N21 Castleisland to Abbeyfeale Road Improvement Scheme

Site AR05, Kilmaniheen West, Co. Kerry

Final Archaeological Excavation Report

for Kerry County Council

Licence No: 04E0975

by Kate Taylor

Job J04/09

(NGR 109440 123180)

15th December 2005

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Summary

Site name: N21 Castleisland to Abbeyfeale Road Improvement Scheme, Site AR05, Kilmaniheen West, Co. Kerry

Townland: Kilmaniheen West

Parish: Brosna

Barony: Trughanacmy

County: Kerry

SMR/RMP Number: N/A

Planning Ref. No: N/A

Client: Kerry County Council, County Buildings, Ratass, Tralee, Co. Kerry

Landowner: Kerry County Council, County Buildings, Ratass, Tralee, Co. Kerry

Grid reference: 109440 123180 (OSI Discovery Series, 1:50,000, Sheet 72)

Naturally occurring geology: Yellow clayey silts across the whole area except for coarse sand and gravel at extreme east

TVAS Ireland Job No: J04/09

Licence No: 04E0975

Licence Holder: Kate Taylor

Report author: Kate Taylor

Site activity: Excavation

Site area: 6826m^2

Sample percentage: 100%

Date of fieldwork: 26th of July to 6th August 2004

Date of report: 15th December 2005

Summary of results: Nineteen charcoal rich pits were excavated and most evidenced *in situ* burning. Radiocarbon dates of AD 810-840 and 860-1030 (2 sigma) and AD 990-1160 (2 sigma) were obtained from charcoal from two of the pits. It is likely that the pits were used for the production of charcoal.

Monuments identified: Medieval charcoal production pits.

Location and reference of archive: The primary records (written, drawn and photographic) are currently held at TVAS Ireland Ltd, Ahish, Ballinruan, Crusheen, Co. Clare.

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Report edited/checked by: Graham Hull ✓15.12.05

N21 Castleisland to Abbeyfeale Road Improvement Scheme, Site AR05, Kilmaniheen West, Co. Kerry Final Archaeological Excavation Report

By Kate Taylor

Report J04/09l

Introduction

This report documents the final results of an archaeological excavation of a series of charcoal-production pits (Site AR05) on the route of the N21 Castleisland to Abbeyfeale Road Improvement Scheme, Kilmaniheen West, Co. Kerry (NGR 109440 123180) (Fig. 1). The excavation forms part of the N21 Castleisland to Abbeyfeale Road Improvement Scheme Archaeological Resolution Contract 2.

The National Monuments Act 1930 (as amended) provides the legislative framework within which archaeological excavation can take place and the following government publications set out many of the procedures relating to planning/development and archaeology:

Framework and Principles for the Protection of the Archaeological Heritage (DAHGI 1999a)

Policy and Guidelines on Archaeological Excavation (DAHGI 1999b)

Code of Practice between the National Roads Authority and the Minister for Arts, Heritage, Gaeltacht and the Islands (NRA/MAHGI 2001)

Project background

As part of the National Roads Authority scheme for upgrading the N21 Limerick to Tralee Road, Kerry County Council, in consultation with NRA Project Archaeologist Sébastien Joubert, requested a series of archaeological investigations along the route of the proposed Castleisland to Abbeyfeale Road Improvement Scheme. The proposed scheme has an overall length of 7.1km and involves the realignment of 7.1 km of the N21 from Ballyduff, Knocknagashel, Co. Kerry, to Kilkinlea Lower, Co. Limerick around 1 km north at Feale's Bridge (Fig. 1).

Five sites of archaeological potential were located as the result of intensive test trenching along the course of the road (O'Donoghue and Kiely 2004). As preservation in situ was not a reasonable option, the mitigation strategy agreed by the Project Archaeologist and the national licensing authorities for these sites was preservation by record, i.e. full archaeological excavation.

The archaeological excavation and post excavation work were funded by Kerry County Council through the National Roads Authority and part-financed by the European Union under the National Development Plan 2000-2006.

Location, topography and geology

The site was located in the townland of Kilmaniheen West, parish of Brosna, barony of Trughanacmy and lay approximately 4km south-west of Abbeyfeale town centre, 4km north-east of Knocknagashel village and was centred on NGR 109440 123180 (Figs 1 and 2).

The site lay in a field that was used for rough pasture and was reasonably dry and adjacent to the river Feale. The majority of the site was flat and was located on a riverside terrace. The site gently inclined

downwards at the north and at the north-eastern the ground stepped down more steeply to the River Feale flood plain (75.9m OD in the south to 74.6m OD in the north-east).

The topsoil (0.1m to 0.15m thick) was a dark brown organic loam that overlay the natural geological deposits. These natural deposits were, mostly yellow clayey silts with occasional stony areas, although at the north-east corner of the site where the land dipped down to the flood plain, a coarse yellow brown riverine gravely sand was recorded.

Archaeological and historical background

As part of the Environmental Assessment process, Kerry County Council commissioned both desk-based and walkover surveys from RPS Cairns Ltd in 2000, leading to the production of a Cultural Heritage Assessment document (Archaeological Impact Statement, Connolly 2000). A total of 12 sites of known or potential cultural heritage significance were identified. Two potential sites were added to the original recording. No archaeological remains were however identified at these locations during later exploratory investigations.

The proposed road runs in the main through the Owveg River Valley and is flanked to the east and west by higher ground that often takes the form of low round-topped hills. There has been a good deal of field amalgamation and land-reclamation in the gently sloping land on the sides of the valley, as well as the valley floor. However, large tracts of the more low-lying land are still very wet and marshy.

The road route land-use primarily comprises permanent grassland used for grazing, silage or haymaking. Several areas of wetland and scrub to woodland are situated throughout the route. The current field system was laid out in the 18th and 19th centuries and subsequently further developed to the present day by land improvement and field amalgamation.

The valley forms a major geographical entry point from the undulating land of south Limerick, across the River Feale and on into north Kerry. This is clearly illustrated by the presence of the existing roadway. It should be noted however, that the current N21 (at least as a metalled roadway) was opened as recently as the early 19th century and prior to that phase of road-building, the area was seen as inaccessible and hostile (Lewis 1842).

There is one known site in the immediate proximity of the route corridor (RMP KE024-001). This site is recorded as a church and is within 20-30m of the proposed route in the townland of Kilmaniheen West.

The other sites recorded as listed monuments for County Kerry, in the general area of the route corridor are;

KE024-002 - A *fulacht fiadh* in the townland of Kilmaniheen East, approximately 700m to the east of the route

KE023-008 - An enclosure in the townland of Carrigeenwood, approximately 600m to the west of the route.

KE023- 010 - A burial ground in the townland of Meenbannivane, approximately 1km to the west of the route corridor.

Archaeological test investigations were undertaken by Eachtra Archaeological Projects in October 2003 (O'Donoghue and Kiely 2004). The assessment consisted of three elements. Part 1 comprised the digging of test trenches at potential sites identified in the Archaeological Impact Assessment by RPS Cairns (licences 03E1772-7). Part 2 consisted of the excavation of test trenches on the centreline and

offsets along the entire proposed route (licence 03E1767) and Part 3 consisted of the excavation of test trenches in advance of the diversion of service cables.

No evidence of archaeological activity was recorded in the test trenches of the six potential sites as identified in the previous assessment undertaken by RPS Cairns. No archaeological stratigraphy, features or artefacts were uncovered at the banks of the Owveg and Feale River.

The centreline and offset archaeological produced five areas of archaeological significance. Two of these were *fulachta fiadh*. Three further areas of archaeological significance were identified by the presence of pits.

An archaeological site was found during testing on the southern side of the Feale River, this was numbered Site AR05 and is the subject of this excavation report. Two pits were recorded within the field. One was circular with a diameter of 0.9m, a charcoal enriched fill and showed evidence of *in situ* burning. The second pit was sub-rectangular with a charcoal rich fill and there was evidence of burning visible around the feature. Small scatters of burnt clay and charcoal were recorded in all of the trenches excavated in this area. It was thought at the time of testing that these deposits were unlikely to be modern.

