Advanced Military Layers and the Historic Environment

Paul Baggaley and Louise Tizzard

Wessex Archaeology
Objectives

• to establish the degree of mutual benefit in integrating AML and archaeological interpretations of seabed features;

• to develop compatibility in methodologies, data standards and metadata standards, covering:
  – archaeological methodologies for discerning, discriminating and characterising seabed features;
  – representation of seabed features as points and polygons at different scales;

• incorporation of digital imagery;

• accommodating copyright and licensing requirements;

• to develop good practice in reporting new and/or enhanced wreck data from archaeological sources to the UKHO;

• to develop good practice in preparing and submitting digital archives to recognised data centres.
WA Archaeological Assessments

- Government funded (research and commercial)
- Heritage funded
- Commercial developers (EA and strategic)
Archaeological Assessments

Marine

- UKHO - AML
- UKHO - Wrecks Office
- UKHO - Hydrography
- MCA
- COWRIE

Geophysical Acquisition and Processing

Geophysical Assessment

Geotechnical Assessment

Diving and ROV Assessments

Cultural Heritage

- OASIS
- NMR EH, CADW, RCAHMS
- Local authority HER
- ADS

Project output
Data output
Data input

http://www.wessexarch.co.uk/
Archaeological Assessments

DBA

Phase 1
- Discern
- Describe
- Output

Phase 2
- Group
- Discriminate
- Qualify
- Output

Phase 3
- Characterise
- Output

Geophysical Assessment

Geotechnical assessment

Diver and ROV survey

http://www.wessexarch.co.uk/
AML product shapefiles

- Data coverage shapefile (polygon)
- CLB_Depth shapefile (point)
- LBO_wrecks shapefile (point)
- LBO_wrecks shapefile (polygon)
- LBO_sensor_anomaly shapefile (point)
- ESB_Bottom_Feature shapefile (point)
- ESB_Bottom_Feature shapefile (polygon)
- SBO_contact shapefile (point)
- SBO_viewpoint shapefile (point)
## Commonalities between the AML products and the WA product

<table>
<thead>
<tr>
<th>AML Product</th>
<th>AML Feature class</th>
<th>WA investigation</th>
<th>WA Product</th>
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<tbody>
<tr>
<td>CLB/ESB/</td>
<td>Data Coverage</td>
<td>Geophysical assessment/DBA/Underwater recording</td>
<td>Survey area</td>
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<tr>
<td>LBO/SBO</td>
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<tr>
<td>CLB</td>
<td>Depth sounding</td>
<td>Geophysical processing</td>
<td>Depth data</td>
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<tr>
<td>ESB</td>
<td>Bottom feature</td>
<td>Geophysical assessment</td>
<td>Sandwave coverage</td>
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<tr>
<td>ESB</td>
<td>Bottom Feature</td>
<td>Geophysical assessment</td>
<td>Sub-set of Phase 2 Geophysics</td>
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<tr>
<td>LBO</td>
<td>Wreck</td>
<td>DBA/ Geophysical assessment</td>
<td>DBA gazetteer / Sub-set of Phase 2 Geophysics</td>
</tr>
<tr>
<td>LBO</td>
<td>Sensor anomaly</td>
<td>Geophysical assessment</td>
<td>Sub-set of Phase 2 Geophysics</td>
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<tr>
<td>SBO</td>
<td>Contact</td>
<td>Geophysical assessment</td>
<td>Sub-set of Phase 2 Geophysics</td>
</tr>
<tr>
<td>SBO</td>
<td>Viewpoint</td>
<td>Underwater recording/Geophysical assessment</td>
<td>Stills Photography/data</td>
</tr>
</tbody>
</table>
Integration of AML projects

Geophysical Assessment
- Discern
- Describe
- Output

Phase 1
- Group
- Discriminate
- Qualify
- Output

Phase 2
- Characterise
- Output

Phase 3
- Geotechnical assessment

Diver and ROV survey

DBA
AML
- LBO
- CLB
- ESB
- LBO

UKHO wrecks

H525 Wreck Reporting

SBO
- CLB
- ESB
- LBO
- SBO
Integration methodology

- Identification of relevant feature classes
- Identification of relevant attributes – descriptive and metadata
- Conversion – shapefile to shapefile
- 3-phase methodology - point data
3-phase methodology

Transition
• Sub-sets of gazetteer data
• Transition template files (2 excel worksheets)

Conversion
• Xls format to shapefile

Append
• Template shapefile to AML shapefile

Results in AML product shapefiles compliant to S57 standard
Representation of seabed features as points and polygons

WA polygons
- Study Areas
- Sandwave coverage
- Seabed disturbance
- Wreck site
- Wreck debris fields
- Wreck exclusion zones

