6.7 BLAST AND VIBRATION IMPACT ASSESSMENT

Blast and Vibration Impact Assessment

Train Support Facility

Pacific National

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Report Details:

Filename: 10634 Blast and Vibration Assessment Rev1.doc
Job #: J0090227-01 Folder #: F10634
Revision: 1 (Final)
Date: 28 September 2010

Endorsements:

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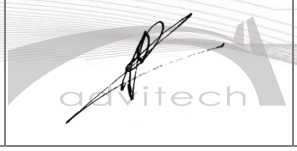
Authorised for Release By		Jeremy Pola Lead Environmental Scientist	28 September 2010

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APPENDICES

1. INTRODUCTION

Advitech Pty Limited was engaged by Monteath and Powys Pty Ltd to prepare a Blast and Vibration Impact Assessment (BVIA) of potential vibration impacts associated with the development of a Train Support Facility (TSF) at Greta, NSW. Pacific National proposes to construct and operate the facility to provide support to its coal haulage business in the Hunter Valley. The location of the proposed facility is provided in **Figure 1**. The site is currently zoned Rural 1a pursuant to the *Cessnock Local Environment Plan* (LEP) 1989 and is located between the existing Main Northern Railway and the proposed F3 freeway extension to Branxton. The purpose of this assessment is to provide an analysis of potential blasting and vibration impacts associated with the construction and operation of the TSF.

It should be noted that this report was prepared by Advitech Pty Limited for Monteath and Powys ("the customer") in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

1.1 Site Location and Surrounding Land Uses

The site is located at Lot 300, DP1117342 Mansfield Road, Greta (**Figure 1**). The site has an area of approximately 46 hectares and is zoned 1(a) Rural pursuant to the Cessnock LEP (1989). The site surrounds include:

- mixture of rural and residential receivers;
- New England Highway to the north;
- Main Northern Railway corridor to the north; and
- proposed Hunter Expressway extension to the south.

Figure 1: Site Location

1.2 Project Description

Pacific National's intention is to establish the Greta site as a train support facility. The new facility is required to meet the expected growth in coal exports through the Newcastle Port and will allow Pacific National to not only achieve its business objectives but to also meet responsibilities within the Hunter Valley coal chain. The development is referred to as a Train Support Facility, which includes the infrastructure required to service trains as well as provide the administration and ancillary development associated with the project.

1.2.1 Train Support Facility

The facility will operate as a service point for Pacific National's existing trains that utilise the Main Northern Railway. On return trips from delivering commodities to the Port of Newcastle, empty trains will utilise the proposed Greta facility to be re-fuelled, maintained and when necessary change crews. The trains currently operate 24 hours a day, seven days a week, and as a result the facility needs to be available to service the trains on this basis. Once the trains have been re-fuelled and serviced, they will return to the Main Northern Railway for their intended destination. Minor planned maintenance works would also be undertaken at the facility.

The layout of the proposed development is provided in **Figure 2**.

1.2.2 Development Staging

Development of the facility will be undertaken in a construction stage and three (3) operational stages. These stages include:

- **Construction** – vegetation clearance, bulk earthworks, establishment of internal stabling roads and establishment of site buildings and ancillary infrastructure. Blasting would also be undertaken during this stage to remove rock from the site that is unsuitable for excavation;
- **Stage 1 Operations** – the facility will operate 24 hours a day, 7 days per week with approximately 10 trains serviced by the facility per day. The facility at this stage will have capacity to house 3 trains (totalling 9 locomotives and 273 wagons). Stage 1 operations are proposed to commence immediately upon commissioning of the facility.
- **Stage 2 Operations** - the facility will operate 24 hours a day, 7 days per week with approximately 15 trains serviced by the facility per day. The facility at this stage will have capacity to house 5 trains (totalling 15 locomotives and 455 wagons). Stage 2 operations are proposed to commence in 2014; and
- **Stage 3 Operations** - the facility will operate 24 hours a day, 7 days per week with approximately 25 trains serviced by the facility per day. The facility at this stage will have capacity to house 5 trains (totalling 15 locomotives and 455 wagons). Stage 3 operations are proposed to commence in 2018.

1.3 Sensitive Receivers

A number of potentially sensitive receivers were identified adjacent to the proposed development site, including residential receivers:

- to the east at Greta;
- to the south-east at Illalong;
- to the south off Tuckers Lane;
- to the west at North Rothbury;
- to the north-west at Branxton; and
- to the north off the New England Highway.

The location of potentially sensitive receivers adjacent to the development site is shown in **Figure 3.** The nearest sensitive receivers with potential to experience vibration impacts are located to the south of the site on Mansfield Road, Illallong.

Figure 2: Site layout

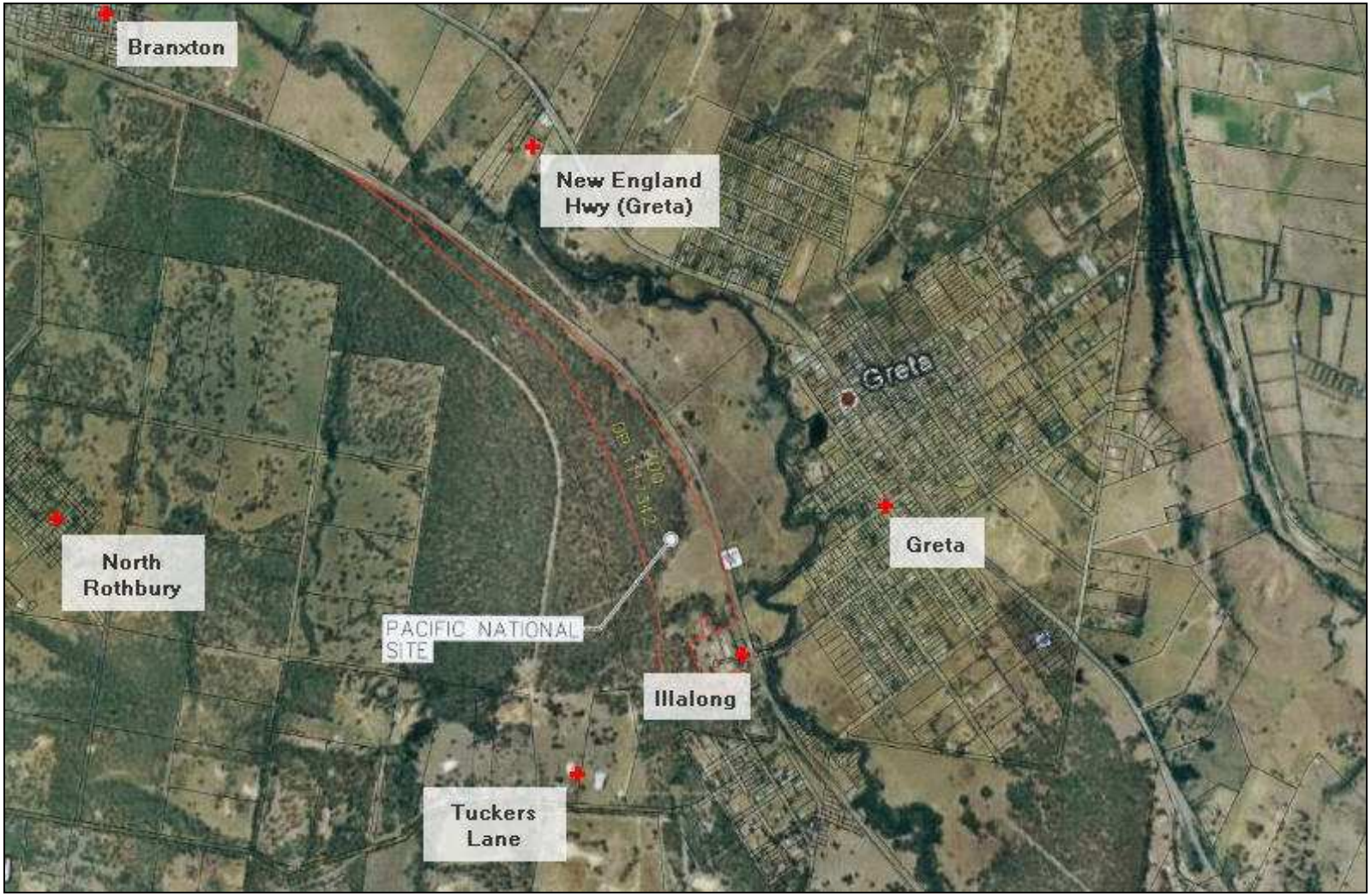


Figure 3: Location of Sensitive Receivers

2. REFERENCES

The following information was used in the preparation of this report:

1. ANZECC (1990). *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*, Australian and New Zealand Environment Council;
2. AS2187.2-2006 *Explosives – Storage and use Part 2: Use of Explosives*;
3. AS2670.1:2001 *Evaluation of human exposure to whole body vibration, Part 1: General Requirements;*
4. Department of Environment and Climate Change (2009). *Interim Construction Noise Guideline*, Department of Environment and Climate Change, Sydney*;*
5. Department of Environment and Conservation (2006). Assessing Vibration: a technical guideline, Department of Environment and Conservation, Sydney;
6. GHD (2009). *Report on ARTC Minimbah Third Track Environmental Assessment: Noise and Vibration Impact Assessment*, Australian Rail and Track Corporation;
7. GHD (2009). *Noise and Vibration Impact Assessment for Maitland to Minimbah Third Track Project*, Australian Rail and Track Corporation;
8. Heggies (2007). Blasting Noise and Vibration Assessment: Modification to Development Consent for Glendell Coal Mine;
9. Heggies (2005). Construction, Operation and Transportation Noise and Blasting Impact Assessment, Wilpinjong Coal Project;
10. Hansen, CE, Towers, DA and Meister, LD (2006). *Transit Noise and Vibration Impact Assessment*, US Federal Transit Administration, Washington; and
11. NSW Roads and Traffic Authority (2001). *RTA Environmental Noise Management Manual,* NSW RTA, Surry Hills.

3. ASSESSMENT CRITERIA

3.1 Construction Stage Blast and Vibration Criteria

3.1.1 Assessment Criteria for Human Annoyance

The NSW Department of Environment, Climate Change and Water (DECCW) advises that impacts associated with blasting be assessed in accordance the Australian and New Zealand Environment Council (ANZEC 1990) *Technical basis for guidelines to minimise annoyance due to blasting overpressure and vibration*. The guideline establishes the following criteria to minimise annoyance associated with blasting:

- Air-blast Overpressure:
  - the recommended peak maximum level for air blast overpressure at sensitive receivers is 115 dB(Lin);
  - the maximum air blast overpressure level should not exceed 115 dB(Lin) during more than 5% of blasts in any 12 month period, and should never exceed 120 dB(Lin).
- Ground Vibration:
  - the recommended maximum peak particle velocity (PPV) value of 5 mm/s;
  - the maximum PPV should not exceed 5mm/s during more than 5% of blasts in any 12 month period, and should never exceed 10 mm/s.
- Timing:
  - blasting should be restricted to the hours 9.00am to 5.00pm, Monday to Saturday;
  - blasting should not take place on Sundays or public holidays.

3.1.2 Assessment Criteria for Structural Damage

Currently no published guideline or Australian Standard establishes a vibration criterion for the assessment of structural or cosmetic damage to buildings or permanent infrastructure caused by blasting. Review of published literature indicates that German Standard DIN 4150-3: 1999 *Structural Vibration – Part 3: Effects of vibration on structures* provides an effective guidance criteria of 80mm/s for rail infrastructure (Heggies 2005, 2007).

AS2187.2-2006 cites more conservative guideline values from British Standard (BS) 7385-2 *Evaluation and measurement for vibration in buildings; Part 2: Guide to damage levels from ground-borne vibration* for cosmetic and minor structural damage to residential and commercial structures. **Table 1** presents vibration criteria for commercial and residential buildings.

Table 1: BS7385-2 Transient vibration guide values for cosmetic damage[1]

	Peak component particle velocity	
Type of Building	**4Hz to 15Hz**	**15Hz and above**
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4Hz and above	
Unreinforced or light framed structure. Residential of light commercial type buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz to 50mm/s at 40Hz and above

Note 1: Reproduced from Appendix J of AS2187.2-2006

3.2 Operational Stage Vibration Criteria

The NSW Department of Environment and Conservation (DEC) document *Assessing Vibration: a technical guideline* is identified as the appropriate guideline for the assessment of vibration impacts from new industrial and transportation developments. The guideline identifies three specific types of vibration:

- continuous;
- impulsive; and
- intermittent.

Rail induced vibration is identified as presenting an intermittent impact in accordance with the following definition:

> *Interrupted periods of continuous (e.g. drilling) or repeated periods of impulsive vibration (e.g. piling works), or continuous vibration that varies significantly in magnitude. It may originate from impulse sources or repetitive sources, or sources which operate intermittently, but which would produce continuous vibration if operated continuously (including intermittent machinery, railway trains and traffic passing by).*

3.2.1 Assessment Criteria for Intermittent Vibration

The DEC guideline identifies the Vibration Dose Value (VDV) as the appropriate indicator for the assessment of intermittent vibration impacts. The VDV provides an assessment of accumulated vibration impacts experienced over the duration of the assessment period. The DEC guideline adopts the assessment methodology from BS6472-1992 *Guide to evaluation of human exposure to vibration in buildings* for determination VDVs. The acceptable VDVs for intermittent vibration are reproduced in **Table 2**.

Table 2: Acceptable vibration dose values for intermitten vibration (m/s$^{1.75}$)

	Daytime[1]		Night-time[1]	
Receiver Type	**Preferred**	**Maximum**	**Preferred**	**Maximum**
Critical areas[2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Note 1. Daytime is defined as the period 7am to 10pm. Night is defined as the period 10pm to 7am.

Note 2. Examples of critical areas include hospital operating theatres and precision laboratories where sensitive operations are occurring.

These are the values above which disturbance to occupants of a building may be expected. Adverse reactions may be expected where vibration impacts approach the maximum values. These criteria relate to human comfort and annoyance and are the criteria against which both operational and construction stage impacts may be assessed.

3.2.2 Assessment Criteria for Structural Damage

Currently no guideline or Australian Standard establishes a vibration criterion for the assessment of structural or cosmetic damage to buildings. The US Federal Transit Administration guideline *Transit Noise and Vibration Impact Assessment* (1995) provides some guidance on the establishment of vibration damage criteria for structures adjacent to transport corridors. The FTA suggested building damage criteria are reproduced in **Table 3**.

Table 3: Structural damage criteria

Building Type	Peak Particle Velocity (mm/s)
Reinforced concrete, steel or timber (no plaster)	12.7
Engineered concrete and masonry (no plaster)	7.6
Non-engineering timber and masonry buildings	5.1
Building extremely susceptible to vibration damage	3.1

4. EXISTING ENVIRONMENT

4.1 Background Monitoring

Vibration monitoring was undertaken on 1 February 2010 in order to characterise ambient vibration impacts at the site of the proposed development. Monitoring was undertaken using a Texcel UMX (S/N:721) vibration analyser. The monitoring location is provided in **Figure 4**. A detailed plan of the monitoring layout is provided in **Figure 5**.

4.2 Methodology

The monitoring location was approximately 12 metres from the Pacific National site boundary and 22 metres south-west of the nearest track. Setback of the monitoring location from the nearest track was consistent with separation distances between the rail corridor and the closest sensitive receivers at Mansfield Street, Illalong.

Operator attended monitoring was undertaken between 12:30 and 14:00 on 1 February 2010. The monitoring unit provided a continuous record of Peak Particle Velocity (PPV) vibration impacts in 3-axes during this period, with assessment of rail pass-by induced impacts undertaken on the basis of operator observations.

4.3 Monitoring Results

While coal trains present the dominant contribution to rail traffic on the Main Northern Railway, freight and commuter trains also utilise this corridor. A total of eight (8) rail pass-by events were observed during the monitoring period, comprised of:

- 3 northbound un-laden coal trains (near track);
- 1 northbound commuter train (near track); and
- 4 southbound laden coal trains (far track).

A summary of the monitoring results are presented in **Table 4 to Table 6.**

Table 4: Summary of pass-by events

Event / ID	Pass-by Duration (s)	Description
T1N	105	Northbound Coal (unladen)
T2N	50	Northbound Countrylink passenger train
T3N	120	Northbound Coal (unladen)
T4N	180	Northbound Coal (unladen)
T5N	160	Southbound Coal (laden)
T6N	90	Southbound Coal (laden)
T7N	135	Southbound Coal (laden)
T8N	105	Southbound Coal (laden)

The pass-by times presented in **Table 4** represent the interval between the passage of the first and last component (locomotive or wagon) of the train at the monitoring location. Assessment of the range of measured PPV values in each axis are presented in **Appendix I**. The data provided in **Table 5** summarises the range of Root Mean Square (RMS) acceleration values from monitored pass-by events.

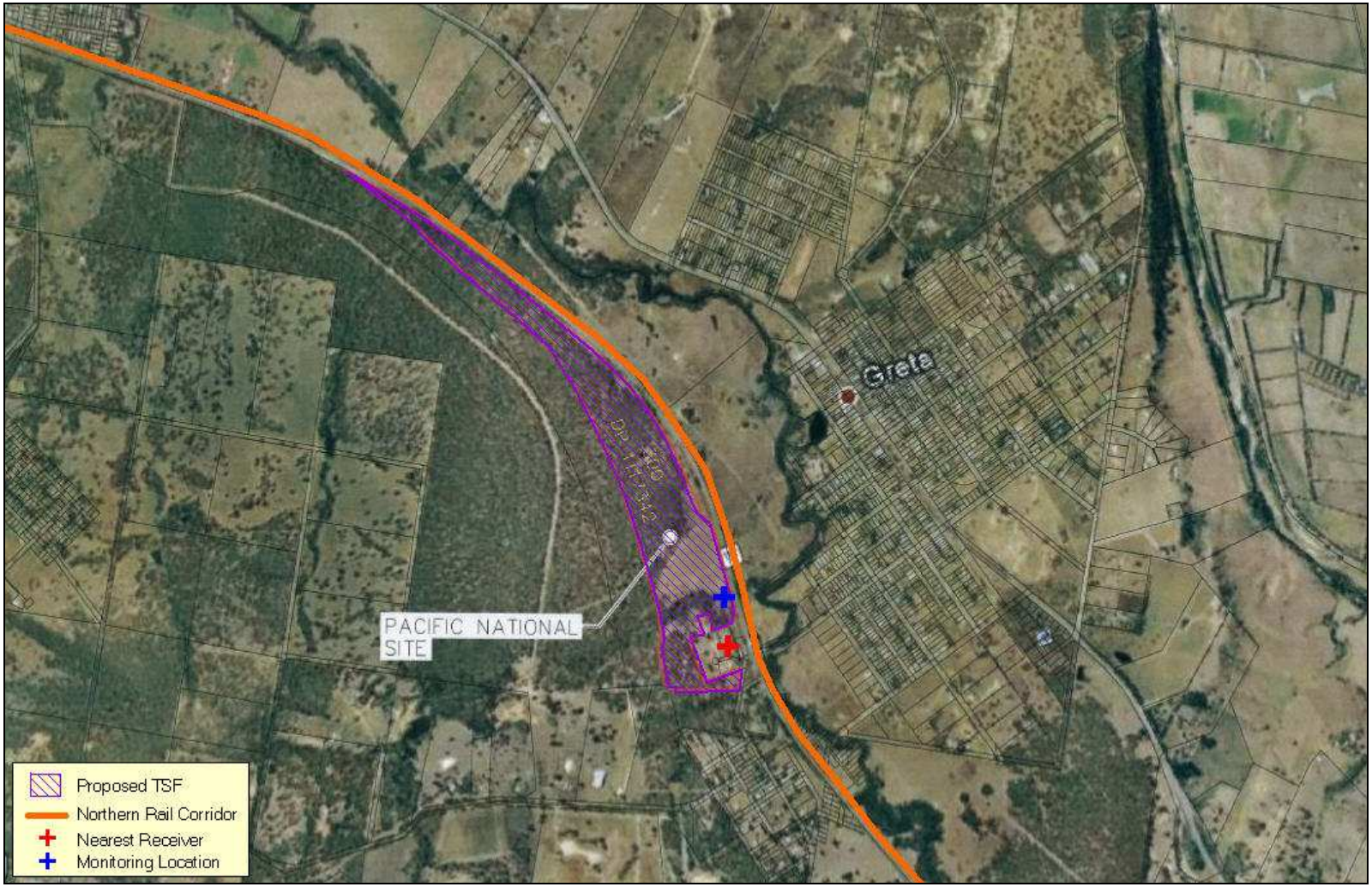


Figure 4: Vibration monitoring location

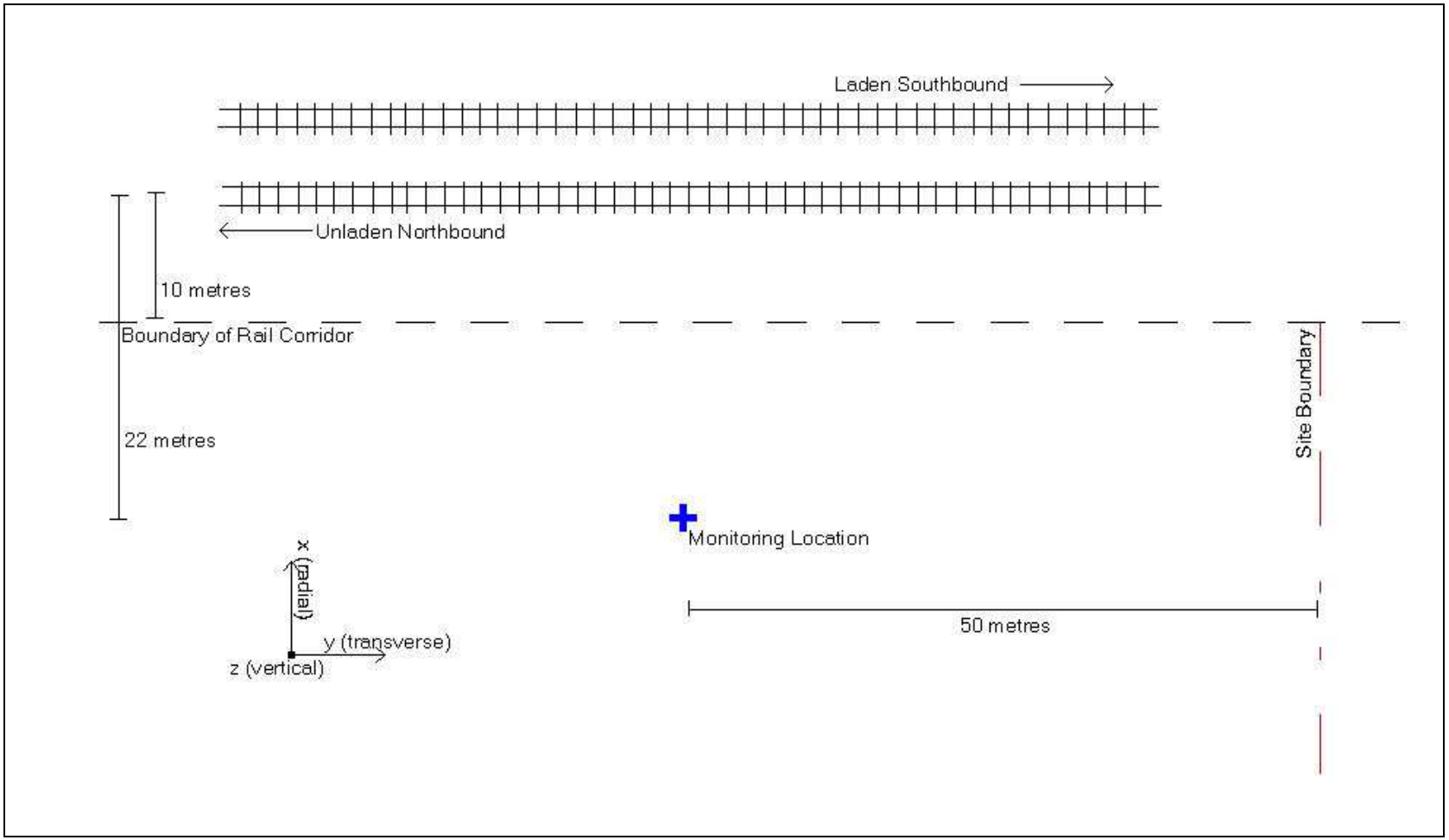


Figure 5: Detailed layout of vibration monitoring location

Table 5: Summary of existing vibration levels

Range of Values		RMS Acceleration (ms^{-2}) Radial	Transverse	Vertical
Northbound (unladen)				
	Minimum	0.0006	0.0006	0.0003
	Maximum	0.0112	0.0116	0.0225
Southbound (laden)				
	Minimum	0.0006	0.0006	0.0003
	Maximum	0.0094	0.0100	0.0091
Background				
	Minimum	0.0006	0.0006	0.0003
	Maximum	0.0009	0.0006	0.0006

The PPV were converted to an RMS velocity value assuming a typical crest factor of 4 for groundborne vibration from trains (FTA 2006). The RMS acceleration values presented in **Table 5** were then evaluated using the methodology presented in Appendix B2 of the DEC (2006) guideline:

$$a_{rms} = 2 \times \pi \times f \times v_{rms}$$

Where: a_{rms} = acceleration in ms^{-2}
f = frequency in Hz
v_{rms} = velocity in ms^{-1}

Review of the noise and vibration impact assessment for the ARTC Minimbah Third Track expansion indicates the dominant frequency for rail pass-by events is approximately 30 Hz (GHD 2008). For the purposes of calculating RMS acceleration from RMS velocity results at the Greta monitoring location, the dominant frequency was assumed to be 30 Hz.

Energy average RMS acceleration values for each of the pass-by events was calculated using the method described in equation B.4 of AS2670.1:2001 *Evaluation of human exposure to whole body vibration, part 1: General Requirements*:

$$a_{we} = \left[\frac{\sum a_{wi}^4 \times T_i}{\sum T_i} \right]^{\frac{1}{4}}$$

Where: a_{we} = equivalent vibration magnitude in ms^{-2}
a_{wi} = vibration magnitude for exposure duration T_i

AS2670.0:2001 provides an alternative method for the evaluation of energy equivalent vibration magnitude, however equation B.4 (presented above) was found to provide a more conservative evaluation of vibration impacts and was applied for the purposes of this assessment.

Based on calculated vibration magnitudes on each axis, the estimated partial VDV (eVDV) for each of the pass-by events was determined in accordance with the method presented in Appendix A of the guideline:

$$eVDV = 1.4 \times a_{rms} \times t^{0.25}$$

Where: eVDV is the estimated Vibration Dose Value ($ms^{-1.75}$)
a_{rms} = acceleration in ms^{-2}
t = duration of exposure in seconds

The total eVDV for each of the pass-by events was then evaluated using the equation provided in Section 2.4.1 of the DEC (2006) guideline for the summation of individual vibration doses:

$$\mathrm{e}VDV = \left[\sum_{i=1-N} eVDV_i^4\right]^{0.25}$$

Where: eVDV is the total Vibration Dose Value ($ms^{-1.75}$)
$eVDV_i$ is the individual dose value (for x, y, z axis) ($ms^{-1.75}$)

The eVDV values for each of the monitoring rail pass-by events are presented in **Table 6.** Bold values indicate the axis on which maximum eVDV were observed.

Table 6: Summary of passby events ($ms^{-1.75}$)

		Partial eVDV		
Event / ID	**Total eVDV**	**Radial**	**Transverse**	**Vertical**
T1N	0.02	0.016	**0.021**	0.013
T2N	0.02	0.018	**0.020**	0.018
T3N	0.05	0.028	0.029	**0.052**
T4N	0.02	0.018	**0.019**	0.015
T5N	0.04	**0.030**	0.027	0.029
T6N	0.02	0.014	0.011	**0.016**
T7N	0.03	0.025	**0.028**	0.020
T8N	0.03	0.021	0.020	**0.021**

4.4 Assessment of Monitoring Results

The monitoring results presented in **Section 2.3** indicate the range of existing vibration impacts does not differ significantly for laden and unladen rail pass-by events. Vibration dose values associated with unladen train pass-by events were typically greatest in the transverse axis. The greater RMS acceleration and eVDV results presented for pass-by event T3N should be interpreted with caution as a large shudder was reported by the operator as the last wagon of the train passed the monitoring location. The reported vibration exposure for this event is likely to be more representative of a worst case impact associated with a damaged wagon than a typical exposure level. Measured PPV values associated with this event were in the order of 0.5 mm/s in the vertical axis. This impact is well below the vibration damage criteria for all building types presented in **Section 3.2**.

Background vibration levels were well below that of rail pass-by events and could not be attributed to any obvious industrial or transportation source.

5. ASSESSMENT OF POTENTIAL VIBRATION IMPACTS

5.1 Blasting Overpressure and Vibration Impacts

Preliminary geotechnical investigations undertaken by Pacific National indicate areas exist within the proposed development site that requires blasting to enable final site levels to be achieved. Blasting will be required to excavate approximately:

- 40,000m^3 of rock between chainages 211250 and 211650; and
- 10,000m^3 of rock between chainages 213250 and 213450.

The location of the proposed blasting areas is provided in **Figure 6**. Minimum separation distances between the proposed blast area and sensitive receivers or critical infrastructure are provided in **Table 7**.

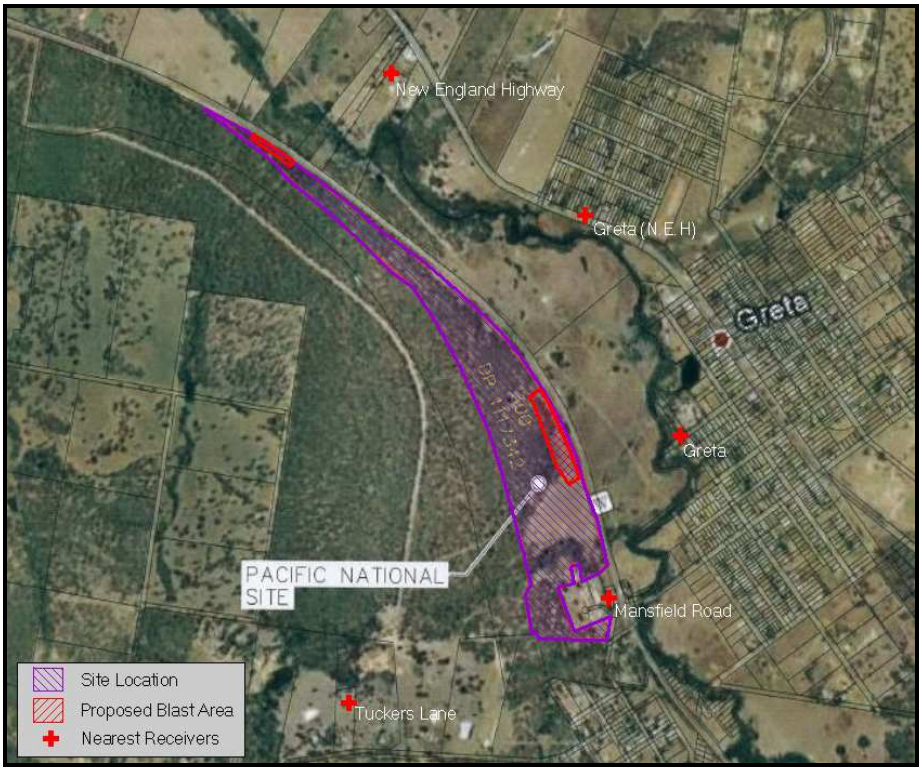


Figure 6: Areas subject to blasting

Table 7: Seperation distances between receivers and blast area

Receiver	Separation Distance (R), metres
Greta (nearest resident)	445
Mansfield Road (nearest resident)	390
Tuckers Lane	1360
North Rothbury	2050
Branxton	1690
New England Highway (nearest resident)	540
New England Highway (Greta)	730
Northern Rail Infrastructure (existing)	8

5.2 Preliminary Blast Design

Review of preliminary blast design has been undertaken for the purposes of understanding potential overpressure and ground vibration impacts. It should be noted information available at the time of the assessment is preliminary, and subject to minor adjustment following initial blast trials until such time as impacts associated with site specific characteristics are understood. Details relating to proposed blast design are provided in **Table 8**.

Table 8: Preliminary blast design

Blast Characteristic	Data
Number of Blastholes	30
Blasthole Diameter	89 to 102 mm
Blasthole Depth	2.5 to 4.0 m
Blasthole per Delay	1
Charge per Blasthole (Q)	4 to 6 kg

It is proposed that blasting would be undertaken every second day for approximately 3 months to excavate the estimated 50,000 m^3 of rock. Blasts would be undertaken between 9am and 5pm however timing would vary depending on the proximity to the Northern Railway and train schedules.

5.3 Assessment of Overpressure Impacts

5.3.1 Estimating Overpressure Levels

Appendix J7 of *AS2187.2-2006 Explosives – Storage and use. Part 2: Use of explosives* provides the following method for evaluating potential airblast overpressure levels:

$$P = K_a \left(\frac{R}{Q^{1/3}} \right)^a$$

Where: P is air pressure (Pa);
R is the distance between charge and point of measurement (m);
Q is maximum instantaneous charge (charge mass per delay) (kg);
K_a,is the site constant; and
a is the site exponent.

Additional detail contained in Clause J7.3 of AS2187.2:2006 provides the following values for the site constant and site exponent for confined blasthole charges:

K_a = range between 10 to 100;
A = -1.45

In lieu of further advice in AS2187.2-2006 relating to the application of site constants, the blast model was validated using data published in existing blast assessments that implement this methodology. The validated model applies a value of 10 for the site constant (K_a).

Equation J5.1 in AS2187.2:2006 allows for the expression of overpressure impacts in decibels:

$$SPL = 10 \times \log_{10}\left(\frac{P}{P_0}\right)^2$$

Where: P is estimated overpressure level (μPa); and
P_0 is the reference pressure of 20 μPa.

5.3.2 Assessment of Overpressure Impacts

A summary of assessed blast overpressure impacts is presented in **Table 10**. The results indicate that, based on observed separation distances, airblast overpressure levels are unlikely to exceed the human annoyance criteria presented in the ANZEC guideline at adjacent sensitive receivers. It should be noted the assessment applies minimum separation distances and hence presents a conservative assessment of potential impacts. **Figure 7** shows the area likely to experience overpressure impacts exceeding 115 dB(Lin).

Table 9: Assessment of blast impacts

Receiver (nearest resident)	Separation Distance (m)	Criteria	Airblast Overpressure (dB(Lin))
Greta	445	< 115dB(Lin) 95% of blasts	105
Mansfield Road	390		106
Tuckers Lane	1360		91
North Rothbury	2050	Should not exceed 120dB(Lin) at any time	86
Branxton	1690		88
New England Highway	540		102
New England Highway (Greta)	730		98

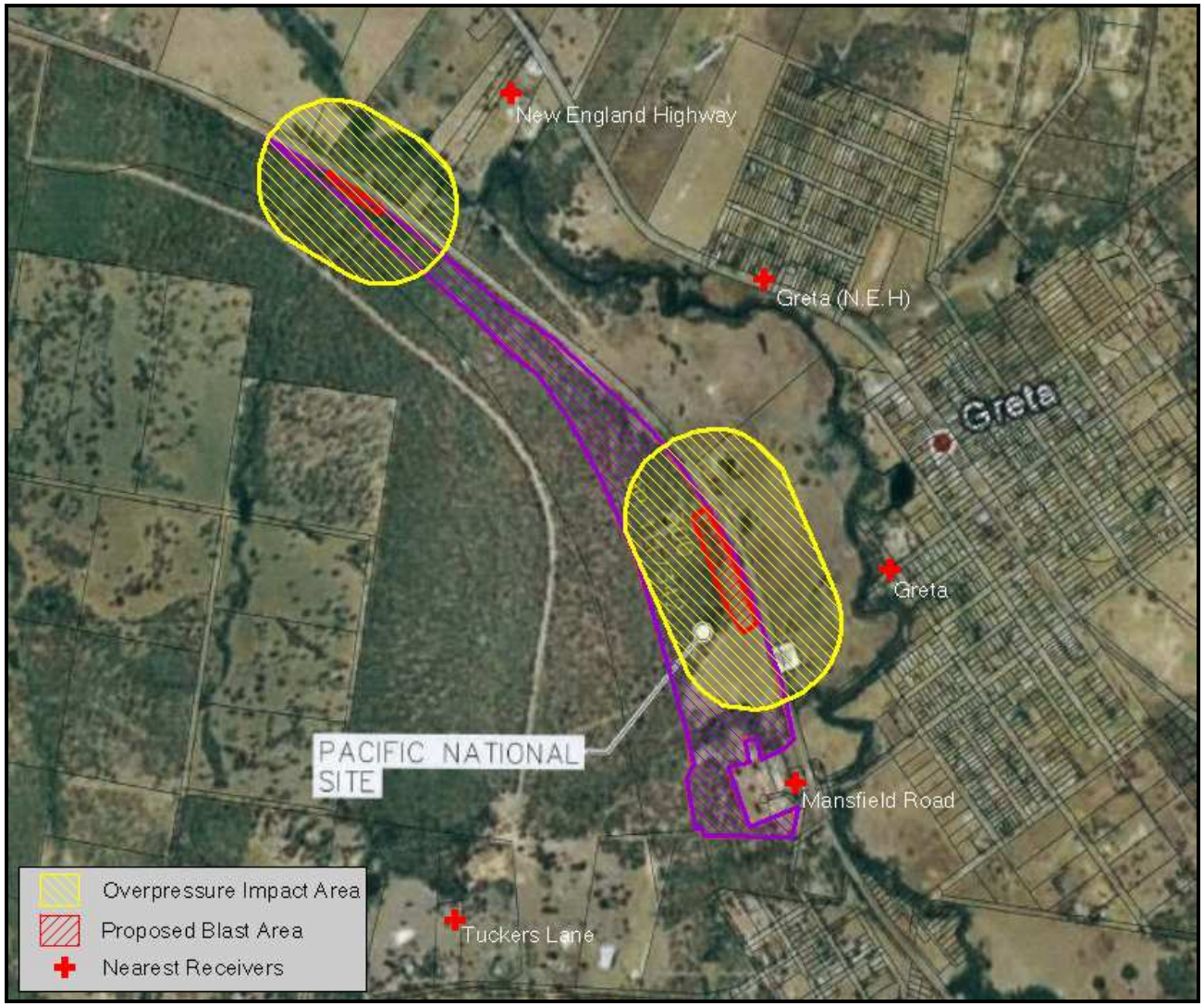


Figure 7: Blast overpressure impacts

5.4 Estimating Ground Vibration Impact

Appendix J7 of *AS2187.2-2006 Explosives – Storage and use. Part 2: Use of explosives* provides the following method for evaluating potential ground vibration levels:

$$V = K_g \left(\frac{R}{Q^{1/2}} \right)^{-B}$$

Where: V is ground vibration as vector peak particle velocity (mm/s);
R is the distance between charge and point of measurement (m);
Q is maximum instantaneous charge (charge mass per delay) (kg); and
K_g, B are constants related to site and rock properties for estimation purposes.

Discussion presented in Clause J7.3 of AS2187.2:2006 states that, in the absence of site specific constants the following values may be used to estimate vibration levels (50% probability of exceedence) in average conditions:

K_g = 1140
B = -1.6

In the absence of detailed understanding of site specific vibration propagation characteristics, the constants for average conditions are applied to this assessment.

5.4.1 Assessment of Blast Impacts

A summary of assessed blast impacts is presented in **Table 10.** The results indicate that, based on the observed separation distances, ground vibration levels are unlikely to exceed human annoyance or structural damage criteria at sensitive receivers adjacent to the blast site. Ground vibration levels may exceed the structural damage criterion established in DIN 4150-3: 1999, however consultation with ARTC to determine an acceptable impact criterion should be undertaken prior to commencement of construction works. Detailed blast designs would then be undertaken to ensure compliance with this criterion.

Table 10: Assessment of blast impacts

Receiver (nearest resident)	Separation Distance (m)	Criteria		Ground Vibration (mm/s)
		Annoyance	Structural Damage	
Greta	445	PPV < 5mm/s 95% of blasts PPV should not exceed 10mm/s at any time	>15mm/s	0.28
Mansfield Road	390			0.34
Tuckers Lane	1360			0.05
North Rothbury	2050			0.02
Branxton	1690			0.03
New England Highway	540			0.20
NEH (Greta)	730			0.13
Northern Rail Infrastructure	8		80mm/s	124

5.4.2 Mitigation of Blast Impacts

While the assessment indicates blasting activities are likely to comply with the relevant criteria, impacts may be perceived by sensitive receivers adjacent to the site. AS2187.2-2006 provides guidance on methods to manage blasting in such a way as to minimise ground vibration and overpressure impacts, including:

- reducing the maximum instantaneous charge;
- using appropriate delays;
- establishing blast times in accordance with prevailing meteorological conditions;
- keeping face heights to a practical minimum;
- optimising blast design;
- ensuring stemming types and lengths are adequate; and
- orienting blasts away from receivers (where possible).

It is also recommended a the construction contractor prepare a Blast Management Plan, and include provisions for:

- monitoring overpressure and ground vibration;
- feedback loops to modify blast design where monitoring indicates impacts are above the criteria; and
- receiving, investigating and responding to complaints.

5.5 Construction Plant Vibration Impacts

Due to the transient nature of the impact and the difficulty in evaluating a vibration dose for an activity that may vary significantly with time, the assessment focuses on reviewing potential impacts against the structural damage criteria. The US Federal Transit Administration guideline *Transit Noise and Vibration Impact Assessment* (1995) provides a methodology for the assessment of potential construction related vibration impacts. The FTA guideline recommends the following model for the evaluation of vibration impacts generated by construction activities:

$$PPV = PPV_{plant} \times \left[\frac{D_{ref}}{D_{sep}} \right]^{1.5}$$

Where: PPV is the Peak Particle Velocity at distance D_{sep} from the source;
PPV_{plant} is the reference PPV for a particular item of plant at reference distance $D_{ref;}$
D_{ref} is the reference distance.

Typical vibration levels generated by items of construction plant are sourced from the FTA guideline (2006) and the NSW RTA Environmental Noise Management Manual (2001). The typical range of vibration levels for common construction plant presented in these documents are reproduced in **Table 11**.

Table 11: Typical vibration levels for common construction activities

Construction Equipment	Peak Particle Velocity (mm/s)
FTA Guideline (reference distance = 7.6m [25 feet])	
Piling (impact)	16 to 39
Piling (sonic)	4 to 18
Vibratory Roller	5
Large Dozer	2
Drilling	2.5
Loaded Truck	2
Jackhammer	1
Environmental Noise Management Manual (reference distance 10m)	
Piling	12-30
Loader Breaking Kerb	6 to 8
15 Tonne Compactor	7 to 8
7 Tonne Compactor	5 to 7
Roller	5 to 6
Pavement Breaker	4.5 to 6
Dozer	2.5 to 4
Backhoe	1
Jackhammer	0.5

5.5.1 Construction Activities

It is estimated that the construction works associated with the proposed development will take 12 to 14 months. Detailed information relating to the construction program is not available at this stage of the design process however the following summary of works is provided:

- vegetation clearance and major earthworks;
- establishment of rail sidings and turnouts from Main Northern Railway;
- construction of buildings, tank farm and ancillary infrastructure;
- construction of internal roadways; and
- commissioning of site infrastructure.

