A Building Stone Audit for Kilmarnock

Surveying, matching and sourcing stone for the built heritage

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OPEN REPORT OR/09/0002

A Building Stone Audit for Kilmarnock: Surveying, Matching and Sourcing Stone for the Built Heritage

Ewan K. Hyslop, Luis J. Albornoz-Parra & Emily A. Tracey

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Keywords

Kilmarnock, building stone, sandstone, repairs, stone decay, quarries, safeguarding, heritage, urban regeneration.

Front cover

Main Image: East Ayrshire Council Office Building, John Dickie Street. *Smaller Images from Left to Right:* Dean Quarry c.1860 map with overlain geology; Mason Murphy Building, Portland Street; microscopic image of sandstone; digital façade survey sheet; and Kilmarnock c.1860 map.

Bibliographical reference

EWAN K. HYSLOP, LUIS J. ALBORNOZ-PARRA & EMILY A. TRACEY. 2009. A Building Stone Audit for Kilmarnock: Surveying, Matching and Sourcing Stone for the Built Heritage. *British Geological Survey Open Report*, OR/09/0002.

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ACKNOWLEDGEMENTS

Staff of East Ayrshire Council are thanked for their support and assistance, in particular John O'Neil and Colin McKee. Colin Tennant of the Scottish Stone Liaison Group is thanked for project coordination and advice at all stages of the project. The authors wish to acknowledge the assistance of Frank Beattie, staff at the Dick Institute (Kilmarnock) and Deborah Mays of Historic Scotland. This report was reviewed by Andrew McMillan (BGS) and is published with permission of the Executive Director, BGS (NERC). This work would not have been possible without the cooperation and enthusiasm of the building owners and occupiers.

EXECUTIVE SUMMARY

Surveys of the condition of the stone masonry in twenty-five buildings and structures in the John Finnie and Bank Street Conservation Area in Kilmarnock have provided information to guide forthcoming grant-aided repairs and inform future maintenance strategies. Stone samples from each surveyed structure have been characterised in order to identify the original stone types, and are matched to stone from currently active quarries to ensure that appropriate stone is used for the repairs.

Kilmarnock's historic stone buildings directly reflect the local geology, providing a strong 'sense of place'. The changing use of stone through time has contributed to the evolution of architectural styles that document different stages in the town's history. The earliest buildings and structures used locally-sourced blonde sandstone with whinstone, probably obtained from nearby surface outcrops and boulders. Subsequently, better quality blonde sandstone was obtained from several town quarries, notably Dean Quarry which provided large quantities of stone in the first half of the 19th century. Once connected to the wider railway network, red sandstone was imported from the Mauchline area, providing higher quality stone that enabled a more ambitious architecture in the second half of the 19th century, reflecting the increasing prosperity of the town. Although red sandstone dominated from this time, a few notable buildings used imported blonde freestone for high quality ashlar and decorative work.

The condition surveys show that the principal reason for damage to stone is water penetration, leading to surface soiling (biogenic growth) and scaling of the masonry surface. A major cause of water penetration is lack of maintenance, in particular failing rainwater goods. Much of the damage is associated with exposed and projecting masonry elements such as cornices, string courses and sills, which require repair or replacement in order to protect the adjacent masonry and ensure long-term survival of the stonework. The use of de-icing salts on roads and pavements has caused considerable salt contamination to masonry at ground level resulting in disaggregation of stone. Damage due to previous stonecleaning has caused loss of masonry details, significantly degrading the appearance of several buildings.

Today all of the original stone quarries that supplied Kilmarnock are closed. Petrographic analysis of the masonry samples has identified the closest matching stone types from currently available quarries throughout the UK. The best way of ensuring compatible stone is to reopen the original quarries. Most of the original quarry sites cannot be reopened, so areas of adjacent geology have been identified which could provide sites for the renewed production of stone.

The results from this study are intended to guide the repair of masonry and ensure that appropriate replacement stone is selected for repairs, as well as highlighting the importance of maintenance. This information is relevant to other buildings in Kilmarnock and the surrounding district, as well as the wider Central Scotland area. The reopening of stone quarries would provide a sustainable source of appropriate stone to ensure the conservation of the built heritage in Kilmarnock and East Ayrshire.

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1. INTRODUCTION TO THE PROJECT

1.1 Background and aims

This project is the result of a commission from East Ayrshire Council to the Scottish Stone Liaison Group to undertake a stone audit of selected buildings and structures within the John Finnie Street and Bank Street Outstanding Conservation Area, Kilmarnock. The work was contracted to the British Geological Survey, and carried out between March and October 2008. The aim is to provide information to assist the local authority, building owners and building professionals (e.g. architects, surveyors and masonry contractors) in making decisions on repairs to stone masonry as part of forthcoming grant-aided heritage conservation and regeneration schemes.

The town of Kilmarnock has been an important regional centre for commercial, political and cultural activities in southwest Scotland for many centuries. It contains a wide range of historic stone buildings, most dating from the 19th century, which reflect the growth of the town and its developing prosperity over time. These remaining parts of the historic town centre provide a strong sense of place, partly through the use of traditional stone masonry. The earliest buildings are constructed using local Carboniferous blonde-coloured sandstone whilst the more ornate later buildings are built of Permian red sandstone imported by railway mainly from the Mauchline area from the 1850s onwards. Today, much of the historic built fabric in Kilmarnock is in need of repair, restoration and investment. The Conservation Area Regeneration Scheme and Townscape Heritage Initiative projects currently being promoted by East Ayrshire Council are intended to exploit the potential of the existing built heritage and produce sustainable buildings of local character for the future.

The aim of this study is to undertake stone condition assessments of selected facades to identify masonry which shows damage or decay, and highlight where stone replacement, repair and maintenance is required. For each surveyed building or structure the stone has been sampled in order to identify the stone type used, and identify matching stone from currently active quarries suitable for the repairs.

In a wider context the results from this study are intended to highlight some of the main issues concerning decay and repair of stone buildings in Kilmarnock, providing information which can be used throughout the town and beyond. The promotion of best practice in aspects such as building maintenance and the selection of matching stone types for repairs will ensure best value and the long-term success of this and other repair and regeneration projects. Additionally, the wider issues of the importance of stone selection and the need to source local stone are of significance throughout Scotland and the United Kingdom.

1.2 Layout of the report

This report presents the results of the façade surveys and stone matching for twenty-five buildings and structures chosen by the East Ayrshire Council for forthcoming repair projects. These are presented in Chapters 3 (façade surveys) and 4 (stone sampling and analysis). Chapter 2 gives an outline of the historical development of Kilmarnock and its buildings. The main findings of the stone condition surveys are discussed and illustrated in Chapter 5 and summarised in Table 3. Chapter 6 describes the main sources of stone used historically in Kilmarnock, the identification

of closest matching stone for repairs, and discusses the future supply of stone including the potential for reopening of quarries.

A short glossary of terms used is given at the back of the report.

1.3 Façade surveys and stone condition reports

The surveyed buildings and structures are listed in Table 1 and their locations shown in Figure 1. Each has been allocated a number (K1 to K25) which is used as a unique building identifier throughout this report. The survey results for each building or structure are presented sequentially in order in Appendix 1 and 2. The surveyed facades are presented as one or more rectified photographic images with digital overlays to show areas of stone masonry requiring repair or maintenance (Appendix 2). The urgency of repair and the type of maintenance required or source of decay is indicated by colour symbols used on the digital façade images. Façade Survey Sheets (Appendix 1) give information regarding the masonry style and stone type for each building, and provides a summary of the main issues regarding stone decay, including causes of the decay and recommendations for future actions to prevent further deterioration of the masonry.

The stone condition surveys in this report are based on visual observations of the surface condition of the stone masonry and are intended to guide further detailed investigation prior to specification of repairs. The surveys were carried out by stone specialists and do not constitute a structural survey as undertaken by a building surveyor. The objectives and constraints of the surveys are described in detail in Chapter 3.

1.4 Sample analysis and stone matching

Stone samples taken from buildings are described in detail in order to characterise the original stone type present in each building; to identify the original source of the stone where possible, and the most appropriate currently available stone from active quarries suitable for repairs. For each sampled building this information is given in a Sample Description Sheet (Appendix 3), which illustrates the microscopic characteristics of the sample in thin section. The description and sample analysis follows the procedure outlined by BS EN 12407:2000 'Natural Stone Test Methods – Petrographic Examination'. The identification of matching stone for future repairs is summarised in Table 2 which lists the stone types and original source for each sampled building.

In this report 'Mauchline sandstone' (or 'Mauchline sandstone type') is used as a generic term to refer to red sandstone that has been obtained from quarries in the (geological) Mauchline Basin. Where stone is known to have come from a specific quarry or group of quarries, then the particular quarry name is used (e.g. 'Ballochmyle sandstone' is used when the stone is known to have been obtained from one of the quarries operating at Ballochmyle). In general, the uniformity of the Mauchline sandstone makes it impossible to distinguish between sandstone from different quarries in the Mauchline Basin.

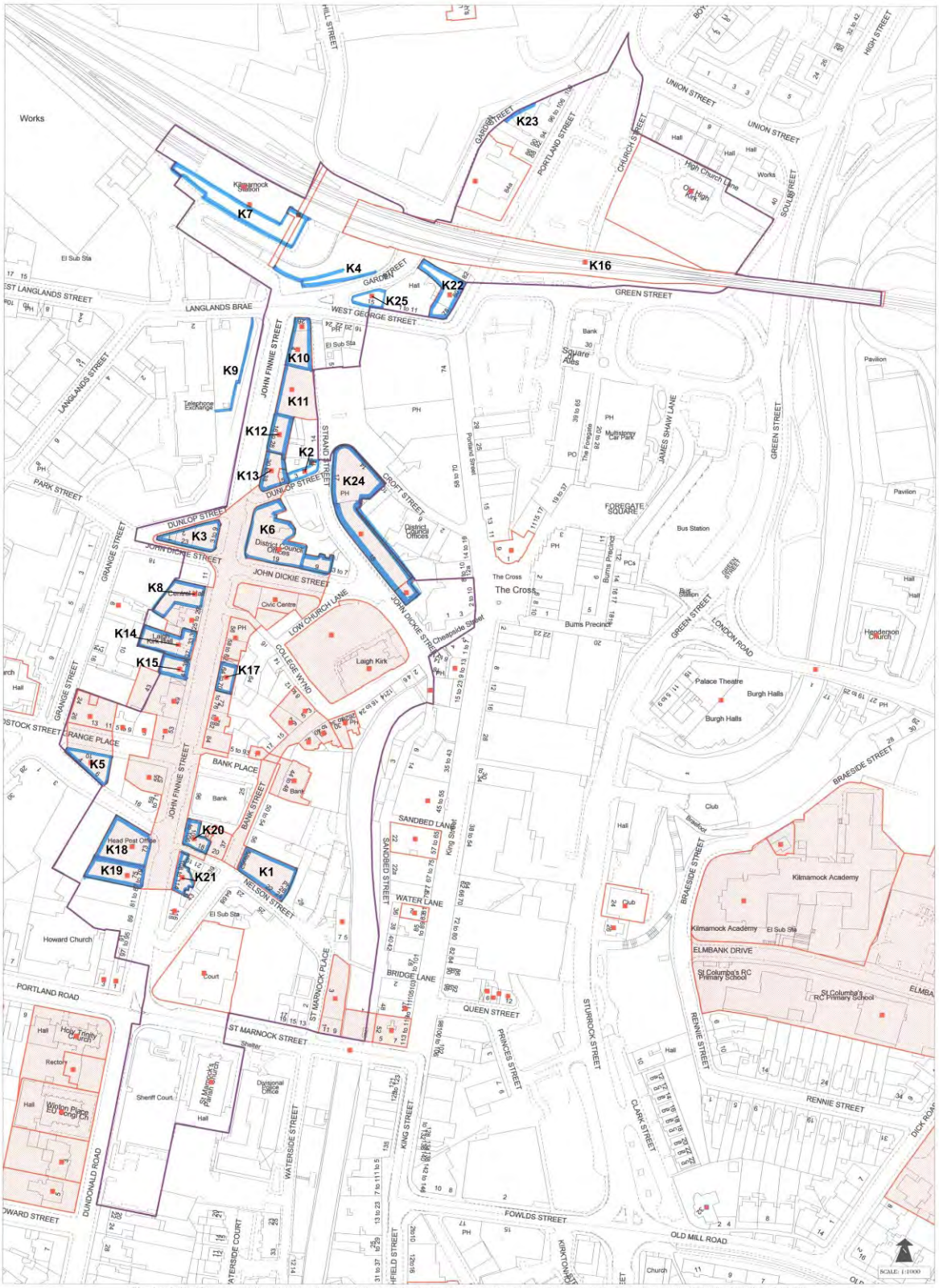

Fig. 1. Map of Kilmarnock town centre showing the John Finnie and Bank Street Conservation Area (within purple boundary line) with each of the 25 buildings and structures surveyed in this project outlined in blue. The "K" numbers are used throughout this study as a unique identifier for each surveyed building and structure.

