PROPOSED YACHT CLUB AND MARINA FACILITIES DENMARK

Preliminary report into development options and development costs

Prepared for:

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This sheet records the issue and revisions of the document. If only a few revisions are made, only the new or revised pages are issued. For convenience, the nature of the revision is briefly noted under 'Remarks', but these remarks are not part of the document.

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CONTENTS

1 Introduction

This report summaries the result of preliminary investigations into the development of a Yacht Club and Marina facility in Denmark. The facility would be on land reserved for Yacht Club purposes (Reserve 36714) and incorporate some land reclamation works. The location of this reserve is shown in Figure 1.1.

As proposed by the Yacht Club, the facility would generally involve the following:

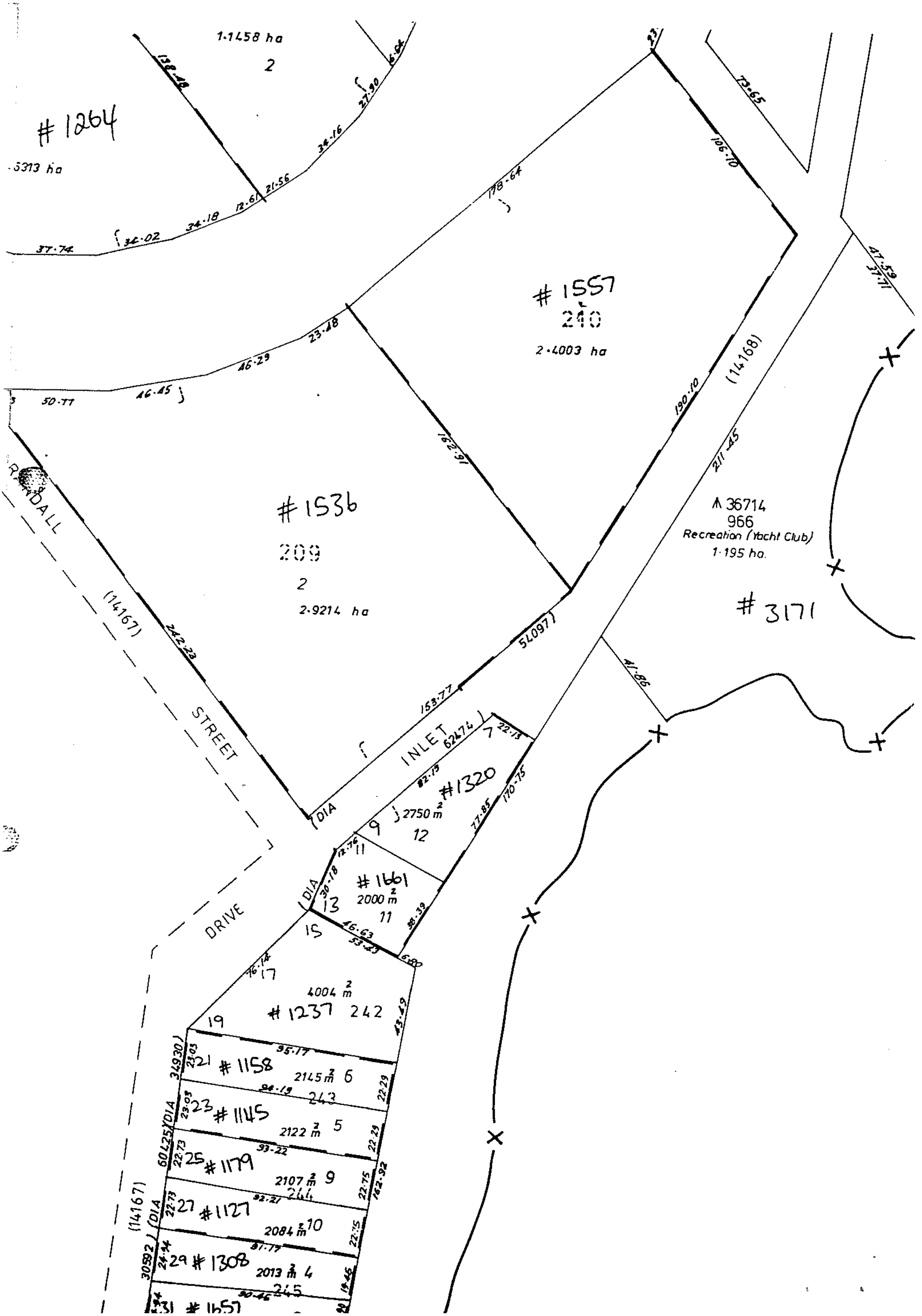
- a grassed area and beach suitable for use by junior sailors for rigging and launching of small sailing vessels such as catamarans;
- extending and widening of the existing reclaimed area by about 25 metres and use of the reclaimed area for a club-house and access to a boat launching ramp;
- construction of a boat launching ramp;
- construction of about 40 metres of groyne to provide access to boat pens and to provide shelter from the preliminary south-east winds;
- provision of 20 boat pens;
- dredged mooring basin and boat launching area and access channel;
- club house building and upgrade of public toilet facilities;
- parking and access roads.

The scope of the preliminary investigations undertaken by Brown & Root are summarised as follows:

- review the conceptual development plans provided by the Shire of Denmark and modify as appropriate;
- prepare a cost estimate for the development, as modified.

The scope of the preliminary investigations did not allow for any field investigations except for visual observations during a site visit undertaken in late May 2000. The data sources utilised for the preliminary investigations are described in Table 1.1.

The major limitation of the available data is the absence of any geotechnical information below a depth of 2m below the surface. Piling for the boat pens would penetrate below this level, making this aspect a significant area of risk for the cost estimates presented in this report. It is recommended that geotechnical investigations be undertaken to address this issue prior to final commitment to proceed with the development.



1·1458 ha
2
#1264
·5313 ha
#1557
210
2·4003 ha
#1536
209
2
2·9214 ha
RANDALL
STREET
(14167)
INLET
DRIVE
(14168)
Λ 36714
966
Recreation (Yacht Club)
1·195 ha.
#3171
#1320
2750 m²
12
#1661
2000 m²
11
4004 m²
#1237 242
#1158
2145 m² 6
243
#1145
2122 m² 5
#1179
2107 m² 9
244
#1127
2084 m² 10
#1308
2013 m² 4
245
#1657

Table 1.1 Data sources used for the preliminary investigations

SOURCE	DATA	COMMENTS
Shire of Denmark.	• concept plan • water levels at 9 March 1994 and 13 March 1995 • soil probes to depth of 2m on a 20m grid throughout dredged area. • club house layout plans.	• original source unknown presumed to be Yacht Club membership.
Estuaries and Coastal Lagoons of South Western Australia, Wilson Inlet, Irwin Inlet and Parry Inlet Estuaries of the Denmark Shire, Environmental Protection Authority Estuary Study Series Number 3 August 1988.	• bathymetry of Wilson Inlet from September 1993 PWD survey • Wilson Inlet water levels to AHD from August 1975 to July 1976	
Wilson Inlet Management Authority, Fringing Vegetation of the Wilson Inlet Delta 1946 to 1994, Water and Rivers Commission Report WRT6 1996.		
Wilson Inlet Management Authority and Shire of Denmark; Foreshore, Wilson Inlet Management Plan; Water and Rivers Commission Report WRM1 1996.	• management plan for Foreshore including reserve 36714 - 966 Recreation (Yatch Club)	
Aerial photograph 370 5389 from DOLA.		
Public Works Department, Wilson Inlet Hydrographic Survey, Soundings July/August/September 1983, PWD WA 554 52-1-1.	• soundings and contours of Wilson Inlet and Yatch Club site.	
Personal communications with Natalie Reeves of Wilson Inlet Management Authority.	• water level data from January 1994 to June 1998 at Poddy Point and Bail's Jetty	Indicative only as not tied to AHD

Site visit by Rob Puglisi in May 2000, including discussions with Shire of Denmark and Keith Graham of Denmark Yacht Club.	• Sources of laterite capstone for groyne construction from Shire gravel pits.	• first priority is rigging area, preferably grass. • deep water access important • public toilets to remain or possibly incorporate into club house • club house should also be suitable for community functions (100 people) • currently 15 boats operating from club. • boat pens for 22 ft boat (largest) - majority are 16–18 ft trailer craft. • boat launching facility may replace Rivermouth ramp. • at Rivermouth ramp can achieve 20–30 boats per day. • 1.5m draft at average summer would seem appropriate for basin. • club house area currently not sewered although adjacent future developments will eventually be sewered.

2 Conceptual design

2.1 DESCRIPTION

The conceptual design layout plan developed by Brown & Root for The Denmark Yacht Club Marina facility is shown on Drawing No. PJ0021-A-001 (Attachment A).

As proposed in the concept plan, the marina facility would comprise the following main elements:

- an extended reclaimed headland that provides parking for cars and trailers and also provide access to a new boat ramp;
- a new boat ramp, complete with timber jetty to facilitate launching and retrieval of boats;
- a new groyne to provide protection from the prevailing south-east wind and to provide access to new boat pens;
- 16 new boat pens;
- a club house located so that it overlooks the grassed rigging area;
- a grassed rigging area backing onto a beach;
- dredged basin and access channel with the dredged spoil utilised to form the grassed rigging area and beach;
- parking area adjacent to the new club house.

