeboom Crossing, Mt Nancar and Daly River Police Station are to be equipped with satellite telephones. Also, a river gauging and rainfall pluviometer station will be installed on the Fergusson River, downstream of the Edith/Fergusson confluence. This station will also be equipped with satellite telephone telemetry.

The upgrade will provide better forecasting capability and ensure that there is no disruption of the information transmission from the gauging stations[1]. The upgrade, to be completed by September 2000, will provide a more reliable flood warning system for the Daly River community.

Discussion

In this report a frequency analysis of floods at Daly River (Police Station gauge) has been carried out and the frequency of major effects on the Daly River community caused by floods, have been determined (Table 2), using hydrological records available to date.

The Daly River flood event in 1998 is seen to have an average recurrence interval (ARI) of the order of 95-105 years and the Daly River flood of March 2000 is seen to have an ARI of 12-13 years. The ARI of the 1957 flood was computed to be 24-26 years.

It is seen (Table 2) that the Daly River community gets cut off (when Tommy's Creek causeway becomes impassable) about once every 5-6 years. Also, the community would need to be evacuated (when the sewerage system is off), once every 9-10 years. The community was evacuated (at considerable cost) during the February 1998 and the March 2000 floods. The Nauiyu Nambiyu (Daly River) Community Government Council is now planning to increase the sewerage pump capability to 15.0 m AHD (from the existing 14.5 m AHD). This would decrease the frequency of evacuation of the community to about once in 14-15 years.

The minimum building floor level for a habitable room in the Daly River community is 15.3 m AHD. This level will be equalled or exceeded on an average once every 16-18 years.

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[1] The telecommunications system failed during the Katherine/Daly River Floods of 1998. A satellite telephone communication system may have minimised the high costs of the 1998 Daly River evacuation and property damage

The Daly River Flood Forecasting System is currently being upgraded and will provide improved flood forecasting capability, and also ensure there is practically no disruption of information transmission from the flood warning gauging stations to the DLPE flood forecasting centre in Darwin. It will result in a more reliable flood warning system for the Daly River community.

Although the 1998 flood (and the March 2000 flood) caused considerable damage and disruption in the Daly River community, the people in the community understand the situation and do not wish to move elsewhere.

The Daly River flood warning upgrade scheduled to be completed by September 2000 will improve the flood warning capability considerably and provide a more reliable flood warning system for the Daly River community. All the flood warning stations would be equipped with satellite telemetry and would ensure little or no disruption of information transmission from the gauging stations to Darwin.

Future developments in the Daly River community must take into account the frequency of major effects of future flooding (determined in this report). There is a plan by the community (Delahay and Finch 1999) to improve (or relocate), with respect to flood levels, the following infrastructure; the access roads both the section of Daly River Road subject to flooding (at Tommy's Creek) and the access road to the community, the electrical supply, the sewerage system, storm – water drainage, the water treatment plant, Telstra communicatons and the airstrip.

From the studies carried out earlier and in this report, it is seen that the impacts of flooding on the Daly River community are well understood.

The community is also considering constructing flood levees in the town to alleviate local flooding problems. A hydraulic flood modelling study (preferably using a 2 – dimensional hydraulic model) of Daly River Town needs to be carried out, however, to determine the engineering feasibility of levees to alleviate flooding problems in Daly River Town.