Major earthworks and establishment of final site levels are identified as the major source of construction vibration impact given the potential requirement for rock breaking equipment and the significant volume of material to be cut. It is anticipated that cut material will be transported within the site only where it is required for use as fill or for construction of a noise barrier adjacent to sensitive receivers at the southern end of the site.

While it is acknowledged that the entire construction program is anticipated to last approximately 12 to 14 months, individual stages within the project will occur over shorter durations and are likely to be mobile in nature. For the purposes of this assessment construction works are considered in terms of two major components:

- **Phase 1**: Major earthworks and establishment of final levels; and
- **Phase 2**: Establishment of rail sidings, site infrastructure and ancillary services.

Phase 1 activities that may generate vibration impacts at receivers at the southern end of the site include rock breaking and construction of the noise barrier. Items of plant that may generate vibration impacts during this phase of the construction works include rock breaking equipment across the site and trucks and dozers used to emplace material and shape the noise barrier.

Phase 2 activities that may generate vibration impacts at receivers at the southern end of the site include construction of the internal roadway. Items of plant that may generate vibration impacts during this phase of the construction works include truck movements and the use of rollers to finish the road surface.

At the time of the assessment it was understood that blasting would not be undertaken as part of the construction phase of the development.

5.5.2 Assessment of Construction Vibration Impacts

The worst case vibration impacts during the construction stage of the development are likely to occur during construction of the noise barrier and internal roadway. During this stage of the development the separation distances between construction plant and privately owned structures is likely to be in the order of 20 metres.

At the time of this assessment any requirement for the use of rock breaking equipment during this phase of the construction works was unknown, however impacts associated with this item of plant represent the potential worst case vibration impact at these receivers. The equation presented in **Section 5.2** was used to predict PPV levels at receivers assuming a separation distance of 20 metres.

This analysis assumes vibration levels generated by rock breaking equipment are consistent with those provided for kerb breaking operations provided in **Table 11**. The results of the assessment are presented in **Table 12**. The results of this assessment indicate predicted PPV impacts fall below the structural damage criteria presented in **Section 3.2** for all building types.

Table 12: Modelled construction vibration impacts

Construction Plant	PPV at 10m (mm/s)	PPV Vibration Level at Receiver(mm/s)
Rock Breaking (kerb breaking)	8	2.8
Dozer	4	1.4
Truck	2	0.7
Roller	6	2.1

5.5.3 Mitigation of Construction Vibration Impacts

While the assessment of construction vibration levels indicates that impacts are unlikely to exceed the structural damage criteria, construction works in close proximity to sensitive receivers at the south of the site may be perceptible to persons in this area. The *Interim Construction Noise Guideline* (DECC, 2009) identifies noise and vibration control practices that may be applied to minimise construction related impacts on the community. Examples of strategies and work practices that may be relevant management of potential vibration impacts include:

- Universal Work Practices:
  - ensure employees and contractors are appropriately trained in the use of equipment in ways to minimise generation of noise and vibration;
  - ensure site managers regularly check the site and nearby residences for problems such that solutions can be quickly applied.
- Consultation and Notification:
  - provide information to neighbours before and during construction;
  - maintain good communication between the community and project staff;
  - provide a contact telephone number for community enquiries during the works; and
  - have a documented complaints handling process, including a register of received complaints, actions and resolutions.
- Plant and Equipment:
  - ensure the correct plant is used for the purpose; and
  - ensure equipment is maintained in good working order.
- Work Scheduling:
  - schedule potentially high impact activities during less sensitive periods and provide periods of respite. An example of such scheduling may be to undertake high impact activities only between 9am to 12pm and 2pm to 5pm.
- At Residences:
  - undertake building condition surveys at potentially impacted dwellings prior to commencement of vibration generating works to provide a reference against which impacts may be assessed.

5.6 Operational Vibration Impacts

Section 4.6 of the DEC (2006) guideline identifies the difficulties in the prediction of vibration impacts due to the level of uncertainty that generally exists in the propagation medium. The guideline references the US Federal Transit Administration guideline *Transit Noise and Vibration Impact Assessment* (1995) as an appropriate methodology on which to base an assessment of potential vibration impacts. This document provides a staged approach to the assessment of vibration impacts:

- screening procedure;
- general assessment; and
- detailed analysis.

5.6.1 Screening Assessment

The procedure provides screening distances within which vibration associated with various activities have potential to generate vibration impacts. Table 9-2 of the screening procedure indicates the critical separation distance between residential receiver types and conventional railroad activities is on the order of 60 metres (200 feet).

The nearest residential receivers are located to the south of the TSF adjacent to the site access on Mansfield Street, Illalong. These receivers are located approximately 150 metres south of the junction of the Main Northern Railway and the arrival track for the TSF. This is the point at which the boundary between vibration impacts associated with the TSF and existing rail sources is defined.

While the screening level assessment indicates vibration impacts are unlikely to occur at receivers more than 60 metres from the vibration source, potential impacts on the Mansfield Street receivers are assessed in accordance with the General Assessment methodology presented in Chapter 10 of the *Transit Noise and Vibration Impact Assessment* (1995) guideline. Where it can be demonstrated that vibration impacts at the Mansfield Street receivers are acceptable, it is assumed that impacts at all other receivers more distant from the TSF are also likely to be acceptable.

5.6.2 General Assessment

The assessment presents a generalised model for the prediction of rail induced vibration impacts as a function of distance from the centreline of the track. The prediction curve for the locomotive powered freight and passenger trains is provided in Figure 10-1 of the FTA guideline, reproduced in **Figure 8**.

A trend line was fitted to this curve and the resulting equation used as a means of extrapolating the curve to evaluate vibration impacts at distances exceeding 100 metres. Validation of this model was undertaken by evaluating the impact at a distance 22 metres from the track centreline (the distance at which background monitoring was undertaken) and applying a correction to ensure the impact prediction was consistent with measured vibration magnitudes.

Comparison of modelled and measured impacts revealed that the FTA prediction curve presented an over-estimate of vibration impacts at the Greta site. As such, the model was corrected such that predicted impacts were representative of the higher end of the range of measured vibration magnitudes in order to present a conservative assessment.

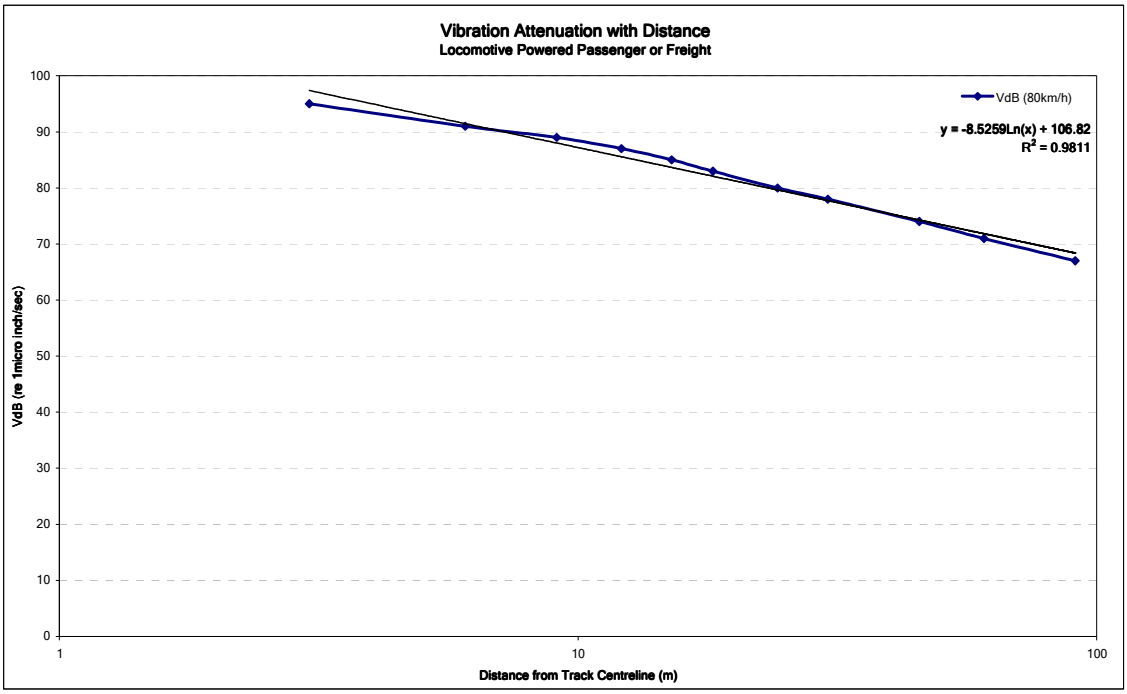


Figure 8: FTA impact prediction curve for locomotive powered rail vehicles

The curve presented in **Figure 8** was used to evaluate potential vibration impacts at residential receivers to the south of the TSF. Corrections were applied to the base curve in accordance with the methodology presented in Section 10.3 of the FTA guideline and parameters provided in **Table 13**.

Table 13: Modelling parameters and corrections to predicted impacts

Parameter	Variable	Correction	Reference
Vehicle Speed	45km/h	-5 VdB	Table 10-1
Vehicle Parameters	Worn Wheels	0 VdB	Table 10-1
Track Conditions	Special Trackwork	+10 VdB	Table 10-1

The adjustment for special trackwork relates to potential impacts generated as vehicles pass through junctions and turnouts with gaps or uneven joins in the rail. It is considered this impact may present where trains enter the TSF from the main line. The FTA guideline states that impacts associated with this variable are less significant at distant receivers, however a +10VdB correction is applied in order to conservatively assess potential impacts. No correction was applied for additional vibration generated by worn wheels as these impacts will be common to both the main rail corridor and the TSF and are considered to be represented in the existing vibration impacts presented in **Section 4**.

The impact predictions for the proposed development are presented in **Table 14**.

Table 14: Modelled vibration impacts

	Separation Distance (m)	Energy Average RMS Vibration Magnitude (ms^{-2})[1]
Measured Impact	22	0.0038 - 0.0117
Modelled Impact[2]	22	0.0116
	150	0.0031

Note 1. RMS acceleration values are calculated using the methodology presented in Section 3.3 and assumes a dominant frequency of 30Hz.

Note 2. Modelled impact is based on prediction curve adjusted to be representative of measured impacts.

5.6.3 Assessment of Impacts against Criteria for Intermittent Vibration

The results indicate that vibration impacts at residential receivers generated by trains entering the TSF are significantly lower than those generated by trains passing on the Main Northern Railway. **Table 15** presents the estimated vibration dose for receivers adjacent to the TSF based on the modelled vibration magnitude (RMS ms^{-2}) for trains entering the site.

Table 15: Modelled eVDV impact at residential receivers (ms^{-175})

Vibration Impact		Period	Pass-by Events	Period eVDV	Criteria
RMS Acceleration (ms^{-2})	0.0031	Day	16	0.032	0.2
Single Event eVDV[1]	0.016	Night	9	0.028	0.13

Note 1. eVDV value is presented for a single pass-by event using the methodology presented in Section 3.3 and assumes a pass-by time of 180 seconds

The results presented in **Table 15** are based on Stage 3 operations at the TSF and assumes the arrival of trains at the facility is equally distributed between the day and night assessment periods. The results indicate the predicted impact is below the vibration dose criteria for both the day and night periods. As the predicted vibration impact is compliant with the criteria at the nearest sensitive receiver, it is also considered to comply with the criteria at more distant receivers.

5.6.4 Assessment of Impacts against Criteria for Structural Damage

No detailed assessment of potential vibration damage to buildings was undertaken as monitoring data indicates PPV values generated by existing rail impacts on the Main Northern Railway are well below the damage criteria at separation distances exceeding 20 metres. Minimum separation distances between sources of vibration associated within the TSF and structures on adjacent properties are in the order of 170 metres. Assuming the intervening ground types are the same, the potential for vibration induced damage to structures is considered negligible.

6. CONCLUSION

Pacific National proposes to construct and operate a maintenance facility at Greta to provide support to its coal haulage business in the Hunter Valley. The site is located between the existing Main Northern Railway and the approved Hunter Expressway extension to Branxton. The purpose of this assessment was to undertake detailed assessment of potential vibration impacts associated with the construction and operation of the facility.

The results of background vibration monitoring indicate estimated vibration dose values associated with the passage of trains on the Main Northern Railway are on the order of 0.02 to 0.05 $ms^{-1.75}$. The maximum peak particle velocity result associated with train a pass-by event was 0.5 mm/s.

These results were used to calibrate the vibration impact prediction curve for locomotive powered freight and passenger rail impacts provided by the US Federal Transit Authority. Additional corrections were applied to this curve to account for lower speeds and special track work encountered as trains enter the TSF. The results of this model that receivers 150 metres to the south of the arrival track may experience eVDV on the order of 0.03 $ms^{-1.75}$, well below the 0.13 $ms^{-1.75}$ criteria for the night period. These results indicate TSF operations would comply with the criteria for both human comfort and annoyance and structural damage to buildings.

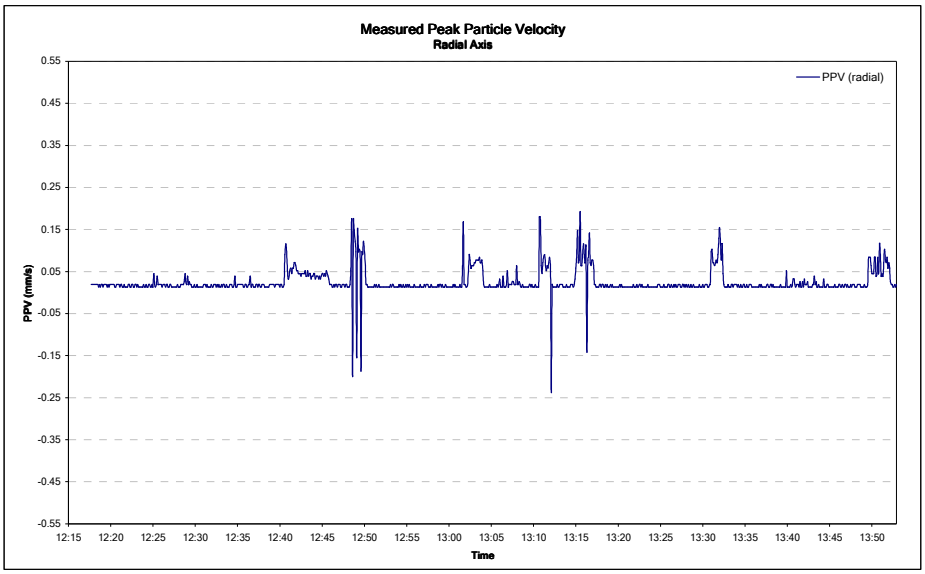
Due to the transient nature of the impact and the difficulty in evaluating a vibration dose for an activity that may vary significantly with time, assessment of potential construction vibration impacts focus on the structural damage criteria. In lieu of a published Australian Standard or guideline for this impact, assessment was undertaken against the building damage criteria presented in the US FTA guideline *Transit Noise and Vibration Impact Assessment* (1995). Analysis presented in **Section 5.2** indicates that construction vibration impacts will comply with the structural damage criteria for all building types at separation distances exceeding 20 metres.

Assessment of potential blast impacts was undertaken against the ANZEC guideline for human annoyance and BS7385-2 for damage to structures. While these results indicate overpressure and ground vibration impacts induced by blasting are likely to be well below the criteria, it is recommended a Blast Management Plan be developed to monitor impacts at receivers and allow for modification to blast designs as required.

Although considered compliant with the structural damage criteria, construction vibration impacts may remain perceptible by members of the community near to construction works. A range of potential mitigation measures outlined in the *Interim Construction Noise Guideline* (DECC, 2009) and AS2187.2-2006 *Explosives – Storage and use Part 2: Use of Explosives* may be applied to minimise vibration impacts and manage the response where impacts are perceptible by the community.

Appendix I

Vibration Monitoring: Logger Results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PPV (radial)
PPV (mm/s)
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0.25
0.15
0.05
-0.05
-0.15
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-0.45
-0.55
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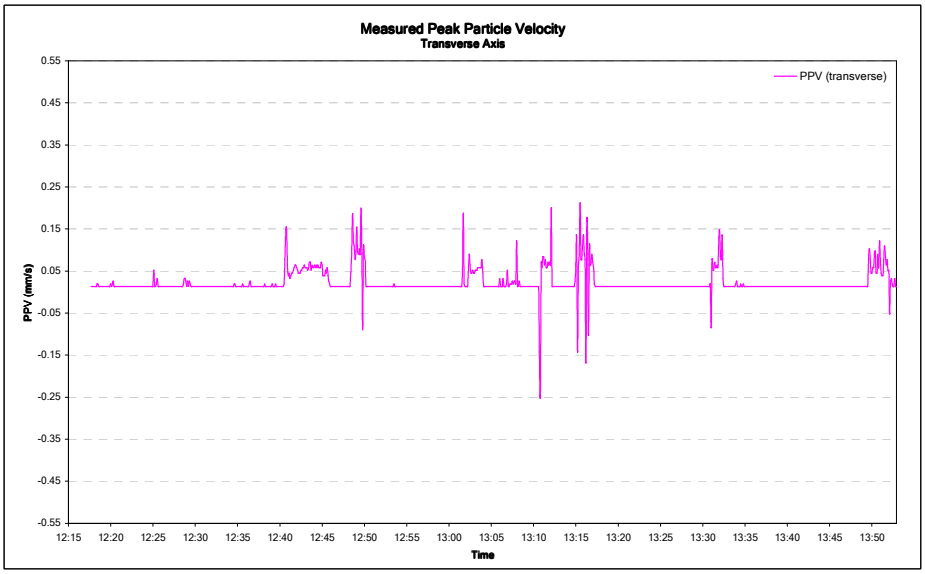
Time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Transverse Axis
PPV (transverse)
PPV (mm/s)
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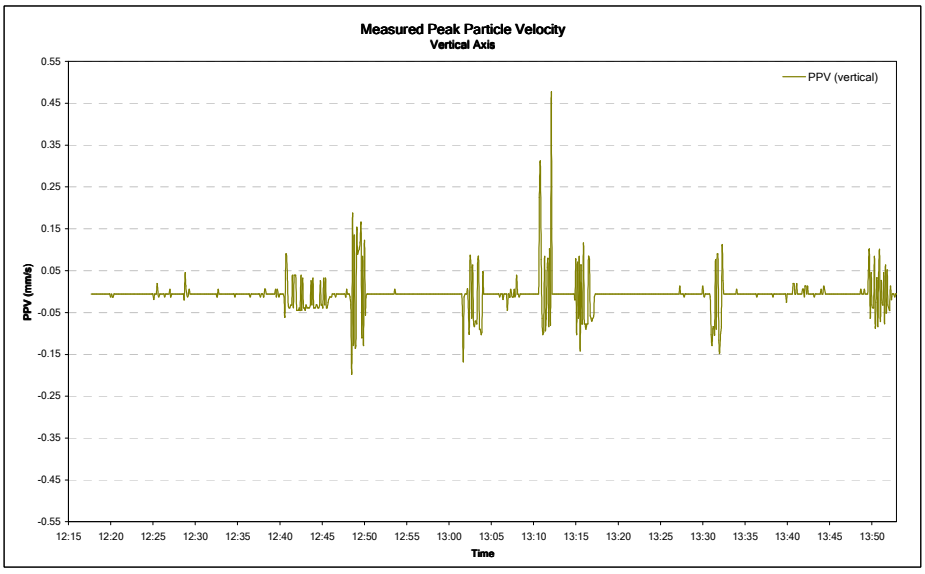
Time


Measured Peak Particle Velocity
Vertical Axis
PPV (vertical)
PPV (mm/s)
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0.05
-0.05
-0.15
-0.25
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-0.45
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Time

6.8 HISTORICAL EUROPEAN HERITAGE ASSESSMENT

6.8.1 Supplementary Report – Response to Submission of the Heritage Department

Archaeology & Heritage maim Pty Ltd

SUPPLEMENTARY REPORT

RESPONSE TO SUBMISSION OF THE HERITAGE BRANCH, NSW DEPARTMENT OF PLANNING: Greta TSF Precinct

TABLE OF CONTENTS

1.0 INTRODUCTION

This further report addresses submissions raised by the Heritage Branch (the Branch) of the NSW Department of Planning (the Department), to the report by Maxim Archaeology & Heritage Pty Ltd (Maxim) of the further field research of the study area. The study area was:

- a parcel of land running along the western side of the main northern railway line in a north westerly direction from Greta railway station and bounded to the west by the proposed route of the F3 Freeway to Branxton; and
- more particularly described in the report.

A surface survey was reported in a document prepared by Sinclair Knight Merz Pty Ltd (SKM)[1]. In subsequent discussions between representatives of Pacific National (the Principal), SKM and the Branch/Department, a methodology was agreed for the further investigation of the study area.

The Branch made five submissions arising out of either the further report or the consideration of broader historical heritage issues. The first four of these submissions relate to the further report and are dealt with individually in **Section 2** of this report, by way of discussion, explanation and distinction. The final two submissions related to matters outside the scope of the agreed methodology and are dealt with in **Sections 3 and 4**.

2.0 SUBMISSIONS 1 – 3

For convenience, I have transcribed a copy of the submissions of the Branch and I therefore address its relevant submissions serially as follows:

2.1 Submission: Extent of Study

1.	Addendum by Maxim Archaeology & Heritage to Appendix J-	The additional archaeological fieldwork undertaken by Maxim, whilst helping to clarify the existence of Miners huts in the general location of the 1873 historic map, is not considered to be adequately detailed to provide answers to the research questions or to be used as comparative material against other mining occupation sites. Of the 11 huts identified in the 1873 map of the site, only four locations were archaeologically tested. Two revealed no evidence of the Miners cottages and two revealed substantial evidence to support that the cottages on the 1873 plan existed (albeit slightly to the east of the location of the map) and that miners were living in them. To draw any conclusions on the nature of the archaeology in regards to its ability to contribute to information about how miners lived or its ability to be used as a comparative example with other similar sites, based on this 50/50 result is premature. Additional excavation is required to confirm the answers put forward to the research questions, which at this stage, are supposition. All the remaining locations of the huts (with the exception of MH 2 & MH 3 which can not be tested due to vegetation issues)- MH1, MH4, MH 7, MH 8 and MH9 need to be archaeologically tested before works begin. This is of the **utmost importance** to determine the nature of the remaining archaeological resource at this site and to allow it to be fully recorded prior to the project being approved.

[1] SKM, 2010.

'…***is not considered adequately detailed to provide answers to the research questions***…'

The Branch will be aware that the research questions addressed in my report were developed by SKM specifically in connection with the concurrent development of a formal methodology that was, as I understand, after considerable discussion with the Department of Planning and the Branch, and refinement in accordance with the Department and Branch, AGREED as an appropriate methodology. That is to say, it was agreed in expectancy that the results of this particular investigation, pursuant to the methodology, would address the research questions. It is therefore inappropriate for the Branch to now suggest otherwise. The fact that the investigation did not yield results of broad constructive value is surely one of the hazards of sub-surface archaeological study.

'…***or to be used as comparative material against other mining occupation sites***…'

At surface level, it must be said that the study area displayed substantial resemblance to many sites of early miners residential areas: that is to say, there were no overt signs that the study area had been occupied for residential purposes. In this regard, the study area compared favorably with my experience of similar sites elsewhere in the South Maitland coalfield (eg: Hebburn Village site near Hebburn No 1, where all surface and sub-surface material evidence had been removed). At sub-surface level, there is no doubt that the study pursuant to the agreed methodology has provided little material evidence for comparison, although my sub-surface study of land at Thornton, adjacent to the Woodford, later Thornley Colliery, in exposing a sub-surface that was virtually devoid of *structural* material evidence, identified some *occupationa*l evidence apart from artefacts:

- the base of a hearth at the indicated site of the under-manager's hut. More or less concurrent with the presumed developments on the study area, the hearth site included residual post holes, suggesting a timber-framed, iron-clad chimney; and

- an extensive brick-paved apron with dwarf brick footing of a presumed verandah. No footings were located for the dwelling, located in the area of the former mine manager's dwelling.

I can say positively that none of the features of the study area related to the Farthing family residence. The family's first of which was located between Bell and Cuthbert Streets Illalong and the second on land purchased in Mrs Farthing's name, fronting Cessnock Road approximately 4km south of Greta Railway Station.

This response is not so much a report as a response and the above material and much other will be dealt with in greater detail in the final report of all studies at the site. The observations are mentioned here merely to highlight the fact that the study to date has produced material that provides a comparator with other mining occupation sites. The Branch (and Department) should appreciate that my further report was, and expressed itself to be, a Preliminary Report, submitted principally to confirm the execution of a study scrupulously in compliance with the *agreed methodology*.

…only four locations were tested…Additional excavation is required to confirm the answers put forward to the research questions, which at this stage are supposition…

The fact that 'only four' locations were tested was of course predicated by the *agreed methodology*. As I understand the situation, this methodology was determined as one proper to appropriately test the sub-surface archaeology of the study area and has, indeed, provided answers to the research questions. To say that these answers are supposition begs the question of whether archaeology can ever be expected to provide absolute answers to research questions: there is always a substantial element of interpretation in the assessment of results. The suggestion that further excavation would not be warranted, was a value judgment made on the ground, in the light of:

- the limited results of the test excavation pursuant to the *agreed methodology*,

- the surface evidence and knowledge of the modifications of the surface that had already been made between MH7 and MH9,
- the vegetation cover west of MH5, and
- the anticipation that further excavation would not provide any more compelling or informative material evidence than was already in hand.

Nonetheless, in the light of this submission by the Branch and earlier to the EA, this issue is given further attention in **Section 4**.

2.2 Submission: p12/1

Addendum by Maxim Archaeology & Heritage to Appendix J- page 12.

The conclusions reached in the Maxim Archaeology report regarding the Research Question – 'Is there any evidence to support hypothesis that occupation was by German Miners', are **suppositions at best**. Wolff's Aromatic Schnapps bottles are commonly found on historical archaeological sites and their presence in no way signifies occupation by German individuals. This alcohol was readily available and popular as a patent medicine in the nineteenth century. Furthermore, using the fact that no remains of clay pipes were found during their limited excavation to suppose that it could mean that Germans were present smoking briar pipes is unreasonable based on the evidence (or lack thereof).

Again the point is made that this report was a preliminary, for the purpose of demonstrating compliance with the *agreed* methodology and providing raw results with some early responses, while foreshadowing a more detailed following report. The 'Discussion' section of the report commences:

> **Discussion of the results of the strategic sub-surface study of the study area must be preliminary at this stage pending the completion of artefact management.**

The research question in point was actually in three parts, reproduced below:

> **Who lived here? Is there any evidence to support hypothesis that occupation was by miners? Or even German miners?**

The first question was a leader, to be extrapolated by the two following questions and the answer given was as follows:

> **Miners lived in two of the huts identified and there is some evidence to suggest they may have been of German origin**.

There are two propositions here. The first is a conclusion: that miners lived in the two huts. The second is a mere suggestion and certainly not a conclusion. It is possible that the presence of schnapps bottles carried some additional significance as is the absence of fragments of clay pipes.

In further distinction, this was not a 'limited excavation': the first stage of the test excavation opened a total slightly in excess of 5,000 square metres, exposing a broad scatter of broken glass, ceramic and animal bone, some evidence of rubbish disposal, but not one identifiable fragment of clay pipe, usually ubiquitous across worker occupation sites. However, at no stage of the report has the evidence relating to schnapps consumption or the absence of clay pipes been expressed as more than possible/probable evidence of the German origin of some miners, and was not expressed as a conclusion.

2.3 Submission: p12/2

Addendum by Maxim Archaeology & Heritage to Appendix J- page 12.	Answer to the research question: 'If, so are we able to determine the type of nature of construction? Are there any structural remains'? The answer to this question is listed as 'No'. However, the remains of the fireplace footing at MH11-E and the door sill and brick doorway apron at MH5-E is conclusive evidence that there are structural remains left at this site. Therefore, the answer of 'no', listed above is **incorrect and should be revised.**

The thrust of the research question to which this submission relates appears to have been misunderstood. The research question followed upon the preceding question:

Is there any material evidence for domestic occupation in the eastern part of the project area?

To which the (correct) response was affirmative, based on the identification of the fireplace footing and the door sill and brick apron (associated with artefact evidence of occupation).

The text of the research question then was as follows:

If so, are we able to determine the type of nature of construction? Are there any structural remains?

Again, the first question of this pair is a leader, relying on the second question to provide a specific direction for inquiry. As a single question, the proposition might have been framed:

Are there any structural remains that assist in determining the type and nature of construction?

In this context the negative response is absolutely correct. While the fireplace footing and door sill and apron are structural, they do not give any indication of the type and nature of construction. In order to provide a positive answer to the research questions, it would have been necessary to expose and identify, for example, residual postholes, timber or brick perimeter residues, fallen structural material (in excess of chimney bricks at M11-E) or conclusive evidence that defined the structural form and/or style and/or plan.

3.0 SIGNIFICANCE, CONDITION, INTEGRITY

The assessment by SKM pointed generally to an assessment of the study area potential as possessing a local level of cultural significance, at no better than representative degree. I still generally support this assessment of level and degree of significance although agreeing that it is not based on proper criteria. The *agreed methodology* did not call for a re-appraisal of significance, however to address the concerns of the Branch, the following has been adopted.

In the context of this report, significance is the measure of the value and importance of elements of the archaeological record of the study area to cultural heritage. While the fabric of the archaeological record is the subject of the assessment of heritage significance, the assessment itself is conditioned by the environmental and historical context of the site at the time of the assessment. In this environment, significance can be seen as a variable quality. It follows that the evaluation of heritage significance is not static quality, but rather is evolutionary as a function of changing levels of archaeological/comparative information, community perspectives and cultural values.

The concept of significance derives from:

3.1 ... Australia ICOMOS under the Act

The approach to the assessment of heritage significance affirmed by the NSW Heritage Office adopts as a foundation the four values of the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter). These values are broadly accepted Australia-wide, as ***historical***, ***aesthetic***, ***scientific*** and ***social classifications*** of significance. The implications of these classifications are as follows:

3.1.1 Classification Criteria

The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter) adopts as the foundation of classification the four value types of ***historical***, ***aesthetic***, ***scientific*** and ***social*** significance. The implications of these classifications are as follows:

- ***Historical significance*** considers the evolutionary or associative qualities of an item with aesthetics, science and society, identifying significance in the connection between an item and cultural development and change.

- ***Aesthetic significance*** addresses the scenic and architectural values of an item and/or the creative achievement that it evidences. Thus, an item achieves aesthetic significance if it has visual or sensory appeal and/or landmark qualities and/or creative or technical excellence.

- ***Social significance*** is perhaps the most overtly evolutionary of all classifications in that it rests upon the contemporary community appreciation of the cultural record. Evaluation within this classification depends upon the social spiritual or cultural relationship of the item with a recognisable community.

- ***Scientific significance*** involves the evaluation of an item in technical and/or research terms, considering the archaeological, industrial, educational and/or research potential. Within this classification items have significance value in terms of their ability to contribute to the better understanding of cultural history or environment and their ability to communicate, particularly to a broad audience within a community[2].

3.1.2 Value Criteria

As a component of the holistic concept of significance, archaeological significance has been described as a measure by which a site may contribute knowledge, not available from other sources, to current research themes in historical archaeology and related disciplines[3]. Archaeology is concerned with material evidence and the archaeological record may provide information not available from historical sources. An archaeological study focuses on the identification and interpretation of material evidence to explain how and where people lived, what they did and the events that influenced their lives.

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2 Marquis-Kyle, P and M Walker, *Australia ICOMOS: The Illustrated Burra Charter*. Australia ICOMOS, Sydney, 1992, 21-23.

3 Bickford, A and S Sullivan, 'Assessing the research significance of historic sites', in Sullivan, S and S Bowdler, (eds), *Site Survey and Significance Assessment in Australian Archaeology*, Department of Prehistory, Research School of Pacific Studies, ANU Canberra, 1984 19-26

Considerations material to the study of the archaeology of a relic include:

- whether a site, or the fabric contained within a site, contributes knowledge or has the potential to do so. If it does, the availability of comparative sites and the extent of the historical record should be considered in assessing the strategies that are appropriate for the management of the site.

- the degree and level at which material evidence contributes knowledge in terms of 'current research themes in historical archaeology and related disciplines'.

In relation to 'current research themes in historical archaeology and related disciplines' (see **Section 4.1**), the assessment of cultural significance is conditioned by considerations of historical, scientific, cultural, social, architectural, aesthetic and natural values:

- ***Historical value*** lies at the root of many of the other values by providing a temporal context and continuity, thereby providing an integrating medium for the assessment of social, cultural and archaeological significance.

- ***Scientific value*** depends upon the ability of an item to provide knowledge contributing to research in a particular subject or a range of different subjects.

- ***Cultural value*** attaches to material evidence that embodies or reflects the beliefs, customs and values of a society or a component of a society and/or have the potential to contribute to an understanding of the nature and process of change and its motivation.

- ***Social value*** derives from the way people work(ed) and live(d) and from an ability to understand the nature, process of change and its motivation. Social significance is closely related to cultural significance, in its concern with the practicalities of socio-cultural identification.

- ***Architectural value*** depends on considerations of technical design (architectural style, age, layout, interior design and detail), the personal consideration (ie. the work of a particular architect, engineer, designer or builder) and technical achievement (construction material, construction technique, finish).

- ***Aesthetic value*** addresses the manner in which an item comprises or represents creative achievement, epitomising or challenging accepted concepts or standards.

- ***Natural value*** attaches to items that either support or manifest existing natural processes and/or systems or provide insights into natural processes and/or systems.

3.1.3 Degree Criteria

In order to provide a ready reference to the ***degree of significance*** *or* ***the distinctiveness*** of an item in general terms, the item may be described as being either 'Rare' or 'Representative' within its community/cultural/geographical level.

3.1.4 Level Criteria

The final denominator of significance is the ***level of significance*** of an item. *Level* is nominally assessable in two classifications, depending upon the breadth of its identifiable cultural, community, historical or geographical context. Thus, within a New South Wales context, a relic may be recognised at the:

- ***Local level*** identifies the item as being significant within an identifiable local and/or regional cultural and/or community group and/or historical/geographical heritage context;

- ***State level*** identifies the item as being significant within an identifiable State-wide cultural and/or community group and/or historical/geographical heritage context;

On a broader front, by derivation, a relic may be recognised at the:

- ***National level*** identifies the item as being significant within an identifiable national cultural and/or community group and/or historical/geographical heritage context;

- ***International level*** identifies the item as having implications of significance for an identifiable cultural and/or community group both nationally and abroad and/or a world-wide historical/ geographical heritage context.

By the simple application of the principles outlined above, a subjective element was present in the significance assessment regime that opened the potential for skewed assessment. As a counter to this potential, the NSW Heritage Office has adopted a set of standardised assessment criteria

3.2 ... NSW Heritage Office Standard Criteria

The NSW Heritage Office[4] defined a series of criteria that will be used by the Heritage Council of NSW as an assessment format within NSW. The seven criteria address:

Criterion (a) the importance of an item in the course or pattern of the cultural or natural history of NSW or a local area [ie: *historical*].

Criterion (b) the existence of a strong or special association between an item and the life or works of a person or group of persons important in NSW or local cultural or natural history [ie: *historical*].

Criterion (c) the importance of an item in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW or a local area [ie: *aesthetic*].

Criterion (d) the existence of a strong or special association between an item and the social, cultural or spiritual essence of a particular community or cultural group within NSW or a local area [ie: *social*].

Criterion (e) the potential of an item to provide information that will contribute to an understanding of the cultural or natural history of NSW or a local area [ie: *scientific*].

4 NSW Heritage Office, *Assessing Heritage Signirficance*, NSW Heritage Office, Sydney, 2001, 9.

Criterion (f) the quality of an item to possess uncommon, rare or endangered aspects of the cultural or natural history of NSW or a local area [ie: *rare* degree of significance].

Criterion (g) the demonstration by an item of the principal characteristics of a class of cultural or natural place or cultural or natural environment within NSW or a local area. [ie: *representative* degree of significance].

Within the framework of the same criteria, where this is relevant, the individual contribution of separate elements or components of a relic may be evaluated according to a five-stage grading system, where:

Exceptional indicates that is a rare or outstanding element, contributing directly to the assessment of an item's significance at the appropriate level;

High indicates that an element exhibits an advanced degree of original fabric and is a key element in the assessment of an item's significance at the appropriate level;

Moderate indicates that an element has been modified or has degraded, with limited individual heritage value, but that makes an interpretive contribution in the assessment an item's significance at the appropriate level;

Little indicates that an element has been modified or has degraded to a degree that detracts from the assessment of an item's significance at the appropriate level;

Intrusive indicates that an element is damaging in the assessment of an item's significance at the appropriate level;

3.3 General Statement of the Significance of the Study Area

The study area is significant in its representation of very early worker accommodation in the Greta area, particularly in the relationship between miners and their nearby workplace. The limited material evidence of the study area serves to complement the strong representation provided by the historical survey of the area, whether or not the location of 'miner's cottages' was drawn with survey rigour or (as appears quite possible) by a later annotation.

The location of accommodation for miners in close proximity to their place of employment was a common feature in the developing major coalfields of New South Wales. The availability of labour was a pre-requisite for mining development at an industrial level. In the Newcastle area, this was reflected earliest by transport of crown prisoners to the Coal River and as the mining radiated under the Australian Agricultural Co and thereafter at the mines of the Newcastle-Wallsend Coal Co, Eales and Christie, J & A Brown and at Burwood, then down along the Fernleigh Railway line to Belmont through Redhead. The westerly extension of industrialisation was associated with the development of the Great Northern Railway and urban development accompanied mines in the Thornton area, West Maitland and Greta. The southerly development followed a similar pattern onto the South Maitland field proper. In this environment, the establishment of a small residential enclave at Greta was symptomatic of the expansion of urban settlement in the lower Hunter River Valley – not rare but representative.

The layout of the town of Greta was surveyed, along with a host of other small potential settlements, in 1842: most of these proposed towns never developed and, indeed, Greta did not develop until after the opening of the Anvil Creek Mine in 1874. Prior to that time, it can be appreciated that

accommodation was both ephemeral and irregular, as is represented by the historical plan and generally complemented by the study area archaeology. Within the framework, the results of the study at MH11-E and MH5-E, although limited in the material evidence they contained, are assessed as making a contribution to the heritage values of the study area at a moderate level, at least.

In the light of all of the above, the significance of the study area warrants assessment at the local level to a representative degree, where the locality is defined as the Newcastle/Lake Macquarie and South Maitland Coalfields areas.

3.4 Statement of Significance by Criteria

The study area it significant because it:

Criterion (a) [Historical]

- nominally represents one of the attributes of the early stages of expansion of coal mining in the lower Hunter River Valley from the Newcastle basin, in presenting some evidence of:
  - the accommodation of miners close to the mining site;
  - the relationship between primary industrial expansion and the extension of urban settlement;
  - the close relationship between industrial and urban expansion with lines of public transport and communication.

  The material evidence of the study area is limited in its extent and the opportunity it provides for interpretation of close detail, however this material evidence serves to confirm the representation of the early survey of the precinct and the interpretation that can be drawn from this plan.

Criterion (b) [Historical]

- nominally has a relationship with some of the people involved in the operation of early coal mines of the Farthings/Greta locality. While the level of archaeological material evidence is relatively low, it provides persuasive evidence in support of the majority evidence for such a relationship, historical, based on the extant survey plan.

Criterion (c) [Aesthetic]

- does not demonstrate qualifying features under this criterion.

Criterion (d) [Social]

- again, nominally has a relationship with the small community of miners involved in the operation of early coal mines of the Farthings/Greta locality. While the level of archaeological material evidence is relatively low, it provides persuasive evidence in support of the majority evidence for such a relationship, historical, based on the extant survey plan.

Criterion (e) [Scientific]

- is an archaeological site, containing little surface, and limited sub-surface, evidence of its original function but, from an archaeological standpoint, has some potential to yield limited information about the use of the eastern sector of the study area for residence by miners, possibly some insights into the demographic structure of the little community and the lifeways of the occupants.

Criterion (f) [Rarity]

- is not rare at a local level*.

Criterion (g)

- although the level of material evidence is limited, the sparse residual is

[Representative quality] considered representative at the local level*.

* Where the locality is defined as the Newcastle/Lake Macquarie and South Maitland Coalfields.

3.5 Condition and Integrity

This section addresses matters that complement the assessment of significance and assist in the comprehension of the potential of the study area to demonstrate heritage values. *Condition* considers the physical state of the fabric of the resource and its potential for survival. *Integrity* observes the degree to which the residual material evidence is an appropriate representation of the resource in its original form. *Potential Impact* assesses the nature and extent to which the resource will be modified as the result of the projected development.

3.5.1 Condition

The condition of heritage resources and/or individual elements that have been identified above is assessed on a five-stage scale, that is to say:

[i.] *intact*, where the material evidence allows a complete recording of the resource without archaeological hypothesis;

[ii.] *substantially intact*, where the material evidence is incomplete but the recording of material evidence will be sufficient to allow an accurate archaeological reconstruction, with hypotheses based on the archaeological record only;

[iii.] *standing ruin*, where the material evidence is incomplete and the recording of material evidence will be sufficient to define the footprint of the resource and some of its elevations and features but will be insufficient to allow an accurate archaeological reconstruction of the resource without hypotheses based on the archaeological record and on a range of outside sources

[iv.] *ruin*, where the material evidence is incomplete and the recording of material evidence may be sufficient to define part, or the whole, of the footprint of the resource but will be insufficient to allow an archaeological reconstruction of the resource/its features, perhaps spatially and certainly vertically, without hypotheses based on the archaeological record and on a range of outside sources, and in circumstances where the validation of the reconstruction cannot be assured.

[v.] *archaeological site*, implying a mostly sub-surface residue, where the material evidence suggest the former presence of an archaeological resource that cannot be defined without sub-surface investigation..

3.5.2 *Integrity*

The integrity of archaeological resources and/or individual elements that have been identified above is assessed on a five-stage scale, that is to say:

[i.] *Intact*, where the resource has remained virtually unchanged its form and/or design and/or function can be totally discerned from the material evidence;

[ii.] *Minor Modification*, where the resource has been modified or deteriorated cosmetically and/or in a manner that does not inhibit the discernment of its form and/or design and/or function by archaeological interpretation of the material evidence;

[iii.] *Material Modification*, where the resource has been modified so that its form and/or design and/or function cannot be discerned only by archaeological interpretation and without reference to external sources;

[iv.] *Major Modification*, where the resource has been so modified that attempted discernment of its form and/or design and/or function cannot be achieved by archaeological interpretation of the material evidence and requires a heavy reliance on external sources and in circumstances where discernment one or more elements may be equivocal;

[v.] *None*, where the integrity of the resource has been completely destroyed and the evidence for its form and/or design and/or function is totally external.