2.2 VARIATIONS FROM THE YACHT CLUB PROPOSAL

The conceptual layout plan developed by Brown & Root is largely based on the concept plans developed by the Yacht Club. The following summarises the variations between the two concept plans:

- the club house location has been moved in order to provide access and parking for cars and trailers. The new location promotes a greater relationship between the club house, club and social activities that would occur on the grassed rigging area;
- the boat ramp orientation has been altered in order to access deeper water. The ramp is also provided with a narrow jetty to facilitate boat launching and retrieval;
- the number of boat pens has been reduced to 16 in order to accommodate clearance requirements of current Australian Standards. The boat pens have also been provided with a lower level timber finger pier in order to improve access from the rock groyne.

- The dredged basin has been divided into two design levels, a deeper area for the boat ramp and pens and a shallower area adjacent to the grassed rigging area. This design reduces the quality and cost of dredging;
- The grassed rigging area and beach have been shaped into a stable concave profile with the level and extent of the fill area matched to the dredged volume;
- channel markers have been provided in order to mark the extent of the dredged basin.

The purpose of the conceptual layout plan is to provide a spatial arrangement of the various components requested by the Yacht Club so that quantities can be determined for the purpose of developing a cost estimate. Changes to the conceptual layout plan can be made without significant change to the cost estimate, providing the changes do not result in significant changes to the quantities. For example, the cost estimate is not sensitive to the location of the club house, but a change to the size of these facilities could have a significant effect on the cost estimate.

2.3 WATER LEVELS

Water levels in Wilson Inlet vary considerably with seasonal conditions. Appendix B contains water level information for the Inlet from January 1994 to June 1998 that was kindly supplied by the Water and Rivers Commission. Although these water levels have not been adjusted to a recognised datum they do show a maximum variation over this time of approximately 1.3 metres. Maximum water levels in Wilson Inlet are artificially controlled through management of the sandbar at the Inlet's mouth.

Water level information from August 1975 to July 1976 (Environmental Protection Authority, 1988) indicates water levels in the summer months generally in the ranges 0.0m AHD to + 0.2m AHD. Over this particular period the water level dropped to a minimum of about - 0.05m AHD in early April 1976. From the available information, it has been assumed that the water level in Wilson Inlet over an average summer would be about + 0.1m AHD. On this basis the water levels in the marina would be 1.5m and 1.0m for the deeper and shallower portions respectively. These water depths would comfortably satisfy the minimum draft requirements for the vessels that are envisaged to use the facility.

3 Development cost estimate

Table 3.1 contains the development cost that has been based upon the information available to Brown & Root at the time of preparing the estimate. Brown & Root does not accept liability for actual costs varying from those estimated. The expected order of accuracy is +/-25%.

The following assumptions have been used in this estimation:

- Rates have been taken from Brown & Root's database for projects in the South West which have been constructed in the Albany/Denmark region between 1997 - 2000 and Rawlinson's Handbook 2000.
- Quantities are based on the Conceptual Layout Plan PJ0021-A-001 Revision A.
- Rock armour stone used to protect the breakwater is available free from the local area (Shire gravel pits) and only transport and laying of these rocks is required.
- Suitable geotechnical conditions exist for the construction of the facility. It is noted that no geotechnical information exists below a depth of 2m below the surface. Piling for the boat pens would penetrate below this level. Site inspections indicate exposed granite outcrops in the area, hence the driving of piles may be of significant risk. No allowance for this risk has been made in the development cost estimates. It is recommended that geotechnical investigations of the site be undertaken before any commitment to proceed with the project.

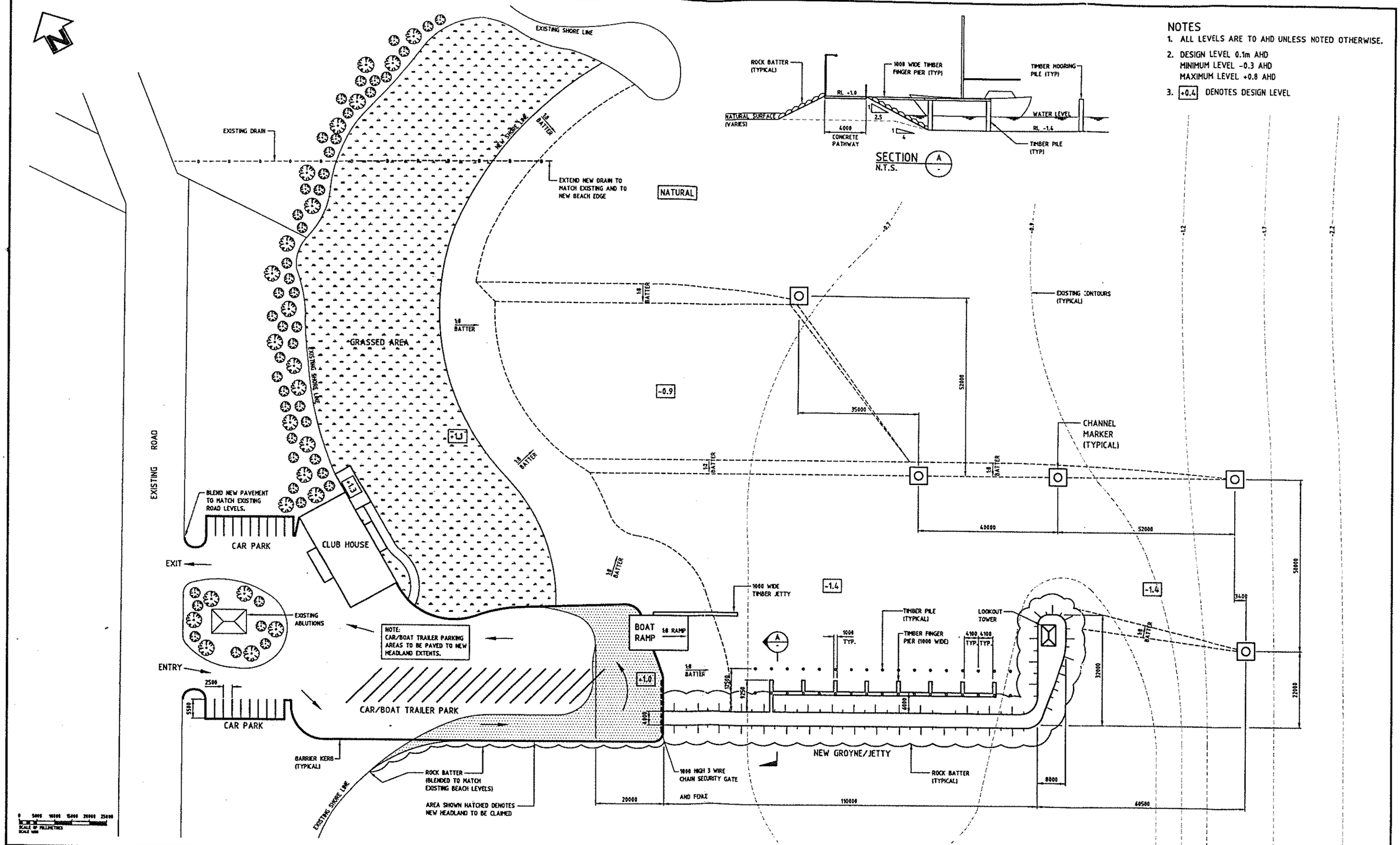
Table 3.1 Development cost estimate - Denmark Yacht Club Marina

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
1	PRELIMINARIES				
1.1	Allow for insurances, bank guarantees, fees permits (including BCITF training levy), etc		Item		Included
1.2	Establishment, maintenance, etc		Item		Included
1.3	Supply, install, maintain and remove project signboard		Item		Included
1.4	Allow for survey costs and provision of all as-constructed information		Item		Included
1.5	Allow for Overheads		Item		Included
1.6	Mobilisation of Equipment including establishment of site offices		Item		Included
1.7	Demobilisation of plant and equipment		Item		Included
1.8	Protection of existing services		Item		Included
	Preliminaries Subtotal (estimated at 15% of construction capital costs)				$201,750
2	EARTHWORKS				
2.1	Strip and remove from site all vegetation.	0.6	ha	5,000	3,000
2.2	Clearing, grubbing and disposal of all deleterious material from site.	0.1	ha	2,000	200
2.3	Strip, stockpile and respread topsoil (150mm).	4,000	m2	0.8	3,200
2.4	Bulk Earthworks				
	a. Transporting dredge to works, setup, dismantle and remove.	1	Item		80,000
	b. Dredging, spread and compact cut material to fill (including preparation of existing surface)	10,000	m^3	7	80,000
	c. Imported fill placed and compacted on site.	500	m3	10	5,000
	d. Excavated material (including excess stripped soil).	500	m3	8	4,000
2.5	Compaction testing of fill areas.	10	No.	400	4,000
2.6	Importing of topsoil and seeding.	6,500	m^2	6.5	42,250
	Earthworks Subtotal				$211,650
3	ROADWORKS				
3.1	Mark out and cut edge of existing sealed pavements for blend area joints.	50	m	14	700
3.2	Basecourse minimum of 150mm compacted thickness.	6,300	m^2	5	31,500
3.3	Prepare surface and apply hot bitumen primerseal (10mm aggregate) to primed basecourse.	6,300	m^2	2.5	15,750
3.4	Prepare surface and apply second coat (7mm aggregate) hot bitumen	6,300	m^2	1.5	9,450

