

ROBERT J. MILLER Land Use Planning Services

179 King Street ST. CATHARINES ON L2R 3J5 905.641.2300 Fax.2382
rjmiller@worldchat.com

November 13, 2003

Leah D. Wallace, MA, MCIP, RPP
Heritage Planner, Town of Niagara-on-the-Lake
1593 Four Mile Creek Road
Virgil, ON L0S 1T0

Dear Ms Wallace:

RE: Bannister Residence, 137 Four Mile Creek Road, St. Davids, Niagara-on-the-Lake

On September 12, 2003 I inspected the above property with Marlene and Paul Smith representing the Canadian Chapter of the Society for the Preservation Of Old Mills (SPOOM).

The tour, attended by several experts in Niagara heritage, was conducted by members of the Municipal Heritage Committee of the Town, part of the assessment process to determine if all or part of the subject is worthy of designation under Part IV of the Ontario Heritage Act.

Before visiting the building and doing the research attached, I was sceptical about the validity of numerous anecdotal and written accounts of the property. I must admit finding numerous inaccuracies in the secondary materials but an exhaustive review of the primary sources leads me to conclude that the structural elements of the Bannister home do indeed date to the eighteenth century.

The timber framing and stonework in the building, including the immense millstone support or "hurst" in the basement, comprise the remains of one of two "banal mills" built for Peter Secord by King George III of England in 1782-83. Archival records show that Peter and his brother James worked this mill for almost a decade as tenants under the seigneurial rights of "bannalité" of the Province of Quebec, within which Niagara-on-the-Lake was located until 1791.

In my view, the subject building contains the intact skeleton of the very first grist mill built in what is now the Province of Ontario. The timber framework, stone basement(s), oak hurst, and the history of this property are of immense heritage significance to Canada. I would therefore have no reservation in recommending the designation of this building under the Ontario Heritage Act by the Town of Niagara-on-the-Lake.

I take pleasure in presenting this report to you, and I apologize for the time taken to prepare it. The work required an almost forensic approach.

Yours very truly

Robert J. Miller, MCIP
Registered Professional Planner

Old Mill at 137 Four Mile Creek Road, Town of Niagara-on-the-Lake

(Part of Lot 91, Con. IV, St. Davids, formerly Township of Niagara)

by Robert J. Miller November 13, 2003

Purpose of this Report

The post and beam building facing "Creek Road" south of St. Davids, is reputed to be an original Loyalist grist mill dating to the American Revolution. It was acquired as the derelict "Old Mill Inn" by Mr. & Mrs. Bill Bannister some fourteen years ago. In the intervening period the Bannisters have transformed the structure into an attractive home with grounds sloping into the gentle valley of the creek behind it.

Fortunately, a heavy oak timber frame discovered in the top half of the cellar was left exposed during the renovation. Currently surrounding a weaving studio, this frame, hand-hewn by broad axe, is a vitally important clue to deciphering the historic origins and significance of the building and its setting.

The purpose of this report is therefore to examine the Bannister home and its setting from a watermill perspective and to connect archival documents and information about other historic mills that may help illuminate the significance of this property.

Focus of this Report

It is recommended that this report be read in conjunction with the intuitive analysis by Peter J. Stokes, Restoration Architect, dated September 13, 2003 plus the title search and detailed investigation of October 2003 by Joy Ormsby, Town Historian. I have done my best to avoid duplicating information presented in the Stokes and Ormsby documents but I have used their findings to give added credence to several of my conclusions.

Given the superb joinery and overall condition of the hurst frame, plus knowledge that St. Davids was burned by a misguided American army in 1814, Paul Smith (of Backus Mill, Long Point) remarked during the site visit - "something bothers me - this is just too good to be true." On that caution, I have taken extra time and care to sift through the voluminous sources of data, which from all accounts confirm the extraordinary heritage significance of this building and its origins.

Conclusions

1. The hand-hewn timber framing, double height stone cellar, and massive oak hurst frame in 137 Four Mile Creek Road constitute original structural parts of an English grist (flour) mill built on the Peter Secord farm during 1782-83.
2. The subject was the first flour mill built in Ontario.

