Balmichael WTW, Arran: Archaeological Monitoring

Data Structure Report

by Thomas Rees

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Rathmell
Archaeology Ltd

Quality Assurance

This report covers works which have been undertaken in keeping with the issued brief as modified by the agreed programme of works. The report has been prepared in keeping with the guidance of Rathmell Archaeology Limited on the preparation of reports. All works reported on within this document have been undertaken in keeping with the Institute for Archaeology's Standards and Policy Statements and Code of Conduct.

Signed …….. Date …….

In keeping with the procedure of Rathmell Archaeology Limited this document and its findings have been reviewed and agreed by an appropriate colleague:

Checked …….. Date …….

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Introduction

1. This Data Structure Report has been prepared for Scottish Water Shared Services in respect to the monitoring of site investigation works at the proposed Water Treatment Works extension to Balmichael WTW, Arran, North Ayrshire. These archaeological works were designed to mitigate the impact from the site investigation works on the archaeological remains within their development area to the agreement of the West of Scotland Archaeology Service.

2. The West of Scotland Archaeology Service who advises North Ayrshire Council on archaeological matters has provided guidance on the structure of archaeological works required on this site during investigation works.

3. Rathmell Archaeology Limited has been appointed by Scottish Water Shared Services to undertake the development and implementation of archaeological mitigation works for the proposed Water Treatment Works extension at Balmichael WTW, North Ayrshire. This stage of monitoring was agreed in a Method Statement (Rees 2010).

4. This Data Structure Report details the findings from this stage of monitoring, background information and guidance on the consequences of the archaeological resource to subsequent development.

5. All work was undertaken according to the terms of the Method Statement (Rees 2010) and in accordance with West of Scotland Archaeology Service Standard Conditions, the Institute for Archaeologists' Standards and Policy Statements and Code of Conduct and Historic Scotland Policy Statements.

Archaeological Background

6. During the construction of Balmichael WTW in 1999 the site was subject to a 2% intrusive archaeological evaluation and an open area excavation. These works were conducted by FIRAT Archaeological Services with the evaluation being undertaken during May 1999 and the excavation running from June to August 1999.

7. The archives for these projects remain with FIRAT Archaeological Services and only the information released by them has been consulted. The reporting and post-excavation stages of the project were not concluded in 1999 and are currently restarted; an agreement was reached in 1999 that no Data Structure Report would be prepared after on-site works, with only a final report being prepared.

8. Two separate texts are available for the evaluation and mapping for the southern four trenches. The evaluation was the vehicle that identified the subsequent excavation areas, being focused on the northern plant building and a cairn in the southern area:

> *"The presence of preserved archaeology in five of the eleven evaluation trenches (Trenches 2, 6, 7, 9 and 10) proved that the Bridge Farm site was indeed archaeologically sensitive."* FIRAT, 13

9. The excavations, in the absence of a Data Structure Report, are less clearly reported on. No report on the stratigraphy has been circulated for the excavations, other than a text based summary in Discovery & Excavation in Scotland 1999.

> *"The site had a blanket covering of peat and a buried agricultural soil of probable Bronze Age date which sealed extensive ard marks containing considerable quantities of charred material considered to represent manuring of small of the small prehistoric field. The ard marks were located between two low knolls.*
>
> *On top of the western knoll ... was a knapping floor of predominantly pitchstone with some flint ... Some 20 sherds of pottery were also recovered from the knapping floor ...*

> *The negative features were difficult to interpret due to site formation processes and no obvious structures could be identified with certainty in the field.*
>
> *On the knoll at the NE of the site beside the road a fine late 18th/ early 19th-century lime kiln was excavated – apparently the first of its kind to be excavated in Scotland. ... The kiln has now been preserved for display to the public."* Discovery & Excavation in Scotland 1999, 65

10. Reports (some in draft or summary style) are available for Soils, Pottery and Lithics, none have supporting illustrations. Registers have been circulated for Photography, but not for Finds, Samples or Drawings. No context summaries have been circulated. A Master Map of the excavation area has been circulated, but this is a composite and does not show some critical boundaries (such as the limits of (040)).