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT
3.5	Adjust existing pavement levels in blend areas	250	m^2	20	5,000
3.6	Install 90mm thick concrete footpath	140	m^2	35	4,900
3.7	Kerbing	400	m	25	10,000
	Roadworks Subtotal				$77,300
4	BREAKWATER & PENS				
4.1	Excavate, spread and compact dredged material to form base of breakwater	3,500	m^3	6	21,000
4.2	Supply and install rock bolders to protect outer surface of breakwater	1,200	m^3	25	30,000
4.3	100mm thick unreinforced concrete deck to top of breakwater	600	m^2	40	24,000
4.4	Supply and install timber decking to provide base for pens (including pile driving)	20	No.	12,000	240,000
4.5	Concrete mattress for Launching Ramp	180	m^2	45	8,100
4.6	Lookout Tower - allow	1	Item	30,000	30,000
	Breakwater & Pens Subtotal				$353,100
5	CLUB HOUSE & OTHER MISCELLANEOUS				
5.1	Supply and construct Club house (including footings, all fittings)	450	m^2	1,400	630,000
5.2	Extension to existing drain outfall	55	m	100	5,500
5.3	Light poles	20	No.	2,200	44,000
5.4	Channel Markers	5	No.	2,500	12,500
5.5	1800 high 3 wire security fence and gate	15	m	65	975
5.6	Biomax sewage system	1	Item	10,000	10,000
	Club house & other Miscellaneous Subtotal				$702,975
Subtotal Marina Facility Construction					**$1,546,775**
6	PROFESSIONAL FEES—ENGINEERING, GEOTECHNICAL AND SURVEY (12.5%)				$193,350
7	CONTINGENCY (10%)				$154,675
Total Development Cost Estimate (Excluding GST)				say	**$1,900,000**

Appendix A

CONCEPTUAL LAYOUT PLAN



NOTES

1. ALL LEVELS ARE TO AHD UNLESS NOTED OTHERWISE.
2. DESIGN LEVEL 0.1m AHD
   MINIMUM LEVEL -0.3 AHD
   MAXIMUM LEVEL +0.8 AHD
3. +0.4 DENOTES DESIGN LEVEL

A1	© BROWN & ROOT SERVICES ASIA PACIFIC PTY LTD
CAD FILE	PJ0021AA
REFERENCE FILES	
PLOT SCALE	1:1
SCALES USED	1:500
DRAFTER	E.BARTOLOMEI

100 MILLIMETRES ON ORIGINAL DRAWING

DRAWING No.	TITLE
REFERENCE DRAWINGS	

CODE	DATE	DESCRIPTION	DES	TECH	PS
REVISIONS AND ISSUES					

DESIGNER	M.KEYS	25.07.00
DESIGN CHECKER		
DRAFTING CHECKER		
PROJECT DRAFTER	E.BARTOLOMEI	
DESIGN APPROVAL		
TECHNICAL APPROVAL		
PROJECT APPROVAL		
CLIENT APPROVAL		

Brown & Root

Brown & Root Services Asia Pacific Pty Ltd
ACN 007 660 317
incorporating KELLOGG
a Halliburton company

DENMARK YACHT CLUB
DENMARK MARINA FACILITY

CONCEPTUAL LAYOUT PLAN

DRAWING NUMBER: PJ0021-A-001

REVISION CODE: A

Appendix B

WILSON INLET WATER LEVEL DATA

Rob Puglisi

From: REEVES Natalie [natalie.reeves@wrc.wa.gov.au]
Sent: 11/Jul/2000 13:03
To: 'rob.puglisi@halliburton.com'
Subject: wilson inlet level plots


Poddy_Plots_94_mid-98.doc

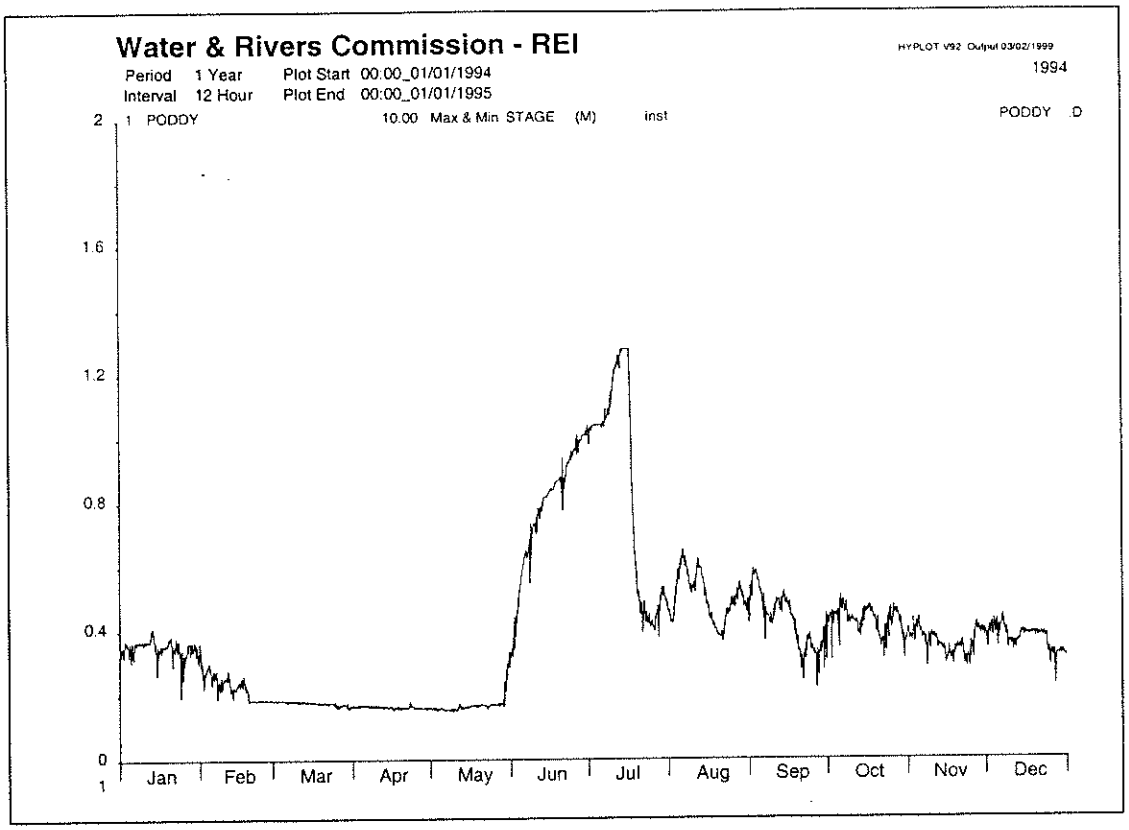

Bail_Plots_94_mid-98.doc

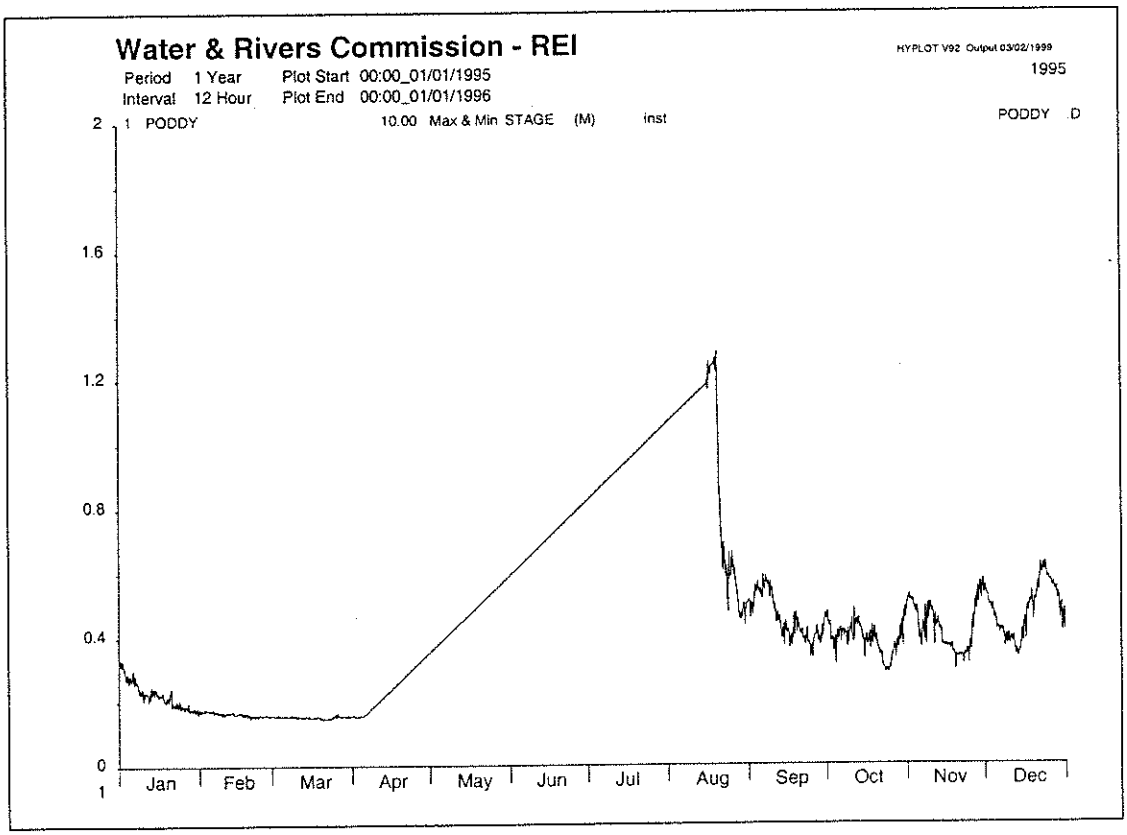
attached are plots of water hieght in wilson inlet. The plots cover a time frame from 1994 to 1998 and are from two different locations:
1. Bails jetty is on the eastern side of the inlet
2. Poddy Point is on the western side of the inlet, near the PoddyShot jetty.