Table 1. List of surveyed buildings and structures

NAME	Building Number		Primary Address		Usage	Listed Building Grade	Group Listing Building Grade	Sample Number	Date of Construction
	Prefix	No.	No.	Street					
Whites	K	1	58-62	Bank Street	Office	B	B	ED10357	1903
Harled cottage	K	2	1-3	Dunlop Street	Shop	C(S)		ED10359	Early 19th C
Kilmarnock Club	K	3	3-9	John Finnie Street	Club	B	A	ED10358	1899
Station wall	K	4		Garden Street	Wall			ED10360	Unknown
Kilmarnock Standard	K	5	10	Grange Place	Office	B	B	ED10361	Late 19th C
EAC corner+CAB	K	6	19	John Dickie Street	Office	B	A	ED10362	1879-1880
Kilmarnock Railway Station	K	7		John Finnie Street	Station	C(S)		ED10363	1878
Central Evang. Church	K	8		John Finnie Street	Church	C(S)	A	ED10364	1900
Finnie NW wall	K	9		John Finnie Street	Wall			ED10365	Unknown
Allen & Harris	K	10	2-4	John Finnie Street	Public House	C(S)	A	ED10366	1883
Opera House	K	11	6-14	John Finnie Street	Gap Site	B	A	ED10367	1874
Handling Hair	K	12	16-28	John Finnie Street	Shop	B	A	ED10368	1880
Old Homeless House	K	13	30-38	John Finnie Street	Shop	B	A	ED10369	1895
Laigh Kirk	K	14	31-37	John Finnie Street	Office	B	A	ED10494	1896
Atrium Homes	K	15	39-41	John Finnie Street	Office	B	A	ED10495	1870
Railway arches	K	16		Railway Arches (Green Street)	Bridge	B		ED10372	1848
Victoria Wine	K	17	64-70	John Finnie Street	Shop	B	A	ED10373	1880
Post Office	K	18	73	John Finnie Street	Post Office	B	A	ED10374	1907
Tannahills	K	19	75-79	John Finnie Street	Shop	B	A	ED10375	1894-1895
Paper Roses	K	20	100-106	John Finnie Street	Shop	C(S)	A	ED10376	1876
Balti	K	21	108-114	John Finnie Street	Shop	C(S)	A	ED10377	1890
Mason Murphy	K	22	78-80	Portland Street	Shop	B		ED10496	Mid 19th C
Garden St Back Wall	K	23	98	Portland Street	Premises			ED10379	Unknown
Johnnie Walkers	K	24	15-17	Strand Street	Shop	B	B	ED10380/497	1895-1897
Goodfellows	K	25	13-15	West George Street	Office	B		ED10316	1875

2. HISTORY AND DEVELOPMENT OF KILMARNOCK

2.1 Origin and early development of the town

The town of Kilmarnock is situated c.31 km southwest of Glasgow in a valley underlain by Coal Measures Group rocks of Carboniferous age. The town is located along the Kilmarnock Water, bordered to the north by the higher lands north of the River Irvine, and to the south by Craigie Ridge. From an early time the town was the centre of a farming community within three parishes: Kilmarnock, Kilmaurs, and Riccarton. From the 16th century Kilmarnock became a significant place for trade and commerce; its position was along the main road that carried people and goods between Ayr and Glasgow (Strawhorn, 1951). The town's main disadvantage was its inland location which hampered trade, and over time a number of significant measures were taken to improve transport links.

Much evidence states that Kilmarnock's earliest days began as a kirktoun—a small settlement centred around a church. It is thought that the original village kirk had its foundations on the site where the present-day Laigh Kirk stands. The original kirk was dedicated to St. Marnock and may date from as early as the 12th century. The name of the town is derived from Kil Marnoch, meaning the Church of Saint Marnoch or Mernoc (originally the town was known as *Cellmarnock*, or the cell of Saint Marnock. Saint Marnock was a bishop interred in the town on the year of his death, which is thought to be c.322 AD (Mackinlay, 1799).

Although the settlement was first mentioned in a charter dating back to 1316, it was not promoted into a burgh of barony until 1592 by James VI (Strawhorn, 1999). Kilmarnock's town centre, known as the Cross, was located beside the Kilmarnock Water, and the town expanded northwards. The town's central location within the parish attracted farmers to trade goods and buy supplies. By the 16th century Kilmarnock was already identified as a busy place for commerce, notably grains, meal, meat, butter, eggs and poultry; and the manufacturing of hose and bonnet-making is referred to as early as 1603 (Groome, 1883).

A fire in 1668 destroyed parts the town, but the survival of the Cross and two significant buildings (the tollbooth and 15th century church) ensured the continuation of the town centre, and the streets intersecting the Cross today represent the remaining fragments of the historical footprint. The riverfront has been much altered during subsequent development; it witnessed the first buildings of the town's early expansion and in later years has been built over with modern streets and commercial buildings.

The historic thoroughfares that survived Kilmarnock's periods of development are: High Street, Fore Street, Soulis Street, Strand Street, Croft Street, Cheapside, and Sandgate, all of which date from the town's early history. College Wynd and Bank Street pre-date the 18th century. As the town expanded, bridges were constructed to improve communication over the Kilmarnock Water. The Green Bridge was erected in 1759, followed shortly after by the Timmer Brig (1762) and the Flesh Market Bridge (1770).

The 1783 town plan of Kilmarnock (Fig. 2) shows Bank Street running south from the Cross into Nelson Street, which then led to Irvine Street; Croft Street veered easterly towards Stewarton and Paisley. High Street drove north eventually crossing the Kilmarnock Water (Mackay, 1992). A town quarry is also visible on this map, north from the present day Portland Street located just south of Gillhall, in a small forested area near Kilmarnock Water. This may have been the site of the first quarried building stone in Kilmarnock prior to the development of the Dean quarry a short distance to the north of the town.

Throughout the 17th century and the industrial revolution much of the community continued in farming, resulting in little expansion within Kilmarnock. Documents from this period describe the historical town as "a large village of great repair" with "a mean and inelegant appearance" (Strawhorn, 1951). However, with the establishment of the 1802 Improvement Act, the town constructed newer, cleaner and wider thoroughfares (Groome, 1883). King, Wellington, and Portland Streets were completed prior to 1810 as a direct result of the Improvement Act (Fig. 3), and by 1811 the population of Kilmarnock had surpassed 10,000. The construction of Portland Street, which runs into Wellington Street and further into Dean Street, now permitted a direct route from Glasgow into Ayr via the town centre. Development expanded northwards along Soulis and High Streets.

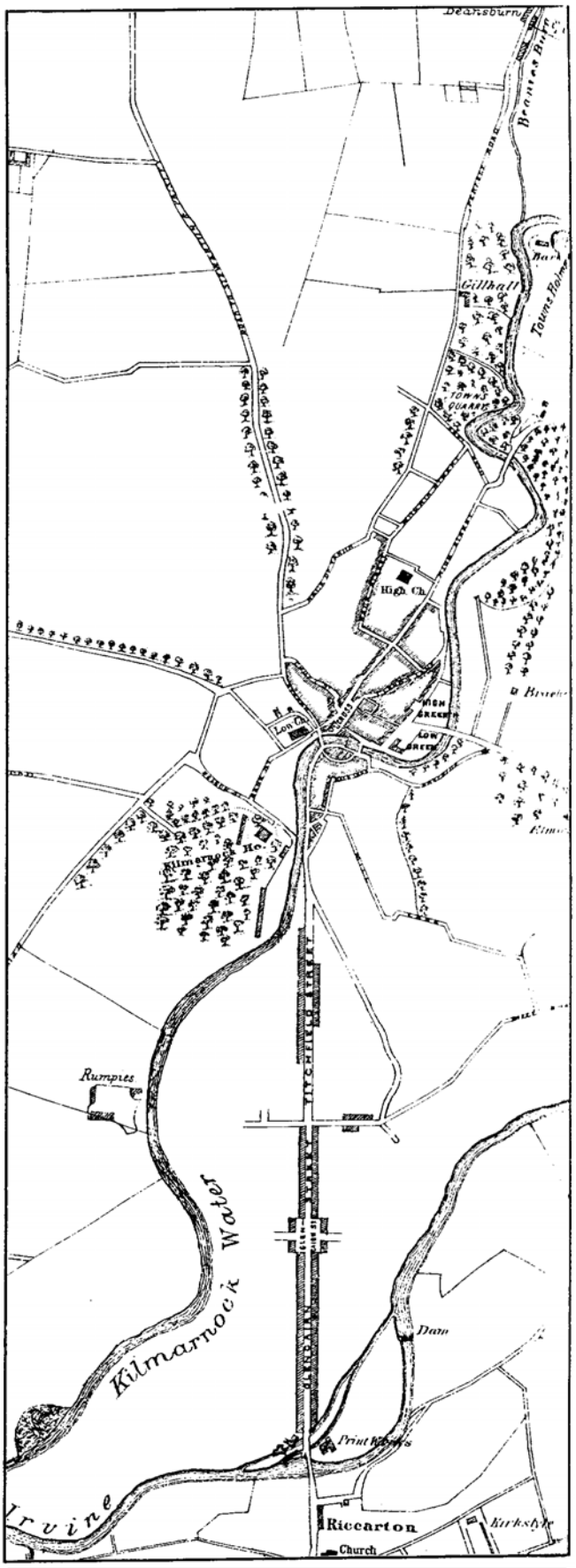

Fig. 2. 1783 Kilmarnock Town Plan (Mackay, 1992).

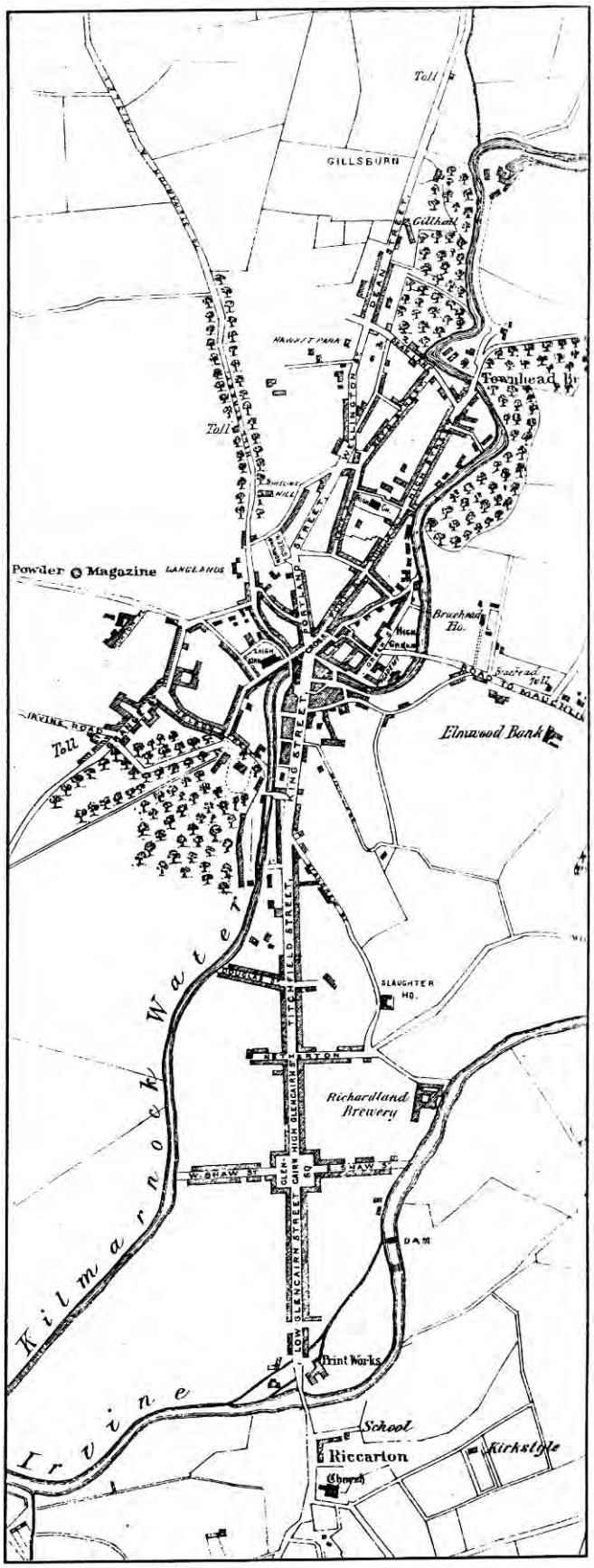

Fig. 3. 1819 Kilmarnock Town Plan (Mackay, 1992).

To the south, a brewery and print works were constructed; and along the river, Bank Street developed as the commercial district of the town. Despite this period of growth, the town's industries still required better transport links in order to improve trade.

2.2 Industry and trade

Kilmarnock's early success depended to a large extent on the shoe and woollen trades, and ultimately the presence of coal. The town is underlain by Coal Measures rocks, with some areas containing coal seams typically up to 10 metres thick (Anderson, 1925). The earliest parish record of coal mining dates to 1665 in the barony of Caprington. Coal pits, such as the Kirkstyle pits in Riccarton, the Nursery pit and the Wellington Pit in Crookedholm, all contributed to the industrial development of the town (Strawhorn, 1951). The first mention of coal in the Statistical Account states that it "is found close to [the town] in vast abundance, and may be had easier and cheaper than in any other town in the neighbourhood" (Mackinlay 1791). The abundance of coal led to the development of the iron smelting industry. Together with coal and iron, expansion of the textile industry (bonnets, stockings, woollens, carpet weaving) and leather goods (boots, gloves, saddlery), turned Kilmarnock into one of the largest manufacturing centres in the west of Scotland outside Paisley and Glasgow. Further expansion of the engineering industry came from production of agricultural machinery and the largest firm of

hydraulic engineers in the British Isles. Other industries such as distilling (i.e. the establishment of Johnnie Walker in 1821), manufacturing of aerated water, clay bricks, tiles and printing also flourished.

Continuation of the town's prosperity became increasingly dependent on the development of improved transport links to expand trade. The existing road links had become insufficient to maintain the town's competitiveness and, despite the rich agricultural surroundings which continued to benefit the town, the inland location became Kilmarnock's main disadvantage. The nearest coastal port was located at Troon, c.13 km away. The first solution was devised during the late 18th century when a canal from Kilmarnock to Troon was proposed, but construction was postponed due to the expense (Mackinlay, 1791). The problem was resolved with the construction of a railway line in 1808.