WA points
- Seabed disturbance
- Wreck site

AML polygons
- LBO Wreck

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## Digital Imagery

<table>
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<tr>
<th>Imagery type</th>
<th>Assessment process</th>
<th>File format</th>
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</thead>
<tbody>
<tr>
<td>Digital stills photography</td>
<td>Diver assessments and geotechnical assessment post-processing</td>
<td>JPEG</td>
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<tr>
<td>Photomosaic photography</td>
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<td>JPEG</td>
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<td>Digital video</td>
<td>Diver assessments</td>
<td>Mini DV</td>
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<td>Digital video snapshots</td>
<td>Diver assessment post-processing</td>
<td>JPEG</td>
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<tr>
<td>Site plans and drawings</td>
<td>Diver assessment post-processing</td>
<td>AutoCAD/PDF</td>
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<tr>
<td>Sidescan sonar images</td>
<td>Geophysical assessment post-processing</td>
<td>Tiff or Geotiff</td>
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<tr>
<td>Sub-bottom profiler images</td>
<td>Geophysical assessment post-processing</td>
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<tr>
<td>Processed modelled images from multibeam data</td>
<td>Geophysical assessment post-processing</td>
<td>Geotiff</td>
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<tr>
<td>Processed modelled images from magnetometer data</td>
<td>Geophysical assessment post-processing</td>
<td>Geotiff</td>
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<td>Core sediment logs</td>
<td>Geotechnical assessment post-processing</td>
<td>AutoCAD</td>
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<tr>
<td>Composite interpretive images</td>
<td>Post-processing</td>
<td>Geotiff</td>
</tr>
</tbody>
</table>

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Wessex Archaeology: Coastal and Marine

Pilot Project

Map showing designated wrecks:
- Mary Rose
- Invincible
- A1
- Designated wrecks

http://www.wessexarch.co.uk/
Pilot Project

Portsmouth Regeneration Project (PRP)

- DBA (2003)
  - Review of UKHO/NMR data
  - Portsmouth Approaches
    - SSS, MBES, SBP
  - Portsmouth Channel
    - SSS, magnetometer

http://www.wessexarch.co.uk/
Pilot Project

Designated (DW) sites

  - MBES, magnetometer, SBP
Pilot Project

Designated (DW) sites

  - MBES, magnetometer, SBP
- Diver assessment
UKHO 58173 –
lifted wreck. Not observed

UKHO 19648 –
dead wreck. Not observed

UKHO 58177 –
wreck. Observed on mag data

UKHO 58185 –
dead wreck. Not observed

UKHO 19159, 19160 and 19523 –
Mary Rose wreck site. Observed on sss, MBES and mag data

UKHO 19186 –
dead wreck. Not observed

UKHO 58183 –
Dead foul. Not observed

UKHO 58189 –
dead wreck. Not observed

NMR –
obstruction. Not observed

Wreck Anomalies
Wessex Archaeology: Coastal and Marine

Transition Conversion Append

WA Results

AML Results

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Example – Mary Rose Designated Wreck Site
HMS A1

Plate 1: Top view of multibeam data.

Plate 2: Multibeam image of HMS A1, looking south.

http://www.wessexarch.co.uk/
HMS A1

http://www.wessexarch.co.uk/
Invincible

Plate 1: Top view of multibeam data.

Plate 2: Multibeam image of the Invincible site, looking north.

http://www.wessexarch.co.uk/
Wessex Archaeology: Coastal and Marine

Invincible
Wessex Archaeology: Coastal and Marine

http://www.wessexarch.co.uk/
Reporting new or enhanced wreck data

- All wrecks to be reported
- Information on form transferred from gazetteer and metadata – manual or auto-transfer?
- Digital Images
- Survey report

REPORT OF WRECK INVESTIGATION

Wreck No:

Sheerlines:

Survey:

Date located:

Date Examined/Swept:

Used Position: 

Fixed Position: 

Method of Positioning:

Horizontal Datum:

Depth Data (LAT):

Sweep Clear:

Sweep Foul:

Leas E/W Depth:

General Depth:

Sweep Depth:

Total observations at:

Narrative information:

Contact Data:

Sonar Height:

Sonar Length:

Sonar Width:

Sonar Orientation:

Sonar Signal Strength:

Magneto Anomaly:

Sonar Length:

Swath Texture:

Sidescan Field:

Description (include attitude and whether intact):

Approved:

In Charge of Surveys:

Survey report

http://www.wessexarch.co.uk/
UKHO 58173 – lifted wreck. Not observed

UKHO 19648 – dead wreck. Not observed

UKHO 58177 – wreck. Observed on mag data

UKHO 58185 – dead wreck. Not observed

UKHO 19159, 19160 and 19523 – Mary Rose wreck site. Observed on sss, MBES and mag data