Following the excavation of Site AR05 additional test trenches were dug in the fields to the north and south in order to establish whether further similar features were present (Taylor 2004a). No archaeological deposits were revealed in these trenches.

A preliminary archaeological report on the excavation of Site AR05 was submitted to the licensing authorities in 2004 (Taylor 2004b).

Excavation aims and methodology

A licence to excavate was granted to Kate Taylor by the National Monuments Section of the Department of the Environment, Heritage and Local Government, in consultation with the National Museum of Ireland, on behalf of the Minister for the Environment, Heritage and Local Government. The licence number is 04E0975.

The aims of the excavation were to:

1) Preserve by record all archaeological deposits and features within the excavation area
2) Produce a high quality report of the findings

The fieldwork took place between 26th July and 6th August 2004 and was directed by Kate Taylor, assisted by Graham Hull and Astrid Lesley Nathan.

The excavation area was broadly rectangular, centred on the archaeological features seen during testing and measured approximately 92m by 75m (actual area examined 6826m^2). Topsoil and overburden were removed by a 26 tonne, 360º, tracked machine, operated under direct and continuous archaeological supervision. The digger was fitted with a 7 foot (2.1m) toothless bucket.

All features were hand-cleaned then fully excavated.

A full written, drawn and photographic record was made following procedures outlined in the TVAS Ireland Field Recording Manual (First Edition 2003).

Excavation results (Figs 3-7 and Plates 1-8)

The excavation revealed evidence of at least two phases of activity ranging in date from the Early Medieval period to the 19th or 20th century. All features and contexts are listed in Appendix 1.

Phase 1: Early Medieval

Nineteen charcoal rich features were exposed during the topsoil stripping of AR05, sixteen of which were self-contained in well-defined cuts. Several features appeared to have been truncated to a greater or lesser degree. The pits are described in detail in Table 1.

With the exception of one circular example (3) and two small depressions, possibly accidentally formed (5 and 6), the pits were similar in form, sharing a long rectangular or oval shape. Most pits had fairly steep sides and flat bases with evidence of *in situ* burning. The elongated pits measured between 1.30m and 3.88m by 0.80m and 1.40m and were ranged in depth from 0.08m and 0.45m.

The less truncated pits had a similar sequence of fills. This sequence was: an extremely charcoal rich deposit (nearly 100%) in the base immediately above heat-oxidised natural clay with a deposit of clean clayey silt (similar to the natural geological deposits) above. It is likely that the features were deliberately backfilled with the original upcast from their excavation after use.

The pits did not appear to form a recognisable pattern in their layout but several were parallel to their immediate neighbours and these were probably not dug randomly.

The other features (deposits 61, 66 and 57) were burnt patches of natural soil, some overlain by charcoal fragments.

Table 1: Pit descriptions

Pit No.	Dimensions (m) (length x width x depth)	Plan Profile	Fill No. and description	Comments
1	1.80 x 0.80 x 0.28	Sub-rectangular, rounded corners. Vertical sides, round to flat base.	Primary fill (52) loose black clayey silty charcoal deposit (80%). Secondary fill (78) Mid-yellow clayey silt, 2% charcoal (redeposited natural).	Regular sided pit with *in situ* burning at the base Primary fill (52) radiocarbon dated to Cal AD 810 to 840 and Cal AD 860 to 1030
2	2.10 x 1.40 x 0.12	Ovoid Gently sloping northern side onto a concave to flat base. Southern side is straight and vertical	Primary fill (53) crumbly black + grey patching charcoal and clayey silt, occasional stones. Secondary fill (75) soft pale yellowish brown silty sand with 2% charcoal.	*In situ* burning. Feature slightly truncated by machining
3	0.98 x 0.80 x 0.12	Sub-circular Shallow inclined sides to a concave base	Single fill (54) black silt with charcoal (80%).	The only pit with *little in situ* burning and circular.
4	3.80 x 1.00 x 0.10	Elongated sub-rectangular/oval Gently sloping sides onto a flat base	Primary fill (59) pale greyish brown sandy clayey silt 2% stones + 1% charcoal flecking. Secondary fill (60) friable greyish black 60% charcoal + 1% stones.	Traces of *in situ* burning vegetation disturbances.
5	0.58 x 0.36 x 0.06	Oval Gently sloping sides onto an irregular but concave base	Single fill (55) loose friable greyish black clayey silt + 50% charcoal and 5% stones.	Location very disturbed by vegetation no *in situ* burning.
6	0.65 x 0.36 x 0.07	Oval with root disturbance channel similar to 5, irregular edges.	Single fill (56) loose dark grey/ black clayey silt with 40% charcoal and 10% stones.	Severely disturbed by vegetation roots. No *in situ* burning.
7	2.30 x 0.95 x 0.08	Elongated oval. Very shallow and concave base.	Single fill (58) loose black clayey silt 80% charcoal.	Traces of *in situ* burning shallow remain of pit. Truncated by machining

Pit No.	Dimensions (m) (length x width x depth)	Plan Profile	Fill No. and description	Comments
8	1.30 x 0.90 x 0.15	Oval. Concave sides to flat base.	Primary fill (80) loose mixed black and yellow silty charcoal deposit more at the east of the feature. Secondary fill (79) friable mid-pale yellow clayey silt 1% charcoal and 1% stones.	Traces of *in situ* burning. Vegetation disturbances. Smaller and more rounded than other pits most similar to pit 3
9	3.75 x 1.32 x 0.30	Sub-rectangular, rounded corners. Steep sides to a flat base.	Primary fill (65) loose dark grey to black clayey silt with 60% charcoal and 1% chunks of burnt clay at base and along the sides. Secondary fill (64) firm mid-yellowish brown clayey silt with occasional stones and charcoal flecks.	Traces of *in situ* burning at base and on the sides.
10	3.80 x 1.25 x 0.24	Sub-rectangular with rounded corners. Steep sides round to flat base.	Primary fill (68) loose black clayey silty charcoal deposit (80%) some very large chunks. Secondary fill (67) firm mid-yellowish brown clayey silt 1% stones and 1% charcoal.	*In situ* burning. Same orientation as pits 11 and 13.
11	3.88 x 1.18 x 0.20	Sub-rectangular. Steep sides round to a flat base.	Primary fill (70) loose black clayey silty charcoal deposit (60%). Secondary fill (69) moderate mid-yellow/ brown clayey silt 1% stones and 1% charcoal, clean deposit (redeposited natural?).	*In situ* burning. Vegetation disturbances. Same orientation as pits 10 and 13
12	1.90 x 1.20 x 0.21	Sub-rectangular / oval. Concave sides round to a flat base.	Primary fill (72) loose dark brown/ black clayey silt with 60% charcoal including very large chunks. Secondary fill (71) moderate mid-yellowish brown clayey silt charcoal flecking and 1% stones.	*In situ* burning. Primary fill (72) radiocarbon dated to Cal AD 990 to 1160
13	2.80 x 1.32 x 0.12	Sub-rectangular, rounded ends. Steep sides to flat base.	Primary fill (74) loose brownish black clayey silt with 60% charcoal spreads outside the feature at south/east. Secondary fill (73) firm mid-yellowish brown clayey silt with 1% charcoal and 1% stones.	Traces of *in situ* burning inside the pit and outside at the south-east. Same orientation as pits 10 and 11.