I will also fax these plots to you. Please note that some problems were experienced with the datum measurement on our instruments, however the data should still provide some indication.
Please advise if you would like the data as well, if the plots are not sufficient.
Regards
Natalie Reeves

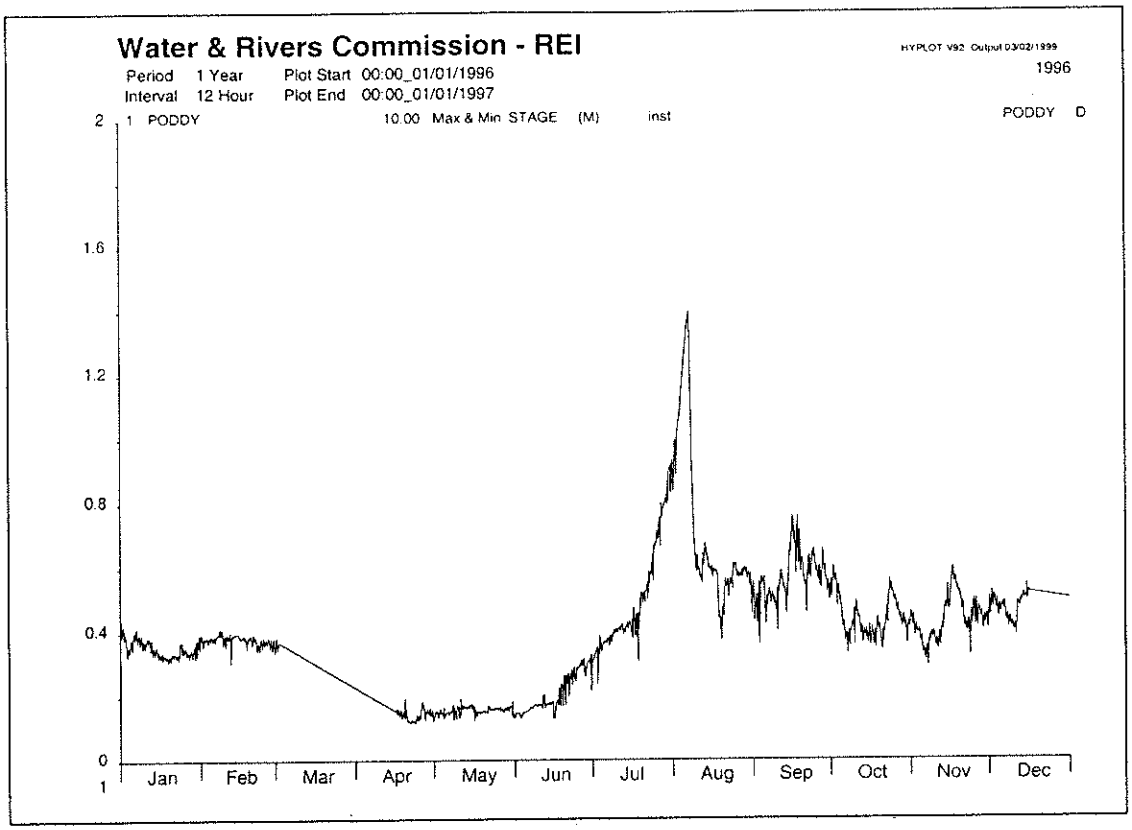
<<Poddy_Plots_94_mid-98.doc>> <<Bail_Plots_94_mid-98.doc>>