References

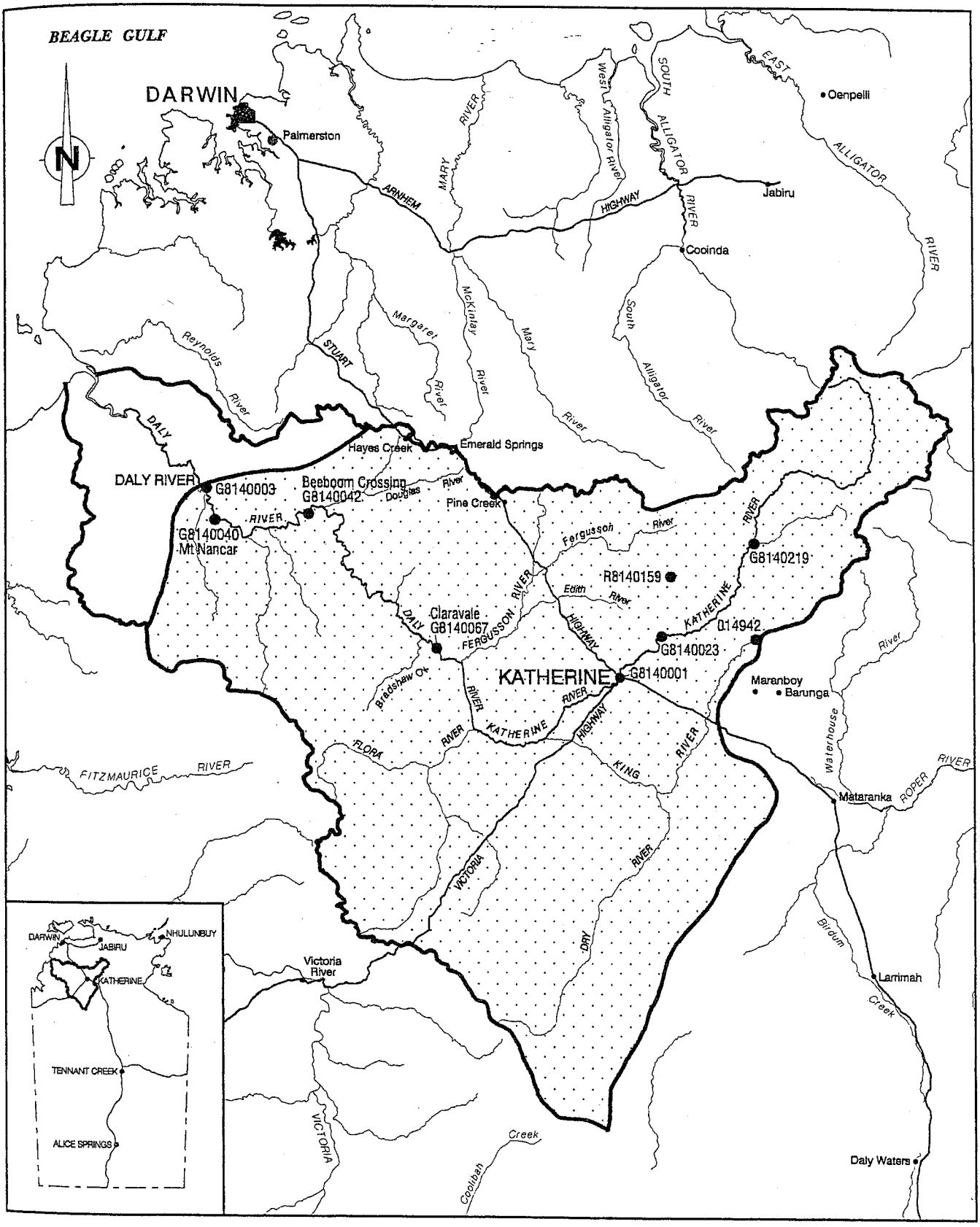
Baker, A. (1988) Flood Forecasting System for the Lower Daly River, Northern Territory. Power and Water Authority, Darwin

Childs, J and Paiva, J (1998) Natural Resources Division Flood Forecasting Performance Katherine-Daly Rivers, January 1998. Department of Lands, Planning and Environment, Darwin.

Delahay, S. and Finch, G. (1999) Community Development Plan, 1998 to 2003. Nauiyu Nambiyu Community Government Council, Daly River, NT.

Bureau of Meteorology (1986) District Rainfall Deciles - Australia. Bureau of Meteorology, Melbourne.

