Armagh windmill

The City's forgotten landmark

by Kevin Quinn

In this year of 2010, Armagh Windmill will have graced the city's skyline for 200 years. Perched on the hill that gives it its name, the windmill is probably the most prominent and visible of the city's landmarks after the two cathedrals. Even though the windmill has been the subject of artist's paintings its history seems not to have captured the same amount of enthusiasm or interest. This lack of interest is not surprising as most historical industrial structures are looked upon as late arrivals having been constructed within the last 200 years. So therefore they do not receive the same investigative attention which would be afforded to not too dissimilar structures of size and appearance from a much earlier period such as an early medieval round tower or a late medieval tower house. However, I hope that this article will go some way in raising its profile from a mere windmill stump to one of the finest structural remains of an early 19th century Irish tower windmill, and hopefully place it were it rightfully belongs among the leading historic buildings and structures of Armagh.

Location & Rocque's map

It has always been believed that the present windmill replaced an earlier 18th century windmill on the same site. Rocque's map of 1760 confirms that there was a windmill but it was sited on the opposite side of present day Convent Hill, more or less where Saint Catherine's College is today[1]. This earlier windmill on the opposite side of Convent Hill does not rule out the possibility that the present windmill was not a same site replacement. It is quite possible that the windmill shown on Rocque's map could have been relocated to the hill on the opposite side of the road after 1760. This relocation may have been due to a number of reasons such as a higher site, a larger structure to meet the demands of a growing population,[2] government incentives[3] and the Napoleonic War 1793-1815.[4]

Date of Construction and Ownership 1810-39

The sill of the first window (now blocked) above the north-west facing ground floor door was utilized as a date stone. The date 1810 can be clearly seen on the remaining piece of sill. (*see fig 6 arrow C*) This date is collaborated by the 1810 James Black painting of Armagh which provides us with a glimpse of the mill at work in its first year and also allows us to see just how magnificent a structure it was. According to Stuart's History of Armagh (1819), a Robert Jackson Esq, was the person who built the windmill in 1810 and it was still in his ownership in 1819.

"...*Such as the Mansion-houses of Tullamore and Rosebrook, and the mills of Balinaowenbeg, Luravallen, and the lofty windmill lately built at the end of Callen-street by Robert Jackson, Esq." p469*

"Mr. Jackson's windmill is at the west end of the town." Footnote p516

In 1836, according to the townland valuations the windmill and surrounding out buildings were now in the ownership of a John Jackson, probably a son of Robert and this was still the case in 1839.

The Windmill and Out Buildings 1839.

The 1839 Townland Valuation and its accompanying plan provides an accurate record of what buildings were there when the windmill was active. The plan shows that the windmill was the central structure of inter-connecting out buildings. The windmill had six floors and was 52ft (15.8m) in height (including cap) 25ft 6inches (7.62m) in diameter, giving it a circumference of around 76ft 8inches (22.1m).[5] The annex was mostly concentrated on the windmill's north eastern side apart from one building on the south-east side. The out-buildings consisted of a substantial barn store measuring 35ft x 23ft x 12ft (10.6m x

fig 1. An earlier windmill appears on Rocque's map of 1760 on the same hill but on the north side of the road where St. Catherine's college is today.

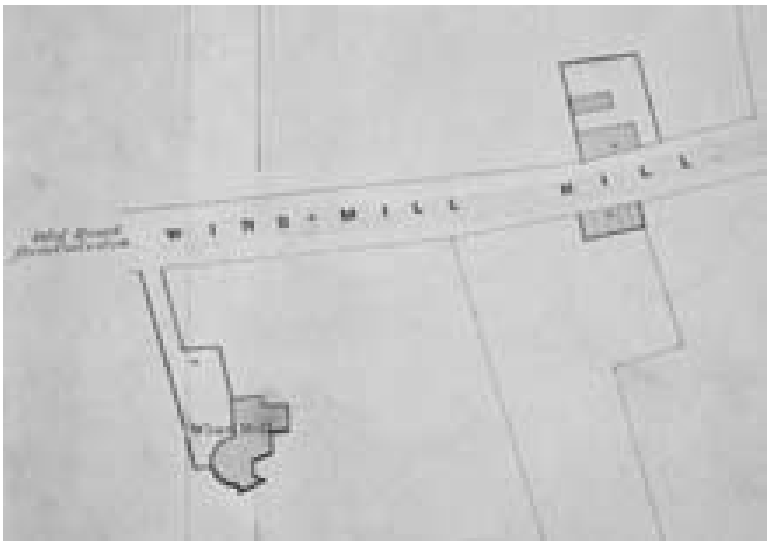

fig 2. The windmill and ancillary buildings as shown on the 1839 Valuation plan of Armagh

