

160499-d3.st

STATE
FOREST
No.36

LOT 1

LOT 5283

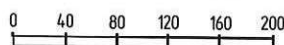
STATE FOREST No.36

CASUARINA DAM 3

- TOP WATER LEVEL (RL 100m)
- CLEARING LEVEL (RL 102m)
- - - CURRENT WATER LEVEL (EXTENT)
- CONTOUR LINE LEVELS (INTERVAL 1m)
- - - SURVEY TRAVERSE LINE
- LOT BOUNDARY
- SURVEY POINT



SCALE 1:4000 @A3



ALL DISTANCES ARE IN METRES

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS

CASUARINA VALLEY ORCHARDS

LOT 5283 ON DEPOSITED PLAN 138085

IREDELL ROAD, BEEDELUP WA 6260

CONTOUR SURVEY PLAN FOR DAM
EXPANSION DEVELOPMENT

R.A.S Machin

Licensed Surveyor

P.O.Box 276
Bridgetown WA 6255
Tel 08 97 644 015
roger@machinsurvey.com

CONTOUR PLAN

Dated on 18.11.2016

RASM Reference

3576

STATE
FOREST
No.36

LOT 1

LOT 5283

STATE FOREST
No.36

CASUARINA DAM 3

- TOP WATER LEVEL (RL 100m)
- CLEARING LEVEL (RL 102m)
- - - CURRENT WATER LEVEL (EXTENT)
- CONTOUR LINE LEVELS (INTERVAL 1m)
- - - SURVEY TRAVERSE LINE
- LOT BOUNDARY
- SURVEY POINT



SCALE 1: 4000 @A3

0 40 80 120 160 200

ALL DISTANCES ARE IN METRES

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS

CASUARINA VALLEY ORCHARDS

LOT 5283 ON DEPOSITED PLAN 138085

IREDELL ROAD, BEEDELUP WA 6260

CONTOUR SURVEY PLAN FOR DAM
EXPANSION DEVELOPMENT

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CONTOUR PLAN

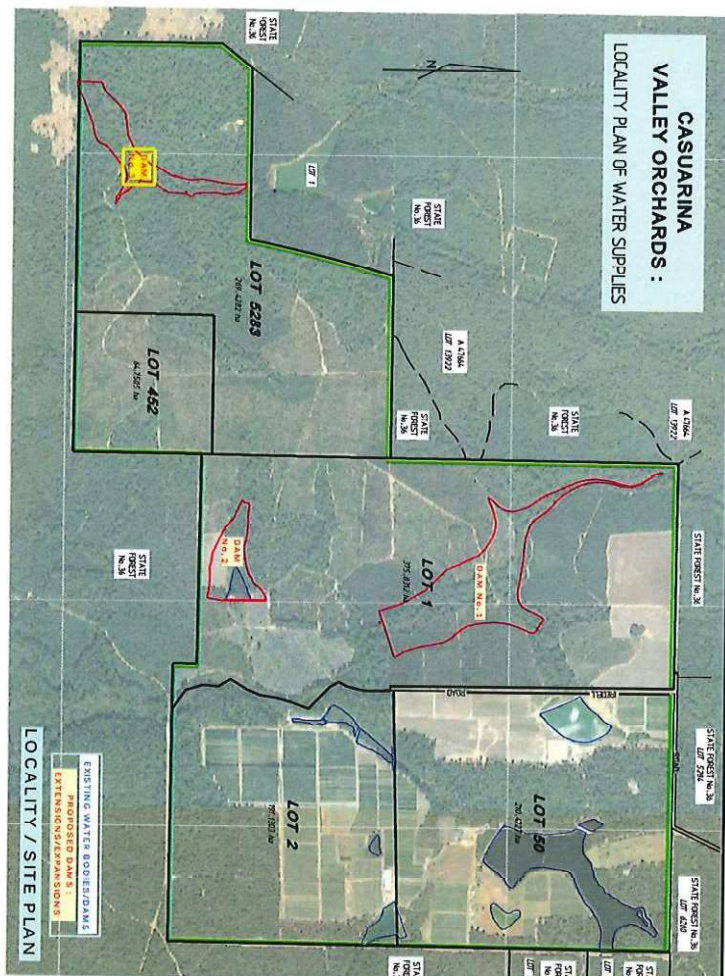
Dated on 18.11.2016

RASM Reference

3576

CASUARINA VALLEY ORCHARDS :

LOCALITY PLAN OF WATER SUPPLIES



Casuarina Valley Orchards

Dam # 3

Statisticsderived from ground truthing survey on assumed level datums

#	Description	Result	Notes
1	Length of dam	1200 metres	
2	Proposed TWL	100 m	
3	Perimeter of Top Water Level	1400 metres	
4	Area within TWL	14.7 ha	
5	Proposed clearing level	102 m	
6	Area within clearing level	200 ha	
7	Volume of dam	440 ML	
1	Clearing of vegetation		
2	Area within clearing level	20.0 ha	
3	Estimated areas within natural vegetation that should not be considered as timbered		Swamp land along stream and open patches (isolated small areas)
4	Allow 25 %	5.0 ha	
5	Net timbered area within dam	15.0ha	
6	wall + pump house	1.0 ha	
7	NETT AREA of timber to be cleared	16.0 ha	Partially cleared

SHEET 3 OF 4

DAM 3 STATISTICS

CASUARINA VALLEY ORCHARDS

Water Storage Dams

Casuarina Valley Orchards is a very large horticultural holding within the Shire of Manjimup, with expansion of existing orchards in progress and with plans to diversify into other horticultural crops. Water security is the top priority to ensure success.

Three (3) Dam sites have been investigated. One being an upgrading of an existing Dam, the other two are completely new Dams.

Casuarina Valley Orchards have over the past years applied to the Department Of Water for a permit under S17, RF 14038.

The application has been advertised and no objections have been received. It has been submitted to The Department Of Environmental Regulations - Rel. CPS 6885-1.

LANDGATE Photography & Topographical maps have been obtained and the 3 sites are subjected to a desktop assessment with viable results.

To verify the desktop study, a GROUND TRUTHING survey has been carried out on each site to check on the reliability of the topography & contours.

To keep cost of this survey proved within reason, the survey has been done on ASSUMED CO-ORDINATES and adopted levels so that we can assess volumes quickly from proposed depth of water. Horizontal co-ordinates have been surveyed to 1 : 1000 and levels to +/- 25 mm.

Hence co-ordinates are good for 2 metre horizontally, and 0.1 metre vertically.

See separate specifications for Contour Survey.

When construction starts, the assumed co-ordinate system will be upgraded to FORMULA - by use of the GEOIDETIC DATUM OF AUSTRALIA (GDA) Grid so that final plans will be in the recognised format.

BUT for initial checks, this cost is not warranted.

METHOD OF OBTAINING CONTOURS from Photographs (Source - Landgate)

As the ground level is not visible, the contours are taken on TREE TOPS and then lowered on average heights.

Tree heights can be checked on roads and fence lines. Hence there can be errors.

The biggest differences are always found in Gullies and the ground truthing surveys has proved this has occurred on these sites.

DAM 3 : near the southern boundary has shown differences greater than normally expected.

SUMMARY OF DAM 3

DAM # 3	New Dam	Potential capacity 450 ML	Does not flood into adjoining Land holdings. Cost effective Wall.
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Dam 3 will not encroach into the adjoining State Forest and/or private Land parcels.

The ground truthing survey confirmed that the desk top study, using LANDGATE Data was within acceptable parameters.