Figures

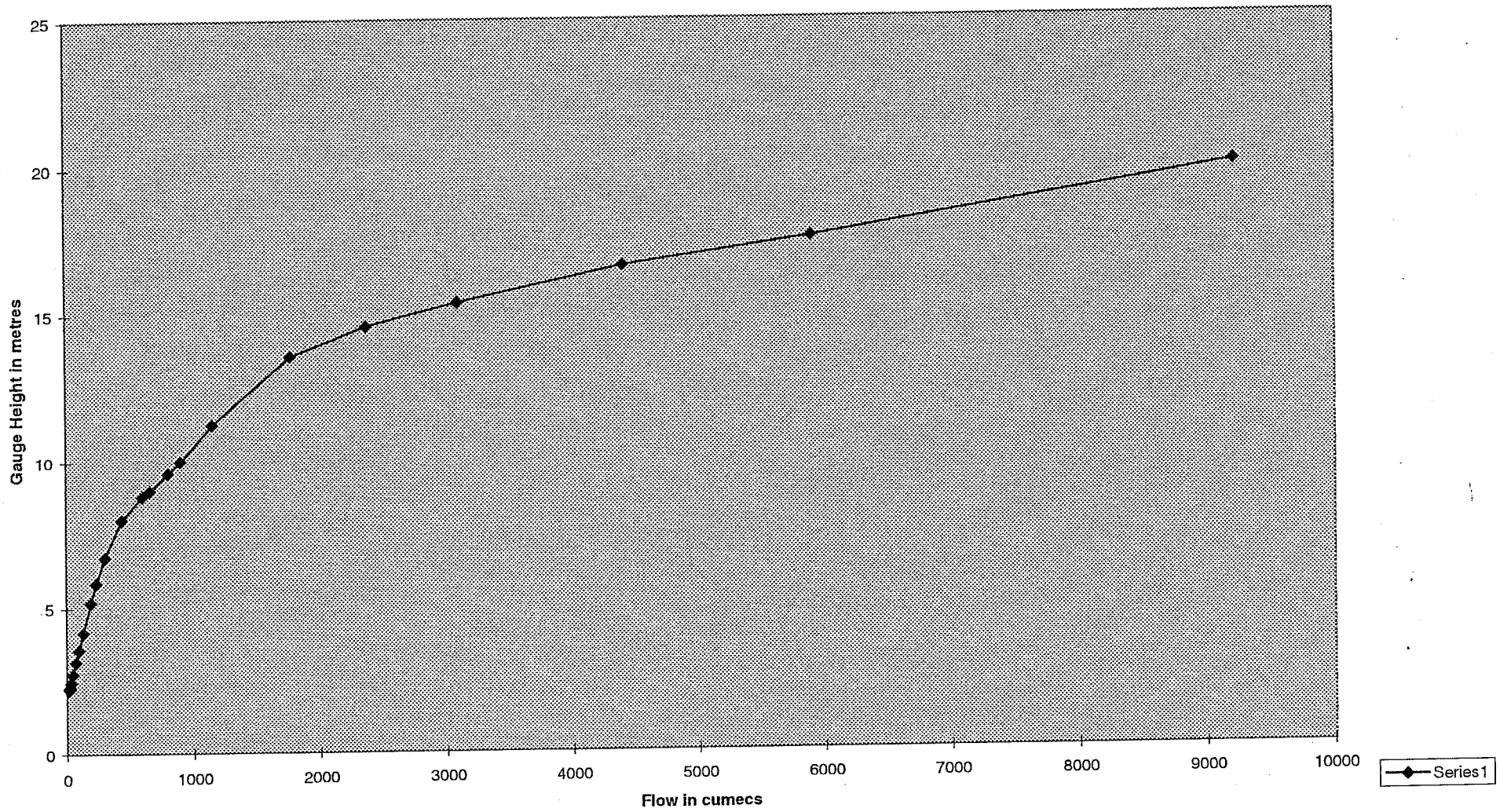


DALY RIVER CATCHMENT AT POLICE STATION G8140003

Surface water \ daly_fld_warn.dgn