7m x 3.6m), a similarly substantial size kiln[6] measuring 18ft x 19ft 6inx 13ft (5.4m x 2.7m x 3.9m). The remaining space was utilized as was described in the valuation record, as "two small offices and a return to mill" measuring 11ft x 5ft x 7ft (3.3m x 1.5m x 2.1m), 14ft x 7ft x 7ft (4.2m x 2.1m x 2.1m) and 7ft x 7ft x 9ft (2.1m x 2.1m x 2.9m). The structure to the south-east is also described as a return to mill but is considerable in height measuring 8ft x 7ft 6 inches x 18ft (2.4m x 2.1m x 5.4m). The total valuation for the site was £14, 19 shilling and 4 pence

Windmill 1846-1862

A snippet from the Armagh Guardian dated 3 March 1846 alludes to the windmill as being inactive for some years before 1846, and that it was now being managed by a James Stanley, Junior, Esq.

> *"The Armagh Windmill which for many years past has been unemployed is now in active operation under the management of James Stanley, Jun, Esq.*

So it seems that the windmill must have been inactive under the ownership of Jackson but there is no entry in the townland valuations for 1836 or 1839 to indicate that this was indeed the case. However, the windmill was probably at rest by 1854.This assumption is based on a reduction in the valuation return for 1854 to £10 from nearly £15 in 1839. It would also suggest that something significant must of have occurred between 1846-5[47]. It is evident from the charred remains of the top floor joists that at some stage the windmill had been damaged by fire. Fire was probably the main cause for the windmill's rapid demise, as the 1862 valuation records describes the structure as the "old windmill."

1862-1908

By 1864 the fate of the windmill is definitely confirmed. According to the valuation records for 1864, the windmill was now vacant and was being described as "*old windmill and offices, dilapidated*" Between 1839-64 a dwelling house had been constructed on the site as it is described as being dilapidated but being occupied by a Michael Hughes. A change of owner also had occurred sometime after 1846. The windmill and site was now owned by a William Jenkinson. In 1868 the valuation records show that the site was being leased by a Mary Johnston from a Jacob Jenkinson (probably a son of William). The windmill is still described as "*unoccupied and dilapidated*" and the house also unoccupied but was now in ruins. According to the 1874 valuation records the windmill was now described as being in ruins. By 1908 according to the Ordinance Survey plan a new dwelling house had been constructed in the same site as the present day Windmill House.

External Features based on Black's paintings

We have to be extremely grateful to James Black for providing probably the only remaining sources on what type of mechanism was used in order to work the windmill. Even though he was more interested in the idea of the windmill, his paintings of the windmill provide very valuable structural details which allows for an accurate interpretation on how it worked and looked. By enlarging a small section of the painting it is possible to make out the main external features. (*See illustration on p2*)

Armagh windmill was operated by the use of a chain wheel. The Chain Wheel is visible to the left of the cap. This was an important part of the windmill's machinery, as it turned the cap that brought the sails face into the wind. It is somewhat surprising that this antiquated mechanism had been in installed in a new windmill in 1810.

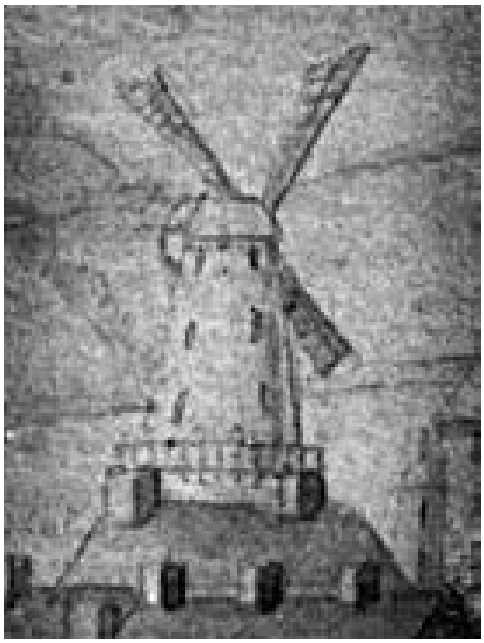

fig 3. Armagh windmill as depicted by James Black in his 1811 pen and wash drawing of Armagh

In 1745 English engineer Edmund Lee had revolutionised windmill designed by inventing the fantail, (*see fig 5 on p19*). The fantail was a small windmill mounted at right angles to the main sails that kept them square into the wind. Once the wind changed it set the fantail vanes in motion that automatically turned the

cap and brought the main sails into the wind.