3.5.3 Summary of Condition and Integrity

The condition and integrity of the heritage resources of the study area is summarised in **Table 3.1.**

Table 3.1 - Summary of Condition of Resources

Resource	Description	Condition	Integrity
MH11-E	Residual fireplace footing with associated artefacts	**Standing Ruin**	**Material Modification**
MH5-E	Residual door sill and brickbatt step or apron with associated artefacts	**Substantially Intact**	**Minor Modification**

4.0 ADDITIONAL FIELDWORK

To the extent that the Branch has relied in part on the Submissions addressed in **Section 2** to sustain the view that further excavation is required, its view does not appear to be adequately supported, particularly given the draft Statement of Commitments referred to at Section 18.3 of the EA. The question of recommendations for further detailed study did not arise for consideration under the terms of the agreed methodology and the suggestion that no further initiating archaeological study appeared warranted was based on the sparse material return from study to date, the likelihood of continuation of sparse results and the anticipation that any further material evidence would be unlikely to advance comprehension of the area and its former occupation(s). It was not intended to give the impression that any party/ies to the proponent's application washed their hands of any archaeological potential that may be subsequently exposed (vide: draft Statement of Commitments).

However, given the views underlying the submissions of the Branch, in the spirit of compromise and particularly in extension of the expression of the draft Statement of Commitments, the following recommendations are made for the continuing study of the study area:

1. In general, in connection with the development, the attention of the developer and all contractors, sub-contractors and employees will be directed to the provisions of the *Heritage Act* 1977 (NSW – the Act)) and in particular to:

   a. the definition of relic under that Act;

   b. the provisions of sections 24-34, 35A-59, 130, 136-7, 139 and 146 of the Act.

2. Having regard to the implications of **Recommendation 1**, the present assessment of the significance of the study area and the nature of the development application that is presently in train, it is not considered appropriate that an application be made to the NSW Heritage Council for an Excavation Permit pursuant to s140 of the Act.

3. In the planning of the project, the proponent should provide time and resources for:

   a. The preparation and delivery of an induction into the heritage implications of the site, and the requirements of the Act, to site employees, contractors and their employees

   b. the completion of any heritage recording, investigation and study recommended below.

4. An archival record of the study area will be created by the following steps:

   a. any project activity in relation to the study area that may have the capacity to obscure, move, modify, damage or destroy any relic of, on or below the surface of the study area will be monitored by a qualified historical archaeologist who will compile an archival record of such activity and the progressive stages of obscurity, movement, modification, damage and/or destruction, as appropriate by:

      i) creating a text record using a suite of field recording materials that and analysis notes and material, and by drafting, in standard formats and field book(s);

      ii) plane survey and developed measured plans and elevations; and

      iii) photographically by monochrome print, colour transparency and digital imaging.

Field notes and records will be in a form appropriate to be appended to subsequent reporting. The graphics of the archival record will be orientated by reference to any extant photography, plans and diagrams of the former report, and will otherwise comply with the criteria established for archival recording by the NSW Heritage Office.

b. in the process of monitoring and recording, the archaeologist will salvage and secure such elements and/or components and/or samples of the historical function of the study area and its maintenance and operation and otherwise such artefacts as shall be considered diagnostic and relevant and capable of assisting in the interpretation of the plants and their heritage values.

5. Project personnel will have been briefed on their obligations regarding heritage management and the potential for relics to be exposed during the course of project works in this precinct.. An appropriately qualified and experienced historical heritage archaeologist should be engaged for on-call consultation in the event that significant material evidence is otherwise suspected to exist or is exposed. In the event of suspicion or exposure of significant material evidence, development work should cease in that area until an appropriate assessment is made by the archaeologist and, where warranted, a detailed investigation is completed and an archival record is made, in terms of **Recommendation 4**.

6. Where this is appropriate, the archaeologist will cause work to cease or be suspended in a specific area in order to allow detailed manual investigation. In a detailed manual investigation, the archaeologist will employ small hand tools such as trowels, brushes and the like.

7. Any artefacts salvaged or recovered in terms of **Recommendation 4.b** will be conserved, identified and, to the extent possible, analysed for implication, significance, provenance and post-depositional effects, and:

   a. recorded in the field, individually by provenance, nature, type, fabric/material, shape, dimension and mass on an artefact recovery index field sheet and in terms of found context in a context field record sheet;

   b. in post-fieldwork management, will be cleaned, catalogued according to typology, features and provenance, and interpreted in the context of the total excavation results.

   On completion of post-fieldwork management, artefacts will be appropriately conserved and packed, an inventory will be taken of packing and all packed material will be deposited with the archive of plans and photographic records for permanent archiving by or on behalf of Pacific National with accessibility to be provided to *bona fide* researchers.

8. All elements of monitoring, archival recording and artefact management will be documented in a detailed report to publication standard, illustrated where relevant by photography, plans, elevations and drawings and complying with such conditions as may be contained in the excavation permit.

9. Copies of the reports and all photography, plans, elevations and drawings will be provided to the proponent, the Branch, the NSW State Library and the local history sections of the Newcastle Regional and Cessnock Libraries.

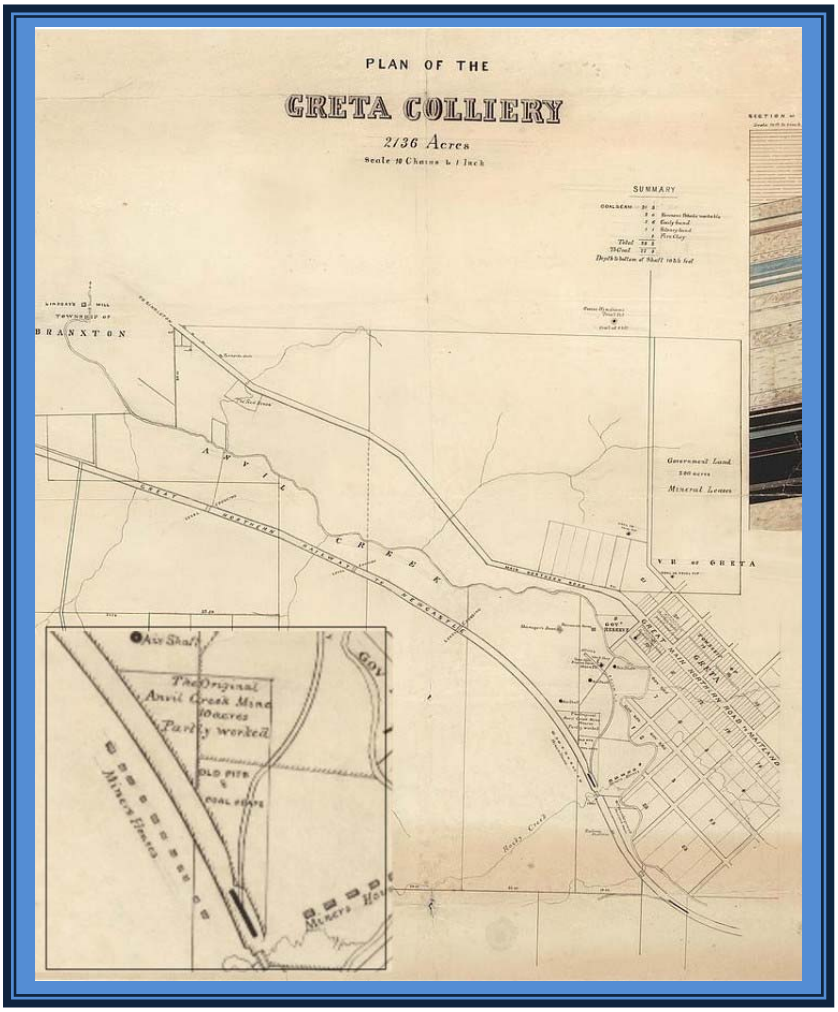
10. Otherwise than as above, on the grounds of the historical/industrial archaeology of the study area, there appears to be no reason for further constraint or modification of the proposed re-development.

6.8.2 Sub-surface Testing of the Archaeology of Part Lot 1, DP1129191, at Greta NSW for Pacific National

Archaeology & Heritage Pty Ltd

December 2010

Sub-surface Testing of the Archaeology of Part Lot 1, DP1129191, at Greta, NSW, for Pacific National



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Sub-surface Testing of the Archaeology of Part Lot 1, DP1129191, at Greta, NSW, for Pacific National: Greta Train Servicing Facility Site

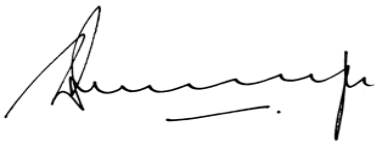
Prepared for:

Monteath & Powys, for Pacific National

by **MAXIM Archaeology & Heritage Pty Ltd**

Project No 100602

Report written by:



Paul Rheinberger
Principal Archaeologist
Date 7 December 2010

Reviewed by:

Ross Gam
Archaeologist
Date 7 December 2010

Cover Illustrations:

Details from the Plan of the Greta Colliery by Surveyor Maitland, 1873

Source:
National Library of Australia,
Ref: F80A & F80B

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FIGURES

APPENDICES

1.0 INTRODUCTION

This document reports the further field study of the study area, which is described as a parcel of land running along the western side of the main northern railway line in a north westerly direction from Greta railway station and bounded to the west by the proposed route of the F3 Freeway to Branxton. The study was commissioned from Maxim Archaeology & Heritage Pty Ltd (Maxim) by Monteath and Powys Pty Ltd on behalf of Pacific National (the Principal).

The surface survey was reported in a document prepared by Sinclair Knight Merz Pty Ltd ('SKM' and 'the SKM Report')[1]. In subsequent discussions between representatives of the Principal, SKM and the NSW Heritage Branch of the Department of Planning, a methodology was agreed for the further investigation of the study area. The further study was predicated to address perceived shortcomings in the study and reporting to that date.

The further investigation of the study area in terms of the agreed methodology for further investigation was completed over the period 5-22 July 2010 inclusive. These elements of research and investigation are collectively referred to herein as 'the study'. To the extent that the interpretations, judgments and conclusions in this report differ from those of the SKM Report, this report should be deemed to supersede the latter.

1.1 OBJECTIVES OF THE STUDY

This section abstracts the expression of objectives set out in the research design prepared in support of draft methodology entitled Phase 4: Archaeological Testing Methodology, Greta Train Support Facility, Greta NSW (version 3) dated 18 January 2010.

Further investigation of the study area was projected to:

- Is there any material evidence for domestic occupation in the eastern part of the project area?
- If so, are we able to determine the type of nature of construction? Are there any structural remains?
- Is there any evidence of other domestic features such as gardens, privies, outbuildings, fencing or pathways?
- Who lived here? Is there any evidence to support hypothesis that occupation was by miners? Or even German miners?
- When was this area occupied?
- Can we distinguish any phases of use?
- What activities were conducted on the site? Was the occupation purely domestic or is there a variety of uses?
- What is the extent and integrity of archaeological deposits across the site?
- What is the geographical extent of activities?
- When was this area abandoned?

1.2 LOCATION AND FEATURES OF THE STUDY AREA

The study area is located in the environs of Greta, approximately 1 kilometres west of the township of Greta, New South Wales. The study area lay on the western side of the main northern railway line and was accessible from Mansfield Street, Greta and thence by internal

[1] SKM, 2010.

property tracks and across Sawyers Creek. Access was found to be restricted during wet weather.

Other relevant information about the location of the study area is shown in ***Table 1.1***.

Table 1.1 - Location Data

Topographic Map Sheet	**91321S - Greta**
Grid reference/range	**348015.6382885 to 347750.6383115**
Portions	**203/204 (Lot 1 in DP 1129191)**
Parish	**Branxton**
County	**Northumberland**
Local Government Area	**Cessnock**

The regional location of the study area is shown on ***Figure 1.1*** and the study area is defined in ***Figure 1.2***.

1.3 METHODOLOGY AND REPORTING

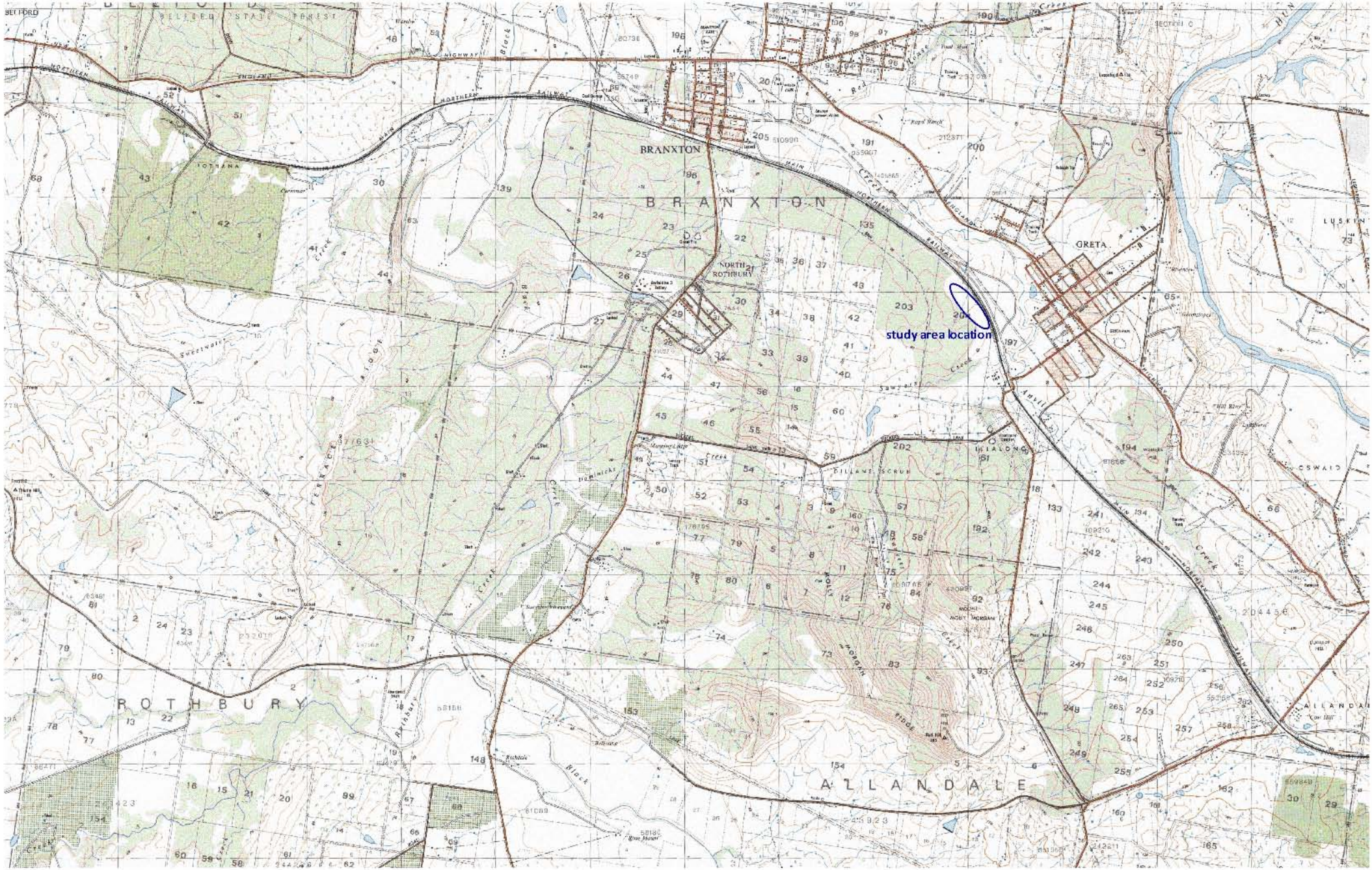
This study and analysis was undertaken within the framework of the agreed methodology copied in ***Appendix 1***. The sequential steps of the study have been as follows:

- The physical context of the study area was archivally recorded in the course of fieldwork. The agreed methodology called for staged excavation of the study area, which was undertaken with monitoring by study personnel and archival recording of all examples of material evidence. As will be seen more items of material evidence were salvaged, together with exemplary material, as relevant, from structural residues. Sequentially, the further study involved a detailed field survey of exposures within the study area by walking transects; two 50 metre square areas were then defined and mechanically stripped of vegetation; stripped areas were then examined by walking transects, trenches 8m x 2m, were opened in each 50 metre square area about the locations anticipated by extrapolation of early plans by survey; the locations of areas of potential interest were identified and additional overburden was removed in 8x2 and 8x1 metre trenches; the sites of two specific features was undertaken by manual investigation; no privy, or suspected privy was encountered so that no soil samples were collected; and, having regard to projected future earthworks in the study area, excavation sites were not backfilled at this stage.

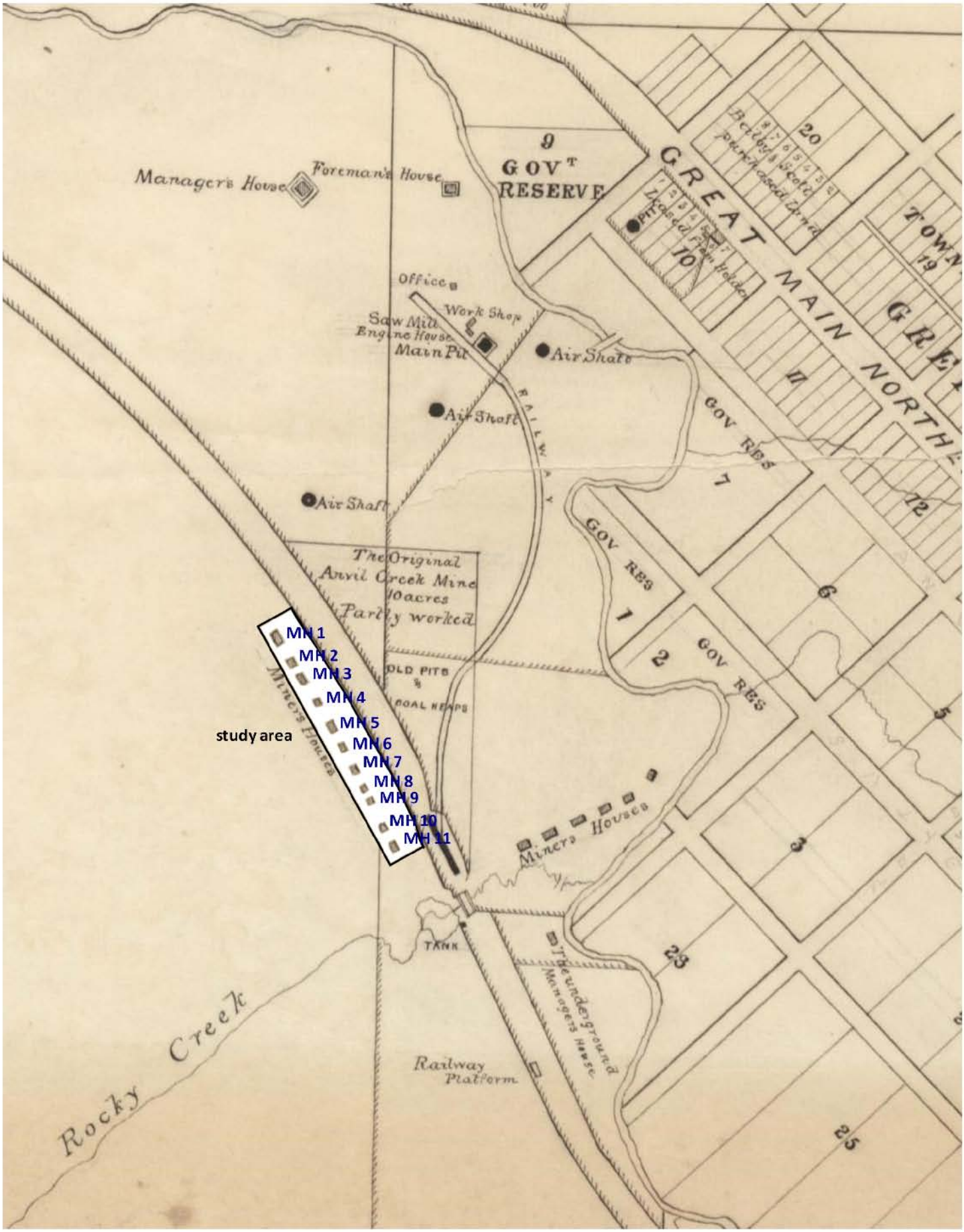
- The observations made during field survey were recorded by field notes and photography. The field methodology and results of the study are described in more detail in **Section 2**;

- Interpretation of the raw results of fieldwork is contained in **Section 3**, in terms of:

  - the studies and observations made before and during the course of fieldwork,
  - our fieldwork notes;
  - the fieldwork plans and elevations recorded during the course of the study and to be refined in due course
  - the photographic record constructed during the course of fieldwork, and



Archaeology & Heritage MCA Pty Ltd	Scale: **1.0 Kilometre Grid**	Client: **Pacific National** Reference: **100602**	Source: **91321S Greta Topo Map: NSW LPI**	Title: **Regional Location of Study Area**	**Figure 1.1**



	Scale:	Client:	Source:	Title:	
Archaeology & Heritage Pty Ltd	No Scale	Pacific National Reference: 100602	Detail from Maitland's Plan, Greta Colliery, 1873	Location of Miners' Huts: Study Area	FIGURE 1.2

- References and bibliography are provided in **Section 4**.

1.4 STUDY PERSONNEL

Paul Rheinberger, Principal Archaeologist, Maxim Archaeology & Heritage Pty Ltd (Maxim), conducted the research of the archaeological and physical contexts and the review and research of the historical context for this assessment.

1.5 ACKNOWLEDGEMENTS

In the conduct of archaeological study, Paul Rheinberger was assisted in the field by Archaeologist Ross Gam, whose input into the successful conclusion of field studies has been significant. Ross also reviewed the text of this report. The conduct of the study was also materially assisted by the help and participation of Steve Fray of Theiss, who was on site during the whole of the study and who provided considerable logistic and practical assistance in trying circumstances caused by the onset of extremely wet weather.

2.0 METHODOLOGY AND RESULTS

2.1 APPLICATION OF METHODOLOGY

The project followed the format of the agreed methodology mentioned above and copied in ***Appendix 1***, sequentially requiring:

[i.] A local survey datum related to the AHD was established by Monteath & Powys, Surveyors.

[ii.] Two 50 metre square areas were defined on the ground encompassing the projected sites of MH10 and MH11 on the one hand and MH5 and MH6 on the other hand. In establishing these areas, reliance was placed on the extrapolation by surveyors from the 1873 plan of the Greta Colliery. The extent of these areas was recorded.

[iii.] A detailed survey of the areas was undertaken by walking transects and a very thin scatter of non-diagnostic broken glass and ceramic was observed across the landscape.

[iv.] Vegetation within the two 50 metre square areas was stripped by grader.

[v.] The areas stripped by grader were examined by walked transects and, in addition to the surveyed projected locations of MH5 & 6 and MH10 & 11, a number of areas of additional interest were determined. Four of these areas were roughly square depressed areas that appeared possibly to have been the residue of structural development. Two other areas of interest were defined by exposures of minimal evidence of brickwork and another by a more concentrated scatter of artefacts.

[vi.] At this stage the sequential process outlined in the excavation methodology was varied in that the location of four 8x2 metres trenches was marked, as originally proposed, about the locations of MH10 and MH11 and thereafter MH5 and MH6, as projected by survey. As mentioned earlier MH5 and MH6 were selected for further investigation rather than MH2 and MH3 because clearing of 50 metres square in relation to the latter would have impacted severely upon existing vegetation. Thereafter, two further 8x1 metre trenches were excavated about MH11 to attempt to extend and explain a light scatter of artefacts in the first trench and trenches were opened in the four depressed areas referred to above. The location of artefacts in trenches at MH11 was excavated by manual techniques using spade scrape and trowel. The locations of artefacts and features were appropriately recorded.

[vii.] The brick features referred to above were exposed and excavated by manual techniques using spade scrape, trowel and brushes. The features were recorded in detail.

[viii.] Trenches and manual excavations were undertaken to a maximum depth of 300mm or to the level of clay, whichever was less.

[ix.] Manual investigation was, of course, undertaken using appropriate tools and was appropriately documented.

[x.] No privy site, or projected privy site, was identified and no soil samples were collected.

[xi.] As observed previously, having regard to the future earthworks to be undertaken on this site, backfilling was not undertaken.

In the course of the field study, a series of written records forms were completed or drafted in standard formats. These forms, and the times of their preparation, are detailed in **Table 2.1**.

Table 2.1: Text-Recording Forms

No	Title	Description and Purpose	Compiled
1	Site Description Sheets	… detail of location, title, ownership, occupation, use, condition, integrity and risks/threats	Before/during fieldwork
3	Site Recording Sheet – Sources	… the sources from which information about the study area have been drawn	Before/during fieldwork
4	Site Feature Recording Sheet	… macro-elements of the study area, description of the feature, its historical and structural context	Progressive, during fieldwork
6	Site Survey Index – Site Type	... the site types identified on the study area, indexing them by context, date, description, ECR Sheet and excavator	Progressive, during fieldwork
7	Excavation/Survey Context Index	… allocation of context identifiers to distinguishable components exposed by excavation	Progressive, during fieldwork
8	Excavation/Survey Context Records	… description and detail of the exposure and investigation of individual contexts	Progressive, during fieldwork
9	Artefact-Origin Index	… the description and provenance of artefacts recovered in the course of fieldwork	Progressive, during fieldwork
10	Structural Element Data	… the description and function of structural elements peripheral to the major element(s) of the site feature(s)	Progressive, during fieldwork
11	Structure Recording Index	… and index SED Sheets by number, site, location and provenance	Progressive, during fieldwork
15	Photographic Catalogue	… the sequence, content and orientation of individual plate of the photographic record and relates each plate to its position in a plan	Progressive, during fieldwork
16	Photographic Plan	… the location and direction of each plate of the photographic record	Progressive, during fieldwork
20	Field Sketches, Plans, Elevations	... graphic observations made in the field of material evidence, site features and attributes and artefacts	Progressive, during fieldwork

Relevant field recording forms are copied in ***Appendix 2***.

2.2 RESULTS

The results of the study of the archaeology of the study area in the following section in terms of the above phases of methodology.

2.2.1 Marking of two large areas to be excavated

Preliminary surveillance indicated that while the area around MH10 and MH11 was clear of middle and upper storey vegetation, that around MH2 and MH3 was not. In the interest of causing minimal interference with existing vegetation at this stage, an election was made to define two 50x50 metre squares around MH5 and MH6 and MH10 and MH11 essentially providing an equal straddle of the nominal line between the two pairs of surveyed projected sites. The surveyed positions were found to be approximately 30 metres apart so that, in a north south direction, the square projected 10 metres north of, respectively MH5 and MH10 and 10 metres south of respectively MH6 and MH11 whilst extending 25 metres on either side of the line between each of the pairs of sites, a total distance of 50 metres. The surveyed positions were determined to be on a bearing of 345 degrees magnetic. The squares were then each pegged at each corner and intermediately along the length of each side.

2.2.2 Surface Survey

A detailed pedestrian survey was undertaken of both 50 metre square areas by transects walked north south at a spacing of approximately 5 metres. Visibility was reduced to about 30% as the result of the coverage of vegetation. In the result, isolated examples of broken bottle glass and plain ceramic were identified. Examination of the few pieces of glass and ceramic that were found indicated that these were non-diagnostic.

2.2.3 Machine Stripping of Overburden

A grader was used to strip overburden from each of the marked 50x50 metres squares, the spoil from each grader transect being allowed to remain as a windrow on the delivery side. Each grader transect was inspected by the archaeologists for signs of any concentration of artefacts or material evidence that might have indicated the presence of a residential unit. In a result, three areas of particular interest were identified, the first approximately 25 metres east of the surveyed projected site of MH11, the second approximately 20 metres east of the surveyed projected site of MH10 and the third approximately 15 metres east of the survey of the projected site of MH5.

Also clarified at this time were four depressed areas on the eastern periphery of the southern square about MH10-MH11.

It was determined that in addition to the planned trenches about the surveyed projected sites at MH5, 6, 10 and 11, all areas of interest – that is to say, the three specific sites and the four depressions – should be further investigated.

2.2.4 Marking trench locations

Trenches measuring 8 x 2 metres were initially planned for opening adjacent to the surveyed projected site locations of MH5, 6, 10 and 11. In order to validate, or otherwise, the accuracy of surveyed projected sites, trenches were opened adjacent to the survey pegs, sequentially, of MH11, MH10, MH6 and MH5. The locations of the trenches were measured and marked by pegs and the opening of the trenches was undertaken with a light excavator using a 1-metre-wide mud bucket. In order to maximise the potential of trenching, the 1 metre wide trenches were separated by approximately one metre and were excavated east-west. Each trench was then sectioned into 1.0 metre intervals and allocated letter running from A – H, west to east.

At survey mark MH11, the southernmost trench was aligned approximately 3.9 metres south of the survey peg. Within this trench, in square A an aggregation of 23 small fractured pieces of ceramic and four similarly small broken pieces of bottle glass were located. In square C a confined scatter of 13 fragments of ceramic, two small animal bones, five fragments of glass bottle and one amorphous piece of iron were found. In square D were located four small

pieces of glass bottle and one of ceramic. None of these items were sufficiently large or carried any markings that could be considered diagnostic.

The second trench adjacent to survey peg MH11 was centred approximately 1.8 metres south of the survey peg. Square C yielded one small piece of window glass and 17 fragments of ceramic and on the intersection of squares C and D, a cup handle and six small pieces of small animal bone. Square D in turn contained what appeared to be the remains of a campfire in the centre of the trench and close to the intersection of that square with square E. Square E yielded seven small pieces of ceramic and two of bottle glass and on the intersection of squares F and G there were three small pieces of ceramic and two of bone. Again, none of these items were of sufficient size or bore any markings that would assist in diagnosis. Because of the nature of these finds it was decided to open one further trench adjacent to MH11 and this was located approximately 1.85 metres north of the survey peg and was sterile.

Trenches were opened approximately 1 metre north and 1 metre south of the survey peg at MH10 and proved to be sterile. Similarly, trenches were opened approximately 1 metre on either side of the survey pegs at MH5 and MH6 and all four trenches proved to be sterile. The locations of these trenches in relation to the relevant survey pegs are shown in blue colour on **Figure 2.1.**

2.2.5 Additional Overburden Removal

Consequent upon the resolution to investigate the depressions on the eastern periphery of the MH10-MH11 50x50 metre square, trenches were opened adjacent to the south eastern corner. This excavation was initially launched as an 8 x 1 metre trench and again sectioned at 1.0 metre intervals and squares identified as A-H from west to east. In this trench squares A, B, C and D revealed evidence of deep burning while the remainder of the squares E, F, G and H revealed a lighter shallow burn decreasing from west to east. Scattered throughout squares A, B, C and D were 30 small pieces of ceramic, four of bottle glass, five of window glass, two amorphous pieces of iron, a ginger beer stopper and a small fragment of linoleum, all burnt. A small southerly extension of squares A, B, C and D indicated that the burn area extended beyond and it was provisionally suggested that this burnt area represented a rubbish disposal site. The northern component of the burnt area appeared to have been excavated and removed in the creation of the deflated area that was being investigated.

The second depression was located, centred 18.0 metres north of the first depression, and was again investigated by an 8 x 1 metre trench which proved sterile. The third depression was located 9.0 metres north of the second and was similarly sterile whilst the fourth and last depression yielded a sparse scatter of ceramic and small pieces of bottle glass, all of which was non-diagnostic.

The locations of these supplementary trenches are shown in ochre colour on **Figure 2.1**.

2.2.6 Manual excavation of features

As mentioned above there were three further features of interest that initially were considered to warrant further detailed investigation.

The first of these was located on the eastern periphery of the MH10-MH11 50x50 metre square and was initially identified by the exposure of two bricks in close proximity having the appearance of having been placed, and reinforced by a significant scatter of bricks on the western side that appeared to be likely to be related. Preliminary manual clarification by spade scrape, trowel and brush indicated a line of the bricks bearing roughly east-west and showing the likelihood of returns at each end in a southerly direction. This situation having been established, a 4x4 metre square was gridded around the brickwork so that it extended

southerly from the northern extent of brickwork. The location of this grid is shown in green on **Figure 2.1** whilst the scheme of gridding and external features are shown on **Figure 2.2.** The grid was identified by letters along the southern boundary and numbers on the western boundary commencing from the south western corner. The brick assemblage was quickly identified as a fireplace footing with some elements of the first course of fireplace still adhering to the south western sector of footing. External dimensions of the feature showed an east-west dimension of 1520 and returns on either side of 850. The footing comprised two leaves of dry- laid bricks in stretcher form with additional closers for length while the fragment of residual fireplace structure indicated that it had been laid in lime mortar, again in two leaves of stretcher bricks. The fireplace footing extended across square B4 and half way across C4.

The north-western peg of square B4 was located 50 north and 50 west of the north-west corner of the footing and was determined to be 23.72 metres, bearing 247 degrees magnetic from the MH11 survey peg. The excavation of the gridded area was undertaken by manual technique and yielded a range of artefact material:

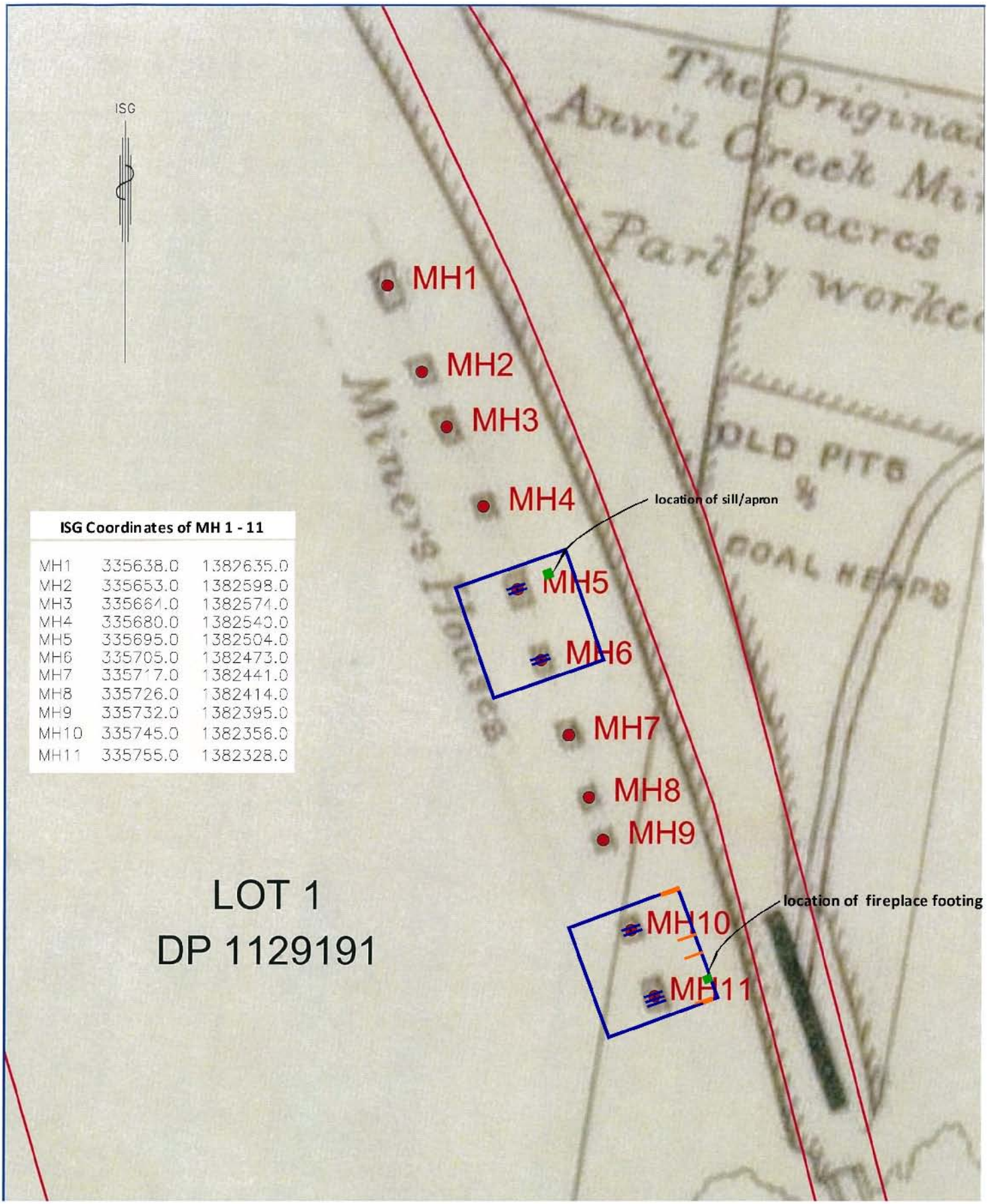
- Square A4 revealed two pieces of glass bottle
- Square B3 exposed a close aggregation of iron nails, a fragment of ironstone ceramic and a tight aggregation comprising a plain egg cup base, four plain and three blue transfer-printed fragments of ceramic.
- Square C2 produced a short iron spike and a small scatter of window glass.
- Square C4 yielded a long iron spike, a substantial part of the broken head of a miner's pick and another fragment of ironstone ceramic.
- Square C4 yielded the base of an Eley 12 gauge shotgun cartridge.
- Square B2 contained an assemblage of window glass, a fragment of ironstone ceramic and several small pieces of ironstone.
- Square D4 provided a sample of thin metal sheet.

Immediately outside the marked grid, adjacent to the prolongation of the 2-3 grid line was another small piece of ironstone ceramic. The locations of the elements are all shown on the relevant ECIs and also upon **Figure 2.2**.

In addition to the plot of gridding, the fireplace footing and the relevant artefacts, the composition of brickwork was also accurately plotted. The bricks were uniformly, approximately 240 long, 120 wide and 70 deep. The footing was proved to be two courses deep and lay upon the clay substrate. The brickwork of the footing was simply laid without overlap.

In terms of depth, the upper surface of the fireplace footing and all the artefacts were identified at a level approximately 150mm below the ambient ground level. This site was accorded the identifier **MH11-E** and a selection of photographs is contained within **Figure 2.3, 2.4, 2.5, 2.6, 2.7 and 2.8**.

The second area of interest was selected because the grader scrape had exposed a number of small fragments of ceramic and bottle glass. Preliminary manual investigation by spade scrape and trowel indicated that there was no depth to the deposit and that it was simply a random scatter of which there were a number across the landscape, as has been previously observed. In the circumstances, this site was abandoned, despite being persuasively located

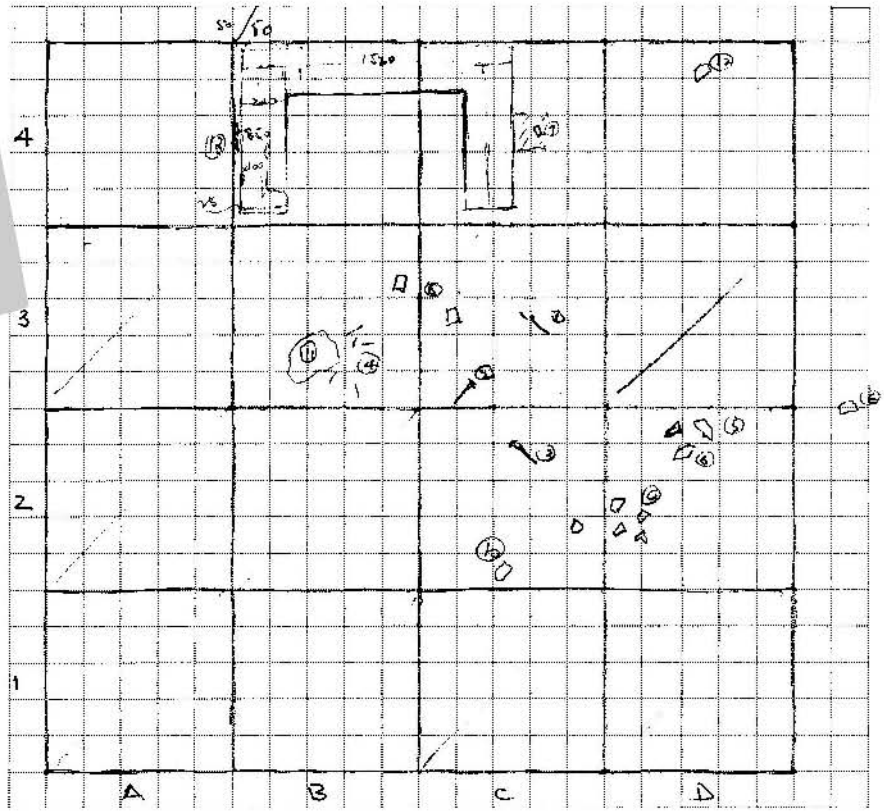


ISG Coordinates of MH 1 - 11

MH1	335638.0	1382635.0
MH2	335653.0	1382598.0
MH3	335661.0	1382574.0
MH4	335680.0	1382540.0
MH5	335695.0	1382504.0
MH6	335705.0	1382473.0
MH7	335717.0	1382441.0
MH8	335726.0	1382414.0
MH9	335732.0	1382395.0
MH10	335745.0	1382356.0
MH11	335755.0	1382328.0

Archaeology & Heritage Pty Ltd	Scale: See Bar Scale	Client: Pacific National Reference: 100602	Source: NLA f10A & 10B & Monteath & Powys	Title: Sub-surface Study Locations	FIGURE 2.1

scheme of grid and features



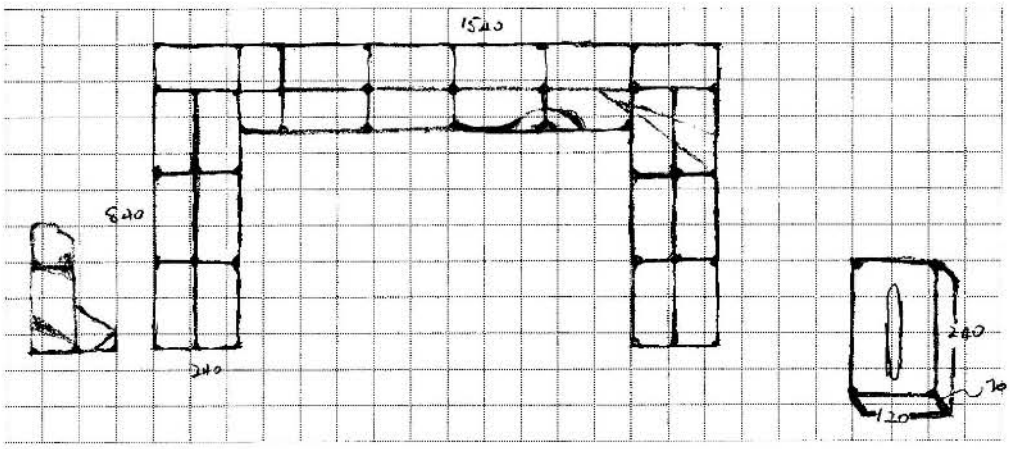
scatter of fallen bricks,
probable chimney fall

1. # miner's pick
2. long Fe spike
3. short Fe spike
4. scatter Fe nails
5. ceramic
6. scatter ceramic (small)
7. 12g shotgun cartridge base
8. 2 x pcs flat Fe
9. 4 x pcs window glass
10. pce bottle glass 'RILI'
11. Egg cup base with ceramic 4 x pcs plain/3 x pcs blue tprint
12. non-Fe metal sheet, thin
13. 2 x pcs bottle glass

scale

0 200 400 600 800 1000mm

deatil of fireplace footings and fireplace residue



scale

0 100 200 300 400 500mm

Archaeology & Heritage Pty Ltd	Scale: See Bar Scales	Client: Pacific National Reference: 100602	Source: Adapted from Field Records, PR	Title: Scheme of Grid, Features, MH11-E

FIGURE 2.2

Figure 2.3

View from south of site MH11-E, looking along the line of shelters over that site, the location of discarded MH10-E and MH5-E

Paul Rheinberger
No Scale

Figure 2.4

Overview of the grid at MH11-E.