Figure 1

Fig 2: Rating Curve at G8140040



Peak Height Correlation G8140040 versus G8140003

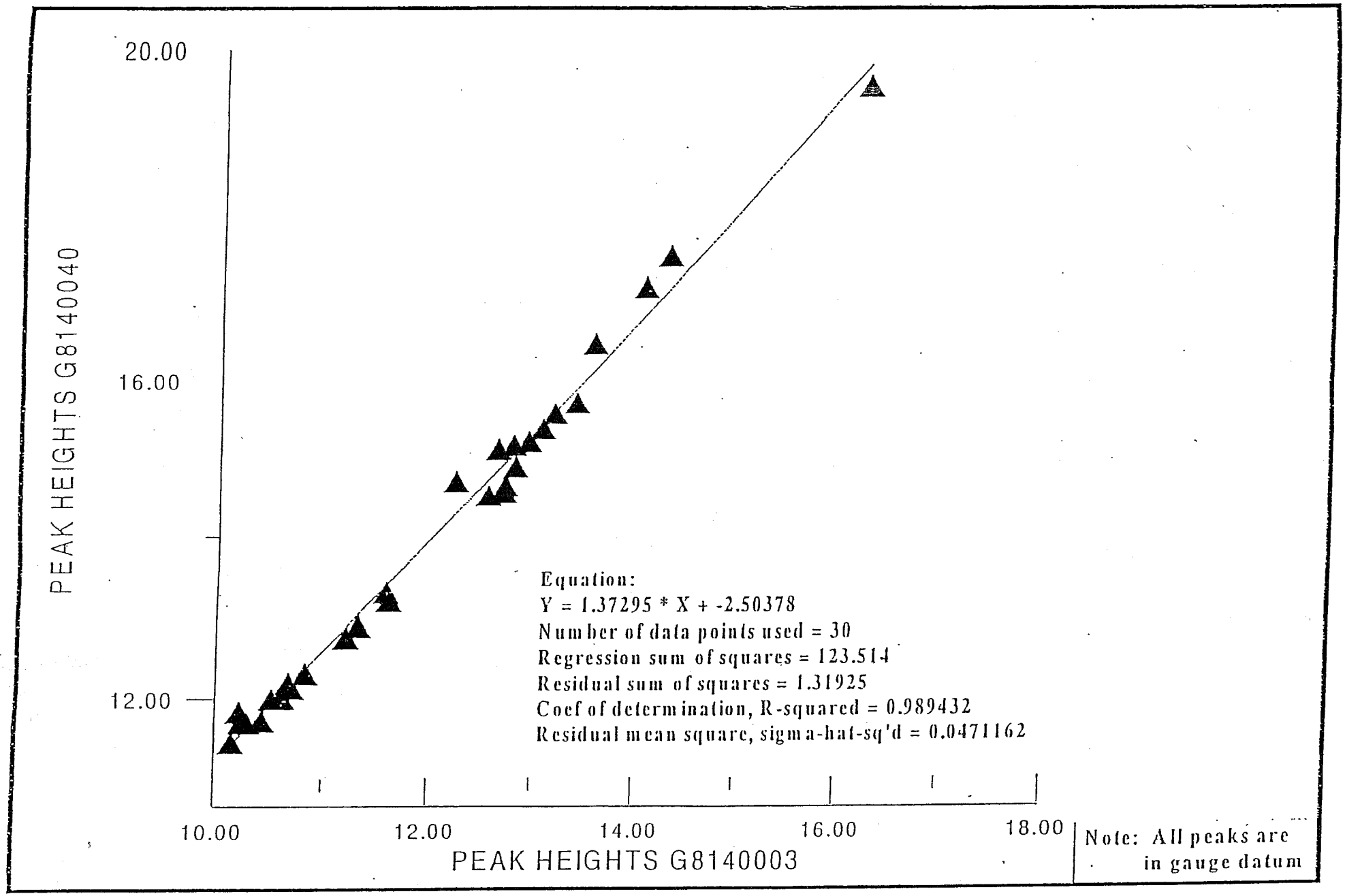
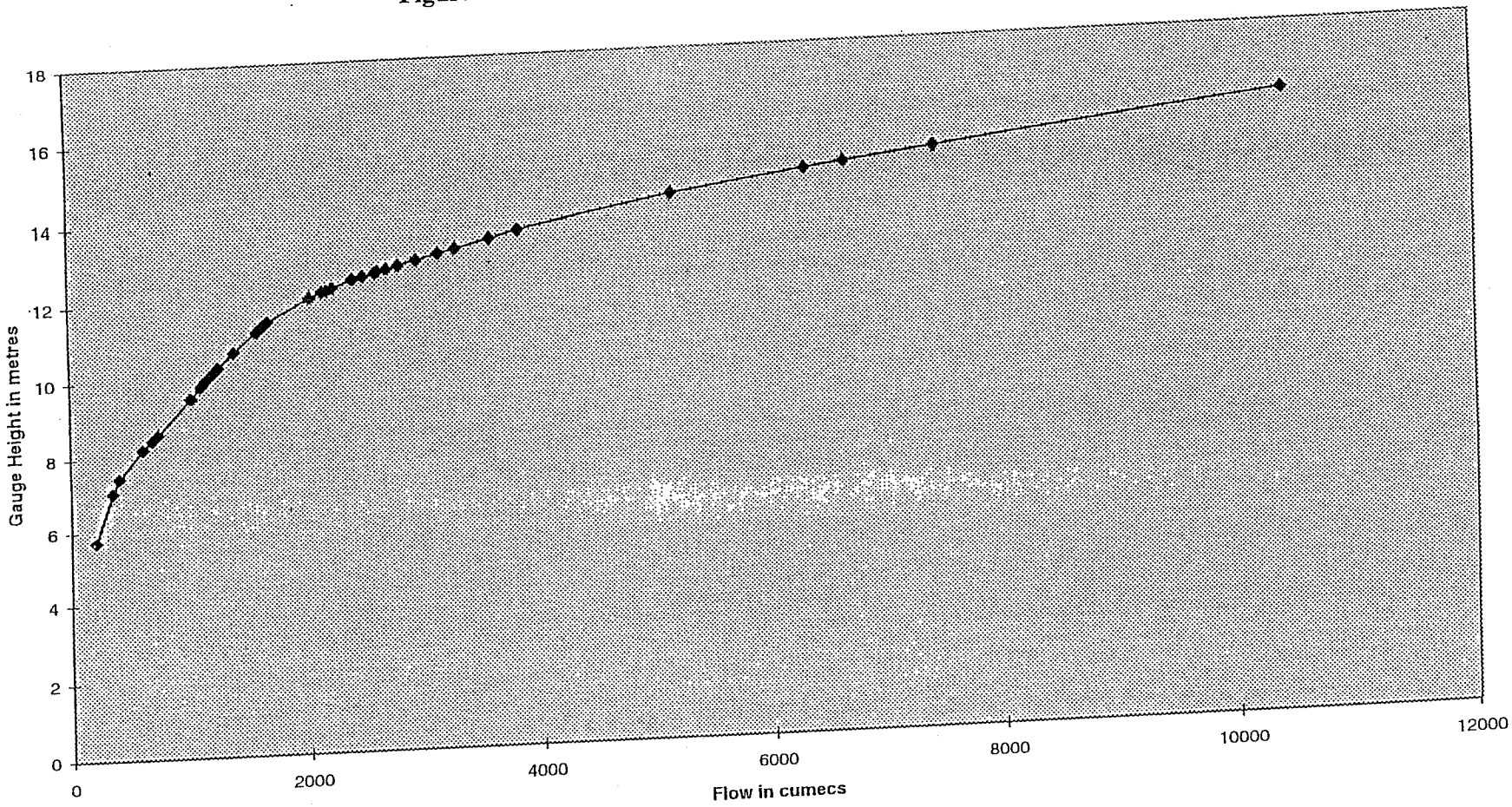
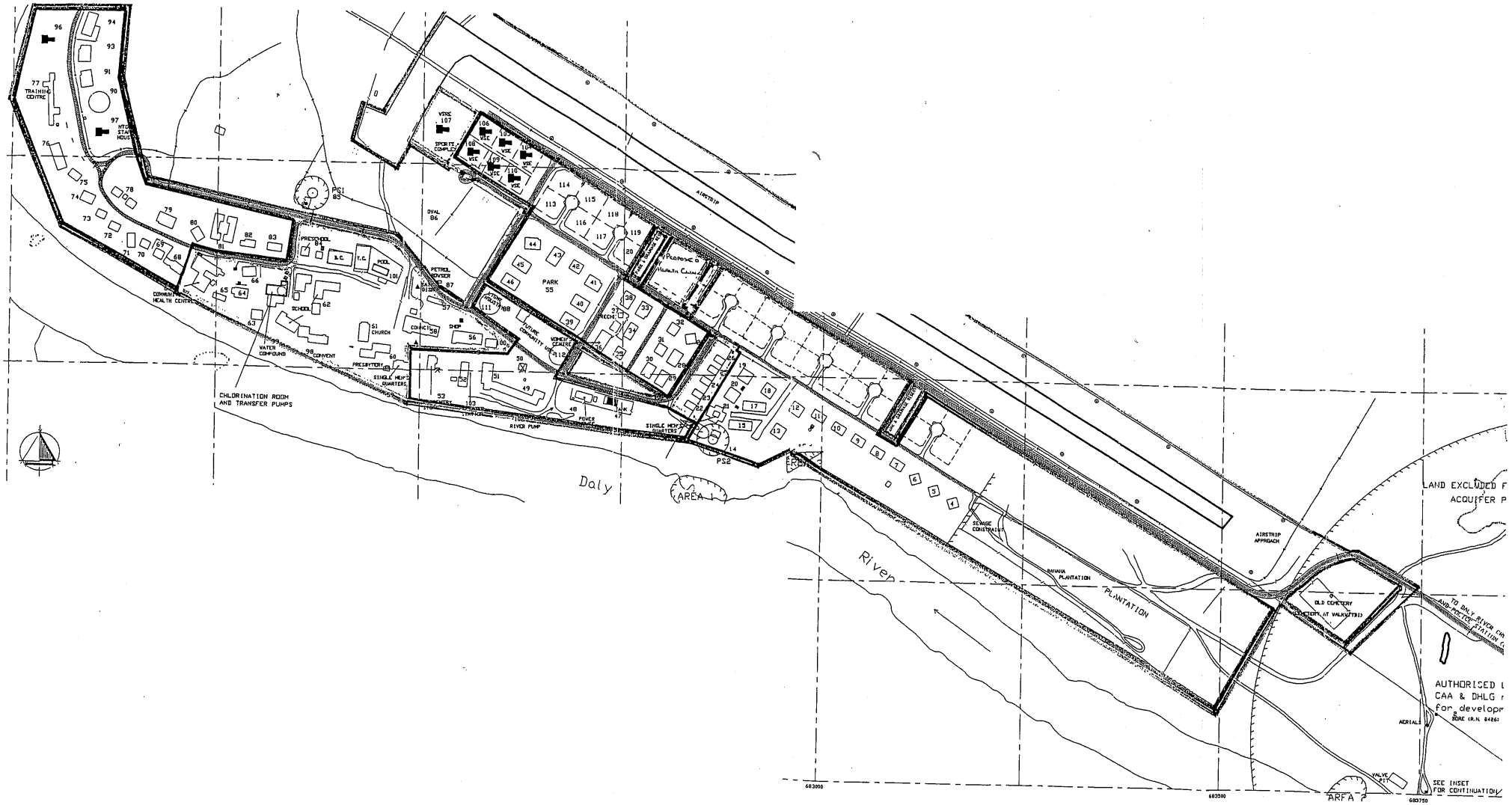