11. From the available reports it is clear that the vast bulk of significant artefacts (lithics and pottery) were recovered from the buried soil horizon (040) on the NW knoll:

> *"The absence of artefacts in the cultivated soils is in striking contrast to the dense concentration of struck pitchstone and flint in 040. The well-defined limits to this area of stone flaking waste indicates a lack of major disturbance since its deposition with no transfer of struck flakes into the area of cultivated soils."* Carter *et al* 1999, 5
>
> *"The vast bulk of the lithic assemblage was recovered from context 040, a buried soil containing dense quantities of lithic material and some pottery and contained 1551 of the 1649 lithics (94.06%)."* Donnelly undated, 24

12. Indeed the Soils report helpfully characterises the prehistoric landscape, explaining this concentration on the northwest knoll within the site:

> *"Podzolisation occurred relatively early in north and west Scotland, certainly before the Neolithic period in Arran, so early human activity at Bridge Farm probably encountered a well-developed freely-draining podzol on the knolls with peat limited to poorly draining groundwater gleys in lower lying areas. The contrast between the dry knolls and wet depressions would have been greater than it is at present, making the knolls an obvious focus for activity like that indicated by the scatter of pitchstone and flint. The present-day uniform cover of shallow peat over the whole area masks this underlying variability in drainage status."* Carter *et al* 1999, 4

13. In the absence of a Data Structure Report or any other stratigraphic report it is difficult to assess the validity of the negative (excavated) features within the main excavation area. However, the Soils report in discussing the soil formation processes did pass some comment on the confidence that could be ascribed to the excavated features:

> *"No clear groups of features could be identified in the field that might suggest coherent structures. Individual feature morphology ranges from highly irregular (probably natural) to regular (possibly man-made). On balance it may be concluded that there is no positive evidence for any man-made deliberate cut features in the excavated area."* Carter *et al* 1999, 6

14. While this should not be taken as a definitive statement of confidence, it strongly suggests that the character of the soils on-site were such that excavators struggled to differentiate between natural and anthropic features. Certainly Carter *et al* seem to side towards recognising that the majority of the negative features were more likely to be natural in origin. This opinion is made more robust wit the knowledge that Carter attended site during the excavation works.

15. In addition to the discoveries of the main excavation area, discussed above, there

are hints from the photo register that the originally proposed excavation of the possible cairn exposed by Trench 2 was carried out. The subsequent failure to mention this cairn (which lay in the southeast corner of the site), suggests that this proved to not be archaeologically significant.

Current conditions

16. The current water treatment works, built in 1999, stands in a landscaped compound to the west of The String (B880). The site access road enters the southern end of the site running north the main building which has a concrete apron to the south. The main building is built out over falling ground of a stream valley to the north

17. To the immediate east of the main building, is a concrete structure retaining ground adjacent to The String. This retained ground was overgrown, and contained the remains of the limekiln excavated prior to the construction by FIRAT. The ground was fenced from the road, but this fence had failed; an intact well maintained fence stands at the top of the retaining structure.

18. The more normal edge between the compound and The String is a fence and hedgerow boundary with an engineered slope falling into the compound; this slope is more pronounced the closer you move to the main building. The access road as it leaves The String is level.

19. To the south of the main building are a group of small structures that cap the boreholes. The water treatment works is contained within modern fencing, and in general all visible surfaces appear to have been engineered with the exception of the very far western edge of the compound.

20. To the immediate south of the main compound is a portion of boggy ground through which access runs to the agricultural land to the west. This is bounded to the south by a line of mature trees that stand on a slight bank, which becomes more pronounced as it runs off to the west. To the south of the bank is an open drain within which runs a minor watercourse.

Project Works

21. The programme of works comprised the archaeological monitoring of ground breaking works from the site investigative works that reasonably had the potential to expose archaeological material. This work was focused at the southern half of the Scottish Water site at Balmichael, Arran.

22. The substantive ground breaking works associated with the site investigation were trial pits excavated by machine. These had the potential to disturb and expose significant archaeological strata on-site so were subject to continuous archaeological monitoring.

23. In compliance with the agreed Method Statement (Rees 2010) all machine dug trial pits were monitored and any potential archaeological features were investigated and recorded, with the on-site works carried out between the 11th and 12th January 2011.