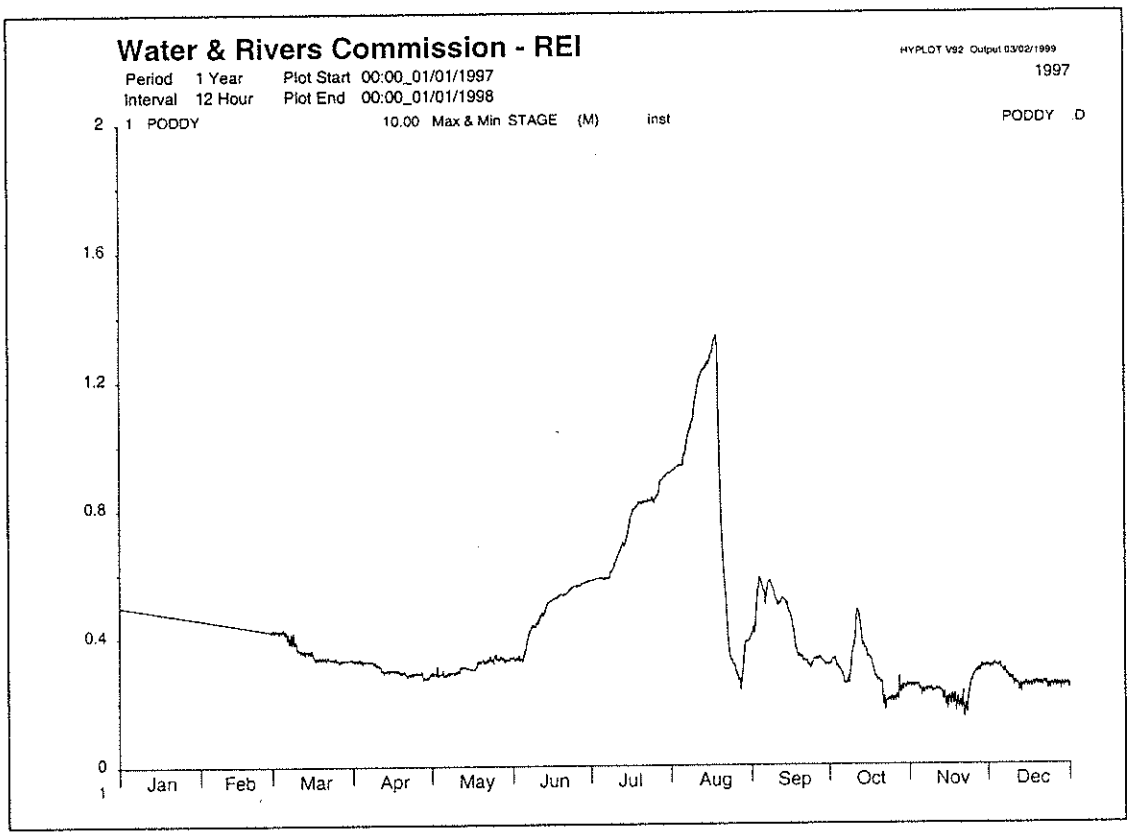
Poddy Point Raw Water Level Data



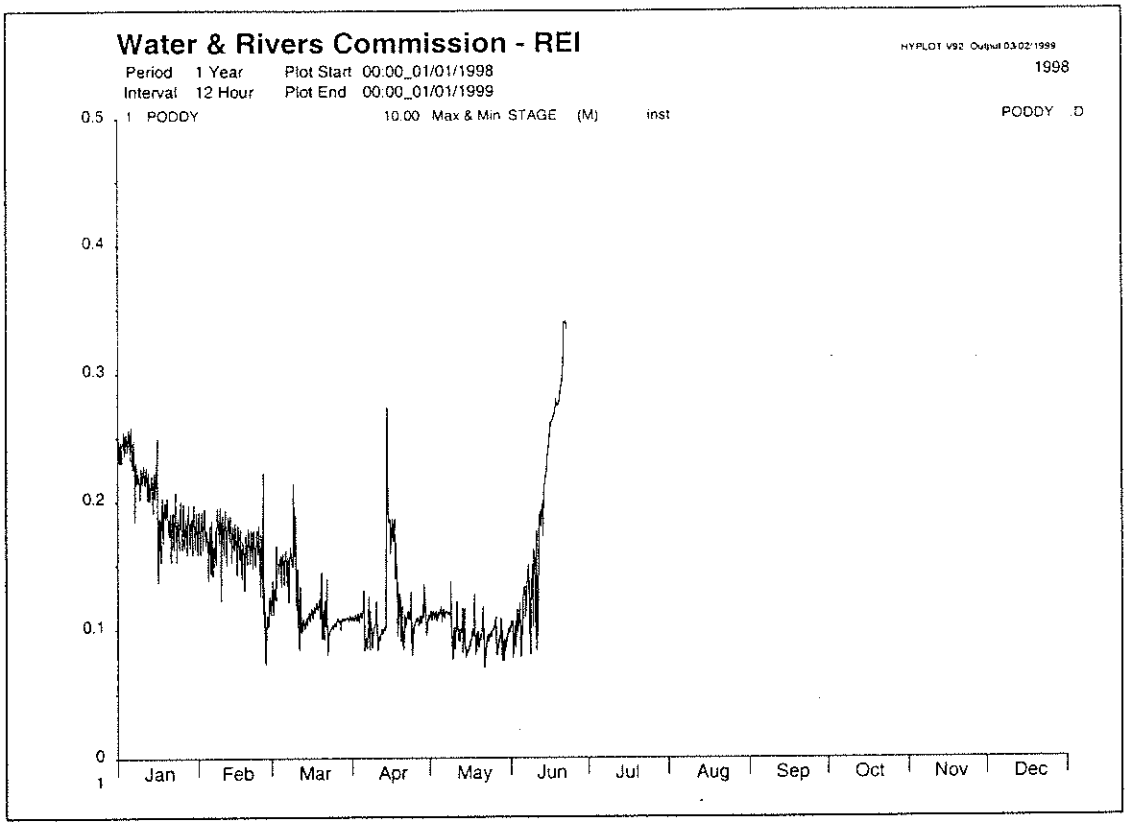


Poddy Point Raw Water Level Data





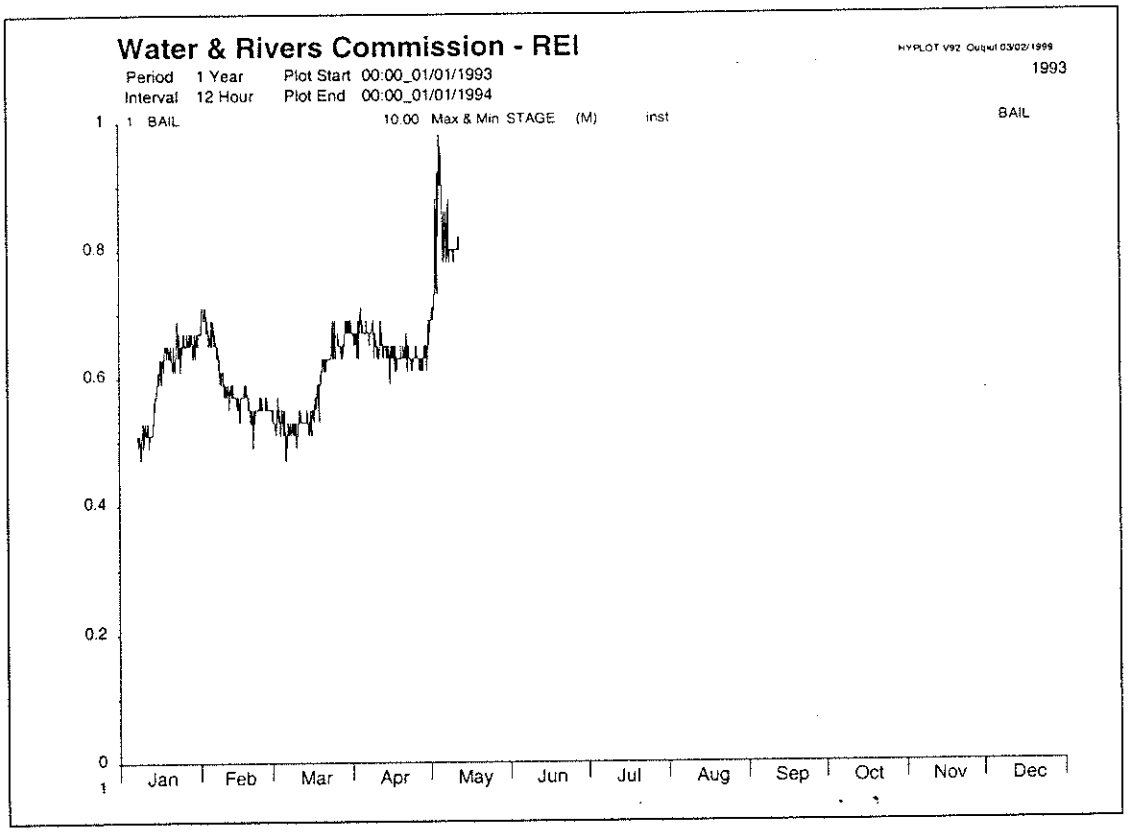
Poddy Point Raw Water Level Data



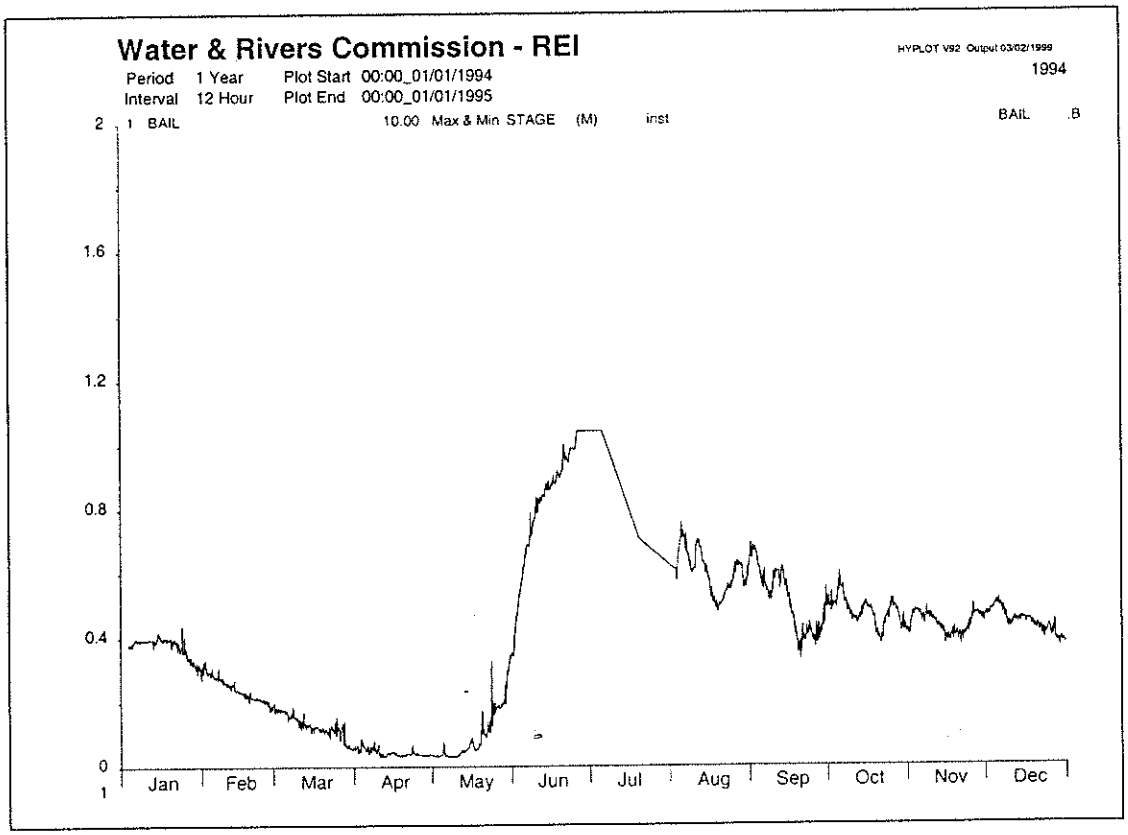
NOTE

The data presented in these plots is raw data and has not been fully verified. Inparticular the datum changes several times, so the absolute levels recorded in each year may not be directly comparable. Until the data is processed using recommended methods it should be used with caution.