Paul Rheinberger
Scale: 1.0 metre grid

Figure 2.5

Detail of the fireplace footing and part first fireplace course, MH11-E, from south.

Paul Rheinberger
Scale: 200mm

Figure 2.6

Detail of the fireplace footing and part first fireplace course, MH11-E, from east

Paul Rheinberger
Scale: 200mm

Figure 2.7

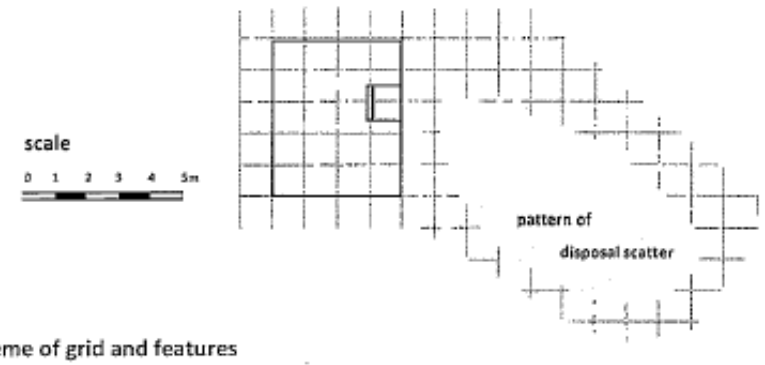
Detail of the fireplace footing and part first fireplace course, MH11-E, from north.

Paul Rheinberger
Scale: 200mm

Figure 2.8

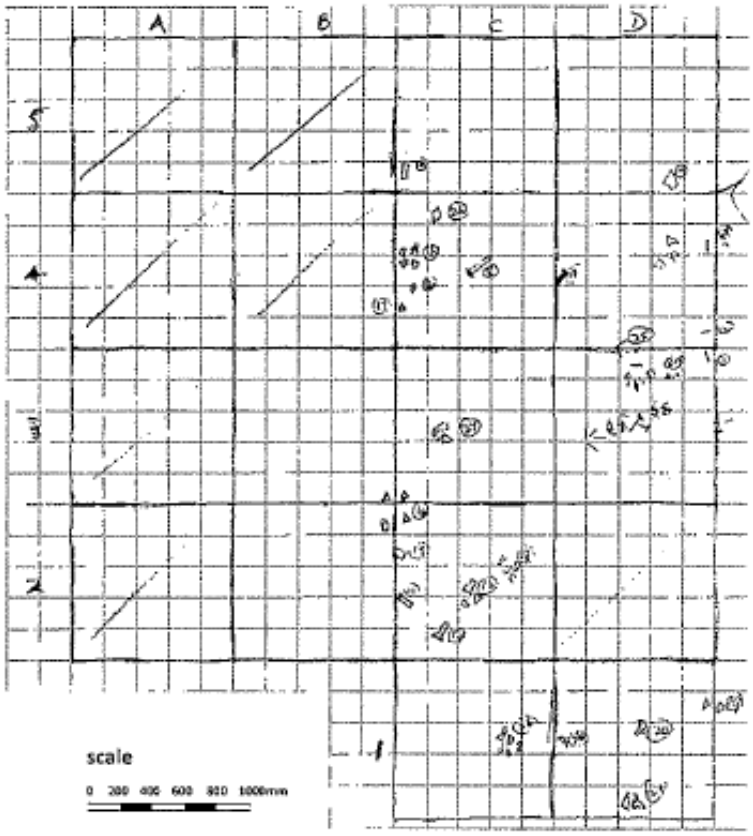
Detail of the fireplace footing and part first fireplace course, MH11-E, from west

Paul Rheinberger
Scale: 200mm



scheme of grid and features

1. Fe nail
2. Fe nail
3. Fe nail
4. Fe bolt
5. scatter of Fe nails
6. ceramic, part manuf's mark
7. bottle glass, green, blowmoulded
8. Fe bolt
9. bone (beef)
10. bottle glass, clear, neck
11. bottle glass, clear, pt neck
12. 3 x pcs, ceramic, blue tprint
13. 4 x pcs ceramic, blue tprint
14. 4 x pcs ceramic, plain
15. bottleglass , green, neck
16. ceramic cup handle
17. 2 x pcs ceramic, 1 plain, 1blue tprint
18. 4 x pcs ceramic, 3 plain, 1 gold band
19. 2 x xpcs ceramic
20. ceramic cup base
21. ceramic, brown
22. ceramic, green tprint
23. 5 x pcs ceramic, plain
24. 4 x Fe nails
25. 3 x Fe nails
26. bottle glass, embossed 'SPERM SEWING MACHINE OIL'
27. 2 x pcs ceramic, plain
28. 2 x Fe spikes
29. scatter small pcs bottle glass and ceramic



	Scale:	Client:	Source:	Title:	
	See Bar Scale	Pacific National Reference: 100602	Adapted from Field Records, PR	Scheme of Grid, Features, MH5-E	FIGURE 2.9

approximately 20 metres east of the survey peg for MH10. This site was nonetheless given the identifier **MH10-E**.

The third area determined to be of further interest was located east of MH5 and was given the identifier **MH5-E**. Initial attention was directed to the site by the exposure of brick batts in association with a length of sandstone in pieces, which appeared to be arranged. Preliminary manual investigation exposed a small pad of brick batts and full bricks adjoining the aforesaid sandstone slabs and it was determined to investigate further, on the basis that this feature may well have been a door sill and outer step as part of a cottage structure.

A grid was established, centred in a north south orientation on the easterly edge of the brick assemblage and extending there from in a westerly direction. The grid comprised 20 x 1 metre squares identified by letter on the southern side from A to D and numerically on the western side northerly from 1-5. The location of this grid is shown in green on **Figure 2.1** whilst the scheme of gridding is shown in the **Figure 2.9**, as is the location of the brick/stone assemblage and the artefact returns which are referred to hereunder. The area was manually excavated using spade, trowel and, particularly in relation to the brick/stone feature, by brush. The brick assemblage had a total maximum length of 1340 in a north south orientation and width of 890 in an east west orientation. The maximum length of stone work was 1500 by a depth of 330.

Manual excavation of the gridded area indicated that the A alignment (the western most line of squares) was sterile. Square B2 contained a single fragment of plain ceramic that was associated with other fragments in the adjoining square B3 as well as the relevant corners of squares C2 and C3. Square C1 yielded five fragments of plain ceramic, C2 the aforementioned two pieces of plain ceramic in association with other squares as well a piece of green bottle glass, a close assemblage of three pieces of blue printed ceramic and another similar assemblage of four pieces of blue printed ceramic and the broken neck of a green bottle. Square C3 yielded the aforementioned piece of plain ceramic and a further two pieces of plain ceramic. Square C4 showed a large iron bolt and a ceramic cup handle in association two pieces of ceramic, one plain and one printed, and the plain flat side of a clear bottle embossed "Sperm Sewing Machine Oil". Square C5 contained a short length of beef bone which appeared to have been butchered. Square D1 yielded two fragments of ceramic, a ceramic cup base, a fragment of blue printed ceramic and one of green printed ceramic. Square D3 yielded a collection of nails, two iron spikes and a tight scatter of very small pieces of ceramic and bottle glass. Square D4 exposed more nails, an iron bolt, two pieces of ceramic one of which gave part of a makers mark and Square D5 yielded a piece of blow moulded green bottle glass.

The north eastern peg of the D4 square was measured at 15.3 metres, bearing 235 degrees magnetic, to the MH5 survey peg.

A feature external to the grid that was observed quite positively was a scatter of fragments of glass (both window and bottle) and ceramic disposed over an area south east of the presumed door way to this hut. The approximate scale and disposition of this scatter is shown on **Figure 2.9**.

Apart from making a detailed measured drawing of the brick/stone assemblage, a series of photographs were exposed of the feature and its environment, these being attached as **Figures 2.10, 2.11, 2.12, 2.13, 2.14 and 2.15**. The detail of the brick/stone assemblage is shown in **Figures 2.11, 2.12, 2.13 and 2.14**.

2.2.7 Finalisation of Fieldwork

At the conclusion of fieldwork the excavations were backfilled, in terms of 'Methodology'. The study area was otherwise left clear with all drains remaining in place: it should be noted that this study was substantially hampered by an extended period of wet weather so that on six days between 6-21 July, visits were made to the site and it was deemed impossible to conduct further investigation. During this period, with the assistance of Theiss personnel, the three sites nominally identified for manual investigation were covered by shelters and it was necessary in the latter part of the wet weather period to employ fans and heaters to attempt to dry the ground sufficiently to enable the manual archaeological investigation to continue.

Figure 2.10

View of t he maerial part of the grid including the door sill and brick and brickbat apron, MH5-E, from south.

Paul Rheinberger
Scale: 200mm

Figure 2.11

Detail of the door sill and brick and brickbat apron, MH5-E, from east.

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Paul Rheinberger
Scale: 200mm

Figure 2.12

Detail of the door sill and brick and brickbat apron, MH5-E, from north.

Paul Rheinberger
Scale: 200mm

Figure 2.13

Detail of the door sill and brick and brickbat apron, MH5-E, from west.

Paul Rheinberger
Scale: 200mm

Figure 2.14

Detail of the door sill and brick and brickbat apron, MH5-E, from south.
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Paul Rheinberger
Scale: 200mm

Figure 2.15

Detail of two identifiable brick types in the apron, MH5-E:
At left, a brick and batt with heart shaped frogs of 'The Pack' type; at right, the long semi-round ended rectangular frog of the early Maitland style.

Paul Rheinberger
Scale: 10mm

3.0 DISCUSSION

At the outset, before completion of artefact management, some conclusions were drawn and suggestions made concerning macroscopic results of the study. These original observations have now been amplified in the light of completion of documentation and analysis of artefact material. Documentation of analysis is contained in copies of the Artefact Analysis Sheets contained in ***Appendix 3***.

[i.] There remains no even argumentative evidence that miners' huts were located in the positions identified on Maitland's survey plan. This is by no means a criticism of the survey/surveyor(s) but rather an indication that the positions shown on the plan of Greta Colliery, 1873, were rough indications of the existence of the huts but not their accurate locations. Objective consideration of the study area suggests that the indications of 'Miners Huts' on Maitland's plan were interpolations of the broad locality of these structures. It is clear that the markings were not inserted on any scale. The raw indication of the siting and dimensions of huts, suggesting an environment 11 huts spread along a distance of about 328 metres, each occupying a floor area between 26 and 170 square metres is completely unrealistic. From a practical standpoint, it seems very unlikely that a limited community of miners would separate themselves by such distances and their residences over such a length

[ii.] The scatter of artefacts at the MH11 survey site was an indication of episodic use, almost certainly for rubbish disposal, but not of residence and was not replicated in the precincts of MH10, MH6 or MH5. There is now good reason to suggest that the assemblage dates from well after the 1860s period of occupation of the area by miners

[iii.] The absence of structural residue across the extended precincts of MH10 and MH6 raised a question as to the durability, and/or length of occupation, of any residential unit in proximity and/or the possibility that some of 'huts' may have been glorified tents, as had been the practise on the goldfields, and indeed for labourers on Great Northern Railway construction, little more than a decade earlier.

[iv.] The fireplace footing at MH11-E, on the other hand, provided substantial evidence of the existence of a hut at this location, while the assemblage of artefacts broadly confirms occupation by a miner. The fact that no evidence of post holes was found suggests that the dwelling may have employed bed-log footings, laid either directly on ground or supported by simple stumps or logs and otherwise constructed of split slabs or perhaps a combination of slab and canvas. The recovery of iron residues including nails and spikes confirms timber fixing, although probably not flooring. The building would probably have been bark-roofed. The bricks of the fireplace footing were thrown with a long narrow frog that was common in the Maitland area in the third quarter of the 18th Century. A residual deposit of coal dust on the eastern side of the fireplace contributed to the confirmation of occupation of this hut by a miner (who probably brought home a bucket of coal each day from the mine). A larger deposit outside the presumed alignment of the eastern wall suggested the location of a home stockpile of coal.

[v.] The artefact scatter at MH10-E was the only indication of human recourse to the broad precinct of MH10, and has been discarded as representing a dwelling site. Like the scatter at MH11, this scatter also probably represented a rubbish disposal site.

[vi.] The door sill and brick doorway apron at MH5-E also provided substantial evidence of the existence of a hut at this location, supported by a broad collection of artefacts including structural spikes and nails and of the residue household utensils and utilitarian items and a bone residue. Although it was relatively sparse, the broad disposal scatter of artefacts concentrated to the south-east of the doorway raised the possibility of disposal of

unwanted items, thrown from the doorway by a left-handed person. Two of the bricks/brickbatts in the apron carried the definitive 'heart' frog of 'The Pack' period of brickmaking in Maitland which is tightly confined to the late 1860s. An example of this brick style was erroneously described at Figure 5-24 of the SKM report as 'probably a convict brick'[2]. In passing, we also located and secured a 'diamond' frog brick in the course of fieldwork.

The following observations can now be made in the light of detailed examination of artefacts:

At MH11:

As has been previously observed the assemblage of artefacts was largely non-diagnostic, however once cleaned and studied, some temporal indicators have been recorded.

1. Two fragments of ceramic were able to be conjoined to reveal a significant part of the manufacturer's mark, shown in the photograph attached to the Ceramic Artefact Analysis Sheet. The indicative markings were

   ANTHONY SHAW]
   [Part of a crest looking suspiciously like a kangaroo]
   'ADVANCE' bannered
   IRONST[ONE CHINA]
   A. SHA[W & CO]
   BUR[SLEM]
   ENG[LAND]
   Reg No 1[-----]

   The maker has been provisionally identified as the Anthony Shaw undertaking at Stoke-on-Trent, Staffs. The words 'A. Sh[aw]' used early in the firms life would not centre under 'Ironstone China', suggesting the addition on '& Son' post 1882 or '&Co' post-1898. The insertion of a registered number indicates the ceramic was manufactured after 1883 but the telling mark is the use of the word 'England', mandatory for export goods after 1898. The crest ('kangaroo' and ADVANCE') suggests the manufacture of a line of ironstone ceramic specifically for Australian consumption. Registration of marks began in 1884, but without the suffix numbers to '1', this is otherwise unhelpful.
2. The second mark is rather more fragmentary, but is provisionally identified to the Crown Staffordhsire China Co, from its Minerva works at Fenton, Staffs. The identification is based around the nature of the fragment of laurel wreath and the bannered 'STA[FFORDSHIRE]', which is comprises the company's mark from 1889 until 1912. The mark is also shown in the photograph attached to the Ceramic Artefact Analysis Sheet

If these results are extrapolated to provide temporal signature for the assemblage across the three trenches at MH11, the suggestion is that the artefacts date from the period , say, 1880 until 1900.

In summary, the structural material evidence at sites MH5-E and MH11-E does little but confirm the survival of limited residue from two huts or ephemeral residences. Based on artefact evidence, the cottages can be said with reasonable certainty to have been occupied by miners. In this context the existence of temporary dwellings on Maitland's 1873 plan[3] appear to be generally validated, and the local belief of at least some of the miners' origins is certainly not contradicted.

At MH11-E:

[2] SKM, 2010:46.

[3] Whether Maitland actually indicated the locations of the cottages on his plan or alternatively the non-scale locations were marked by another person on a working plan, as an annotation.

1. The broken head of a miner's pick is objective evidence of the employment of (at least one) occupant of that hut.
2. The fragment of slate may suggest the presence of a child, but in the circumstances is more likely to be the residue of a miner's tally slate.
3. The base of an Eley 12-gauge shotgun cartridge suggests opportunistic taking of game to supplement diet. The cartridge base is marked [El]'ey London, which indicates the manufacture of the brass-based paper-bodied 12-bore cartridge by the *Eley Company* between its development of a first centrefire cartridge in 1857 coupled with the incorporation of the Boxer primer in the 1860s, and the commencement of an association with the *Kynoch* company in 1918 and movement of the Company's manufactory from London to *Waltham Abbey* in 1921: the cartridge will have been manufactured at either the *Tile Kiln Lane* or *Angel Road* plants of the Company. In this context, the cartridge base can be seen to fall (barely) within the time scale of projected occupation by miners, but is not particularly helpful as to *terminus ante quem*.
4. One fragment of glass bears letters appearing to be 'RILI'[?]. This association of letters could not be readily identified against any Australian bottle manufacturer or any recorded supplier in Australia of bottled goods between 1830 to 1930. If the fourth letter had been abridged by the breakage of the fragment, as appeared possible, the bottle may have been a reference to *Butler's Sarsaparilla Essence*, manufactured in Sydney in three forms from the early 1840s.
5. One bottle fragment can be positively identified as part of a schnapps bottle, almost certainly *Wolff's Aromatic Schnapps*.

[i.] At MH5-E:

- The section of beef bone bears a fairly clear mark of butchery and was initially saw-cut at both ends. The shaft of the bone also appears to carry canine teeth scars.
- One piece of ceramic bears part of a manufacturer's stamp, but which too fragmentary to allow identification.
- The relatively high count of nails and spikes indicates timber fixing on site while the door sill and brick doorway apron raise the possibility of a timber floor. The nails, and even the nail fragments, appear to represent nails of substantial cross-section, many suggesting hand-forging from square nail rod, and to be appropriate for structural framing.
- The fragment of a "SPERM SEWING MACHINE OIL" bottle raises interesting possibilities about the occupant(s) of the cottage. Sperm oil was of American origin, manufactured for example by HB Foster, Concord, New Haven before 1850,Southard Herbert & Co of Boston before 1860, Seccomb Oil Works of Salem, Massachusetts before 1870 and the Donnell Company of St Louis, Missouri before 1860s. On the other hand, sewing machines were manufactured in America, Canada and certainly exported widely from as early as 1857. The machines were hand operated and were highly portable, and capable of clamping to a table or bench. Advertisements of the period recommended that the machines should be lubricated *only* with sperm whale oil, because of its lightness and quality of non-coagulation. It is not impossible that the hut was occupied by a married couple and that they possessed an early sewing machine. Alternatively, it is quite possible that the oil was simply used as a light oil lubricant in the household.
- One bottle fragment at this site could also be positively identified as part of a schnapps bottle, again almost certainly *Wolff's Aromatic Schnapps*.

A selection of bricks was salvaged from across the study area, notably examples of bricks carrying the long narrow frog associated with the Maitland area for a short period after the mid 19th Century and examples of the heart and diamond frog of 'The Pack' tightly dated to the later 1860s. The presence of these bricks in close proximity or integral to the brick material evidence acts as an effective *terminus post quem* indicator.

Generally, the study area is also interesting for artefacts that were not observed and/or salvaged, the most notable being the total absence of fragments of clay pipes. At a time

when pipe smoking was part of the workmen's way of life and the most popular pipe was the fragile, but plentiful and cheap, clay pipe, the absence of residue of such pipes in residential sites is surprising. One explanation, ***advanced with a substantial caveat***, may be that the workmen followed the dominant European practise of smoking the more valuable briar pipes. There is, however, no compelling or substantially persuasive evidence that the occupants of either of the huts examined to date were of German extraction.

In summary, the structural material evidence at sites MH5-E and MH11-E does little but confirm the survival of limited residue from two huts or ephemeral residences. Based on artefact evidence, the cottages can be said with reasonable certainty to have been occupied by miners but there is no compelling evidence of their German origin (whether the presence of *Wolffs Aromatic Schnapps* bottles has a bearing on the origin of the occupant is unclear). In this context the existence of temporary dwellings in an area proximate to mining, indicated on on Maitland's 1873 plan, appear to be generally validated; the local belief of at least some of the miners' origins is certainly not contradicted.

Otherwise, the material evidence at present makes little contribution to an appreciation of the lifeways and human condition of the early industrial workers. The study area may be viewed in common with the more substantial residual material evidence of the Greta Colliery, the known locations of Farthings Pit and the Anvil Creek Colliery, and the surviving evidence of railway connections and yards, to represent an early and evolving mining precinct. Within this precinct, however, the fragmentary nature of the material evidence and notable lack of structural evidence of the buildings (as opposed to that relating to building attributes) makes little significant contribution to the industrial heritage of the Greta locality and the wider South Maitland Coal Fields. In this context, although it is expressed in terms outside the criteria espoused by the Branch, the general intention or thrust of the evaluation of cultural significance in the assessment report of SKM[4] appears to be supported. This thrust is converted into a complying format in **Section 4**, below.

The following responses are made to the questions posed in the Research Design:

• Is there any material evidence for domestic occupation in the eastern part of the project area?	Yes.
• If so, are we able to determine the type of nature of construction? Are there any structural remains?	No. While the fireplace footing and door sill and apron are structural, they do not give any indication of the type and nature of construction. In order to provide a positive answer to the research questions, it would have been necessary to expose and identify, for example, residual postholes, timber or brick perimeter residues, fallen structural material (in excess of chimney bricks at M11-E) or conclusive evidence that defined the structural form and/or style and/or plan.
• Is there any evidence of other domestic features such as gardens, privies, outbuildings, fencing or pathways?	With the exception of domestic rubbish disposal, No.

[4] *Op cit*.

• Who lived here? Is there any evidence to support hypothesis that occupation was by miners? Or even German miners?	There is good reason to believe that miners lived in two of the huts identified but there is no compelling reason to think that they may have been of German origin.
• When was this area occupied?	Material evidence suggests as early as the 1860s.
• Can we distinguish any phases of use?	No.
• What activities were conducted on the site? Was the occupation purely domestic or is there a variety of uses?	Apparently purely domestic.
• What is the extent and integrity of archaeological deposits across the site?	Artefacts, mainly non-diagnostic ceramic and glass, are scattered thinly across the landscape. Some aggregations indicate disposal areas while specific scatters are associated with building residues: a fireplace footing was found identified as MH11-E and a stone door sill and brick apron at MH5-E. The condition of these building residues was 'Substantially Intact' (for what they represented) and their integrity was assessed as 'Minor Modification'.
• What is the geographical extent of activities?	Apparently limited to a strip beside the railway line, although the linear extent of settlement indicated on Maitland's plan, and the size and precise locations of residential units appears extremely unlikely.
• When was this area abandoned?	On present evidence, this cannot be defined, although evidence from rubbish disposal (MH11) suggests human access in the broader area around the turn of the 20th Century, at least.

Comparative observations:

At surface level, it must be said that the study area displayed substantial resemblance to many sites of early miners' residential areas: that is to say, there were no overt signs that the study area had been occupied for residential purposes. In this regard, the study area compared favorably with experience of similar sites elsewhere in the South Maitland coalfield (eg: Hebburn Village site near Hebburn No 1, where all surface and sub-surface material evidence had been removed). At sub-surface level, there is no doubt that the study pursuant to the agreed methodology has provided little material evidence for comparison, although the sub-surface study of land at Thornton, adjacent to the Woodford, later Thornley Colliery, in exposing a sub-surface that was virtually devoid of *structural* material evidence, identified some static material evidence apart from artefacts:

- the base of a hearth at the indicated site of the under-manager's hut. More or less concurrent with the presumed developments on the study area, the hearth site included residual post holes, suggesting a timber-framed, iron-clad chimney; and

- an extensive brick-paved apron with dwarf brick footing of a presumed verandah. No footings were located for the dwelling, located in the area of the former mine manager's dwelling.

None of the features of the study area related to the Farthing family residence. The family's first residence was located between Bell and Cuthbert Streets, Illalong and the second on land purchased in Mrs Farthing's name, fronting Cessnock Road approximately 4km south of Greta Railway Station.

Detailed analysis of artefacts and static material evidence has provided some limited understanding of the nature of the huts' occupants and their way of life, but little in the way of deeper insights. On the basis of the quantum and analytical potential of material evidence exposed by the current strategic investigations, further preliminary excavation in search of miners' huts would not appear to be supported. This suggestion is a value judgment, and is also made on the grounds of:

- the surface evidence and knowledge of the modifications of the surface that had already been made between MH7 and MH9,

- the vegetation cover west of MH5, coupled with the likelihood that the miners' settlement would have been unlikely to extend significantly west of that location, and

- the anticipation that further excavation appears unlikely to provide any more compelling or informative material evidence than is already in hand.

However, the possibility of the survival of some further material evidence cannot be discounted and provision for appropriate management of this potential underpins part of the recommendations of **Section 5**, below.

4.0 SIGNIFICANCE, CONDITION & INTEGRITY

The assessment by SKM pointed generally to an assessment of the study area potential as possessing a local level of cultural significance, at no better than representative degree. The ***agreed methodology*** did not call for a re-appraisal of significance, however to address the concerns of the Branch, the following has been adopted.

In the context of this report, significance is the measure of the value and importance of elements of the archaeological record of the study area to cultural heritage. While the fabric of the archaeological record is the subject of the assessment of heritage significance, the assessment itself is conditioned by the environmental and historical context of the site at the time of the assessment. In this environment, significance can be seen as a variable quality. It follows that the evaluation of heritage significance is not static quality, but rather is evolutionary as a function of changing levels of archaeological/comparative information, community perspectives and cultural values.

The concept of significance derives from:

4.1 ,,, AUSTRALIA ICOMOS UNDER THE ACT

The approach to the assessment of heritage significance affirmed by the NSW Heritage Office adopts as a foundation the four values of the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter). These values are broadly accepted Australia-wide, as ***historical***, ***aesthetic***, ***scientific*** and ***social classifications*** of significance. The implications of these classifications are as follows:

4.1.1 Classification Criteria

The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter) adopts as the foundation of classification the four value types of ***historical***, ***aesthetic***, ***scientific*** and ***social*** significance. The implications of these classifications are as follows:

- ***Historical significance*** considers the evolutionary or associative qualities of an item with aesthetics, science and society, identifying significance in the connection between an item and cultural development and change.

- ***Aesthetic significance*** addresses the scenic and architectural values of an item and/or the creative achievement that it evidences. Thus, an item achieves aesthetic significance if it has visual or sensory appeal and/or landmark qualities and/or creative or technical excellence.

- ***Social significance*** is perhaps the most overtly evolutionary of all classifications in that it rests upon the contemporary community appreciation of the cultural record. Evaluation within this classification depends upon the social spiritual or cultural relationship of the item with a recognisable community.

- ***Scientific significance*** involves the evaluation of an item in technical and/or research terms, considering the archaeological, industrial, educational and/or research potential. Within this classification items have significance value in terms of their ability to contribute

to the better understanding of cultural history or environment and their ability to communicate, particularly to a broad audience within a community[5].

4.1.2 Value Criteria

As a component of the holistic concept of significance, archaeological significance has been described as a measure by which a site may contribute knowledge, not available from other sources, to current research themes in historical archaeology and related disciplines[6]. Archaeology is concerned with material evidence and the archaeological record may provide information not available from historical sources. An archaeological study focuses on the identification and interpretation of material evidence to explain how and where people lived, what they did and the events that influenced their lives.

Considerations material to the study of the archaeology of a relic include:

- whether a site, or the fabric contained within a site, contributes knowledge or has the potential to do so. If it does, the availability of comparative sites and the extent of the historical record should be considered in assessing the strategies that are appropriate for the management of the site.

- the degree and level at which material evidence contributes knowledge in terms of 'current research themes in historical archaeology and related disciplines'.

In relation to 'current research themes in historical archaeology and related disciplines' (see **Section 4.1**), the assessment of cultural significance is conditioned by considerations of historical, scientific, cultural, social, architectural, aesthetic and natural values:

- ***Historical value*** lies at the root of many of the other values by providing a temporal context and continuity, thereby providing an integrating medium for the assessment of social, cultural and archaeological significance.

- ***Scientific value*** depends upon the ability of an item to provide knowledge contributing to research in a particular subject or a range of different subjects.

- ***Cultural value*** attaches to material evidence that embodies or reflects the beliefs, customs and values of a society or a component of a society and/or have the potential to contribute to an understanding of the nature and process of change and its motivation.

- ***Social value*** derives from the way people work(ed) and live(d) and from an ability to understand the nature, process of change and its motivation. Social significance is closely related to cultural significance, in its concern with the practicalities of socio-cultural identification.

- ***Architectural value*** depends on considerations of technical design (architectural style, age, layout, interior design and detail), the personal consideration (ie. the work of a particular architect, engineer, designer or builder) and technical achievement (construction material, construction technique, finish).

- ***Aesthetic value*** addresses the manner in which an item comprises or represents creative achievement, epitomising or challenging accepted concepts or standards.

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5 Marquis-Kyle, P and M Walker, *Australia ICOMOS: The Illustrated Burra Charter*. Australia ICOMOS, Sydney, 1992, 21-23.

6 Bickford, A and S Sullivan, 'Assessing the research significance of historic sites', in Sullivan, S and S Bowdler, (eds), *Site Survey and Significance Assessment in Australian Archaeology*, Department of Prehistory, Research School of Pacific Studies, ANU Canberra, 1984 19-26

- ***Natural value*** attaches to items that either support or manifest existing natural processes and/or systems or provide insights into natural processes and/or systems.

4.1.3 Degree Criteria

In order to provide a ready reference to the ***degree of significance*** *or* ***the distinctiveness*** of an item in general terms, the item may be described as being either 'Rare' or 'Representative' within its community/cultural/geographical level.

4.1.4 Level Criteria

The final denominator of significance is the ***level of significance*** of an item. *Level* is nominally assessable in two classifications, depending upon the breadth of its identifiable cultural, community, historical or geographical context. Thus, within a New South Wales context, a relic may be recognised at the:

- ***Local level*** identifies the item as being significant within an identifiable local and/or regional cultural and/or community group and/or historical/geographical heritage context;

- ***State level*** identifies the item as being significant within an identifiable State-wide cultural and/or community group and/or historical/geographical heritage context;

On a broader front, by derivation, a relic may be recognised at the:

- ***National level*** identifies the item as being significant within an identifiable national cultural and/or community group and/or historical/geographical heritage context;

- ***International level*** identifies the item as having implications of significance for an identifiable cultural and/or community group both nationally and abroad and/or a world-wide historical/ geographical heritage context.

By the simple application of the principles outlined above, a subjective element was present in the significance assessment regime that opened the potential for skewed assessment. As a counter to this potential, the NSW Heritage Office has adopted a set of standardised assessment criteria

4.2 ,,, NSW HERITAGE OFFICE STANDARD CRITERIA

The NSW Heritage Office[7] defined a series of criteria that will be used by the Heritage Council of NSW as an assessment format within NSW. The seven criteria address:

Criterion (a) the importance of an item in the course or pattern of the cultural or natural history of NSW or a local area [ie: *historical*].

Criterion (b) the existence of a strong or special association between an item and the life or works of a person or group of persons important in NSW or local cultural or natural history [ie: *historical*].

Criterion (c) the importance of an item in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW or a local area [ie: *aesthetic*].

7 NSW Heritage Office, *Assessing Heritage Signirficance*, NSW Heritage Office, Sydney, 2001, 9.

Criterion (d) the existence of a strong or special association between an item and the social, cultural or spiritual essence of a particular community or cultural group within NSW or a local area [ie: *social*].

Criterion (e) the potential of an item to provide information that will contribute to an understanding of the cultural or natural history of NSW or a local area [ie: *scientific*].

Criterion (f) the quality of an item to possess uncommon, rare or endangered aspects of the cultural or natural history of NSW or a local area [ie: *rare* degree of significance].

Criterion (g) the demonstration by an item of the principal characteristics of a class of cultural or natural place or cultural or natural environment within NSW or a local area. [ie: *representative* degree of significance].

Within the framework of the same criteria, where this is relevant, the individual contribution of separate elements or components of a relic may be evaluated according to a five-stage grading system, where:

Exceptional indicates that is a rare or outstanding element, contributing directly to the assessment of an item's significance at the appropriate level;

High indicates that an element exhibits an advanced degree of original fabric and is a key element in the assessment of an item's significance at the appropriate level;

Moderate indicates that an element has been modified or has degraded, with limited individual heritage value, but that makes an interpretive contribution in the assessment an item's significance at the appropriate level;

Little indicates that an element has been modified or has degraded to a degree that detracts from the assessment of an item's significance at the appropriate level;

Intrusive indicates that an element is damaging in the assessment of an item's significance at the appropriate level;

4.3 GENERAL STATEMENT OF THE SIGNIFICANCE OF THE STUDY AREA

The study area is significant in its representation of very early worker accommodation in the Greta area, particularly in the relationship between miners and their nearby workplace. The limited material evidence of the study area serves to complement the strong representation provided by the historical survey of the area, whether or not the location of 'miner's cottages' was drawn with survey rigour or (as appears quite possible) by a later annotation.

The location of accommodation for miners in close proximity to their place of employment was a common feature in the developing major coalfields of New South Wales. The availability of labour was a pre-requisite for mining development at an industrial level. In the Newcastle area, this was reflected earliest by transport of crown prisoners to the Coal River and as the mining radiated under the Australian Agricultural Co and thereafter at the mines of the Newcastle-Wallsend Coal Co, Eales and Christie, J & A Brown and at Burwood, then down along the Fernleigh Railway line to Belmont through Redhead. The westerly extension of industrialisation was associated with the development of the Great Northern Railway and

urban development accompanied mines in the Thornton area, West Maitland and Greta. The southerly development followed a similar pattern onto the South Maitland field proper. In this environment, the establishment of a small residential enclave at Greta was symptomatic of the expansion of urban settlement in the lower Hunter River Valley – not rare but representative.

The layout of the town of Greta was surveyed, along with a host of other small potential settlements, in 1842: most of these proposed towns never developed and, indeed, Greta did not develop until after the opening of the Anvil Creek Mine in 1874. Prior to that time, it can be appreciated that accommodation was both ephemeral and irregular, as is represented by the historical plan and generally complemented by the study area archaeology. Within the framework, the results of the study at MH11-E and MH5-E, although limited in the material evidence they contained, are assessed as making a contribution to the heritage values of the study area at a moderate level, at least.

In the light of all of the above, the significance of the study area warrants assessment at the local level to a representative degree, where the locality is defined as the Newcastle/Lake Macquarie and South Maitland Coalfields areas.

4.4 STATEMENT OF SIGNIFICANCE BY CRITERIA

The study area it significant because it:

Criterion (a) [Historical]

- nominally represents one of the attributes of the early stages of expansion of coal mining in the lower Hunter River Valley from the Newcastle basin, in presenting some evidence of:
  - the accommodation of miners close to the mining site;
  - the relationship between primary industrial expansion and the extension of urban settlement;
  - the close relationship between industrial and urban expansion with lines of public transport and communication.

  The material evidence of the study area is limited in its extent and the opportunity it provides for interpretation of close detail, however this material evidence serves to confirm the representation of the early survey of the precinct and the interpretation that can be drawn from this plan.

Criterion (b) [Historical]

- nominally has a relationship with some of the people involved in the operation of early coal mines of the Farthings/Greta locality. While the level of archaeological material evidence is relatively low, it provides persuasive evidence in support of the majority evidence for such a relationship, historical, based on the extant survey plan.

Criterion (c) [Aesthetic]

- does not demonstrate qualifying features under this criterion.

Criterion (d) [Social]

- again, nominally has a relationship with the small community of miners involved in the operation of early coal mines of the Farthings/Greta locality. While the level of archaeological material evidence is relatively low, it provides persuasive evidence in support of the majority evidence for such a relationship, historical, based on the extant survey plan.

Criterion (e) [Scientific]

- is an archaeological site, containing little surface, and limited sub-surface, evidence of its original function but, from an archaeological standpoint, has some potential to yield limited information about the use of the

eastern sector of the study area for residence by miners, possibly some insights into the demographic structure of the little community and the lifeways of the occupants.

Criterion (f) [Rarity]
- is not rare at a local level*.

Criterion (g) [Representative quality]
- although the level of material evidence is limited, the sparse residual is considered representative at the local level*.

* Where the locality is defined as the Newcastle/Lake Macquarie and South Maitland Coalfields.

4.5 CONDITION AND INTEGRITY

This section addresses matters that complement the assessment of significance and assist in the comprehension of the potential of the study area to demonstrate heritage values. *Condition* considers the physical state of the fabric of the resource and its potential for survival. *Integrity* observes the degree to which the residual material evidence is an appropriate representation of the resource in its original form. *Potential Impact* assesses the nature and extent to which the resource will be modified as the result of the projected development.

4.5.1 Condition

The condition of heritage resources and/or individual elements that have been identified above is assessed on a five-stage scale, that is to say:

[i.] *intact*, where the material evidence allows a complete recording of the resource without archaeological hypothesis;

[ii.] *substantially intact*, where the material evidence is incomplete but the recording of material evidence will be sufficient to allow an accurate archaeological reconstruction, with hypotheses based on the archaeological record only;

[iii.] *standing ruin*, where the material evidence is incomplete and the recording of material evidence will be sufficient to define the footprint of the resource and some of its elevations and features but will be insufficient to allow an accurate archaeological reconstruction of the resource without hypotheses based on the archaeological record and on a range of outside sources

[iv.] *ruin*, where the material evidence is incomplete and the recording of material evidence may be sufficient to define part, or the whole, of the footprint of the resource but will be insufficient to allow an archaeological reconstruction of the resource/its features, perhaps spatially and certainly vertically, without hypotheses based on the archaeological record and on a range of outside sources, and in circumstances where the validation of the reconstruction cannot be assured.

[v.] *archaeological site*, implying a mostly sub-surface residue, where the material evidence suggest the former presence of an archaeological resource that cannot be defined without sub-surface investigation..

4.5.2 Integrity

The integrity of archaeological resources and/or individual elements that have been identified above is assessed on a five-stage scale, that is to say:

[i.] *Intact*, where the resource has remained virtually unchanged its form and/or design and/or function can be totally discerned from the material evidence;

[ii.] *Minor Modification*, where the resource has been modified or deteriorated cosmetically and/or in a manner that does not inhibit the discernment of its form and/or design and/or function by archaeological interpretation of the material evidence;

[iii.] *Material Modification*, where the resource has been modified so that its form and/or design and/or function cannot be discerned only by archaeological interpretation and without reference to external sources;

[iv.] *Major Modification*, where the resource has been so modified that attempted discernment of its form and/or design and/or function cannot be achieved by archaeological interpretation of the material evidence and requires a heavy reliance on external sources and in circumstances where discernment one or more elements may be equivocal;

[v.] *None*, where the integrity of the resource has been completely destroyed and the evidence for its form and/or design and/or function is totally external.

4.5.3 Summary of Condition and Integrity

The condition and integrity of the heritage resources of the study area is summarised in **Table 3.1.**

Table 4.1 - Summary of Condition of Resources

Resource	Description	Condition	Integrity
MH11-E	Residual fireplace footing with associated artefacts	**Standing Ruin**	**Material Modification**
MH5-E	Residual door sill and brickbatt step or apron with associated artefacts	**Substantially Intact**	**Minor Modification**

5.0 RECOMMENDATIONS

To the extent that the Branch has relied in part on the Submissions addressed in **Section 2** to sustain the view that further excavation is required, its view does not appear to be adequately supported, particularly given the draft Statement of Commitments referred to at Section 18.3 of the EA. The question of recommendations for further detailed study did not arise for consideration under the terms of the agreed methodology and the suggestion that no further initiating archaeological study appeared warranted was based on the sparse material return from study to date, the likelihood of continuation of sparse results and the anticipation that any further material evidence would be unlikely to advance comprehension of the area and its former occupation(s). It was not intended to give the impression that any party/ies to the proponent's application washed their hands of any archaeological potential that may be subsequently exposed (vide: draft Statement of Commitments).

However, given the views underlying the submissions of the Branch, in the spirit of compromise and particularly in extension of the expression of the draft Statement of Commitments, the following recommendations are made for the continuing study of the study area:

1. In general, in connection with the development, the attention of the developer and all contractors, sub-contractors and employees will be directed to the provisions of the *Heritage Act* 1977 (NSW – the Act)) and in particular to:

   a. the definition of relic under that Act;

   b. the provisions of sections 24-34, 35A-59, 130, 136-7, 139 and 146 of the Act.

2. Having regard to the implications of **Recommendation 1**, the present assessment of the significance of the study area and the nature of the development application that is presently in train, it is not considered appropriate that an application be made to the NSW Heritage Council for an Excavation Permit pursuant to s140 of the Act.

3. In the planning of the project, the proponent should provide time and resources for:

   a. The preparation and delivery of an induction into the heritage implications of the site, and the requirements of the Act, to site employees, contractors and their employees

   b. the completion of any heritage recording, investigation and study recommended below.

4. An archival record of the study area will be created by the following steps:

   a. any project activity in relation to the study area that may have the capacity to obscure, move, modify, damage or destroy any relic of, on or below the surface of the study area will be monitored by a qualified historical archaeologist who will compile an archival record of such activity and the progressive stages of obscurity, movement, modification, damage and/or destruction, as appropriate by:

      i) creating a text record using a suite of field recording materials that and analysis notes and material, and by drafting, in standard formats and field book(s);

      ii) plane survey and developed measured plans and elevations; and

      iii) photographically by monochrome print, colour transparency and digital imaging.

Field notes and records will be in a form appropriate to be appended to subsequent reporting. The graphics of the archival record will be orientated by reference to any extant photography, plans and diagrams of the former workings and occupation, and will otherwise comply with the criteria established for archival recording by the NSW Heritage Office.

b. in the process of monitoring and recording, the archaeologist will salvage and secure such elements and/or components and/or samples of the historical function of the study area and its maintenance and operation and otherwise such artefacts as shall be considered diagnostic and relevant and capable of assisting in the interpretation of the plants and their heritage values.