Figure 3

Figure 4: Derived Extrapolated Flood Rating Curve at G8140003





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DALY RIVER
LAND USE PLAN

SOURCE DRAWING: SLAP OCT. 1996 (AS AMMENDED)

Date	Drawn	Checked	Approved
SEPT.97	RPR		
Scales 1:2500	Job No. 78235	Sheet No. C4	Rev.

Figure 5 Daly River Land Use Plan

Appendix 1

Daly River Flood Height Forecasting Technique

Daly River Flood Height Forecasting Technique

A flood forecasting system for the Daly River has been developed using as a data base the peak flood stage heights at Claravale (G8140067), Beeboom Crossing (G8140042), Mt Nancar (G8140040) and Daly River Police Station (G8140003)

The basis of this system is the prediction of flood levels at the Daly River Police Station and therefore the Daly River Community. Watch points have been selected from Emergency Services experience and through the regression relationships developed for each of the gauging stations used in the study.

Should the water level in the river reach these watch points at any station in the system, a flood forecasting program should be initiated.

The watch points are:

G8140067 Claravale	:	13	m
G8140042 Beeboom Crossing	:	12	m
G8140040 Mt Nancar		13	m
G8140003 Daly River Police Station		11.5	m

The flood forecasting system comprises two separate parts:

Prediction of peak flood heights
Prediction of the time to peak flood height

Estimation of Flood Heights

Using multiple regression analysis a relationship between peak stages at Daly River Police Station and those at the gauging stations upstream has been derived.

Because of the number of stations used, regression analyses were carried out on various combinations of the gauging stations. This ensured that should any one station fail, predictions could be made from levels at the remaining sites in the flood warning network.

A number of predictive equations have been derived as shown below.

Prediction of maximum stage height at Daly River Police Station given peaks at all stations upstream

PS = 0.02 x C - 0.01 x BB + 0.75 x MtN + 1.50.....(1)

Coefficient of multiple correlation r = 0.995

where PS is the flood height in metres (gauge datum) at G8140003 (Daly River Police Station)

C is the flood height in metres (gauge datum) at G8140067 (Claravale)

BB is the flood height in metres (gauge datum) at G8140042 (Beeboom)

MtN is the flood height in metres (gauge datum) at GS8140040 (Mt Nancar)

Prediction of maximum stage height at Daly River Police Station given peaks at Beeboom and Claravale

PS = 0.92 x C - 0.77 x BB + 6.87.....(2)

coefficient of multiple correlation r = 0.915

Prediction of maximum stage height at Daly River Police Station given peaks at Mt Nancar and Claravale.

PS = 0.010 x C + 0.75 x MtN + 1.45..... (3)

coefficient of multiple correlation r = 0.992

Prediction of maximum stage height at Daly River Police Station given peaks at Nt Nancar and Beeboom.

PS = 0.01 x BB + 0.76 x MtN + 1.43.....(4)

coefficient of multiple correlation r = 0.992

Prediction of maximum stage at Daly River Police Station given only peaks at Claravale

PS = 0.43 x C + 4.90.....(5)

coefficient of correlation r = 0.904

Prediction of maximum stage at Daly River Police Station given only peaks at Beeboom

PS = 0.63 x BB + 3.59.....(6)

coefficient of correlation r = 0.874

Prediction of maximum stage at Daly River Police Station given only peaks at Mt Nancar

PS = 0.76 x MtN + 1.44.....(7)

coefficient of correlation r = 0.992

Therefore if peaks from all stations upstream of Daly River Police Station are known, equation (1) should be used. However, since the delay time between peak events at Mt Nancar and the Police Station is normally only in the range of 8 to 9 hours, an earlier less accurate prediction can be made using equations (2), (5) or (6).

A graphical relationship between successive stations downstream of Claravale is attached, however this should be used for preliminary estimates only and not for final peak level predictions at Daly River Police Station.

Estimation of Time to Peak Flood Height

Ratios of lag time between stations at the upper end of the network and those nearer the police station showed that the delay times for Claravale to Beeboom versus both Claravale to Mt Nancar and Claravale to Daly River Police Station provide the most consistent values. The following equations were derived.