24. The boreholes sunk were of narrow diameter, consequently these boreholes were not considered to be a significant risk so long as they were not located over identifiable archaeological features. Hand pits were also dug to locate known services, these were wholly excavated in made ground so again had no likely archaeological impact. Hence once safely located boreholes and hand pits were not archaeologically monitored.

25. All works complied with the Institute for Archaeologists' Standards and Policy Statements and Code of Conduct and Historic Scotland Policy Statements.

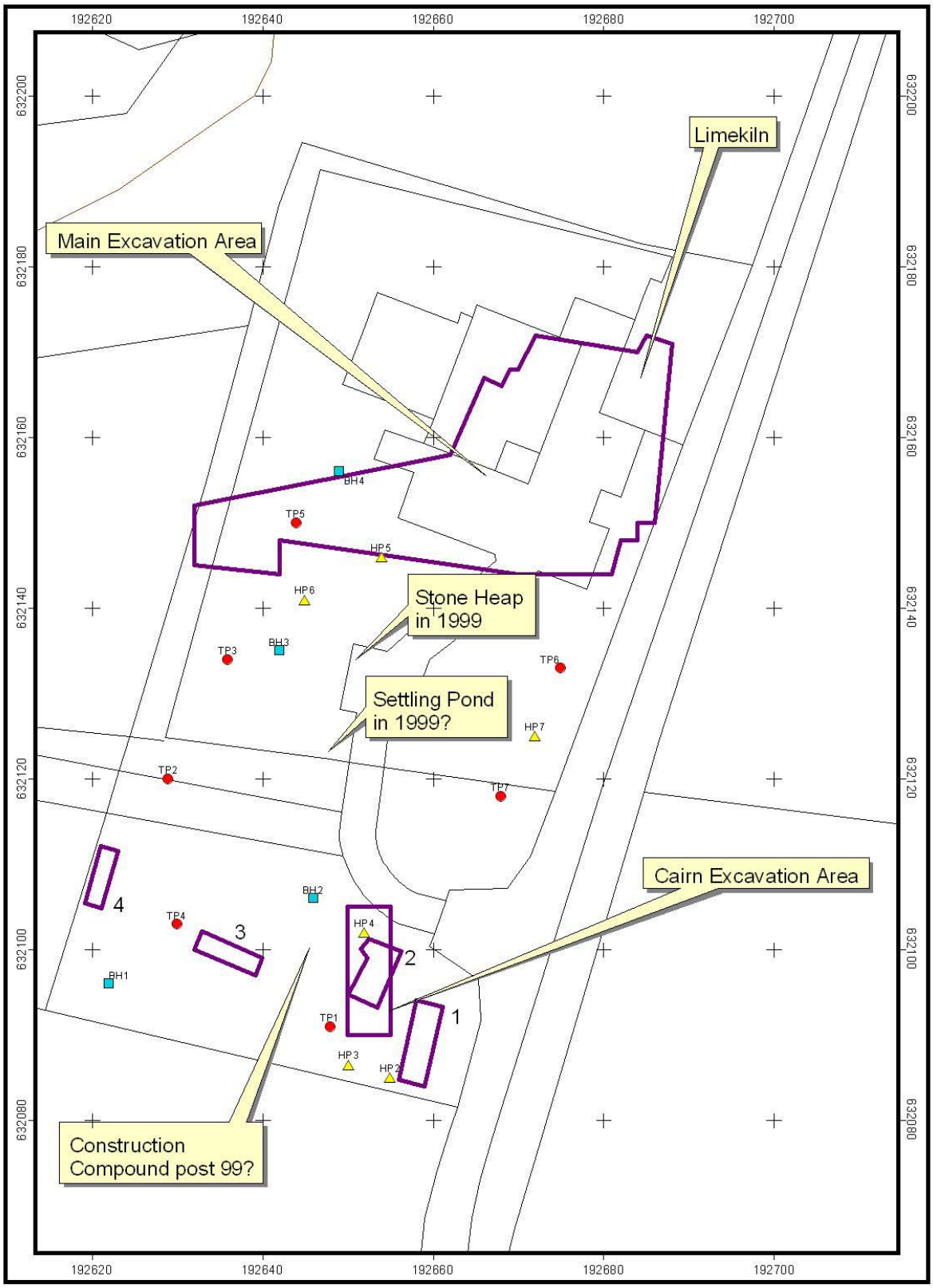

Figure 1: Site Plan of SI works and known extents of FIRAT excavation works

Figure 2a: NW Knoll at Balmichael WTW from the North

Figure 2b: Southern area at Balmichael WTW from the East

Findings

26. No significant archaeological features were identified in any of the monitored test-pits; nor were any significant artefacts recovered in the course of the works. The table, below, summarises the sediments and archaeological issues within each test pit.

Table 1: Test Pit summary

Test-pit	Size	Stratigraphic comment	Archaeological comment
TP1	0m70 by 2m40 North-South	0m to 0m40 Topsoil 0m40 to 0m80 Compact sand & gravel 0m80 to 1m20 Fibrous clay 1m20+ Clayey silt	Excavation started on apparently natural slope surface outwith obviously engineered area. No archaeological features met.
TP2	0m70 by 4m North-South	0m to 0m42 Fibrous topsoil 0m42 to 0m85 Grey clay with stones 0m85 to 1m40 Fibrous clay 1m40 to 3m+ Compact sand & gravel	Excavation started on apparently natural slope surface outwith obviously engineered area. No archaeological features met.