Volume from contour file C357631 CON using contour interval 1

CONTOUR	AREA	LAYER VOL	NETT VOL
92.000	2274.0	0.0	0.0
93.000	8970.1	5622.1	5622.1
94.000	19842.1	14406.1	20028.2
95.000	29803.2	24822.7	44850.8
96.000	44580.6	37181.9	82032.8
97.000	60333.9	52457.3	134490.0
98.000	84888.7	72621.3	207111.3
99.000	116662.6	100775.6	307887.0
100.000	146778.6	131720.6	439607.6
101.000	173718.5	160248.5	599856.1
102.000	199853.5	186786.0	786642.1
103.000	227438.8	213646.2	1000288.3
104.000	258853.9	243146.4	1243434.6
105.000	298863.9	278858.9	1522293.5
106.000	349562.9	324213.4	1846506.9

Total volume is 1846507 cubic metres

Total volume to TWL 100 = 440 mL

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS

CASUARINA VALLEY ORCHARDS

LOT 5283 ON DEPOSITED PLAN 138085

IREDELL ROAD, BEEDELPUP WA 6260

R.A.S Machin

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Dated on 18.11.2016

RSM Reference

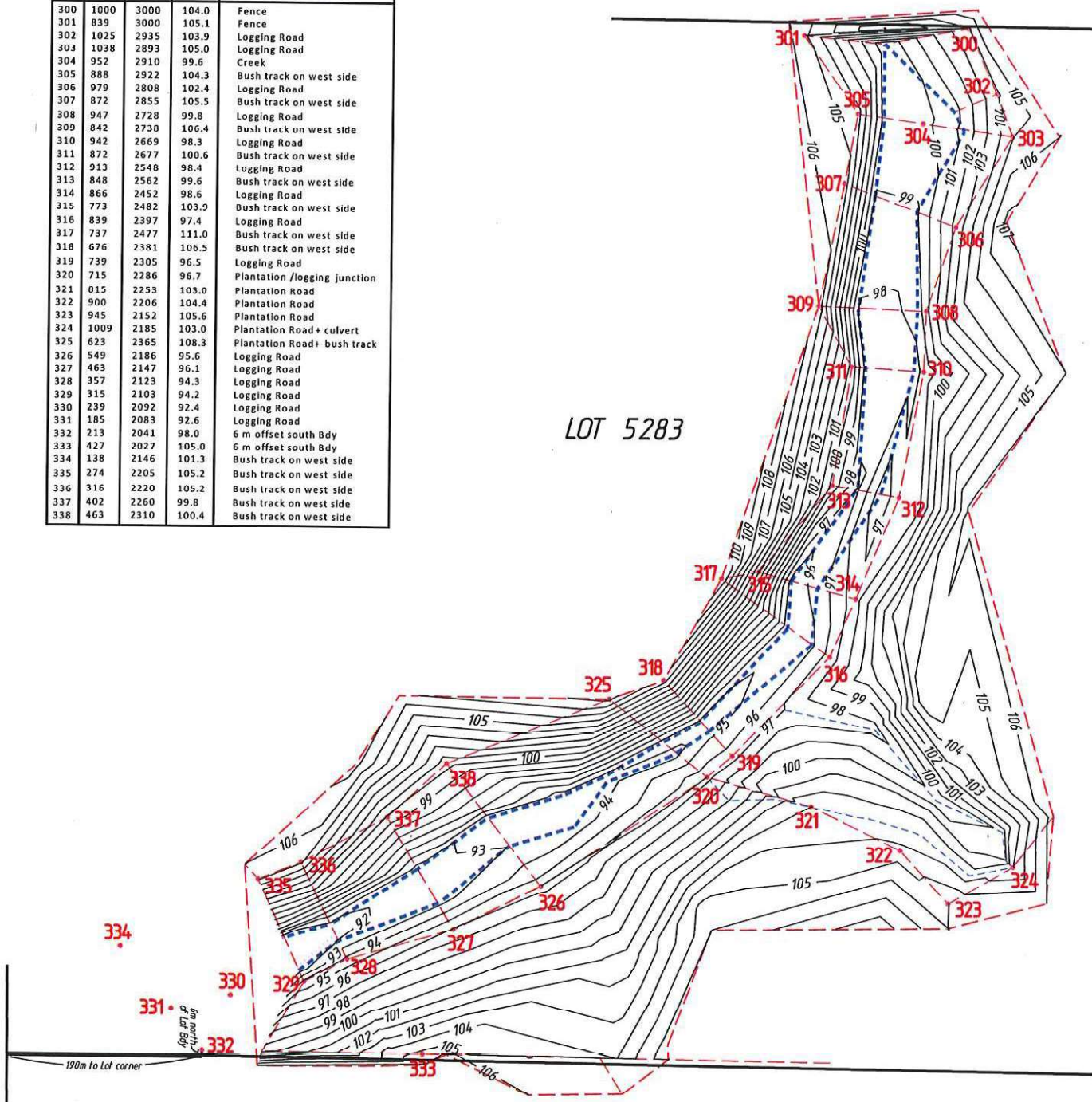
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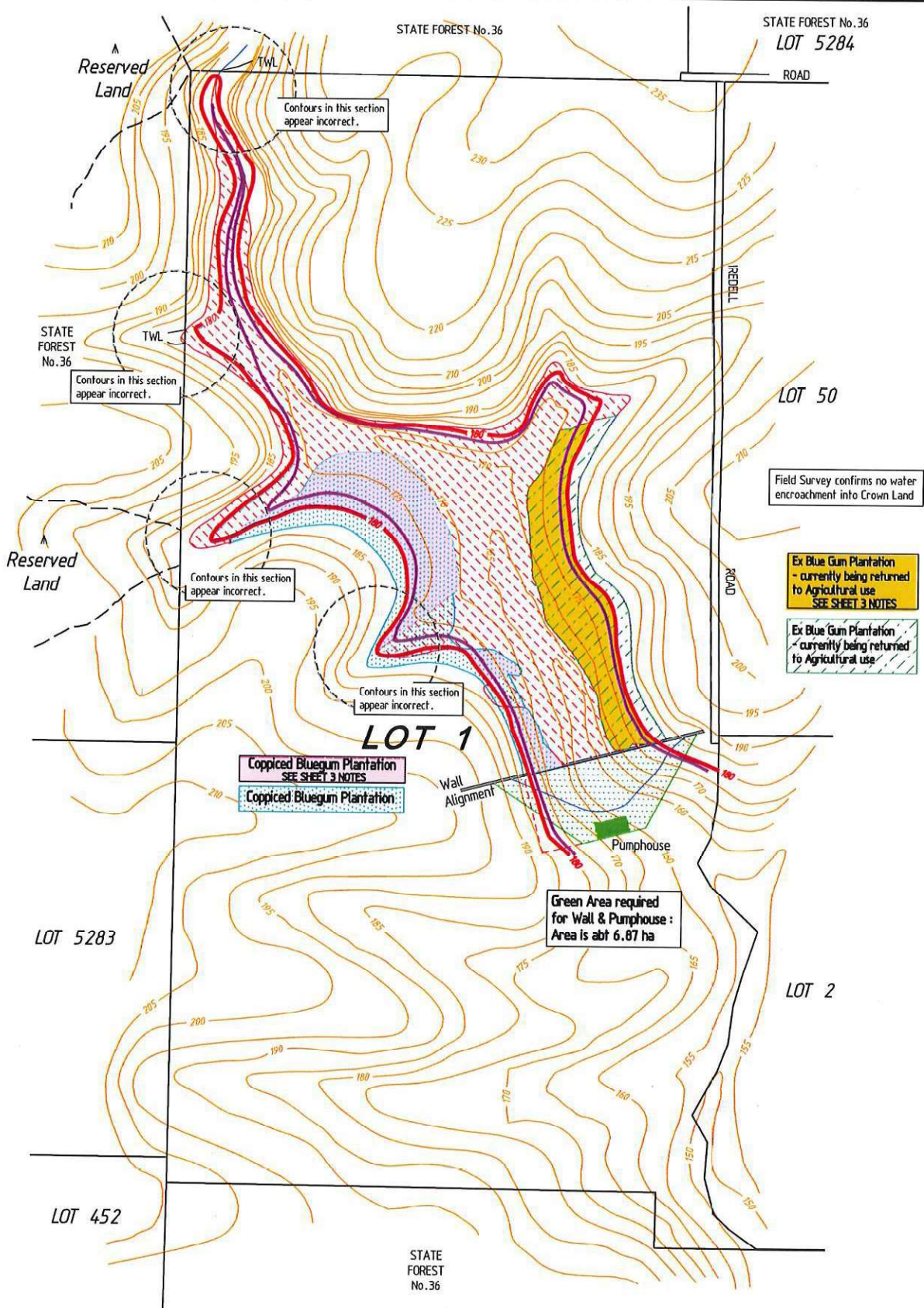
TABLE OF CO-ORDINATES
(based on Assumed Datum)

