Scotia Archaeology

REPORT TO STRATHMORE ESTATES

GLAMIS MILL GLAMIS, ANGUS

Standing Building Survey June 2011

> 5 Bank Street ABERFELDY Perthshire PH15 2BB Tel & Fax No: 01887-820880 email: scotarc@02.co.uk

INTRODUCTION

This report describes the results of a standing building survey undertaken at Glamis Mill before repairs are carried out to the building to enable it to house a turbine for a new hydroelectric scheme. The survey was carried out in June 2011 by Sam Scott of Scotia Archaeology at the request of John Wood, factor of Strathmore Estates.

The survey record comprises the following:

scale drawings (plans, elevations and sections) of the original mill building together with details of architectural features within it and the surviving elements of its machinery;

a comprehensive photographic record of the mill and its associated features; and

a written account including a brief resumé of the history of the mill and a description of its surviving features.

The drawings and photographs are not included with this textual account.

HISTORICAL SUMMARY

Flax-processing was once a thriving industry in Glamis (Nicoll & Quigley 2000, 18) but its principal surviving remains now consist of the derelict mill building which is the subject of this report. Information on the flax and linen industry can be gleaned from several sources, one of the best of which can be found in Raistrick (1979, 103-4). Hume (1977, 135) describes the Glamis mill as '..A one-storey and attic rubble building, now with a corrugated-iron roof..' and dating to the 18th century. There is also compelling evidence that it was built around 1806 by William Baxter & Son of Dundee with the purpose of spinning flax (Gauldie 1969, xx). At one stage it contained 16 frames powered by a 16 horse-power waterwheel and employed 66 people. A 10 horse-power steam engine was added in 1820 to enable the process to continue when water levels were low (Shaw 1984, 254).

At some stage the mill was converted to allow the manufacture of bobbins. Around 1911 a large building of post and beam construction with board and batten cladding was erected against the east side of the mill, this large structure now being an estate workshop and store. Other, associated buildings stood near the mill which is located at NO 38593 46510 on the top of a gentle slope above the Glamis Burn. Some of those buildings still survive.

On completion of the restoration programme, the building will incorporate a water-driven turbine, linked to a new hydro-electric generation scheme. Plans are afoot to display the turbine along with the restored waterwheel and launder.

THE MILL BUILDING

The two-storey structure is not the sawmill itself but the building that houses the waterwheel and associated drives that once powered the lathes for making bobbins and which was used latterly to power the adjacent sawmill. It is situated on the south-east edge of Glamis and is flanked on its south by the A94 Perth to Forfar road which once ran through the village but which now skirts it. The mill is a C(S) category Listed Building (no 11697) and has been

allocated the monument number of NO34NE 51 by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS). It is set into the sloping west bank of the burn, access to the waterwheel area being at ground level while the upper storey is entered directly from the road that runs at that level. It is built of mortar-bonded rubble masonry with sandstone dressings and was once roofed with stone slates and latterly with corrugated iron although the roof had been removed before the survey commenced. Photographs, supplied by Strathmore Estates, showing the mill with its roof still in place are included at the end of the site archive.

The mill is aligned approximately NNW to SSE but, for ease of understanding within this report, it is described here as north to south.

Ground floor

The principal entrance is in the east wall and is flanked by two six-pane fixed glazed windows which face onto the burn. This doorway gives access to the north and south compartments of the building, the latter containing the waterwheel. Additional light is provided by two half-glazed windows and another doorway in the north gable. A doorway in the south gable leads directly into the sawmill.

The cross wall which divides the ground floor is built of random rubble but is not tied into the west wall of the building and is probably of secondary construction. This wall has several openings at various levels, suggesting that secondary drives had once led into the north compartment to drive lathes for making bobbins.

The south chamber houses the waterwheel and associated drive shafts which are now gone except for one horizontal secondary drive shaft and cogwheel powered by the primary rim drive from the waterwheel. On the west wall, at mid-height, is an opening, now bricked up, with a timber-safe lintel still in situ. A sheet of corrugated iron has been placed against the outside face of the wall at that point, presumably to act as shuttering when the ground level was raised.

A modern concrete base, 1.2m square with four exposed fixing bolts, has been built against the south side of the cross wall, probably to anchor an engine that powered the sawmill latterly.

First floor

At this level, a doorway in the centre of the tympany (or tympanum) on the west wall leads from road level into the loft space. This area was probably divided internally but at the time of the survey all floorboards and partitions had been removed because they were rotten and hence dangerous. On the north gable are two splayed windows with fixed lead lights configured in a diamond patterned matrix. The south gable has a centrally placed, splayed window with fixed glazing providing light for the waterwheel and pit compartment which would have extended through from the ground floor. Above the wheel area are two large beams, 2.5m apart and supported on timber columns extending down to ground floor level. The beams each measure 0.28m by 0.18m and extend northwards for 3m from the inner face of the south gable. They may have supported block and tackle for lifting and lowering the wheel during maintenance and when balancing the wheel.

Waterwheel and launder

Water for driving the wheel was taken from the Glamis Burn to the south of the mill, beyond the A94 road. Originally the water ran along a stone-lined lade down the west side of the burn and then through a vitreous clay pipe, 0.45m in diameter, which fed the launder, the timber trough that carries water from the lade to the wheel. The launder extends 6m beyond the wheel at first floor level and includes two sluice mechanisms. One regulated or stopped the flow of water to the wheel while the second, at right angles on the south side of the launder, controlled the flow of waste water. These sluices were controlled by means of a system of levers and cogwheels, via a clutch mechanism operated from ground level, which regulated the flow of water and hence the speed of the wheel.