2.3 Railway construction and subsequent development

The 4th Duke of Portland owned much land in Ayrshire, including the Kilmarnock Estate, and the Duke's personal pursuit in the wellbeing of his land led to the development of Scotland's first railway. With the abundance of coal being produced in the Kilmarnock pits, a method was needed to transport these resources to Troon Harbour. In 1808 the Duke obtained the right from Parliament to begin building the first railway in Scotland, and construction began immediately on the 15km line, with a final cost of £50,000 (Mackay, 1992). Over the River Irvine, the 4-arch stone Laigh Milton Viaduct was erected—the first railway viaduct in Scotland and today the oldest standing in the world.

Wagons pulled by relays of horses were the initial means of transporting the coal, and by 1812 other goods and passengers were being transported along the rail line, marking the first regular railway passenger service in Scotland (Beattie, 1999). The horse railroad continued successfully until 1837 when an Act of Parliament enabled Kilmarnock to convert the track for steam locomotion, although this did not occur until the railway from Glasgow was connected to Kilmarnock in 1843. In 1847 the Kilmarnock-Troon railway line became part of the Glasgow, Paisley, Kilmarnock and Ayr Railway, and was fully converted into a 'conventional' line (RCAHMS, 1999).

The effect of the railway on Kilmarnock was massive. The population more than doubled by 1851; peaking at over 21,000 (Strawhorn, 1951), and the town soon outgrew its early boundaries. With improving wealth and status the town's architecture became increasingly ambitious, and newly designed streetscapes were created to improve the infrastructural system. 1859 marked the construction of Duke Street, linking The Cross to Green Street. In 1863 the red sandstone Corn Exchange (present day Palace Theatre) was completed on the corner of Green Street and London Road. The Italianate designed Corn Exchange strongly influenced one of Kilmarnock's largest architectural developments—John Finnie Street—and thus marked the start of a significant period of architectural development that was to record the wealth of Kilmarnock at the height of its prosperity.

2.4 John Finnie Street development

During the second half of the 19th century Kilmarnock was witness to a peak of industrial and commercial based wealth and prosperity at the height of the Victorian era. Between 1855 and 1870, a major second wave of construction occurred, with the

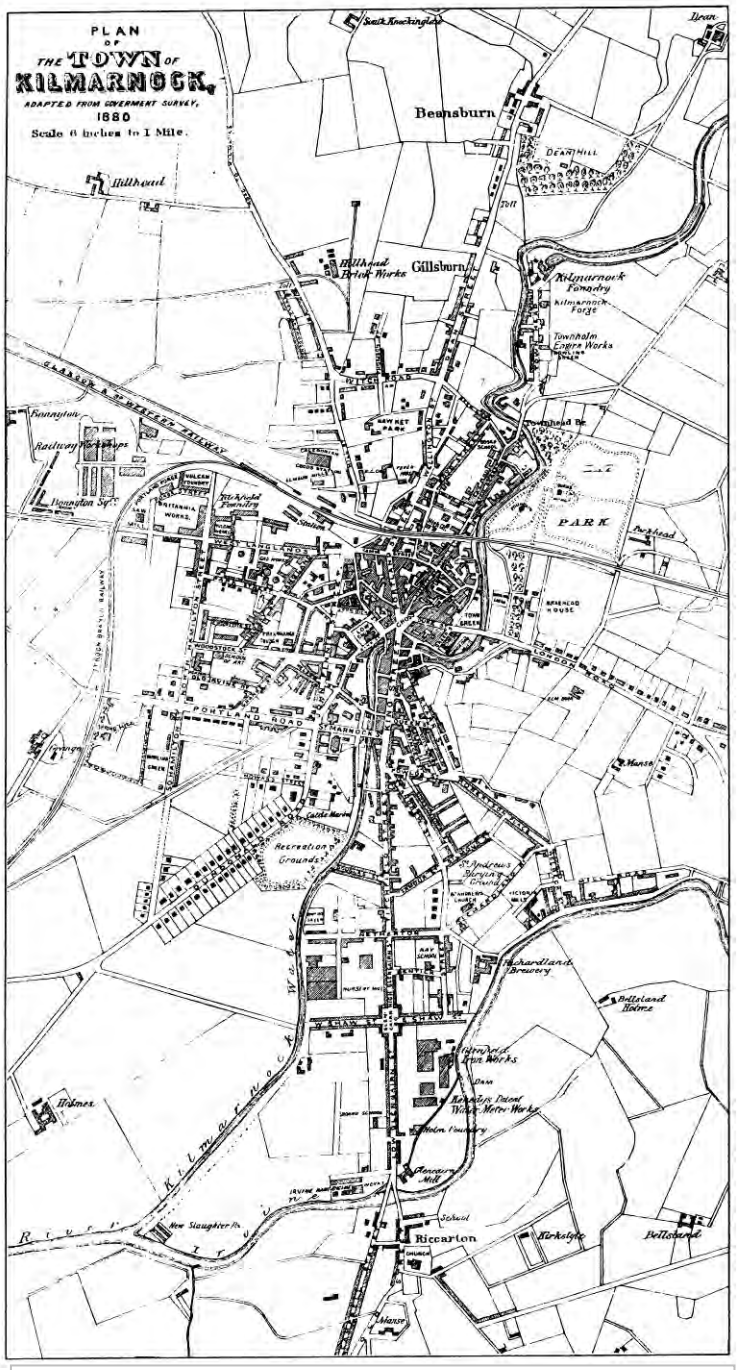

Fig. 4. 1880 Kilmarnock Town Plan (Mackay, 1992).

creation of Portland Road, Duke Street, Dundonald Road, Hamilton Street, and most notably John Finnie Street (Figs. 4 and 5). John Finnie Street is first recorded in the *Minute Book of Trustees for Improvements* in January 1861, and by the beginning of March that year the architect William Railton presented a 'Plan of Proposed Street' before the Trustees.

The scale of the new street required existing properties to be purchased and razed by the Town of Kilmarnock. This proved to be a timely affair, and it was on the 26th October 1864 that the thoroughfare was officially opened and named 'John Finnie Street', after a Kilmarnock-born developer who was the financial supporter of the new commercial district.

John Finnie Street runs in a direct line connecting Kilmarnock Station to the Court House on St. Marnock Street, providing a direct line of sight towards the station at the top of the hill. It intersected with numerous pre-existing streets and, in contrast to the earlier commercial area in Bank Street, is longer, wider and much more imposing in both design and location. Contemporary architects praised the development as being one of the finest examples of planned Victorian architecture in Scotland (Gracie, 1992). By the 1900s John Finnie Street had developed into the most important street in the town, along the periphery of Kilmarnock's commercial core.[1]

1 14 of the 25 structures and buildings surveyed in this report are on John Finnie Street, and of these the earliest is dated 1870 (39-41 John Finnie Street K15) and the latest is 1907 (Post Office K18), with the majority built in the 1890s. This implies that the construction along the new street continued for

John Finnie Street has many grandiose buildings constructed in the late 19th century at the height of the Victorian era. However, instead of an architectural cohesion, the unity of the street is largely reflected in the use of materials, notably red sandstone from which most of the buildings are built. Although it is possible that this stone type was obligatory for the John Finnie Street development (Gracie, 1992), it is highly likely that at this time red sandstone from the Mauchline area was relatively easily available (by rail); it was also probably the closest source of abundant high quality freestone, which was capable of providing the ornate Victorian architectural styles required of the time. It is no coincidence that the local blonde sandstone quarries (in particular Dean Quarry) declined at this time (see Chapter 6 for further discussion).

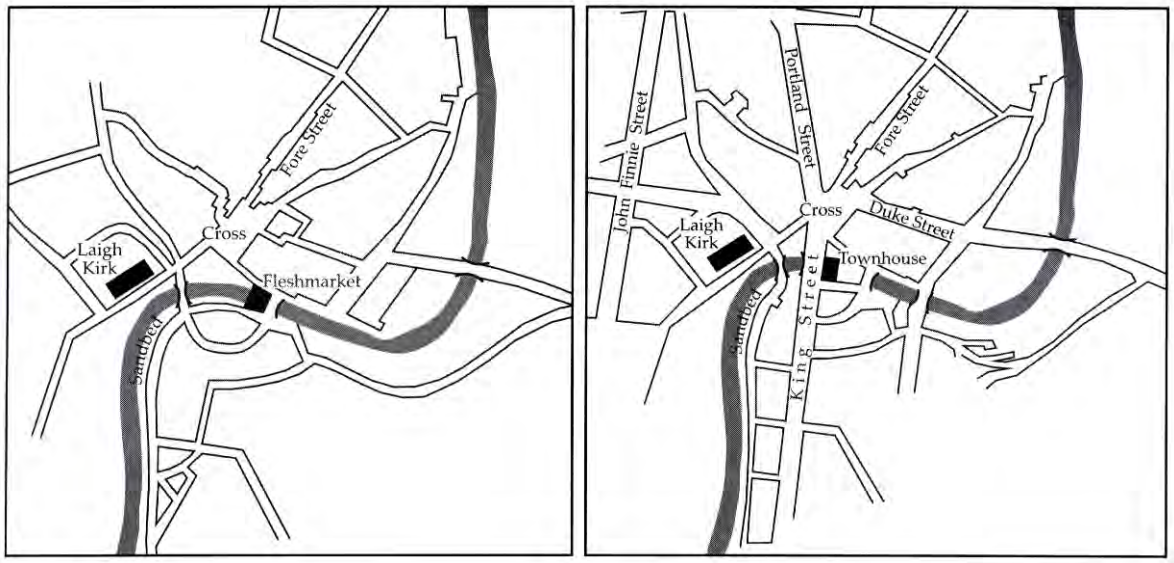

Fig. 5. Close up of Kilmarnock's town development around the Cross. Map on left represents Kilmarnock c. mid 18th century, and map on right is c. late 19th century. Note the increased development over the Kilmarnock Water and the improvement of routes intersecting the Cross. John Finnie Street also appears on the later map in the upper left hand corner. (Mackay, 1992).

2.5 Decline and regeneration

In the second half of the 20th century the textile and manufacturing industries underwent a major decline in the face of foreign competition, and the closure of many of the larger employers in Kilmarnock led to a deterioration of the town's built fabric. Major redevelopment in the eastern part of the town centre took place in the late 20th century involving much demolition of buildings in the King Street and Portland Street areas. The erection of large new retail areas and the creation of a one-way road system dramatically changed the historic pattern of the town, cutting off several pre-existing routes. A number of prominent historic buildings were demolished (e.g. King Street Church and the Town Hall), leaving others cut-off from the town centre (e.g. Palace Theatre). A large part of the Kilmarnock Water, for so long a fundamental part of the town's history, was built over and made into a culvert.

As a result of redevelopment, Kilmarnock's town centre was essentially cut in half. The eastern side is dominated by large retail outlets and chain stores, and whilst the western side retains much of its historic fabric, it has deteriorated and today is in very

some 40 years after it was opened. John Finnie Street never quite became the mercantile street that it was intended to be, but is a fine example of Victorian architecture none the less.

poor condition. Despite this, Kilmarnock remains the administrative, commercial and social centre for the district, and the town is home to a busy shopping centre and the offices of East Ayrshire Council.

Recent recognition of the potential value of the remaining historic parts of the town centre have led to the creation of the John Finnie Street and Bank Street Outstanding Conservation Area, and the establishment of a Conservation Area Regeneration Scheme in 2006. Much of Kilmarnock's once magnificent architecture is now in very poor condition and these schemes, including a Townscape Heritage Initiative, are now being initiated to repair and revitalise what remains and conserve and improve the unique historic setting for the future.

3. FAÇADE SURVEYS AND ASSESSMENT OF THE CONDITION OF THE STONE MASONRY

3.1 Selection of buildings and purpose of the surveys

A number of buildings and structures were identified for stone condition surveys, selected by East Ayrshire Council as those most likely to undergo grant-aided repairs in the short to medium term. These structures represent a range of buildings typical of Kilmarnock centre. Also included are a number of important stone walls and structures, considered to be of value to the area.

The purpose of the surveys is to provide information to inform and guide stone masonry repairs for each building and structure, presented in an easily understandable format. The surveys are intended to highlight areas of stone decay and specific issues concerning causes of stone decay and maintenance needs in order to bring these to attention at an early stage in the assessment and planning of repairs. The surveys constitute a visual assessment of the stone condition based on surface appearance. The surveys are not intended to be a detailed itemisation of specific stone blocks which require repair, nor a substitute for detailed structural or architectural surveys. Closer inspection may identify additional issues.

In this report the survey results for each building or structure are presented as an A3 size digital image with colour overlays showing the areas of stone which require repairs (Appendix 2). Related issues such as maintenance requirements are also highlighted. Each image is accompanied by a Façade Survey Sheet (Appendix 1), which describes the main types and causes of stone decay, and suggested actions and intervention needs. The information given represents observations made at the time of survey as shown on the Façade Survey Sheet.

3.2 Survey methodology and categories of damage

The selected buildings and structures were surveyed from street level. No access was obtained to higher levels or building interiors. The surveys only include elements visible from street levels and do not include roof details, chimneys or parapet detailing which are not readily visible.

Building facades were photographed using high quality digital cameras. Images were digitally ‘stitched’ together and rectified to correct for perspective and lens distortion using commercially available digital photographic software. The corrected images of facades were converted to ‘line drawing’ images which were printed out at A3 size or larger and marked up by hand in the field during the surveys. For some structures (e.g. walls) representative images of parts of the structure are presented in the report, although the entire structures were examined in the field.

Three specific categories of decayed or damaged stone were identified during the study, namely:

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement.