Pit No.	Dimensions (m) (length x width x depth)	Plan Profile	Fill No. and description	Comments
14	2.72 x 1.40 x 0.22	Sub-rectangular wider in the middle. Steep sides round to a flat irregular base into stony natural.	Primary fill (77) loose dark brown/ black and yellow patching, clayey silt with 60% charcoal. Secondary fill (76) moderately firm mid yellow brown clayey silt with 1% charcoal and 5% stones	*In situ* burning.
15	1.94 x 0.94 x 0.20	Oval. Concave sides and base. Steeper at southern end.	Primary fill (82) loose and soft mixed black and yellow clayey silt containing 60% charcoal. Secondary fill (81) moderately soft mid-pale yellow brown clayey silt with 1% charcoal and 1% stones.	*In situ* burning at each end. Vegetation disturbances at North.
16	2.60 x 0.85 x 0.45	Sub-rectangular. Vertical sides round to flat base.	Primary fill (84) loose and soft black clayey silt with 80% charcoal very thin as opposed to other pits. Secondary fill (83) moderately firm mid-yellowish brown clayey silt with 1% charcoal and very occasional stones.	Burrowing disturbance and traces of *in situ* burning.

Finds

Five artefacts were recovered during the excavation (Appendix 2). One of these, a piece of iron slag, was recovered from one of the pits, however this was not well stratified and may have been intrusive. The other finds were further fragments of slag, a small piece of lead and a struck flint that were recovered from the topsoil.

Lithics by Dr Steve Ford

A single, intact flint, flake (04E0975:1) was recovered from the topsoil. It is assumed that on this medieval site, this flake represents residual casual loss or discard, though some *ad hoc* use in the medieval period cannot be discounted. The flake measures 26 by 13mm and weighs 3gm.

Slag and associated material identification by Lynne Keys

Three pieces of metal-working waste were examined and identified by Lynne Keys and are described in Table 1.

Table 1: Slag

Cut	Deposit	Find no.	Identification	Weight (gm)	Length (mm)	Width (mm)	Depth (mm)	Comment
2	50	3	Smithing hearth bottom	474	95	90	50	Topsoil
16	83	5	Cinder	36				
-	50	4	Undiagnostic	68				Possibly smithing slag

Samples

One charcoal sample and thirteen bulk soil samples were taken from the charcoal fills of the pits (Appendix 3).

Note. A piece of charcoal recovered from Pit 1 was examined by Lorna O'Donnell before export for radiocarbon dating (below. This piece of charcoal was oak (Quercus sp.) and weighed 10.13gm, and was radially split. The piece was of slow growth, and at least 28 years old. All other charred plant remains were examined by Lucy Cramp (below).

Charred plant remains by Lucy Cramp

Methodology

A total of 13 bulk samples of sediment and one sample of charcoal were taken for analysis. Samples were floated and sieved for macrobotanical remains through a 300micron and then a 2mm mesh, before being sorted under a low-power binocular microscope.

Preliminary sorting revealed that wood charcoal was the only material present for analysis. Pieces of charcoal were hand-picked for identification under a binocular microscope at low- (up to x40) and high magnification (up to x400). Where fewer than 20 pieces of identifiable charcoal were present, all were selected for identification. Where a sample contained greater than 20 fragments of identifiable charcoal, 20 pieces were randomly selected for identification from a range of fragment sizes.

Results

The results are presented in Table 2 (below). All pieces were preserved by carbonisation.

Summary and conclusions

These samples contained very high concentrations of relatively large pieces of charcoal. The species was almost entirely oak (Quercus sp.) although isolated, and relatively small fragments of alder (Alnus sp.) and hawthorn (Pomoideae sp.) were also present within one sample (Sample 8). The abundance of charcoal is consistent with the interpretation of the deposits being related to semi-industrial charcoal production, and the almost exclusive use of oak suggests that it was specifically sought as a preferential wood-type.

Table 2: Charred plant remains

Sample identification		<2> [3] (54)	<3> [7] (58)	<4> [4] (60)	<5> [9] (65)	<6> [10] (68)	<7> [11] (70)	<8> [12] (72)	<9> [13] (74)	<10> [2] (53)	<11> [8] (80)	<12> [16] (84)	<13> [15] (82)	<14> [14] (77)
Sample volume (litres)		0.25	5	5	5	5	5	5	8	5	8	2	5	5
Sample description		Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill	Pit fill
	Abundance													
Quercus sp.	Oak	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Alnus sp.	Alder							+						
Pomoideae sp.	Hawthorn etc.							+						

+ present (<2) ++ some (<10) +++ much (>10)

Radiocarbon dates

Two radiocarbon determinations were made by Beta Analytic Inc, Miami, Florida, from charcoal from the primary fill of two of the pits (Appendices 4 and 5).

Table 3: Radiocarbon determinations

Sample material	Context	Lab code	Radiometric age	Calendrical calibrations
Quercus	Pit 1, fill 52, sample 1	Beta-194572	1080±60 BP	2 sigma (95%) Cal AD 810 to 840 and Cal AD 860 to 1030 1 sigma (68%) Cal AD 900 to 1010
Alnus/Corylus	Pit 12, fill 72, sample 8	Beta-207373	980±40 BP	2 sigma (95%) Cal AD 990 to 1160 1 sigma (68%) Cal AD 1010 to 1040

The sample from Pit 1 was from a long-lived tree (oak) and the sample from Pit 12 was from shorter-lived alder/hawthorn. Given the old-wood effect, it is safe to assume that the later-10th to 12th century date is likely to be more indicative of the pits' use than the 9th to 11th century date from the oak.

Discussion

The excavation of Site AR05, Kilmaniheen West, Co. Kerry has produced evidence of semi-industrial charcoal making dating to the early medieval period. It is very possible that the excavated pits were for the production of charcoal as a fuel for iron smelting. The small amount of iron slag recovered from the site was not however well stratified and could not be directly associated with the features. The radiocarbon determinations indicate that this charcoal making was taking place in the later-10th to 12th centuries.

The predominance of oak charcoal in the pits is not unexpected as hardwoods, when burnt, make a product that will not easily crumble and will survive cartage (transportation). The Owveg Valley clearly had large oak woods before the modern period. Two Bronze Age sites, excavated as part of this road scheme and within 3km of AR05, also showed a high proportion of oak within the charred plant remains from two *fulachta fiadh* (Hull 2005a and Taylor 2005).

Very similar charcoal pits have been excavated in both Britain and Ireland, although little is known about the making of charcoal in early periods (Tylecote 1986, 225). These features have variously been described as 'charring hearths', 'pit-steads' and charring pits' (*ibid.*) and similar pits are described by Biringuccio in a 16th century treatise on metals and metallurgy (Smith and Gnudi 1990, 173-9).

Biringuccio details two methods of charcoal-making. The first is in clay-covered piles of stacked wood and the second is in pits. The pit is filled with wood, lit at both ends and sealed with earth to slow the fire. See Plate 9 for a reproduction of Biringuccio's illustration of charcoal burning in pits.

Other archaeological excavations in Ireland have encountered similar charcoal-rich pits. At Ballycorick, Clondagad, Co. Clare a rectilinear pit measuring 4.2m by 1.4m and 0.2m deep and 100% filled with carbonised wood was interpreted as being for oak charcoal production (Hull 2005b). Similarly sized and shaped pits thought to be for making oak charcoal have been found at Kilquane, Co. Clare (O'Donovan 2002) and at Aghamore, Co. Mayo (Red Tobin *pers. comm.*).

Iron smelting has been demonstrated in the vicinity of the charcoal production pits. As part of this road project, a furnace was excavated 2.6km to the south-west (Hull 2005c). The furnace was dated to the 6th to 7th centuries AD, which is three or four centuries before the charcoal production site was in operation. At the furnace, oak charcoal was also the dominant type and although the two sites were not contemporary, there was clearly an iron working industry operating in the Owveg Valley in the second half of the 1st millennium AD.

Archaeological potential off the road CPO

This excavation and the two phases of testing nearby (O'Donoghue and Kiely 2004, Taylor 2004a) have indicated that the site has been fully excavated within the CPO. No further features were revealed in the lower ground either to the north or south. Within the excavated area, the pits were seen to be distributed widely across the field and did not appear to respect the modern field boundaries. It is therefore likely that, although no surface expression is apparent, further similar archaeological deposits may be present in the neighbouring fields off the road CPO.

Further work

The results of the excavation of site AR05, Kilmaniheen West, Co. Kerry, 04E0975, will be submitted for publication in the Journal of the Kerry Archaeological and Historical Society.