Pt #	East	North	RL	Notes
300	1000	3000	104.0	Fence
301	839	3000	105.1	Fence
302	1025	2935	103.9	Logging Road
303	1038	2893	105.0	Logging Road
304	952	2910	99.6	Creek
305	888	2922	104.3	Bush track on west side
306	979	2808	102.4	Logging Road
307	872	2855	105.5	Bush track on west side
308	947	2728	99.8	Logging Road
309	842	2738	106.4	Bush track on west side
310	942	2669	98.3	Logging Road
311	872	2677	100.6	Bush track on west side
312	913	2548	98.4	Logging Road
313	848	2562	99.6	Bush track on west side
314	866	2452	98.6	Logging Road
315	773	2482	103.9	Bush track on west side
316	839	2397	97.4	Logging Road
317	737	2477	111.0	Bush track on west side
318	676	2381	106.5	Bush track on west side
319	739	2305	96.5	Logging Road
320	715	2286	96.7	Plantation /logging junction
321	815	2253	103.0	Plantation Road
322	900	2206	104.4	Plantation Road
323	945	2152	105.6	Plantation Road
324	1009	2185	103.0	Plantation Road+ culvert
325	623	2365	108.3	Plantation Road+ bush track
326	549	2186	95.6	Logging Road
327	463	2147	96.1	Logging Road
328	357	2123	94.3	Logging Road
329	315	2103	94.2	Logging Road
330	239	2092	92.4	Logging Road
331	185	2083	92.6	Logging Road
332	213	2041	98.0	6 m offset south Bdy
333	427	2027	105.0	6 m offset south Bdy
334	138	2146	101.3	Bush track on west side
335	274	2205	105.2	Bush track on west side
336	316	2220	105.2	Bush track on west side
337	402	2260	99.8	Bush track on west side
338	463	2310	100.4	Bush track on west side

LOT 1

LOT 5283





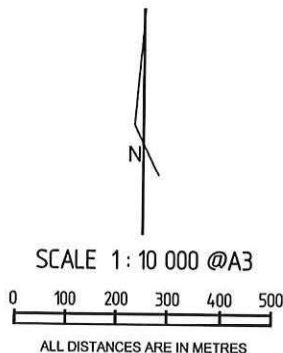
CASUARINA DAM 1

—	TOP WATER LEVEL (RL 178m)
—	CLEARING LEVEL (RL 180m)
—	CURRENT WATER LEVEL (RL 183m)
—	CONTOUR LINE LEVELS (INTERVAL 5m)

THE CONTOUR INFORMATION SHOWN HEREIN WAS OBTAINED FROM LANDGATES SCOB - AUGUST 2016

SHEET 1

Page 1 of 8



DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS
CASUARINA VALLEY ORCHARDS

LOT 1 ON PLAN 8940
IREDELL ROAD, BEEDELPUP WA 6260

CONTOUR SURVEY PLAN FOR DAM
EXPANSION DEVELOPMENT

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CONTOUR PLAN

Dated on 18.11.2016

RASM Reference

3576

STATE FOREST No.36

LOT 5284

ROAD

Reserved
LandSTATE
FOREST
No.36

LOT 50

Reserved
Land

IREDELL

ROAD

LOT 1

Dam Wall
Alignment

LOT 5283

LOT 2

LOT 452

CONTOUR 178m = TWL
= 118m ON SHEET 3 TABLE

CONTOUR 180m = TWL
= 120m ON SHEET 3 TABLE

CONTOURS SHOWN ARE OBSERVED
FROM GROUND TRUTHING SURVEY
(WITH LIMITED DATA)

CASUARINA DAM 1

- TOP WATER LEVEL - TWL (RL 178m)
- CLEARING LEVEL (RL 180m)
- CURRENT WATER LEVEL
- CONTOUR LINE LEVELS (INTERVAL 1m)
- - - SURVEY CONTROL NETWORK

STATE
FOREST
No.36

N

SCALE 1: 10 000 @A3

0 100 200 300 400 500

ALL DISTANCES ARE IN METRES

SHEET 1A

Page 2 of 6

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS
CASUARINA VALLEY ORCHARDS

LOT 1 ON PLAN 8940
IREDELL ROAD, BEEDELUP WA 6260

CONTOUR SURVEY PLAN FOR DAM
EXPANSION DEVELOPMENT

R.A.S Machin

Licensed Surveyor

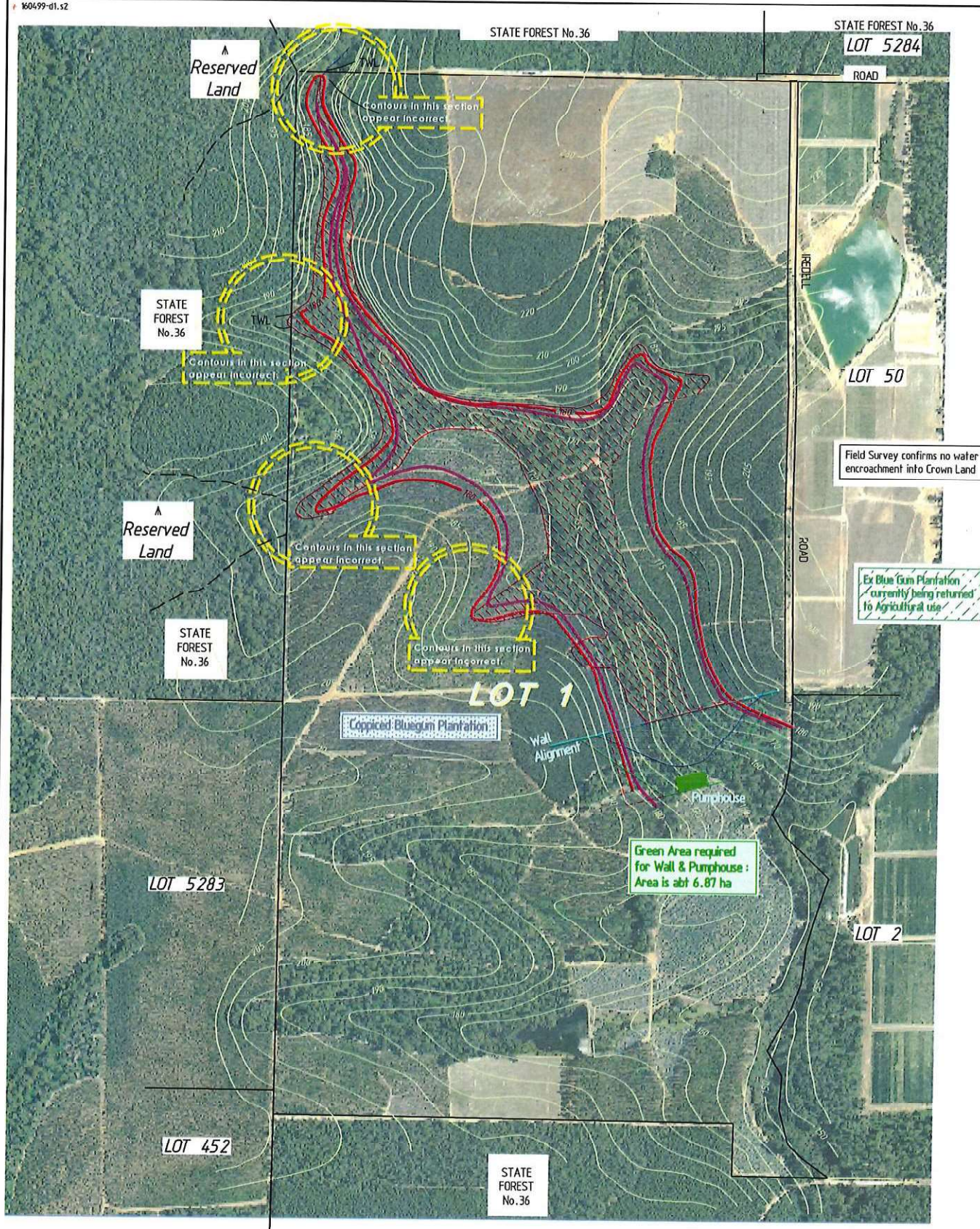
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CONTOUR PLAN

Dated on 18. 11. 2016

RASM Reference

3576



CASUARINA DAM 1

	TOP WATER LEVEL (RL 178m)
	CLEARING LEVEL (RL 180m)
	CURRENT WATER LEVEL (RL 183m)
	CONTOUR LINE LEVELS (INTERVAL 5m)

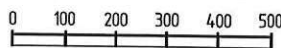
THE CONTOUR INFORMATION SHOWN HEREIN WAS OBTAINED FROM LANDGATES SCDB AUGUST 2016