For each surveyed façade a coloured digital photographic image has been prepared, marked with the areas of stone decay/damage highlighted in colour (red, orange or yellow respectively). Areas requiring maintenance are shown overlain with diagonal hatched ornament. Each category is explained in more detail below. Specific comments concerning decay and maintenance issues for each building are given on the relevant Façade Survey Sheet which accompanies the survey images.

3.2.1 Stone requiring urgent repair (red colour)

The stone masonry shows severe decay or structural damage and in many cases the masonry element is considered unstable and incapable of performing its structural function or other functional role. It is recommended that all masonry identified in this category is subjected to immediate inspection (East Ayrshire Council has been informed of these locations in advance of the publication of this report).

3.2.2 Stone likely to require replacement (orange colour)

Stone masonry shows decay or damage to a degree that it is affecting the ability of the masonry element to perform its function (e.g. decay of water shedding features such as string courses, cornices, window surrounds etc.). Also included are elements where further decay could result in future instability (e.g. decayed dentils and projecting mouldings). This category also includes stonework which is decayed to the extent that it causes significant disruption of the architectural or aesthetic value of the building. It is considered that the stone identified in this category is likely to require replacement in forthcoming repair works.

3.2.3 Damaged stone not necessarily requiring replacement (yellow colour)

Stone which shows superficial decay or damage, but which is not causing impairment of the structural or functional aspect of the stone, and/or which is not significantly disrupting the overall appearance of the building. It is recommended that stone identified in this category is given a more detailed inspection during the course of the repair works or planning stages in order to confirm whether replacement is considered necessary or not. The stone is highlighted for future consideration and may require immediate maintenance to prevent further decay. In some cases the decay is such that the stone surface may be redressed or dressed back to sound stone. Further details and recommendations for each building are given in the Façade Survey Sheets, and summarised in Table3.

3.2.4 Fractured or cracked stonework

Areas of masonry which are fractured are highlighted on the survey images using a thick black line in order to draw attention to these features, whether or not the stonework is considered to require replacement. It is recommended that detailed inspection of these areas is undertaken prior to repairs.

3.2.5 Areas of masonry requiring maintenance

Where maintenance is required to parts of facades and specific masonry elements, this is highlighted on the images by crossed hatch ornamentation. For each of these areas the reason for the maintenance need, or the recommended action is shown as a code on the survey image. The highlighting of maintenance issues is intended to raise awareness of the need for specific types of maintenance in order to prevent further deterioration and stone decay, such as regular inspection of rainwater goods. Where

relevant, specific details of the maintenance requirements for each building are described and written into the comments section of the Façade Survey Sheet.

Codes used on the images for the different maintenance needs are explained below:
R = Repointing is required. This is generally where the original mortar is eroded (in many cases washed-out due to water penetration), or where damage is being caused to the stone by the presence of relatively impermeable replacement mortars. In many buildings repointing is required at ground level due to loss of mortar and saturation of the stone by water splash and salt contamination.

D = Water penetration/damp where the stone is saturated by water, typically due to poor maintenance (e.g. failure of rainwater goods) or exposed elements which are prone to water saturation (e.g. copestones, projecting hood mouldings, cornices, sills etc.).

C = Cement mortar patches or other applied coatings (sometimes known as 'plastic repairs') which have been used to coat or patch a damaged stone surface. This includes cement-based 'skims', epoxy-based 'repair' products (e.g. 'linostone') and paints. Also where masonry has been detrimentally repointed (overpointed) using inappropriate or impermeable cement mortar which is likely to result in damage to the stone.

S = Salt splash when the stone shows evidence of containing soluble salts and/or related stone decay from salt contamination. This is typically observed in the lower masonry courses at street level due to contamination by de-icing salts. Salts can also be introduced into sandstone masonry from dissolution of mortars due to water penetration, commonly seen in upper parts of buildings resulting from failure of rainwater goods. Salts may also be introduced by other sources such as contact with soil (e.g. in retaining walls) and contamination by chemical agents (e.g. stone cleaning products).

B = Organic growth and biological deposits ranging from algae (typically green, forming a dark/black soiling over a long time period) to moss and lichen, and higher plants. It also includes soiling from bird droppings (guano), in particular pigeon infestation.

O = signifies 'other' maintenance needs which are identified in the comments section of the Façade Survey Sheet.

3.3 Detailed survey methodology

All the surveyed facades were photographed using digital cameras, selected on the basis of image quality, ease of use and portability. Two cameras were employed for the survey work, a Canon Ixus 950IS with 8.0 Mega Pixels, and a Fuji FinePix 6900 with 6x Optical Zoom and 5.0 Mega Pixels. The Canon was used for most facade images as it has a wider angle lens, whilst the Fuji was used for photographing details at high levels on facades as it has a more powerful zoom function. The images were recorded in 'jpeg' format, typically in the range 1500 to 2000 Kb file size. All the images used are registered in the BGS Geoscience Imagebase where they are archived in digital form and available for future reference through the National Archive of

Geological Photographs. Weather conditions at the time of survey were recorded on the Facade Survey Sheet.

Following the field survey, images were selected for processing to produce the digital facade images. For some facades a single image was taken but in most cases it was necessary to join several photographic images together to create a composite facade image. The selected images were corrected for lens ('barrel') distortion and rectified in order to correct for perspective, using standard commercially-available photographic software. Where required, images were 'digitally stitched' together to form composite facade images. The completed composite images were digitally converted to black and white 'line-drawing' images and printed at A3 size and taken into the field where the decayed areas were marked directly onto the printout as part of the facade survey. Following the survey, the images were imported into ArcGIS 9.2 Geographic Information System and the areas of stone decay and related issues marked on the photographic printout were digitally traced as layers onto the images. The various stages in this process are illustrated in Fig. 6.

For each surveyed building and structure a standard pro forma survey sheet ('Facade Survey Sheet') was completed to ensure systematic collection of information in the field. For buildings where significant differences occur between different facades more than one sheet was completed. The information recorded was used in the production of the digital survey images and summarised in the facade survey sheets that accompany each of the building surveys in this report. Each sheet gives a summary of the masonry style and stone type, and an overview of the main findings of the stone survey including intervention needs. A 'Comments' section gives details of the main types and causes of stone decay and other issues relating to the building and its repair needs. An example of a field survey sheet is shown in Fig. 7.

3.4 Criteria for decision-making and constraints of the stone surveys

The objective of the facade surveys, as outlined in the introduction to this report, is to assess the condition of the stonework and provide information which will assist the repairs programme for each building. It is not the purpose of this study to identify unsafe masonry or other materials which may constitute a risk to health and safety, nor to comment on other issues such as structural stability which would constitute a building survey. In order to ensure consistency and to clarify the decision-making process, the following points are made:

The facade surveys were undertaken by Dr Ewan Hyslop and Mr Luis Albornoz-Parra, both of whom are experienced in the identification of stone decay and façade assessment. Much of the approach was based on the methods used for a previous study of the condition of the stone built heritage in Glasgow (Scottish Stone Liaison Group 2006; Urquhart 2007). The identification of stone decay was based on a number of internationally recognised published works (Verges-Belmine 2008; Fitzner and Heinrichs 2002; Esbert et al. 1997).

In the present study the decision to identify stone as damaged and requiring repair was guided by a number of specific criteria:

- Unsafe stonework at risk of failure or which is likely to become unsafe.

- Functional stone elements which are failing to perform (e.g. damaged cornices, hood mouldings and other features designed to protect the building from water).
- Stone masonry showing structural damage (e.g. cracked lintels, areas of structural subsidence).
- Stonework where the integrity of the block is decayed or damaged such that the surrounding masonry is at risk from exploitation of the damaged area by weathering processes (e.g. where a block or part of a block has eroded back to an extent that further water penetration, frost action etc. will risk accelerating the decay to surrounding masonry).
- Stonework is decayed or damaged such as to have a significant impact on the aesthetics and architectural value of the facade, including requiring the reinstatement of missing masonry and carved details.
- Where it is judged that the stone is so badly damaged that deterioration will occur over the next few years that will result in any of the above factors.
- Where cement based plastic repairs have been used which are showing evidence of damage to underlying or adjacent stone and/or are at risk of failure. (Note that where thin surface 'skins' of render are present over stonework which is in reasonable condition these have been identified as a maintenance issue requiring removal by the site mason, even though stone replacement may not be required).

It is accepted that there is a degree of subjectivity to the decision-making process outlined above. Because stone decay is caused by a number of complex factors and interactions, there is clearly a degree of interpretation involved, and it has to be accepted that this process cannot be totally accurate. However, by setting out the points above, it is hoped that the decision-making process used in the present study is clear and understandable, and the results from this study are likely to be as accurate as is practicable within the constraints of the project. It is recognised that the specific repair programme for each building or structure will be governed by the available budget and other constraints, and that further refinement (prioritisation) of the survey findings may have to be made.

In summary, the decision to replace stone is guided firstly by functional and structural requirements, and secondly to preserve to a reasonable degree the original visual architectural intention of the facade. It is not the aim to propose reinstatement of the masonry in order to produce a pristine facade which appears exactly as it was when originally constructed, but rather to repair the building so that it has both the functional capability to survive in the future, and retains the essential aesthetic elements of its original design.

The visual and petrographic surveys undertaken during this study, document the condition of the stone from observations of the masonry surface. The surveys do not constitute a building or structural survey as undertaken by a professional building surveyor, and the results should not be linked, or considered to effect, the monetary value of the surveyed buildings.

Fig. 6. Stages in the completion of a digital facade image; showing digital ‘stitching’ of individual images and correction of photographic distortion, the converted ‘line-drawing’ marked-up in the field survey, and the final image with digital overlays showing stone decay types and maintenance requirements.

BGS KILMARNOCK BUILDING STONE AUDIT: FACADE SURVEY FORM

West

Date/Surveyor 2/5/08, LJAP Number 1x 10 (JF elevation)

Building Name/Type Oriental Restaurant & Bar + Papa Sports bar + Allen & Harris

Address 4 J.F street,

Façade Orientation/Environment NNE, busy road w lots of traffic

Brief Description 2 storey building (~~[illegible]~~).

Weather Conditions (light/damp/rain etc.) Patches of sun, rain and clouds. Variable

Masonry Style (Oriental) ashlar w. simple carvings. Papa & A&H mostly plain ashlar w. some pitted rubble.

Oriental Stone Description (type/location/grainsize/colour/texture/others) Fine to medium red sst. often laminated, but not too strongly, w. some v. uniform. Same all along, but A&H is not cleaned (no pitting).

Problems (location/type/notes)

Basically 2 diff buildings: Oriental A&H + Papa Bar.

ORIENTAL: Salts & soot on top, w. salts, soot & biological growth in some protruding bits. Minor scaling at TLS and TRS. Mostly alright. Base course has some veg. growth. Big hole for vent pipe at BRS. Repointing and slight maintenance needed in most of the base courses and slightly above it. Higher plants

~~PAPA 12 + ALLEN & HARRIS: Some repointing on top courses.~~ Bigger problem is on Balcony, above A&H. Damp, salts & soiling and scaling may have weakened stone w. Plants growing. Some minor face bedding in some blocks is scaling. Base course A&H: stone is decaying badly & soft, due to granular disintegration + soft beds + water ingress. Lots of stone gone. Some deeper scaling too. Salts present. Base course of PAPA is cemented over w. knostone. Quite bad in Kilmarnock

☑ Crust (Minor) ☑ Scaling ☑ Crumbling ☑ Face Bedding ☑ Splitting ☐ Plastic repair ☐ Cement pointing

☑ Salts ☐ Urgent maintenance ☐ Previous stone repair ☑ Requires repointing ☑ Damp

☑ Severe Soiling ☑ Cleaning: ☐ Chemical ☑ Abrasive ☐ Cracks ☐ Subsidence ☐ Guano

☐ Measurements: ☐ Sample:

Is façade representative? Yes Façade proportion of building 75%

Fig. 7. Example of a completed facade survey form, as used for each of the surveyed buildings and structures. The information is summarised and presented in the Facade Survey Sheets which accompany each of the façade images in this report.

4. ANALYSIS OF SAMPLES AND STONE MATCHING

4.1 Introduction

For each of the surveyed buildings and stone structures one or more samples of the stone masonry was obtained for petrographic analysis. The purpose of the sampling and analysis is to identify the various building stone types that are 'key' to the stone-built heritage of the Conservation Area. A number of additional samples were also obtained from adjacent structures which have been used to inform the stone identification process and help build up a picture of the main building stone types used over time in Kilmarnock. For each surveyed building the closest matching currently-available stone type(s) suitable for repairs is identified. Petrographic analysis defines the stone in terms of factors such as mineral composition, texture and porosity characteristics, and is used to identify a replacement stone type of similar performance to ensure long term compatibility with the original stone. The Sample Description Sheets are presented in Appendix 3.

4.2 Methodology

Samples were obtained where possible from already-damaged masonry and from areas of the building where it would not result in a negative visual impact. In many cases samples were taken from masonry which is likely to be replaced as part of forthcoming repair works. In most cases a small sample typically less than 100 mm in size was obtained using a hammer and chisel from, for example, an already cracked masonry block or at ground level where the stone was already damaged. For some buildings small diameter (<40 mm) cores were taken using a portable hand-held diamond core drill, again usually from damaged or decayed stone already in need of repairs. Permission for sampling was arranged through East Ayrshire Council.

