

**Birkhill Fireclay Mine
Clay Preparation Buildings
FALKIRK**



**HISTORIC
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Survey and Recording Section: Architecture and Industry

**Birkhill Fireclay Mine
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**NS97NE 83 (NS 9650 7896)
Canmore ID 47866**



Birkhill Fireclay Mine, mine surface buildings. View of haulage gantry and 'run of mine' wagon rail gantry, from south. These structures have since been demolished. RCAHMS, 2007 [DP028368].

01 October 2015

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1. General

Birkhill Fireclay Mine process buildings (NGR: NS 9650 7896) were situated some 12.3km east of Falkirk and 4.4km south west of Bo'ness on the banks of the River Avon. Fireclay was mined in the area of Bo'ness for both pottery (18th century) and brick production (from c. 1860). The mine at Birkhill was originally set up, mined and operated by Peter and Mark Hurl Ltd ¹, which produced the Kilinit, Klinit G and Hurl brickmarks. Commercial operations at Birkhill Fireclay Mine ceased in 1980. Birkhill was the last surviving example of a fireclay mine and buildings in Scotland and had been in the care of the Bon'ess Development Trust from the 1990s. Latterly it was owned by Falkirk Council. The process buildings were demolished in December 2012.

The mine was closed to public visits at the time of writing (2015). There is no historical mapping evidence of the development of the site on Ordnance Survey maps during the time of its expansion from the 1910s until the 1930s.

Historic Environment Scotland (formerly RCAHMS and Historic Scotland until 1 October 2015) recorded the Birkhill clay processing builds and mine as part of its survey programme. It was a unique survivor of clay mining in Scotland. The mine itself and some ancillary buildings are not discussed in this report. These are noted in the [RCAHMS photographic survey undertaken in 2011](#).

1.1 Fireclay

The fireclay mined and processed at Birkhill is a sedimentary mudstone (fossilised earth) that is found beneath almost every coal seam. Known as 'seat-earths' and commonly named after the overlying coal seam (at Birkhill it is known as Glenboig Lower Fireclay Seam), the fireclay seams tend to be no more than 3.0m in depth. Fireclay is named as such due to its original use in the making of refractory bricks to line furnaces and is composed of kaolinite, illite (hydrous mica) and quartz. Scotland has always produced a modest amount of fireclay in comparison to England. ²

Today, fireclay is used to make buff coloured bricks for the building trade. [Donington Island](#) near Swadlincote in Leicestershire (South Derbyshire Coal Field) is the main stockpile in the UK as well as Northumberland and Durham Coalfields and Coalbrookdale coalfield in Shropshire (Caughley) and in a small scale near Halifax, Yorkshire.³ The last fireclay mine operating in the UK is referred to in 2006 as being in Shibden Valley near Halifax. The fireclay mined was used to make 'glasshouse pots'. ⁴

2. The Site

Birkhill Fireclay Mine had several components on the date of survey:

- The clay processing buildings connected to the railway/road network with a cable-operated incline

¹ Garnqueen and Garlieston Fireclay Works, Glenboig, Lanarkshire, established c.1887 (information from Ross Letham, Fireclay Mine site manager, Falkirk Council, 2012). The Hurlles were in competition with the Glenboig Union Fireclay Company Ltd, Glenboig, Lanarkshire (originally founded as the Glenboig Union Fire-clay Company in 1860 by James Dunnachie - Dunnachie was a partner in the 1860s with one John Hurl) and John G. Stein of Bonnybridge and Castlecary, Stirlingshire.

² Fireclay Mineral Planning Factsheet, British Geological Survey, 2006, 5 see <http://www.bgs.ac.uk/mineralsUK/planning/mineralPlanningFactsheets.html>, [retrieved: 30-09-15].

³ Fireclay Mineral Planning Factsheet, British Geological Survey, 2006, 2 see <http://www.bgs.ac.uk/mineralsUK/planning/mineralPlanningFactsheets.html>, [retrieved: 30-09-15].