By 1826, another 249 had been built and by 1848, the number had risen to 553¹. The Bannister home and property is therefore of immense historical significance in Ontario.

3. The grist mill and saw mill constructed on the Secord farm between 1782 and 1783 were state of the art English watermills costing £500 York currency paid for entirely by the government.² These were the first "King's Mills" built in Upper Canada.
4. For eight years Peter and James Secord worked their mills as tenants under the seigneurial rights of "bannalité" of the Province of Quebec³ which the area was part of until the British Parliament enacted the Constitutional Act in 1791 "severing Upper Canada from the Lower Province".

Lieut. Gov. Simcoe would later write, "The Act may be considered as the Magna Carta under which that Colony [Upper Canada] will immediately be admitted to all the privileges that Englishmen enjoy."⁴

The Bannister home may therefore be the only surviving eighteenth century "banal" mill in Ontario.

5. The Secord mills were built with many large cast iron components, reflecting state of the art English industrial technology in 1783. The massive oak hurst frame in the basement of the Bannister home supported the main vertical drive shaft, gearing and millstones and survives as an extremely rare artifact in itself.
6. The wooden ground floor of the home, complete with circular openings for the two runs of millstones sitting on the wooden hurst below, have

¹ Public Archives of Ontario, Journals of Upper Canada House of Assembly, **Census of 1826, Census of 1848.**

² Letter from Gen. Maclean in Fort Niagara to Gen. Haldimand, November 24, 1782, extract in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 45.

³ Larry McNally, **The Mills and Millwrights of Southwest Quebec**, Chateauguay Valley Historical Society Annual Journal, 2003, Vol. 36, p. 2.

⁴ Quoted in E. A. Cruikshank, ed., **The Correspondence of Lieutenant Governor John Graves Simcoe**, Ontario Historical Society, 1923, Vol. I, p.151.

survived without any signs of burning. There are no scorch marks on any part of the hurst or the stonework.

The Burnett/Slingerland, Servos, and Pickard mills along Four Mile Creek were all burned in the War of 1812 and rebuilt incorporating the labour saving grain elevating innovations of Oliver Evans, made popular around 1795. There are no traces of such modifications in the subject mill, suggesting it pre-dates them.

7. In my view, based on the available physical evidence and archival documentation, the Bannister home dates to 1782 and somehow survived the holocaust of 1814 in St. Davids.

Milling Origins of the Bannister Home

The Bannister home was originally a grist (flour) mill built by Peter Secord and his brother James, freehold farmers from Van Cortlandt Manor, Westchester County, New York⁵. Van Cortlandt Manor was a massive 86,000 acre Dutch plantation dating to 1697 in the Hudson River valley. The Van Cortlandt family kept slaves and employed hundreds of farmers, carpenters and millers who lived on the Manor - some as tenants and some as freehold land owners. The Manor's prime economic purpose was to supply food and other necessities to New Amsterdam (New York City).

The American Revolution created a civil war environment on the Manor leading to its temporary abandonment. Peter "Seacord" (from "Sicard", French Huguenot) was loyal to King George III and moved his family north behind the British lines in the Mohawk Valley, west of present day Albany. In 1777 Peter then became one of seven "Seacords" who enlisted with Butler's Rangers, based at Fort Niagara opposite what is now Niagara-on-the-Lake.

SECORD MILLS APPROVED

British government approvals to build mills for the King in what would become Niagara Township, date to July 1780 when Peter Secord and others of Butler's Rangers were instructed to take their families and begin farming westerly from the Niagara River to Four Mile Creek.⁶ The government had just acquired a tract of land from the Mississauga's which was roughly four miles wide, west of the Niagara River between Lakes Ontario and Erie. By

⁵ Kathleen Eagen Johnson, www.hudsonvalley.org/web/vanc-01.html

⁶ Letter from Gen. Haldimand to Col. Bolton, Quebec July 7, 1780, extract in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 18.