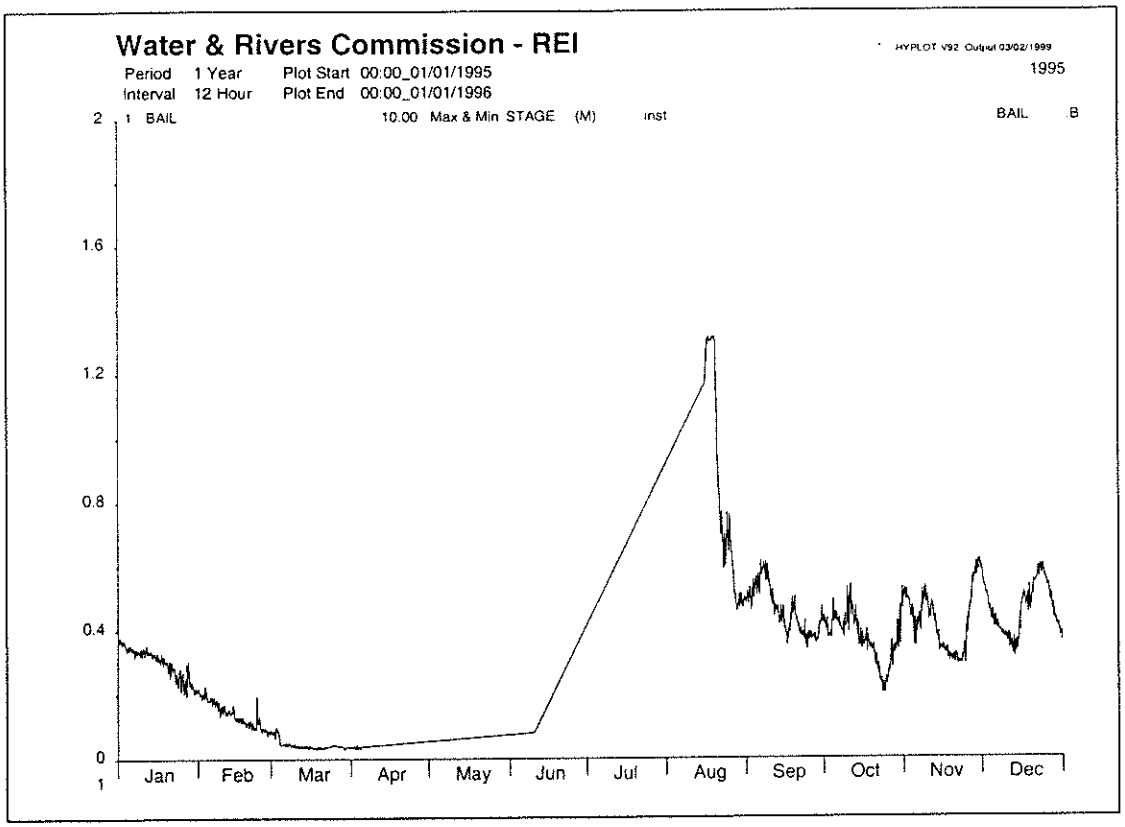
Bail's Jetty Raw Water Level Data



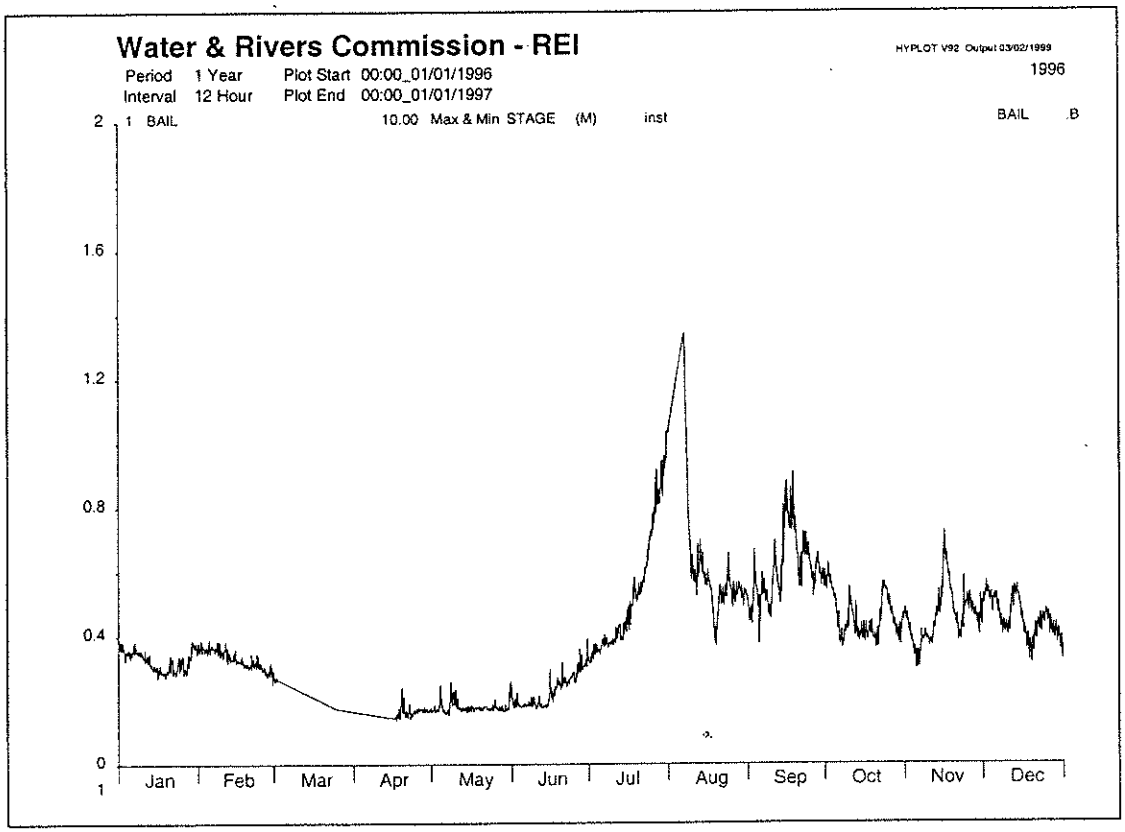
Note different datum and instrument.