T(C-MtN) = T(C-BB) / 0.51.....(8)

T(C-PS) = T(C-BB) / 0.46.....(9)

where

T(C-MtN) is the delay between the time of peak stage at Claravale and the time of peak at Mt Nancar in hours..

T(C-PS) is the delay between the time of peak stage at Claravale and the time of peak stage at Daly River Police Station in hours.

T(C-BB) is the delay between the time of peak stage at Claravale and the time of peak stage at Beeboom in hours.

The use of equations (1) and (2) should normally give acceptable long term predictions of the time to peak stage. If any anomalies are noted in the estimation of the time lags it should be remembered that the peak level at Daly River Police Station will occur approximately 8 to 9 hours after the peak stage at Mt Nancar.

Prediction Process

The gauging station watch points are:

G8140067 Claravale	:	13	m
G8140042 Beeboom Crossing	:	12	m
G8140040 Mt Nancar		13	m
G8140003 Daly River Police Station		11.5	m

A flood forecasting program should be initiated with the rise of water above any of the above watch points.

Preliminary estimation of stages at Daly River Police Station and Community may be calculated from both rising and peak stages at Claravale (G8140067) using the graphical method on the attached chart. The graphical method together with an example is attached. More accurate predictions of the stage level at the Police Station will be possible as rises occur at Mt Nancar and equation 7 correlating the stage at the Daly River Police Station with that at Mt Nancar, can be used.

Peak stage at the Police Station may be calculated using the equations 1 to 7 as peak levels become available at the upstream stations.

Initial prediction of the time of peak stage at Daly River Police Station may be made by using the equations 8 and 9, however, a final estimation of the peaks stage time should be made by adding 8 hours to the time of peak stage at Mt Nancar.

Calculation of Peak Stage Height at Daly River Police Station using the Graphical Method

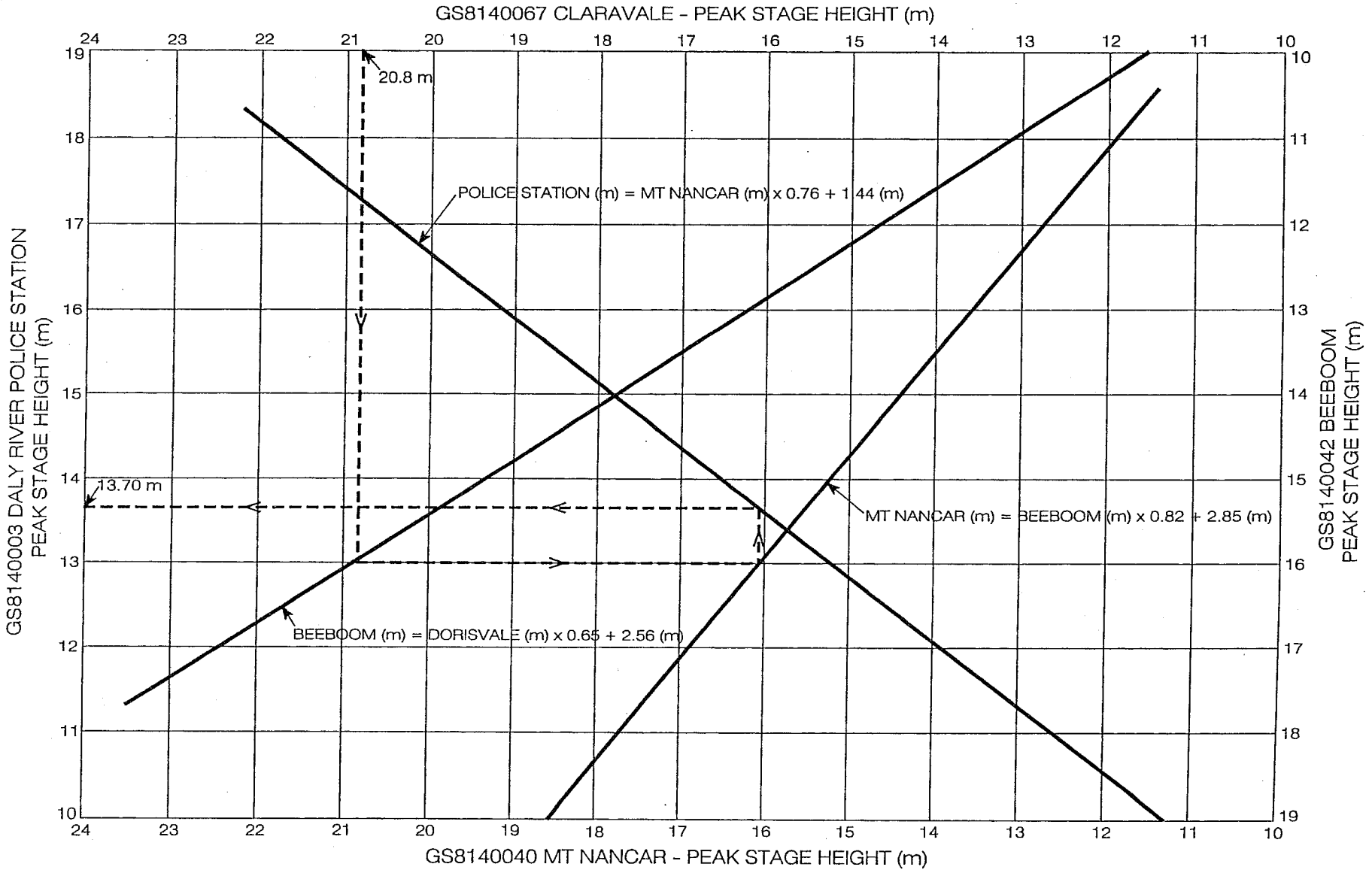
The graphical presentation in attached chart allows calculation of preliminary estimates of the stage height at Daly River Police Station, given a peak stage at Claravale or any station downstream.