Samples were initially gently cleaned to remove superficial dirt and dust, and examined using a binocular microscope. Colour was determined using a standard Munsell® Colour Rock Chart (Geological Society of America). Samples underwent thin sectioning at the BGS thin section laboratory, and were impregnated with blue dye resin in order to highlight porosity. Thin sections are supplied on a glass slide measuring 75 by 25mm. The thin section was chosen to be as representative of the stone sample as possible, cut perpendicular to the fabric. Each was examined using a petrological microscope (Zeiss Standard WL polarizing microscope) following the procedures given in BS EN 12407:2000 'Natural Stone Test Methods – Petrographic Examination'. Note that the thin sections were taken from as fresh a part of the sample as possible in order to identify the original characteristics of each stone type. It is not the purpose of this study to investigate the decay mechanisms occurring on a microscopic scale; it is the identification of the stone type that is important.

Each sample underwent a detailed petrographic description in accordance with BS EN 12407:2000, the results of which are presented on a Sample Description Sheet. Where possible, the original quarry source of the stone has been identified by comparing the sample with archive specimens from historic quarries held in the BGS collections. The samples were then compared with the BGS database of currently active building stone quarries from throughout the UK in order to identify the most similar matching stone types for repairs. Comparisons were made on both a general visual (macroscopic) and detailed (microscopic) basis. The Sample Description Sheet also shows a representative microscope photograph of the sample in thin section. All the images are taken under identical conditions, viewed in plane polarised light, and are approximately 1mm across. The blue colour in each image represents the porosity space between the mineral grains.

For each building/sample the source of the original stone is identified where possible, or where this is uncertain its origin is discussed. Any significant or unusual characteristics of the stone type are also mentioned. The closest matching currently available stone types are also listed, in order of similarity (i.e. closest matching first, least similar last). Where a particularly close stone match has been identified the recommended stone type is underlined. Where it is difficult to identify a good match the suggested stone type is shown in brackets. In some cases several possible matching stone types are given which display a range of characteristics (e.g. variation in colour, texture or grain size), in order to provide a wider choice for the selection of stone for repairs. All the options given have been selected on the basis of having similar (and compatible) petrographic characteristics to the original stone in the building, but may vary in their visual appearance.

4.3 Sources of the building stone used in Kilmarnock

Table 2 summarises the stone types identified for each building, the original quarry of origin (where identified), and the recommended currently available matching stone types for repairs.

4.3.1 Permian Red sandstone

Of the thirty-two samples analysed, twenty-one are Permian red sandstone. These represent late 19th and early 20th century buildings mostly associated with John Finnie Street. As there are no Permian red sandstones in the immediate vicinity of Kilmarnock, this stone type has undoubtedly been imported into the town. Comparison of the samples with quarry specimens held in BGS collections shows that most of the red sandstone is of a type found in the Mauchline basin (located approximately 15 km southeast of Kilmarnock) (Fig. 8). The Mauchline sandstone is distinctive in that it has a bimodal grainsize distribution, but with a variable texture ranging from strongly bedded to uniform. All of the sandstone quarries in the Mauchline basin are now closed.

Three samples from Kilmarnock buildings are a much finer grained red sandstone, similar to Corsehill sandstone (from Annan in Dumfriesshire (Fig. 9). It is possible that this stone is a finer grained variety of red sandstone from one of the Mauchline quarries, but it is not typical of the Mauchline red sandstones. This finer grained red sandstone is found in only three buildings; Whites (K1), Kilmarnock Standard (K5), and the west elevation of 36 John Finnie Street (K13). A third type of red sandstone with has been identified in the Post Office building (K18), which has a different shade of colour (lighter orange-pink) and distinct petrographic characteristics (coarser grained), very similar to Locharbriggs sandstone from Dumfriesshire (Fig. 9).

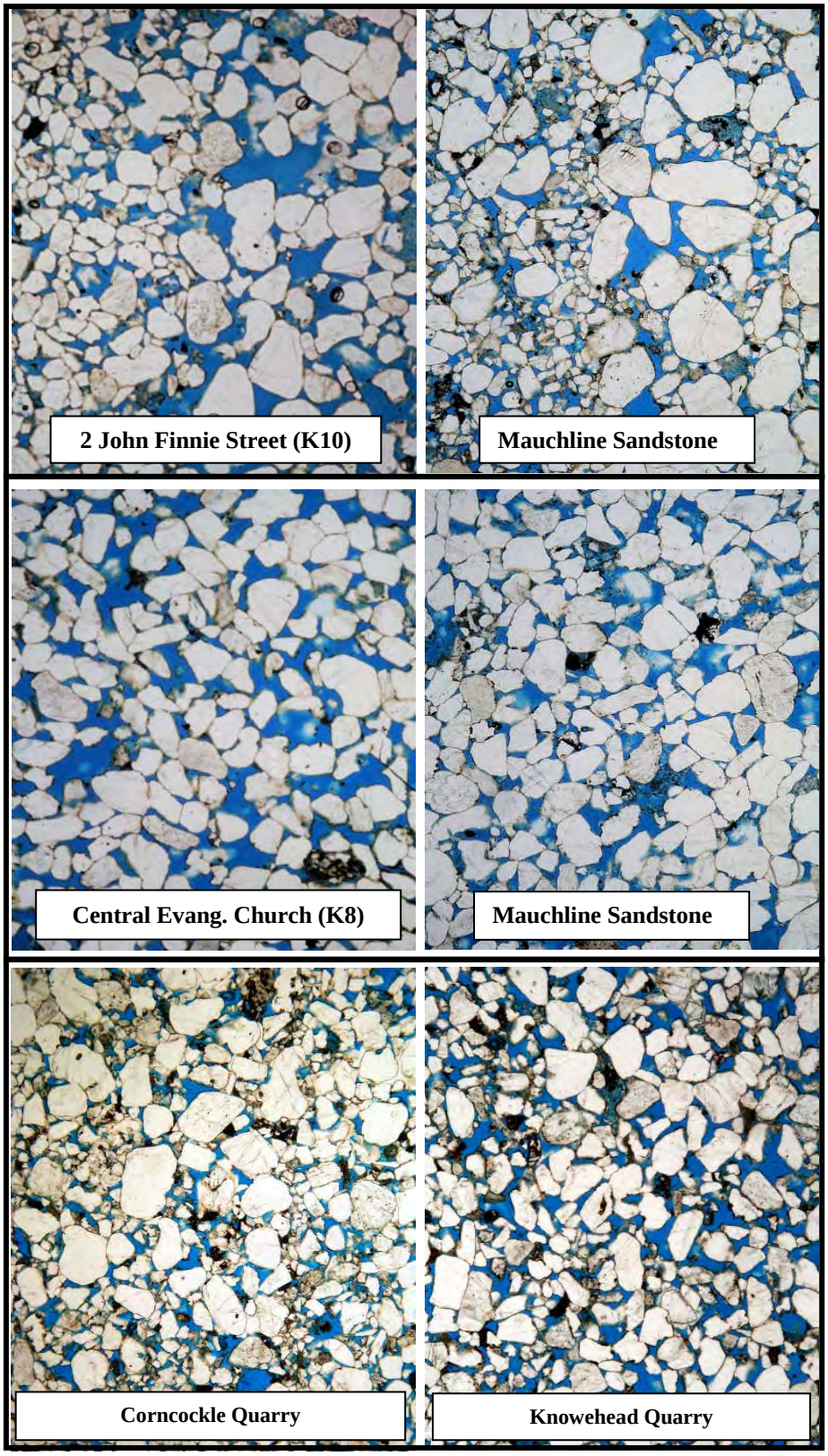

Fig. 8. Comparison of microscopic thin section images of red sandstone from Kilmarnock buildings with known quarry sources. The top-left and centre-left images are from buildings K10 and K8, and have been 'matched' to sandstones from quarries in the Mauchline area (top-right and centre-right). The closest matching currently-available sandstones are shown bottom-left and right, from Corncockle and Knowehead quarries in Dumfriesshire. All images are c.3mm across; viewed in plane polarised light; and blue dye impregnated to highlight porosity.

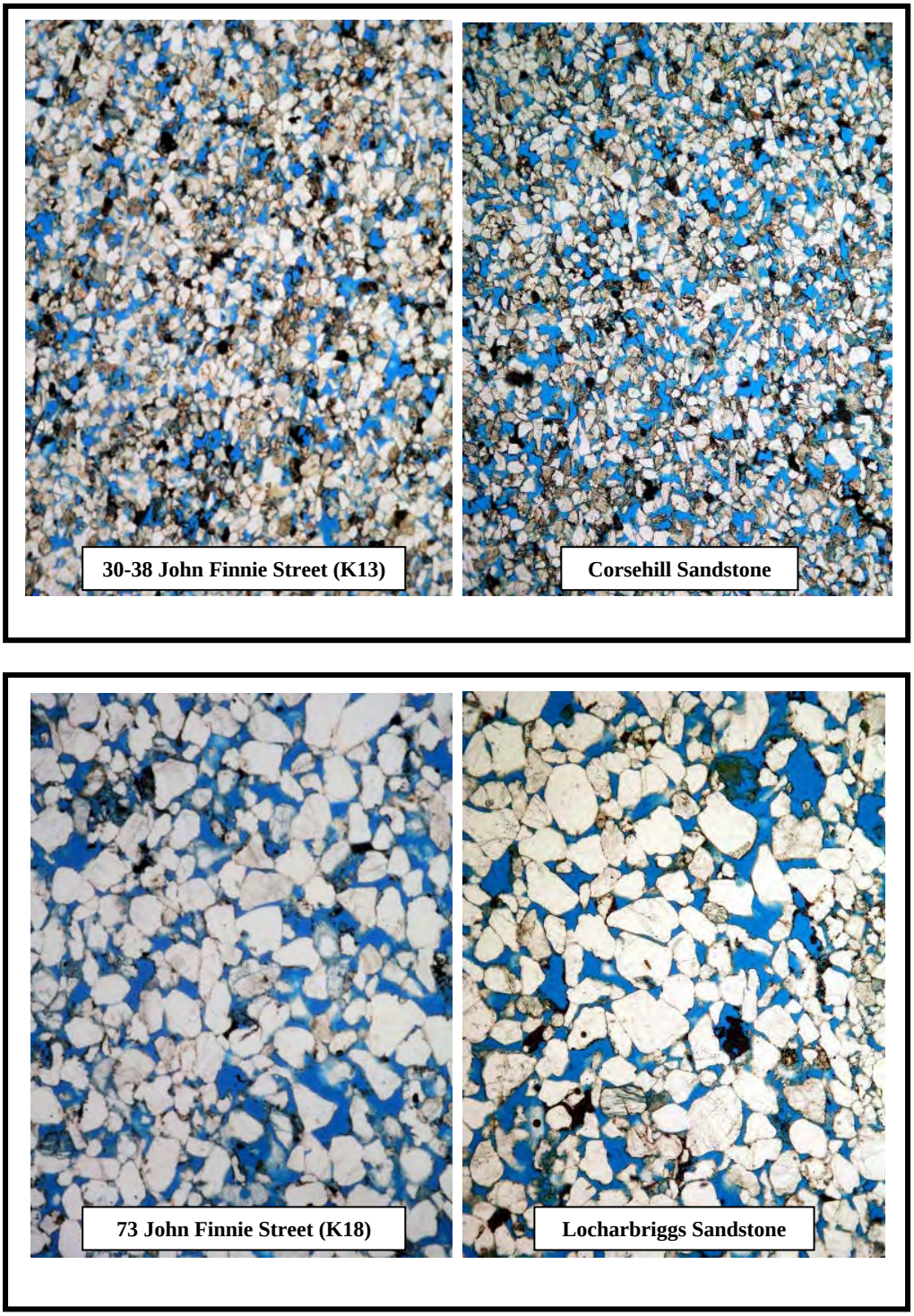

Fig. 9. Microscopic thin section images of red sandstone from two Kilmarnock buildings which match sandstones from the Corsehill and Locharbriggs quarries. All images are c.3mm across; viewed in plane polarised light; blue dye impregnated to highlight porosity.

4.3.2 Blonde sandstone

Seven of the surveyed buildings and structures are constructed of blonde sandstone, which ranges from high quality freestone (Johnnie Walker Building (K24); Goodfellows (K25); Citizens Advice Bureau (K6)) to stone mostly used as squared rubble masonry (e.g. John Finnie Street northwest wall (K9); Railway Arches (K16); Mason Murphy (K22); Portland/Garden Street buildings and walls (K23)). Petrographic analysis indicates that the latter stone type is almost identical to samples from the former Dean Quarry in Kilmarnock, and it is likely that this stone type was obtained from this and other local quarries in or near the town. This local blonde sandstone was typically used for earlier buildings constructed before the railway (e.g. the Mason Murphy and Portland Street buildings), and for structures such as boundary walls and the railway bridge.

The high quality blonde freestone sandstone has quite different petrographic characteristics and has similarities to samples from numerous former large scale building stone quarries in the western part of the Scottish Central Belt (e.g. Glasgow area, North Lanarkshire etc.). Comparison of the samples with former quarries throughout these areas has failed to identify the exact source of this sandstone, and it is possible that the stone was supplied from several different quarry sites. A number of large freestone quarries also once operated on the Ayrshire coast, although no samples are available for comparison, and it is also possible that stone was sourced from here (see quarry chapter for further discussion). Unfortunately no historic records have been found to verify the origins of this imported high quality blonde sandstone, but it seems most likely to have been brought into Kilmarnock, probably by railway, in order to provide a high quality pale coloured sandstone for higher status ashlar and carved work (e.g. Goodfellows (K25); Johnnie Walker building (K24)).