TP3	0m80 by 4m North-South	0m to 0m30 Topsoil 0m30 to 1m20+ Gravel with modern detritus in upper portions	Excavation started on apparently natural slope surface outwith obviously engineered area. No archaeological features met; engineered layer covers full at 1m20.
TP4	0m70 by 3m30 North-South	0m to 0m40 Fibrous topsoil 0m40 to 0m75 N ½ Sand & Gravel; S ½ Clay with modern detritus 0m75+ Clay	Excavation started on apparently natural slope surface outwith obviously engineered area. No archaeological features met; redeposited / dumped layer covered southern half of trench to 0m75.
TP5	0m70 by 3m50 North-South	0m to 0m26 Topsoil 0m26 to 0m50 Fibrous silty clay 0m50 to 2m50 Compact sand & gravel 2m50+ Bedrock or compacted cobbles	Excavation started on apparently natural slope surface outwith obviously engineered area. No archaeological features met; potential that fibrous silty clay was redeposited given heterogeneous character of some pockets of fibrous material.
TP6A TP6B	0m70 by 2m60 North-South Both test-pits identical	0m to 0m30 Topsoil 0m30+ saturated 3/4“ gravel	No archaeological features met; saturated engineered layer encountered in base trench. Excavation halted.
TP7	0m75 by 3m50 North-South	0m to 0m50 Saturated topsoil 0m50 to 1m70 Compact stone & clayey silt with modern detritus inc. large concrete fragments	Excavation started on apparently natural slope surface outwith obviously engineered area. No archaeological features met; redeposited / dumped layer covered full bed of trench at 1m70.