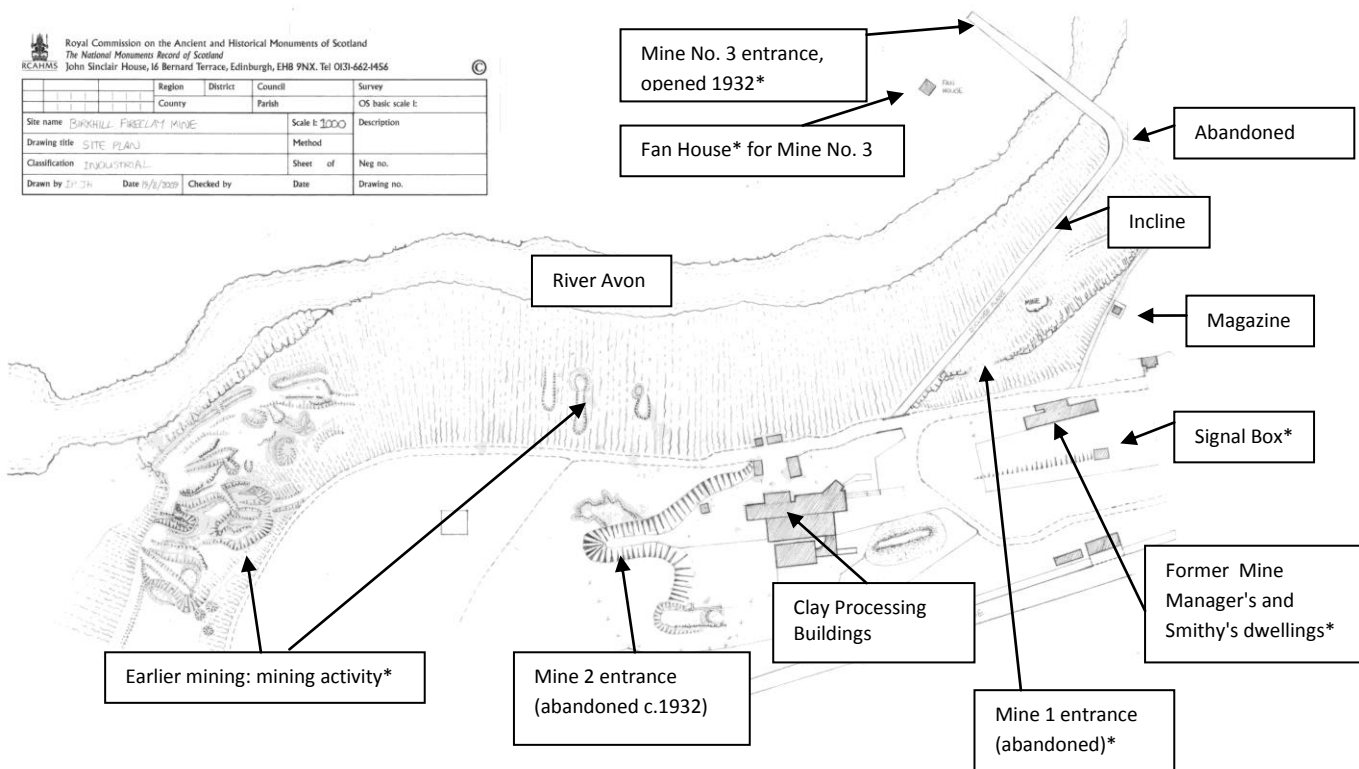
⁴ Fireclay Mineral Planning Factsheet, British Geological Survey, 2006,8, see <http://www.bgs.ac.uk/mineralsUK/planning/mineralPlanningFactsheets.html>, [retrieved: 30-09-15].

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- Underground workings (No.3 Mine)
- Earlier mine entrances Nos. 1 (1916) and 2 (1930-32)
- Earlier extraction areas area to the south east in Avon Banks Woods (NS967 787) near Todd's Mill (NS9649 7865, North bank of River Avon, flint mill and crusher and brickworks, now the site of a private residence).

This report will concentrate on the clay processing buildings. The clay processing buildings covered an area of some 0.5 acres (0.2 hectares) and consisted of two pan mills, clay storage hoppers, wagon handling facilities and ancillary buildings such as a smith, garage and bothy.