4.4 Matching stone from active quarries

4.4.1 Red sandstone

None of the sandstone quarries in the Mauchline basin are open today, so that the original sandstone used for the majority of the surveyed buildings is unobtainable (see Chapter 6 for detailed discussion of the former quarries and the potential for their reopening). The samples identified as Mauchline sandstone from the surveyed buildings were compared to specimens from active red sandstone quarries from throughout the UK in order to identify the closest currently available stone types for repairs. Sandstone from Corncockle quarry (Dumfriesshire) is the most similar to the Mauchline sandstones in terms of petrographic and visual characteristics (Fig. 8), and this is recommended as the closest matching replacement stone for most red sandstone buildings (Table 2). The reddest varieties of sandstone from Knowehead quarry (Dumfriesshire) are also similar to the Mauchline sandstone, and have been recommended for a number of buildings (Fig. 8; Table 2). Locharbriggs sandstone typically has a distinctive more pinkish colour compared to the deeper orange-red colour of the Mauchline sandstones. Only the more red varieties of Locharbriggs sandstone are considered to be a suitable substitute for Mauchline stone (Table 2).

The few buildings containing other red sandstone types (Corsehill and Locharbriggs) can be matched using stone from these quarries, both of which are still active (Fig. 9). The stone matching recommendations for each building are summarised in Table 2, and more detail is given in the Sample Description Sheets for each building.

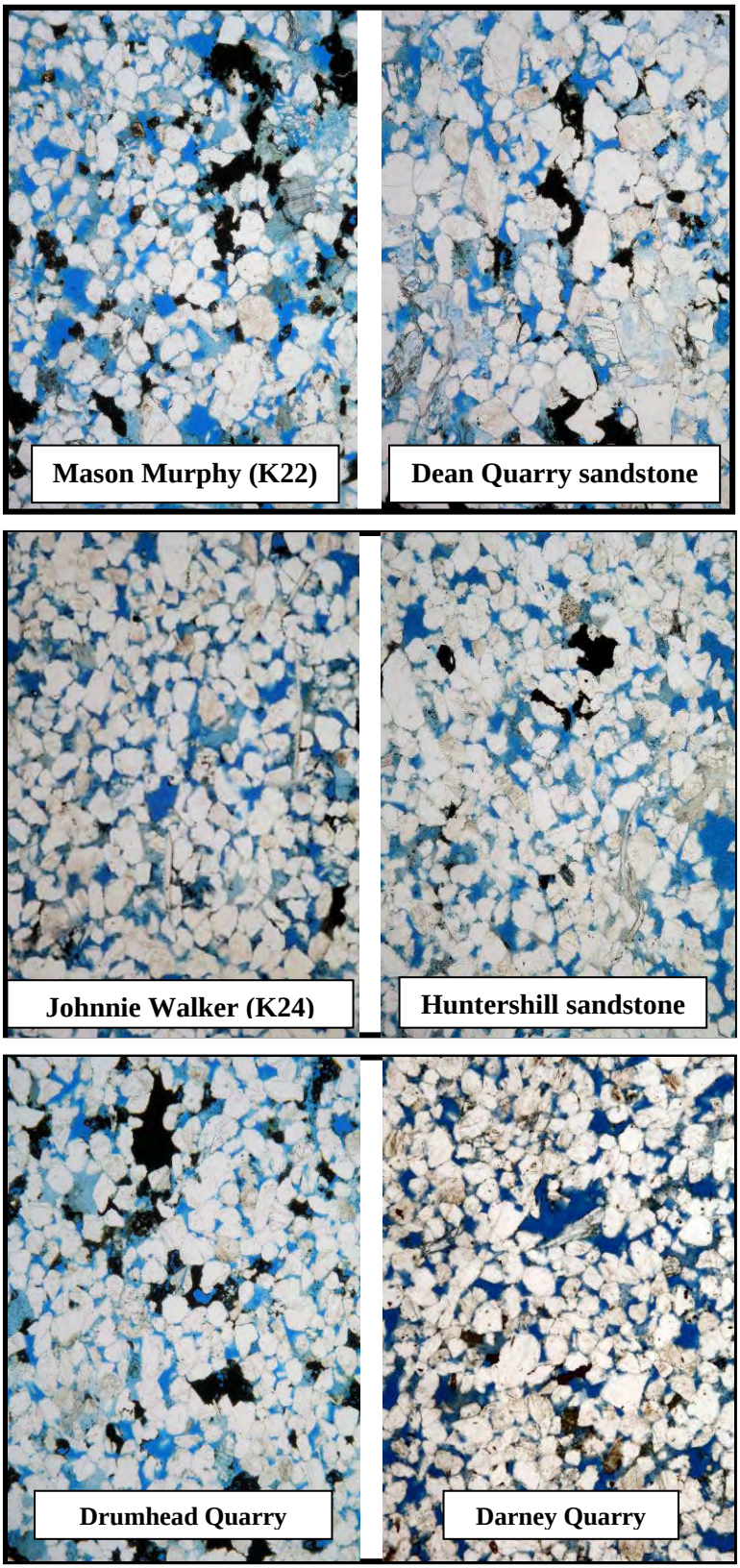

Fig. 10. Microscopic comparison of blonde sandstones from Kilmarnock buildings with known quarry sources. Top images: Sample from Mason Murphy (left) compared to Dean Quarry sandstone (right), showing that the stone for this building almost certainly came from this quarry. Centre images: Sample from Johnnie Walker building (left) showing similarity to sandstone from Huntershill (Bishopbriggs) near Glasgow; Bottom images are the closest matching available stone types; Left: sandstone from Drumhead quarry (near Falkirk), similar to the Dean Castle sandstone; Right: sandstone from Darney quarry (Northumberland), similar to stone from the Johnnie Walker building. Images c.3mm across; plane polarised light; blue dye impregnated to highlight porosity.

4.4.2 Blonde sandstone

It is difficult to find a currently available matching stone type for the local Kilmarnock blonde sandstone. All the building stone quarries in the Kilmarnock area are closed (discussed in Chapter 6), and there are no quarries in the UK supplying sandstone of exactly this type. Comparison with specimens in the BGS collections has identified a number of quarries which produce stone which has some similarities to the original Kilmarnock blonde sandstone (Table 2; see also individual Sample Description Sheets for each building). The most commonly recommended stone types are Drumhead (Doghillock) sandstone (Fig. 10), Northumberland Buff, Bearl and Catcastle Buff. These sandstones are generally pale in colour, relatively coarse grained (or variably grained) and have a banded or bedded texture. The recommended stone types show a range of characteristics, including some which have a more buff brownish colour (rather than 'blonde') which may replicate the weathered appearance of the original blonde sandstone in a building. A number of more uniform currently available sandstones are also suggested (e.g. High Nick and Birchover) should a less banded texture be required (e.g. for reproducing carved or moulded details). Because the original Kilmarnock blonde sandstone can be variable, it is recommended that prior to specification of replacement stone for a particular building, a range of the recommended samples are obtained for on-site comparison, so that the most suitable stone type for the particular job is obtained.

Comparison of the high quality 'imported' blonde sandstone with stone from currently active quarries has identified a number of available stone types with similar petrographic characteristics. These are mostly from northeast England where most of the sandstones have a stronger buff (variable orange-brown-yellow) colour. The recommended sandstone types which are closest to the original stones used in Kilmarnock are Darney, Blaxter, High Nick, Birchover, Dunhouse Buff, Black Pasture and Hazeldean (Fig. 10). Table 2 lists the recommended stone types for each particular building (discussed in more detail in the Sample Description Sheets). As stated above, samples of the recommended stone types should be obtained prior to specification to allow on-site comparison with the original stone.

4.5 Other considerations for stone matching

The character of stone from a quarry can vary over time such that stone in one building may differ from another building, even if they came from the same quarry. It is always recommended that petrographic stone matching is carried out on a case-by-case basis for every building needing stone repairs. It should also be noted that the stone matching in this report was undertaken using stone types available at the time of writing, and that other quarries may become available in the future providing stones that are more similar. Contact details and information on stone types can be obtained from organisations such as the Natural Stone Directory (QMJ Publishing), Stone Federation GB, Scottish Stone Liaison Group, English Stone Forum, British Geological Survey and individual stone companies.

It is recommended that prior to stone specification, samples of the recommended stone types are obtained for on-site visual comparison. Discussion with the mason must ensure that a particular stone type is suitable for the required function and desired masonry finish. The analysis undertaken in this report complies with BS EN 12407:2000 which is designed primarily to determine the microscopic characteristics of a stone type in terms of factors such as composition, porosity, texture colour etc. Whilst indicating compatibility of stone types, it does not imply that a particular stone type is suitable for a specific function, and factors such as loading, strength, slip resistance etc. should be confirmed with the stone supplier to ensure that the stone type is fit for the intended purpose (and with reference to the appropriate BS

EN Test Method available from British Standards Institute). The mention of specific stone types in this report should not be taken as an endorsement, or otherwise, of the quality of a particular product.

Table 2. Summary of original stone type, quarry origin and closest-matching replacement stone suitable for repairs

Building	Type of Sandstone/ Element	Possible origin	Suggested closest available matching stone (in order of similarity)	Notes
K1, Whites, 58-62 Bank St.	Red Sandstone.	Similar to sandstone from Corsehill quarry	**Corsehill** (uniform variety; not the banded variety), **Gatelawbridge/Newton**, (Corncockle)	Slightly orange colour.
K2, Harled Cottage, 1-3 Dunlop St.	Various types of different stones.	A range of poor quality sandstones and whinstone. Probably local field stones, river stones, or from nearby small quarry excavations.	Range of common blonde/buff sandstone types; reclaimed whinstone (e.g. from setts, kerbs etc.)	Should be harled.
K3, Kilmarnock Club, 3-9 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	Redder varieties of **Corncockle**, **Knowehead**, (Locharbriggs)	Uniform red sandstone, with orange colour, and slight fabric.
K4, Station wall, Garden Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)	**Gatelawbridge/Newton**, redder variety of **Knowehead**, (Corncockle)	Fairly uniform red sandstone with lighter coloured thin laminae (parallel bedding).
K5, Kilmarnock Standard, 10 Grange Place	(A) Red sandstone from string course.	Uniform fine grained sandstone similar to Corsehill, or finer grained uniform varieties of Mauchline sandstone.	**Corsehill** (uniform variety), **Gatelawbridge/Newton**	Uniform fine grained red sandstone. Some clay content.
K5, Kilmarnock Standard, 10 Grange Place	(B) Red sandstone ashlar	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)	**Knowehead**, redder variety of **Locharbriggs**, (Gatelawbridge)	Bedded red sandstone. Slightly clay content. Occasional dark spots of ?manganese.
K6, CAB, 3-7 John Dickie Street	(A) Blonde Sandstone: CAB Building	Likely to be highest quality Ayrshire sandstone (e.g. Ardeer/Stevenston)	**Darney, Dunhouse Buff, Black Pasture**	High quality blonde freestone, uniform texture suitable for polished ashlar and carving. Pale, yellowish buff, near white ('blonde') sandstone.
K6, EAC, 19 John Dickie Street	(B) Red Sandstone: Rear Rubble (C) Red Sandstone: South Elevation	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)	**Gatelawbridge/Newton, Knowehead, Corncockle**	Red sandstone, variable from uniform to laminated with small white feldspars and some manganese spots.
K7, Station, John Finnie Street	Red Sandstone: Main building	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)	**Gatelawbridge, Knowehead**, (reddest, most uniform variety of Locharbriggs).	Faintly laminated dark red sandstone, relatively 'dense'.
K8, Central Evangelical Church, John Finnie Street	Red Sandstone	Probably a coarser grained, uniform variety of 'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)	**Corncockle, Knowehead**, (red Locharbriggs).	Orange-red, uniform sandstone.
K9, Finnie NW wall, John Finnie Street	Blonde Sandstone rubble	Likely to be from local Kilmarnock quarries (e.g. Dean quarry; other local quarries such as Braehead)	*Banded or coarse sandstones:* B**earl, Doghillock, Northumberland buff, Catcastle Buff** *Uniform sandstones:* **Birchover, High Nick**, (Blaxter)	Standard quality local sandstone, suitable for rubble building and walling. Bedded texture. No identical stone types are available. A wide range of stone types are suitable for repairs.
K10, 2-4 John Finnie Street	Red Sandstone: ashlar, main W façade.	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	Reddest varieties of **Knowehead**, **Corncockle**, (Locharbriggs, Gatelawbridge/Newton)	Red sandstone with small, white feldspars.
K11, Opera House, 6-14 John Finnie Street	Red Sandstone: main façade, above entrance.	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	**Corncockle, red Locharbriggs, Knowehead**.	Orange-red sandstone, faintly bedded, with white feldspar grains and dark ?manganese spots on bedding planes. Fairly well rounded grains are apparent macroscopically.
K12, Handling Hair, 16-28 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)	**Gatelawbridge/Newton, Knowehead**.	Uniform, slightly orange-red sandstone.