The chain wheel was mounted at the back of the cap, which ran an endless chain down to the balcony or reefing stage. The miller would pull on the chain to turn the cap into the wind. The chain wheel would be connected to a gear wheel that meshed with a rack around the top of the mill and this allowed the cap to turn. Compared to the fantail this mechanism was labour intensive.[8]

The Break Rope hung from the back of the cap down the outside of the tower to the reefing stage. The purpose of the break rope was to stop and start the mill. On the forward end of the windshaft and turning with it was the **Brake Wheel**. Around its edge was the gear teeth that meshed with a smaller gear wheel that was attached to the top of the upright shaft. On the outside of the brake wheel was the **Brake Band**. One end of the break band was attached to the cap frame the other end was fixed to the break lever. **The Break Lever** was raised and lowered by the break rope. When the lever was raised the brake band slackened off and the sails turned. When it was lowered the band tightened around the brake wheel, bringing the mill to a stop.

The Reefing Stage; the main purpose of the reefing stage or balcony was to allow the miller to reach the tip of the bottom sail so he could spread the cloth across it or roll it up at the end of the day and to access the break rope. The sails usually would have come down to 3 or 4 ft (1.5m) above the reefing stage. The miller with the use of a hooked sail pole would bring the sail within reach. (*see fig 6 on p20 - Arrow B*)

The Common Sail in the painting seem to be cloth or canvas covered. (*see illustration on p2*) The fact that the windmill had a reefing stage would confirm this observation, as fantail operated windmills would have mostly been fitted with a spring sail.[9] The common sail was the oldest type of windmill sail, canvas or cloth was spread upon the wooden framework to catch the wind. The canvas/cloth was untied and unfurled and spread over the sail by means of ropes with pointing lines to its edge. Metal rings were fixed to the top end of the canvas/cloth and were run on an iron bar, allowing it to be pulled across like a curtain on a rail. Based on the level of the reefing stage the sails were probably 27-30ft (8m to 9m) long, slightly over half the height of the windmill tower. The sails would have been about 5ft 6inches (1.5m) in breath, all the way down. In the painting the sails appear to be tapered this was due to a twist or the weather in them. (*see illustration on p2*)

The Cap was made of wood its shape was a bit like an upturned clinker boat rather than the more common "ogee" or onion shaped cap. (*see illustration on p2*) It would have probably been weather-proofed with pitch. The cap would have turned on a cast iron ring, made up of segments, bolted to the top of the stone tower, usually on a packing of wood. The cap would usually have extended down below the outside of the top of the stonework of the tower to prevent rain and birds getting in and this seems to be the case at Armagh.

The Windmill Tower; (*see fig 6, p20*) the exposed stonework on the present structure shows that the tower was constructed of Armagh Limestone. On closer examination the stonework reveals patches of faded rendering. Black's painting clearly demonstrates that at the time of construction the tower had been rendered. It was essential to render the windmill stonework in order to prevent the interior from becoming damp as it was crucial to keep the grain dry for milling. Black's painting can be relied upon for fairly accurate external structural detail. As his structural accuracy is evident on the tower today. On the other hand he seems to have taken the opportunity to indulge in a bit of probability, as he inserted a figure which could be interpreted as representing the miller on the reefing stage. (*see illustration on p2*)

Internal Structural Features

The workings of a windmill are easier understood from the top floor down. Once the grain is lifted by the sack hoist to the dust floor it comes down through the different floors by gravity. Likewise, the power of the wind turning the sails is transmitted down through the mill to turn the millstones.

a) **The Cap**; was the moveable top section of the mill that allowed the sails to be kept head into the wind. It was the engine room of the windmill. It held the most important parts of the windmill's machinery such as the windshaft that carried the sails that transmitted the power to the upright shaft that in turn drove the millstones.