5. Project personnel will have been briefed on their obligations regarding heritage management and the potential for relics to be exposed during the course of project works in this precinct.. An appropriately qualified and experienced historical heritage archaeologist should be engaged for on-call consultation in the event that significant material evidence is otherwise suspected to exist or is exposed. In the event of suspicion or exposure of significant material evidence, development work should cease in that area until an appropriate assessment is made by the archaeologist and, where warranted, a detailed investigation is completed and an archival record is made, in terms of **Recommendation 4**.

6. Where this is appropriate, the archaeologist will cause work to cease or be suspended in a specific area in order to allow detailed manual investigation. In a detailed manual investigation, the archaeologist will employ small hand tools such as trowels, brushes and the like.

7. Any artefacts salvaged or recovered in terms of **Recommendation 4.b** will be conserved, identified and, to the extent possible, analysed for implication, significance, provenance and post-depositional effects, and:

   a. recorded in the field, individually by provenance, nature, type, fabric/material, shape, dimension and mass on an artefact recovery index field sheet and in terms of found context in a context field record sheet;

   b. in post-fieldwork management, will be cleaned, catalogued according to typology, features and provenance, and interpreted in the context of the total excavation results.

   On completion of post-fieldwork management, artefacts will be appropriately conserved and packed, an inventory will be taken of packing and all packed material will be deposited with the archive of plans and photographic records for permanent archiving by with accessibility to be provided to ***bona fide*** researchers.

8. All elements of monitoring, archival recording and artefact management will be documented in a detailed report to publication standard, illustrated where relevant by photography, plans, elevations and drawings and complying with such conditions as may be contained in the excavation permit.

9. Copies of the reports and all photography, plans, elevations and drawings will be provided to the proponent, the Branch, the NSW State Library and the local history sections of the Newcastle Regional and Cessnock Libraries.

Otherwise than as above, on the grounds of the historical/industrial archaeology of the study area, there appears to be no reason for further constraint or modification of the project.

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Websites:

www.thepotteries.org for references to Staffordshire potteries;
www.Eley.co.uk for references to Eley & Co;

Archaeology & Heritage maim Pty Ltd

Appendix 1

Copy of Phase 4: Archaeological Testing Methodology, Greta Train Support Facility, Greta NSW, (Version 3) by Sinclair Knight Merz

Memo

To	Kylie Seretis, Heritage Branch, Department of Planning	**Date**	18 June 2010
From	Rose Reid	**Project No**	VW04784
Copy	Monteath-Powys, Pacific National, SKM		
Subject	**Phase 4: Archaeological Testing Methodology, Greta Train Support Facility, Greta NSW (Version 3)**		

1. Introduction

Sinclair Knight Merz Pty Ltd (SKM) have been contracted by Pacific National to address historical heritage assessment and reporting requirements issued by the Director-General as part of the Environmental Assessment (EA) for the proposed Greta Train Support Facility (TSF), in Greta, New South Wales. The project is being conducted under Part 3A of the *Environment Planning and Assessment Act* 1979.

The Greta TSF is a major rail development project for New South Wales and is considered to be critical major infrastructure. The TSF will include rail infrastructure, a site office and access road. The TSF is required to service and provision trains for the Pacific National coal freight business. The proposed works will include earthworks throughout the project area for the preparation of the site and construction of the infrastructure required to service locomotives and wagons as well as an administration facility and ancillary development associated with the project. The project will also include connection of the rail tracks within the TSF to the Main Northern Railway.

A Historical Heritage Assessment is required in order to determine the nature of any historical heritage within the project area, impacts to this heritage as a result of the proposed works

2. Results of Previous Investigations

Several investigations have already been undertaken at the project area. A summary of these and any relevant results are provided in the following sections.

2.1 Indigenous Cultural Heritage Assessment

The Indigenous Cultural Heritage Assessment included consultation, desktop assessments and field survey and sub-surface testing in accordance with the requirements of the *National Parks and Wildlife Act* 1974 and the *Draft Community Consultation Requirements for Proponents, for Aboriginal Cultural Heritage* (DECCW 2005).

The project area is gently undulating plain in the south, and becomes undulating to rolling hills to the north of Sawyers Creek. Small outcrops of the sandstone bedrock outcrop in the drainage line at the north of the study area, and on the soft high ridge north of Sawyers Creek.

The results of the Indigenous Cultural Heritage Assessment determined that artefact scatters represent the most common Indigenous site type within the Hunter Valley, followed by isolated stone artefact finds.

To complement and test the findings of the desktop assessment, a field survey was undertaken. During field survey, a total of 151 flaked stone artefacts were identified, as well as two areas of Potential Archaeological Deposits (PADs).

Sub-surface test excavation was undertaken to explore the nature of PADs where works are proposed. A total of 125 test-excavations were undertaken as part of the Indigenous sub-surface testing program. As a result of the sub-surface testing a total of 90 new artefacts were recorded, 8 within PAD 1, and 82 within PAD 2. These artefacts form, with the results of the field survey, two discrete areas of past Aboriginal activity or archaeological cultural heritage *sites* (Sawyers Creek Artefact Scatter 1 [AHIMS# 37-6-2165] and Sawyers Creek Artefact Scatter 2 [AHIMS# 37-6-2164]).

Specific recommendations to manage Indigenous cultural heritage during the construction and operation of the TSF have been developed in the Indigenous Assessment report.

The following results of the Indigenous Cultural Heritage Assessment are relevant to the preparation of this methodology:

- A stratigraphic drawing of test pit TP2, located near to the proposed location of the miners houses, indicates that the surface soil is a light brown silty loam to a maximum depth of 15cm, underlain by mottled yellow and brown clay. Sandstone bedrock was encountered at approximately 20 cm below ground surface.
- Of the 125 test pits excavated during the Indigenous Assessment, 21 contained historic artefacts. All of the historic artefacts were located at depths of less than 20 cm.

2.2 Historical Heritage Assessment

A Historical Heritage Assessment has been undertaken which documents the results of background research, a field assessment (field survey and sub-surface testing), an assessment of heritage significance and an assessment of impacts to features within the TSF project area as well as an assessment of impacts to historical heritage places within 1km of the TSF.

The Historical Heritage Assessment has so far comprised three Phases, namely field inspection (Phase 1), pedestrian survey (Phase 2) and sub-surface testing (Phase 3).

The scope of sub-surface testing already undertaken in the vicinity of the miners houses includes the following:

- 38 shovel test pits (STPs), 50cm by 50cm, in five east – west trending transects. These STPs were excavated to determine the location of historical features in the central part of the project area. This is an area associated with a surface scatter of artefacts exposed by grader activity during the formation and maintenance of a trotting track. These historical artefacts may be related to occupation of the miners houses. Artefacts were found on the surface and at up to 10 cm below ground surface.

The results of the Historical Heritage Assessment to date indicate the following:

- The background research did not reveal any additional information about the miners houses, other than the approximate location of the 11 residences, based on the historic map.
- There is little historical information available about the possible nature of construction of these houses, however, based on the location (rural), the era (1870s-1890s), the demographic (low working class) and the availability of housing materials, the construction was likely to be of timber, with or without posts, with a dirt floor and possibly a brick or stone hearth (see photo in Attachment 2). There may have been shallow drainage channels around each house to divert water away.
- The ground visibility during survey and previous sub-surface testing was poor (approximately 15%) in the approximate location of the miners houses.
- Parts of the project area have been subject to high degree of ground disturbance, in particular the trotting track area, which is regularly graded.
- Several scatters of historical material, mainly domestic, were found across the study area during different phases of the assessment. These scatters were located in areas recently disturbed by grading activities in the vicinity of the trotting track.
- Some anecdotal information has indicated that the houses may have belonged to German miners. However, the report concludes that there is little evidence within the study area to confirm the location, nature or significance of a row of miners houses, marked on some historical plans.

This methodology seeks to further investigate the location and nature of occupation of 11 historic miners houses, which accordingly to a historic map (1873) are potentially located in the eastern part of the project area, adjacent to the Great Northern Railway. Additional testing is proposed in order to determine the answers to some of the research questions posed n Section 3 of this methodology.

3. Research Design

Archaeological research objectives are typically framed as a series of questions. The key questions relating to the miners houses are as follows:

- Is there any material evidence for domestic occupation in the eastern part of the project area?
- If so, are we able to determine the type and nature of construction? Are there any structural remains?
- Is there any evidence of other domestic features such as gardens, privies, outbuildings, fencing or pathways?
- Who lived here? Is there any evidence to support hypothesis that occupation was by miners? Or even German miners?
- When was this area occupied?
- Can we distinguish any phases of use?
- What activities were conducted on the site? Was the occupation purely domestic or is there a variety of uses?

- What is the extent and integrity of archaeological deposits across the site?
- What is the geographical extent of activities?
- When was this area abandoned?

These questions assist in the development of a methodology for the proposed excavation.

4. Proposed Archaeological Excavation Methodology

4.1 Purpose of the Archaeological Assessment

The purpose of this archaeological assessment is to:

- Evaluate the likely extent, nature and integrity of the archaeological deposit;
- Determine the significance of the resource; and
- Provide the appropriate management and mitigation measures.

4.2 Preparation for Fieldwork

An Archaeological Excavation Permit, under Section 140 of the Heritage Act, 1977 may be required prior to the commencement of works.

Site conditions will dictate access to the site, as access requires a creek crossing. Heavy machinery (an excavator) will need to be mobilised to site, and the moisture levels on site may limit access for the excavator.

Prior to the fieldwork a safety plan will be prepared and authorise by the Project Manager (Jo Brooke) and Project Director (Vanessa Edmonds).

Potential constraints to the field program will include:

- The location and extent of the PADs identified during the Indigenous Assessment;
- The location and extent of registered Indigenous Sites;
- Ecologically sensitive vegetation, to be advised once the locations of the excavations are identified;
- Areas of existing ground disturbance;
- Adverse weather conditions (ie more than 1 day of rainfall)

The location and extent of the PADs, registered Indigenous sites and ecologically sensitive vegetation will be overlaid on the site plan prior to undertaking fieldwork to determine the limitations that these constraints may place on the location of archaeological testing excavations. If necessary the trench locations may be altered to accommodate these constraints.

4.3 Excavation Methodology

The project is being conducted under Part 3A of the *Environment Planning and Assessment Act* 1979.

Two areas within the eastern part of the study area have been selected for further investigation using excavation techniques. These areas are at the southern and northern ends of the supposed location of the miners houses (see map in Attachment 1).

The process for excavation will involve the following:

1) A local survey datum, keyed to Australian Height Datum will be established to record the location and levels of extant deposits and features;
2) Marking of the two large areas to be excavated (each approximately 50m×50m), and recording of the extent of the areas on differential GPS;
3) Detailed pedestrian survey of these areas, GPS recording, retrieving and bagging of any historical artefacts detected on the surface.
4) Machine stripping of overburden, mainly grass, covering the areas;
5) Detailed examination of the topsoil once overburden has been removed to determine areas of interest. Additional overburden removal may be required to allow the extent of the houses (should structural features be identified) to be planned within the area investigated.
6) If any features are revealed these should be cleared by hand. Excavation will be by archaeological (stratigraphic) context. Any features detected will be recorded on a detailed site plan.
7) Marking of locations of approximately four 2m×8m trenches, in areas of interest, two in each 50m×50m area. The exact location of these trenches will be determined once the overburden has been removed. Should structural features be identified, the trenches will be located to allow investigation of the extent of the features and establish the integrity of the deposits within the larger context.
8) Excavation of trenches by archaeological context to maximum depth of 30cm (the base of historic artefacts identified during previous investigations).
9) Detailed manual investigation (using hand tools) and archaeological documentation (per standard methods) of specific features identified the excavated areas.
10) Collection of soil samples will be undertaken if a privy is encountered during the excavation. These will be sent to a NATA accredited laboratory for appropriate analysis.
11) On completion of the excavation, any archaeological features identified will be covered with geofabric and the area will then be backfilled with the overburden previously removed.

The objective of this work will be exposure of historical features for (i) recording, and (ii) to facilitate decision-making re their future management.

If evidence of the houses or other structures and significant relics are uncovered then the NSW Heritage Branch (Department of Planning) and Infrastructure Projects will be notified.

4.4 Contingency for the discovery of Indigenous cultural heritage material during works

At any time during the historical archaeological excavation, if Indigenous cultural heritage material, features and/or deposits are found, all works that could potentially harm the cultural heritage must cease (including stopping all works within at least 10 m). Only works that are required to comply with occupational and environmental health and safety standards and/or to protect the cultural heritage should occur. Excavation works may recommence when the Field Supervising Archaeologist has deemed that appropriate mitigation or salvage has occurred.

Where Indigenous cultural heritage material is discovered in the works area, Pacific National must engage an archaeologist to record in detail the location and context of the material and decide if the material forms a new site or is part of a previously recorded site. The archaeologist must complete and submit relevant AHIMS recording forms to DECCW. The archaeologist should facilitate the involvement of the registered Indigenous stakeholders and in consultation decide the most appropriate course of action for the material. This may include reburial of the material in a durable container to an area unlikely to be disturbed. If reburial is undertaken, the location of this should be recorded and all documentation provided with an updated AHIMS site card.

If the cultural heritage material and/or deposits found are deemed to be *in situ* and of moderate or higher significance, it is preferable to avoid impact if possible. If avoidance is not possible, a suitably qualified and experienced archaeologist must be engaged to conduct salvage excavation. The archaeologist must facilitate the involvement of the registered Indigenous stakeholders and develop a suitable methodology for salvage excavation in consultation with them. This may include, but not be limited to, a 1m x 1m manually excavated trench (or more trenches of differing dimensions where appropriate and necessary) surrounding and encompassing the material/deposit, proceeding stratigraphically where possible and if not, in 5cm spits. This should also include, where possible and appropriate, collection of samples suitable for radiometric dating.

The archaeologist and the registered Indigenous stakeholders should then agree on the most appropriate course of action for the salvaged material and appropriate custodianship.

4.5 Recording

All historical artefacts or structural remains will be recorded in accordance with the NSW Heritage Office publication *Archaeological Assessments* (1996), in the following manner:

- All the location (x, y, z) of all historical artefacts will be recorded on a field context recording sheets for each trench.
- Scaled site plans and profile or cross-section drawings will be prepared showing the location of all archaeological deposits and features revealed by excavation. These will be located relative to the site datum;
- The location, dimensions and characteristics of all archaeological features and deposits will be recorded on sequentially numbered context recording sheets;
- A stratigraphic matrix showing relationship of context will be prepared; and
- Colour digital photographic recording of all phases of the work will be undertaken.

4.6 Analysis, Conservation and Storage of Artefacts

In accordance with the NSW Heritage Office publication *Archaeological Assessments* (1996), all artefacts collected during the fieldwork will be recorded in an artefact catalogue, which detailed location, provenience, depth, material and datable information where available.

Temporary storage of artefacts recovered will be at SKM offices, Armadale Victoria. All artefacts will be labelled and stored in a locked secure storage area. Post-excavation analysis will be undertaken by appropriately qualified staff, namely Peter Holmes or Rose Reid depending on the classes of artefacts recovered.

Greta Historical Museum has indicated that it will be the custodian for the historic material.

If significant finds requiring conservation are uncovered the need for and cost of conservation will be determined and a decision made in consultation with the Heritage Branch.

The packing and labelling of the collection will be to specified standards agreed with the receiving institution.

5. Reporting

The draft Historical Heritage Assessment report will be updated to include the results of the additional excavation as proposed. The report will meet the requirements of section 4.11 of the Heritage Office publication *Archaeological Assessments* (1996).

6. Project Team

We propose to undertake the project using the following team:

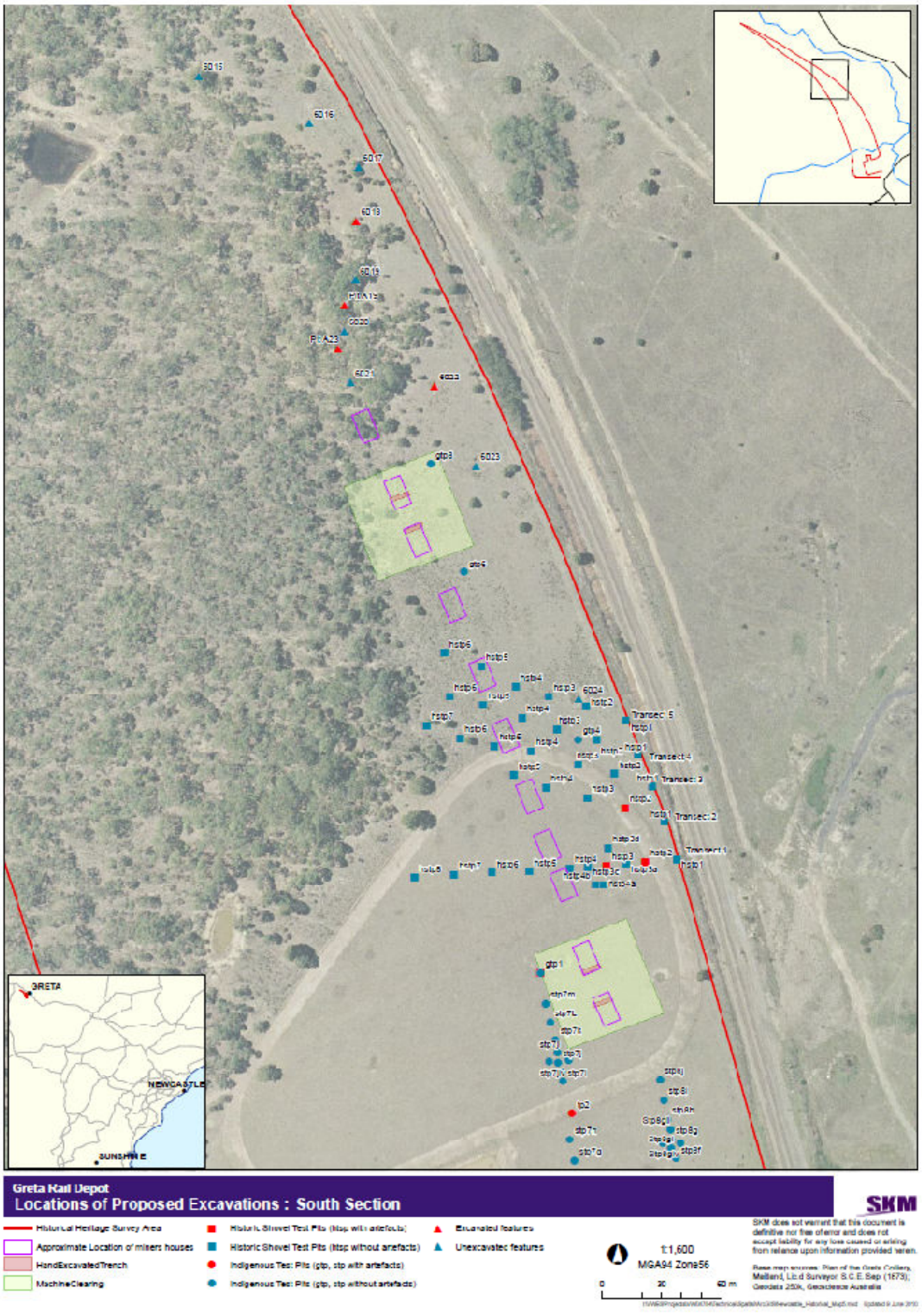
- Project Director: Vanessa Edmonds;
- Project Manager: Rose Reid
- Field Supervising Archaeologist: Robyn Jenkins
- Field Archaeologists: Vanessa Edmonds, Joseph Brooke, Rachel Loizou.

Rose Reid

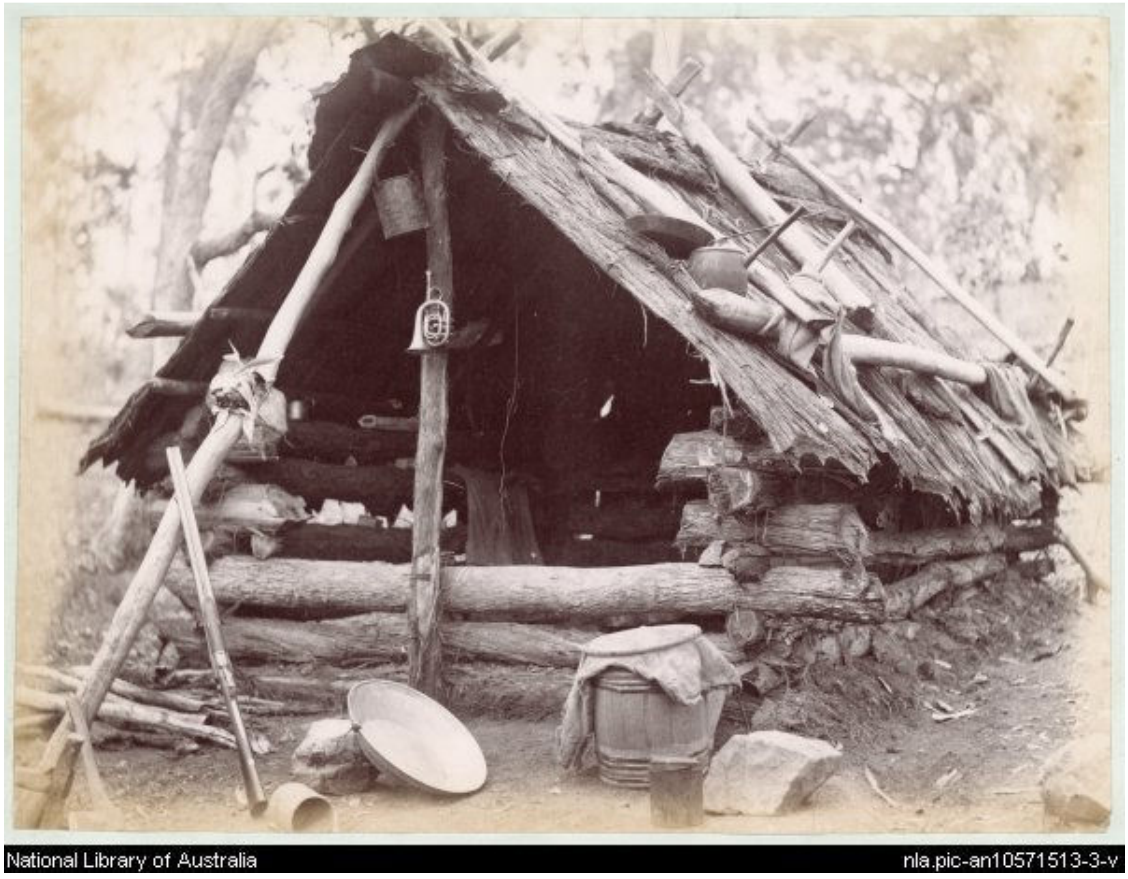
Project Manager

Phone: (03) 9248 3433
Fax: (03) 9248 3400
Mobile: 0407 470 500
E-mail: rxreid@skm.com.au

Attachment 1: Map of Proposed Excavation Locations



Attachment 2: Sample Photos of Miners Huts



Miners Hut, East Maitland, NSW

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Appendix 2

Copies of Field Records

Site Description Sheet

GTSF / MHS-6-10-11
Site Number

Site Name: MINERS' HUT SITES

Study Area: 2x50² m areas

Site Description: Suggested sites of miners' huts, W side of GNR N Greta Rly Stn

Site Type:

Significance: [Check appropriate]

Arch	Hist	Soc	Tech	Aes
(Arch)	(Hist)	(Soc)	(Tech)	

Rare	Rep	Nat	State	Reg	Loc	None
	(Rep)				(Loc)	

Map Series: NSW CMA Topographic Zone: **Name:** Greta

Number: 9132-1-S **AMG Gridref:** Range E. 378015 to 377750 N 6382485 to 6382115

Locality: ≈ 1km N Greta Village Centre, N side of GNR ≈ Barns N Greta Rly Stn, spread along ≈ 600m

Cadastral Data: County: Northumberland Parish: Branxton

Lot/Portion: 203/204 Other:

Title: NK

Status- Usage: Farmer grazing and part trotting exercise track

Ownership: Pacific National

Occupant: Pacific National

Control: Owner / Landholder

Access: Off Mansfield Street, dirty tracks across Sawyers Ck

Present Use: Awtg development

Condition: [Check appropriate]

Intact	Substantially Intact	Standing Ruin	Ruin	Archaeological Site
				(Archaeological Site)

Integrity: [Check appropriate]

Intact	Minor Modification	Material Modification	Major Modification	None
		(Material Modification)		

Current Threats: Ambient ground will be excavated / cut & fill to reduce level to suit rail.

Informant: Stephen Fray & ors, Thrive

Site Recording Sheet - Physical Evidence

GTSF / MH 11-E
Site Number

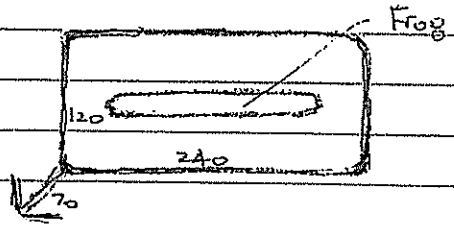
Site Name: MH 11 Actual Location

Site Description: Fireplace Site

Initial sighting of 2 placed bricks in stretcher
Exposure revealed footing of fireplace opening S,
1520 x 850, 2 leaf, stretcher bond, dry-laid in
2 courses, laid flat on yellow clay substrate
On SW cnr, residue of base course of fireplace
structure of 1 brick & 2 bats, with lime mortar bond.

Scatter of bricks / bats W – SW from ≈ 1m N
of footing. Scatter of ceramic, glass, iron, metal,
slate & shotgun cartridge base

Bricks routinely 240 L x
120 W x 70 D, long narrow
rectangular form frog



Site Features:	Feature Numbers:	
Fireplace footing	6	
Fireplace structure (fragment)	7	
Qty ceramic	2	No SFRS – see ECR # A/01
Window glass	3	
bottle glass	4	
Iron	5	
Slate	8	
Shotgun cartridge base	9	

Site Recording Sheet - Physical Evidence

GTSF / MH11.
Site Number

Site Name: Site of S'most miner's hut by survey

Site Description:

Clear surface with grass vegetation
3x(8 x 1m) trenches.
@ -150 - evidence of human intervention

The site was located by x, y, z coordinates in survey, found ≈ mid-height of gentle southerly rise at a point determined by reference to 1873 plan of Greta Colliery (Maitland Surv'r).

Site Features:	Feature Numbers:
Remains of Campfire	1
Qty of ceramic	2
Window glass	3
Bottle glass	4
Iron	5

No SFRS - see ECR # 4101

Site Recording Sheet - Physical Evidence

GTSF / MH 10
Site Number

Site Name: Site of S'most – 1 miners hut by survey.

Site Description:

Gear surface with grass vegetation.
2 x (8 x 1m) trenches
@ -150 – no evidence of human intervention

The site was located by N, E ? coordinates in survey, found a mud height of gentle S-Westerly rise at a point determined by reference to plan, Greta Colliery (Maitland, 1975)

Site Features:	Feature Numbers:
Nil to.	

Site Recording Sheet - Physical Evidence

GTSF / MHG
Site Number

Site Name: Site of central (of 11) miners huts by Survey

Site Description:

Obscured surface, grass and scrappy undergrowth vegetation
2x (6x1m) trenches
@ 150 – no sign of human intervention
The site was located by x, y, z coordinates in survey, found below mid-height of gentle SW rise at a point determined by reference to historic Greta Colliery (Maitland, 1893).

Site Features:	Feature Numbers:
Nil fd.	

Site Recording Sheet - Physical Evidence

GTSF / MH 5

Site Number

Site Name: [illegible] N-4 miner's hut by survey

Site Description:

Obscured surface, grass and undergrowth vegetation, [illegible] metres
@ 150. no sign of human intervention
Site located by x, y, z coordinates in survey, found low on gentle SW rise at a point determined by reference to plan, Greta Colliery, (Maitland 1873).

Site Features:	*Feature Numbers:*
NS. 1 fd.	

Site Recording Sheet - Physical Evidence

GTSF / MHS-E
Site Number

Site Name: MHS Actual Location

Site Description: Doorsill and apron

Initial sighting of an assemblage of 6 brickbatts, appearing placed. Exposure revealed a [illegible] pad of bricks and (mostly) brickbatts forming a stepping apron E of an assemblage of sandstone slabs. Bricks/batts & sandstone [illegible] clay base.

Apron: irregular shape, max length 1340, width 890
Sill: damaged by machine, oriented N-S max length
width

Scatter of ceramic, glass, iron, bone

Specific bricks identified: heart frog of "[illegible] Pack"; early Maitland rectangular frog

Site Features:	Feature Numbers:
Sandstone door sill	10
Brick / batt apron	11
Qty ceramic	2
Window glass	3
bottle glass	4
iron	5
bone	12

} NO SFRS - see ECR & A/01.

Site Recording Sheet – Sources

GTSF / MHS 5, 6, 10, 11
Site Number

Site Name: MINERS' HUT SITES

Documentary Evidence:

'Train support facility, Greta, New South Wales: Historical heritage assessment', SKM (Holmes et al) 2010

Oral Evidence:

Pictorial Evidence:

Plans, Maps:

Maitland. 1873. 'Greta Colliery' (NLA Map f80A, f80B)

Maps. Greta Town

Maps. Parish Branxton, Co N'land

Cadastral Survey Data:

9132 1 S, Greta, Topographic Map

Monteath & Powys, 2010. Survey verification of two mapped locations, Miners' Huts (Based on Maitland, 1873)

Site Feature Recording Sheet

GTSF / MH11
Site Number
GTSF / MH11 / 1
Feature Number

Site Name:	Site of Stone miners hut by Survey
Feature Name:	Remains of Camp fire
Location:	Square D1
Description of Feature:	Roughly circular deposit of black ash and cinder ≈ 300 diameter
Historical Context:	N/K.
Structural Development:	Non-structural.
Ownership:	Pacific National
Usage:	Former grazing, trotter t's
Access:	Off Mansfield St
Present Site Use:	Awtg development
Owner/Occupant/Control:	Pacific National

Condition:					***Integrity:***				
Intact	Substantially Intact	Standing Ruin	Ruin	Archaeological Site	Intact	Minor Modification	Material Modification	Major Modification	None

Current Threats/Risks: Will be destroyed by development

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Site Feature Recording Sheet

GTSF / MH II-E
Site Number
GTSF / MHII-E / 6
Feature Number

Site Name: Site of S'most Miners' Hut (MHII eastern)

Feature Name: Fireplace footing

Location: Across Squares B4 - C4

Description of Feature: Assemblage of dry-laid bricks, stretcher form, 2 leaf and 2 courses based on yellow clay; with one brick + 2 bricks, lime mortar, base course of fireplace, at SW corner

Historical Context: Apparently: accompanied building of MHII

Structural Development: Footing: dry laid, [illegible] stretcher, two courses on yellow clay substrate.

Ownership: Pacific National	**Usage:** Former grazing, trotter training
Access: off Mansfield St	**Present Site Use:**

Owner/Occupant/Control: Pacific National

Condition:

Intact	Substantially Intact	Standing Ruin	Ruin (circled) ⊗	Archaeological Site

Integrity:

Intact	Minor Modification	Material Modification (circled) ⊗	Major Modification	None

Current Threats/Risks: Will be destroyed by development

⊗ of Fireplace footing substantially intact / minor modification.

Site Feature Recording Sheet

GTSF /MHS-E
Site Number
GTSF /MHSE/ 10
Feature Number

Site Name: Site of Miner's Hut 5th from N (MHS)

Feature Name: Door Sill

Location: Across D3-D4 Squares

Description of Feature: Assemblage of sandstone laterally N-S, max length 1500, max width 330 – damaged but possibly 3 slabs.

Historical Context: Apparently accompanying building of MHS.

Structural Development: Stone door sill above external brick layer to hut entrance

Ownership: Pacific National

Usage: Former grazing, timber harvesting,

Access: Off Heyfield Rd.

Present Site Use: Awtg dev+.

Owner/Occupant/Control: Pacific National

Condition:

Intact	Substantially Intact	Standing Ruin	Ruin	Archaeological Site
		(Standing Ruin)		

Integrity:

Intact	Minor Modification	Material Modification	Major Modification	None
	(Minor Modification)			

Current Threats/Risks: Will be destroyed by development.

Site Feature Recording Sheet

GTSF / MHS-E
Site Number
GTSF / MHS-E / 11
Feature Number

Site Name: Site of Miner's Hut 5th from N (MHS)	
Feature Name: Brick apron & Stone door sill	
Location: Across D3-D4 Squares, E of Feature 10	
Description of Feature: Assemblage of roughly fitted bricks & brickbatts max length N-S 1340, max width 890 - included 1x Brick + 1x Batt of "the Pack (♡)". 1x Brick long rect frog; finished at W by assemblage of Sandstone sill, max 1500 x 330.	
Historical Context: Apparently: accompanied building of MHS.	
Structural Development: Brick / batt apron external to stone door sill to hut entrance	
Ownership: Pacific National	**Usage:** Former grazing trotter training
Access: Off Mansfield St	**Present Site Use:** Awtg devt
Owner/Occupant/Control: Pacific National	

Condition:

Intact	Substantially Intact (circled)	Standing Ruin	Ruin	Archaeological Site

Integrity:

Intact	Minor Modification (circled)	Material Modification	Major Modification	None

Current Threats/Risks: Will be destroyed by development.

Site Survey Index by Site Type

GTSF / MH11.-1
Map/Plan Number

Site Type: Miners' huts

Site Numbers:	Site Names:
MH 11	Site of S'most miner's hut (MH11) by survey.
MH 10	Site of S+1 miner's hut (MH10) by survey.
STT	Southern depression test trench
SCTT	Southern central depression test trench
NCTT	Northern central depression test trench.
NTT	Northern depression test trench
MH6	Site of central miner's hut (MH6) by survey
MH5	Site of N-4 miner's hut (MH5) by survey
MH11-E	Actual site of S'most miner's hut (MH11)
MH5-E	Actual site of N-4 miner's hut (MH5)

Excavation/Survey Context Index

GTSF / ALL
Map/Plan Number

MH 11 = MH11-E
MH 10 = MH10-E
MH 6
MH 5 = MH5-E

Site Name: All as indicated

Excavation Context #	Date Issued	Description	ECR Sheet #	Excavator [Initials]
1	060710	Natural surface of ambient ground including vegetation cover	Comma	
2	060710	Surface -50 after vegetation stripped - light - mid brown silty loam to depth averaging 120 - 140 from ambient surface	✓	
3	060710	Surface of horizon of yellow clay at depth from ambient surface	✓	
4	060710	Surface to 180 from ambient surface to Context 3 - deposit of ash & charcoal.	MH11 STT.	

Excavation/Survey Context Recording Sheet

GTSF / 2 / MH11 / 1
Site/Context/Locater(s)/Number

Site: MH11

Project: 8 x 1 Test Trench

Date Excavated: 6/1/10, by PR & RG
Recorded: 6/1/10, by PR
~~Phased: / / , by~~

Description: 1st of 3 test trench at this location to validate accuracy of 1873 plan & survey. *Centred 2250 S/ Survey peg.

SPOT LEVELS RECORDED

SURFACE	BASE
Datum	Datum
A	A
B	B
C	C
D	D
E	E

RL DEPTHS: A −150, B −150, C −150, D −150, E −150

Soil – Colour: mid brown
Type: loam
Texture: Nominally friable (very damp/heavy)
Thickness/Depth: 150
Horizon Definition: Clear over yellow clay at 180

Disturbance: Not obvious – possibly has been ploughed (no lands obvious) – long term timber clearance – no roots evident –

Context Physically Under				3			
Context Physically Above				2			
Context Physically Abuts				1			
Context Correlated to				/			

Chronological Sequence: Contemporary (?) original European settlement period

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Ceramic	tba	23 small pieces ✓			
① Glass		4 pcs, bottle ✓			
② Ceramic		13 pcs ✓			
② Glass		5 pcs, bottle ✓			
② Iron		Flat ✓			
③ Glass		4 pcs, bottle ✓			
③ Ceramic		1 pce ✓			
② Brick		2 bats ✓			

Comments:

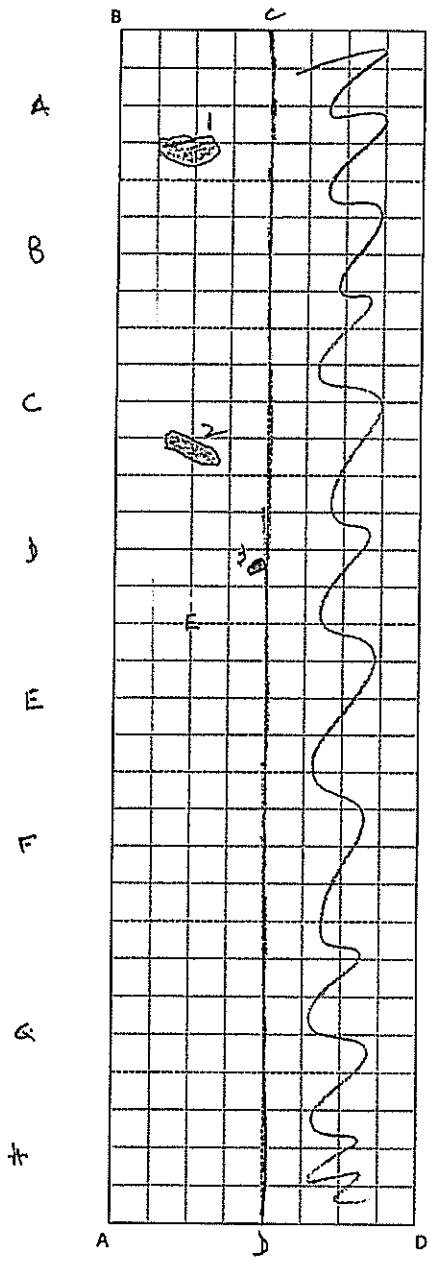
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

_____/_____/_____/_____
Site/Context/Locater(s)/Number

MN

BASE PLAN



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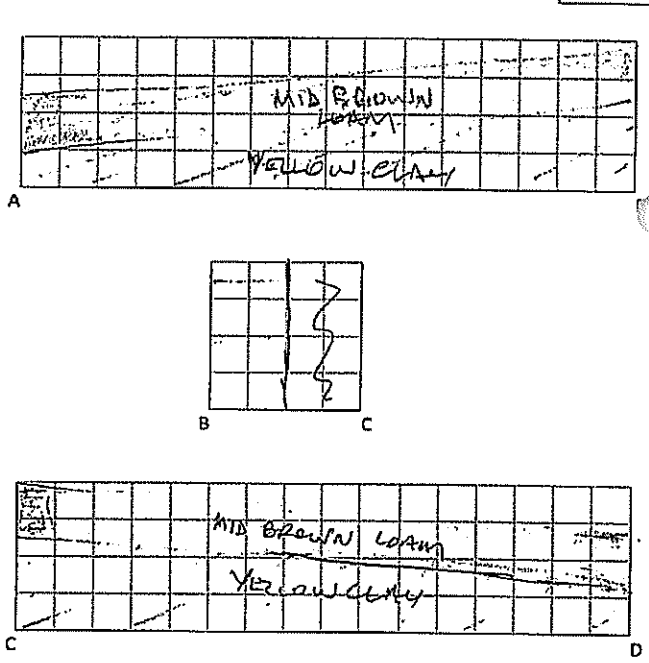

Scales [mm]:						
500	1000	1500	2000	2500	3000	*Horizontal*
100	200	300	400	500	600	*Vertical*

Scales [mm]: Horizontal								
250	500	750	1000	1250	1500	1750	2000	2250

NB
3RD TRENCH STERILE

Drawn by: [signature]

Date: 6/7/16

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Excavation/Survey Context Recording Sheet

GTSF / 2 / MH11 / 2
Site/Context/Locater(s)/Number

Site: MH11

Project: 8 x 1m Test trench

Date Excavated: 6/7/10, *by* RR & RG

Recorded: 6/7/10, *by* RR

~~*Phased:* / / , by~~

Description: 2nd of 3 test trench to validate(?) accuracy of 1873 plan & survey.
*Centred 1350 S/survey peg

SPOT LEVELS RECORDED

	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		

RL DEPTHS: A – 150, B – 150, C – 150, D – 150, E – 150

Soil – Colour: Mid-brown

Type: loam

Texture: Normally friable (very damp)

Thickness/Depth: 150

Horizon Definition: Clear, over yellow clay at 180

Disturbance: Not obvious – possibly has been ploughed (no tracks obvious) – long term timber clearance – no roots evident

Context Physically Under				3					
Context Physically Above				1					
Context Physically Abuts				2					
Context Correlated to				/					

Chronological Sequence: Contemporary/Original European Settlement Period.