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Kate Taylor MIFA MIAI
TVAS Ireland Ltd
15th December 2005

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Appendix 1: Catalogue of features and deposits

Context number	Description	Sample Number	Finds
1	Cut of pit	-	-
2	Cut of pit	-	-
3	Cut of pit	-	-
4	Cut of pit	-	-
5	Cut of pit	-	-
6	Cut of pit	-	-
7	Cut of pit	-	-
8	Cut of pit	-	-
9	Cut of pit	-	-
10	Cut of pit	-	-
11	Cut of pit	-	-
12	Cut of pit	-	-
13	Cut of pit	-	-
14	Cut of pit	-	-
15	Cut of pit	-	-
16	Cut of pit	-	-
50	Topsoil	-	1 - lithic; 2 – metal; 3&4 - slag
51	Natural	-	-
52	Fill of pit 1	1	-
53	Fill of pit 2	10	-
54	Fill of pit 3	2	-
55	Fill of pit 5	-	-
56	Fill of pit 6	-	-
57	Burnt patch and root holes	-	-
58	Fill of pit 7	3	-
59	Fill of pit 4	-	-
60	Fill of pit 4	4	-
61	Burnt patch	-	-
62	Burnt patch	-	-
63	Patch of burnt deposit	-	-
64	Fill of pit 9	-	-
65	Fill of pit 9	5	-
66	Patch of burnt deposit	-	-
67	Fill of pit 10	-	-
68	Fill of pit 10	6	-
69	Fill of pit 11	-	-
70	Fill of pit 11	7	-
71	Fill of pit 12	-	-
72	Fill of pit 12	8	-
73	Fill of pit 13	-	-
74	Fill of pit 13 + outside spread	9	-
75	Fill of pit 2	-	-
76	Fill of pit 14	-	-
77	Fill of pit 14	14	-
78	Fill of pit 1	-	-
79	Fill of pit 8	-	-
80	Fill of pit 8	80	-
81	Fill of pit 15	-	-
82	Fill of pit 15	13	-
83	Fill of pit 16	-	5 - slag
84	Fill of pit 16	12	-

Appendix 2: Catalogue of finds

Find number	Cut	Deposit	Sample number	Category	Description
1	-	50	-	Lithic	Struck flint
2	-	50	-	Metal	Lead tube
3	-	50	-	Slag	2 pieces
4	-	50	-	Slag	8 fragments
5	16	83	-	Slag	1 piece

Appendix 3: Catalogue of samples

Sample number	Cut	Deposit	Volume sieved (L)	Volume floated (L)	Stone sample?	Charred plant material?
1	1	52	-	-	N	Y
2	3	54	0.25	0.25	N	Y
3	7	58	5	5	N	Y
4	4	60	5	5	N	Y
5	9	65	5	5	N	Y
6	10	68	5	5	N	Y
7	11	70	5	5	N	Y
8	12	72	5	5	N	Y
9	13	74	8	8	N	Y
10	2	53	5	5	N	Y
11	8	80	8	8	N	Y
12	16	84	2	2	N	Y
13	15	82	5	5	N	Y
14	14	77	5	5	N	Y

Appendix 4: Calibration of radiocarbon age to calendar years

Pit 1, fill 52, *Quercus*

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-27.8:lab. mult=1)

Laboratory number: **Beta-194572**

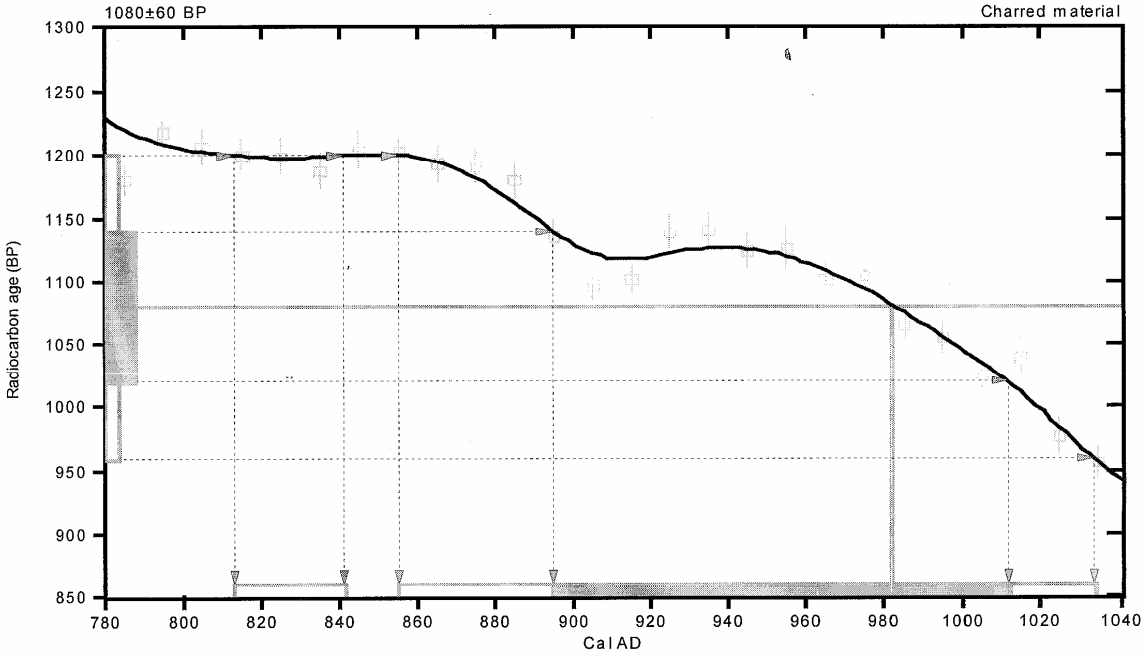
Conventional radiocarbon age: **1080±60 BP**

2 Sigma calibrated results: (95% probability) **Cal AD 810 to 840 (Cal BP 1140 to 1110) and Cal AD 860 to 1030 (Cal BP 1100 to 920)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 980 (Cal BP 970)

1 Sigma calibrated result: (68% probability) Cal AD 900 to 1010 (Cal BP 1060 to 940)



References:

Database used
Intcal98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: beta@radiocarbon.com

Appendix 5: Calibration of radiocarbon age to calendar years

Pit 12, fill 72, *Alnus/Corylus*

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-27.6:lab. mult=1)

Laboratory number: **Beta-207373**

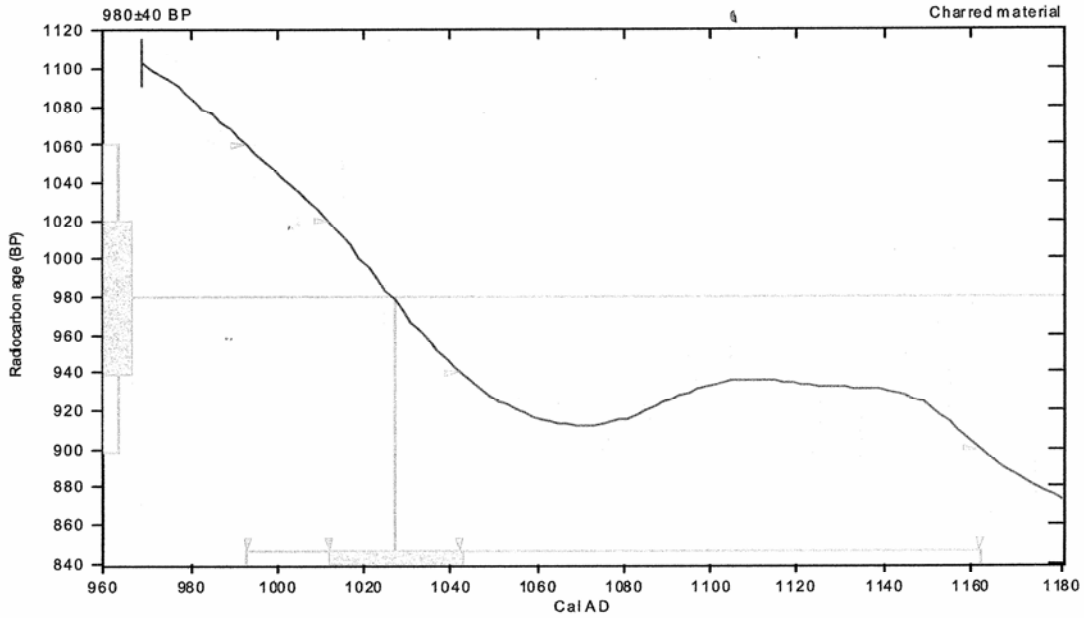
Conventional radiocarbon age: **980±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 990 to 1160 (Cal BP 960 to 790)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1030 (Cal BP 920)