The unusual feature of the processing buildings from this period was the survival of one eight feet wide Bradley and Craven 'Incla' pan mill (for milling clay into clay dust) in the 'Old' Pan House. This would have been the last surviving example of such a pan mill *in situ* in Scotland and dated from c.1916 when it was acquired from the manufacturers, possibly second hand.⁵ It is unclear as to the fate of this artefact as the building in which it was located has been demolished.



General layout of the River Avon fireclay mining activity and associated structures, RCAHMS, 2009 [SC 1256004] (*not discussed in the report)

3. Process

The production of fireclay at Birkhill Fireclay processing plant had several production phases. These included mining the raw earth, kibbling/crushing, sieving, storage and transportation. The material produced Birkhill was sent on to brick making sites in Lanarkshire. No firebricks were made at Birkhill.

⁵ See manuscript MS/500/57/2 held in RCAHMS Collections, Edinburgh

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The production phases were as follows:

- *Mining the material* - The land on which Birkhill sits was leased by P and M Hurl in 1908 from the Hamilton Estate. The exact date of the opening of Birkhill Mine is unknown, although the first adit (No. 1, at NGR NS96363 79071) roadway was being worked by 1st April 1916⁶ by which time it would have needed a rail link in place and maybe its pithead buildings in place to process the clay from the workings. Mine No.1 was worked until 1928 when a geological fault put an end to extraction. By this time the mine was abandoned it was some 200.0m from the entrance at its furthest point and 36.0m below the surface at its deepest point. This mine is now dangerous and was not accessed during the survey. Mine No.2 was abandoned due to geological faults being encountered prior to 1932. Mine No.3 was begun in 1932 and closed in 1981.⁷ Its sandstone roof is some 6m in depth and there are about 10Km (6 miles) of tunnels which were worked using the *stoop and room* (also known as *pillar and stall*) technique.
- *Kibbling/Crushing* - Next the fireclay was sent for kibbling or breaking down large clumps of material in order to pass for finer milling or crushing. Material from the kibbling or pre-breaking pieces was then passed to the box feeder and then to the Pan Mill for fine crushing to smaller particle size product.
- *Sieving* - A screen then sieved the material removing large particles for re-milling in the Pan Mill to reduce the size of the particles further. The material was fed onto a conveyor.
- *Storage* - The material was then stored in a series of hoppers.
- *Transport* - The crushed, milled and sieved clay was originally transported by train. Latterly it was dispatched from the hoppers by road. Walking permits were issued to allow clay mine employees access to walk along the railway line.⁸



Above: View of reconstructed tramway as it enters Mine No 3, RCAHMS, 2007 [DP028338]



Above: Underground roadway or adit, RCAHMS, 2007 [DP028326]. Fireclay was mined using the 'stoop and room' or 'pillar and stall' method.

⁶ See 'Birch-Hill Mine workings in Glenboig Lower Fireclay Seam', original map at Falkirk Museums (A595.01): copy in RCAHMS MS/500/57/2.

⁷ Information from information boards at the mine site and from pers. comm. with Ross Letham, site manager, Falkirk Council on one of the survey visits (2011)

⁸ Callender House Archives: A475.47, 1964-1973, Walking permits issued by the British Railways Board to employees of P & M Hurl Ltd, giving access to railway property

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4. Buildings

The brick and steel- built Birkhill process buildings were originally connected to the main railway. At the time of closure in 1980 all clay processed onsite was removed by road. The lease for the land on which the process buildings were built was acquired by P & M Hurl Ltd in 1908. The process buildings were constructed c.1916, as mining appears to have been taking place by this time.⁹ The site underwent change in the 1930s with the opening of Mine No.3 and in the immediate post-war period (after 1946) where aerial photographic evidence shows that the New Pan Mill was built after this time.¹⁰

'Old' Pan Mill House, see SC1361815, A

The 'old' Pan Mill house (c.1916)¹¹ is a remodelled, brick-built structure which, along with the haulage house, appears to have formed the original core of the processing buildings (of c.1916). The Pan Mill House was originally two compartments, forming an L- shape. The Haulage Building (see SC1361815, B) was wrapped around its south and east sides. It would appear that the opening of Mine No.3 (see SC 1256004 above) accounts for modifications to the 'old' Pan Mill House. The double-pitch roof was removed from the 'old' Pan Mill House and a steel-framed structure was inserted (pre-1946 and probably around the time of the opening of Mine No. 3 in 1932) to allow the creation of what could be called a 'charging' and clay distribution level. From this floor, material from the mine wagons accessing it from the mine incline was tipped into a crusher below which in turn fed the Pan Mill on the ground floor. The north east corner of building A has been rebuilt with concrete lintels inserted above the doors (see distribution platform top of incline windows), contrasting with the wooden window frames and lintels in the northwest and west walls.