Materials	*Mass(gm)*	*Observations*	*Materials*	*Mass(gm)*	*Observations*
① Glass	tba	Clear, flat, window			
① Ceramic		17pcs, non-diag			
② Ceramic		Cup handle			
② Brick		bait			
③ Ceramic		7 pcs, non-diag			
③ Glass		2pcs, bottle			
④ Ceramic		3 pcs			
⑤ Bone/antler		Camptive resolve/NOT SAMPLED			
⑥ Brick		2 x batts			

Comments: No post holes seen – 3rd test trench elected N/ survey peg To maximise possible range of artefacts/ post holes

*TRENCH 3 PROVED STERILE

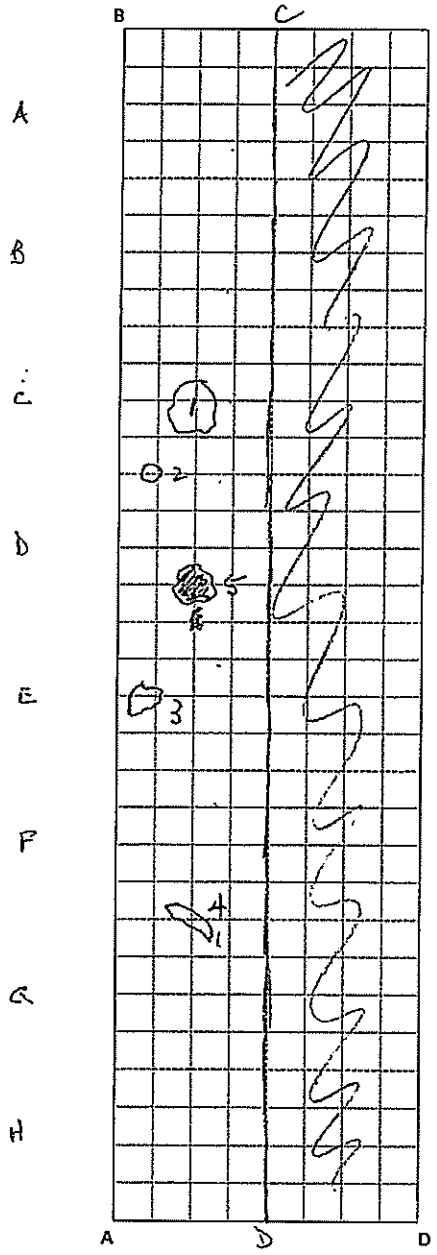
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

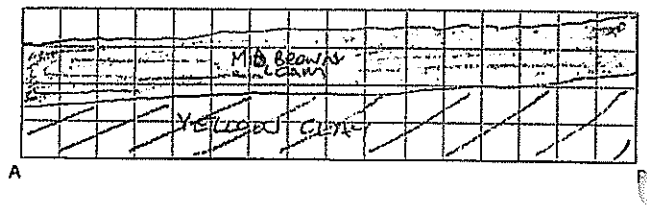
GTSF / 2 / MH11 / 1
Site/Context/Locater(s)/Number

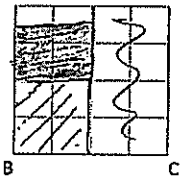
MN

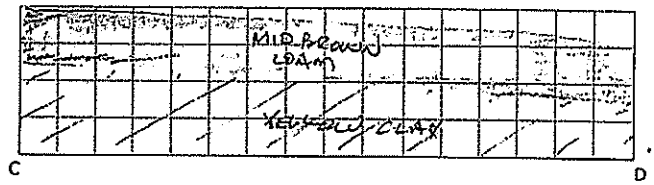
BASE PLAN

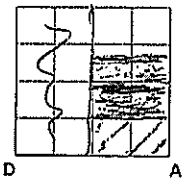


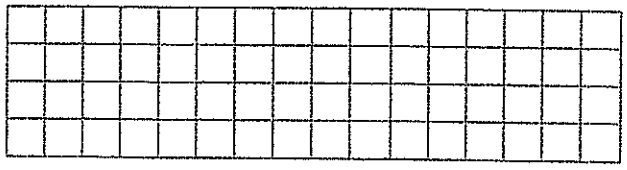
SECTIONS











Scales [mm]:						
500	1000	1500	2000	2500	3000	*Horizontal*
100	200	300	400	500	600	*Vertical*

Scales [mm]: Horizontal								
250	500	750	1000	1250	1500	1750	2000	2250

Drawn by: AK

Date: 6/7/10

Excavation/Survey Context Recording Sheet

GTSF / 2 / MH11-E / A4
Site/Context/Locater(s)/Number

Site: MH11-E

Project: Grid Square A4

Date Excavated: 21/7/16, by PR & RG
Recorded: 21/7/16, by PR.
~~Phased: / / , by~~

Description: Sp immed W of fireplace

SPOT LEVELS RECORDED

	SURFACE	BASE
Datum		
A		
B		
C		
D		
E		
RL DEPTHS	A -150, B -150, C -150, D -150, E -150	

Soil – Colour: Mid brown
Type: Heavy sandy loam
Texture: Nominally, friable, heavy/damp
Thickness/Depth: 150 above yellow clay
Horizon Definition: Clear

Disturbance: Unclear – possibly prev ploughed (no sign of lands) – timber cleared (prob more than once) – no roots

Context Physically Under				3				
Context Physically Above				1				
Context Physically Abuts				2				
Context Correlated to								

Chronological Sequence: Contemporary with original European settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
1. Glass	tba	2pcs +120			

Comments:

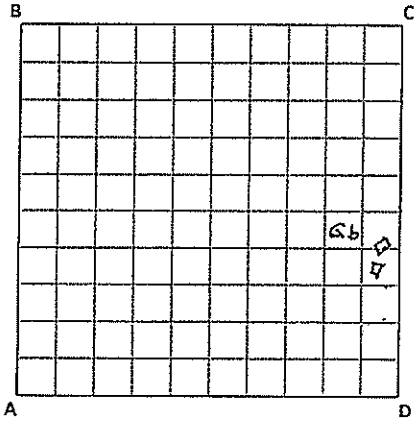
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

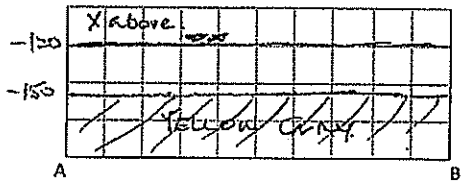
GTSF / 2 / MH11-3 / _____
Site/Context/Locater(s)/Number

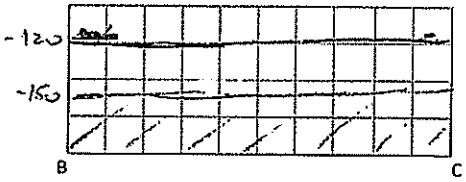
MN

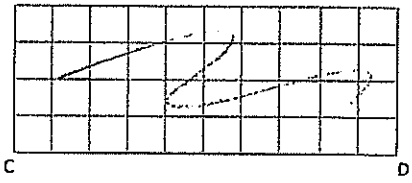
BASE PLAN

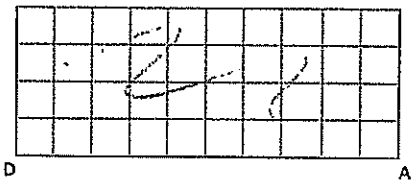


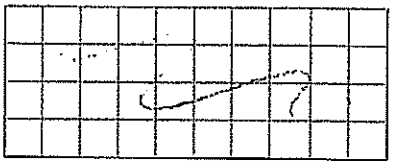
SECTIONS











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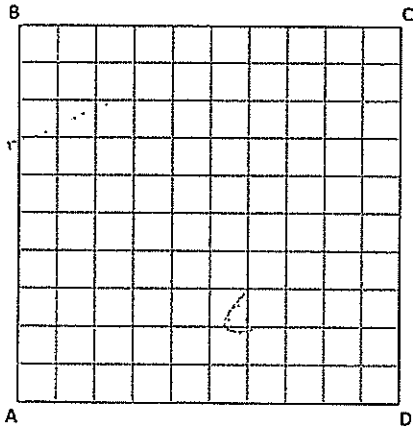

Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 7/7/20

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PACIFIC NATIONAL
GRETA TRAIN SUPPORT FACILITY

Excavation/Survey Context Recording Sheet

GTSF / 2 / MH11-E / C4
Site/Context/Locater(s)/Number

Site: MH11-E

Project: Grid Square C4

Date Excavated: 21/7/10, by PR & RA
Recorded: 21/7/10, by PR.
~~Phased: / / , by~~

Description: Sϕ immed E of fireplace & Cont° part of fireplace.

SPOT LEVELS RECORDED

SURFACE Datum___ A___ B___ C___ D___ E___

BASE Datum___ A___ B___ C___ D___ E___

RL DEPTHS A___ B___ C___ D___ E___

Soil – Colour: Mid brown
Type: Heavy sandy loam
Texture: Normally friable. heavy/damp
Thickness/Depth: 150
Horizon Definition: Clear, above yellow clay

Disturbance: Part disturbed by fireplace – subsequent post ploughing, timber cleared (perhaps 7/2) no roots

Context Physically Under				3				
Context Physically Above				1				
Context Physically Abuts				2				
Context Correlated to				—				

Chronological Sequence: Contemporary with original European settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
1. Brass	tba	'Eley' 12g shotshell base			

Comments:

See Sketch Over>>>

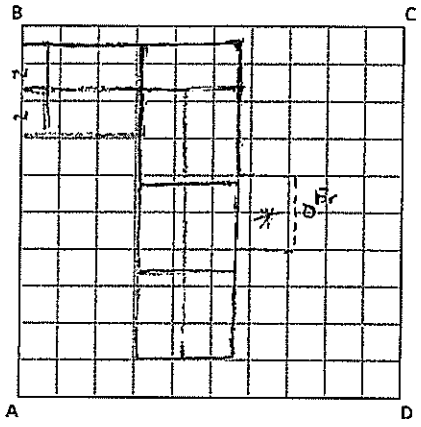
100602_08

Excavation/Survey Context Recording Sheet — Drawings

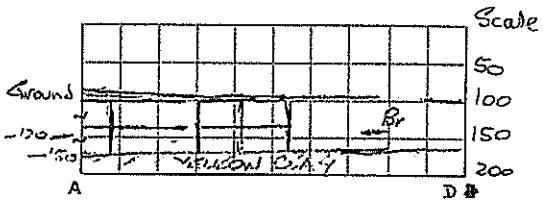
GTSF / 2 / MUH-E / C4
Site/Context/Locater(s)/Number

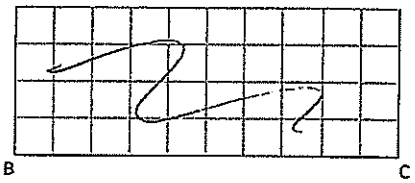
MN

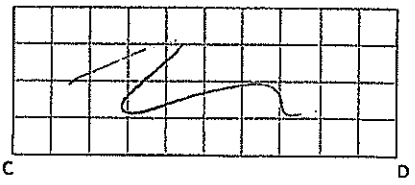
BASE PLAN

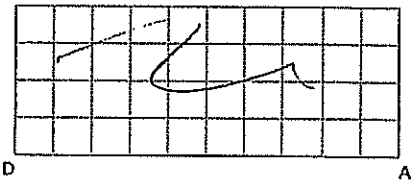


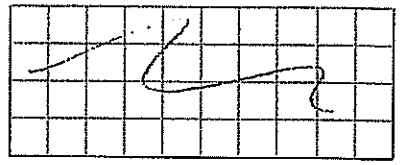
SECTIONS











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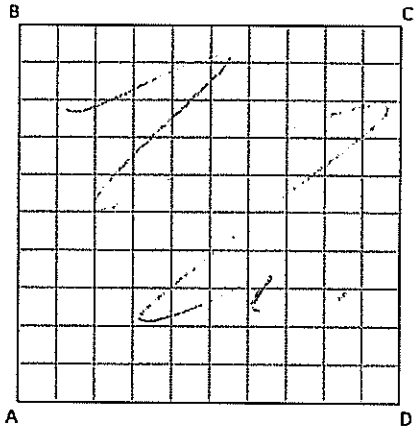


Scales [mm]:					
100	200	300	400	500	*Horizontal*
20	~~40~~	~~50~~	~~80~~	100	*Vertical*

See above: Vertical

Drawn by:

Date: 21/7/10

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHH-E / B4
Site/Context/Locater(s)/Number

Site: MHH-E

Project: Grid Square B4

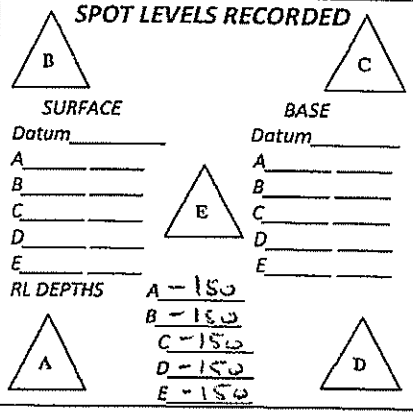
Date Excavated: 21/7/10 by PR & RG.

Recorded: 21/7/10, by PR.

~~Phased: / / , by~~

Description: Sf containing W component of fireplace

SPOT LEVELS RECORDED



Soil – Colour: Mid Brown

Type: Heavy Sandy loam

Texture: Non friable, heavy/damp

Thickness/Depth: 150

Horizon Definition: Clear above yellow clay

Disturbance: Dark dust from fireplace – subsequent possible ploughing (no lands), timber cleared (perhaps > once) – no roots

Context Physically Under				3				
Context Physically Above				1				
Context Physically Abuts				2				
Context Correlated to				—				

Chronological Sequence: Contemporary with original European settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations

Comments: No artefacts, moulding within fireplace footprint

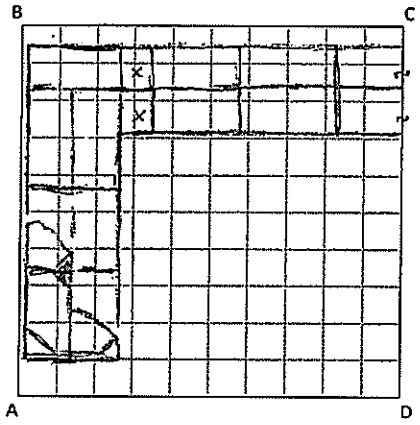
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

GTSF / #2 / MH11-E / B4
Site/Context/Locater(s)/Number

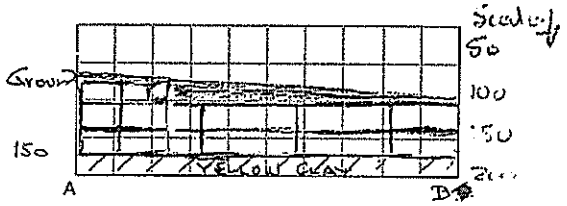
MN

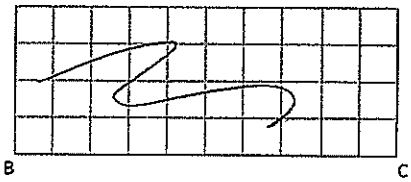
BASE PLAN

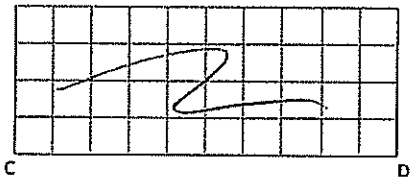


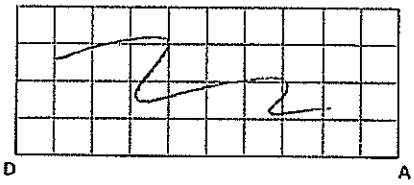
x Matched Queen cleats.

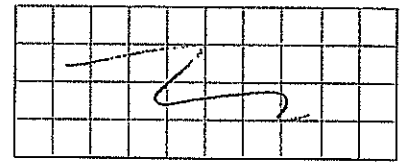
SECTIONS



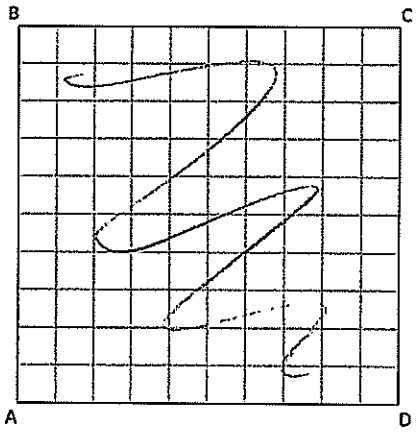








SUPPLEMENTARY:



Scales (mm):					
100	200	300	400	500	Horizontal
~~20~~	~~40~~	~~60~~	~~80~~	~~160~~	Vertical

Scale above: Vertical

Drawn by:

Date: 21/7/10

Excavation/Survey Context Recording Sheet

GTSF / 2 MH11-E / B3
Site/Context/Locater(s)/Number

Site: MH 11 - E

Project: Grid Square B3

Date Excavated 21/7/10, by PR & RG.
Recorded: 21/7/10, by PR.
~~Phased: / / , by~~

Description: Sp immediately S of fireplace W section

SPOT LEVELS RECORDED

	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		
RL DEPTHS	A -150, B -150, C -150, D -150, E -150	

Soil – Colour: Mid Brown
Type: Heavy sandy loam
Texture: Nominally friable, heavy/damp
Thickness/Depth: 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear - poss ploughed (no lands visible) timber clearance (poss > once) no roots

Context Physically Under				3					
Context Physically Above				1					
Context Physically Abuts				2					
Context Correlated to				/					

Chronological Sequence: Contemporary with original European Settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
1 Iron	tba	Close Scatter of nails			
2 Ceramic		Eggcup base 4x plain 3 blue t/p pcs.			
3 Iron		1 of 2 pcs, flat iron (km)			

Comments:

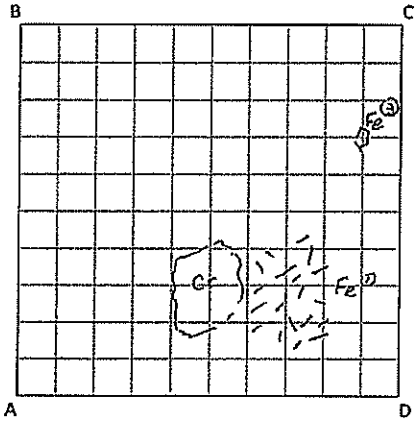
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

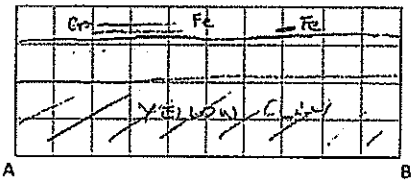
GTSF / 2 / MKII-E / B3
Site/Context/Locater(s)/Number

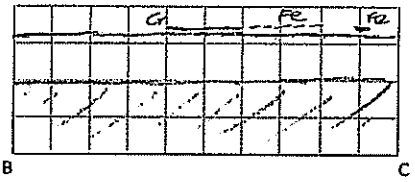
MN

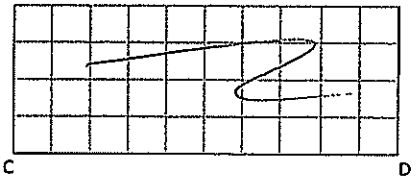
BASE PLAN

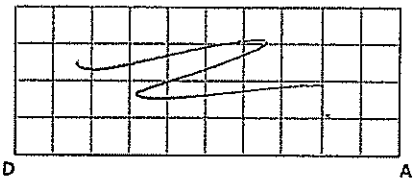


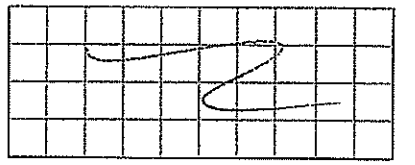
SECTIONS











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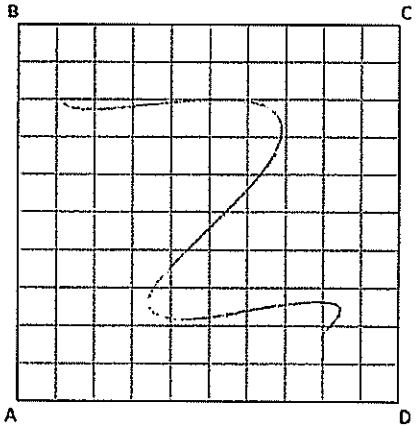

Scales [mm]:					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/10

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PACIFIC NATIONAL
GRETA TRAIN SUPPORT FACILITY

Excavation/Survey Context Recording Sheet

GTSF / 2 MH11-E / C3
Site/Context/Locater(s)/Number

Site: MH 11 – E

Project: Grid Square C3

Date Excavated: 21/7/10, by PR & RG
Recorded: 21/7/10, by PR.
~~Phased: / / , by~~

Description: Sq immediately S of E fireplace section

SPOT LEVELS RECORDED

SURFACE	BASE
Datum	Datum
A	A
B	B
C	C
D	D
E	E

RL DEPTHS: A -150, B -150, C -150, D -150, E -150

Soil – Colour: Mid brown
Type: Heavy sandy loam
Texture: Normally friable. heavy/damp
Thickness/Depth: 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – possibly ploughed (no lands visible) Timber cleared (poss > once) no roots.

Context Physically Under				3			
Context Physically Above				1			
Context Physically Abuts				2			
Context Correlated to							

Chronological Sequence: Contemporary with early European settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Iron	tba.	# miner's pick head			
② Iron		long structural spike			
③ Iron		Pce flat, thin iron sheet			

Comments:

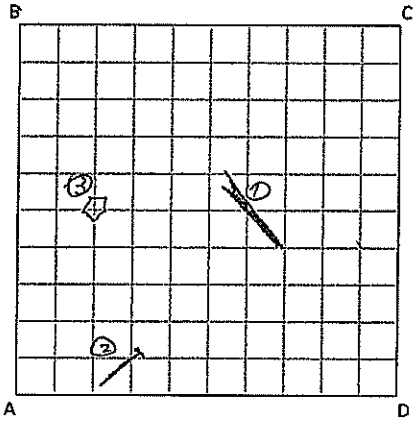
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

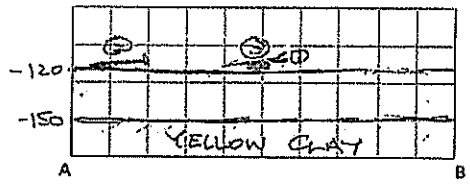
GTSF / 2 /MH11-E/ C3.
Site/Context/Locater(s)/Number

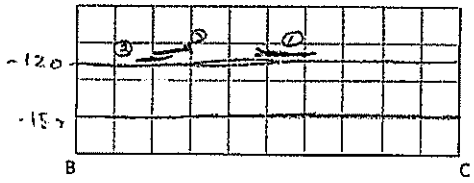
MN

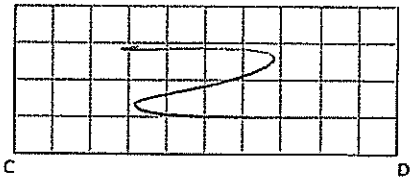
BASE PLAN

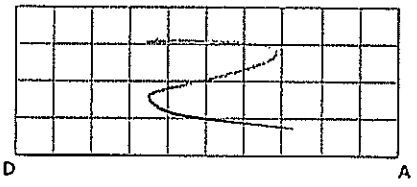


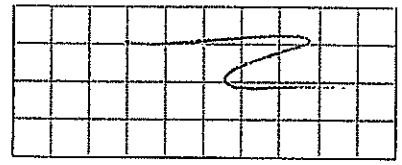
SECTIONS











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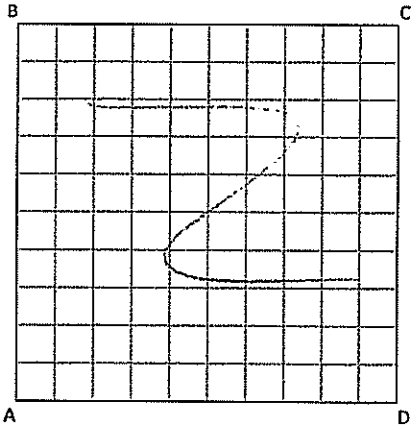


Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date:

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHII-E / C2
Site/Context/Locater(s)/Number

Site: MH II-E

Project: Grid Square C2

Date Excavated: 21/7/10, by PR & RG.
Recorded: 21/7/10, by PR
~~Phased: / / , by~~

Description: Sq 2.0m S. fireplace E

SPOT LEVELS RECORDED

	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		
RL DEPTHS	A -150, B -150, C -150, D -150, E -150	

Soil – Colour: Mid-brown
Type: Heavy sandy loam
Texture: Nominally friable, heavy damp
Thickness/Depth: ≈150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – ploughed? (no lands seen)
timber clearance (possibly) no roots

Context Physically Under	3
Context Physically Above	1
Context Physically Abuts	2
Context Correlated to	/

Chronological Sequence: Contemp with earliest European settlement.

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Iron	tba	Short structural spike			
② Glass		1 pce, thin old window – (See also D2)			
③ Glass		1 pce, bottle, "RILI" embossed			

Comments:

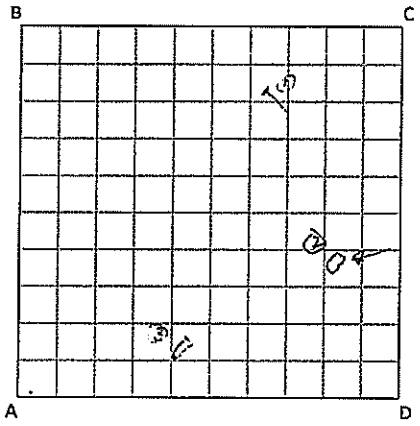
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

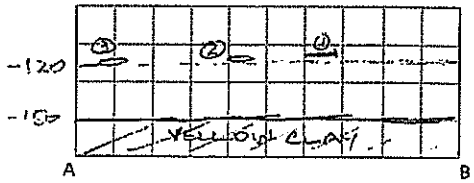
GTSF / 2 / WALL / C2
Site/Context/Locater(s)/Number

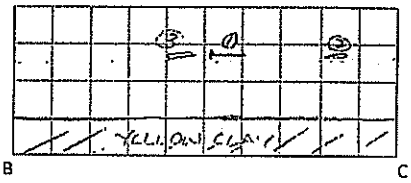
MN

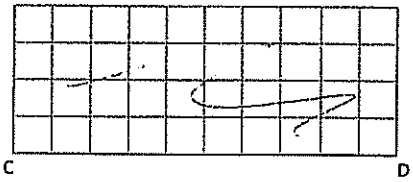
BASE PLAN

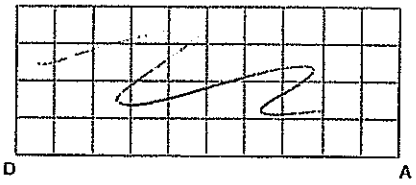


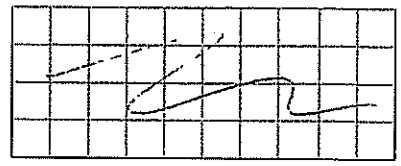
SECTIONS











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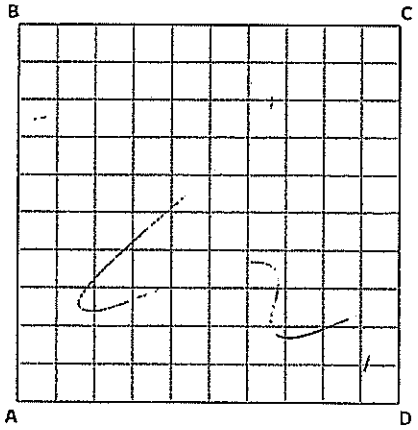


Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date:

Excavation/Survey Context Recording Sheet

GTSF / 2 / MH11-E / D4
Site/Context/Locater(s)/Number

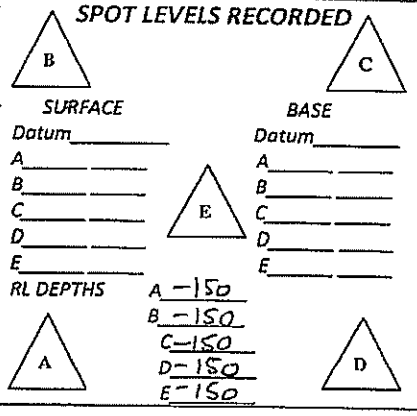
Site: MH11-E

Project: Grid Square D4

Date Excavated: 21/7/10, *by* PR & RG.
Recorded: 21/7/10, *by* PR.
~~*Phased:* / / , by~~

Description: Sq 1.5m E fireplace

SPOT LEVELS RECORDED



	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		

RL DEPTHS
A -150
B -150
C -150
D -150
E -150

Soil – Colour: Mid-brown
Type: Heavy sandy loam
Texture: Nonuniform friable, heavy/dam
Thickness/Depth: ≈ 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – ploughing? (no land residue)
timber cleared (poss > once) no roots

Context Physically Under				3					
Context Physically Above				1					
Context Physically Abuts				2					
Context Correlated to				/					

Chronological Sequence: Contemporary earliest European settlement

Materials	*Mass[gm]*	*Observations*	*Materials*	*Mass(gm)*	*Observations*
Metal		1 pce: Al?, Pb?, Zn?			

Comments:

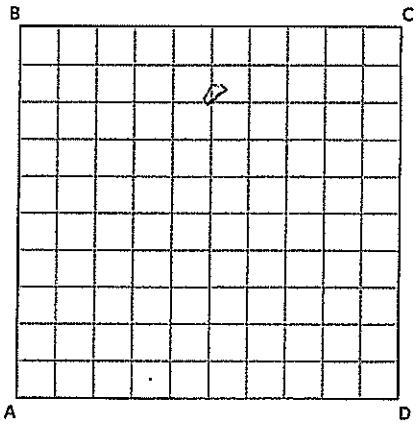
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

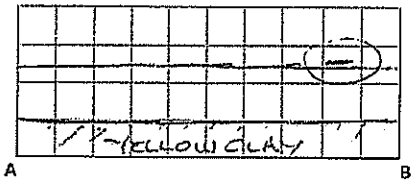
GTSF / 2 / MH11-E / D4
Site/Context/Locater(s)/Number

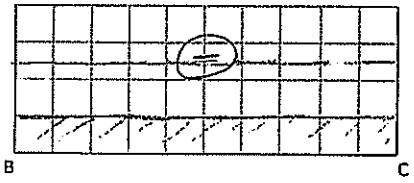
MN

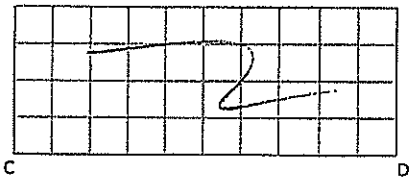
BASE PLAN

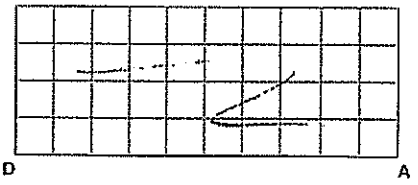


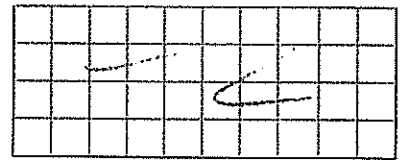
SECTIONS











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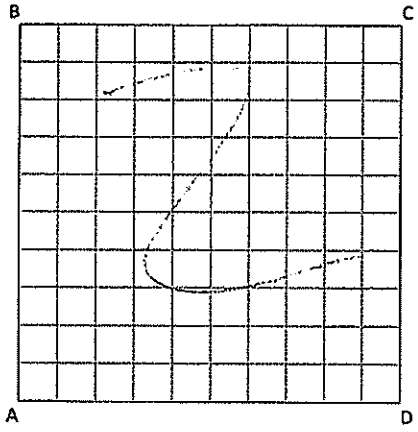


Scales [mm]:					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date:

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHII-E / D2
Site/Context/Locater(s)/Number

Site: MHII-E

Project: Grid Square D2

Date Excavated: 21/7/10, *by* PR & RG
Recorded: 21/7/10, *by* PR
~~*Phased:* / / , by~~

Description: E-mid periphery of grid

SPOT LEVELS RECORDED

	SURFACE	BASE
Datum		
A		
B		
C		
D		
E		
RL DEPTHS	A -150, B -150, C -150, D -150, E -150	

Soil – Colour: Mid-brown
Type: Heavy sandy loam
Texture: Nominally friable, heavy/damp
Thickness/Depth: ≈ 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – ploughing? (no residual lands) timber cleared (poss >1 occ) no roots

Context Physically Under					3				
Context Physically Above					1				
Context Physically Abuts					2				
Context Correlated to									

Chronological Sequence: Contemporary earliest European settlement

Materials	*Mass[gm]*	*Observations*	*Materials*	*Mass(gm)*	*Observations*
① Stoneware		Scatter extending o'side Sq (1 pce) 2-3 extension			
② Glass		Scatter Window, fine, old			

Comments:

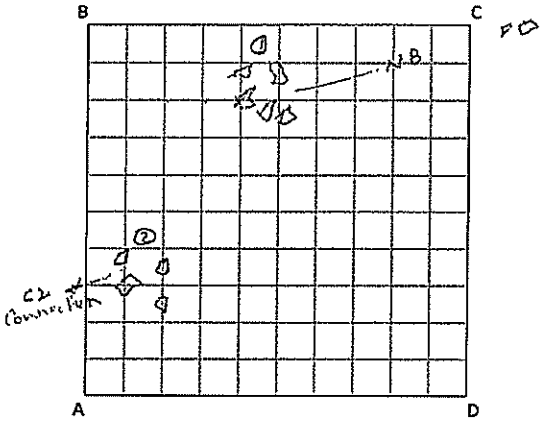
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

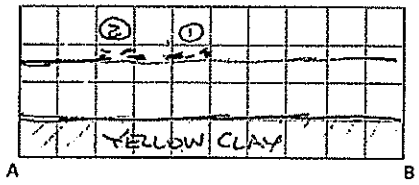
GTSF / 2 /MH11-E / D2.
Site/Context/Locater(s)/Number

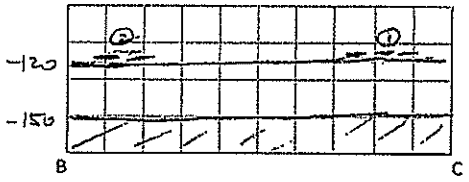
MN

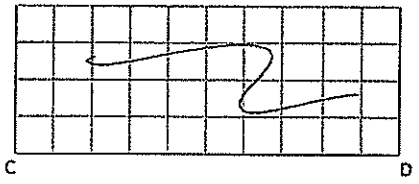
BASE PLAN

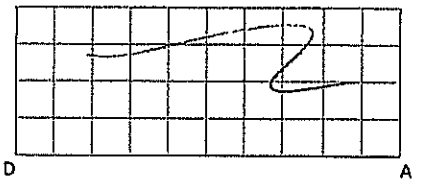


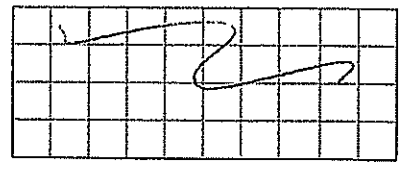
SECTIONS











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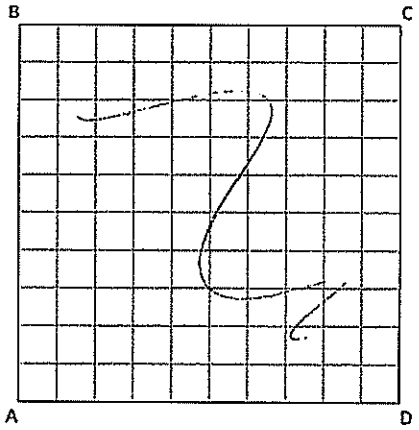


Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date:

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / D4
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Square D4

Date Excavated: 21/7/10, *by* PR & RG.
Recorded: 21/7/10, *by* PR
~~*Phased:* / / , by~~

Description: N part of doorsill/apron

SPOT LEVELS RECORDED

	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		

RL DEPTHS: A -150, B -150, C -150, D -150, E -150

Soil – Colour: Mid-brown
Type: Heavy sandy loam
Texture: Nominally friable, heavy/damp
Thickness/Depth: ≥150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – timber cleared (possibly)
no roots in site (but in surrounding)

Context Physically Under	3
Context Physically Above	1
Context Physically Abuts	2
Context Correlated to	/

Chronological Sequence: Contemporary with earliest European settlement.

Materials	*Mass[gm]*	*Observations*	*Materials*	*Mass(gm)*	*Observations*
① Iron		Nail			
② Iron		Nail			
③ Iron		3x Nails			
④ Iron		Bolt			
⑤ Ceramic		2pcs. Pt Manf Insignia.			

Comments:

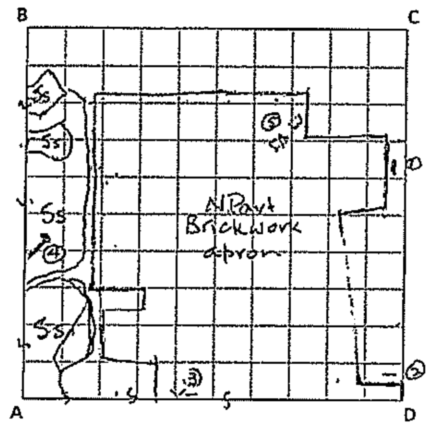
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

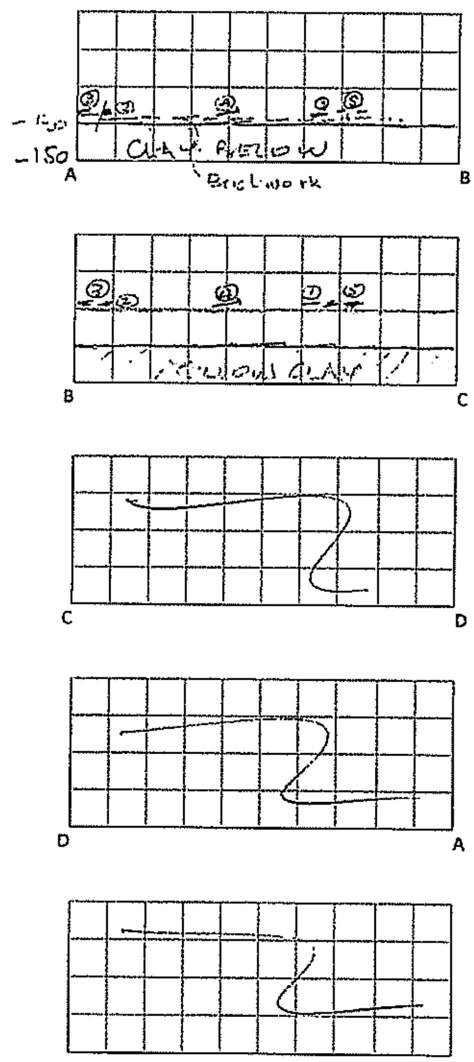
GTSE / 2 / MHS-E / D4
Site/Context/Locater(s)/Number

MN

BASE PLAN



SECTIONS



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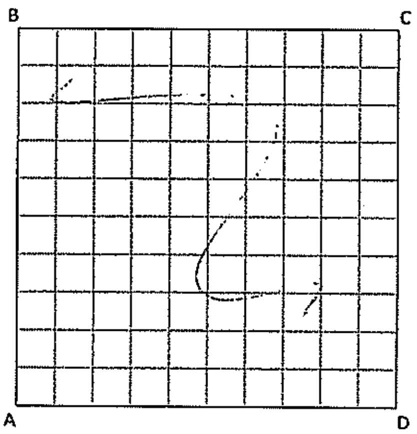


Scales [mm]:

100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/10

Excavation/Survey Context Recording Sheet

GTSF / 2 / MH5-E / C4
Site/Context/Locater(s)/Number

Site: MH5-E

Project: Grid Square C4

Date Excavated: 21/7/10 by PR & RG
Recorded: 21/7/10 by PR
~~Phased: / / , by~~

Description: Sq W of major N sill/apron component. Contains W termination of sill

SPOT LEVELS RECORDED

SURFACE Datum
A
B
C
D
E

BASE Datum
A
B
C
D
E

RL DEPTHS
A -150
B -150
C -150
D -150
E -150

Soil – Colour: Mid brown
Type: Heavy Sandy loam
Texture: Nominally friable, heavy/damp
Thickness/Depth: ≈ 150
Horizon Definition: Clear above yellow clay.

Disturbance: Unclear - timber cleared ([illegible] zone). No roots in site (see surrounding area)

Context Physically Under				3				
Context Physically Above				1				
Context Physically Abuts				2				
Context Correlated to				–				

Chronological Sequence: Contemporaneous with earliest European settlement.

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Iron		Bolt			
② Glass		1pce, bottle 'SPERM SEWING MACHINE OIL'			
③ Ceramic		4pcs, plain / 1 gold banded			
④ Ceramic		2x Pcs (1 Plain, 1 [illegible])			
⑤ Ceramic		Cup handle			

Comments:

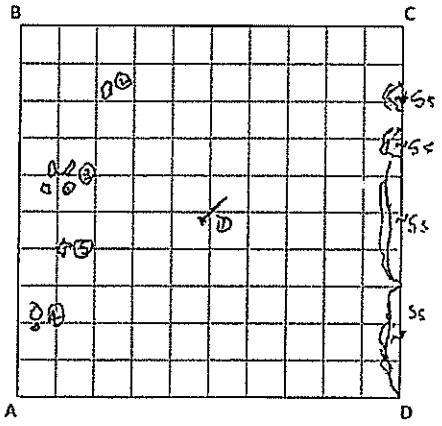
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

GTSF / 2 / MHS-E / C4
Site/Context/Locater(s)/Number

MN

BASE PLAN



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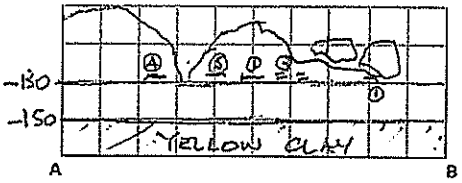

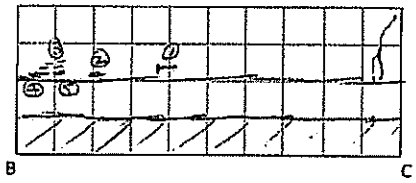

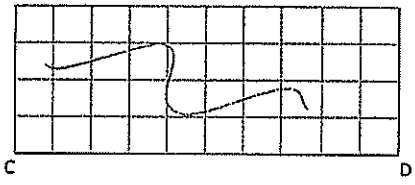

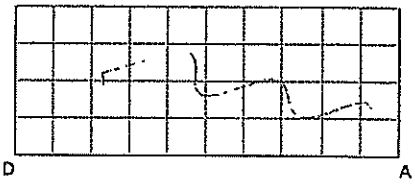

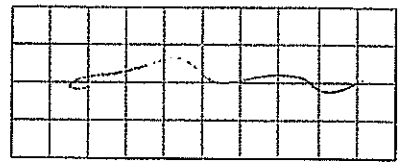

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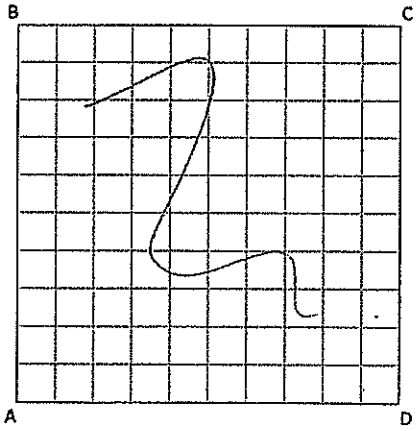


Scales [mm]:					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date:

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / D3
Site/Context/Locater(s)/Number

Site: MHS E

Project: Grid Square D3

Date Excavated: 21/7/10, by PR & RG.