The water poured from the launder into one of 56 wooden bucket floats, each 1.6m wide and slotted into the 5.9m-diameter cast iron waterwheel, slightly below its top. This made the wheel turn in a pitch-back motion. The wheel is of composite construction, made up of four sections bolted together to make up the full circumference. Eight metal cross-braces have been inserted within its drum area to maintain rigidity. A cogwheel is bolted to the outer flange of the wheel, providing the primary drive from the edge of the wheel rather than a direct drive from the centre axle, as is usually the case in corn-grinding mills. The advantage of the method employed at Glamis is that numerous drives could be engaged or disengaged around the circumference of the wheel via clutch mechanisms.

Waste water was discharged along a tail race into the burn. When the wheel was not turning, water was diverted along a wooden trough and overflow channel which runs below the south gable and into the tail race.

REFERENCES

Gauldie, E (ed) 1969 'The Dundee Textile Industry 1790-1885', Scot Hist Soc, ser 4, vi.

Hume, J R 1977 Industrial Archaeology of Scotland, 2. London.

Nicoll, A R & Quigley, D 2000 *Glamis: a village history*. Glamis.

Raistrick, A 1979 Industrial Archaeology: An Historical Survey. London.

Shaw, J 1984 Water Power in Scotland 1550-1870. Edinburgh.

LIST OF DRAWINGS

The drawings described below were prepared by Sam Scott and are contained on four sheets. The plans of the mill at ground-floor and first-floor levels were based on those produced by Bell Ingram of Forfar to whom Scotia would like to acknowledge its thanks for allowing us to use them.

Sheet 1	Plan of ground floor of mill. Scale 1:50
Sheet 2	Plan of first floor of mill. Scale 1:50
	Plan of axle mounting. Scale 1:10
	Plan of base of mounting. Scale 1:10
Sheet 3	East/west section through waterwheel. Scale 1:50
	South elevation of tympany. Scale 1:50
Sheet 4	Window details
	Ground floor, north gable: internal elevation of west window
	Ground floor, east wall: external elevation of south window
	First floor, north gable: internal elevation of window
	First floor, south gable: internal elevation of window
	First floor, south gable: external elevation of window
	Scales: elevations 1:20. Details 1:1

LIST OF PHOTOGRAPHS

The photographs listed below are contained within the site archive and are available on disc. They are not reproduced within hard copies of the report.

Photographs 42 and 43 were taken before the recent refurbishment commenced and were supplied by Strathmore Estates.

- 1 External doorway at first-floor level in the tympany; viewed from the west
- 2 Detail of the external lintel over the door in the tympany, showing droving in the masonry; viewed from the west
- 3 Interior of the west window at ground-floor level in the north gable; viewed from the south
- 4 Interior of the east window at ground-floor level in the north gable; viewed from the south
- 5 Interior of the north window at ground-floor level in the east wall; viewed from the west
- 6 Interior of the south window at ground-floor level in the east wall; viewed from the west
- 7 Detail of wooden lock on interior of central door at ground-floor level in the north wall; viewed from the west
- 8 Detail of axle bearing and mounting on the waterwheel
- 9 Detail of secondary drive axle and bearing
- 10 Detail of drive shaft and secondary belt drive
- 11 External view of the west window at ground-floor level in the north gable; viewed from the north
- 12 External view of the east door at ground-floor level in the north gable; viewed from the north

- 13 External view of the central window in the south gable of the mill with the 1911 sawmill extending eastwards; viewed from the south-west
- 14 View of the sawmill from the south-west
- 15-16 Views, from the south-west, of other associated buildings
- 17 The south gable of the mill with the sawmill to the right; viewed from the south
- 18 The Glamis Burn with the mill beyond; viewed from the east
- 19 External view of the north window at ground-floor level in the east wall; viewed from the east
- 20 Detail of the sluice drives and clutch
- 21 Internal face of the south gable at first-floor level with the launder adjacent to the waterwheel; viewed from the north
- 22 The tympany at first-floor level in the west wall; viewed from the north
- 23 The launder and sluice mechanism; viewed from the north
- 24 The tympany with the north gable of the mill beyond; viewed from the west
- 25 The launder and waste water sluice; viewed from the west
- 26 View of the waterwheel with axle bearing, spoke fixing and spoke; viewed from the north
- 27 Floor joists and overhead drive mountings on the first floor
- 28 Detail of secondary cogwheel and drive shaft; viewed from the north-east
- 29 The drum of the waterwheel and its wooden bucket floats
- 30 Interior view of the blocked opening in the west wall; viewed from the east
- 31 The door into the sawmill and the drive slot in the south gable; viewed from the north
- 32 The interior of the 1911 sawmill; viewed from the east
- 33 The interior of the sawmill showing the post and beam construction of its south wall; viewed from the north-west
- 34 Detail of the waterwheel axle and bearing
- 35 Detail of the waterwheel showing a timber spoke, metal shoe and rim drive
- 36 Detail of the waterwheel showing the metal slots for wooden bucket floats
- 37 Internal view of the central window at first-floor level in the south gable; viewed from the north
- 38 View of the waterwheel sluices and clutch; viewed from the east
- 39 Internal view of the double windows and safe lintels in the north gable; viewed from the south
- 40 Detail of the sluice mechanism and clutch
- 41 The wooden bucket floats on the waterwheel
- 42 The mill with its roof intact; viewed from the south
- 43 The mill with its roof intact; viewed from the north-west