1782 Peter Secord (aged 60), Abigail (38), their four children, his brother James Secord (51) and Magdalen (47) with their five children (including David 23) had cleared a farm of 57 acres in and around the lands subject of this report.⁷

In June 1782 Lieut. Col. John Butler wrote to British headquarters in Quebec stating "Peter and James Seacord" propose to build a grist and saw mill, pay for the stones and iron work, but asked that they "be sent up in the King's Batteaux".⁸ Lieut. Col. Butler felt there was a great need for a flour mill to feed the garrison and Loyalists streaming into Niagara. At that time all flour was being sent up from Quebec by boat, often arriving in deplorable condition. It was then distributed gratis from the King's Stores to the settlers.

In July 1782 approval was granted on condition "with respect to the mills proposed to be built by the Seacords, His Excellency will not permit anything of the kind as private property, it must be undertaken entirely upon the same footing as the farms."⁹ Lieut. Col. Butler replied that such was in fact the intended approach.¹⁰ The British government would pay for and own the mills.

Sgt. David Brass (an "American genius" millwright according to Col. Ross of Catarqui) with Butler's Rangers, was promoted to Lieutenant and designated "principal Workman" on the mills in fall 1782.¹¹ A number of men were put to work felling trees and squaring timbers - including the Secord brothers, who were assigned as millwrights on their own mills plus another saw/grist mill at Palatine Hill occupied by Daniel Servos some six miles downstream near Lake Ontario.¹² The plan, strongly promoted by Lieut. Col. Butler, was to pay Lieut. Brass £500 York currency to complete the work.

⁷ John Butler, **A Survey of the Settlement at Niagara, 25th August, 1782**, Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 42.

⁸ Letter from Col. John Butler in Fort Niagara to Cpt. Robert Mathews, June 12, 1782, extract in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 38.

⁹ Letter from Cpt. Robert Mathews in Quebec to Col. John Butler, July 9, 1782, extract in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 40.

¹⁰ Letter from Col. John Butler in Fort Niagara to Cpt. Robert Mathews, September 2, 1782, extract in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 43.

¹¹ Letter from Gen. Maclean in Fort Niagara to Gen. Haldimand, November 24, 1782, extract in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 45.

¹² Letter from Gen. Maclean in Fort Niagara to Gen. Haldimand, February 2, 1783, extract in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 46.

*"The expenses for building a saw and grist mill at Peter Secord's farm will amount to £500 N. Y. currency for cutting and hauling Boards and Timber, building and filling in both Dams, nails, Iron, Stones, bolting cloth and saw excepted. The saw mill to be built first to get boards and small Timber for the Grist Mill."*¹³

GRINDING BY FALL 1783

In February 1783 Lieut. Brass reported the trees required for timbers and lumber in the Secord mills had been cut down, squared and delivered to the construction sites.¹⁴ But the cast iron gears, wheels and shafts promised to be sent up in spring 1783 did not arrive. Instead, news of the peace treaty with the Americans caused general confusion as all public works at the upper military posts were ordered to be halted. Numerous letters from Lieut. Col. Butler and other officials at Fort Niagara eventually clarified that the intent of the orders excluded mills. After several more written pleas throughout that summer, the millstones and iron work finally arrived in fall 1783.¹⁵

The building at 137 Creek Road thus started life as an English farm-style or "custom" flour mill with two runs of stones - a function it would fulfill for the next 127 years - never converting to an "automated" merchant mill.

None of the dynamic power train has survived (wheels, shafts, gears etc.), yet in the basement, the massive white oak frame (the hurst or husk) that held the millstones and buffered the surrounding building against vibrations, remains in pristine condition.. Certain refinements in its design, described in detail later, plus the grinding controls (tentering screw holes, levers and bedstone levellers) are clear indication of skilled craftsmen under the guidance of a master millwright.