SHEET 2

Page 3 of 6

N

SCALE 1: 10 000 @A3



ALL DISTANCES ARE IN METRES

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS

CASUARINA VALLEY ORCHARDS

LOT 1 ON PLAN 8940

IREDELL ROAD, BEEDELUP WA 6260

CONTOUR SURVEY PLAN FOR DAM EXPANSION DEVELOPMENT

R.A.S Machin

Licensed Surveyor

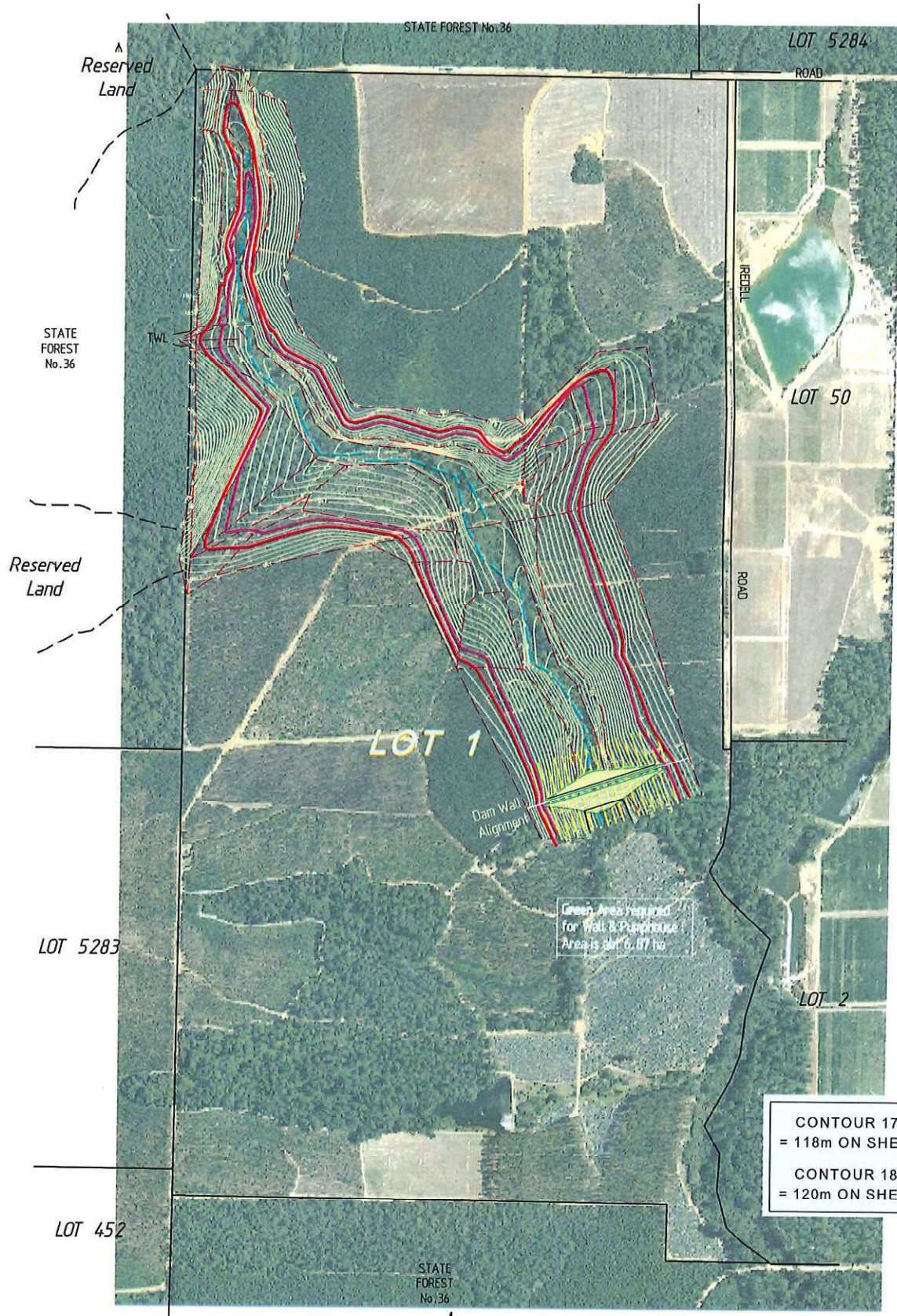
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CONTOUR PLAN

Dated on 18.11.2016

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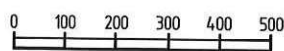


CONTOURS SHOWN ARE OBSERVED
FROM GROUND TRUTHING SURVEY
(WITH LIMITED DATA)

CASUARINA DAM 1

- TOP WATER LEVEL - TWL (RL 178m)
- CLEARING LEVEL (RL 180m)
- CONTOUR LINE LEVELS (INTERVAL 5m)
- CURRENT WATER LEVEL (RL 183m)

SCALE 1: 10 000 @A3



ALL DISTANCES ARE IN METRES

SHEET 2A

Page 4 of 6

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS
CASUARINA VALLEY ORCHARDS

LOT 1 ON PLAN 8940
IREDELL ROAD, BEEDELUP WA 6260

CONTOUR SURVEY PLAN FOR DAM
EXPANSION DEVELOPMENT

R.A.S Machin

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CONTOUR PLAN

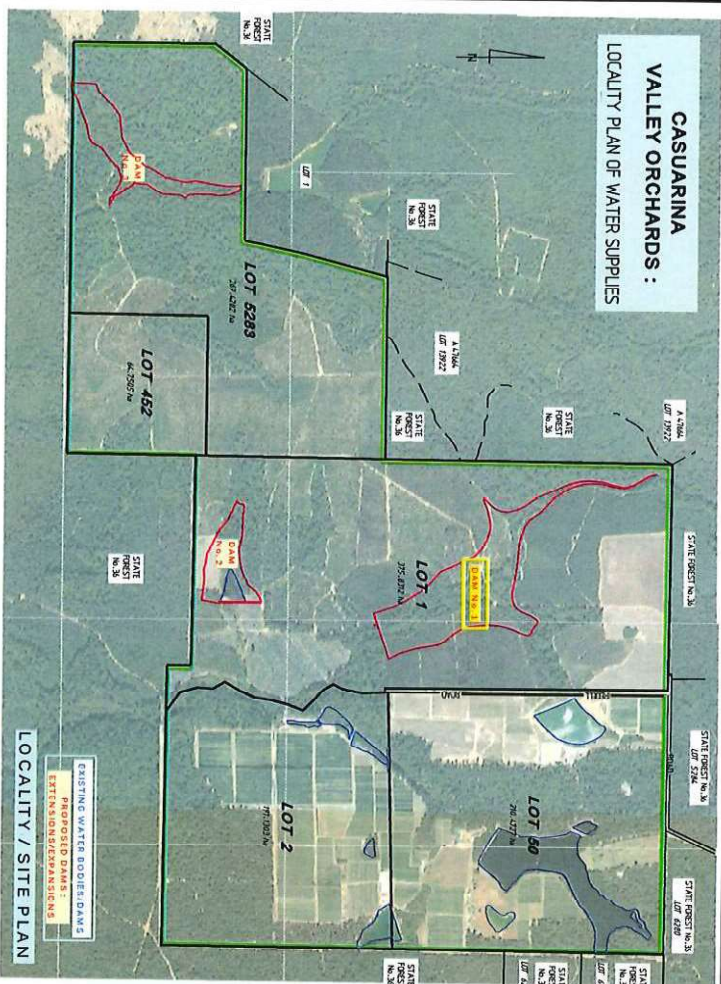
Dated on 18.11.2016

RASM Reference

3576

CASUARINA VALLEY ORCHARDS :

LOCALITY PLAN OF WATER SUPPLIES



Casuarina Valley Orchards

Dam # 1

Statisticsderived from ground truthing survey on assumed level datums

#	Description	Result	Notes
1	Length of dam	2300 metres	
2	Proposed TWL	118 m	
3	Perimeter of Top Water Level	5250 metres	
4	Area within TWL	48 ha	
5	Proposed clearing level	120 m	
6	Area within clearing level	58.4 ha	
7	Volume of dam	2.95 GL	Permit allows 3 GL
1	Clearing of vegetation		
1	Area within clearing level	58.4 ha	
2	Area of blue gums already harvested on east side and coloured orange	11.5 ha	
3	Area of blue gums to be harvested on west side and coloured pink	13.5	
4	Nett area within dam to be harvested	33.4 ha	
5	Estimated areas within natural vegetation that should not be considered as timbered	10.0 ha	Swamp land along stream and open patches (isolated small areas)
6	Allow 30 %		
6	Nett timbered area within dam	23.4 ha	
7	Timbered area required for wall + pump house	6.4 ha	
7	NETT AREA of timber to be cleared	30.3 ha	

CASUARINA VALLEY ORCHARDS

Water Storage Dam

Casuarina Valley Orchards is a very large horticultural holding within the Shire of Manjimup, with expansion of existing orchards in progress and with plans to diversify into other horticultural crops. Water security is the top priority to ensure success.