Recorded: 21/7/10, by PR

~~Phased: / / , by~~

Description: S part of door sill/apron

SPOT LEVELS RECORDED

	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		
RL DEPTHS	A -150	
	B -150	
	C -150	
	D -150	
	E -150	

Soil – Colour: Mid-brown

Type: Heavy sandy loam

Texture: Nominally friable, heavy/damp

Thickness/Depth: ≈ 150

Horizon Definition: Clear above yellow clay

Disturbance: Unclear - timber cleared (possibly once) no roots visible - surrounding √

Context Physically Under				3					
Context Physically Above				1					
Context Physically Abuts				2					
Context Correlated to				/					

Chronological Sequence: Contemp with earliest European settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Iron		Nail			
② Glass		V. small pce, bottle			
③ Ceramic		V. small, plain			
④ Iron		4 x Nails			
⑤ Iron		2 x Structural spikes			
⑥ Iron		4 x Nails			

Comments:

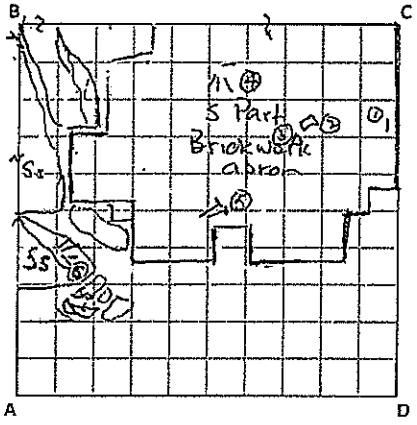
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

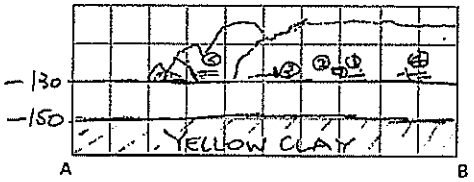
_____/_____/_____/ D3
Site/Context/Locater(s)/Number

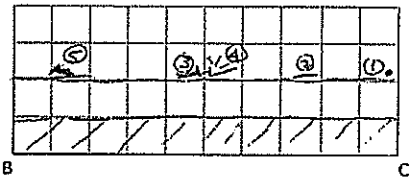
MN

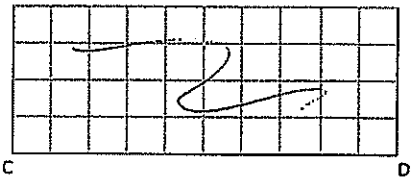
BASE PLAN

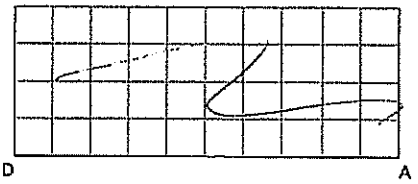


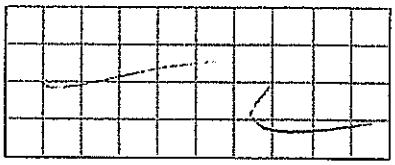
SECTIONS



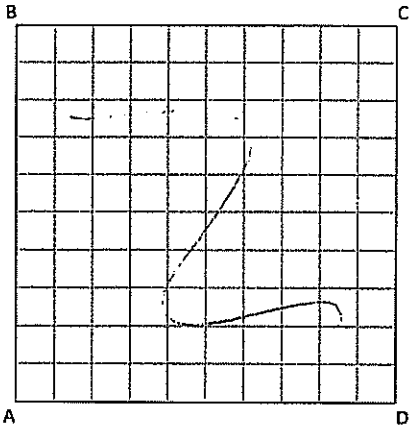








SUPPLEMENTARY:



Scales [mm]:					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date:

Archaeology & Heritage Pty Ltd

PACIFIC NATIONAL
GRETA TRAIN SUPPORT FACILITY

Excavation/Survey Context Recording Sheet

GTSF/ 2 /MHS-E/ C3
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Square C3

Date Excavated: 21/7/10 by PR & RG
Recorded: 21/7/10, by PR
~~*Phased:* / / , by~~

Description: Sp W of major S sill/apron component Contains W termination of sill

SPOT LEVELS RECORDED

SURFACE		BASE	
Datum		Datum	
A		A	
B		B	
C		C	
D		D	
E		E	

RL DEPTHS: A – 150, B – 150, C – 150, D – 150, E – 150

Soil – Colour: Mid-brown
Type: Heavy sandy loam
Texture: Nominally friable, heavy/damp
Thickness/Depth: ≈ 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – timber cleared (poss? > once) no roots in site, but surrounding

Context Physically Under				3			
Context Physically Above				1			
Context Physically Abuts				2			
Context Correlated to				—			

Chronological Sequence: Contemp with earliest European Settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Ceramic		2pcs – plain			
② Ceramic		1/4 pcs – plain see B2,3/C2			

Comments:

See Sketch Over>>>

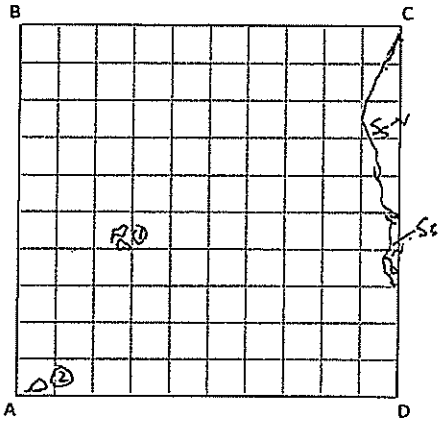
100602_08

Excavation/Survey Context Recording Sheet – Drawings

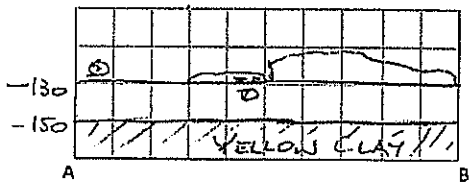
RTSF / 2 MHS-E / C3
Site/Context/Locater(s)/Number

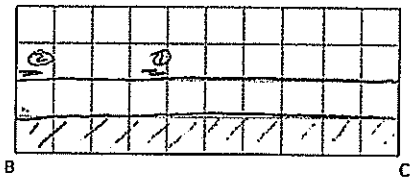
MN

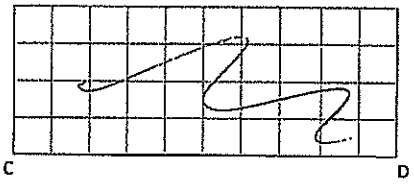
BASE PLAN

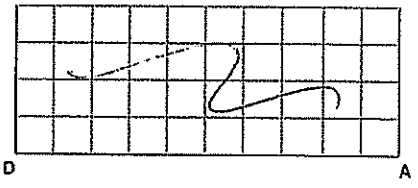


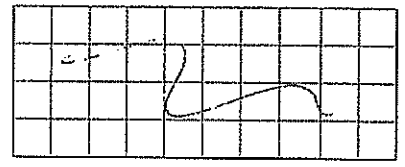
SECTIONS











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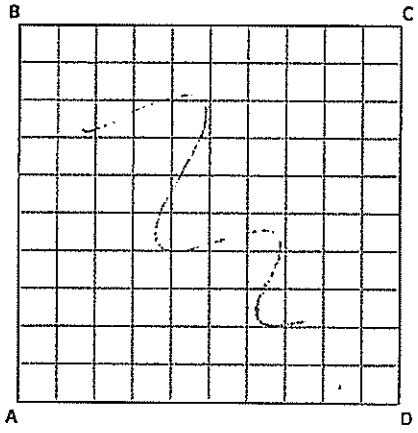


Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/10

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / D5
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Square D5.

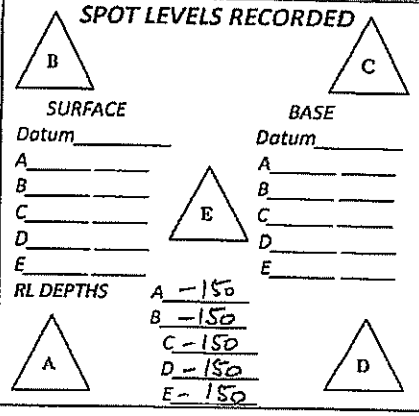
Date Excavated: 21/7/10, by PR & AG

Recorded: 21/7/10, by PR.

~~Phased: / / , by~~

Description: Immediately N of N part/ fireplace Sq (D4)

SPOT LEVELS RECORDED



Soil – Colour: Mid-brown

Type: Heavy sandy loam

Texture: Nominally friable, heavy/damp

Thickness/Depth: ≈ 150

Horizon Definition: Clear above yellow clay

Disturbance: Unclear – timber cleared (poss > once)
Ne roots in site, but in surrounding

Context Physically Under				3				
Context Physically Above				1				
Context Physically Abuts				2				
Context Correlated to				/				

Chronological Sequence: Contemp with earliest European local settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
Glass	tba	Green, blown moulded			

Comments:

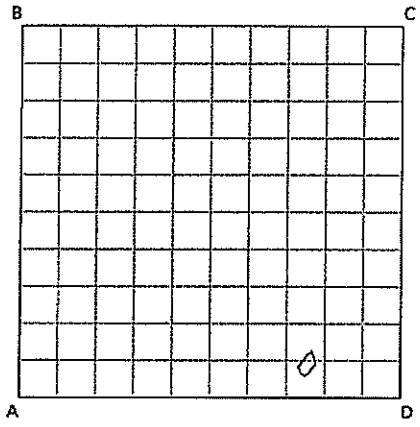
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

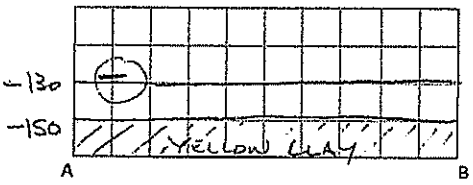
GTSF / 2 / MHS-2 / DS.
Site/Context/Locater(s)/Number

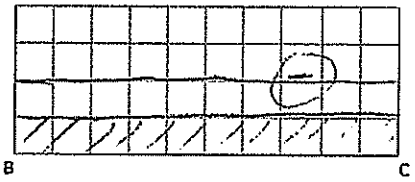
MN

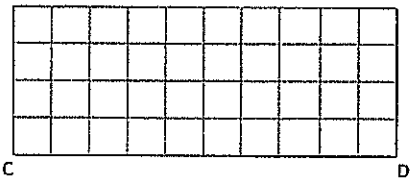
BASE PLAN

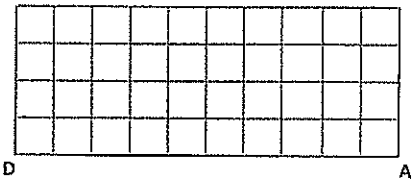


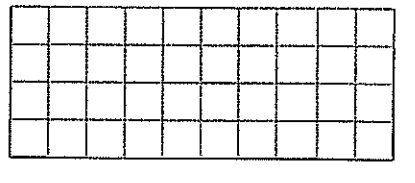
SECTIONS











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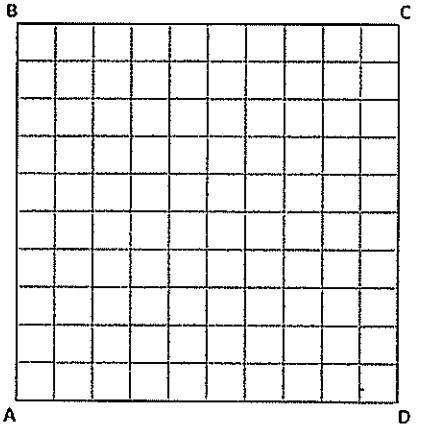


Scales [mm]:					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 4/7/15

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / CS
Site/Context/Locater(s)/Number

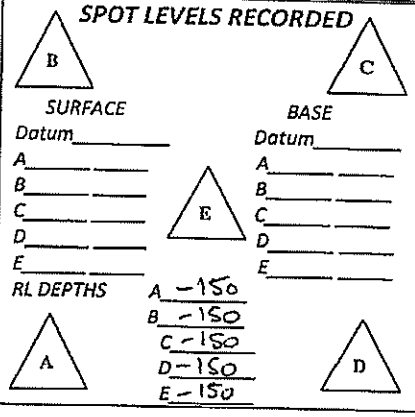
Site: MHS-E

Project: Grid Square C5

Date Excavated: 7/7/10, by PR & RG
Recorded: 7/7/10, by PR
~~Phased: / /, by~~

Description: SQ at Centre N of Grid

SPOT LEVELS RECORDED



Soil – Colour: Mid-brown
Type: Heavy sandy loam
Texture: Nominally friable, heavy/stamp
Thickness/Depth: ~150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – timber cleared (possibly) no roots in site but surrounding

Context Physically Under				3					
Context Physically Above				1					
Context Physically Abuts				2					
Context Correlated to				~					

Chronological Sequence: Contemp earliest local European Settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
Bone	tba	Beef, butchery signs			

Comments:

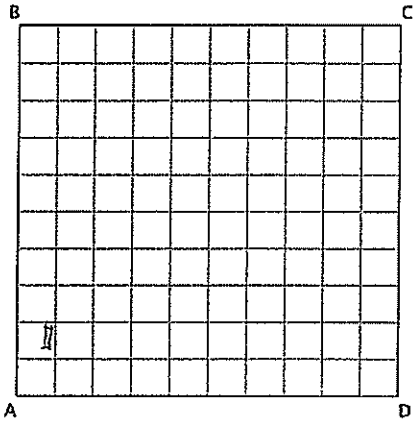
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

CTSF / 2 /MHS-C / C5
Site/Context/Locater(s)/Number

MN

BASE PLAN



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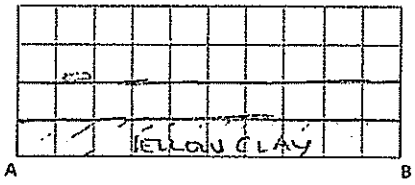
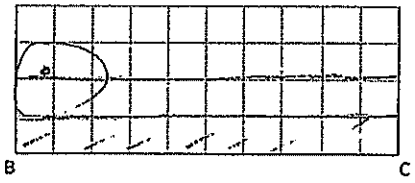
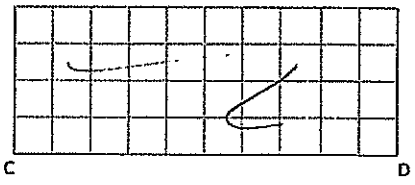
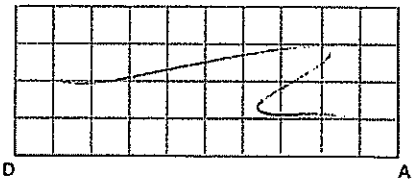
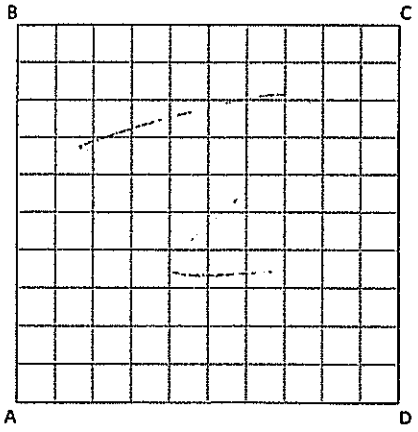








SUPPLEMENTARY:



Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21.1.10

Archaeology & Heritage Project

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GRETA TRAIN SUPPORT FACILITY

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHGE / B3
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Square B3

Date Excavated: 21/7/10, by PR & RG.
Recorded: 21/7/10 by PR.
~~Phased: / / , by~~

Description: Square W of minor soil square

SPOT LEVELS RECORDED

	SURFACE	BASE
Datum		
A		
B		
C		
D		
E		

RL DEPTHS: A -150, B -150, C -150, D -150, E -150

Soil – Colour: Mid-brown
Type: Heavy Sandy loam
Texture: Neminaily friable heavy damp
Thickness/Depth: ≈ 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear – timber cleared ("Bosc" zone) no roots in site but surroundings

Context Physically Under				3			
Context Physically Above				1			
Context Physically Abuts				2			
Context Correlated to				–			

Chronological Sequence:

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
Ceramic		1/4 pcs, plain – see C3, B2-3			

Comments:

See Sketch Over>>>

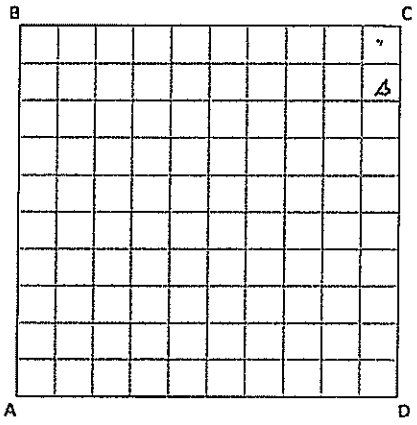
100602_08

Excavation/Survey Context Recording Sheet – Drawings

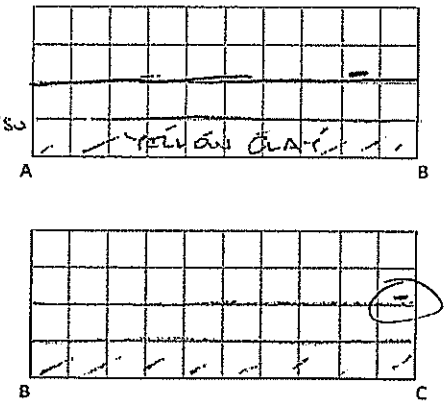
GTSF / 2 / MHS-E / B3
Site/Context/Locater(s)/Number

MN

BASE PLAN



SECTIONS



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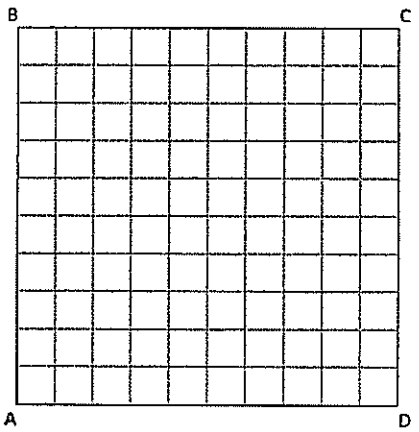

Scales [mm]:					
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20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/10

Anthropology School of ... maxim ... Pty Ltd

PACIFIC NATIONAL
GRETA TRAIN SUPPORT FACILITY

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / C2.
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Square C2

Date Excavated: 21/7/10, by PR & RG.
Recorded: 21/7/10, by PR
~~*Phased: / / , by*~~

Description: S minor door sill square

SPOT LEVELS RECORDED

SURFACE	BASE	RL DEPTHS
Datum	Datum	
A	A	A -150
B	B	B -150
C	C	C -150
D	D	D -150
E	E	E -150

Soil – Colour: Mid-brown
Type: Heavy sandy-loam
Texture: Nominally friable, heavy / damp
Thickness/Depth: ≈ 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear - timber cleared (poss? > once)
No roots in site, but surrounding

Context Physically Under			3				
Context Physically Above			1				
Context Physically Abuts			2				
Context Correlated to			/				

Chronological Sequence: Contemp with earliest local European settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Ceramic	tba	1/4 pcs, plain sa B2-3 C2			
② Glass		1 bottleneck, clear			
③ Glass		1pce, bottle, green			
④ Ceramic		3pcs, t print, blue			
⑤ Glass		1pce, bottle, white.			
⑥ Ceramic		4pcs, tprint blue			

Comments:

See Sketch Over>>>

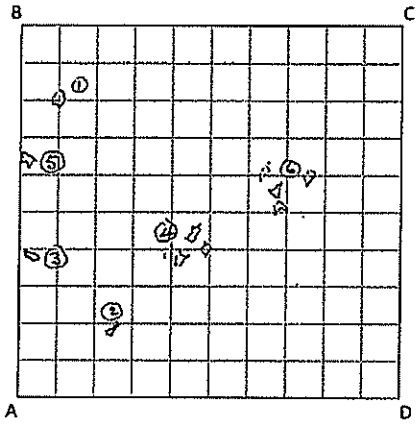
100602_08

Excavation/Survey Context Recording Sheet – Drawings

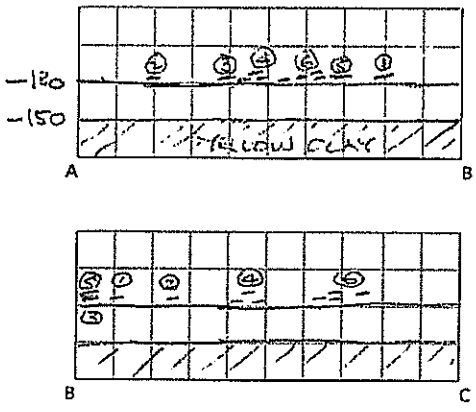
_____/_____/_____/_____
Site/Context/Locater(s)/Number

MN

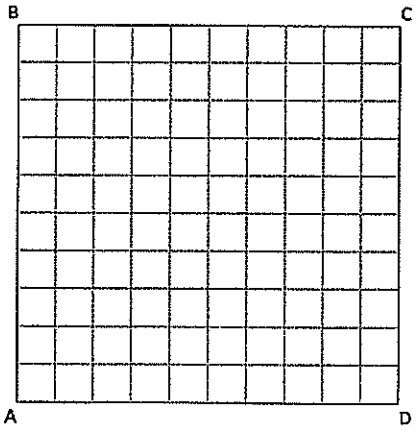
BASE PLAN



SECTIONS



SUPPLEMENTARY:



Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/10

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / B2
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Square B2

Date Excavated: 21/7/10, by PR & RG.
Recorded: 21/7/10, by RG.
~~Phased: / / , by~~

Description: S' most responsive B square

SPOT LEVELS RECORDED

	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		
RL DEPTHS	A -150, B -150, C -150, D -150, E -150	

Soil – Colour: Mid Brown
Type: Heavy Sandy loam
Texture: Nominally friable, heavy clays
Thickness/Depth: ≈ 150
Horizon Definition: Clear above yellow clay

Disturbance: Unclear - timber cleared (horse drawn?) no roots in site, but surrounding

Context Physically Under					3				
Context Physically Above					1				
Context Physically Abuts					2				
Context Correlated to					–				

Chronological Sequence: Contemp with earliest local European settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
Ceramic		4 pcs, White, Sq B3, C3-2			

Comments:

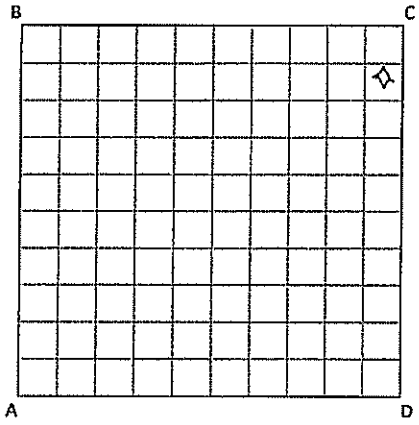
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

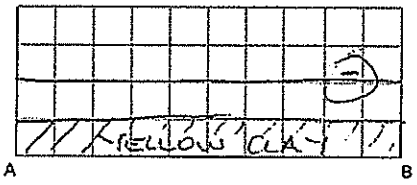
GTSF / 2 / MHS-E / B2
Site/Context/Locater(s)/Number

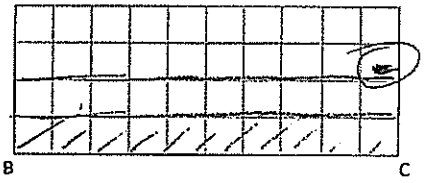
MN

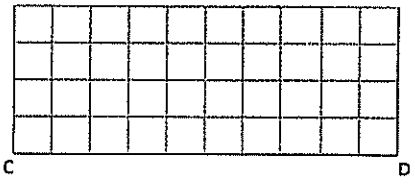
BASE PLAN

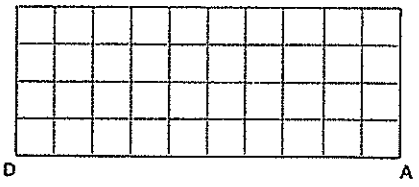


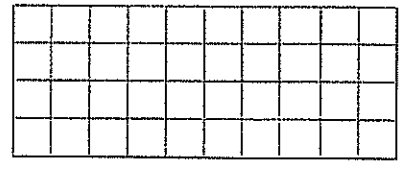
SECTIONS



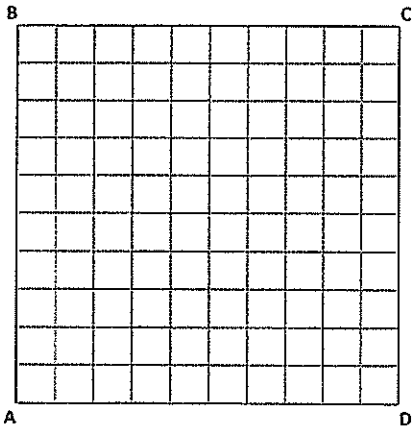








SUPPLEMENTARY:



Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/10

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / D1
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Square D1

Date Excavated: 21/7/10, by PR & RC

Recorded: 21/7/10, by PR

~~Phased: / / , by~~

Description: Almost D square

SPOT LEVELS RECORDED

	SURFACE Datum	BASE Datum
A		
B		
C		
D		
E		

RL DEPTHS: A -150, B -150, C -150, D -150, E -150

Soil – Colour: Mid brown

Type: Heavy sandy loam

Texture: Nominally friable, heavy/clumpy

Thickness/Depth: ≈ 150

Horizon Definition: Clear above yellow clay

Disturbance: Unclear – timber cleared (poss. 2 area) two roots in site, but surrounding

Context Physically Under					3				
Context Physically Above					1				
Context Physically Abuts					2				
Context Correlated to					/				

Chronological Sequence: Contemporary ark-earliest local European Settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
① Ceramic		2pcs, Main (1 just 0/s Sd)			
② Ceramic		cup base			
⑤ Ceramic		2pcs, brown			
⑦ Ceramic		1pce, grey tprint.			

Comments:

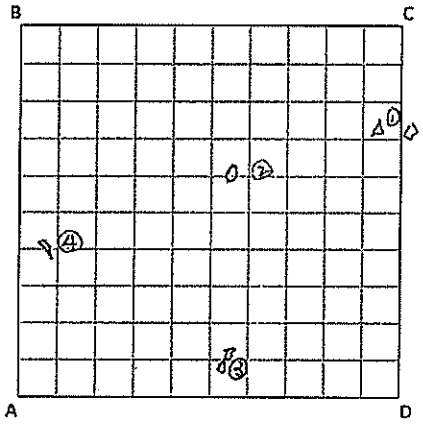
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

GTSF / 2 / MHS-E / D1
Site/Context/Locater(s)/Number

MN

BASE PLAN



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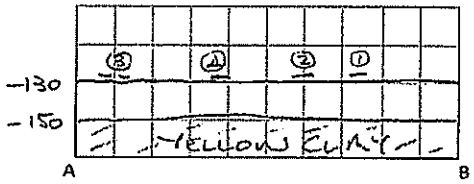

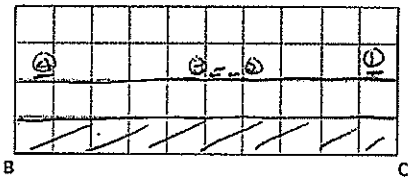

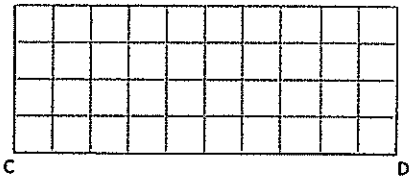

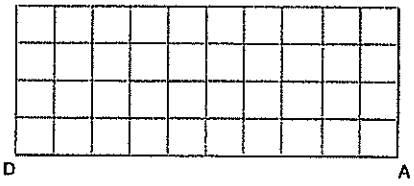

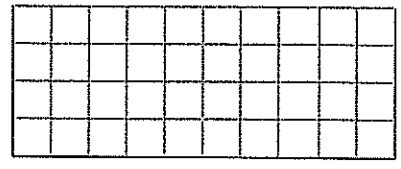

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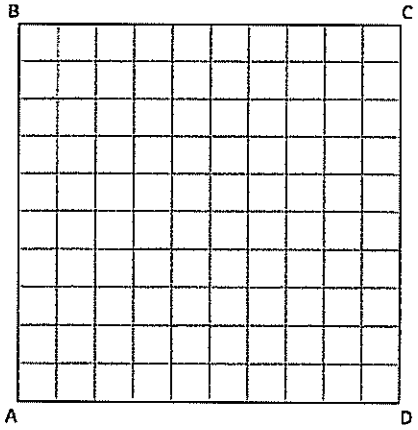


Scales (mm):					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/2

Excavation/Survey Context Recording Sheet

GTSF / 2 / MHS-E / C1
Site/Context/Locater(s)/Number

Site: MHS-E

Project: Grid Sq C1

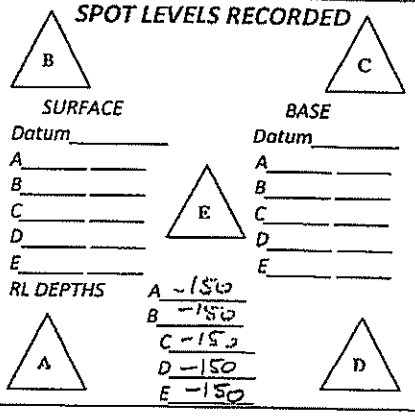
Date Excavated: 21/7/10, by PR & RG.

Recorded: 21/7/10, by PR.

~~Phased: / / , by~~

Description: Almost C square

SPOT LEVELS RECORDED



Soil – Colour: Mid-brown

Type: Heavy sandy loam

Texture: Normally friable, heavy/damp

Thickness/Depth: ≈ 150

Horizon Definition: Clear above yellow clay

Disturbance: Unclear, timber cleaved (possibly > once). No roots in situ, but surrounding.

Context Physically Under				3				
Context Physically Above				1				
Context Physically Abuts				2				
Context Correlated to				–				

Chronological Sequence: Contemp? earliest local European Settlement

Materials	Mass[gm]	Observations	Materials	Mass(gm)	Observations
Ceramic		5pcs, plain			

Comments:

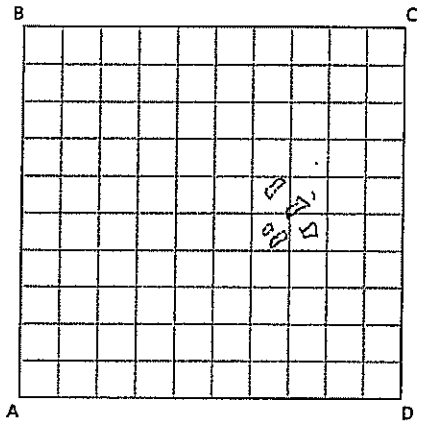
See Sketch Over>>>

Excavation/Survey Context Recording Sheet – Drawings

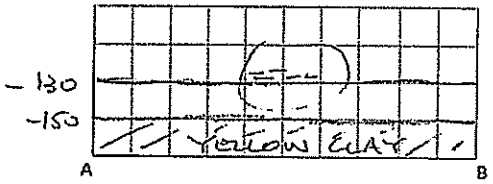
GTSF / 2 / MHS-2 / C1
Site/Context/Locater(s)/Number

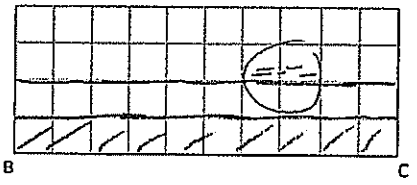
MN

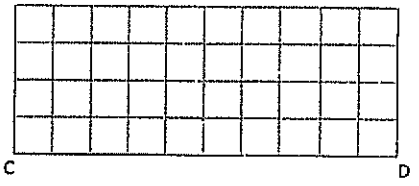
BASE PLAN

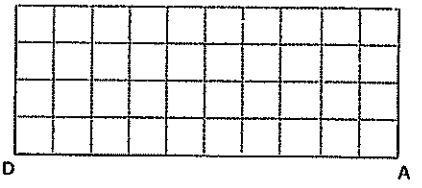


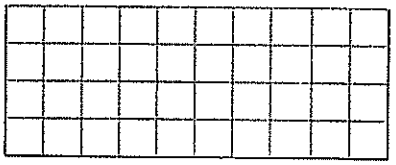
SECTIONS











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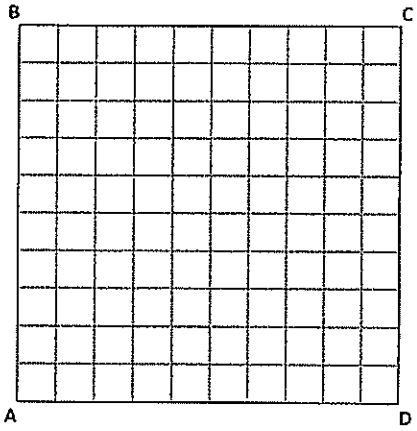

Scales [mm]:					
100	200	300	400	500	*Horizontal*
20	40	60	80	100	*Vertical*

Drawn by:

Date: 21/7/10

Artefact/Origin Index

Site Name: MH 11

Recorder: PAUL RITTENBERGER

Date: 6/7/10

Ident No:	Origin: Context #	Square #	E–N–D Co-ord	Artefact: Material	Typology	Dimensions L	B	T	Mass gms	Notes
1	2	A	350/850/150 C	Cr/Sw						23 small pcs, B
2	2	A	350/850/150 C	Gb						4 pcs
3	2	C	400/900/150 C	Cr/SW						13 pcs
4	2	C	400/850/150 C	Gb						5pcs
5	2	C	400/900/150 C	Fe						Flat
6	2	C	400/900/-/C	Brick						2 x batts, amorphous, old #
7	2	D	960/750/150 C	Gb						4 pcs
8	2	D	960/750/150 C	Cr/Sw						1 pce
9	2	C	490/500/150 C	GN						1 pce, clear, flat, C19, (thin)
10	2	C	490/500/150 C	Cr/Sw						11 pcs
11	2	C/D	190/-/150 C	Cr/Sw						Cup handle
12	2	C/D	190/-/150 C	Brick						batt, amorph, old
13	2	E	170/200/150 C	Cr/Sw						7 pcs, handmade
14	2	E	170/200/150 C	Gb						2 pcs
15	2	F/G	500/-/150 C	Cr/Sw						3 pcs
16	2	F/G	500/-/150 C	Brick						2 x batts

NOTES:
The following abbreviations are routinely used in this form:

Materials: Ag – Silver, Al – Aluminium, Au – gold, Bz – Bronze, Bs – Brass, Ch – Chinaware, Cl – Cloth, Cr – Ceramic, Cu – Copper, Ew – Earthenware, Fe – Iron, Gb – Glass (bottle), Gt – Glass (tableware), Gw – Glass (window), Lr – Leather, Pb – Lead, Pp – Paper, St – Steel, Sw – Stoneware, Th – timber (hand-tool dressed), Tp – Timber (profiled), Tr – Timber (Raw), Ts – Timber (sawn),

Notes: B – Broken, E – Etch pattern, G – Glazed, H – Sign of thermal alteration, R – Signs of Retouch, T – Transfer printed, U – Usewear; Col – colourr br – brown, cm – cream, d. – dark, gn – green, gy – grey, l. – light, pk – pink, rd – red, w t– white, yl – yellow (and combinations as */*);

Dimensions are expressed in mms; mass is expressed in gms.

PACIFIC NATIONAL
GRETA TRAIN SUPPORT FACILITY

Artefact/Origin Index

Site Name: MH 11-E

Recorder: PAUL RHEINBERGER

Date: 21/7/10

Ident No:	Origin: Context #	Square #	E-N-D Co-ord	Artefact: Material	Typology	Dimensions L	B	T	Mass gms	Notes
17	2	A4	950/400/120	Gb						2pcs.
18	2	C4	800/500/120	Br						Base of [illegible] 12 [illegible] cartridge
19	2	B3	740/250/120 C	Fe						Close Scatter of nails
20	2	B3	500/300/120 C	Cr/Sw						Eggcup base, 4 Pl + 3 Blue tp pcs.
21	2	B3	900/700/120	Fe						Pce flat, thin iron
22	2	C3	625/440/120	Fe						Miner's pick head
23	2	C3	225/230/120	Fe						Long structural spike
24	2	C3	200/500/120	Fe						Pce flat thin iron (see 21)
25	2	C2	550/725/120	Fe						Short structural spike
26	2	C2	845/340/120	Gw						Fine/old (See D2-30)
27	2	C2	230/110/120	Gb						Embossed "RILI"
28	2	D4	510/825/120	Al/Pb/Zn ?						1 pce non-Fe metal.
29	2	D2	435/910/120 C	Sw						1 lge, scatter small pcs
30	2	D2	115/390/120 C	Gw						Sm scatter thin, old (See C2-26)
31	2	D2		Slate						

NOTES:
The following abbreviations are routinely used in this form:

Materials: Ag – Silver, Al – Aluminium, Au – gold, Bz – Bronze, Bs – Brass, Ch – Chinaware, CCl – Cloth, Cr – Ceramic, Cu – Copper, Ew – Earthenware, Fe – Iron, Gb – Glass (bottle), Gt – Glass (tableware), Gw – Glass (window), Lr – Leather, Pb – Lead, Pp – Paper, St – Steel, Sw – Stoneware, Th – timber (hand-tool dressed), Tp – Timber (profiled), Tr – Timber (Raw), Ts – Timber (sawn),

Notes: B – Broken, E – Etch pattern, G – Glazed, H – Sign of thermal alteration, R – Signs of Retouch, T – Transfer printed, U – Usewear; Col – colourr br – brown, cm – cream, d. – dark, gn – green, gy – grey, l. – light, pk – pink, rd – red, w t– white, yl – yellow (and combinations as "/");

Dimensions are expressed in mms; mass is expressed in gms.

PACIFIC NATIONAL
GRETA TRAIN SUPPORT FACILITY

Artefact/Origin Index

Site Name: MHS-E				Recorder: PAUL RHEINBERGER						
				Date: 21/7/10						
Ident No:	**Origin:**			**Artefact:**						
	Context #	**Square #**	**E–N–D Co-ord**	**Material**	**Typology**	**Dimensions L**	**B**	**T**	**Mass gms**	**Notes**
32	2	D4	960/630/130	Fe	Nail					
33	2	D4	970/75/130	Fe	Nail					
34	2	D4/3	240/10/130 C	Fe	3x Nails					
35	2	D4	45/405/130	Fe	Bolt					
36	2	D4	695/720/130 C	Cr/Sw						2pcs, part Manuf's mark.
37	2	C4	510/500/130	Fe	Bolt					
38	2	C4	220/810/130	Gb						Embossed 'SPERM SEWING MACHINE OIL'
39	2	C4	95/590/130 C	Cr/Sw						4Pcs, plain, one with gold band
40	2	C4	60/215/130 C	Cr/Sw						2Pcs, 1 plain, 1 t.ptd.
41	2	C4	110/400/130	Cr/Sw						Cup handle
42	2	D3	480/725/130	Fe	Nail					
43	2	D3	775/720/130	Gb						V.small
44	2	D3	745/690/130	Cr/Sw						
45	2	D3	530/870/130 C	Fe	4x Nails					
46	2	D3	510/500/130 C	Fe	2x Spikes					Structural
47	2	D3	120/390/130 C	Fe	4x Nails					
48	2	C3	270/430/130 C	Cr/Sw						2pcs, plain
49	2	C3	75/30/130	Cr/Sw						1/4 pcs, plain - see B2-3, C2
50	2	D5	740/90/130	Gb						Green, blow mould
51	2	C5	85/170/130	Bone						Beef, butchery signs.
52	2	B3	950/825/130	Cr/Sw						1/4 pcs, plain - see B2, C2-3
53	2	C2	80/790/130	Cr/Sw						1/4 pcs, plain - see B2-3, C3
54	2	C2	240/185/130	Gb						# neck, wt
55	2	C2	45/385/130	Gb						1pce, body, gr
56	2	C2	450/500/130 C	Cr/Sw						2pcs, t print, blue.

NOTES:
The following abbreviations are routinely used in this form:

Materials: Ag – Silver, Al – Aluminium, Au – gold, Bz – Bronze, Bs – Brass, Ch – Chinaware, CCl – Cloth, Cr – Ceramic, Cu – Copper, Ew – Earthenware, Fe – Iron, Gb – Glass (bottle), Gt – Glass (tableware), Gw – Glass (window), Lr – Leather, Pb – Lead, Pp – Paper, St – Steel, Sw – Stoneware, Th – timber (hand-tool dressed), Tp – Timber (profiled), Tr – Timber (Raw), Ts – Timber (sawn),

Notes: B – Broken, E – Etch pattern, G – Glazed, H – Sign of thermal alteration, R – Signs of Retouch, T – Transfer printed, U – Usewear; Col – colourr br – brown, cm – cream, d. – dark, gn – green, gy – grey, l. – light, pk – pink, rd – red, w t– white, yl – yellow (and combinations as "/");

Dimensions are expressed in mms; mass is expressed in gms.

Artefact/Origin Index

Site Name: MH 5-E				**Recorder:** PAUL RHEINBERGER.							
				Date: 21/7/10							
Ident No:	**Origin:**			**Artefact:**							
	Context #	Square #	E–N–D Co-ord	Material	Typology	Dimensions L	B	T	Mass gms	Notes
57	2	C2	25/635/[illegible]	Gb						1 pce, white.
58	2	C2	710/580/130 C	Cr/Sw						4 pcs, t print, blue
59	2	B2	950/875/130	Cr/Sw						1/4 pcs, plain, see B3, C2-3
60		D1	940/720/130	Cr/Sw						2pcs, white (1 just E of Sb)
61		D1	555/605/130	Cr/Sw						Cup base
62		D1	535/700/130 C	Cr/Sw						2 pcs, brown
63		D1	70/405/130	Cr/Sw						1 pce, grey t print.
64		C1		Cr/Sw						5 pcs, plain

NOTES:
The following abbreviations are routinely used in this form:

Materials: Ag – Silver, Al – Aluminium, Au – gold, Bz – Bronze, Bs – Brass, Ch – Chinaware, Cl – Cloth, Cr – Ceramic, Cu – Copper, Ew – Earthenware, Fe – Iron, Gb – Glass (bottle), Gt – Glass (tableware), Gw – Glass (window), Lr – Leather, Pb – Lead, Pp – Paper, St – Steel, Sw – Stoneware, Th – timber (hand-tool dressed), Tp – Timber (profiled), Tr – Timber (Raw), Ts – Timber (sawn),

Notes: B – Broken, E – Etch pattern, G – Glazed, H – Sign of thermal alteration, R – Signs of Retouch, T – Transfer printed, U – Usewear; Col – colourr br – brown, cm – cream, d. – dark, gn – green, gy – grey, l. – light, pk – pink, rd – red, w t– white, yl – yellow (and combinations as */*);

Dimensions are expressed in mms; mass is expressed in gms.