1 Sigma calibrated result: (68% probability) Cal AD 1010 to 1040 (Cal BP 940 to 910)



References:

Database used
INTCAL98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
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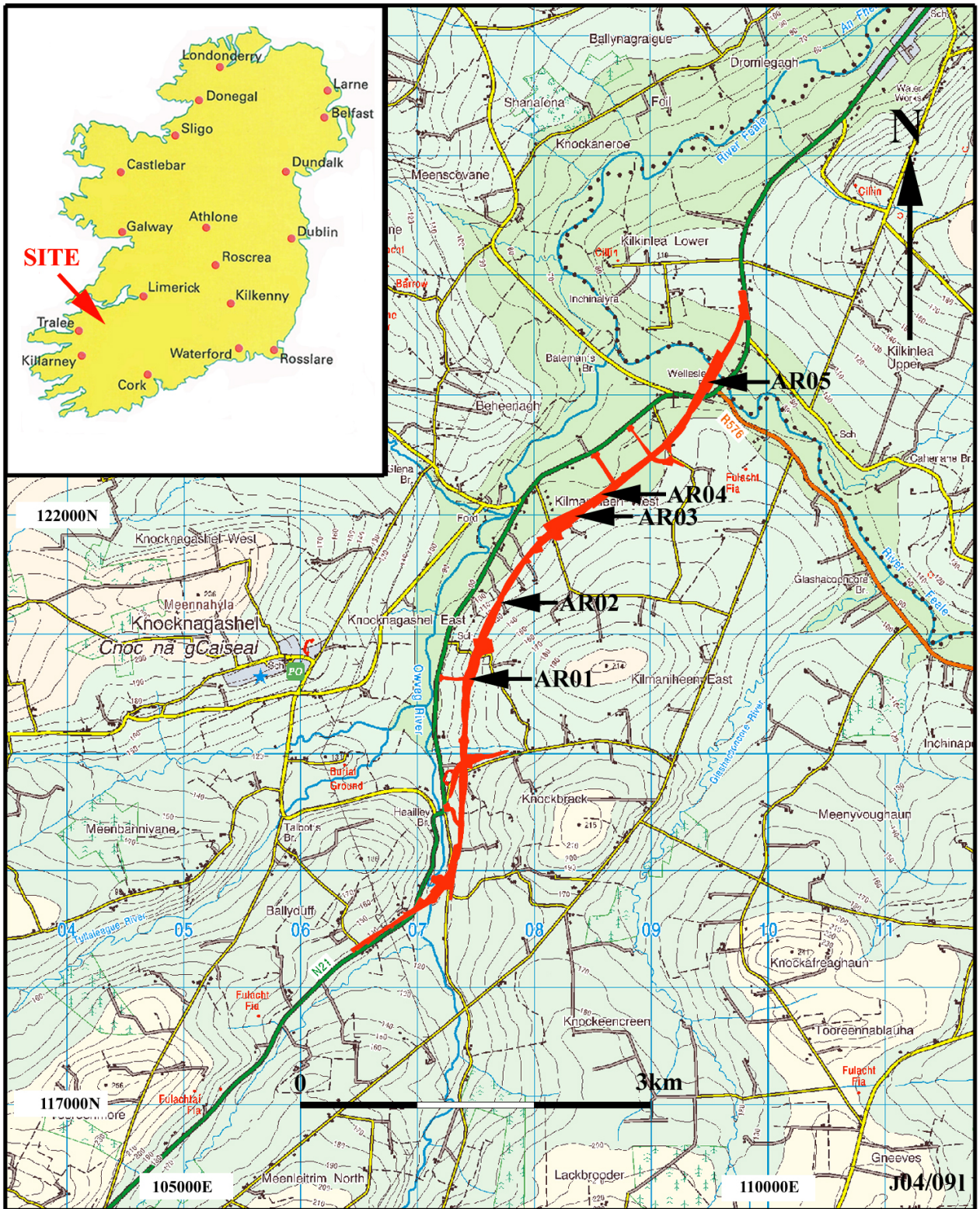
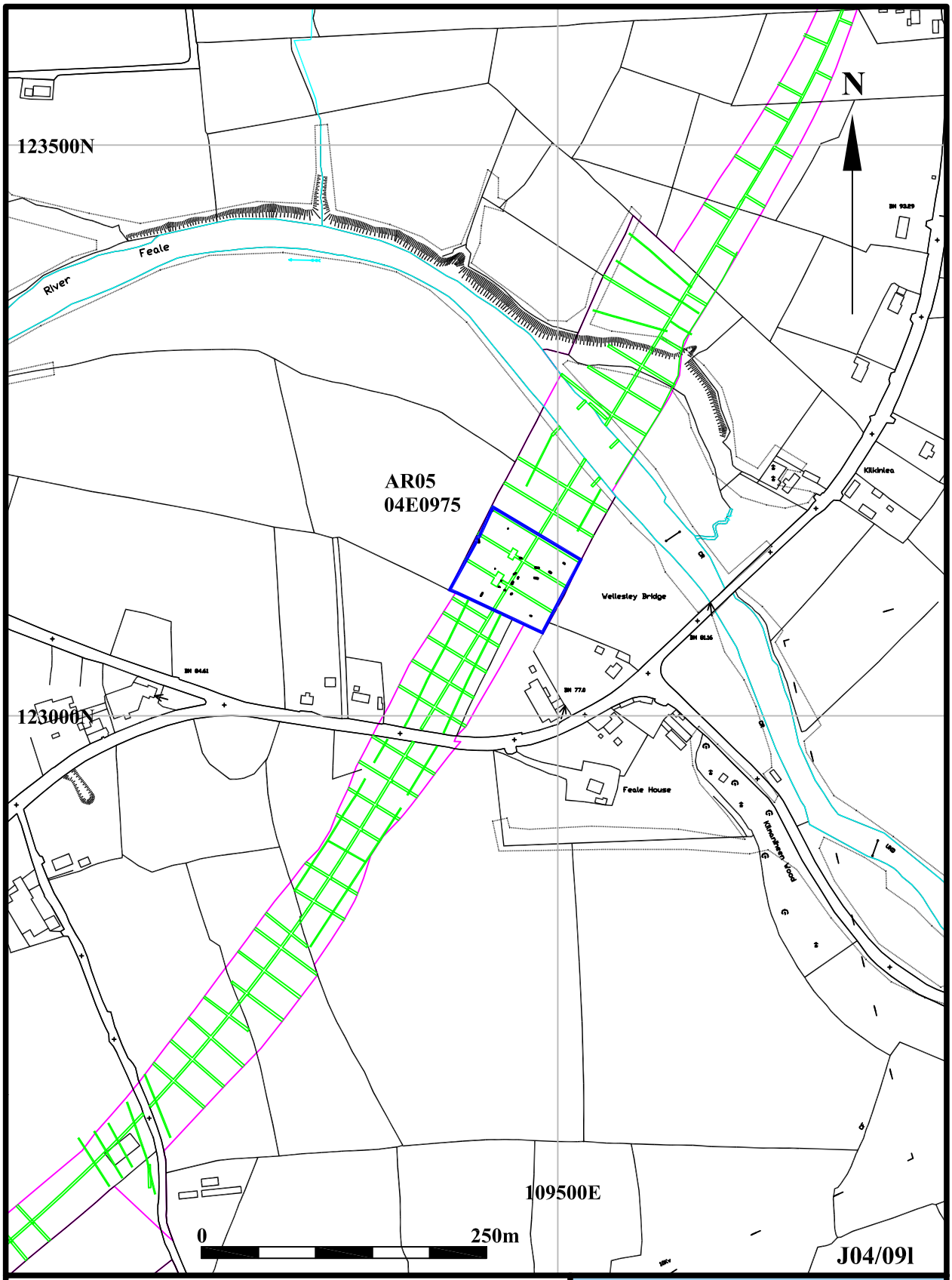