Three (3) Dam sites have been investigated. One being an upgrading of an existing Dam, the other two are completely new Dams.

Casuarina Valley Orchards have over the past years applied to the Department Of Water for a permit under S17, PF 14038.

The application has been advertised and no objections have been received.

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LANDGATE Photography & Topographical maps have been obtained and the 3 sites are subjected to a desktop assessment with viable results.

To verify the desktop study, a GROUND TRUTHING survey has been carried out on each site to check on the reliability of the topography & contours.

To keep cost of this survey project within reason, the survey has been done on ASSUMED CO-ORDINATES and adopted levels so that we can assess volumes quickly from proposed depth of water.

Horizontal co-ordinates have been surveyed to 1 : 1000 and levels to +/- 25 mm.

Hence co-ordinates are good for 2 metre horizontally, and 0.1 metre vertically.

See separate specifications for Control Survey.

When construction starts, the assumed co-ordinate system will be upgraded to FORML - by use of the GEODETIC DATUM OF AUSTRALIA (GDA) Grid so that final plans will be in the recognised format.

But for initial checks, this cost is not warranted.

METHOD OF OBTAINING CONTOURS from Photographs (Source - Landgate)

As the ground level is not visible, the contours are taken on TREE TOPS and then lowered on average heights.

Tree heights can be checked on roads and fence lines. Hence there can be errors.

The biggest differences are always found in Gullies and the Ground truthing surveys has proved this has occurred on these sites.

SUMMARY OF DAM 1

DAM # 1	New Dam	Permitted 3 GL capacity	Has potential to be larger, Very cost effective, Does not flood into State Forest
---------	---------	-------------------------	---

Dam 1 will not encroach into the adjoining State Forest and/or private Land parcels.

The ground truthing survey confirmed that the desk top study using LANDGATE Data was within acceptable parameters.

Volume from contour file C357601.DGN using contour interval 1

CONTOUR	AREA	LAYER VOL	NETT VOL
101.000	2339.9	0.0	0.0
102.000	9920.2	6130.1	6130.1
103.000	17624.2	13772.2	19902.3
104.000	30311.7	23968.0	43870.2
105.000	42771.0	36541.3	80411.6
106.000	56492.6	49631.8	130043.4
107.000	82715.7	69604.1	199647.5
108.000	103641.2	93718.4	292205.9
109.000	127382.2	115311.7	408337.7
110.000	151387.0	139384.6	547722.3
111.000	182697.8	167042.4	714764.7
112.000	214069.8	193383.8	913148.5
113.000	250858.1	232464.0	1145402.5
114.000	290378.1	270618.1	1416230.6
115.000	334083.4	312230.7	1728461.3
116.000	380724.2	357403.8	2085865.1
117.000	429641.7	405383.0	2497048.1
118.000	479536.1	454588.9	2945637.0
119.000	530236.9	505786.5	3454423.5
120.000	584149.7	558093.3	4009516.8
121.000	637111.8	610630.7	4620471.5
Total volume @TWL (RL) 118 = 2.94 GL			

SURVEYORS DECLARATION

I, ROGER A.S. MACHIN, BEING A LICENSED LAND SURVEYOR AND APPROVED LANDGATE SUPPLIER, HEREBY CERTIFY THAT THE OBSERVATIONS & CALCULATIONS SHOWN ON THIS PAGE, AS DESCRIBED WITHIN THE LAND PARCEL, ON SHEET 1 WAS CARRIED OUT IN ACCORDANCE WITH THE PROVISIONS OF THE LICENSED SURVEYORS REGULATIONS 1961.

SIGNED  Roger Machin
181310+11100
R A S MACHIN
Licensed Land Surveyor
DATED 20161125

DAM 1 STATISTICS

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS
CASUARINA VALLEY ORCHARDS

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LOT 1 ON PLAN 8940

IREDELL ROAD, BEEDELPUP WA 6260

CASUARINA
DAM 1

Dated on 18.11.2016

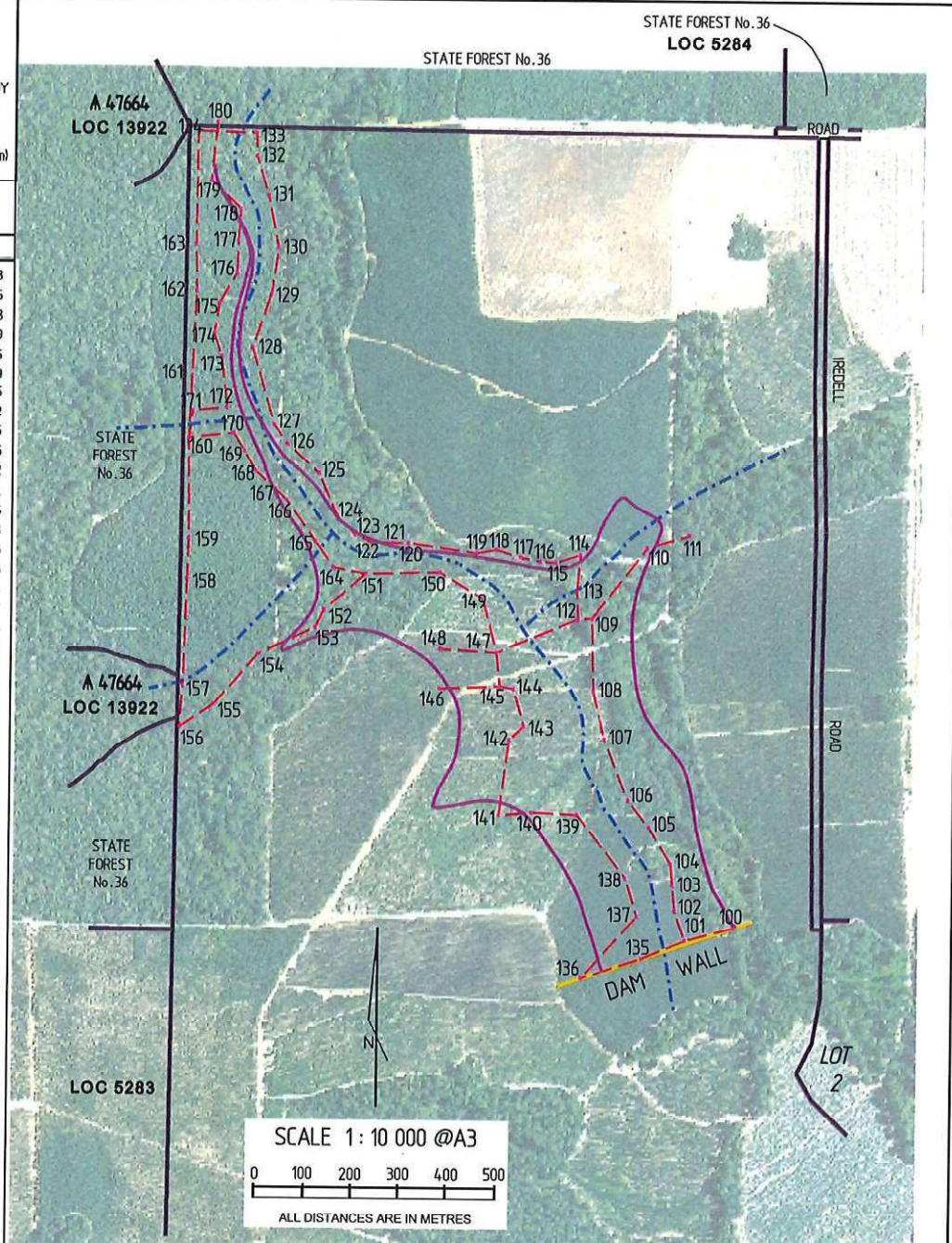
RSM Reference
3576

LEGEND

- CONTROL POINT
 162 CONTROL PT ID NUMBER
 CENTRELINE OF WATER BODY
 TRAVERSE LINE
 LOT BOUNDARY
 TOP WATER LEVEL (RL 178m)

