

**REPORT**

TRIM to  
PM/258

**GPR Survey, Wadjemup Cemetery,  
Rottnest Island**

*Prepared for*

**Rottnest Island Authority**

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13 June 2005

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URS Australia Pty Ltd completed this Ground Penetrating Radar (GPR) survey over areas adjacent to the fenced boundary of the Wadjemup Cemetery, Rottnest Island during December 2004. The cemetery contains the graves of Aboriginal prisoners who died whilst imprisoned at the Rottnest Island Gaol during the nineteenth century. The location of the Aboriginal cemetery has not been well documented by historical records. The GPR survey work was requested by the Rottnest Island Authority (RIA), with the support of the Rottnest Island Deaths Group (RIDG), to determine the extent of the cemetery area.

Four GPR surveys were completed to assist in determining the extent of the Aboriginal cemetery at Rottnest Island during the period 1990-1992. These surveys were conducted on behalf of the Department of Aboriginal Sites (DAS), to locate areas of disturbed ground that could possibly represent graves. The surveys initially examined the area where graves had previously been found south of the Tentland area, to provide an understanding of the GPR signatures over known graves. Additional calibration surveys were completed over 19th century graves at the Rottnest Island Cemetery and the Aboriginal cemetery at Mogumber. Later GPR surveys at Rottnest were used to more fully determine the extent of the Aboriginal cemetery.

As a result of the study conducted by DAS, of which the GPR surveys were part, an area was fenced and named the Wadjemup Cemetery. This area contained the graves discovered several years earlier indicating the existence of a cemetery, and also included sites of disturbed ground interpreted from the GPR results and considered to most likely represent grave sites.

In 1994 a 19th century burial was discovered at a location outside the Wadjemup Cemetery, and outside the area surveyed by GPR. As a result the cemetery fencing was extended further west to include this site.

The December 2004 GPR survey examined areas adjacent to the current Wadjemup Cemetery boundary to more fully determine the extent of the cemetery. The survey was conducted during the periods 13-17<sup>th</sup> December and 20-22<sup>nd</sup> December 2004. This report presents the results of the survey with conclusions and recommendations drawn from these results.

## 2.1 Survey Preparation

During a site visit on 11<sup>th</sup> November 2004, Vern Wilson (URS), accompanied by Iva Hayward-Jackson, Chairman of the Rottneest Island Deaths Group (RIDG), met with Paolo Amaranti (Chief Executive Officer) and Graeme Hoey (Projects Manager) of the RIA. At this meeting Mr Amaranti explained that the RIA wanted the question of possible burial sites in the area outside the boundary of the Cemetery to be finalised once and for all. The RIDG had requested that a GPR survey be conducted over areas they considered as possible burial areas and the RIA was willing to fund the survey. The RIA requested that RIDG show Mr Wilson the areas they wished to be surveyed. Mr Hayward-Jackson then toured the site with Mr Wilson to inspect areas to be investigated.

URS then presented a proposal that was accepted by the RIA. The RIA informed URS that additional work would be required around the Quod and adjacent worker's quarters as requested by RIDG. It was agreed by all parties that the first morning of the survey would be used to set the full scope of the work.

On the first day of the survey Iva Hayward-Jackson, assisted by Paul Allerdycce, accordingly showed Graeme Hoey and Vern Wilson the areas to be surveyed. These were agreed upon and included additional areas of the Quod, the adjacent worker's quarters and areas in northern and western "Tentland" to those initially proposed.

## 2.2 The Ground Penetrating Radar (GPR) Method

The Ground Penetrating Radar (GPR) technique transmits radio waves into the earth. These are reflected back to the surface when changes in electrical conductivity occur within the rocks. The transmission time of the energy and changes of wave velocity are recorded at the receiver. These electrical conductivity changes occur due to varying amounts of air, clay, salt and water content of the rocks as well as changes in the type of rock. Structures within the rocks can then be interpreted from the GPR data.

The GPR technique can distinguish areas of disturbed earth due to the increased air content of the disturbed soil and from the discontinuity of the strata where it has been disturbed. The method is also highly effective in locating underground services containing metal and water.

## 2.3 GPR Surveys at the Wadjemup Cemetery

The 1990-1992 GPR surveys were managed by Peter Randolph (DAS), designed by Vern Wilson (then at Curtin University), who interpreted the results. Chris Frampton was contracted from Ground Radar Australia Pty Ltd to record and process the data on a pulseEkko Mark IV GPR set. Graeme Merritt supervised the survey on behalf of the RIDG. Reports issued were Wilson 1991(a), Wilson 1991(b), Wilson 1992, and Wilson (1993). A paper was published on the DAS study of the cemetery (Randolph et al. 1993).

The characteristics formulated as indicating possible grave sites from these surveys were:

- Discontinuities in strata were obvious.
- Depth extent was 1.5 – 3.0 m from surface.
- Width varied from 1 m to several metres.
- Shape was that of a hand dug trench.
- Generally, but not always, reflectors were evident above and below the anomaly- with the upper reflection often raised probably due to higher porosity (air content) of the disturbed ground.

These characteristics were used to interpret the results from the December 2004 survey.