N21 Castleisland to Abbeyfeale
Road Improvement Scheme
Site AR05, Kilmaniheen West, Co. Kerry
04E0975

Figure 1: Site location

Based on OSI Discovery Series 1:50000
OSI Licence AR0049403

TVAS IRELAND LTD



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04E0975

Figure 2: Site location in local landscape, showing test trenches 03E1767, 03E1776, 04E1078, 04E1079
Scale 1:5000 OSI Licence: AR0049403

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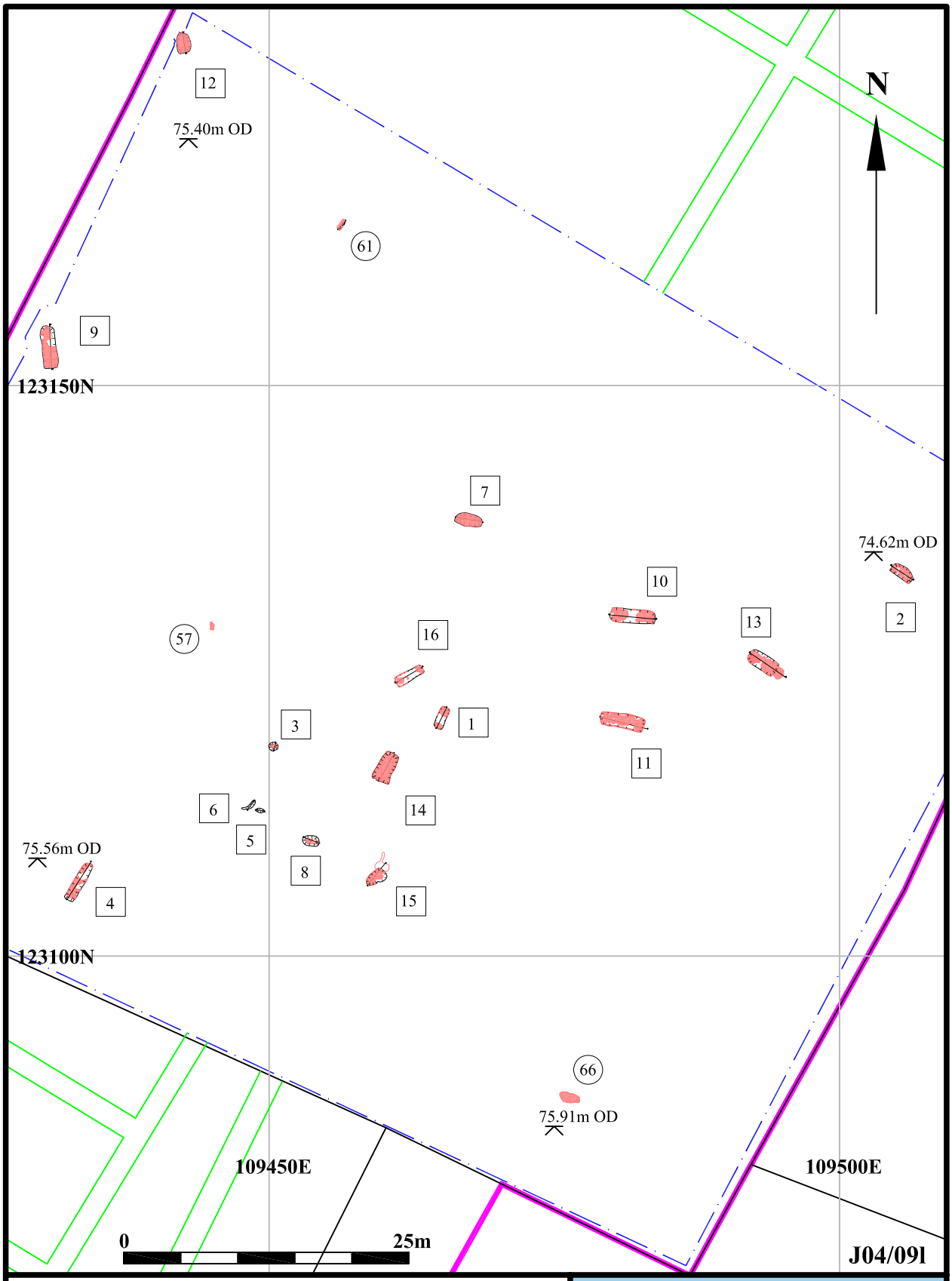

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Figure 3: Plan of site, showing all features

Scale 1:500 OSI Licence: AR0049403

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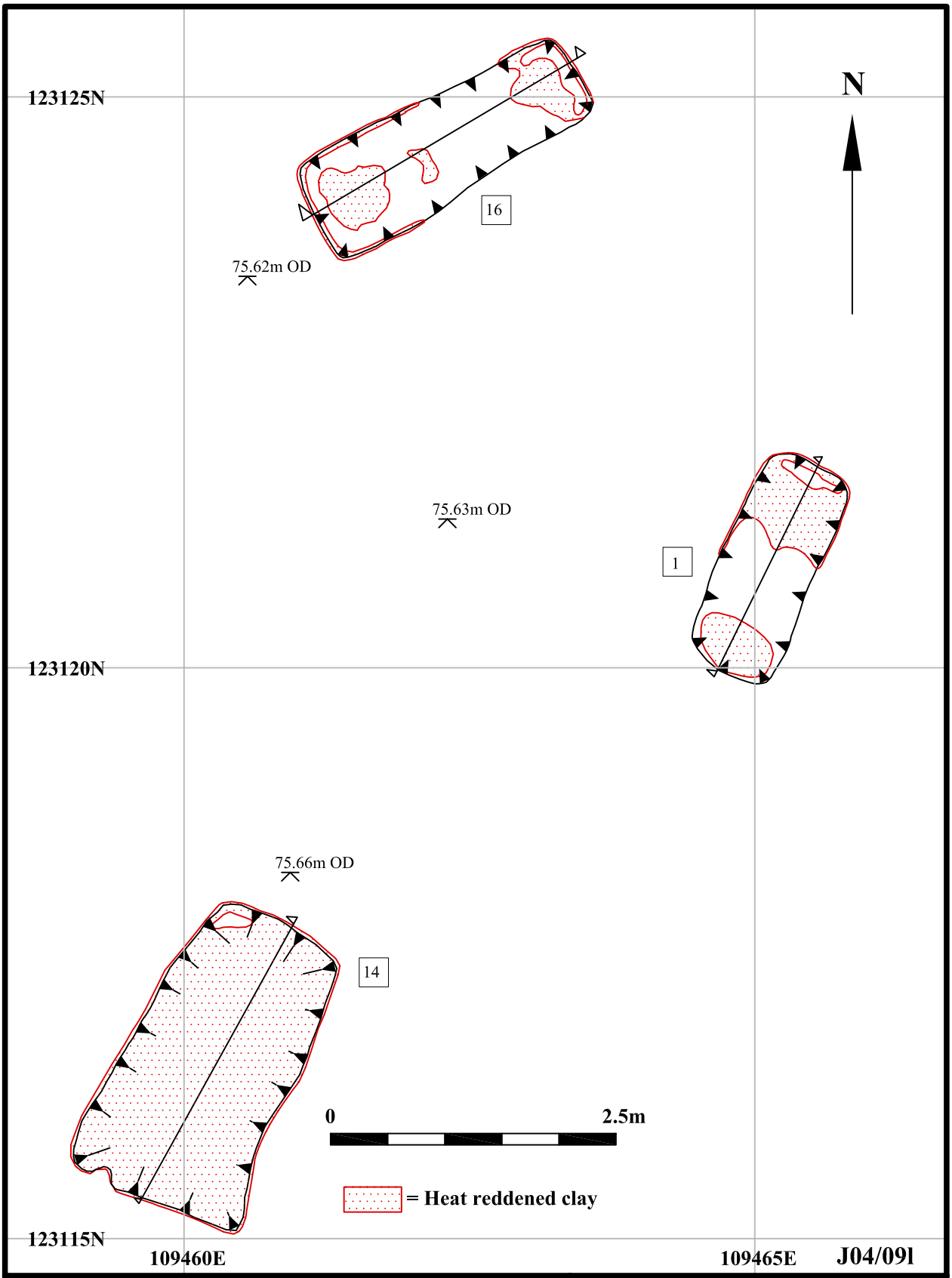