The building of the New Pan Mill House sometime in the late 1940s/1950s further modified the upper floor as an opening was created through which the wagons could continue through to the New Pan Mill House (see DP111676).

The east wall of the Old Pan Mill House has been rebuilt, presumably when the hopper area (C and D) with its undercroft was built (sometime between c.1916 and 1946) and later modified (between c.1932 and 1946). It may be that around this time, and more probably during the 1930s, the east wall has been roughly slapped through to insert the bucket elevators from the Old Pan Mill to the screen above Hoppers C and D along with the return chute from the screen for re-milling of fireclay which would not go through the sieve. The remodelling of the Old Pan House building probably around the time of the opening of Mine No.3 (1932) may have precipitated the removal of the internal wall to allow the gantry for the crusher to be inserted (see 'Ground Plan of Processing Plant' above).

Mine No. 2 (abandoned prior to 1932 for geological reasons) was at the south end of the site and a distance away from the processing buildings than Mine No.1 (worked 1916-1928). It is unclear how the clay from Mine No.2 was fed into the Old Pan House at the north end of the site. It is possible that the clay was hand barrowed north to the Old Pan House and hand fed into the pan mill at ground floor level.

⁹ 'Birch-Hill Mine workings in Glenboig Lower Fireclay Seam', original map at Falkirk Museums, A595.01: copy in RCAHMS MS/500/57/2

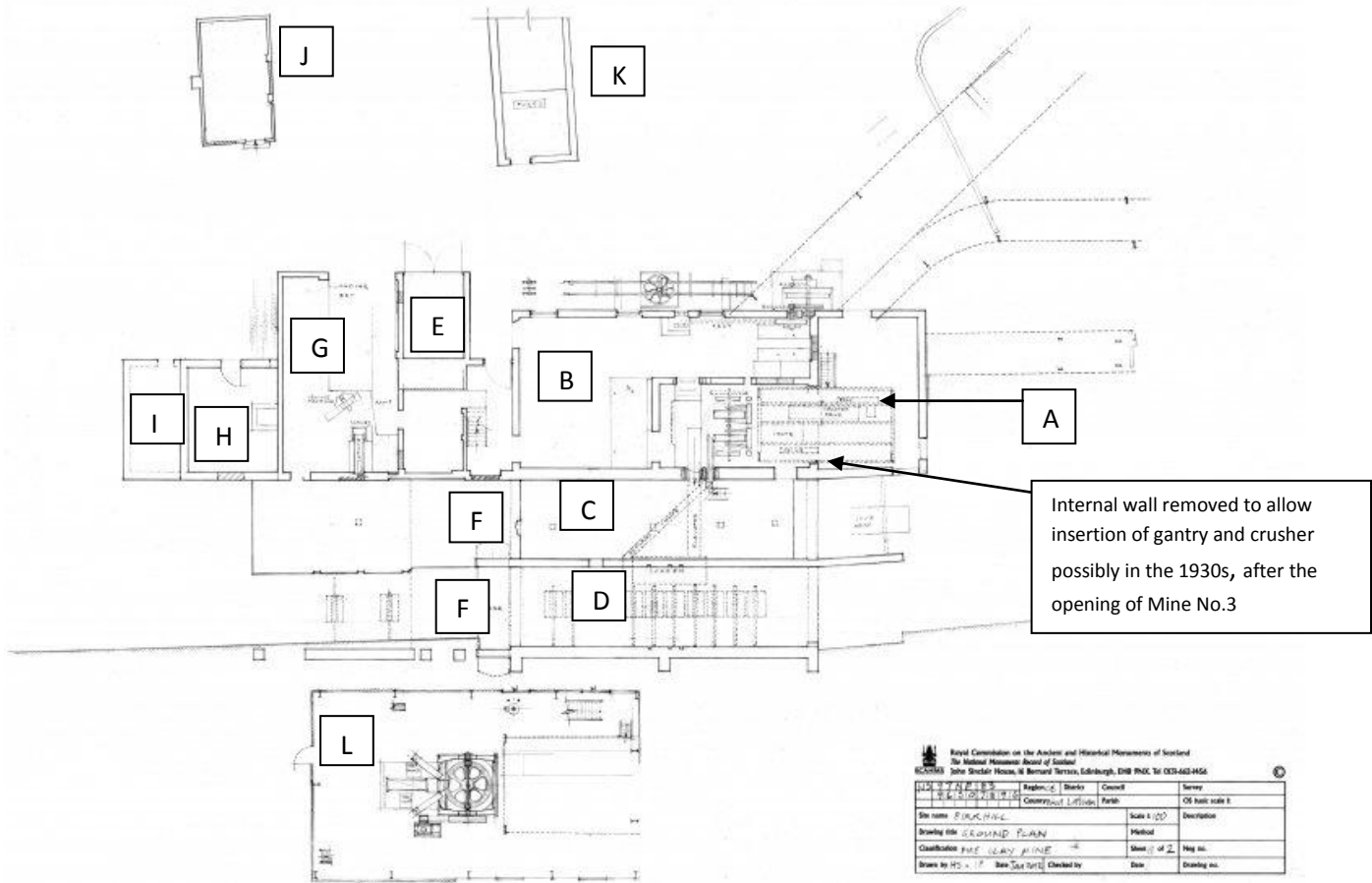
¹⁰ Sortie 106G/Scot/UK/0092, frames 4363-4364, 15 May 1946 (HES: NCAP): the New Pan House does not appear in these photographs