The December 2004 survey was managed by Graeme Hoey (RIA) and assisted by Iva Hayward-Jackson (RIDG). The data set was designed, acquired, processed and interpreted by Vern Wilson (URS), with considerable assistance throughout the survey by Iva Hayward-Jackson. Shane Burke and students from the Department of Archaeology at the University of Western Australia are gratefully acknowledged for providing on-site assistance during the acquisition of data.

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A Ramac X3M 250 MHz GPR instrument was used for this survey. This incorporates:

- Shielded 250 MHz antennas fitted to sled
- Integrated radar control unit - no fibre optic cables
- Auto-stacking function secures best data quality at maximum speed
- Ramac XV series monitor

The above equipment represents current state of the art GPR equipment and is a mobile unit suitable for locating targets requiring high resolution such as burials.

A total of 624 lines were surveyed. Each line is named by a letter (area name) and line number. The majority of lines surveyed are shown on Figure 1. Additionally seven lines were surveyed within the Quod (Lines S1-S7) and four lines were surveyed around and within the Worker's Cottages adjacent to the Quod (Lines T1-T5).

The areas were generally surveyed using a grid of lines spaced 1 m apart. Measuring tapes were placed using a compass on a grid to provide accuracy. The sled was fitted with a measuring wheel and was regularly calibrated alongside a measuring tape. Readings were recorded every 0.09m along each line. The antenna separation was 0.36 m (fixed). Sampling frequency was 2,765 MHz.

The velocity used for time-depth conversion was chosen from walk-a-way tests. A velocity of 0.13 m/ns was chosen for the GPR data as being representative of the 0-4 m depth interval. This was the velocity used in previous surveys.

The processes used in Ramac GroundVision software were:

DC Removal	Removes DC offset from the data.
Time Varying Gain	Applies time varying gain to compensate for geometrical spreading and attenuation loss.
Background Removal	Removes horizontal features from the data by applying a spatial high pass filter.
Band Pass Filter	Removes unwanted frequency components from the data.
Automatic Gain Control	Equalizes amplitudes by applying a time varying gain that makes the mean amplitude in a sliding time window equal.
Running Average	This is a low pass filter.

Due to the frequent occurrence of underground infrastructure (both known and unknown) it was necessary to process the data more than once using different filters to distinguish digging associated with these sites from other areas. This greatly increased the processing time.

Sites of disturbed ground interpreted to be significant for this survey were identified according to the conditions stated in Section 2.3, and have been located on Figure 1. There were no significant sites found within the Quod and within the adjacent Worker's cottages. These sites are not included on Figure 1.

Significant sites were found in the following four areas:

Areas A	Sites were found immediately north, and approximately 35-60 m to the northwest, of the grave site in northern Tentland. The extent of these sites is limited by the extensive surveying completed beyond this area.
Area B	Sites were found at the western end of the present cemetery boundary. The extent of sites in this area is limited by a shallow water table to the north, to limestone rock at the surface to the west and south and from the GPR survey work.
Area C	The sites are limited in this area by the extensive GPR survey work completed and the limestone outcrop to the south.
Area K	The extent of these sites in this area is limited by the GPR survey work conducted.



The December 2004 GPR survey over areas adjacent to the Wadjemup Cemetery has enabled the identification of ground that has been disturbed at depth in a manner consistent with known burial sites within the cemetery. The survey has provided evidence of disturbed ground by mapping reflections from discontinuities in the strata formed by digging and then the return of mixed earth to the area. These significant areas of disturbed ground are outlined on Figure 1.

The interpretation models used to locate potential burial sites from the GPR data have been substantiated through calibration with known burials within the cemetery during previous GPR surveys. However the GPR data cannot distinguish a burial from a similar trench dug for other purposes. The GPR survey data cannot alone conclude as to whether any one of the areas is a burial site.

It is concluded that the GPR survey has assisted greatly in determining the extent of the cemetery by identifying areas where burial sites may possibly be located and also indicating that there are no burial sites over much of the survey area.

It is further concluded that the cemetery is most unlikely to extend beyond the areas surveyed. This is based upon the low water tables evident in the GPR data in far northern Tentland, the surface limestone to the west and south and the historical knowledge provided by Paul Allerdyce limiting the eastern extent to the west of the old road to the Basin.

Based on the above conclusions it is recommended that consideration be now given that the extent of the Wadjemup Cemetery has now been adequately determined from both the GPR data and the known surface geology.

A conventional archaeological examination would prove or disprove whether any one of the significant areas marked on Figure 1 is a burial site. However it is understood that the RIDG do not wish to disturb a burial site.

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- Randolph et al.2003      Rottnest Island Prisoner's Cemetery: Report of Department of Aboriginal Sites, December 2003.
- Wilson 1991(a)          Trial GPR Survey, Tentland Area, Rottnest Island: Report, Dept. of Exploration Geophysics, Curtin University of Technology, 1991.
- Wilson 1991(b)          GPR Survey, Rottnest Island: Report, Dept. of Exploration Geophysics, Curtin University of Technology, March 1991.
- Wilson 1992              GPR Survey-Phase 3 Rottnest Island, WA: Report, Dept. of Exploration Geophysics, Curtin University of Technology, July 1992.
- Wilson 1993              GPR Survey-Phase 4 Rottnest Island, WA: Report, Dept. of Exploration Geophysics, June 1993.