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Figure 4: Plan of Pits 1, 14 and 16

Scale 1:50 OSI Licence: AR0049403

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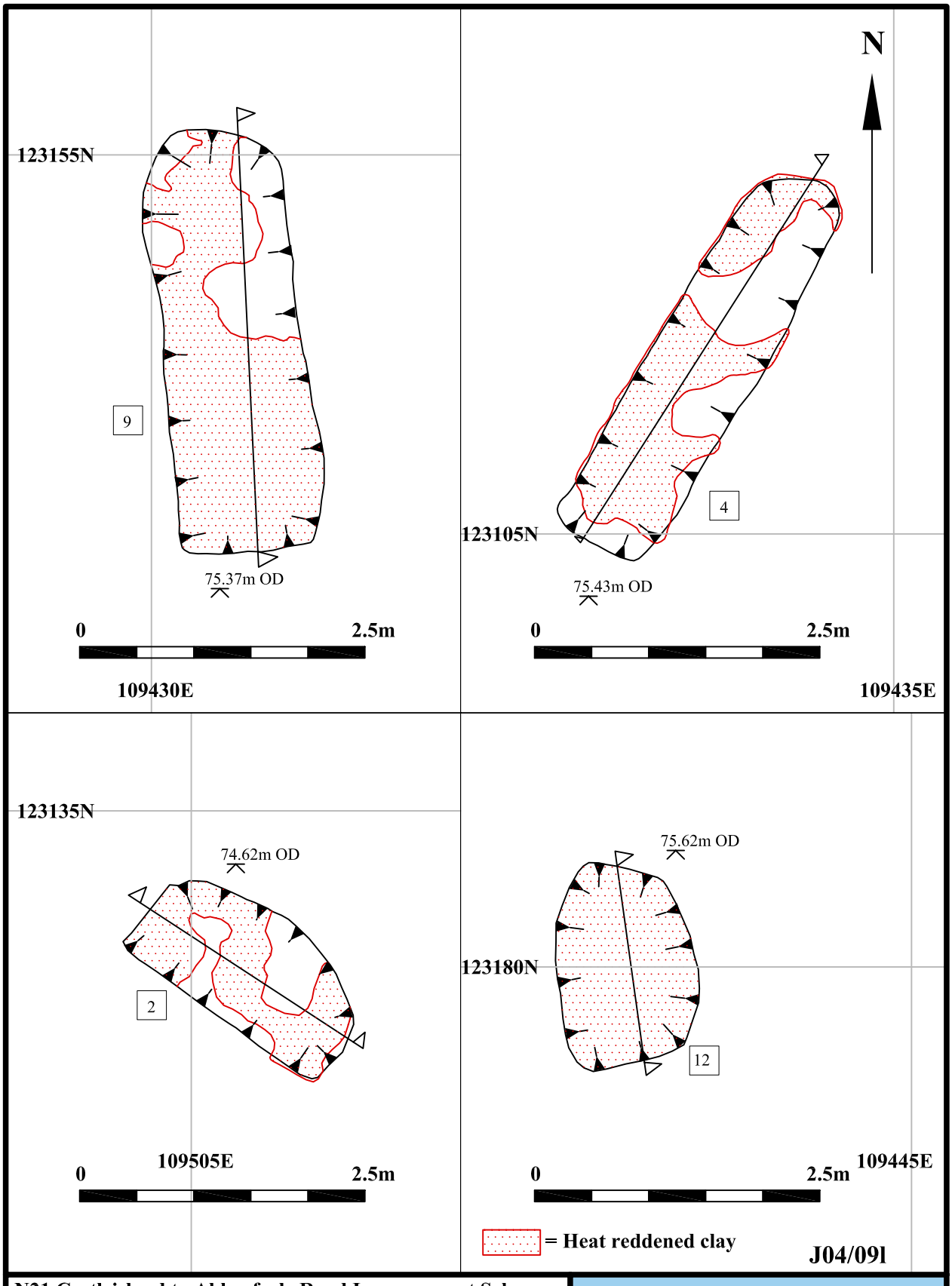

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Figure 5: Plans of Pits 9, 4, 2 and 12

Scale 1:50 OSI Licence: AR0049403

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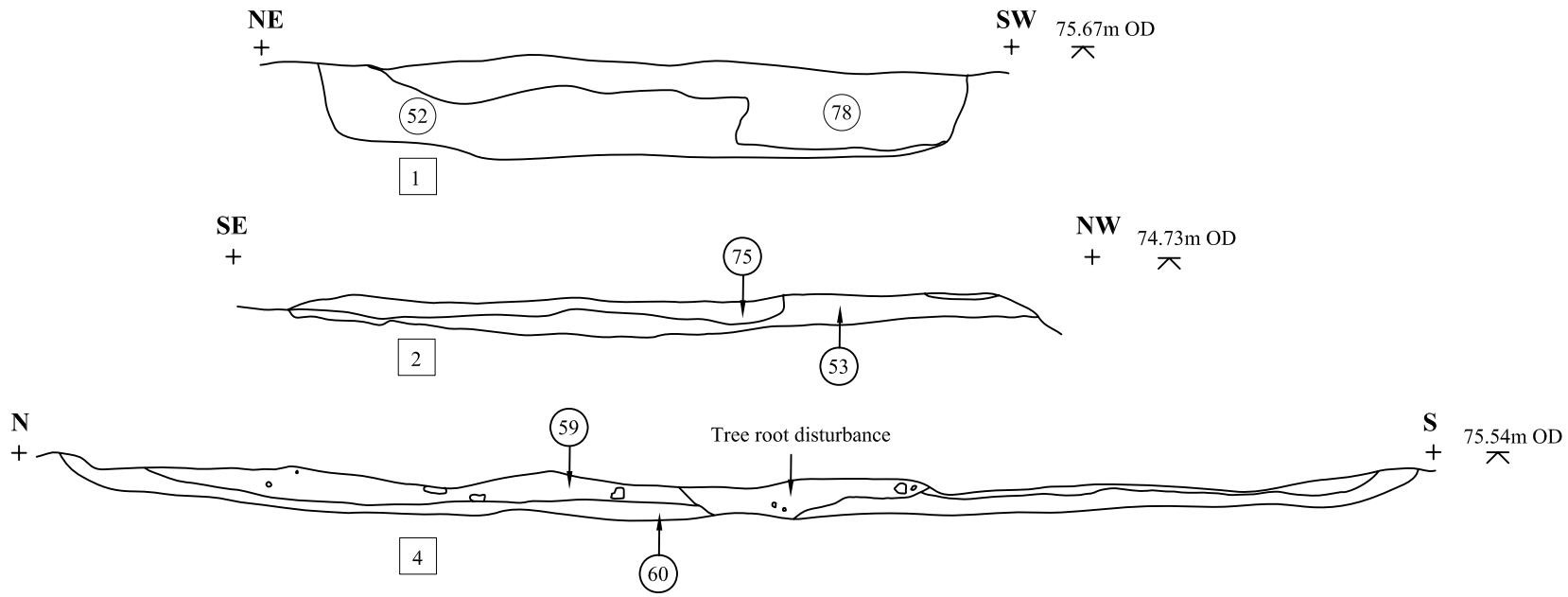