¹¹ Falkirk Archives: A475.56, undated, 'Diagram of Inda [Incla] Grinding Mill with Instructions'

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- Key**
- A. Old Pan Mill House (c.1916)
 - B. Haulage House and Workshop (c.1916)
 - C. Loading Area (1st floor) (1916 -1946)
 - D. Loading Area (1st floor) (1916 -1946)
 - E. Garage
 - F. Undercroft, south end (1916 -1946) accessed from Loading Bay/Bag Sewing Area (ground floor).
 - G. Loading Bay/Bag Sewing area with lorry access
 - H. Smith's Shop
 - I. Bothy/ Drying Room
 - J. Modern office - wages?
 - K. Electricity sub station
 - L. New Pan Mill House (post-1946/1950s): mill, feeder house, fireclay hopper, crusher and screen

→ N



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115 9 17 11 15	Region:	Shire:	County:	Survey
115 9 17 11 15	Country:	Latitude:	Parish:	OS Grid scale 1
Site name: BIRK HILL	Scale: 1:100		Description	
Drawing title: GROUND PLAN	Method			
Classification: FIRE CLAY MINE	Sheet: 1 of 2		Map no.	
Drawn by: HS + TP	Site: [X] [Y] [Z]	Checked by:	Date:	Standing no.

Birkhill, fire clay mine, ground plan of processing plant. RCAHMS, 2011/12 [SC1361815]

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Left: North end processing buildings, original c.1916 (and modified) Old Pan House, incline and 'run of mine' incline on right, with chute on left. Double arch area is the undercroft of the hopper area may also date from c.1916, although modified and extended at the south end post -1946. RCAHMS, 2011 [DP028266]. Right: East elevation of the Old Pan House (see SC SC1361815, A) remodelled to accommodate the later hopper area (just visible, left). The 'run of mine' rails on right are precariously balanced on a brick pier on the wallhead. This building was still roofed until at least the closure of the site in 1980 1946. Image: Miriam McDonald, 2011.

The 'run of mine' chute, through which clay not bound for processing was tipped, may again date from the 1930s. Such material would go straight to the brick-making factory without processing.

Haulage House and Workshop (SC1361815, B)

Looking at the plan of the ground floor, this appears to closely date with A, although it is clear that the south or rear wall has been rebuilt presumably as a result of modification to the hopper area (SC1361815 C and D). The haulage house contained concrete, plant-supporting plinths, the machinery for which was in pieces or missing on the date of survey. The haulage would also possibly have been inserted when Mine No. 3 was opened in c.1932 at which time Building A was remodelled.