Building	Type of Sandstone/ Element	Possible origin	Suggested closest available matching stone (in order of similarity)	Notes
K13, Old Homeless House - Blue Triangle - Yick Fai Lee, 30-38 John Finnie	(A) Red Sandstone: West Elevation.	Similar to Corsehill; or possible fine grained variety of Mauchline sandstone.	**Corsehill**	Unusual finer grained sandstone.
K13, Old Homeless House 30-38 John Finnie Street	(B) Red Sandstone: South Elevation	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	**Corncockle**, orange-red varieties of **Knowehead** or **Locharbriggs**.	Orange-red sandstone, coarse grained and friable with white feldspars and patchy dark mottles of black ?manganese.
K14, Laigh Kirk, 31 -37 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	**Corncockle**, orange-red varieties of **Knowehead** or **Locharbriggs, Gatelawbridge**.	Red sandstone with dark orange colour, fine to medium grainsize, with faint lamination.
K15, Atrium Homes, 39-41 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	**Corncockle**, **Knowehead** or orange-red variety of **Locharbriggs**.	Red sandstone, dull orange brown colour, mostly parallel bedded, fine to medium grained.
K16, Railway arches, Green Street	Blonde Sandstone: various samples	Probably from local Kilmarnock quarries e.g. Dean quarry or from immediate vicinity (former Braehead quarry in Kay Park).	*Banded or coarse sandstones:* **Doghillock, Northumberland Buff, Bearl, Catcastle Buff** *Uniform sandstones:* **Millknock, High Nick, Birchover**	Standard quality sandstone, variable composition and texture. No identical stone types are available. A wide range of stone types are suitable for repairs.
K17, Victoria Wine, 64-70 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)?	**Corncockle, Knowehead**, (reddest Locharbriggs, Gatelawbridge).	Fairly uniform red sandstone, with occasional black spots of ?manganese.
K18, Post Office, 73 John Finnie Street	Red Sandstone	Possible Locharbriggs.	**Locharbriggs, Knowehead**.	Pinkish red sandstone with very abundant white feldspars. Hard and well cemented.
K19, Tannahills, 75 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	**Corncockle, red Locharbriggs, Knowehead**.	Slightly orange red sandstone, with white feldspar grains and occasional medium size black mottles of manganese.
K20, Paper Roses, 100-106 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	**Corncockle, Knowehead**, (reddest Locharbriggs, Gatelawbridge/Newton).	Fairly uniform red sandstone with some dark spotting due to ?manganese on the bedding planes. Fairly uniform.
K21 Balti, 108-114 John Finnie Street	Red Sandstone	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)	**Knowehead, Gatelawbridge/Newton**.	Red sandstone with some small white feldspar and black spots of ?manganese. Slightly laminated, with parallel lamination.
K22, Mason Murphy, 78-80 Portland Street	Blonde Sandstone: front elevation.	Stone reputed to be from Dean quarry, Kilmarnock.	*Banded sandstones:* **Doghillock, Northumberland Buff**. *Uniform sandstones:* Millknock**, High Nick, Birchover.** *Coarse sandstones:* **Bearl, Catcastle Buff**.	Blonde sandstone, variable and bedded, with cross-bedding and sedimentary deformation. Appears coarse grained (though variable). Colour varies from pale cream buff-orange to strong brown-buff with patches of orange staining.
K23, 98 Portland Street: Garden St back wall.	(A) Blonde Sandstone: Dressing.	Probably obtained from the local Kilmarnock quarries (e.g. Dean quarry, or others such as Braehead).	*Banded sandstones:* **Doghillock, Northumberland Buff**. *Uniform sandstones:* **Millknock, High Nick, Birchover.** *Coarse sandstones:* **Bearl, Catcastle Buff**.	Pale greyish buff sandstone, laminated and with 'speckled' appearance due to iron oxides/organic matter. Local blonde sandstone of standard quality.
K23, 98 Portland Street: Garden St back wall.	(B) Blonde Sandstone: Rubble Wall.	Probably obtained from the local Kilmarnock quarries (e.g. Dean quarry, or others such as Braehead).	*Banded sandstones:* **Doghillock, Northumberland Buff**. *Uniform sandstones:* **Millknock, High Nick, Birchover**. *Coarse sandstones:* **Bearl, Catcastle Buff**.	Pale greyish buff, impure sandstone with faint irregular laminae of organic matter/iron oxides.Variable local blonde sandstone of standard quality, suitable for rubble building. Banded texture. Because of the variable quality the wall is likely to have been lime harled for protection. A wide range of stone types are suitable for repairs.

Building	Type of Sandstone/ Element	Possible origin	Suggested closest available matching stone (in order of similarity)	Notes
K24, Johnnie Walker, 15-17 Strand Street and 14 Croft Street	(A) Blonde Sandstone. Generally high quality pale orange-buff freestone.	Probably imported from quarries in West Central Scotland or further afield (NE England).	Uniform pale orange-buff freestones: **Darney, Dunhouse Buff, Stanton Moor** (High Nick, Birchover, Blaxter).	Original quarry source(s) not identified. Similar to certain Northumberland sandstones, in particular Darney (quarries in northeast England connected to Scottish Central Belt by rail from mid-19th century).
K24, P&R Torbet, John Dickie Street	(B) Red Sandstone: Torbet building.	'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)	**Corncockle, red Locharbriggs**.	Orange-red sandstone, fairly uniform. Occasional black spots of ?manganese.
K25, Goodfellows, 13-15 West George Street	(A) Coarse grained blonde sandstone: Front Elevation, ground level.	Source unknown, possibly local blonde sandstone.	**Witton Fell Coarse Grit, Rockingstone, Stoke Hall, Millknock**.	Unusual very coarse grained sandstone possibly used for base course only (i.e. not representative of rest of masonry on this building).
K25, Goodfellows, 13-15 West George Street	(B) Blonde sandstone rubble: Rear Elevation NW Facing	Moderate quality freestone sandstone similar to many sandstones from Glasgow area or from an Ayrshire quarry.	*Pale sandstone:* **High Nick, Birchover, Blaxter.** *Buff sandstones (to replicate weathered surface):* **Peak Moor, Stanton Moor, Swinton, Dunhouse Buff**.	No identical stone types are available. Quartz rich pale (whitish) sandstone, with a strongly speckled appearance caused by orange iron oxides.
K25, Goodfellows, 13-15 West George Street	(C &D): Fine grained blonde sandstone: S Elevation, Main Façade, string courses.	Very similar to 'blonde' sandstone from Glasgow quarries. Also possibly obtained from a high quality Ayrshire quarry.	Pale varieties of: **High Nick, Blaxter, Birchover, Stanton Moor, Dunhouse Buff, Black Pasture**, (pale Swinton).	Moderate to high quality sandstone freestone, suitable for ashlar and carved work. Blonde sandstone, pale greyish buff colour, micaceous, impure and relatively clay-rich. Some orange iron oxide speckling.

5. SUMMARY OF OBSERVATIONS OF STONE DECAY IDENTIFIED FROM THE BUILDING SURVEYS

5.1 Introduction

This section provides a summary of the main causes of decay and damage to stone masonry as determined by the building surveys. These different mechanisms are described in turn and the processes of stone decay are explained in more detail where relevant. The purpose of this section is to highlight the reasons why stone decay is a problem in the surveyed buildings, so that action can be taken to mitigate future stone deterioration. The results are applicable to other stone buildings in Kilmarnock and beyond. The main findings from the building surveys are summarised in Table 3 which shows the different decay types and related issues identified for each surveyed building.

Fig. 11: General discolouration of a facade due to water penetration and dark organic soiling, with salts in parts of the masonry, and occasional blocks patched with cement (K15; Atrium Homes, John Finnie Street).

Fig. 12: General decay of masonry over large parts of façade due to long term water penetration. Some lighter patches represent cement repairs (K25; Goodfellows, West George Street).

Fig. 13: Water penetration to exposed and prominent masonry (parapet, cornice, decorative stonework above entrance), showing organic soiling, salt staining and plant growth (K3; Kilmarnock Club, Dunlop Street).

5.2 Water penetration

Almost every building and structure examined in the study shows some degree of damage to stone resulting from rainwater penetration. This ranges from staining and minor localised damage (e.g. K17 Victoria Wine; K15 Atrium Homes; Fig. 11) to more extensive stone decay (e.g. K19 Tannahills; K20 Paper Roses; K25 Goodfellows; Fig. 12). Damage due to water is most common on protruding masonry features such as cornices, string courses, sills, hoods etc., and particularly on the upper parts of buildings where features such as parapets and copestones present horizontal and low-angle surfaces to rainwater.

It is also particularly apparent on protruding decorative elements and carved work, such as above entranceways (e.g. K14 Laigh Kirk; K3 Kilmarnock Club; Fig. 13). Such water penetration is commonly associated with dark organic soiling of the stone surface, which develops due to persistent moisture within the stone.

Soiling and discolouration are the most common effects of moisture saturation from rainwater penetration. If the masonry remains saturated over significant periods of time, or if there is a particularly high flux of water, then stone decay will occur by surface scaling or granular disintegration. Scaling occurs due to an abnormally high rate of water evaporation from the masonry surface which draws out soluble minerals from inside the stone to be precipitated at the surface, leaving a weakened subsurface layer which is prone to failure (Figs. 14 & 15). Granular disintegration occurs when the bonds between individual grains in the sandstone are broken due to saturation of clays and other vulnerable minerals, or the formation of expansive salts, resulting from water saturation.

Fig. 14: Soiling and scaling of masonry due to water penetration. Note cement patch repairs above and around quatrefoil detail which may have increased the rate of decay in adjacent stone (K17; Victoria Wine, John Finnie Street).

Fig. 15: Water penetration and soiling of basal masonry courses adjacent to the pavement. The increased amount of water evaporation is causing stone decay by scaling of the masonry surface (K1; Whites, 60 Bank Street).

A consequence of continual saturation of the masonry is the opening up of mortar joints due to dissolution of mortar, commonly allowing mobilisation of salts into the stones (Fig. 16). Where open joints allow plants to become established the root systems can exploit saturated mortar, resulting in further opening of the joints and increasing water penetration as they grow (e.g. K11 Opera House) (Fig. 17: K21 Balti House).

Fig. 16: Damage to stone masonry resulting from lack of maintenance. The gutter is blocked with vegetation growth, resulting in water running down face of the building causing erosion of pointing, water saturation and green soiling of the prominent central band course. The open joints are being exploited by higher plants, and the washing-out of the mortar is introducing white salts into the underlying masonry (K10; Allen & Harris, Strand Street Lane).

Fig. 17: Failed rainwater goods resulting in the growth of higher plants and saturation of the underlying masonry with white salts. (K21; Balti House, 108 John Finnie Street).

In many cases excess rainwater penetration is the result of lack of maintenance. However much of the observed damage is an inevitable consequence of long term exposure of protruding masonry features whose function is to protect the underlying stonework by throwing rainwater off the face of the building. Some of these features are in effect sacrificial and will decay faster than other parts of the building. In some historic buildings such exposed elements may be built using less porous stone, but this is not normally the case in Kilmarnock where most buildings have been built from a single stone type.

One of the main issues in Kilmarnock is the use of porous Mauchline red sandstone in many buildings. This is a relatively highly permeable sandstone, so that all the masonry elements, in particular the water shedding features, are relatively easily saturated by rainwater. Even where buildings have been generally well maintained typically at least some of the water shedding elements are in need of replacement. In more extreme cases, in particular where maintenance has been poor, water can have penetrated beyond (through) these protective elements and into the underlying ashlar stonework which is now in need of repair (e.g. K10 Allen & Harris) (Figs. 18 & 19). In a number of buildings water penetration to cornices has resulted in deterioration of the underlying dentils which are in very poor condition (e.g. K24 Johnnie Walker building).

Fig. 18: Organic (green) soiling of exposed masonry adjacent to prominent and horizontal masonry surfaces. Downwards penetration of water into the stonework underlying the cornice and copestones has led to acculumations of white salts and scaling of the stone surface. The copestones show damage to the drip detailing and also require repointing (K18; 73 John Finnie Street).

Fig. 19: Organic soiling of masonry adjacent to prominent and horizontal masonry surfaces where water has accumulated. Note that the upper surface of the cornice has lead flashing which prevents water penetration and protects the underlying stone (K18; 73 John Finnie Street).

The vulnerability of permeable sandstone which has been used for prominent and water shedding elements underlines the importance of good maintenance. Physical damage to specific elements such as the drip detailing on moulded string courses can also lead to damage to the underlying ashlar masonry (Fig. 20). In many of the surveyed buildings parts of these water shedding features are no longer functioning correctly to protect the adjacent masonry and are in need of replacement. Relatively recent repairs to the railway station (upper building) have involved the application of lead flashing to horizontal surfaces (parapet and cornice), enabling these water shedding elements to function correctly and allow the underlying stone to remain dry.

Fig. 20: Damaged string course on façade with broken drip detailing allowing water to run onto the underlying masonry, causing stone decay (Building K22; Mason Murphy, Portland Street).

Fig. 21: Defective rainwater drainage from a parapet gutter leading to saturation and soiling of the underlying masonry. The stonework on the upper cornice is badly decayed as a result of the water saturation with splitting of the stone and loss of prominent elements. Note the damaged drip detailing on the string course (Building K1; 60 Bank Street).

5.3 Defective rainwater goods

A significant problem observed in many buildings is excessive water penetration due to failing rainwater goods, normally resulting from to lack of maintenance (e.g. blocked or broken gutters and downpipes, or problems with parapet gutters and internal drainage). Such problems typically concentrate large volumes of water into localised parts of the masonry, which is unable to cope. Damage to stone resulting from failed rainwater goods is observed in a number of buildings (e.g. Fig. 21: K1 Whites; Fig. 22: K19 Tannahills; Fig. 17: K21 Balti House; K12 Handling Hair), and in the most severe cases it is clear that these problems have been occurring for a long period of time. Where saturated, the masonry is likely to show biological growth and soiling, with white salts typically precipitated in areas where continual wetting and drying of the masonry is occurring. Scaling of the stone takes place where the level of water evaporation is enhanced, and granular disintegration occurs where accelerated wetting and drying results in the formation of salts. It is important to note that damage to masonry from defective rainwater goods can be relatively easily and cheaply avoided by regular maintenance.

Fig. 22: Severe water penetration caused by blocked rainwater goods. Saturation of the underlying masonry has led to intense organic soiling and growth of higher plants, and development of white salts within the stone. This level of damage indicates that the water penetration has probably been occurring over a long period of time, likely to result in internal dampness to the building (Building K19; Tannahills, 75 John Finnie Street).

Fig. 23 Decay to red sandstone sills due to splitting along bedding planes. Note coloured cement repairs to the base of mullions (K3 Kilmarnock Club, John Dickie Street).