As peaks are reached at gauging stations downstream more accurate predictions may be made with the use of the regression equations 1 to 7.

The graphical method may be used by following a simple set of instructions.

They are:

1. Plot the peak stage height at Claravale on the Claravale axis.
2. Draw a vertical line downwards until it hits the Beeboom - Claravale regression line.
3. At this point draw a horizontal line until it hits the Mt Nancar - Beeboom regression line.
4. At this point of intersection draw a vertical line until it hits the Police Station - Mt Nancar regression line.



LINEAR REGRESSION RELATIONSHIPS FOR SUCCESSIVE GAUGING STATIONS
DALY RIVER (ALL DEPTHS TO GAUGE DATUM)

Finally draw a horizontal line to the Police Station axis. This value is the preliminary estimate of peak stage at Daly River Police Station.

A Simple example of the Graphical Method

is shown on Figure

Assume a peak height of 20.80 metres has occurred at Claravale (G8140067).

Step 1 Plot 20.80 on the Claravale axis

Step 2 Draw a vertical line until it touches the Beeboom - Claravale regression line.

Step 3 Step 2 gives a value of 16.0 m for the peak at Beeboom. Now draw a horizontal line to the Beeboom - Mt Nancar regression line.

Step 4 Step 3 gives a value of 16.05 m for the peak at Mt Nancar. Now draw a vertical line to the Mt Nancar - Police Station regression line.

Step 5 By drawing a horizontal line from the point found in step 4 we arrive at a peak stage of 13.70 m for Daly River Police Station.

Appendix 2

Daly River at Police Station – Flood Frequency Analysis

Daly River at Police Station G8140003 - Flood Frequency Analysis

FLOW	RANK	PLOT POS'N	YEAR
8619	1	.015	97/98
6883	2	.039	56/57
6394	3	.063	73/74
6171	4	.087	76/77
5464	5	.112	99/00
5155	6	.136	75/76
3824	7	.160	96/97
3582	8	.184	83/84
3284	9	.209	67/68
3284	10	.233	94/95
3143	11	.257	65/66
2948	12	.282	90/91
2795	13	.306	86/87
2694	14	.330	79/80
2622	15	.354	80/81
2596	16	.379	92/93
2491	17	.403	58/59
2407	18	.427	98/99
2399	19	.451	54/55
2229	20	.476	66/67
2174	21	.500	93/94
2144	22	.524	68/69
2034	23	.549	55/56
1676	24	.573	84/85
1652	25	.597	74/75
1620	26	.621	78/79
1577	27	.646	77/78
1386	28	.670	82/83
1245	29	.694	81/82
1208	30	.718	52/53
1196	31	.743	91/92
1196	32	.767	59/60
1133	33	.791	57/58
1100	34	.816	95/96
1012	35	.840	53/54
734	36	.864	62/63
685	37	.888	63/64
601	38	.913	61/62
407	39	.937	64/65
348	40	.961	69/70
202	41	.985	60/61

STATISTICS OF LOGS OF FLOWS

MEAN	3.2807
S.D.	.3574
SKEW	-.5678

LOG PEARSON TYPE 3 DISTRIBUTION

PROBABILITY %	FLOW	5% C.L.	95% C.L.
.2	11724	22857	6014
.5	10277	17724	5959
1.0	9147	14405	5809
2.0	7981	11527	5525
5.0	6392	8370	4881
10.0	5146	6422	4124
20.0	3864	4762	3135
50.0	2062	2606	1631
80.0	986	1309	743
90.0	640	923	444
95.0	438	709	270
99.0	201	457	89