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URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of the Rottnest Island Authority and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between January to June 2005 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

GPR Survey Line Details

# Appendix A

## Area A

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
A000E	003	357	52	A023E	027	177	108
A001E	004	177	50	A024E	028	357	57
A002E	005	357	48	A025E	029	177	55
A003E	006	177	48	A026E	030	357	50
A004E	007	357	53	A027E	032	177	53
A005E	008	177	55	A028E	033	357	52
A006E	009	357	45	A029E	034	177	50
A007E	010	177	54	A030E	035	357	50
A008E	011	357	56	A031E	036	177	50
A009E	012	177	79	A032E	037	357	51
A010E	013	357	74	A033E	038	177	54
A011E	014	177	76	A034E	039	357	53
A012E	015	357	77	A035E	040	177	54
A013E	017	177	78	A036E	041	357	51
A014E	018	357	79	A037E	042	177	55
A015E	019	177	82	A038E	043	357	54
A016E	020	357	86	A039E	044	177	56
A017E	021	177	82	A040E	045	357	56
A018E	022	357	81	A041E	046	177	55
A019E	023	177	83	A042E	047	357	58
A020E	024	357	70	A043E	048	177	59
A021E	025	177	105	A044E	049	357	60
A022E	026	357	107	A045E	050	177	61

# Appendix A

Line	File No.	Direction (deg. True)	Length (m)	Line	File No.	Direction (deg. True)	Length (m)
A046E	051	357	62	A069E	074	177	90
A047E	052	177	63	A070E	075	357	127
A048E	053	357	64	A071E	076	177	127
A049E	054	177	65	A072E	078	357	126
A050E	055	357	109	A073E	079	177	127
A051E	056	177	109				
A052E	057	357	103				
A053E	058	177	104				
A054E	059	357	114				
A055E	060	177	115				
A056E	061	357	114				
A057E	062	177	116				
A058E	063	357	115				
A059E	064	177	117				
A060E	065	357	109				
A061E	066	177	110				
A062E	067	357	122				
A063E	068	177	122				
A064E	069	357	123				
A065E	070	177	123				
A066E	071	357	123				
A067E	072	177	124				
A068E	073	357	89				

# Appendix A

## Area A

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
A001W	306	357	52	A024W	329	177	51
A002W	307	177	51	A025W	331	357	35
A003W	308	357	54	A026W	332	177	34
A004W	309	177	51	A027W	335	357	37
A005W	310	357	53	A028W	336	177	30
A006W	311	177	52	A029W	337	357	31
A007W	312	357	52	A030W	338	177	31
A008W	313	177	52	A031W	339	357	32
A009W	314	357	50	A032W	340	177	31
A010W	315	177	50	A033W	341	357	30
A011W	316	357	53	A034W	342	177	32
A012W	317	177	52	A035W	343	357	29
A013W	318	357	53	A036W	344	177	26
A014W	319	177	52	A037W	345	357	26
A015W	320	357	53	A038W	346	177	26
A016W	321	177	53	A039W	347	357	28
A017W	322	357	53	A040W	348	177	27
A018W	323	177	52	A041W	349	357	32
A019W	324	357	55	A042W	350	177	31
A020W	325	177	51	A043W	351	357	30
A021W	326	357	52	A044W	352	177	29
A022W	327	177	52	A045W	353	357	27
A023W	328	357	52	A046W	354	177	24

## Appendix A

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
A047W	355	357	23	A070W	380	177	34
A048W	356	177	22	A071W	381	357	36
A049W	357	357	20	A072W	382	177	33
A050W	358	177	18	A073W	383	357	36
A051W	359	357	17	A074W	384	177	34
A052W	360	177	15	A075W	385		28
A053W	361	357	13	A076W	386		28
A054W	362	177	14	A077W	387		33
A055W	363	357	14	A078W	388		39
A056W	364	177	10	A079W	389		28
A057W	365	357	9	A080W	390		28
A058W	366	177	7	A081W	391		27
A059W	367	357	7	A082W	392		28
A060W	368	177	7	A083W	393		31
A061W	369	357	6	A084W	394		32
A062W	370	177	6	A085W	395		27
A063W	371	357	27	A086W	398		54
A064W	372	177	25	A087W	399		52
A065W	373	357	27	A088W	400		44
A066W	374	177	26	A089W	401		34
A067W	375	357	33	A090W	402		36
A068W	376	177	33	A091W	403		39
A069W	379	357	33	A092W	404		50



# Appendix A

## Area A

Line	File No.	Direction (deg.True)	Length (m)
A093W	405	357	45
A094W	406	177	48
A095W	407	357	57
A096W	408	177	47
A097W	409	357	48
A098W	410	177	44