 TABLE OF CO-ORDINATES
 (based on Assumed Datum)

POINT	E	N	RL
100	1101	1027	116.3
101	1000	1000	105
102	978	1061	105.8
103	973	1114	105.9
104	969	1159	106.5
105	923	1235	103.9
106	879	1289	105
107	828	1418	108.2
108	804	1518	109.5
109	800	1668	112.6
110	915	1818	117.2
111	1003	1844	121.1
112	771	1667	110.6
113	768	1726	111.3
114	775	1802	117.6
115	723	1785	119.6
116	691	1787	117.4
117	650	1796	113.7
118	599	1811	114.6
119	557	1804	115.7
120	416	1824	112.7
121	382	1824	114.1
122	339	1825	115.6
123	305	1840	115.2
124	270	1873	114
125	228	1969	115
126	161	2029	117.9
127	133	2088	118.1
128	86	2230	119.6
129	125	2341	123.2
130	139	2437	124.3
131	117	2545	126.3
132	92	2628	129
133	91	2676	128.7
134	-32	2680	129
135	909	962	104
136	783	920	124.5
137	899	1050	103.6
138	875	1129	106.9
139	772	1260	109.8
140	677	1264	119.6
141	609	1258	121.5
142	630	1416	110.8
143	660	1444	109.4
144	638	1521	109.4
145	609	1526	112.4
146	484	1521	121.4
147	601	1596	110.3
148	484	1603	117.1
149	571	1708	109.4
150	482	1763	109.6
151	328	1759	111.1
152	241	1683	114.4
153	223	1646	116.5
154	104	1590	118.1
155	11	1485	123.6
156	-61	1437	125.5
157	-54	1525	121
158	-47	1746	140.5
159	-44	1832	139
160	-46	2040	121
161	-40	2170	130.1
162	-32	2347	131
163	-34	2443	129.4
164	259	1772	112.2
165	222	1826	112.7
166	161	1913	115.7
167	136	1936	116.2
168	95	1972	116.8
169	71	2014	116
170	48	2050	116.2
171	-37	2097	121.4
172	33	2104	117.5
173	21	2212	120
174	5	2258	123
175	15	2321	122.9
176	52	2385	121
177	54	2452	121.1
178	59	2517	119.6
179	-4	2576	122.3
180	9	2698	123.3


**SURVEY METHODS &
CONTROL CO-ORDINATES**

Surveyed using Total Station for traversing and trig heighting to FOURTH (4) order accuracy.

Co-ordinates are ASSUMED with level datum varying.

DAM 1 --- estimated floor at lowest point at proposed wall = RL 100m

AZIMUTH based on MAGNETIC azimuth and adjusted to TRUE azimuth.

Accuracy

Horizontal +/- 2 metres, Vertical +/- 50 mm

Dam 1 was surveyed by closed traverses.

Trig heights were observed by both backsight and foresight observations.

Note: this survey is for investigative purposes and did not justify the high cost to obtain CDA horizontal and third order vertical accuracy.

If project proves viable, then co-ordinates will be re-observed to GDA values for construction.

SURVEYORS DECLARATION

I, ROGER A.S. MACHIN, BEING A LICENSED LAND SURVEYOR AND APPROVED LANDGATE SUPPLIER, HEREBY CERTIFY THAT THE OBSERVATIONS & CALCULATIONS SHOWN ON THIS PAGE, AS DESCRIBED WITHIN THE LAND PARCEL ON SHEET 1 WAS CARRIED OUT IN ACCORDANCE WITH THE PROVISIONS OF THE LICENSED SURVEYORS REGULATIONS 1961.

Roger Machin
 2016.11.25
 18:18:58 +11'00'

SIGNED R A S MACHIN
 Licensed Land Surveyor

**CONTROL NETWORK
SURVEY**

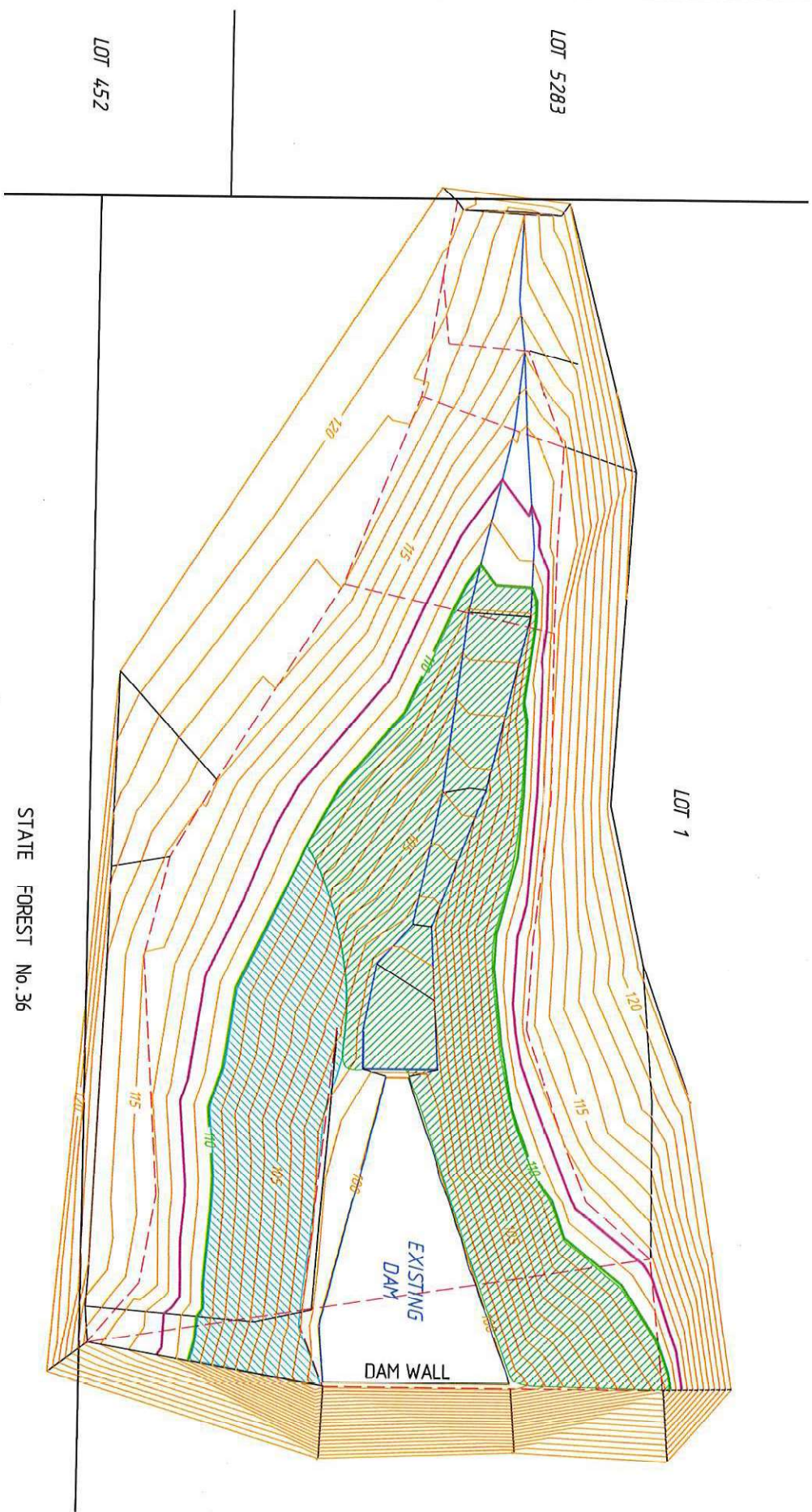
R.A.S Machin
 Licensed Surveyor

P.O.Box 276
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 Tel 08 97 644 015
 roger@machinsurvey.com





CASUARINA
 DAM 1

Dated on 18.11.2016

RASM Reference
 3576

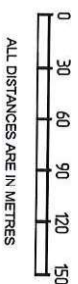


CASUARINA DAM 2

	TOP WATER LEVEL (RL 110 m)
	CLEARING LEVEL (RL 112 m)
	CURRENT WATER LEVEL (RL 100m)
	CONTOUR LINE LEVELS (INTERVAL 1m)