Water power for the Bannister mill was the Four Mile Creek which flows to this day from multiple springs in the Niagara Escarpment to the south. In 1782 when the creek flowed into the area now partly occupied by Log Cabin Trailers, about 300 metres upstream, it was impounded by an ingenious earthen dam called a "weir". The weir, likely engineered by Lieut. Brass himself, diverted water from the main channel of the creek into a mill race (called a "leat" in Britain) which ran northerly along the west side of Creek Road until it reached a point opposite the mill where it crossed the road and likely flowed in an open wooden box flume to a wooden waterwheel mounted outside the east

wall of the building.

The Hurst Frame in the Basement

In the 1960's the bottom storey of the mill was back filled with earth and rubble.¹⁶ Certain extra heavy timber framing sitting at the fill line was saved in situ by the Bannisters and now surrounds a weaving studio. This, we discovered, is the most important structural feature in any grist mill - the sublevel "husk" or "hurst frame" that held the gearing and supported the millstones on the floor above at street level.

In most English mills it was built with extra heavy timbers, often exhibiting finer craftsmanship than the actual building that protected it. English millwrights framed such millstone platforms separate from the mill building itself so that the millstones could be independently levelled, power maximized and the surrounding building not weakened by the vibrations created by the waterwheel, gear train, and the millstones.

STRUCTURAL MEASUREMENTS

I returned to the site on September 16, 2003 and measured the building and the hurst frame with the help of Mr. Bannister. The exterior dimensions of the building are 35 ft. x 28.6 ft. while the interior of the stone basement measures 32 ft. x 24 ft. at breast height.

The hurst frame measures 24 feet in length, 8.5 feet in width and 9 feet 7 inches in height, thereby occupying the eastern part of the stone cellar to its full interior width. The inside height of the hurst from the floor to the bottom of the top beams is 8 feet 2 inches while the inside width is 6.5 feet. Exhibiting no saw marks, the entire frame is square-hewn white oak held together with shouldered mortise and tenon joints, each secured with double pegs. The main beams measure 14 inches x 11.5 inches and extend the full 24 feet of the frame.

Several top beams connect to both vertical sides of the frame and the owner advises that these are mirrored under a removable plywood floor installed by him to isolate the earth fill below. He did this to facilitate unearthing the bottom level if more extensive future investigations are warranted. The remainder of the current basement has a poured concrete floor, also installed by the owner. The

¹³ Undated Memorandum by Col. John Butler, quoted in Niagara Historical Society **Records of Niagara No. 38**, 1927, p. 45.

¹⁴ Op.cit. No. 12

¹⁵ See letters between Fort Niagara and army Headquarters Quebec, August and September 1783, quoted in Niagara Historical Society **Records of Niagara No. 38**, 1927, pp. 64-65.

¹⁶ Personal conversation, September 14, 2003 with Mr. Walt Fedorkow who bought the farm across from the mill when released from the army in 1946. He observed Niagara Township dumping fill all around the mill in the 1960's. He recalled the cellar was totally empty and wet in the late 1940's and that it too was later filled in after Ife Stevens sold the Old Mill Inn in the early 1950's. Access to the cellar was from a trap door in the floor of the restaurant addition at the front of the building. Liquor was hidden below in the old mill cellar.

“floor” beams in the hurst are in reality centre tie beams when one considers that space of the same height is duplicated in the buried cellar below them.

The hurst posts are all 14 inches square with knee bracing top and bottom in parallel with the long axis of the frame to maximize the space inside for the great spur wheel which would have rotated horizontally within it on a heavy vertical shaft, most likely cast iron. Some of the lower knee bracing was removed by the owner to avoid shin scrapes.

SUPPORTING THE MILLSTONES

The posts are generally spaced at six foot intervals except directly below the millstones where they are closer together and aligned with dual overhead beams to support each of the two runs of stones. Circular openings in the “stone floor” above reveal the millstone positions and tell us the stones were 48 inches in diameter with their “eyes” 8 feet 4 inches apart. The stationary bottom (also called “nether” or “bed”) stones each sat on the dual beams perfectly positioned for the task, with each using three-point iron levelling bolts which remain in situ.