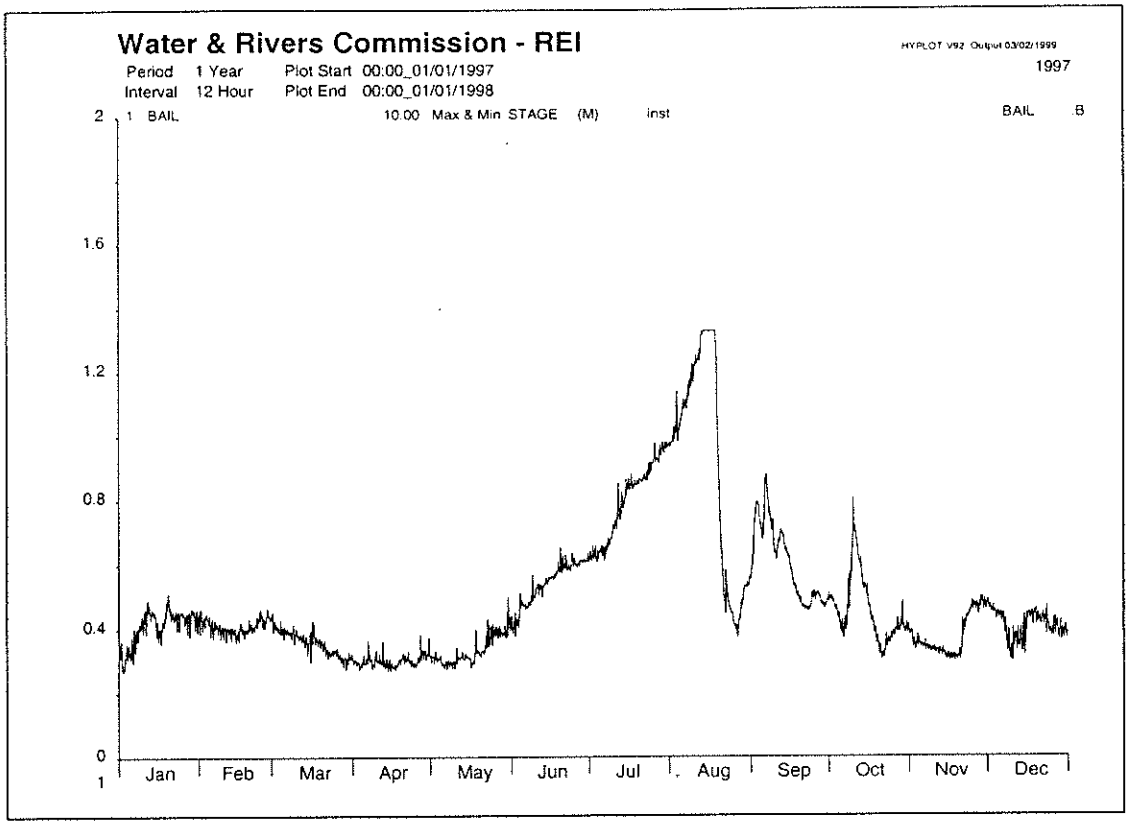
Bail's Jetty Raw Water Level Data

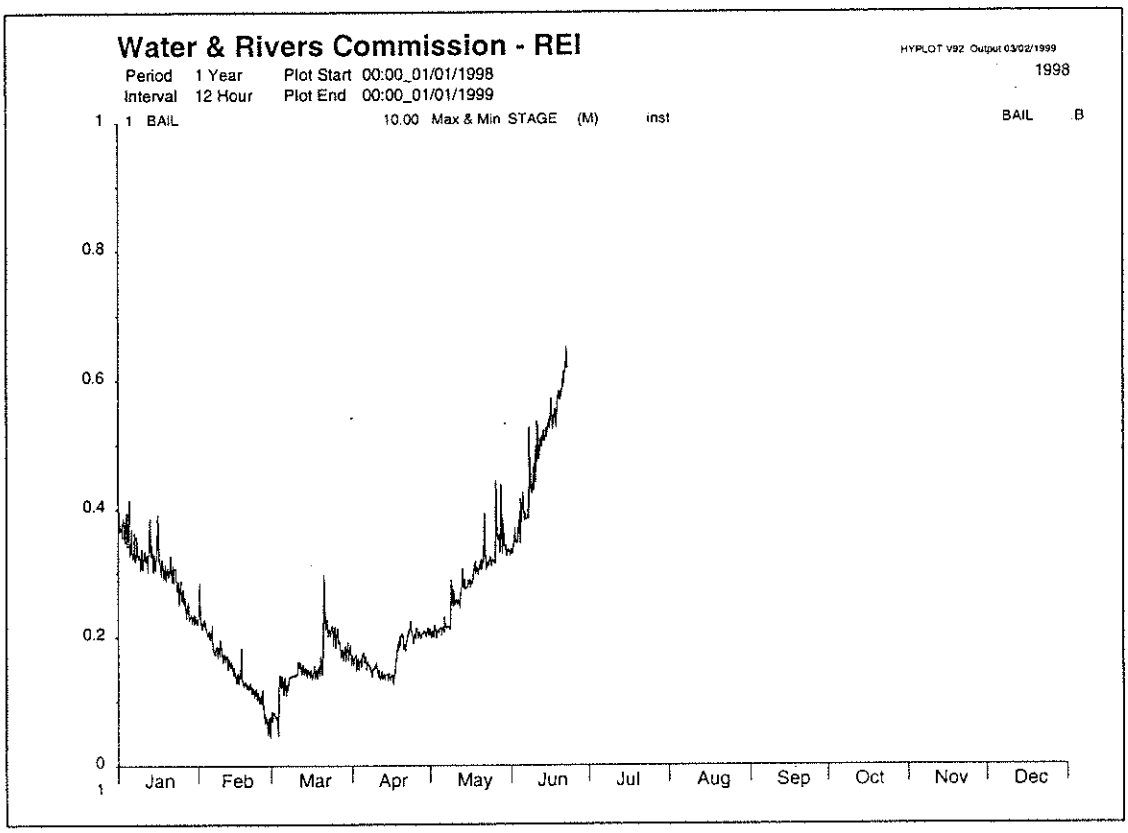


Note March 1195 – mid August 1995 no data.