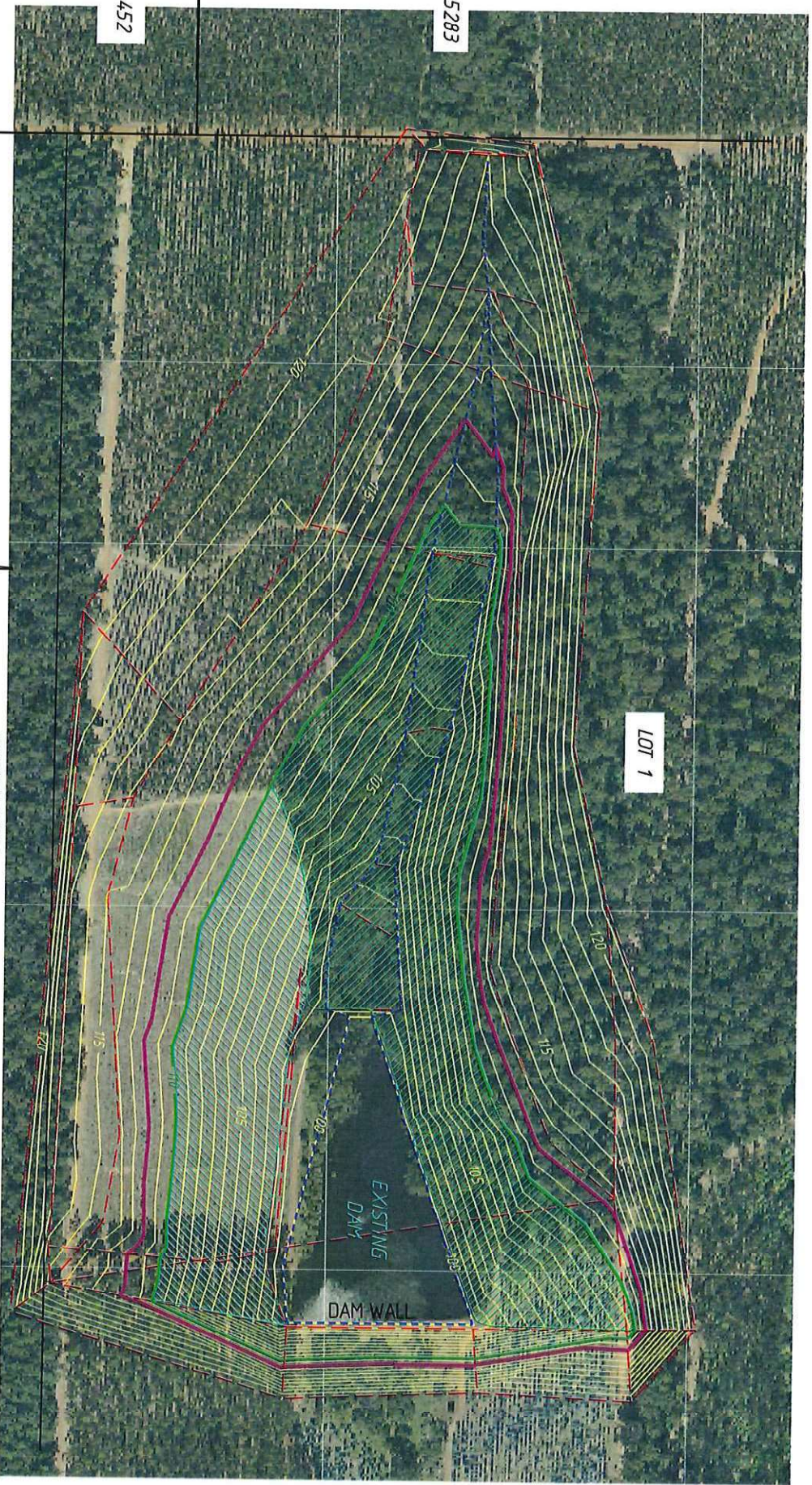


SCALE 1:3000 @A3

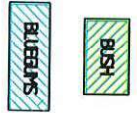


SHEET 1 OF 4

R.A.S Machin Licensed Surveyor		P.O. Box 276 Bridgetown WA 6255 Tel 08 97 644 015 roger@machinsurvey.com		DEPARTMENT OF WATER RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS CASUARINA VALLEY ORCHARDS LOT 1 ON PLAN 8940 IREDELL ROAD, BEEDELUP WA 6260 CONTOUR SURVEY PLAN FOR DAM EXPANSION DEVELOPMENT
CONTOUR PLAN		Dated on 18.11.2016		3576
		RASM Reference		

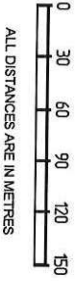


CASUARINA DAM 2



- TOP WATER LEVEL (RL 110 m)
- CLEARING LEVEL (RL 112 m)
- CURRENT WATER LEVEL (RL 100m)
- CONTOUR LINE LEVELS (INTERVAL 1m)
- CONTROL TRAVERSE LINE
- LOT BOUNDARY

SCALE 1 : 3000 @A3



STATE FOREST
No. 36

R.A.S Machin
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**AERIAL PHOTO
OVERLAY**

Dated on 18.11.2016

RASV Reference
3576

DEPARTMENT OF WATER

RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS
CASUARINA VALLEY ORCHARDS

LOT 1 ON PLAN 8940
IREDELL ROAD, BEEDELUPT WA 6260
CONTOUR SURVEY PLAN FOR DAM
EXPANSION DEVELOPMENT

Water Storage Dams:

Casuarina Valley Orchards is a very large horticultural holding within the Shire of Manjimup, with expansion of existing orchards in progress and with plans to diversify into other horticultural crops. Water security is the top priority to ensure success.

the other two are completely new Dams.

Casuarina Valley Orchards have over the past years applied to the Department Of Water for a permit under S17, RF 14039.

The application has been advertised and no objections have been received

It has been submitted to the Department Of Environmental Regulations - Ref. CPS 6985-1

LANDGATE Photography & Topographical maps have been obtained and the 3 sites are subjected to a desktop assessment with viable results.

To verify the desktop study, a GROUND TRUTHING survey has been carried out on each site to check on the reliability of the topography & contours.

CO-ORDINATES and adopted levels so that we can assess volumes quickly from proposed depth of water. Horizontal or on-rafting have been surveyed by a 1000 ft. line.

Hence co-ordinates are good for 2 metre horizontally, and 0.1 metre vertically.

When construction starts, the assumed co-ordinate system will be upgraded to **FORMAL** - use of the **GEODETIC DATUM OF AUSTRALIA 1984** will be required.

For initial checks, this cost is not warranted.

METHOD OF OBTAINING CONTOURS from Photographs (Source - Landgate)
As the ground level is not visible, the contours are taken on TREE TOPS and then lowered on average heights

Tree heights can be checked on roads and fence lines. Hence there can be errors. The biggest differences are always found in Guñes and the Ground truthing surveys has proved this

has occurred on these sites.

DAM #2	Upgrade existing 'CARPENTERS' Dam by filling water level 10 metres	Potential capacity 600 ML	Expensive Wall - Not as cost effective as Dam 1.
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Dam 2 will not encroach into the adjoining State Forest and/or private Land parcels.

The ground truthing survey confirmed that the desk top study using LANDGATE Data was within acceptable parameters.