The long top beams of the hurst rest on the stone side walls. The bottom beam adjacent to the building’s end wall is supported through its entire length by a ledge fashioned in the stone wall specifically for the purpose. The bottom beam opposite, functions as sort of a summer beam resting on what appears (from as-found photos taken by the owner) to be an interior stone bearing wall buried in the cellar below.

How the Bannister Hurst Frame Worked

Two massive “bridge tree” beams (removed by the owner), spanned the narrow axis of the hurst at waist level directly in line with the centre point of each bedstone above. These beams supported the bearing blocks and iron pinion gears (stone nuts) and the spindles that extended vertically through the eye of each bed stone to turn the runner stones immediately above them. The bridge trees essentially supported the combined weight of the runner stones and the iron components that ran them, as the runner stones did not actually touch the bedstones as they rotated. The separation distance was usually set to about the thickness of tissue paper.

LEVERAGE

The double tenons securing each bridge tree to a hurst post were not removed when the beams were cut away by the owner. The stumps of the massive tenons clearly show how each was mortised into an extra heavy (15 inch square) hurst post creating a fulcrum point for the bridge tree to act like a giant hinged arm. The tenon stumps are held in place by horizontal walnut pins fully fifteen inches

in length and two inches in diameter.¹⁷ This was the only part of the hurst that moved and it provided the mechanism by which the miller adjusted the fine gap between the millstones while they were running.

The moveable ends of the bridge trees sat on adjustable beams, which remain in situ. Each of these is mortised into hurst posts at each end with one end of each pinned with an iron bolt to create an ingenious lever that could raise and lower the bridge tree resting on it.

Each lever beam would have been controlled by a round iron rod extending vertically through the top beam to a location beside a millstone and threaded into wing-nuts or small hand wheels on the floor.¹⁸ Holes drilled in precisely the right points in the Bannister hurst show where such rods passed through the long beams to the stone floor above.

TENTERING

As he turned the wing-nut or wheel beside the millstone, the miller raised or lowered a lever beam below, the centre of which in turn elevated or lowered one end of the bridge tree that carried the iron stone nut and spindle supporting the runner-stone at the floor above beside the miller. This activity was called “tentering” and the associated cast iron controls were therefore called tentering screws.

Having tentered the stones correctly, at the start of a day's work, the only adjustment necessary was to compensate for the expansion of the stones as they warmed up during use. This tweaking often required less than one full revolution of the tentering screw throughout the day. By adjusting the tentering screws, the miller could grind with one stone or two or could disengage the stone nuts from the great spur wheel and leave the mill essentially out of gear when he left for the night.

THE BURIED LEVEL

From examining hursts in other English mills we know that components of the Bannister frame are probably buried in the cellar below. This bottom part of the mill, often called the wheel pit, housed the vertical pit gear which turned on the horizontal axletree connected through a window in the wall to the waterwheel outside.

An archival photograph in the Niagara Historical Society Museum, confirms that both stone storeys were identical in height and the east wall, now completely buried, is pierced through the bottom level with a square window for

¹⁷ See Appendix “A”

¹⁸ See Appendix “H”

an axletree.¹⁹ This photograph and our measurements of the basement in the home suggest the total height of the stone walls to be 19 feet.

When the Bannisters acquired the building, an extremely heavy oak beam, hewn to 20 inches by 16 inches was found and photographed sitting loose on the bottom cross beams of the hurst. Joint channels in it did not match anything found in the floor beams of the hurst.²⁰

The beam was subsequently removed in pieces and used by a skilled German artisan to create wooden bowls. Owing to its great size, it may have been assessed too valuable to bury in the cellar and consequently hoisted up one level where it sat until the Bannisters arrived. Its extreme weight suggests it may have been the primary hurst beam (sole tree) supporting the vertical power shaft of the mill. Heavy single beams, or beam cribs, were often used in this way to avoid deflection under the extreme weight they supported.