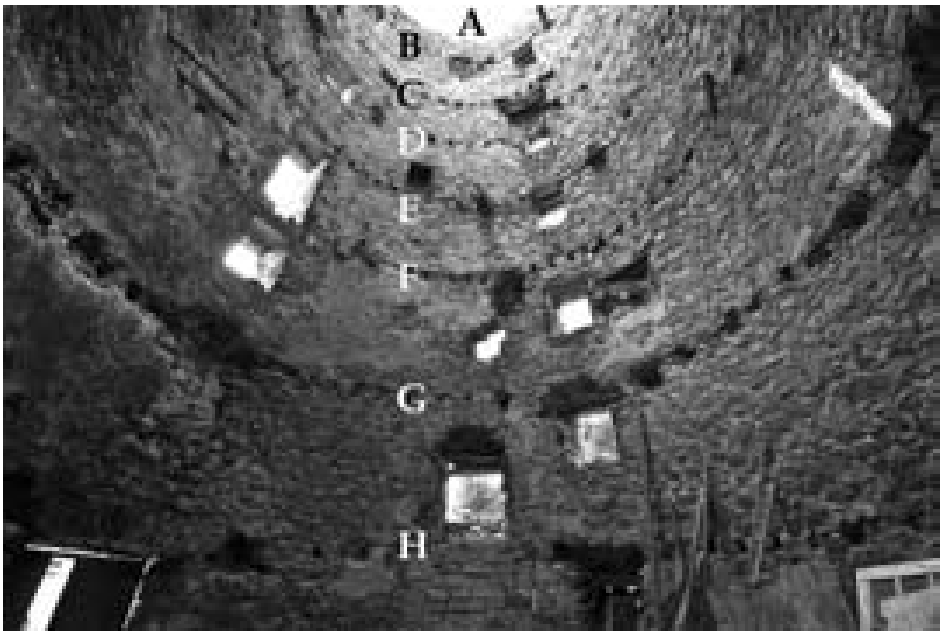

fig 4 *A view of the interior of the windmill looking east, see text for details.*

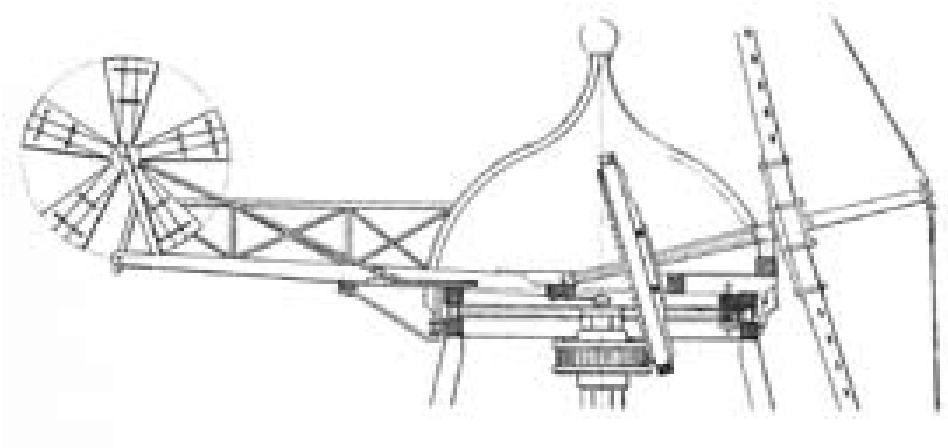

fig 5. An ogee or onion shaped windmill cap with fantail.

b) **Dust Floor**; the very highest floor, it allowed access to the cap. The grain was lifted to this floor by the sack hoist, where it was poured into the grain storage bins on the floor below. The dust floor also housed the sack hoist mechanism. The sack hoist wheel was contacted to the sails mechanism and providing that the sails where turning, the sack was lifted up the mill pushing open the trap doors as it passed through each floor.

c) **Top Bin Floor**; with the highest window. It not only housed the grain storage bins but also some type of grain cleaner to remove the chaff and dust. The chaff and dust were fed into a hopper at the top of the grain cleaner. The grain was then fed from the bottom of the hopper on to a sieve which was shaken rapidly to and fro. The chaff and dust were separated and were blown out by an exhaust attached to a fan, hence the square opening on the north-side of the top window. (*see arrow A in fig 6, p20*)

d) **A platform** for holding the sacks which would then be opened and poured into the grain bins below.

e) **Bin Floor**; was for storing cleaned grain ready for milling. The clean grain was fed down to the millstones on the floor below.

f) **Floor to Reefing Stage**; this floor was known as "the stone floor" as the millstones where positioned in its centre. This was the heart of the windmill from where the grain was ground into flour. This was the floor where the miller was usually found when the mill was at work. The miller had control over many parts of the mill. He had access to the reefing stage to make adjustments to the sails and to operate the brake rope in order to stop and start the windmill.

g) **Meal Floor**; this is where the flour from the millstones fell down through chutes into the sacks.[10]

h) **Flour Dressing Floor**; housed on this floor would have been a flour dresser. The function of the flour dresser was to process the wholemeal flour into white flour.