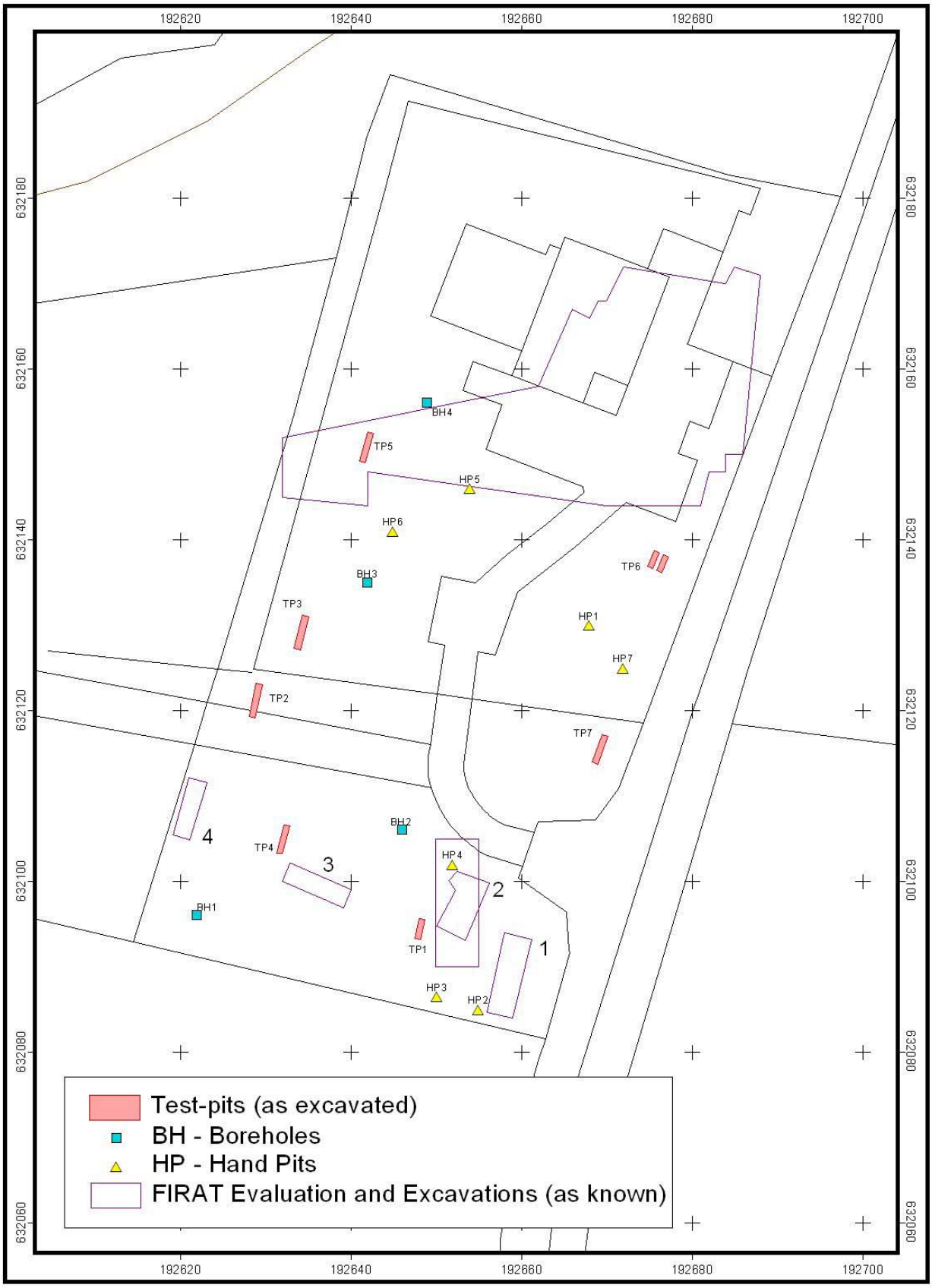

Figure 3: Area surrounding development area.

Figure 4a: Test Pit 1, note subsoil and topsoil dump over natural soil sequence

Figure 4b: Test Pit 3, note engineered material at depth

Figure 5a: Test Pit 4, note split in stratigraphy

Figure 5b: Test Pit 7, note buried construction waste at depth

Discussion

27. No significant archaeological features were uncovered in the course of the monitoring works and no anthropic material was recovered other than that which related to the 20th century use of the site. Any potentially significant archaeological features or deposits were investigated. There was no indication of survival of any material remains earlier than the existing structures of the Water Treatment Works.

28. Within the existing compound all test-pits (bar Test-Pit 5) exposed engineered made ground which had clearly disrupted any pre-works strata. The scale of this disruption appeared comprehensive and much more substantial then would be assumed by walking over the area.

29. Test-Pit 6 had all the characteristics of an engineered surface and the immediate presence of gravel was unsurprising. The scale of immediate water ingress strongly suggests impeded drainage in this area – potentially as a consequence of the construction of the Water Treatment Works.

30. In contrast Test-Pit 3 was in a location below an obviously engineered slope falling to the west of the Works. The current vegetation cover and general condition strongly suggested that this test-pit was placed beyond the ground disturbed by the construction. The evidence from the excavation of the test-pit strongly contests this with a considerable depth of engineered material, showing that construction impact is larger than the visible machined surface.