Distribution area (Upper Floor, SC1361816)

The distribution area overlies Building A and the Hopper area above Loading areas (SC1361815, C and D). From this level the crusher for the Old Pan Mill in Building A can be accessed. There is a brick crusher (SC1361816, A) on this level whereby crushed brick can be added to the clay prior to crushing in Building A or sent to the New Pan Mill (SC1361816, F).¹²

¹² The addition of crushed brick or 'grog', as it is known, reduces shrinkage and aids even drying of the firebricks. It also opens up the clay and allows gasses to escape in the kiln.

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Left: View of incline, supported on a brick pier above the Haulage Building, RCAHMS, 2011 [DP028357] (left) and a view of the originally roofed distribution building at the top of the incline, Haulage Building below it, with the haulage



Above left: Old Pan House. The slapped through wall clearly is visible and the steel structure carrying the crusher which fed the Incla Mill. The gable above is clearly later (possibly the 1930s). Image: M McDonald, 2011

Above right: Old Pan House, Incla Mill. Note the bucket elevator behind with the return chute from the sieve to the left of it. The drive wheel is visible extreme right. The space was extremely cramped unlike the purpose built New Pan House (pre-1946), RCAHMS, 2011 [DP111699]



Above, left: Old Pan House with Incla Mill, from north. Chute on left from crusher on steel frame. The space was extremely cramped unlike the purpose-built New Pan House, RCAHMS, 2011 [DP11170]. Above centre: Old Pan House. The slapped through wall is clearly visible and the later steel structure carrying the crusher, which fed the Incla Mill, is to the left. Image: M McDonald, (2011).

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Above left: South wall of Old Pan House (Building showing blocked doorway to Haulage Building (Building B) and the insertion of the incline above. The slatted through wall of A2 (to insert crusher and motor gantry) visible on left. Image: M McDonald, 2011 Above right: Clay distribution Top of incline with turntable (gone) scales for weighing full tubs, tub backing up area and run of mine rails (extreme right). RCAHMS, 2011 [DP111683].



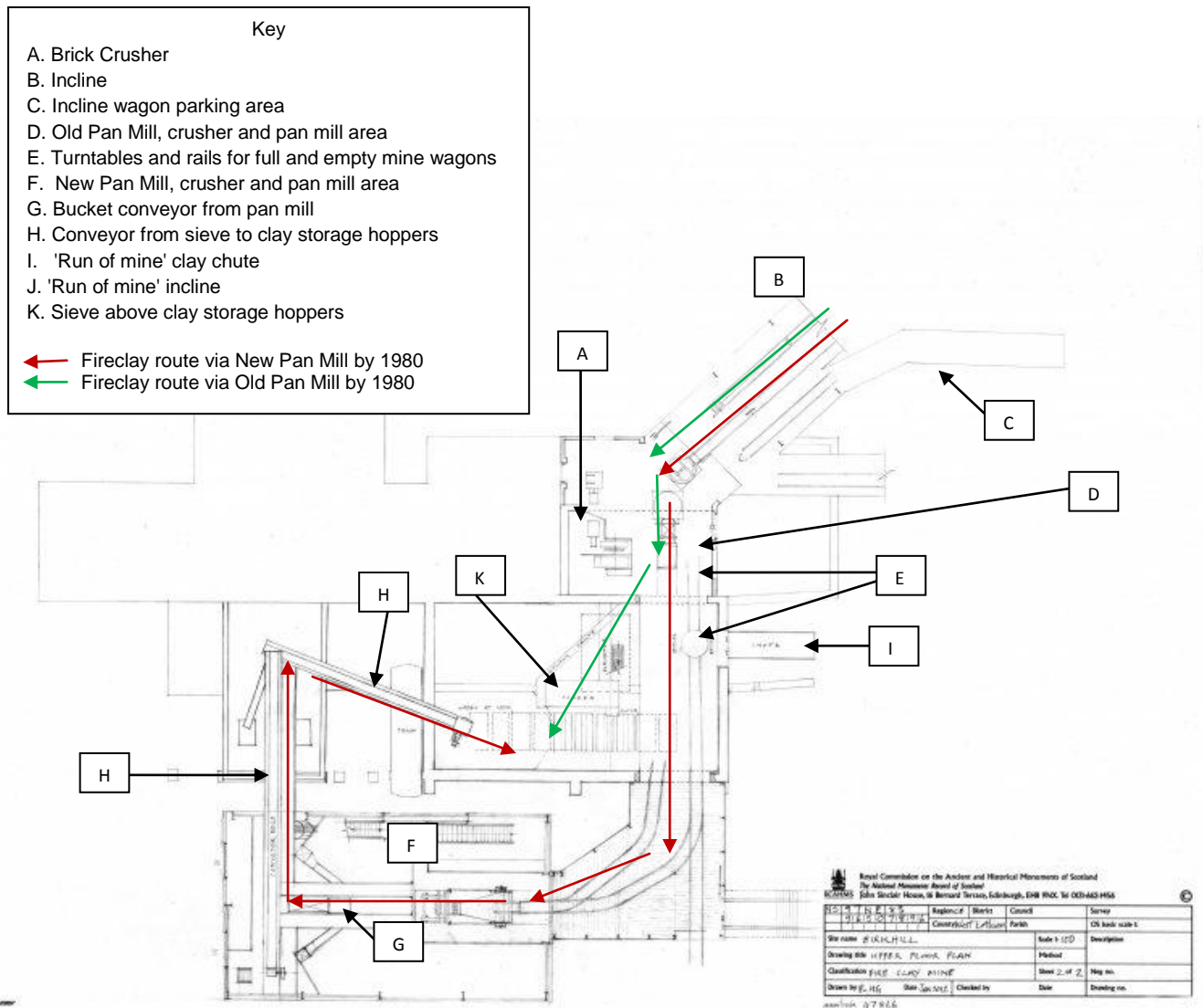
Above left: View from west of tipping area for tub into crusher for Pan Mill below [DP111682]. This has been inserted into an existing floor. Above right: Detail of tipping area with crusher jaws visible on frame below from south. The Pan Mill is directly beneath the camera [DP111681]