# Appendix A

## AREA B

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
B000	003	267	52	B023	027	87	108
B001	004	87	50	B024	028	267	57
B002	005	267	48	B025	029	87	55
B003	006	87	48	B026	030	267	50
B004	007	267	53	B027	032	87	53
B005	008	87	55	B028	033	267	52
B006	009	267	45	B029	034	87	50
B007	010	87	54	B030	035	267	50
B008	011	267	56	B031	036	87	50
B009	012	87	79	B032	037	267	51
B010	013	267	74	B033	038	87	54
B011	014	87	76	B034	039	267	53
B012	015	267	77	B035	040	87	54
B013	017	87	78	B036	041	267	51
B014	018	267	79	B037	042	87	55
B015	019	87	82	B038	043	267	54
B016	020	267	86	B039	044	87	56
B017	021	87	82	B040	045	267	56
B018	022	267	81	B041	046	87	55
B019	023	87	83	B042	047	267	58
B020	024	267	70	B043	048	87	59
B021	025	87	105				
B022	026	267	107				

# Appendix A

## Area C

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
C000	125	217	16	C023	148	37	20
C001	126	37	16	C024	149	217	24
C002	127	217	16	C025	150	37	25
C003	128	37	16	C026	151	217	24
C004	129	217	28	C027	152	37	25
C005	130	37	29	C028	153	217	30
C006	131	217	17	C029	154	37	32
C007	132	37	17	C030	155	217	30
C008	133	217	17	C031	156	37	30
C009	134	37	17	C032	157	217	29
C010	135	217	17	C033	158	37	31
C011	136	37	17	C034	159	217	32
C012	137	217	17	C035	160	37	32
C013	138	37	17	C036	161	217	32
C014	139	217	18	C037	162	37	33
C015	140	37	17	C038	163	217	30
C016	141	217	21	C039	164	37	30
C017	142	37	22	C040	165	217	33
C018	143	217	20	C041	166	37	34
C019	144	37	21	C042	167	217	30
C020	145	217	22	C043	168	37	31
C021	146	37	23	C044	169	217	37
C022	147	217	19	C045	170	37	37

## Appendix A

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
C046	171	217	36	C069	194	37	50
C047	172	37	37	C070	195	217	47
C048	173	217	38	C071	196	37	47
C049	174	37	38	C072	197	217	47
C050	175	217	38	C073	198	37	49
C051	176	37	39	C074	199	217	48
C052	177	217	39	C075	200	37	49
C053	178	37	40	C076	201	217	49
C054	179	217	42	C077	202	37	49
C055	180	37	42	C078	203	217	47
C056	181	217	39	C079	204	37	50
C057	182	37	40	C080	205	217	47
C058	183	217	39	C081	206	37	47
C059	184	37	42	C082	207	217	48
C060	185	217	47	C083	208	37	49
C061	186	37	47	C084	209	217	48
C062	187	217	46	C085	210	37	49
C063	188	37	47	C086	211	217	49
C064	189	217	47	C087	212	37	49
C065	190	37	49	C088	213	217	48
C066	191	217	45	C089	214	37	48
C067	192	37	46	C090	215	217	46
C068	193	217	48				

# Appendix A

## Area D

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
D001	216	37	18	D024	243	217	15
D002	217	217	17	D025	244	37	14
D003	218	37	17	D026	245	217	14
D004	219	217	17	D027	246	37	13
D005	220	37	18	D028	247	217	13
D006	221	217	17	D029	248	37	13
D007	222	37	17	D030	249	217	12
D008	223	217	17	D031	250	37	11
D009	224	37	17	D032	251	217	10
D010	225	217	17	D033	252	37	10
D011	226	37	17	D034	253	217	9
D012	227	217	16	D035	254	37	9
D013	228	37	15	D036	255	217	8
D014	229	217	14	D037	256	37	8
D015	230	37	14	D038	257	217	7
D016	233	217	10	D039	258	37	6
D017	234	37	14				
D018	235	217	14				
D019	236	37	16				
D020	237	217	16				
D021	238	37	15				
D022	241	217	16				
D023	242	37	15				

# Appendix A

## Area E

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
E001	259	204	31	E024	282	24	23
E002	260	24	30	E025	283	204	22
E003	261	204	30	E026	284	24	19
E004	262	24	28	E027	285	204	14
E005	263	204	30				
E006	264	24	30				
E007	265	204	31				
E008	266	24	28				
E009	267	204	29				
E010	268	24	28				
E011	269	204	28				
E012	270	24	27				
E013	271	204	28				
E014	272	24	27				
E015	273	204	28				
E016	274	24	27				
E017	275	204	26				
E018	276	24	26				
E019	277	204	26				
E020	278	24	26				
E021	279	204	25				
E022	280	24	24				
E023	281	204	24				

# Appendix A

## Areas F and G

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
F001	286		12	G001	296		22
F002	287		11	G002	297		22
F003	288		11	G003	298		22
F004	289		12	G004	299		22
F005	290		24	G005	300		22
F006	291		12	G006	301		22
F007	292		12	G007	302		22
F008	293		13	G008	303		21
F009	294		13	G009	304		22
F010	295		13	G010	305		20