The Upstream Water Power System

By 1781, lands to the immediate west of the Bannister property extending south along the present alignment of Four Mile Creek Road, were recognized as suitable for a millrace or "leat". A leat was dug in this location in 1783 and was still flowing in 1872 when surveyors tied their measurements to the centre line of it along the west side of the road from the "Murray Farm mill" southerly to the lands now occupied by Log Cabin Trailers.²¹

COMPUTER MAPPING

I converted the chain/link metes and bounds lease in the 1872 survey mentioned above, and plotted it on an aerial orthophoto of the area using autoCAD. That analysis confirmed that the millrace was intentionally designed and constructed to supply water from a weir on the present Log Cabin Trailers property directly to the Bannister property via a leat on the west side of the road.²²

The weir system diverted water from the main channel of the creek into the leat. Only when the leat was full was the rest of the water in the pond formed above the weir allowed to flow over it and down towards St. Davids.

¹⁹ See Appendix "B"

²⁰ Personal conversation, September 16, 2003, with Ugene Schlaak, the bowl maker who removed the beam from the hurst.

²¹ Instrument No. 624 filed at the Niagara Historical Society Museum, Niagara-on-the-Lake and listed in title search by Joy Ormsby.

²² See Appendix "I"

Water flowing in the leat was directed around the mill to an overshot waterwheel mounted on the eastern or back side of the building. A "shadow" of the wheel, reflected by damage to the stone wall by water splashing from the wheel, can be seen in an archival photograph in the Niagara Historical Society Museum.²³

HOW THE WATER WHEEL WORKED

In order to ensure a sweetening flow of water down the leat system at all times, the top of the waterwheel and wooden box flume ("pentrough" in Loyalist times) at the mill were engineered in 1783 with their top elevations exactly equal to the crest of the weir far upstream to the south. Thus, as long as the flow of Four Mile Creek was sufficient to overflow the weir upstream, it would also overflow the box flume at the mill thereby keeping the leat and flume constantly flowing with fresh water even during periods when the mill was not running.

At the mill, the water from the leat was carried onto the top of the waterwheel via a wooden box flume (often called a "launder"). The miller controlled the flow of water onto the wheel by moving a lever which raised a sluice-gate, or lowered a short penstock, at the end of the flume.

It is highly probable that the Secord Mill was fitted with an "overshot" waterwheel approximately 18 feet in diameter - about the height of the bottom two storeys of the mill. This type of wheel made use of the weight of water spilling from the flume into a series of buckets on its rim. The wheel worked by gravity and turned because the water flowing into the top buckets made one side of it much heavier than the other.

The buckets were self-emptying at the bottom as the water wheel rotated. The vertical turning force would be transferred horizontally into the mill via an oak axle tree, usually about two feet in diameter, which extended through the aforementioned window in the adjacent stone wall.

The 1872 water system lease was assigned to a new owner in 1889.²⁴ An eyewitness account confirms that the same system survived to at least 1909 when it was observed still flowing past an "old feed mill" complete with a water wheel.²⁵

The Downstream Water Power System

After spilling from the bottom bucket of the wheel, the

²³ See Appendix "C"

²⁴ Title search by Joy Ormsby

²⁵ Quoted from the Diary of Otto Hanniwell in the report accompanying the title search by Joy Ormsby

water would have flowed away from the Bannister mill in a ditch called a tail race. At that point it entered a mill pond created by a weir immediately downstream on Lot 90.

The downstream weir caused water to back up onto Lot 91 covering the area to about one acre behind what is now the Bannister residence. That was actually the water that powered the second Secord mill downstream on Lot 90. Encroachment rights for this millpond, to a limit of one acre on Lot 91, were legally formalized in 1833 when Lieut. Gen. John Murray acquired the Bannister mill and the other lands around it then owned by Stephen Secord's widow Hannah.²⁶ The instrument stipulates that the millpond encroaching onto Lot 91 must never interfere with the operation of the mill found in that location - the present Bannister home.