31. The last Test-Pit 5 within the compound lay on the north-western knoll, within the FIRAT excavation area. While this rise is known to have been stripped and excavated in 1999, it appears now to be an undisturbed portion of the site that is subject to the natural regeneration of woodland. The test-pit did reveal a topsoil rich in small scale modern detritus, but no archaeologically significant material. This was the expected condition given the prior excavation.

32. Prior to the test-pit exercise the southern portion of ground has had an uncertain history of use relative to the construction process in 1999. The evaluation covered this ground and the subsequent mitigation was planned to include the excavation of the 'cairn' and the photographic register circulated by FIRAT implies that this was done. This illustrates that it was considered in 1999 as part of the development area with the intention to site underground services through this area and to base the contractor's compound here.

33. The depth of engineered ground identified within Test-Pit 2 was not a surprise, given that the test-pit was cut into ground that fell from the visible works to the north. In contrast the exposure at depth of large scale buried waste in Test-Pit 7 was unexpected. The volume of material suggested the large scale burial of waste construction material on the eastern side of the southern ground – reinforcing that this area was used as the contractor's compound in 1999.

34. Ground condition in the general, open, boggy portion of the southern ground suggested prior to excavation that Test-Pits 1 and 4 would exhibit natural soil sequences. However, a general horizon of re-deposited sediment was observed in Test-Pit 1. This is taken to illustrate a general levelling up of the eastern half of the southern ground by material extracted from the core works site during its construction in 1999. A careful re-examination of the visible landscape supported this as the southern boundary of the site was a bank surmounted by mature trees; however this became a line of trees flush with the ground surface in this eastern portion.

35. Test-Pit 4 did exhibit a natural soil sequence for half of its length, but the remaining portion of the trench was filled by dumped modern detritus, again reflecting disruption of a comparable if at a shallower depth, to that seen within Test-Pit 7.

Figure 6a: Standing stones in rough farmland to west of Balmichael WTW (to rear)

Figure 6b: Limekiln in marginal ground adjacent to the String Road

Recommendations

36. The archaeological monitoring failed to identify any significant archaeological features or artefacts within the development area.

37. Within the existing compound all test-pits (bar Test-Pit 5) exposed engineered made ground which had clearly disrupted any pre-works strata. This disruption continued to the south with the exposure of buried waste (Test-Pit 7), engineered ground (Test-Pit 2) and re-deposited sediment (Test-Pit 1). Only Test Pits 4 and 5 appeared to have relatively undisturbed natural sequences, although Test-Pit 5 is known to be within the FIRAT excavation area.

38. Coupled with these test-pit results is the reality that the original development of this ground was preceded by a full site evaluation (2% in extent) followed by the area excavation of all areas that were identified as archaeologically significant. The coverage of these mitigation works clearly addressed the southern portions of ground that were subsequently used as a contractor's compound and for underground infrastructure.

39. On balance, it appears unlikely that there are any significant archaeological strata that have both avoided the original programme of mitigation and the subsequent construction across the bulk of the site. Therefore, we recommend that no further archaeological works are appropriate with regard to the continuing development of the enclosed Water Treatment Works site including the southern compound, subject to the following exceptions:

    - the immediate flanks of the north-west knoll where the pitchstone knapping site was previously excavated retains a residual potential for significant archaeological features. This is identified on a precautionary basis and should be taken to extend some 5m out from the excavated portion of the knoll in all directions;

    - there is a continuing need to conclude the reporting of the original 1999 works to communicate the findings of the original mitigation. This is a liability on the now defunct West of Scotland Water; and

    - any works outwith the fenced enclosures goes beyond our robust archaeological knowledge and hence may encounter significant archaeological features.

40. The forthcoming development proposal must take cognisance of the findings of this phase of works and use this to structure an appropriate assessment of impact with a view to avoiding unnecessary impacts and mitigating unavoidable consequences. The appropriateness and acceptability of our recommendations rest with North Ayrshire Council and their advisors, West of Scotland Archaeology Service.