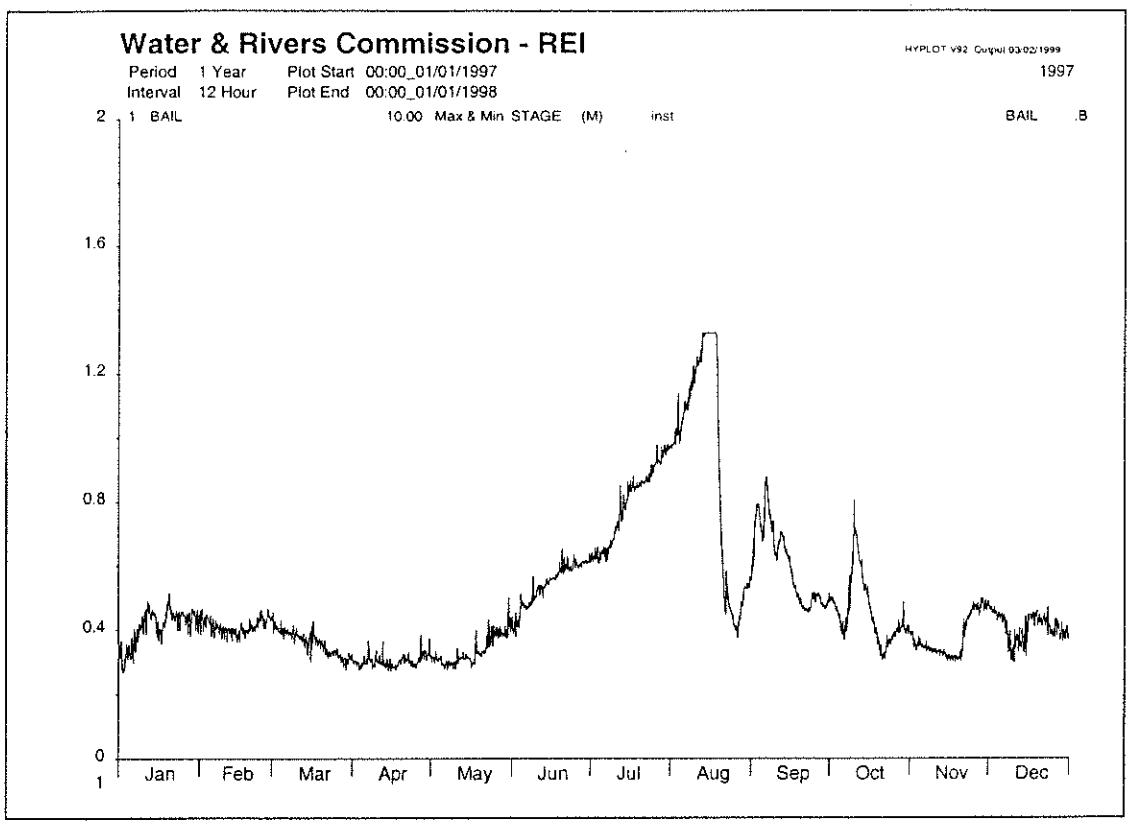


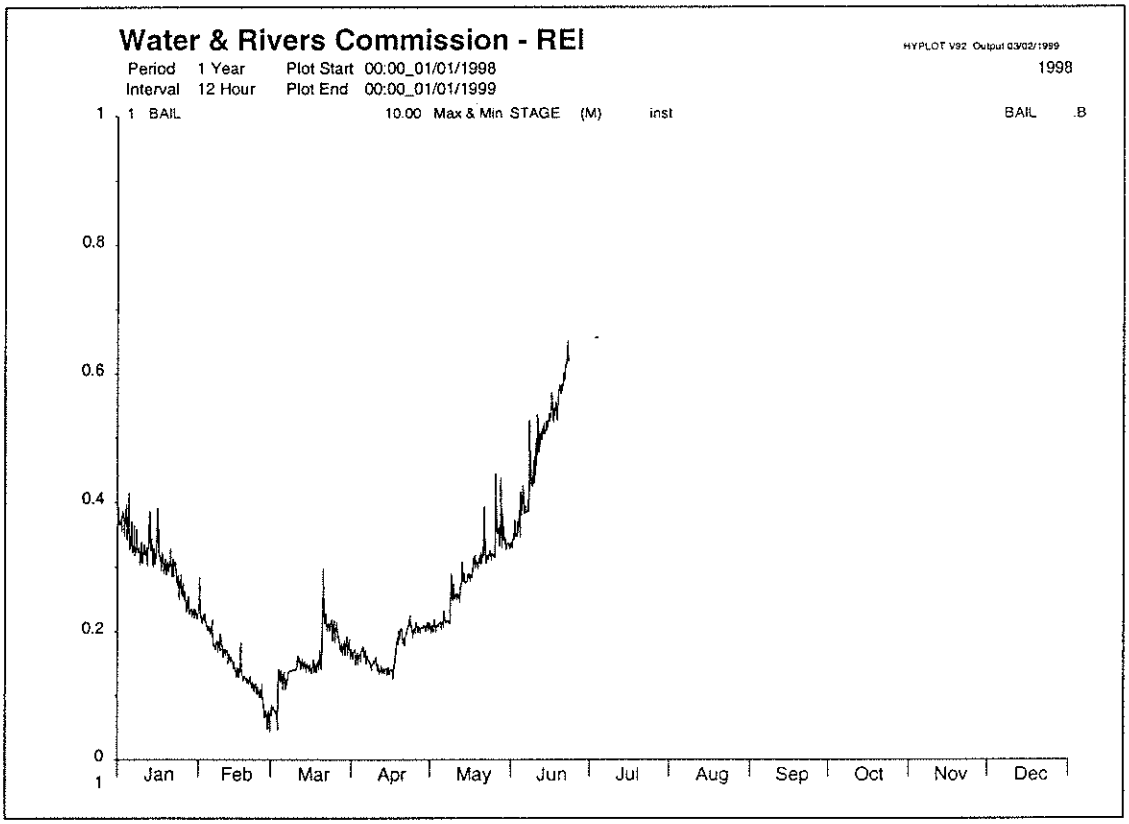
Bail's Jetty Raw Water Level Data





Bail's Jetty Raw Water Level Data





NOTE

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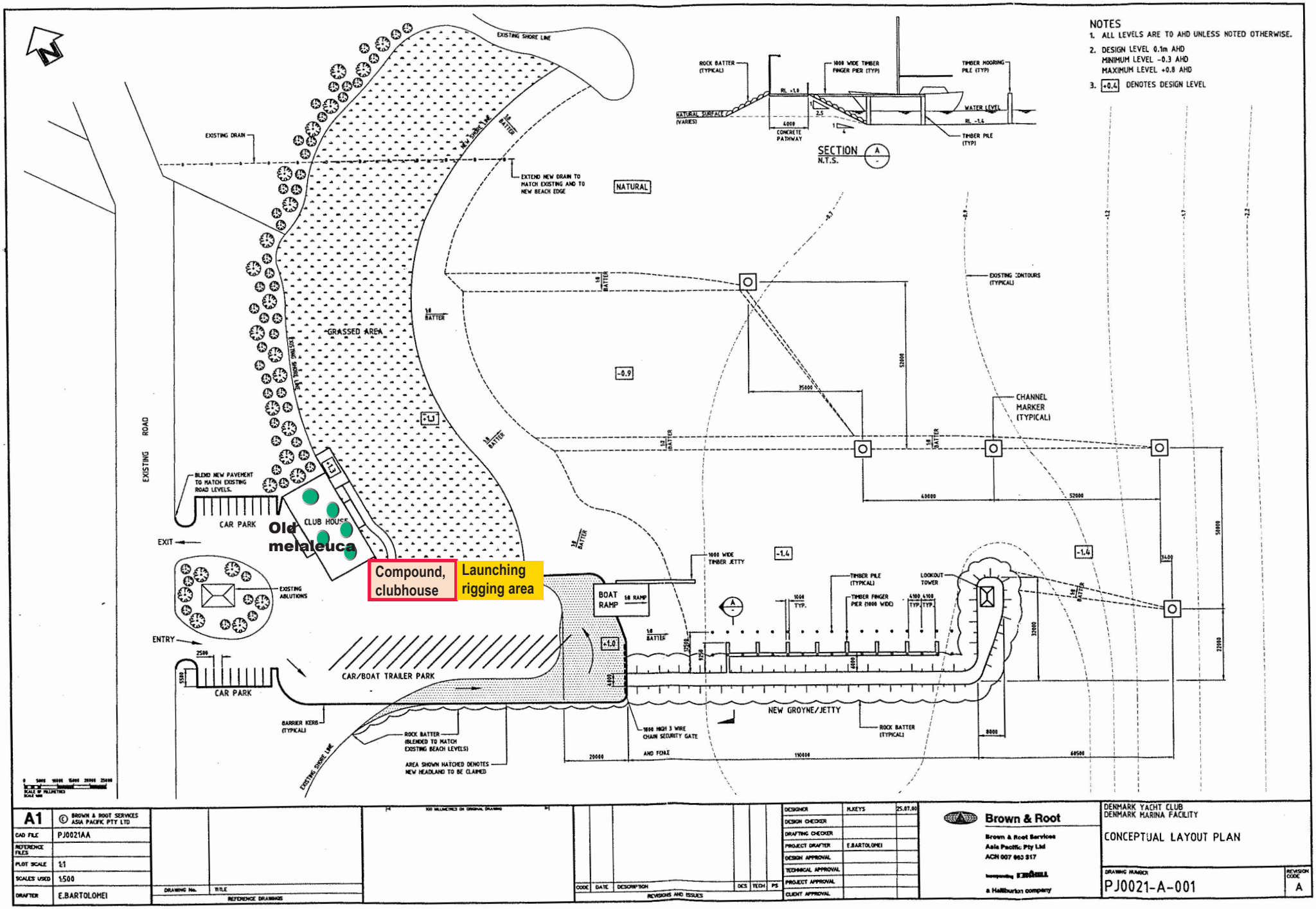
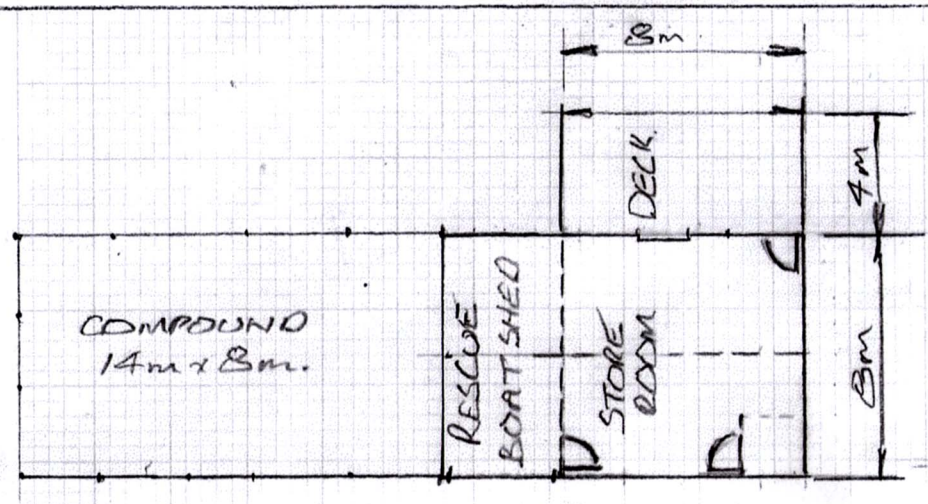
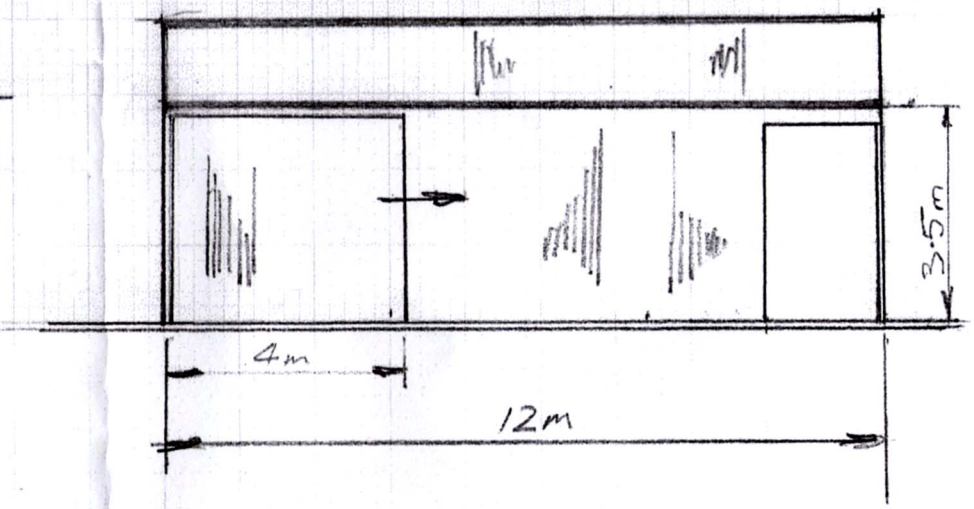


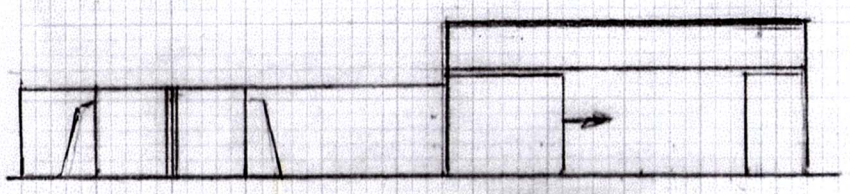
28 July 2015 - Attachment 8.5.2b

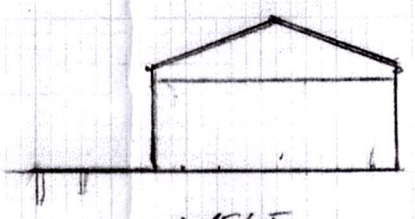


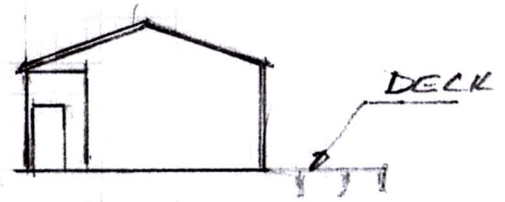


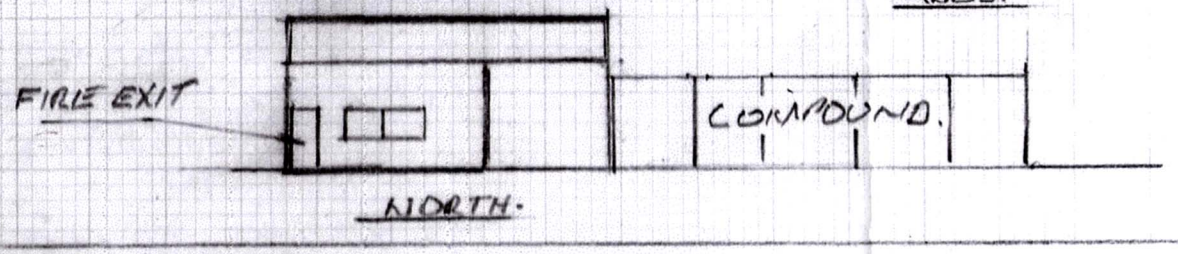
NOTES: POWER + WATER TO BOAT SHED.

DENMARK YACHT CLUB









DRAFT ONLY
PLEASE COMMENT