Ground Floor; is where the finished flour would have been waiting for distribution and where the grain would be sent up the mill on the sack hoist to be processed.

The Windmill 1810-1854?

It is more than likely that its construction was a direct response to the demand for flour at that time.[11] The constructed date of 1810 would suggest Robert Jackson was making the most of the high price for flour during the Napoleonic war period. The demand especially for flour continued after the war and lasted up to the mid 1830's. By the early 1840's, wider economic factors brought about a marked decline in the importance of the medium to small country grist mills.[12] This seems to have been the case for Armagh Windmill. From the valuation records it appears that Armagh Windmill had been struggling as a business from about the late 1830's early 1840's. As with so many other windmills it was becoming uneconomic to work in the face of competition.[13] Its fate was probable sealed when it was severely damaged by fire in the early 1850's which brought about its relatively short working life span of 40 years or so to an end.

Armagh Windmill 2010

Armagh Windmill has been in disuse for 150 years but for those years it was operating it provided an essential service for the local and rural economy of Armagh. As Black's painting shows it was an impressive structure which is still very much the case today. It might have lost its internal and external features through the passage of time but its architectural and technological character is still very much evident today.

Acknowledgements;

I would like to thank Mr Kevin Hart for allowing access to the windmill site and for sharing his knowledge on the same.
A very special thanks to Mr David Bent "Miller at Green's Mill, Nottingham, England" for his invaluable observations and interpretations of the external and internal structural arrangements of Armagh Windmill based on Black's painting of 1810 and the surviving visible features.

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Endnotes

[1] Rocque was a distinguish cartographer. He mapped Dublin, London, Paris and Lima. The accuracy of his maps represents the highest standards for the period.

[2] The late 18th & early 19th centuries in Britain witnessed a rapid rise in population as the industrial revolution took off.

[3] Foster's Corn Law (1784); this act provided subsides on the export of corn. The import of oatmeal, flour, oats and rye was forbibben. The higher subsidy for flour rather than grain encouraged an expansion of provincial flour milling.

[4] During the Napoleonic War, England blockaded the European coast. The blockade created an increase demand in Britain for Irish oats, wheat, oatmeal and flour.

[5] Armagh Windmill was the second highest in Ulster after Ballougry Windmill on the Derry/ Donegal border.

[6] Mills (water as well as wind) on the west side of Britain & Ireland all had kilns on site. This was due to the higher rainfall and the need to keep the grain dry.

[7] The repeal of the Corn Laws in 1846 was largely caused by the unprecedented conditions in Ireland during the famine, the import of grain from abroad was allowed and the advantage previously enjoyed by Irish Flour on the English market disappeared.

[8] The reason for the chain wheel rather than a fantail was purely the choice of the owner or miller. Most millers seemed to have been quite resistant to new technology and bumbled along as their fathers had done, allowing progressive millers to gradually put them out of business. Robert Jackson's preference for a chain wheel mechanism rather than opting for the fantail which by 1810 had been in the use for sixty years surely must have restricted the mill's economic competitiveness in the long term.

[9] Scottish millwright, Andrew Meikle developed the spring sail in 1772. The shutters either canvas or wood on each sail were linked together rather like a venetian blind. The shutters were opened or closed by the use of a spring mechanism which responded to wind speed.

[10] Armagh Windmill was a "Grist Mill" dealing solely with milling corn for flour.

[11] The Irish milling trade especially flour received a direct incentive from Foster's Corn Law of 1784. The response to this incentive was an upsurge of both wind and water powered corn mills in Ireland. By 1835 there were almost 2000 corn mills operating in Ireland, over 600 of them in Ulster. Armagh City and county saw an expansion of corn mills along its water courses with many of them along the Callan River running a service for local farmers.

[12] The famine of the late 1840's sparked off an economic domino reaction in Ireland. It led to the repeal of the Corn Laws in 1846 which allowed the import of foreign grain which consequently caused Irish flour to lose the privileged position it had held for many years in the British market. Between, 1847-1897 a decease in the rural population led to a decline in the acreage of cereal crops in Ulster which brought about a fairly abrupt decline in country mills. The introduction of roller mills powered by steam and later by electricity along with improved transport such as better roads, rail and canal gradually put the smaller operations out of business.

[13] Outside County Down the number of windmills in the six counties was around twenty, ten of them where in County Armagh.

fig 6. The north face of the windmill showing A: opening for fan and B joist holes for Reefing Stage level and supports.