# Appendix A

## Area I

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
I000	411	334	19	I023	434	154	11
I001	412	154	19	I024	435	334	12
I002	413	334	19	I025	436	154	11
I003	414	154	16	I026	437	334	11
I004	415	334	18	I027	438	154	11
I005	416	154	16				
I006	417	334	18				
I007	418	154	17				
I008	419	334	17				
I009	420	154	16				
I010	421	334	23				
I011	422	154	21				
I012	423	334	16				
I013	424	154	15				
I014	425	334	16				
I015	426	154	14				
I016	427	334	15				
I017	428	154	13				
I018	429	334	15				
I019	430	154	12				
I020	431	334	14				
I021	432	154	12				
I022	433	334	13				



# Appendix A

## Area J

Line	File No.	Direction (deg. True)	Length (m)	Line	File No.	Direction (deg. True)	Length (m)
J001	439		24	J024	462		20
J002	440		21				
J003	441		26				
J004	442		28				
J005	443		26				
J006	444		27				
J007	445		26				
J008	446		30				
J009	447		30				
J010	448		30				
J011	449		25				
J012	450		22				
J013	451		18				
J014	452		14				
J015	453		10				
J016	454		11				
J017	455		7				
J018	456		5				
J019	457		4				
J020	458		3				
J021	459		4				
J022	460		3				
J023	461		1				

# Appendix A

## Area K

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
K001	463	357	132	K024	486	177	81
K002	464	177	134	K025	487	357	77
K003	465	357	118	K026	488	177	76
K004	466	177	119	K027	489	357	75
K005	467	357	114	K028	490	177	75
K006	468	177	113	K029	491	357	47
K007	469	357	111	K030	492	177	45
K008	470	177	109	K031	493	357	42
K009	471	357	107	K032	494	177	42
K010	472	177	106	K033	495	357	40
K011	473	357	104	K034	496	177	39
K012	474	177	101	K035	498	357	44
K013	475	357	94	K036	499	177	38
K014	476	177	93	K037	500	357	37
K015	477	357	93	K038	501	177	36
K016	478	177	91	K039	502	357	34
K017	479	357	87	K040	503	177	34
K018	480	177	87	K041	504	357	33
K019	481	357	87	K042	505	177	32
K020	482	177	86				
K021	483	357	84				
K022	484	177	84				
K023	485	357	82				

# Appendix A

## Areas L and M

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
L001	506		37	M001	508		17
L002	507		34	M002	509		17
				M003	510		4
				M004	511		5
				M005	512		4
				M006	513		17
				M007	514		19
				M008	515		18
				M009	516		7
				M010	517		20

# Appendix A

## Area N

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
N074E	519	357	65	N097E	542	177	145
N075E	520	177	62	N098E	543	357	148
N076E	521	357	63	N099E	544	177	150
N077E	522	177	62	N100E	545	357	134
N078E	523	357	63	N0101E	546	177	132
N079E	524	177	62	N0102E	547	357	87
N080E	525	357	63	N0103E	548	177	84
N081E	526	177	64	N0104E	549	357	82
N082E	527	357	66	N0105E	550	177	83
N083E	528	177	68	N0106E	551	357	80
N084E	529	357	69	N0107E	552	177	78
N085E	530	177	69	N0108E	555	357	77
N086E	531	357	73	N0109E	556	177	77
N087E	532	177	73	N0110E	557	357	74
N088E	533	357	76	N0111E	558	177	74
N089E	534	177	76	N0112E	559	357	71
N090E	535	357	77				
N091E	536	177	81				
N092E	537	357	131				
N093E	538	177	129				
N094E	539	357	167				
N095E	540	177	174				
N096E	541	357	144				

# Appendix A

## Areas O and P

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
O001E	558		50	P005	579	327	22
O002E	559		48	P006	580	147	24
O003E	560		20	P007	581	327	25
O004E	561		21	P008	582	147	27
O005E	562		10	P009	583	327	28
O006E	563		8	P010	584	147	28
O007E	564		8	P011	585	327	29
O008E	565		20	P012	586	147	30
O009E	566		20	P013	587	327	31
O010E	567		9	P014	588	147	32
O011E	568		9	P015	589	327	34
O012E	569		9	P016	590	147	39
O013E	570		10	P017	591	327	43
O014E	571		4	P018	592	147	66
O015E	572		20	P019	593	327	67
O016E	573		21	P020	594	147	67
				P021	595	327	67
P000	574	147	20	P022	596	147	69
P001	575	327	22				
P002	576	147	21				
P003	577	327	22				
P004	578	147	22				

# Appendix A

## Areas Q and R

Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
Q001E	597	180	44	Q024E	620	0	33
Q002E	598	0	44	Q025	621	180	35
Q003E	599	180	46	Q026	622	0	40
Q004E	600	0	47	Q027	623	180	44
Q005E	601	180	49				
Q006E	602	0	48	R001	624	357	39
Q007E	603	180	49	R002	625	177	39
Q008E	604	0	46	R003	626	357	37
Q009E	605	180	45	R004	627	177	40
Q010E	606	0	42	R005	628	357	37
Q011E	607	180	43	R006	629	177	38
Q012E	608	0	41	R007	630	357	39
Q013E	609	180	42	R008	631	177	38
Q014E	610	0	40	R009	632	357	40
Q015E	611	180	41	R010	633	177	36
Q016E	612	0	40				
Q017E	613	180	41				
Q018E	614	0	40				
Q019E	615	180	40				
Q020E	616	0	39				
Q021E	617	180	39				
Q022E	618	0	38				
Q023E	619	180	37				