41. More broadly, the current site operator (Scottish Water) may like to consider within their management plan for the site the appropriate long-term treatment of the limekiln which was retained for long-term presentation by the original mitigation strategy in 1999. This ground was successfully excluded from the original development but is now overgrown and poorly presented. Should there be the capacity we would recommend:

    - Renewing the post and wire fence around site including a pedestrian gate to prevent stock and vehicle encroachment while encouraging site access by the public;

    - Erecting interpretive signage to explain the site to the public, promotinh the role of Scottish Water in safeguarding this site; and

    - Establishing an intermittent grass/vegetation cutting within the fenced compound to ensure the long term stability of the protected monument.

Conclusion

42. Archaeological monitoring was carried out on behalf of Scottish Water Shared Services on site investigation works at the proposed extension to Balmichael Water Treatment Works, Arran, North Ayrshire. These archaeological works were designed to mitigate the impact from the site investigation works on the archaeological remains within their development area to the agreement of the West of Scotland Archaeology Service.

43. No significant archaeological material was observed during the course of the archaeological works and the only anthropic material observed was that relating to twentieth century construction and use of the site.

44. The archaeological potential of the development area was fully explored during 1999 by FIRAT Archaeological Services prior to the original construction of the works. The monitoring evidenced the scale of disruption from the subsequent construction of the works.

45. On balance, it appears unlikely that across the bulk of the site there are any significant archaeological strata that have both avoided the original programme of mitigation and the subsequent construction. The only exception to this are the immediate flanks of the north-west knoll where there is a residual potential for significant archaeological features associated with the pitchstone knapping site previously excavated at this location.

References

Carter, S et al	1999	*Analysis of soils and sediments from an archaeological excavation at Bridge Farm, Arran* unpublished commercial report by Headland Archaeology to FIRAT Archaeological Services
Donnelly, M	undated	*Arran Ring Main Water Pipeline and Excavations at Bridge Farm, Lithic Report*, unpublished commercial report to FIRAT Archaeological Services
Baker, F	1999	*Archaeological Evaluation at NR 92653215 (centred) Bridge Farm, Machrie Moor, Isle of Arran Summary Report and Excavation Proposal* unpublished commercial report by FIRAT Archaeological Services
Baker, F	1999	*Bridge Farm, Machrie Moor,* Discovery & Excavation in Scotland, 65
Baker, F	undated	*Bridge Farm, Machrie Moor, Arran*, unpublished first draft of commercial report by FIRAT Archaeological Services
MacSween, A	1999	*Bridge Farm, Machrie Moor, Arran: Report on the Pottery*, unpublished commercial report to FIRAT Archaeological Services
Rees, T	2010	*Balmichael WTW, North Ayrshire: Archaeological Watching Brief*, *Method Statement,* Rathmell Archaeology Ltd

Appendix 1: Discovery & Excavation in Scotland

LOCAL AUTHORITY:	North Ayrshire
PROJECT TITLE/SITE NAME:	Balmichael WTW
PROJECT CODE:	10069
PARISH:	Kilmory
NAME OF CONTRIBUTOR:	Thomas Rees
NAME OF ORGANISATION:	Rathmell Archaeology Limited
TYPE(S) OF PROJECT:	Monitoring
NMRS NO(S):	NR93SW97
SITE/MONUMENT TYPE(S):	None
SIGNIFICANT FINDS:	None
NGR (2 letters, 6 figures)	NR 926 321
START DATE (this season)	11th January 2011
END DATE (this season)	12th January 2011
PREVIOUS WORK (incl. *DES* ref.)	DES 1999, 65
MAIN (NARRATIVE) DESCRIPTION: (may include information from other fields)	Archaeological monitoring was carried out during the initial site investigation work relating to the extension of existing Balmichael WTW, Arran, North Ayrshire. No significant archaeological material was observed during the course of the works with extensive disruption noted from the 1999 construction of the existing water treatment works.
PROPOSED FUTURE WORK:	None
CAPTION(S) FOR ILLUSTRS:	None
SPONSOR OR FUNDING BODY:	Scottish Water Shared Services
ADDRESS OF MAIN CONTRIBUTOR:	Unit 8 Ashgrove Workshops, Kilwinning, Ayrshire KA13 6PU
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ARCHIVE LOCATION (intended/deposited)	Report to West of Scotland Archaeology Service and archive to National Monuments Record of Scotland.

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