Dem # 2

Statisticsderived from ground truthing survey on assumed level datums

#	Description	Result	Notes
1	Length of dam	600 metres	
2	Proposed TWL	110 m	
3	Perimeter of Top Water Level	1650 metres	
4	Area within TWL	11.3 ha	
5	Proposed clearing level	112 m	
6	Area within clearing level	13.9 ha	
7	Volume of dam	574 ml	Permit allows 3 GL
Clearing of vegetation			
1	Area within clearing level	13.5 ha	
2	Area of existing dam	3.2 ha	
3	Area of blue runs already harvested on south side and coloured yellow	3.7	
4	Nett area within dam to be harvested – coloured green	7.0 ha	
5	Estimated areas within natural vegetation that should not be considered as timbered		Swamp land along stream and open patches (isolated small areas)
Allow 10 %			
6	Nett timbered area within dam	0.7 ha	
7	area required for wall + pump/house	6.3 ha	
	NETT AREA of timber to be cleared	6.3 ha	Already cleared

Volume from Control to the 135/62.00 mL using control interval 1				
CONTROL	AREA	LAYER VOL	NETT VOL	
101.000	23760.8	0.0	0.0	
102.000	32565.2	28163.0	28163.0	
103.000	39736.5	36150.9	66373.8	
104.000	47387.9	43562.2	107876.1	
105.000	56009.6	51698.8	159574.9	
106.000	65604.8	60807.2	220382.1	
107.000	76286.4	70945.6	293321.7	
108.000	871963.7	82705.1	373436.2	
109.000	100376.7	94710.2	467623.0	
110.000	712694.1	703555.4	574558.4	
111.000	125617.9	119155.9	693314.3	
112.000	392192.2	382466.5	5823182.8	
113.000	154714.0	147031.6	972814.3	
114.000	171042.8	162893.4	1135707.7	
115.000	189006.3	180064.5	1351772.3	
116.000	207185.2	198450.7	1514223.0	
117.000	227146.6	217639.9	1731862.9	
Total volume @TWL (RL) 110 = 574. mL				

Volume from contour file C:\357621.CON using contour interval 1

SURVEYORS DECLARATION

I, ROGER A.S. MACHIN, BEING A LICENSED LAND SURVEYOR AND APPROVED LANDGATE SUPPLIER, HEREBY CERTIFY THAT THE OBSERVATIONS & CALCULATIONS SHOWN ON THIS PAGE, AS DESCRIBED WITHIN THE LAND PARCEL ON SHEET WAS CARRIED OUT IN ACCORDANCE WITH THE PROVISIONS OF THE LICENSED SURVEYORS REGULATIONS 1961.

SIGNED  Roger Machin
2016.11.18 11:34:04 +11'00

KASIMACHIN
Licensed Land Surveyor

DAIEL

DEPARTMENT OF WATER

**RED MOON PROPERTY HOLDINGS PTY LTD TRADING AS
CASUARINA VALLEY ORCHARDS**

R.A.S. Machine

Licensed Surveyor

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Dated on 18.11.2016

RASM Reference

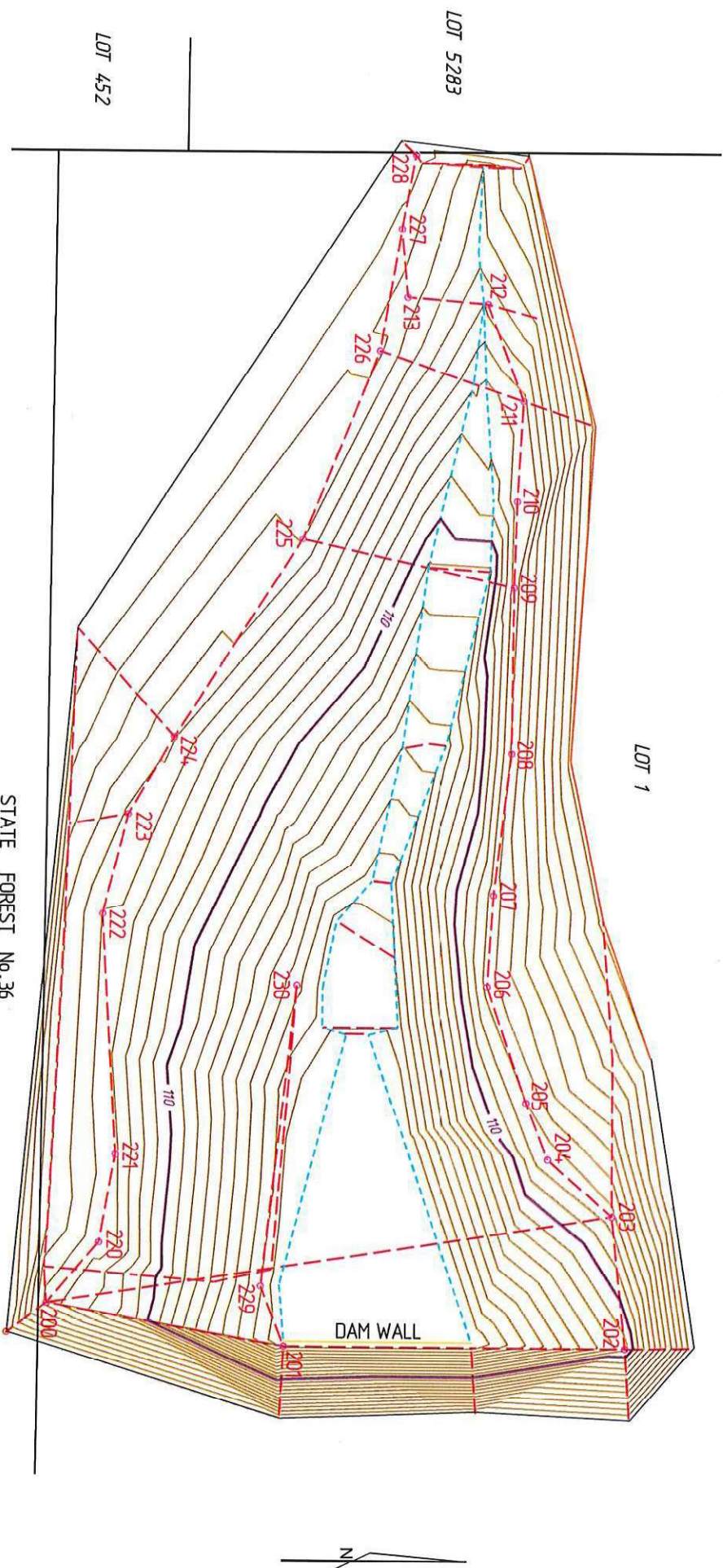


TABLE OF CO-ORDINATES

(Based on Assumed Datum)

PT #	EAST	NORTH	RL	Notes
200	970	330	114.5	on Plantation Rd on South Bay
201	1000	500	100.6	Dam wall TWL = 100.00
202	1000	744	108.5	Plantation Road
203	906	734	112.6	Plantation Road
204	865	687	112.2	North side
205	825	671	113.0	North side
206	743	643	113.4	North side
207	677	647	113.5	North side
208	576	659	114.2	North side
209	458	659	113.5	North side
210	397	661	113.6	North side
211	325	665	113.7	North side
212	256	639	115.4	North side
213	251	582	118.5	North side
214	251	582	118.5	North side
215	251	582	118.5	North side
216	251	582	118.5	North side
217	251	582	118.5	North side
218	251	582	118.5	North side
219	251	582	118.5	North side
220	251	582	118.5	North side
221	251	582	118.5	North side
222	251	582	118.5	North side
223	251	582	118.5	North side
224	251	582	118.5	North side
225	251	582	118.5	North side
226	251	582	118.5	North side
227	251	582	118.5	North side
228	251	582	118.5	North side
229	251	582	118.5	North side
230	251	582	118.5	North side

SURVEY METHODS & CONTROL CO-ORDINATES

Surveyed using Total Station for traversing and tieing to existing to FOURTH (4) order accuracy.

Co-ordinates are ASSUMED with level datum varying.

DAM 2 — adopting overflow invert level of existing dam = RL 100 m

AZIMUTH based on MAGNETIC azimuth and adjusted to TRUE azimuth.

Accuracy

Horizontal \pm 2 metres, Vertical \pm 50 mm

Dam 2 was surveyed by closed traverses.

Tie heights were observed by both backsight and foresight observations.

Note : this survey is for investigative purposes and did not justify the high cost to obtain GDA horizontal and third order vertical accuracy.

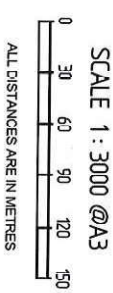
If project proves viable, then co-ordinates will be re-observed to GDA values for construction.

LEGEND
○ CONTROL POINT
○ CONTROL PT ID NUMBER
--- EXISTING WATER BODY
--- CONTROL TRAVERSE LINE
--- LOT BOUNDARY
--- TOP WATER LEVEL (TWL)

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SIGNED: Roger Machin
2016/11/19/20
+1100
B.A.S. MACHIN
Licensed Land Surveyor
DATED



CONTROL NETWORK SURVEY

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CASUARINA
DAM 2
Dated on 18.11.2016
RASIN Reference
3576