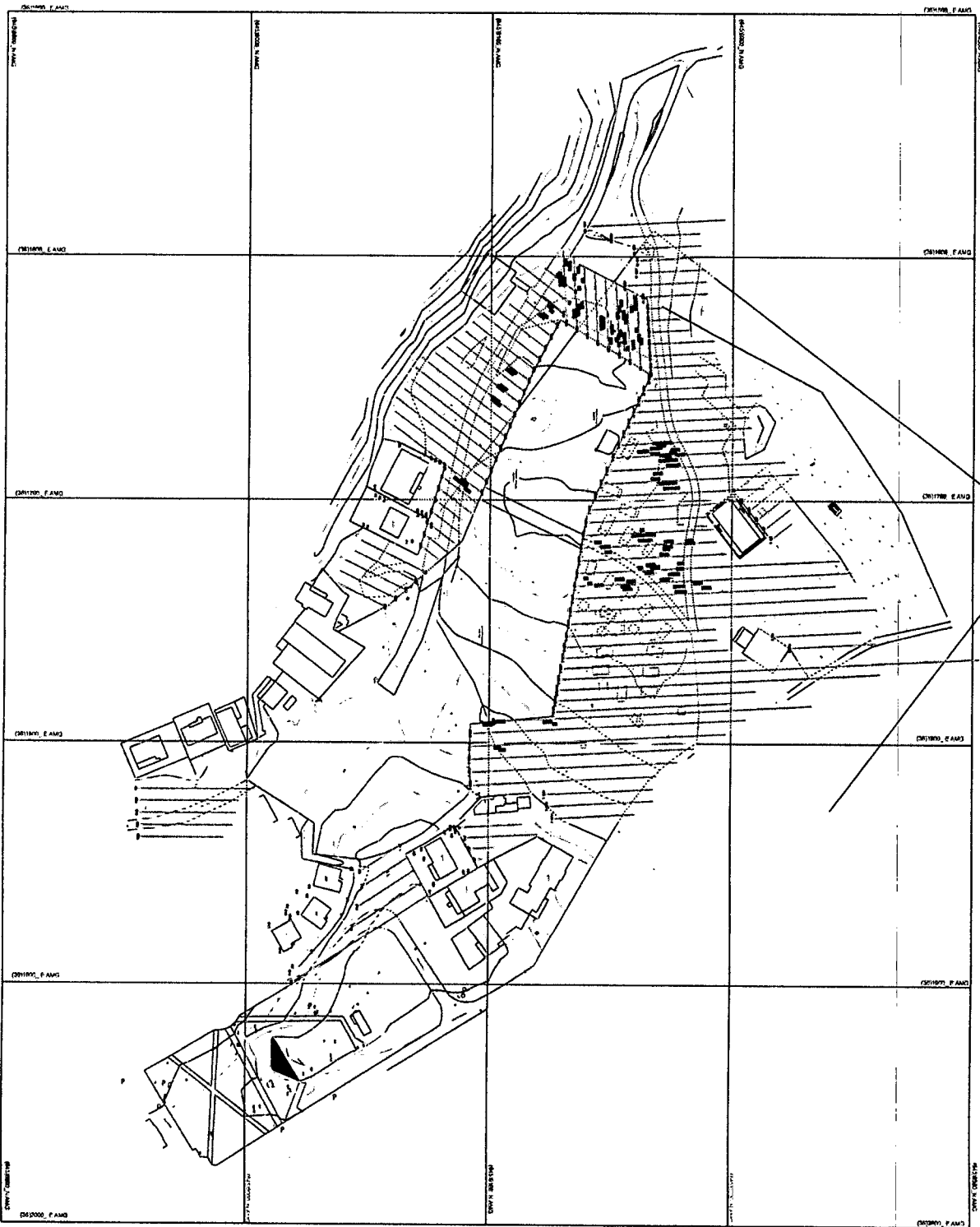
# Appendix A

## Areas S and T

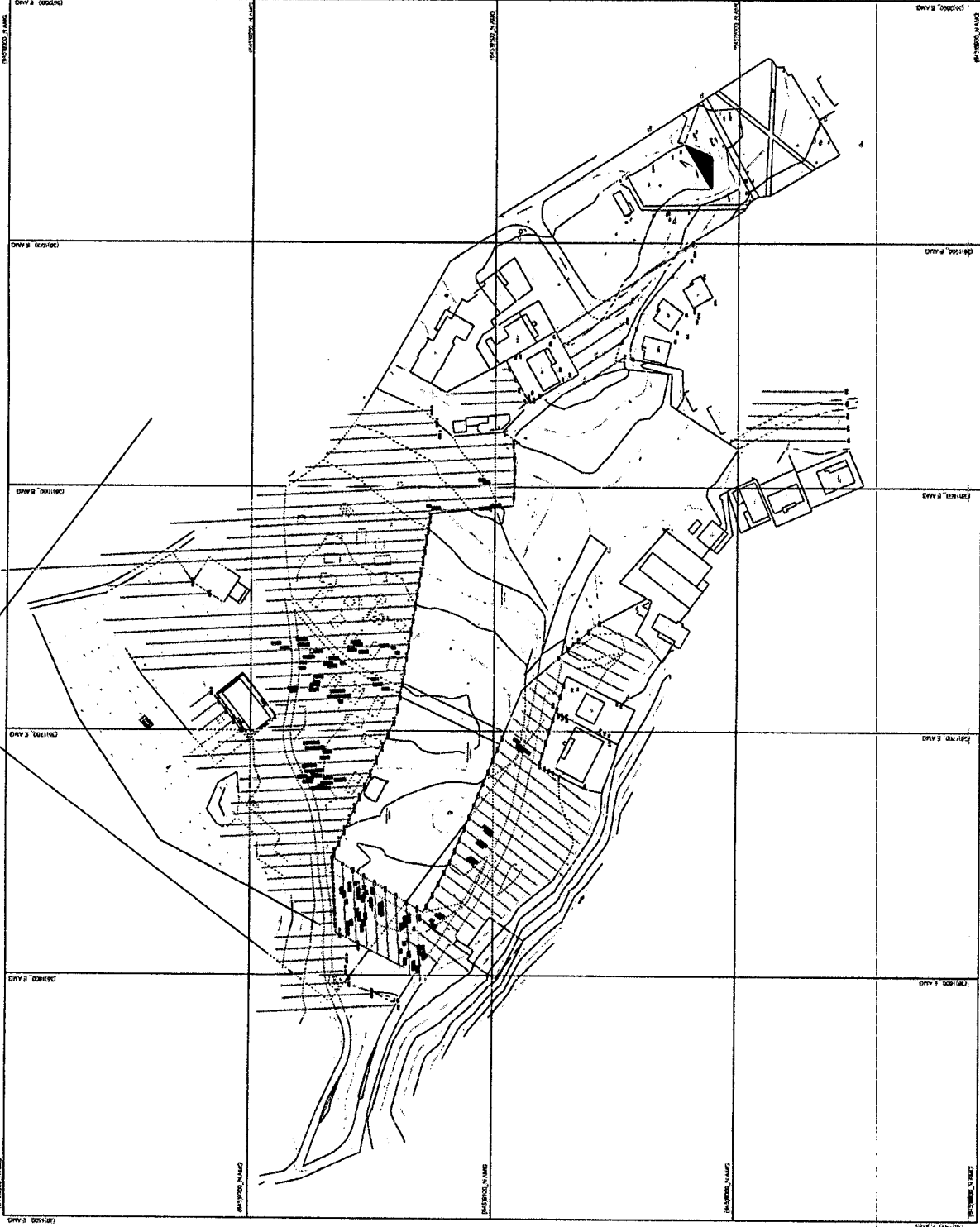
Line	File No.	Direction (deg.True)	Length (m)	Line	File No.	Direction (deg.True)	Length (m)
S001	634		39				
S002	635		42				
S003	636		45				
S004	637		47				
S005	638		44				
S006	639		39				
S007	640		42				
T001	642		43				
T002	643		20				
T003	644		20				
T004	645		22				
T005	646		18				

# Appendix A





URS  
 URS CORPORATION  
 200 WEST WASHINGTON AVENUE  
 SUITE 1000  
 CHICAGO, ILLINOIS 60601  
 TEL: 312.420.2000  
 FAX: 312.420.2001  
 WWW.URS.COM