Structural Element Data Sheet

GTSF / 2 / MHS-E / 2
Site/ Context/Locater(s) Number

Site Name:	MHS-E
Structure:	ARCH. SITE
Element Name:	DOORSILL & APRON
Area/Space:	D3 - E4
Provenance:	PRESUMABLY WITH HUT CONSTRUCTION
Fabric:	Sandstone Sill Brick & brickbat apron
Features:	Sill stood higher than apron (gentle step) Sill max dims: 1500 x 330 Apron max dims: 1340 x 590
Finish:	Sill damaged by earthworks Brickwork - rough & irregular
Method of Attachment:	Set on clay base.
Condition:	Substantially intact in condition Minor modification in integrity
Current Threats/Risks:	Will be destroyed by development
Drawings:	Grid & feature ✓✓
Photographs:	Grid & feature ✓✓
Catalogue:	✓
Equivalent Elements:	ALL

Structural Element Data Sheet

GTSF / 2 / MH11-E / 1
Site/ Context/Locater(s) Number

Site Name:	MH 11-E
Structure:	ARCH SITE
Element Name:	FIREPLACE FOOTING
Area/Space:	B2 - C2
Provenance:	PRESUMABLY WITH HUT CONSTRUCTION
Fabric:	Brick
Features:	2-Courses, 2 leaves dry laid on clay bed with residual bottom course fireplace bricks to SW corner, lime mortar
Finish:	Orderly, uncomplicated, footing bricks not tied/overlapped
Method of Attachment:	Dry laid over clay base
Condition:	Footing: substantially intact condition, minor modification integrity, Fireplace: ruin in condition, major modification in integrity
Current Threats/Risks:	Will be destroyed by development
Drawings:	Grid feature ✓
Photographs:	Grid of feature ✓
Catalogue:	✓
Equivalent Elements:	Nil

Structure Element Index

Element Name:

SEDS #	*Site*	*Square*	*Locater(s)*		*Provenance*	*Note Ref^ce^**
1	MH11-E	B4-C4	B4 50/100	C4 570/800	North Hut Construction	/
2	MH5-E	D3-D4	D3 925/365	925/830	✓ ✓ /	

* *See Notes (Continuation) Sheet(s)*

Photographic Catalogue Sheet

GTSF	MH11/E
Site Name	Numerical reference

Photographer: PRheinberger	Date: 21/7/10
Camera: Kodak Lens:	Job No:
Film: Col / Mono / Print / Tpcy / Film / (Dig) Make: — Speed: ISO —	Processing:
Film No/Reference: —	Page: 1 of 2

Frame No:	Description		Px Plan #
	Subject and Detail	Orientation	
1	View from S of Site, through MH10-E & MH5-E	N	1
2	Overview of MH11-E grid from S	N	1
3	Detail of fireplace from B2-C2 interface, S	N	1
4	✓ ✓ ✓ ✓ E	W	1
5	✓ ✓ ✓ ✓ N	S	1
6	✓ ✓ ✓ ✓ W	E	1

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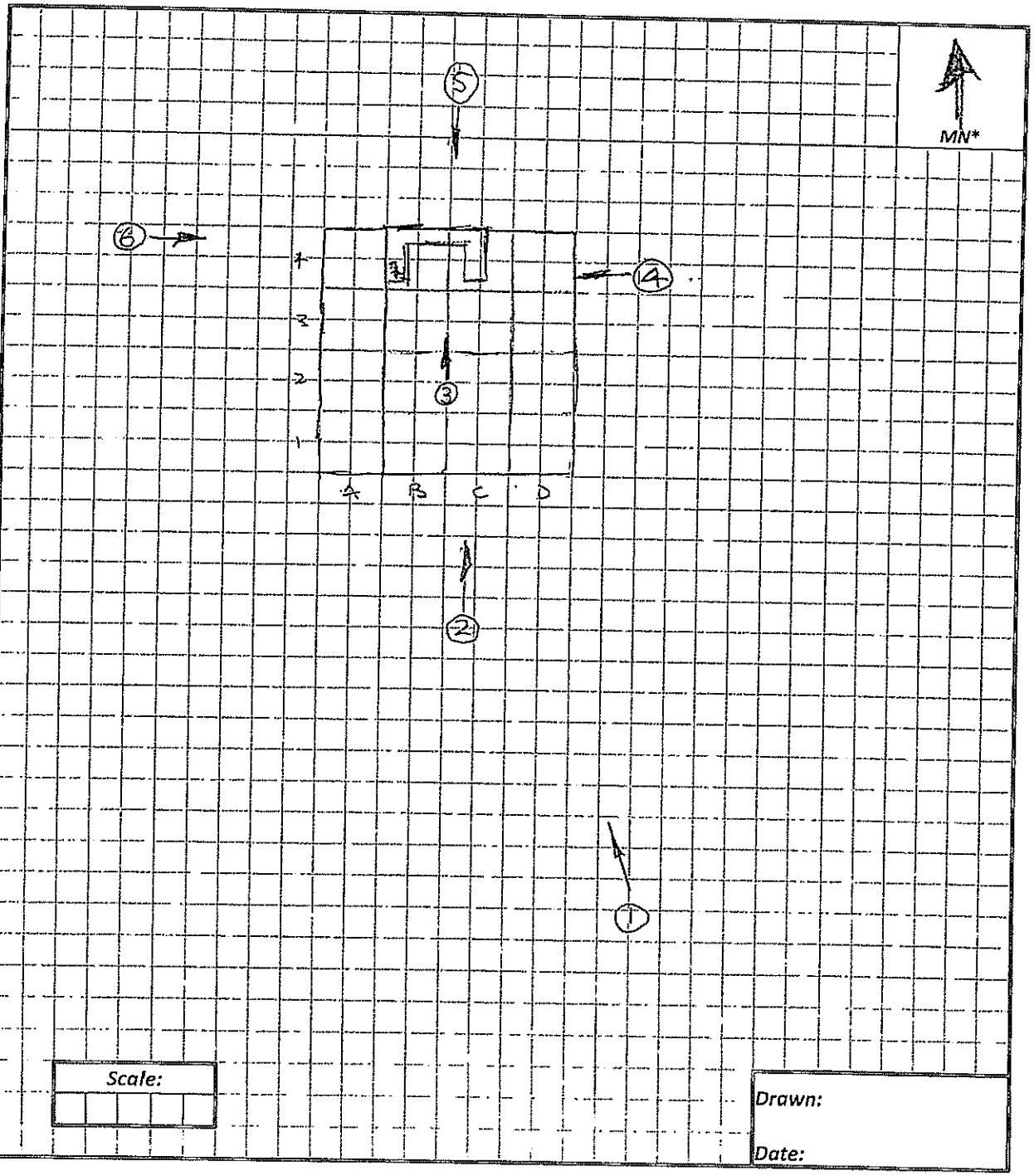
Photographic Plan Sheet

GTSF	MH/11/E
Site Name	Numerical Reference

Photographer: P Rheinberger	Date: 21/7/2010
Camera: Kodak	Lens:	Job No: 100602
Film: Col / Mono / Print / Tpcy / Film / (Dig) Make: — Speed: ISO —	Processing: —
Film No/Reference: —	Page: 1 of 2



* Unless otherwise stated, top of form represents photographic north

Photographic Catalogue Sheet

Site Name: GTSF	Numerical reference: MH11/E
Photographer: P R Rheinberger	Date: 21/7/2010
Camera: Kodak / Lens:	Job No: 100602
Film: Col / Mono / Print / Tpcy / Film / (Dig) — Make: — Speed: ISO —	Processing: —
Film No/Reference: —	Page: 2 of 2

Frame No:	Description: Subject and Detail	Orientation	Px Plan #
1	View from S of material part of site	N	2
2	Detail of door sill & apron from E	W	2
3	" " " " " from N	S	2
4	" " " " " from W	E	2
5	from S	N	2
6	Detail of "the Pack" heart frog in brick & bolt	E/near vertical	2
7	Detail of old rectangular frog in N brick.	E/near vertical	2

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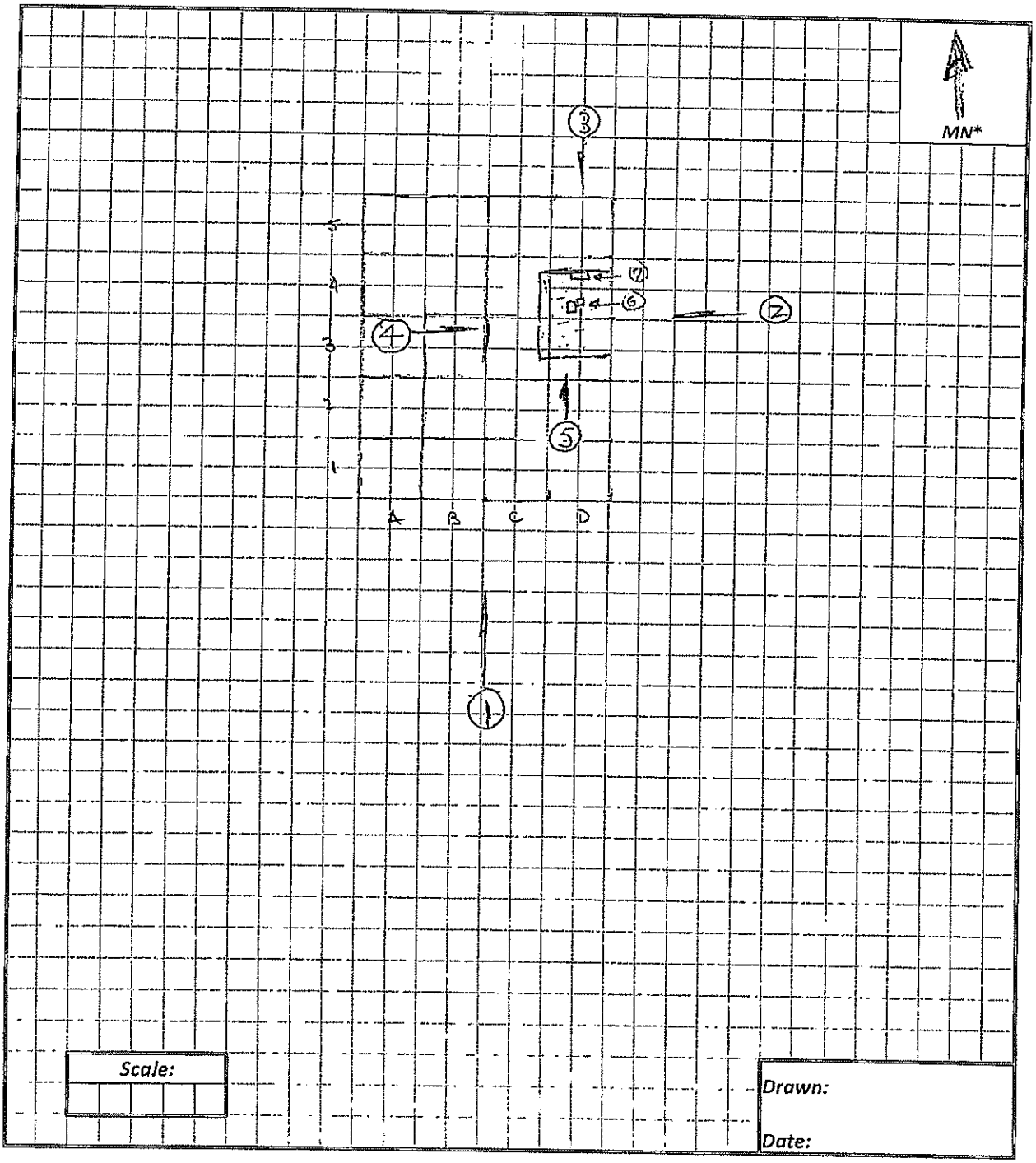
Photographic Plan Sheet

GTSF	MH/5 / E
Site Name	Numerical Reference

Photographer: P Rheinberger	Date: 2/7/2010
Camera: Kodak Lens:	Job No: 100602
Film: Col / Mono / Print / Tpcy / Film / (Dig) Make: — Speed: ISO —	Processing: —
Film No/Reference: —	Page: 2 of 2



Scale:

Drawn:

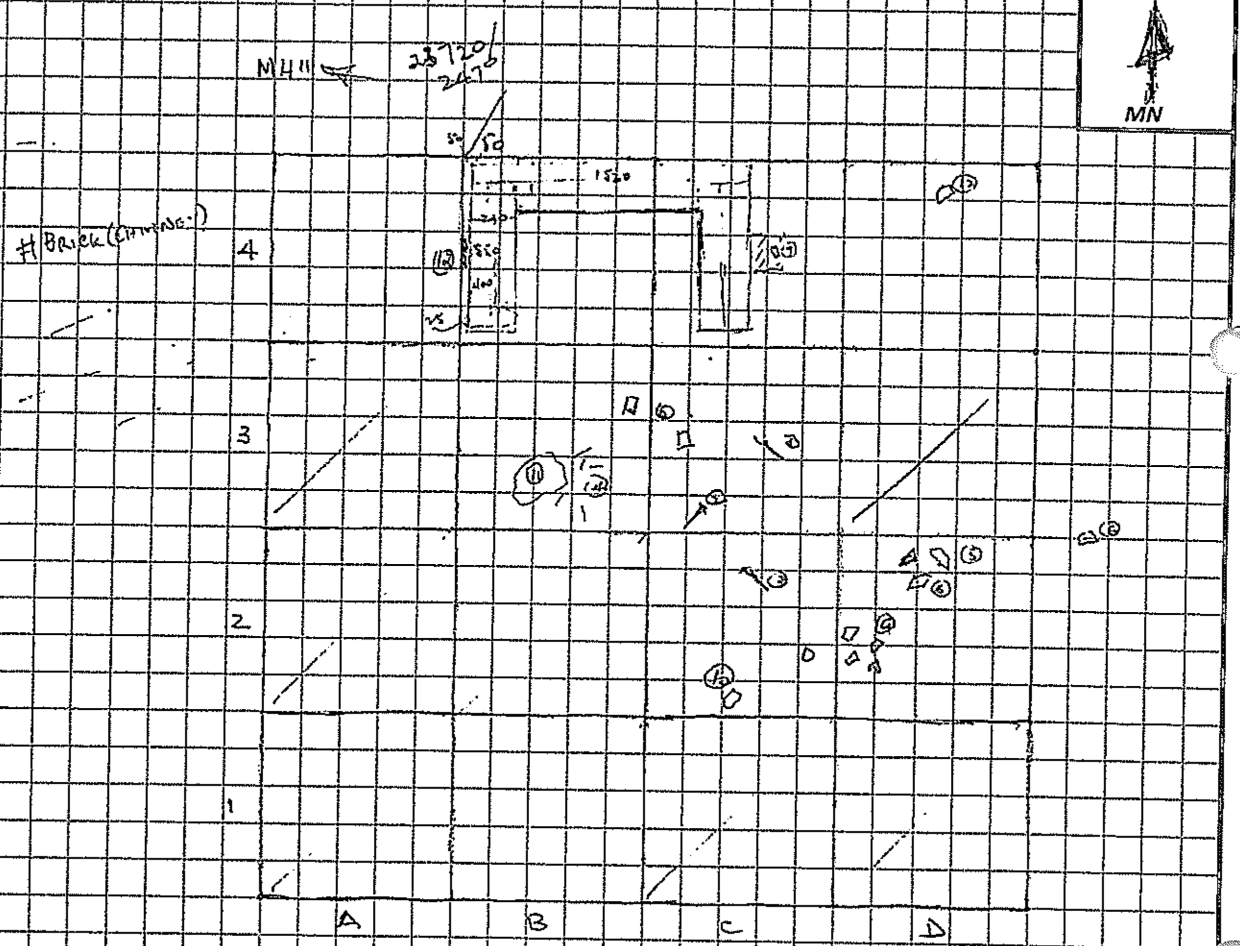
Date:

* Unless otherwise stated, top of form represents photographic north

PACIFIC NATIONAL
GRETA TRAIN SUPPORT FACILITY

Field/Site Sketchblock

GTSF / 2/3 / MH11-E / 1
Site/Context/Locater(s) Number



- ✓ ① # Miners Pick
- ✓ ② Long Fe Spike
- ✓ ③ Short " "
- ✓ ④ Fe Nails
- ✓ ⑤ Ce Festone
- ✓ ⑥ " " (small
- ✓ ⑦ Shotgun Base
- ✓ ⑧ 2x Flat Fe
- ✓ ⑨ Window Gl
- ✓ ⑩ "Rili" Glb
- ✓ ⑪ Egg cup base + 1 Plain / 3 Blue Ce
- ✓ ⑫ CH3 - Thin Metal Sheet
- ✓ ⑬ 2x Glb

To do here:
① Draw Fireplace ✓
② Dist → MH11 + Bug ✓

Scale[s]:
mm 200 400 600 800 1000

Horizontal	
Vertical	

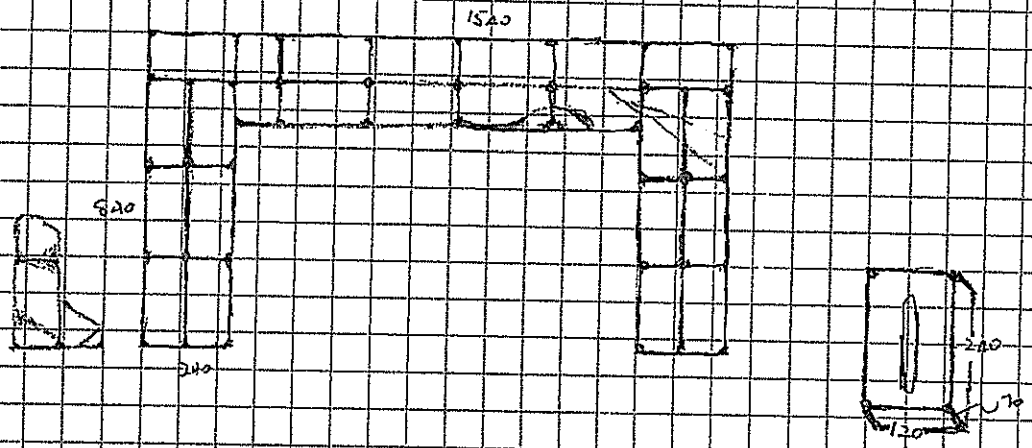
Drawn by:

Date: 3/6/10

Field/Site Sketchblock

GTSF / 3 / MHII-E 2.
Site/Context /Locater(s) Number

MN



Scale[s]:

Horizontal

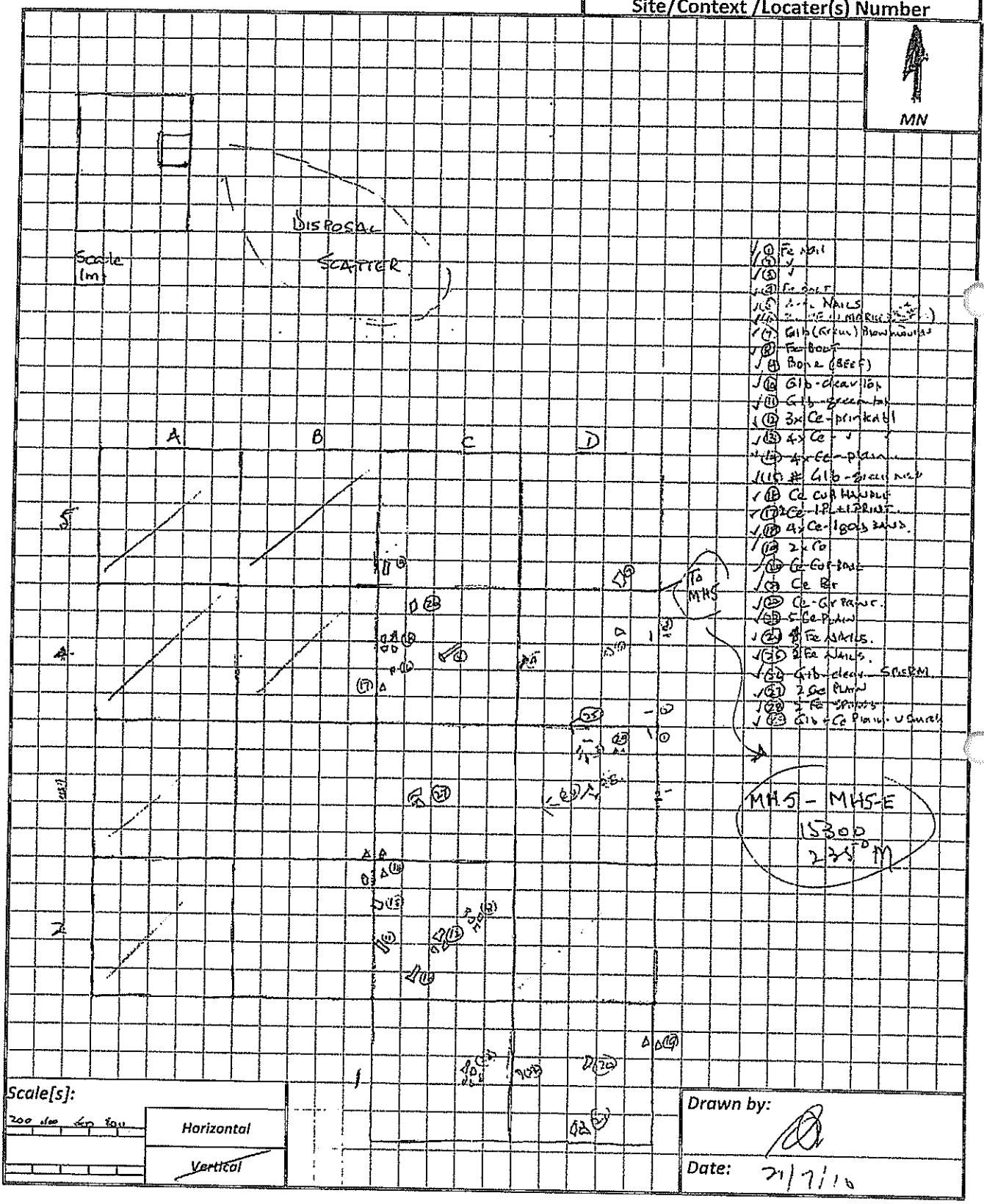
Vertical

Drawn by:

Date:

Field/Site Sketchblock

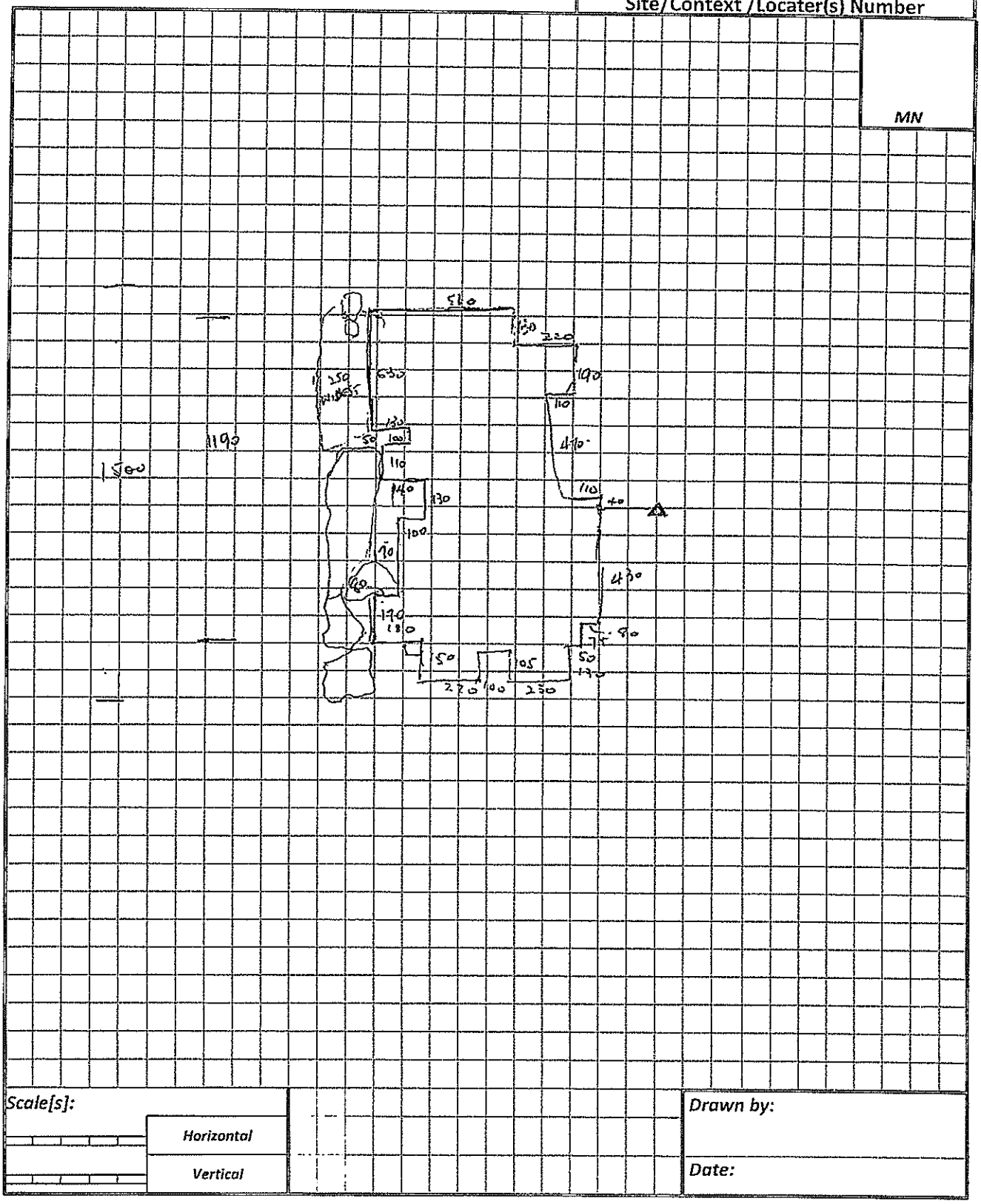
GTSF / Z / MHS-E / 1
Site/Context /Locater(s) Number



Field/Site Sketchblock

_____/_____/_____/_____
Site/Context /Locater(s) Number

MN



Scale[s]:

Horizontal

Vertical

Drawn by:

Date:

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Appendix 3

Copies of Artefact Analysis Sheets

ANALYSIS OF ARTEFACTS

CAT #	ORIGIN		FABRIC						NO OF PCS	MASS (gr)	COMMENTS
	SITE	LOC'N	TYPE	FORM	GLAZE	PATTERN	COLOUR	MARKS			
1	MH11	1N-C	Stone	Bowl/Mug	Slip	Abstract	Blue/White	—	2	11.6	Brushed pattern, crazed, heat. (? Shaving?)
2		1N-C	Stone	Bowl	Slip	Flower	Blue/White	—	1	12.8	ttr
3		1N-C	Stone	Plate	Slip	Clear	White	—	2	15.9	Conjoin
4		1N-C	Stone	Bowl?	Slip	Clear	Brown/LB	—	1	6.1	
5		1N-C	Clay	Plate	Slip	Clear	White	—	5	18.4	
6		1N-C	Stone	—	Slip	Clear	White	—	1	2.1	Fine section
7		1N-C	Stone	Plate?	Slip	Clear	White	—	2	9.5	Crazed, heat.
8		1N-C	Stone	—	Slip	Clear	Cream	—	1	3.2	
9		1N-C	Stone	Cup	Slip	Vine/flower	Brown/White	—	1	1.6	ttr
10		1N-C	Stone	—	Slip	Clear	White	—	1	—	Discarded.
11		1N-C/D	Stone	Cup Handle	Slip	Clear	White	—	1	22.2	
12		1N-E	Stone	Cup/Mug	Slip	Geometric ttr	Blue/White	—	1	4.3	ttr
13		1N-E	Stone	Plate	Slip	Clear	White	—	3	11.2	Crazed. cf #7
14		1N-E	Stone	Bowl?	Slip	Clear	Brown/LB	—	1	5.9	Cf #4
15		1N-E	Clay	Plate	Slip	Clear	White	—	1	2.9	Cf #5
16		1N-E	Stone	Cup	Slip	Vine/flower	Brown/White	—	1	8.8	Cf #9, ttr
17		1N-F/G	Stone	Plate	Slip	Clear	White	—	2	22.5	Cf #7, crazed, heat.
18		1N-F/G	Clay	Cup/rim	Slip	Clear	White	—	1	2.6	Cf. 5, 15.
19	MH11	2N-A	E'ware	Jug/bottle	Salt	Clear	Cream+	—	6	102.5	*Mottled brown/grey, 2pcs conjoin
20		2N-A	Stone	Plate	Slip	Clear	White	✓	2	19.3	Sec px: Anthony Shaw & Co Burslem - post 1898
21		2N-A	Stone	Plate	Slip	Clear	White	✓	2	11.5	Wreath, banner "STT — prob "Crown Staffordshire" post-1891, Crazed, heat.
22		2N-A	Stone	Bowl/Mug	Slip	Abstract	Blue-Grey/White	—	2	16.5	Tob & bottom joins to body, cf #1 (? Shaving?)
23		2N-A	Clay	Plate	Slip	Clear	Cream	—	2	3.7	
24		2N-A	Clay	—	Slip	Geometric ttr	Blue/White	—	1	1.1	ttr
25		2N-A	Stone	—	Slip	Clear	White	—	4	8.2	Amorphous, unrelated, undiagnostic, crazed
26		2N-A	Clay	Cup/rim	Slip	Clear	White	—	1	5.0	Cf 5, 15, 18
27		2N-A	Stone	Cup	Slip	Clear	White	—	1	3.9	Crazed
28		2N-A	Stone	Bowl	Slip	Clear	Cream	—	2	26.4	Crazed, heat
29		2N-C	Stone	Cup/Mug	Slip	Geometric ttr	Blue/White	—	1	5.10	ttr, cf #12
30		2N-C	Stone	Plate	Slip	Vine/flower	Brown/White	—	2	21.5	cf #9, 16, Conjoin
31		2N-C	Stone	Bowl/Mug	Slip	Abstract	Blue/White	—	2	10.2	cf - #1, 22
32		2N-C	Stone	—	Slip	Lined	Blue/White	—	1	1.0	
33		2N-C	Clay	Cup/rim	Slip	Clear	White	—	1	1.7	cf 5, 15, 18, 26
TOTAL											

ANALYSIS OF ARTEFACTS

CAT #	ORIGIN		FABRIC						NO OF PCS	MASS (gr)	COMMENTS
	SITE	LOC'N	TYPE	FORM	GLAZE	PATTERN	COLOUR	MARKS			
34	MH11	2N-C	Stone	Plate	Slip	Lattice/Flowers	Brown/Cream	—	1	6.1	Tfr print.
35	MH11	2N-C	Stone	Bowl	Slip	Clear	White	—	2	16.4	
36	MH11	2N-C	Clay	Plate/rim	Slip	Clear	Cream	—	1	3.5	
37	MH11	2N-C	Clay	Plate/rim	Slip	Clear	L. Brown	—	1	6.2	
38	MH11	2N-C	Stone	—	Slip	Clear	Blue	—	1	1.6	
39	MH11	2N-D	Stone	Bowl	Slip	Moulded scallops	White	—	1	5.1	
40	MH11E	D2	Stone	Plate	Slip	Clear	White	Pt Mans Stamp	1	6.1	Marked "Ironstone China" in medallion with Crown above.
41	MH11E	D2	Stone	Plate/rim	Slip	Clear	White	—	1	23.1	
42	MH11E	D2	Stone	Cup	Slip	Clear	White	—	1	5.4	
43	MH11E	B3	Stone	Eggcup base	Slip	Clear	White		1	16.7	
44	MH11E	B3	Stone	Cup	Slip	Lattice/Flowers	Blue/White	—	2	11.9	Conjoin, tfr print
45	MH11E	B3	Stone	Plate	Slip	Tractop	Blue/White	—	1	4.6	
46	MH11E	B3	Stone	—	Slip	Clear	White	—	2	13.9	
47	MH11E	B3	Clay	Cup	Slip	Clear	White	—	2	12.7	
48	MH5E	C4	Stone	Cup handle	Slip	Clear	White	—	1	14.1	
49	MH5E	C4	Clay	Saucer	Slip	Gold band	White	—	2	12.5	
50	MH5E	C4	Clay	Cup	Slip	Clear	White	—	1	4.7	
51	MH5E	C4	Stone	—	Slip	Flower	Blue/White	—	1	1.1	
52	MH5E	C4	Stone	—	Slip	Geometric	Blue/White	—	1	1.9	Cf 51
53	MH5E	C4	Clay	—/Rim	Slip	Clear	White	—	1	1.0	
54	MH5E	D4	Stone	Plate	Slip	Clear	White	—	2	22.0	
55	MH5E	D3	Stone	Mug	Slip	Clear	Cream	—	1	12.8	
56	MH5E		Clay	Cup	Slip	Clear	White	—	1	2.6	
57	MH5E	D4	Stone	Plate	Slip	Clear	White	Frag Mans Mk	1	19.9	Part Royal Arms above framed 'S'
58	MH5E	D1	Stone	Cup base	Slip	Clear	White	—	1	13.4	
59	MH5E	D1	Stone	Plate	Slip	Clear	White	—	2	25.8	One ft base, one part rim
60	MH5E	C2	Stone	Plate	Slip	Clear	White	Frag Man's Mk	2	27.2	Part Royal Arms, Cf #56 (Same Sector of mark)
61	MH5E	C2	Stone	Plate	Slip	Flowers	Blue/White	—	1	3.2	Tfr print
62	MH5E	C2	E/ware	Jug/bottle	Salt	Clear	Cream	—	1	30.1	
63	MH5E	C2	Stone	Plate(s)	Slip	Geometric	Blue/White	—	2	42.5	
64	MH5E	C2	Stone	Cup/rim	Slip	Flower	Blue/White	—	1	2.5	
65	MH5E	D1	Stone	Plate	Slip	Leaf/Grecian	Brown/Cream	—	1	6.0	
66	MH5E	D1	Stone	Plate	Slip	Geometric	Brown/Cream	—	1	3.4	
67	MH5E	D1	Stone	Plate	Slip	Linear	Brown/White				Originally indicated "Grey tp." — tfr print.
TOTAL											

ANALYSIS OF ARTEFACTS

CAT #	ORIGIN		FABRIC						NO OF PCS	MASS (gr)	COMMENTS
	SITE	LOC'N	TYPE	FORM	GLAZE	PATTERN	COLOUR	MARKS			
68	MHSE	C1	Stone	Plate	Slip	Clear	White	—	2	11.2	
69	MHSE	C1	Clay	Plate	Slip	Clear	Creamm	—	2	4.3	
70	MHSE	C1	Stone	Cup/base	Slip	Clear	White	—	1	3.8	
TOTAL											

ANALYSIS OF ARTEFACTS

CAT #	ORIGIN		FABRIC						NO OF PCS	MASS (gr)	COMMENTS
	SITE	LOC'N	TYPE	FORM	FCTN-GEN	FCTN-SPEC	COLOUR	MARKS			
71	MH11	1N-C	Fine: 2.35mm	Flat	Structural	Window	Clear	—	1	4.0	
72	MH11	1N-E	Bottle	1xBase 1xShldr	Liquid	Alcohol	Clear	—	2	14.0	
73	MH11	2N-A	Bottle	Body (RS)	Liquid	Alcohol	Olive	—	2	14.2	Thick glass, 5.17, round bottle,
74	MH11	2N-A	Bottle	Body/Case	Liquid	Alcohol	Olive	—	2	5.1	Thin glass, 2.28. case bottle (spirits)
75	MH11	2N-A	Fine: 1.85	Flat	Structural	Window	Clear	—	1	1.2	
76	MH11	2N-C	Bottle	Base & body	Liquid	Alcohol	Olive	—	3	76.6	1 pce base rim & pontil, beer or pressurised wine
77	MH11	2N-C	Bottle	Base ⊗	Liquid	Oil/Condiment	Clear	—	4	95.4	2 pc mould; inc base, part body, neck & stopper
78	MH11	2N-D	Bottle	Body	Liquid	Alcohol	Olive	—	3	92.7	Heavy glass 7.2
79	MH11	2N-D	Bottle	Neck	Liquid	—	Clear	—	1	3.9	
80	MH11E	C2	Fine: 2.4mm	Flat.	Structural	Window	Clear	—	1	4.5	
81	MH11E	D2	Fine: 2.4mm	Flat	Structural	Window	Clear	—	4	14.9	
82	MH11E	C2	Bottle	Body/base	Liquid.	Sarsaparilla	Clear	"RILY"	1	20.4	
83	MH11E	A4	Bottle	Neck	Liquid	—	Clear	—	1	14.9	
84	MH11E	A4	Bottle	Neck	Liquid	Oil/Condiment	Clear	—	1	4.6	Fluted mould,
85	MH5E	C4	Bottle	Body	Liquid	Oil	Clear	SPERM SEWING MACHINE OIL	1	8.4	'SPERM/SEWING MACHINE OIL.
86	MH5E	D5	Bottle	Body	Liquid	Alcohol	Olive	—	1	27.0	Blow-moulded on very worn mould
87	MH5E	D3	Bottle	Shoulder	Liquid	Oil/Condiment	Clear	Leaf pattern?	1	2.9	Blow moulded
88	MH5E	C2	Bottle	# Neck	Liquid	Alcohol	Olive	—	1	20.3	Beer or pressurised wine, laid on strap.
89	MH5E	C2	Bottle	Body	Liquid	Alcohol	Olive	—	—	—	Discarded.
90	MH5E	C2	Bottle	Body	Liquid	Alcohol	Clear	—	—	—	Discarded.
TOTAL									0	0	

ANALYSIS OF ARTEFACTS

CAT #	ORIGIN		FABRIC						NO OF PCS	MASS (gr)	COMMENTS
	SITE	LOC'N	MATERIAL	FORM	FCTN-GEN	FCTN-SPEC	COLOUR	SIZE			
91	MH1	ZN	Fe	Curved Strap	Structural	Connection	Rust	82 x 39	1	151.1	Strap broke off at bolt hole
92	MH1E	D4	Br	Washer	Structural	Connection	Brown	11.68 D	1	0.9	Aperture 3.6
93	MH1E	C2	Fe	Spike	Structural	Fixing	Rust	142 x 17	1	169.3	
94	MH1E	C3	Fe	Spike	Structural	Fixing	Rust	322 x 20	1	266.4	
95	MH1E	C3	Fe	#Pick head	Mining	Hewing	Rust	199 x 29 Ave	1	476.7	Broken head of miner's pick.
96	MH1E	B3	Fe	Nail	Structural	Framing	Rust	124 x 10	1	30.5	
97	MH1E	B3	Fe	Nail	Structural	Framing	Rust	Av 70 x 7	4	34.1	
98	MH1E	B3	Fe	Nail Frags	Structural	Framing	Rust	Various	6	13.1	
99	MH1E	B3	Fe	Strap	Structural	Connection	Rust	53.7 x 24.8	1	12.4	
100	MH1E	C3	Fe	Strap	Structural	Connection	Rust	63.3 x 26.1	1	12.3	
101	MH5E	C4	Fe	Bolt	Structural	Fixing	Rust	128 x 18	1	162.3	Cup or rose head
102	MH5E	D4	Fe	Bolt	Structural	Fixing	Rust	159 x 26	1	452.0	Square head.
103	MH5E	D4/3	Fe	Nail	Structural	Framing	Rust	Av 67.6 x 7	3	16.1	
104	MH5E	D4	Fe	Nail	Structural	Framing	Rust	Av 80.1 x 6.7	2	21.3	
105	MH5E	D3	Fe	Nail	Structural	Framing	Rust	81.7 x 7.5	1	12.0	
106	MH5E	D3	Fe	Nail	Structural	Framing	Rust	Av 67.2 x 7.0	2	14.3	
107	MH5E	D3	Fe	Nail Frags	Structural	Framing	Rust	Av 40 x 6.9	2	7.9	
108	MH5E	D3	Fe	Spike	Structural	Fixing	Rust	Av 71.5 x 10.7	2	55.5	
109	MH5E	D3	Fe	Nail Frags	Structural	Framing	Rust	Av 40.2 x 9.1	4	20.2	
TOTAL											

ANALYSIS OF ARTEFACTS

CAT #	ORIGIN		FABRIC					NO OF PCS	MASS (gr)	COMMENTS
	SITE	LOC'N	MATERIAL	FORM	MARKS	COLOUR	SIZE			
110	MH11	1N-C/D	Brick	Bat	—	Red	Amorphous	2	—	Discarded
111	MH11	1N-F/G	Brick	Bat	—	Red	Amorphous	2	—	Discarded
112	MH11	2N-C	Brick	Bat	—	Red	Amorphous	2	—	Discarded
113	MH11E	C4	Brass	12g cartridge case	[illegible]ley London	Brown	22mm D	1	3.9	
114	MH11E	D2	Slate	Tally slate	—	Grey	128 x 46mm	1	33.1	
115	MH5E	C5	Bone	Bovine long	—	L Brown	117.2 x 43.8	1	97.6	
TOTAL										

Figure A1

Conjoined fragments of ironstone china, Artefact #20, showing the mark interpreted as of Anthony Shaw and Co, Stockton on-Trent, Staffs.

Paul Rheinberger
Scale: 10mms

Figure A2

Detail of the manufacturer's mark, Artefact #20.

Paul Rheinberger
No Scale: see previous

Figure ><

Fragments of ironstone china, Artefact #21, showing the mark interpreted as of Crown StaffordhsireChina Co, Minerva Works, Fenton, Staffs.

Paul Rheinberger
Scale: 10mm

Figure A4

Detail of the manufacturer's mark, Artefact #21.

Paul Rheinberger
No Scale: see before

Figure A5

Detail of the manufacturer's mark, Artefact #40, manufacturer not presently identified.

Paul Rheinberger
Scale: 10mm

Figure A6

Fragments of the body of clear glass, probably oil or condiments, bottle, Artefact #77.

Paul Rheinberger
Scale: 10mm

Figure A7

Elevation view of the fragments comprising Artefact #77.
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Paul Rheinberger
Scale: 10mm

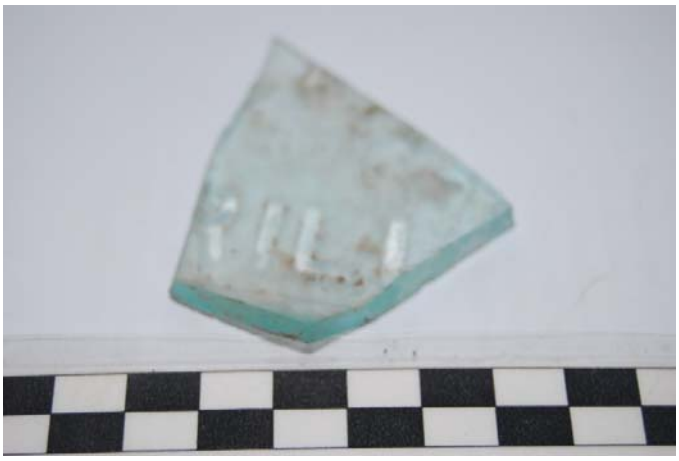

Figure A8

Fragments of clear glass bottle embossed RILL, interpreted as of Butler's Sarsaparilla Essence, manufactured Sydney post-1840, Artefact #82.

Paul Rheinberger
Scale: 10mm

Figure A9

Fragment of a clear glass bottle body embossed SPERM SEWING MACHINE OIL, Artefact #85.

Paul Rheinberger
Scale: 10mm

Figure A10

The broken head of miner's pick recovered from MH11E, Artefact #95.
.

Paul Rheinberger
Scale: 10mm

Figure A11

Selection of iron spikes, strap and nails recovered from MH11E, Artefacts ##93, 94, 96, 97 and 99.

Paul Rheinberger
Scale: 10mm

Figure A12

Assemblage of iron bolts, nails and fragments recovered from MH5E, Artefacts ##101-107 enc.

Paul Rheinberger
Scale: 10mm

Figure A13

Base of a 12-bore shotgun cartridge impressed '[E]LEY LONDON, Artefact #113
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Paul Rheinberger
Scale: 10mm

Figure A14

Fragment of graded slate, suggested as residue of a miner's tally slate, Artefact #114.

Paul Rheinberger
Scale: 10mm

Figure A15

Beef bone recovered from MH5E, signs of butchery and canine teeth marks, Artefact #115.

Paul Rheinberger
Scale: 10mm