UKHO 19186 – dead wreck. Not observed

UKHO 58183 – Dead foul. Not observed

UKHO 58189 – dead wreck. Not observed

NMR – obstruction. Not observed

A1 and A3 Anomalies

http://www.wessexarch.co.uk/
**UKHO 19648**

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### REPORT OF WRECK INVESTIGATION

**Wreck No:** 19648

**Ship/Unit:** HMSLM Gleaner

**Survey:** Wessex Archaeology: Portsmouth Regeneration Project

**Date located:** September 2003

**Listed Position:** 50° 47’ 034” N 001° 06’ 637” W

**Fixed Position:** N/S 0° E/W

**Method of Positioning:** N/A

**Horizontal Datum:** N/A

**Depth Data:**
- Swept Clear: metres
- Swept Foul: metres
- Least E/S Depth: metres
- General Depth: 1 metre
- Scour Depth: metres

**Tidal observations at:**

**Contact Data:**
- Sonar Height: metres
- Sonar Length: metres
- Sonar Width: metres
- Orientation: ddd° / ddd° (Bows: ddd°)

**Sonar Signal Strength:** Nil, Poor, Moderate, Strong, Unknown

**Magnetic Anomaly:** Nil, Poor, Moderate, Strong, Unknown

**Scour Length:** metres

**Seabed Texture:**

**Debris Field:** Length: metres

**Buoyage:**

**Description (include attitude and whether intact):**

UKHO lists the wreck as dead as of 2001. At the reported location no anomaly was observed on the sidescan sonar, bathymetry or magnetometer data.

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**Approved:**

**In Charge of Surveys:**

**Date:**

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**Sweep Diagram, E/S trace (reduced for tide), sidescan traces, magnetometer trace, investigation and close sounding plots to be included. (See HMOG Vol 1 GSI D.5.7)**
REPORT OF WRECK INVESTIGATION

Wreck No: 20224

Ship/Unit: Emu Surveyor
HMOI No:

Survey: Wessex Archaeology: Wrecks on the Seabed

Date located: May 2003
Date Examined/Swept:

Listed Position: 50° 45' 135'' N 000° 51' 556'' W
Fixed Position: 50° 45' 128'' N/S 000° 51' 521'' E/W

Method of Positioning: DGPS
Accuracy (2,447a): metres

Horizontal Datum: WGS84

Depth Data: (LAT)
  Swept Clear: metres
  Swept Foul: metres
  Least E/S Depth: 6.4 metres
  General Depth: 7 metres
  Scour Depth: metres

Tidal observations at:
Cotidal adjustments by:

Contact Data:
  Sonar Height: 0.6 metres
  Sonar Length: 120.3 metres
  Sonar Width: 56.8 metres
  Orientation: 090° / 270° (Bows: ddd °)

Sonar Signal Strength: Nil Poor Moderate Strong Unknown
Magnetic Anomaly: Nil Poor Moderate Strong Unknown
Scour Length: metres Direction (towards): °
Seabed Texture:
Debris Field: Length: metres Direction (towards): °

Buoyage:
Description (include attitude and whether intact):
The following description is based on multibeam and magnetic surveys of the wreck Hazardous

The main wreck site shows on the multibeam data as a slight depression in the seabed orientated west to east, measuring approximately 120 x 57m and has a measurable height of 0.6m. A number of magnetic anomalies were observed on the wreck site, the largest measuring 155nT. A number of features are visible in the depression, the most prominent ones possibly representing guns.

A 11m x 4m depression around 0.4m deep with a number of upstanding features is visible to the west of the main site. The prominent feature within the depression measures 2.3 x 0.7 x 0.3m, orientated west to east.

A small depression, measuring 2.5m x 3.5m is situated approximately 15m north of the main site.

Approved: In Charge of Surveys Date:

Sweep Diagram, E/S trace (reduced for tide), sidescan traces, magnetometer trace, investigation and close sounding plots to be included. (See HM OG Vol 1 GSI D.5.7)

http://www.wessexarch.co.uk/
Conclusions

WA Project

- DBA
- Geophysical Acquisition and Processing
- Geophysical Assessment
- Geotechnical Assessment
- Diving and ROV Assessments

Integration methodology

Client reports
Client digital output
Reports to UKHO

AML  UKHO  NMR  HER  OASIS  COWRIE
Conclusions

WA Project

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Integration methodology

AML
UKHO
NMR
HER
OASIS
COWRIE

http://www.wessexarch.co.uk/
Conclusions

• The project has successfully integrated heritage data into AML products

• Successfully proven as a MDIP/MEDIN ‘use-case’

• Flexibility in implementation is the key

• Heritage data can contribute to existing databases, in particular the UKHO wreck records