Incline

An almost intact, cable-hauled incline survived at Birkhill (in 2011). It is difficult to establish if, in its first phases (pre-1932), there was indeed the developed incline and haulage system. It may have been that material was hauled up from Mine 1 on an earlier incline and barrowed in at ground level to the 'old' Pan Mill. The structure for haulage and distribution surviving in 2011 probably dates from the opening of Mine No.3 as there is evidence of the haulage system being inserted and the top of the incline area sits as a separate platform with concrete window lintels, and so later than the 'old' Pan Mill House (SC1361815, A) and Haulage Building (SC1361815, B). It seems possible, therefore, that

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the incline plane was remodelled when Mine No 3 was opened, the New Pan Mill was added and the 'old' Pan Mill (SC1361815, A) remodelling took place.



Birkhill, fire clay mine: Plan of upper (1st) floor plan, processing plant. RCAHMS 2012 [SC 1361816]

Hoppers and Loading area

This area was where the crushed clay dust was stored prior to shipment. The crushed dust was taken by elevator bucket from the Old and New Pan Mill Houses (SC1361815, A and L) and conveyed by bucket elevator into screens or sieved. The New Pan Mill had its screen within the pan mill building and so dust was conveyed by conveyor belt into the south end of the Hopper (SC1361815, D).

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Above left: Clay Distribution Area View from north of gantry area accessing the screen for the 'Old Pan Mill'. The hoppers below contained the crushed and screen dust ready for loading into railway wagons or into bags for lorry distribution. RCAHMS 2011 [DP111677]

Above right: View from west looking towards the access to the New Pan House. This level has been remodelled, RCAHMS 2011 [DP111676]

This building containing the hoppers and loading areas C, D (1st floor) and E (ground floor) appear to be later than buildings A and B, but before the building of the New Pan House (post-1946). The hopper buildings are clearly visible on RAF aerial photographs¹³ and perhaps suggest a 1930s date for the introduction of the Old Pan Mill inserted crusher plant (see SC1361816, A and DP111681-2). The loading area (but not the Hoppers) was extended to the south after 1946, presumably as part of the New Pan Mill House construction and to accommodate the conveyor feeding from the screen in the New Pan Mill House to Hopper D.