CONNECTS TO THE BURNETT-SLINGERLAND MILL

There are few traces of that downstream weir or pond today but the creek remains and detailed CGD (Canadian Geodetic Datum) mapping shows the surface of such a pond would not have flooded the buried cellar of the Bannister home. It would, however, have been about at the same level as the old Burnett-Slingerland mill seat downstream in St. Davids.

By analysing present day contour elevations, it is apparent that water from the ancient millpond originally behind the Bannister home could have been diverted via a leat/flume to a level connecting perfectly with the downstream mill. This would have provided a head of water about thirteen feet high which is almost exactly the elevation of the old Burnett-Slingerland Mill site above Four Mile Creek today.

The Burnett-Slingerland Mill, demolished in 1961, was therefore most likely the second Secord mill (originally a mulay style sawmill) constructed in 1782-83.

Mechanical Power Transmission Mystery

Not a single gear or shaft remains in the Bannister building. We know that has been the case since at least 1946 when a neighbour went into the basement before it was half filled. So, how did the mill work?

We know from the various letters from Fort Niagara to British headquarters in 1782-83 that the millwrights were willing to wait all summer for cast iron parts for the Secord mills rather than hand carve wooden cog wheels and other wooden parts more easily cast in iron. Despite a long tradition of wooden gearing in English and New England mills, it is obvious in 1783 cast iron was the preferred material for mechanical parts in new mills.

As illustrated in Appendices "D" and "E" to this report, the transmission of power in English watermills has followed the same principles for centuries but a large advantage obviously arose when iron gears were introduced in the mid eighteenth century. To that point, technology had restricted the minimum size of wooden cog wheels.

Iron wheels could be cast in smaller dimensions than their wooden counterparts. For example, iron stone nuts allowed the ratio between them and the great spur wheel that drove them to be increased, thus allowing faster revolutions by the millstones.

THE CAST IRON COMPONENTS

We are left to deduce how the gearing of the Bannister mill might have been configured, knowing there was a quantity of iron parts sent up from Quebec in 1783. The question is - what exactly were they?

In order to understand the clues it is necessary to grasp the general principles of how power was transmitted in an English watermill from the turning water wheel to the rotating millstones.

Old mills today tell us that most vertical waterwheels rotate at about ten revolutions per minute (rpm) and their power is transmitted into the mill along a horizontal axle tree to a pit-wheel mounted vertically in the lowest part of the hurst frame. The rotating pit-wheel drives a smaller wallower gear mounted horizontally on a vertical main drive shaft causing this shaft to rotate. A large gear wheel, called the great spur, is always mounted horizontally on the drive shaft at the level of the cast iron stone nuts to which its gears are meshed causing them to also rotate. Each stone-nut is attached to an iron spindle which passes upward through the eye of the bed-stone to engage the runner-stone causing it to rotate and grind the grain between the faces of the stones.

Combinations of gears thereby increase the speed of rotation from 10 rpm at the waterwheel to about 120 rpm at the runner-stone.

INTERPRETING THE CLUES

Given the above information, it is much easier to understand the following clues about the mechanical system that once operated in the Bannister mill.

1. Circular openings in the thick pine subfloor above the hurst reveal there were two runs of 48 inch diameter stones (see Appendix "A").
2. The main vertical power shaft was cast iron about three inches in diameter indicated by one half of an oiled wooden guide block located in the top beams of the hurst designed specifically to centre

²⁶ Instrument No. 1427 filed in the St. Catharines Land Titles Office and listed in the title search by Joy Ormsby.

a shaft in the frame (see Appendix "A").

3. Photographs of the iron stone nuts from the Burnett-Slingerland Mill and the Servos Mill likely show the identical iron part used in the Bannister mill (See Appendix "G").
4. The eye centres of the millstones in the Bannister building were 8 feet 4 inches apart, revealing that the great spur wheel must have been about 7 feet 6 inches in diameter to mesh with the stone nuts connected to spindles separated on 8 foot 4 inch centres. It was probably cast iron with wooden teeth and was likely the "big black steel wheel lying on the dirt floor in the mill basement" observed by Grace Doyle as a young child peering from outside through a door in the cellar.²⁷
5. The pit gear in the Burnett-Slingerland Mill was a "compass" wheel nine feet in diameter, made of oak with a maple rim, strengthened with iron bolts, with iron gearing affixed to its edges.²⁸ This is a good indication of the type of pit wheel that might have been used in the Bannister mill.
6. The axle tree in the Burnett-Slingerland Mill was oak, two feet in diameter, planed to sixteen sides. Its ends included cast iron gudgeons and bands.²⁹ The axletree in the Bannister mill was probably of similar dimensions, hence the size of the window piercing the stone wall to accommodate it. (See Appendix "B")