↑ North

Access road leads to Country Club/Golf Course

Camping Ground

Heritage Commn

County Units

Existing Aboriginal Burial Ground

existing sign

staff housing

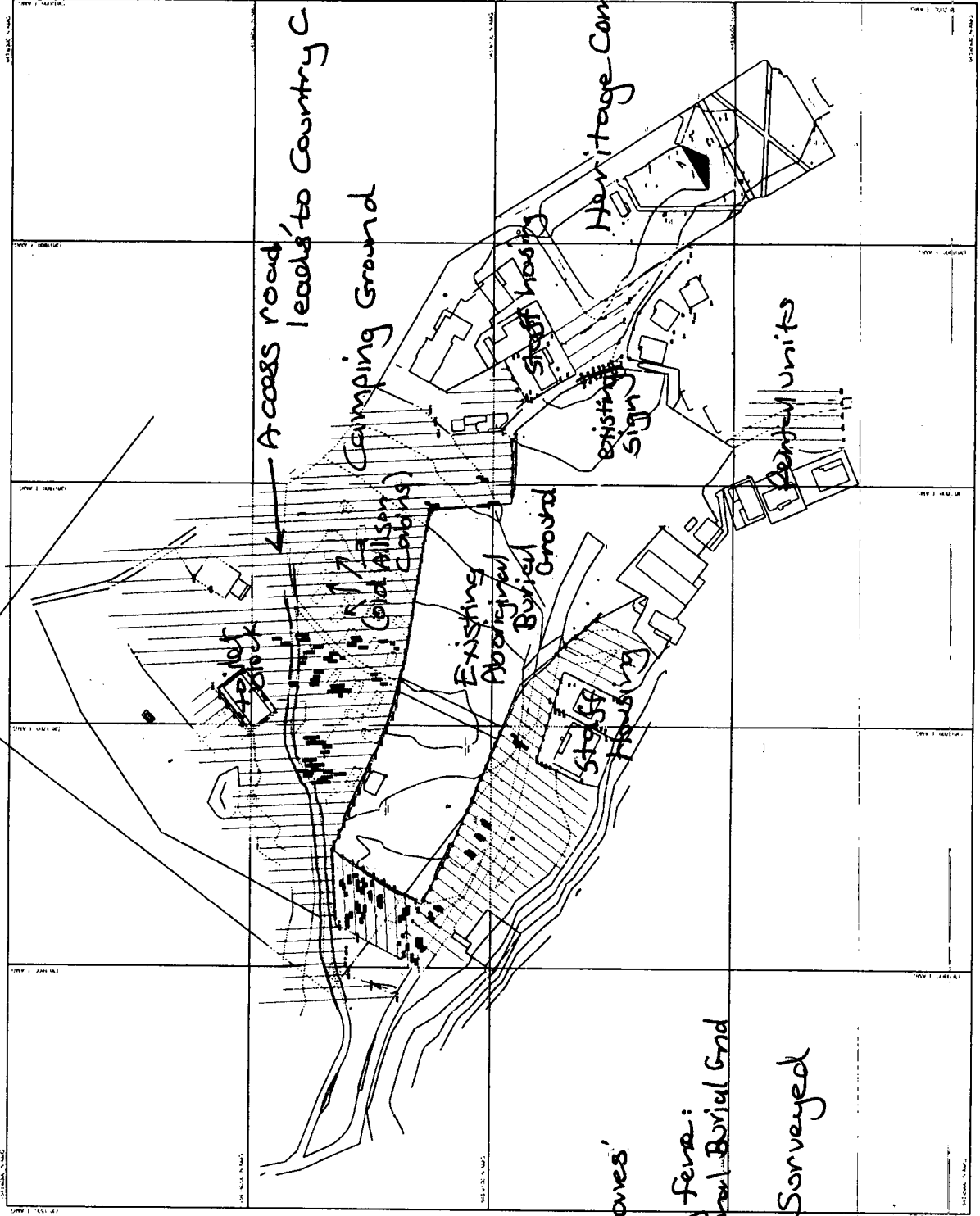
(old Allison Cabins)

staff

- - - new 'graves'

- - Existing fence:  
Aboriginal Burial Grnd

Area Surveyed



# Interpretation

## SECTION 4

Sites of disturbed ground interpreted to be significant for this survey were identified according to the conditions stated in Section 2.3, and have been located on Figure 1. There were no significant sites found within the Quod and within the adjacent Worker's cottages. These sites are not included on Figure 1.

Significant sites were found in the following four areas:

- Areas A Sites were found immediately north, and approximately 35-60 m to the northwest, of the grave site in northern Tentland. The extent of these sites is limited by the extensive surveying completed beyond this area.
- Area B Sites were found at the western end of the present cemetery boundary. The extent of sites in this area is limited by a shallow water table to the north, to limestone rock at the surface to the west and south and from the GPR survey work.
- Area C The sites are limited in this area by the extensive GPR survey work completed and the limestone outcrop to the south.
- Area K The extent of these sites in this area is limited by the GPR survey work conducted.

# Conclusions and Recommendations

## SECTION 5

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The December 2004 GPR survey over areas adjacent to the Wadjemup Cemetery has enabled the identification of ground that has been disturbed at depth in a manner consistent with known burial sites within the cemetery. The survey has provided evidence of disturbed ground by mapping reflections from discontinuities in the strata formed by digging and then the return of mixed earth to the area. These significant areas of disturbed ground are outlined on Figure 1.

The interpretation models used to locate potential burial sites from the GPR data have been substantiated through calibration with known burials within the cemetery during previous GPR surveys. However the GPR data cannot distinguish a burial from a similar trench dug for other purposes. The GPR survey data cannot alone conclude as to whether any one of the areas is a burial site.

It is concluded that the GPR survey has assisted greatly in determining the extent of the cemetery by identifying areas where burial sites may possibly be located and also indicating that there are no burial sites over much of the survey area.

It is further concluded that the cemetery is most unlikely to extend beyond the areas surveyed. This is based upon the low water tables evident in the GPR data in far northern Tentland, the surface limestone to the west and south and the historical knowledge provided by Paul Allerdyce limiting the eastern extent to the west of the old road to the Basin.

Based on the above conclusions it is recommended that consideration be now given that the extent of the Wadjemup Cemetery has now been adequately determined from both the GPR data and the known surface geology.

A conventional archaeological examination would prove or disprove whether any one of the significant areas marked on Figure 1 is a burial site. However it is understood that the RIDG do not wish to disturb a burial site.