- *Hopper C* (SC1361815, C): This may post-date the Old Pan Mill House of c.1916 (its east wall has been slapped through to allow the Old Pan Mill conveyor access to the sieve and hopper area, see SC1361815, A) and pre-date the New Pan Mill (post-1946). Hopper C has been remodelled: the chute areas have been closed off (date unknown) but presumably when rail access was no longer needed and the platform for lorry dispatch was built.
- *Hopper D* (SC1361815, D): This post dates the Old Pan Mill House (its east wall has been slapped through to allow the Old Pan Mill conveyor access to the sieve and hopper area, see SC1361815, A) and pre-dates the New Pan Mill. It may therefore date to the development of Mine No. 3 after 1932. The south wall of the hopper area has also been rebuilt indicating that it is maybe later than the Old Pan Mill House and Haulage buildings (SC1361815, A and B). This hopper contained clay dust and was fed from not only the screen above from the Old Pan Mill House (SC136815, A) but also from the conveyor belt from the screen in the New Pan Mill House (see SC136185, L and SC136186, G).

The *Smith's Shop* (SC1361815, H) was incorporated into the south end of the range containing the Old Pan Mill House (SC1361815, A), Haulage (SC1361815, B), Garage (SC1361815, E), bag sewing area (SC1361815, G) and Bothy (SC1361815, H).

¹³ RAF Sortie 106G/Scot/UK/0092, frames 4363-4364, 15 May 1946, RCAHMS: NCAP

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*Above left: View of Hopper (SC1361816, D) above loading area from north, RCAHMS, 2011 [DP111695].
Above right: Hopper (SC1361816, D) above loading area, south end. The conveyor from the New Pan Mill House (post -1946) screens has been slapped through the south wall. RCAHMS, 2011 [DP111693]*



Left: Screen or Sieve for the Old Pan Mill House which dropped clay dust into the Hoppers (SC1361816, C and D) below for dispatch. RCAHMS, 2011 [DP111691]

It is single storey, one bay, brick-built and contained an infrequently used, single, blacksmith's hearth.

Buildings J (Office) and K (Electricity sub-station) are all of an inter- or post-war brick-built design.

New Pan Mill House (see SC 1361816, F) was built after 1946. It was a steel-framed, corrugated iron and asbestos building with open steel mezzanine areas, incorporating (ground floor) pan mill and portable worm screw for feeding crushed clay into the pan mill (maker: Fawcett); first mezzanine, crusher; second mezzanine storey, access rails to distribution area on the top floor which allowed the one ton wagons to tip into the crusher hopper semi-automatically; third mezzanine level, south end of the building allowed access to the elevator buckets and the clay dust screen and conveyor. This conveyor then crossed into hopper area (SC1361816, H) storage area prior to dispatch by train and latterly by lorry.

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Left: View of Loading Bay below Hopper D. The handles visible allowed the opening of the hoppers above, emptying clay dust into railway wagons below. RCAHMS, 2011 [DP111702]



Above left: View of Loading Bay below Hopper C from south. This was originally served by railway wagons but was converted to allow bagging and loading into lorries. Image: M McDonald, 2012 Above centre: Funnel from modified hopper above to allow bag filling. The bags were then manhandled into the bag sewing area and loaded onto lorries. Above right: View from north of platform and funnel for filling bags with dry clay dust from modified hopper floor above. Image: M McDonald, 2011



Far left: New Pan Mill House (post-1946), Pan Mill with the access mezzanine to the clay crusher above. RCAHMS, 2011 [SC1082490]. Left: View from south of New Pan Mill House. Bucket elevator and clay pit (left) return chute from screen sieve (centre) and drive motor (right). RCAHMS, 2011 [SC1082488]

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Above left: The tippler which tipped the clay wagon contents into the crusher below. RCAHMS, 2011 [SC1082489] Above right: View of the housing for the motors which drove the crusher and pan mill. The portable worm screw which pushed the crushed material from the crusher into the pan mill can be seen to the left. RCAHMS, 2011 [DP111671]

Conclusion

Birkhill Clay Mine and processing buildings were a unique survival of the clay mining industry in Scotland. Relatively intact, it clearly showed the process from the mined clay brought to the processing buildings by incline, into the processing buildings for crushing, milling and dispatch.