J04/091

0 1m

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Figure 6: Sections of Pits 1, 2 and 4

Scale 1:20

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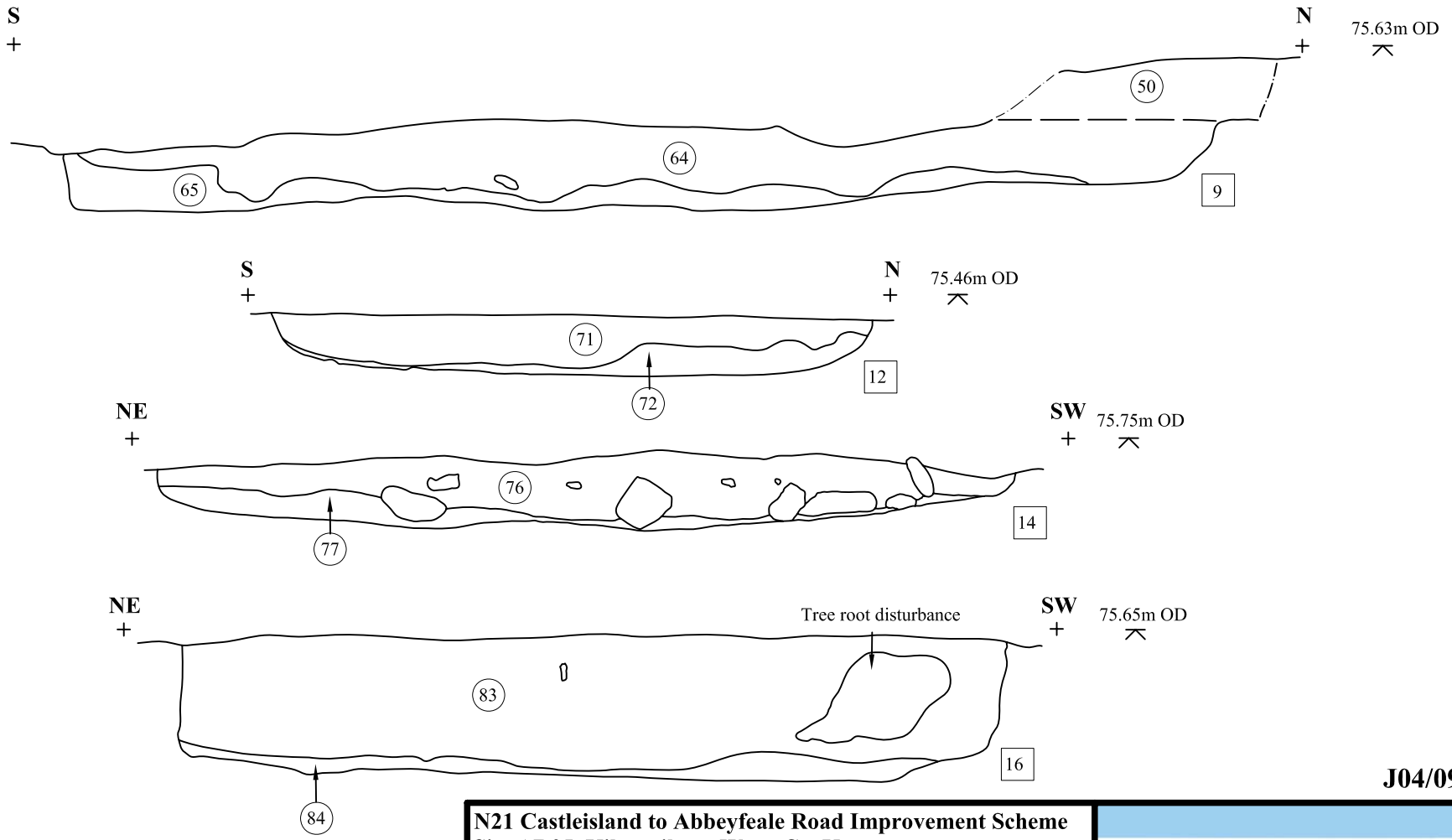

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Figure 7: Sections of Pits 9, 12, 14 and 16

Scale 1:20

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Plate 1: Pit 12, half-sectioned. Looking west. Scales 1m and 0.2m

Plate 2: Pit 3, half-sectioned. Looking south-east. Scales 1m, 0.5m and 0.1m

Plate 3: Pit 11. Fully excavated. Looking south. Scales 1m and 0.5m

Plate 4 : Pit 1, half-sectioned. Looking south-east. Scales 1m and 0.2m

Plate 5: Pit 14. Looking south-west. Scales 1m and 0.1m

Plate 6: Pit 1. Looking south-west. Scales 1m, 0.5m and 0.2m

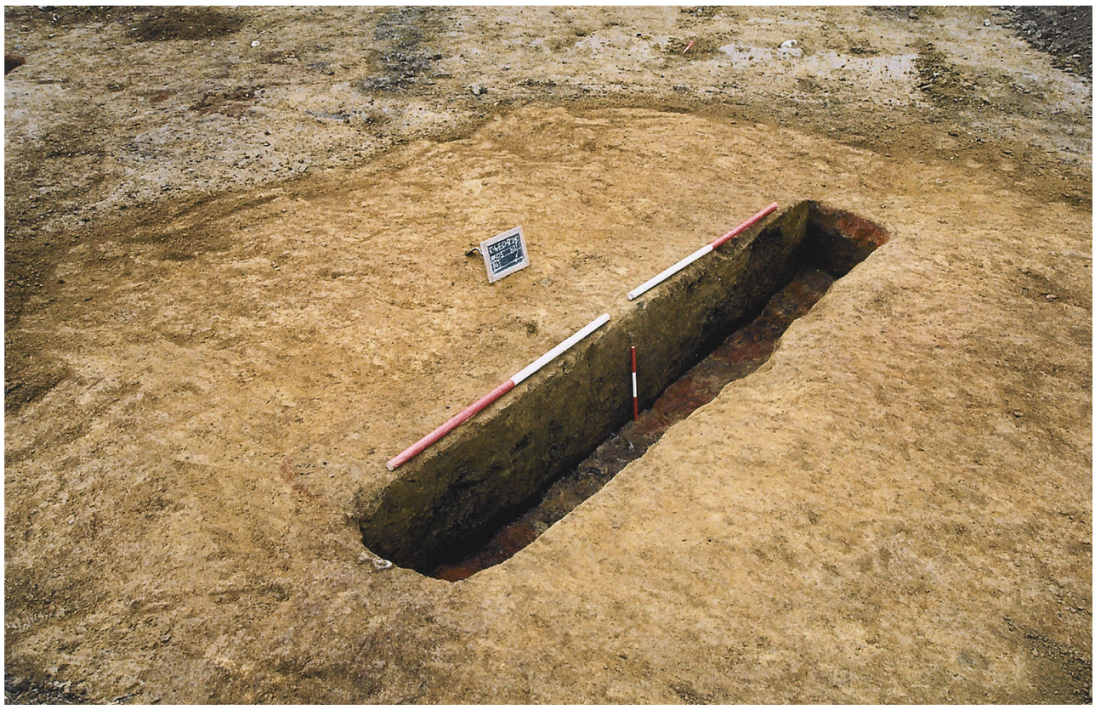

Plate 7: Pit 16. Half-sectioned. Looking south. Scales 1m and 0.3m

Plate 8: Pit 16. Fully excavated. Looking south-west. Scales 1m and 0.3m

Plate 9: Charcoal-burning in pits.
From Biringuccio's 16th century treatise on metals and metallurgy
(Smith and Gnudi 1990, 178)