Epilogue

The historical records show that Peter Secord ran his mills for thirteen years until 1796 when he moved to Turkey Point on Lake Erie, where he lived to be 104. The records also show his tenacious pursuit of freehold ownership of his mills and property on Four Mile Creek before he moved away.

In a census of mills taken in 1792 by D. W. Smith, Surveyor General and Augustus Jones, government Surveyor, Peter Secord Sr. attests that his grist mill had been promised to him by no less than Lord Dorchester (Sir Guy Carleton), the acting Governor General of Quebec Province "at the house of the late Major Tice in the presence of Mr. Burtch

²⁷ Personal communication during summer 2003 with Grace Doyle, aged 88. She recalled several men trying unsuccessfully to get the old wheel out of the cellar. We now know they were successful as it was not there when Walt Fedorkow visited the cellar in 1946. See also footnote 16.

²⁸ W.H. Kribs, **The Little Mill At St. Davids**, Niagara Falls Evening Review, no date, found in Grace Doyle's scrap book.

²⁹ Ibid.

and others."³⁰

Major Tice was a prominent resident of Stamford. Mr. Burtch built the first mill at Niagara Falls and had been just appointed a Magistrate by Lord Dorchester and given a seat on the first Land Board for the District of Nassau.³¹

Peter made his first of several petitions to the new Land Board on June 6, 1791.³² He acknowledged his 300 acre farm and mills on Four Mile Creek but claimed he had been promised a total of 600 acres by Brigadier General Powell. Brig. Gen. Powell had been Commander of the upper posts in 1782 and stationed at Fort Niagara when the Secord mills received approval from Quebec. He would later become involved himself in constructing mills along the Niagara River near Fort Erie.

Peter Secord's 300 acres on Four Mile Creek were not patented by the Crown until May 16, 1798³³ - two years after he had moved many of his family to live on his second land claim located in Charlotteville, Turkey Point. His son Silas had already moved there from Niagara as had some of his Loyalist relatives from Van Cortlandt Manor NY, after fleeing to New Brunswick.

In May 1799 Peter sold the Bannister mill and his 300 acres, which had come to be known as Lots 90, 91 and 92 of Con. IV Township No. 1, to David Secord Jr. (26), grandson of Peter's brother James and son of Laura Ingersoll Secord.

Just two months later in July 1799 David Jr. sold the mill and all 300 acres to one David Secord Sr. (41), Peter Secord's nephew, who would become the infamous namesake of St. Davids. David Secord Jr. then immediately followed his great-uncle Peter to the Turkey Point settlement where he married Polly Mabee.

Both "Davids" would eventually participate as British officers and survive the Battles of Queenston Heights and Lundy's Lane.

Digital & Print Copyright © Robert J. Miller 2003

³⁰ **Statement of Mills in the District of Nassau November 7, 1792**, Bureau of Archives, Report No. 3, 1905, pp. 334-335 Quoted in Edwin Guillet's famous book, **Early Life in Upper Canada, (1933 reprinted 1963, 1967, 1969)** p.219.

³¹ **Proceedings of Land Board Niagara, May 3, 1791**, quoted in Niagara Historical Society **Records of Niagara No. 41**, 1930, p. 96.

³² **Proceedings of Land Board District of Nassau held in Niagara June 6, 1791**, quoted in Niagara Historical Society **Records of Niagara No. 41**, 1930, p. 111.

³³ Title search, Joy Ormsby, October 2003