5.4 Splitting

Some prominent horizontal masonry elements such as sills, cornices and string courses show splitting along natural bedding planes (e.g. Fig. 23). This occurs where such features have been water saturated over a long period of time. The Mauchline sandstone in particular is generally strongly bedded, and internal contrasts in grain size and porosity/permeability between the beds can result in planes of weakness which, where relatively poorly supported in prominent masonry elements, can be prone to failure. The presence of excess moisture in the stone greatly increases the likelihood of the stone splitting along the bedding.

Fig. 24: Severe damage to lower masonry courses caused by contamination from de-icing salts used on the pavment. The most intense damage is adjacent to the block margins where water is transported along the mortar joints and penetrates into the adjacent stone. Evaporation of water then causes the salts to crystallise out within the pore spaces of the stone, resulting in granular decay (Building K10; Allen & Harris, West George Street).

5.5 Salts

Salt contamination is observed on the stone masonry in many of the surveyed buildings and structures, and is contributing to stone decay in 11 buildings. Salt is generally introduced into masonry in three main ways:

i. As a result of water saturation and washing out of salts from the mortar, or by contamination from sources such as chemical cleaning or guano. This is apparent as white efflorescence at the edge of water saturated stone, and is most common in the upper parts of buildings due to rainwater penetration.
ii. Salt splash due to contamination of stone from de-icing salts on roads and pavements, typically seen in basal masonry courses and around entranceways. Salts are dissolved in rainwater and drawn into the porous sandstone where they precipitate within the pore spaces of the sandstone causing granular disintegration. This can be a very destructive process, resulting in severe damage to masonry (e.g. Fig. 24; K10 Allen & Harris).
iii. In retaining walls salt can be introduced into stone through moisture ingress from soil which is in contact with the masonry. Crystallisation of salts within the pore spaces can result granular stone decay. This is observed in a number of the surveyed structures (e.g. K4; Station wall), though is generally not developed to a large extent.

5.6 Soiling

Almost all the surveyed buildings show some degree of soiling of the masonry. It is typically observed as dark staining or organic growth on the stone surface resulting from excessive moisture. It is typically green, and turns black over time, and areas which have been prone to long term soiling are commonly soiled to black (e.g. cornices, string courses etc.). Rapid localised soiling commonly occurs where rainwater goods are not functioning correctly (e.g. Fig. 25: K20 Paper Roses; K7 Railway Station).

Fig. 25: Broken downpipe producing intense water saturation of the masonry with severe organic soiling. The sandstone is unable to cope with this level of moisture and will undergo relatively rapid stone decay, unless the issue is addressed (K20; 100 John Finnie Street).

Soiling is also commonly present on lower masonry courses where water splash and/or rising damp has introduced moisture into the stone, particularly where drainage is limited by impermeable paving surfaces (e.g. Fig. 26). Over time, the presence of soiling can impede evaporation of moisture in the stone, leading to stone decay. In several buildings soiling is present resulting from bird colonisation, in particular pigeon droppings (guano) which can cause chemical damage to the stone.

Fig. 26: Organic soiling to damp basal courses of masonry caused by water ingress from the pavement (K24; Johnnie Walker building, Croft Street).

Soiling is best treated by eliminating the source of the problem, in most cases prevention of water penetration, by reinstating or maintaining rainwater goods and ensuring run-off at the base of the building. It can then be allowed to dry and eventually removed by brushing. The application of biocides and other more aggressive treatments may not be necessary.

5.7 Development of soiling crusts

Heavy soiling and development of black crusts or gypsum coatings is rare in the surveyed buildings. In many towns and cities this can be a major source of stone decay as it can prevent water evaporation from the stone surface. These coatings generally form as a result of former air pollution and in particular coal burning, and it seems likely that some buildings which have undergone stone cleaning may have has such coatings. It is also possible that the relative lack of heavy industry and the prevailing wind in Kilmarnock prevented the formation of crusts which are generally more common in other urban areas.

5.8 Graffiti

Graffiti is a relatively minor problem in the surveyed buildings and structures.

5.9 Repointing

Many of the surveyed buildings and structures require some degree of repointing, most commonly resulting from washing-out of mortar by water penetration. Much of this is due to the process whereby relatively permeable lime-based mortars are dissolved in preference to the adjacent stone masonry, thus protecting the stone. Loss of mortar is enhanced in areas of particular exposure to water penetration (e.g. cornices, string courses etc.).

Several of the surveyed buildings and structures show evidence of repointing using ‘modern’ cement mortars which are typically less permeable and harder than the stone. These encourage moisture to penetrate into the stone, enhancing its decay. In addition, incorrect application of cement mortars which partially cover the masonry can trap water in the stone and restrict evaporation, resulting in stone decay. This is seen in the surveyed boundary walls where extensive repointing with hard cement mortar on lesser quality sandstone has resulted in enhanced stone decay.

Fig. 27: Face bedded stone beneath window sill showing spalling of bedding layers (K20; Paper Roses, John Finnie Street).

5.10 Face bedding

The vast majority of the stonework in the surveyed buildings and structures is correctly bedded, i.e. the sandstone is oriented with its natural bedding planes in a horizontal position. Face bedding (where bedding planes are vertical and aligned along the face of the building) is only occasionally observed, for example in ashlar block beneath window sills in K20 Paper Roses (Fig. 27). Some carved details are also face bedded and show decay (e.g. K1 Whites; K17 Victoria Wine). The most common face bedding is in 'lower status' rubble walls (K9 John Finnie Street NW wall; K2 Cottage, Dunlop Street) where lesser quality blonde sandstone has been oriented vertically to provide greater block height. Several of these have been repaired using cement patching.

5.11 Stonecleaning

A number of surveyed buildings (7) show evidence of previous stone cleaning. No records have been found regarding the cleaning methods used (e.g. chemical or abrasive), although the roughened and etched surfaces of (previously smooth) masonry indicates mostly abrasive cleaning by grit blasting (Figs. 28 & 29). Several buildings show evidence of over-aggressive cleaning which has resulted in loss of carved details and the rounding of previously sharp edges, reducing the quality of the masonry and degrading the appearance of the buildings (Fig. 30).

Fig. 28 (LEFT): Masonry that has been cleaned by abrasive methods (probably grit-basting) showing etching of the once smooth masonry surfaces and loss of sharpness to the edges and moulded details (K11; Opera House, 6 John Finnie Street).
Fig. 29 (CENTRE): Damage to masonry caused by abrasive stone cleaning, leading to loss of the smooth ashlar surface and an overall reduction in the architectural quality and appearance of the building (K1; 60 Bank Street).
Fig. 30 (RIGHT): One of the effects of former stonecleaning; a loss of sharpness to carved ornamental details, leading to a reduction in the quality of the architecture (K1; 60 Bank Street).

Fig. 31: Cracks to stone lintel and overlying ashlar block (K20; Paper Roses, John Finnie Street).

5.12 Unsafe masonry

A number of the surveyed buildings have masonry which is considered to be in urgent need of attention. These represent a variety of problems, for example cracks due to structural movements where broken stone could become detached (e.g. Fig. 31), or where defective rainwater goods have led to long-term saturation of stone resulting in masonry which is unsound (e.g. decay of dentils beneath saturated a cornice). In a number of buildings loose cement pointing or cement 'plastic repairs' has been observed, resulting from water trapped behind the impermeable cement causing the stone to decay. All areas designated as unsafe masonry are highlighted on the digital survey sheets, and EAC has been notified of these problems in advance of this report.

5.13 Plastic repairs and other coatings

A number of buildings have plastic cement repairs and painted masonry, including epoxy-based coatings (commonly known as 'linostone'). Where these impermeable materials have been used the adjacent stone commonly shows damage due to increased water runoff, and the underlying stone appears weak and decayed due to trapping of water behind the coating (e.g. Fig. 14). An epoxy-based coating has been used on parts of the ground floor masonry of the Goodfellows building (K25), which is now showing blistering and detachment (Fig. 32). Overpainting of the lower cornice on the southern part of the Johnnie Walker building (K24) is now flaking, revealing highly friable stone underneath where water has been trapped (Fig. 33). Although it is likely in many cases that the plastic repairs were applied as a 'cosmetic' solution to already damaged masonry, it is apparent that these products have a relatively short life and are likely to result in increased stone decay.

Fig. 32: Detatchment of epoxy-based coating, revealing damaged stone underneath (K25; Goodfellows, West George Street).

Fig. 33: Flaking of paint showing badly decayed stone underneath (K24; Johnnie Walker, Strand Street/John Dickie Street).

5.14 Differences in performance between red and blonde sandstones

As discussed earlier in this report, most of the blonde sandstones used for buildings in Kilmarnock are from quarries originally in or nearby the town, and generally represent the earlier buildings. Almost all the red sandstone used was transported by railway from the Mauchline area, and represents the later (typically post-1850) development. Furthermore the blonde sandstone buildings tend to be simpler in terms of architectural style, partly because the quality of the local stone was not sufficient for ambitious masonry work and ornate detailing. The presence of carbonaceous laminae (bedding planes) rich in mica and clay act as planes of weakness and can limit the bed heights available, as well as making the stone generally unsuitable for carving and moulded detailing. In contrast the red sandstone is more consistent in terms of quality, providing larger block sizes, and can be relatively easily worked allowing it to be carved and even sculpted.

The red sandstones are relatively permeable compared to the blonde sandstone. The former are typified by well rounded grains of uniform size within a particular bed, and are generally not highly compacted. This results in a relatively open texture and high porosity making the red Mauchline sandstones prone to water ingress and saturation, leading to the common problems of soiling and consequent decay observed in many of the surveyed buildings. Because of the porous nature of the red sandstone used in Kilmarnock it is particularly important that the buildings are maintained in such a way that water is kept out of the masonry if stone decay is to be avoided.

Table 3. Summary of stone decay and other damage types recorded for each of the surveyed buildings

Building Name	Building Number		Type of Decay/Actions											
	Prefix	Number	Water penetration	Soiling	Condition of rainwater goods	Salts	Decay types	Previous plastic repair	Cracks to masonry	Previous cleaning	Face bedding	Severe damage	Extensive repointing required	Notes & Repair Requirements
Whites	K	1	Cornice and exposed areas at upper levels; localised areas of masonry.	Green soiling where wet; some guano.	Very poor	Associated with damp areas of masonry	Scaling resulting from salt damage; splitting along bedding of water-saturated elements.		Severe and open.	Abrasive, with much loss of carved details	Decorative brackets	Severe water penetration and cracks at high level due to failed rainwater goods	Yes	Considerable stone replacement required, and protection of prominent and water shedding elements.
Harled cottage	K	2	Stone masonry obscured by harling.	To basal courses	All defective			Cement render to façade					Yes	Rainwater goods require reinstating. Condition of stone beneath render is unknown.
Kilmarnock Club	K	3	Exposed upper areas and prominent elements; basal courses	Where wet; some plant growth	Poor condition	Cornice level; water splash to basal courses.	Splitting to cornice and string courses; scaling and granular decay where long term water penetration.	Over basal scaling	Some, mostly at upper levels.			Splitting of blocks in string course	Yes	Much replacement of stone damaged by water penetration, and protection of water-shedding features.
Station wall	K	4	From retained soil; road splash.	Heavy green soiling in damp and sheltered areas; some moss.	n/a		Some scaling from water penetration	Some cement patch repairs	Some blocks cracked.					Removal of soiling and replacement of cement pointing.
Kilmarnock Standard	K	5	Protruding water-shedding elements (sills, string courses, cornices etc.).	To wet protruding elements; some plant growth and guano.	Upper masonry very wet suggesting rainwater goods not functioning	Associated with water splash to basal courses; and penetration to cornice.	Much granular decay to basal courses from salts; splitting of damp prominent elements; physical damage to ground floor sill course.	Coating of lower levels (linostone?)	localised areas of cracked masonry	Abrasive, loss of details			Yes	Stone replacement to water damaged masonry (e.g. cornice) and basal courses. Much repointing required, and protection of water-shedding elements.
EAC	K	6	Prominent elements.	Associated with damp prominent elements; localised plant growth.		Wet upper parts	Scaling of areas with water penetration; localised splitting of sills, string courses etc.	Linostone to parts of ground floor	Locally intense cracking	Abrasive, loss of details		Cracks above corner entrance and splitting string course		Replacement of water damaged prominent elements and related ashlar, and some cracked masonry.
Kilmarnock Railway Station	K	7	Localised areas.		Generally good but with severe localised failure leading to masonry saturation		Previously scaled masonry has been dressed back to sound stone.	Possible coating to parapet		Abrasive, loss of details				Recent repairs include dressing back of scaling stone, some replacement and protection of prominent elements. Lack of maintenance with defective downpipe causing water saturation to wall.
Central Evangelical Church	K	8	Much penetration to exposed upper parts and prominent elements.	Much dark organic; some guano.		Wet upper parts and to basal courses.	Scaling and splitting to wet masonry.						To areas of water penetration	Stone replacement due to extreme water penetration, and protection of wet prominent elements required.
John Finnie Street NW wall	K	9	Much of wall has water penetration.	Much heavy soiling where damp.	n/a		Much granular decay of saturated masonry.	Cement and brick patch repairs to damaged areas	Structural bulging; cracks to copestones				Replacement of failing cement pointing	Some rebuilding and replacement stonework required. Replacement of damaged copestones required.
Allen & Harris	K	10	Much to protruding elements and high level masonry (e.g. copestones); also basal courses	Soiling to wet areas; some plant growth; some graffiti.	Much defective with blocked gutters and damaged flashings.	From splash to basal courses and damp upper levels.	Very much scaling and granular decay due to water penetration; splitting of some dressed stone.	Render in places	Localised cracking	Ground floor cleaned with loss of smooth ashlar surfaces.	Minor spalling		Yes	Stone replacement to basal courses and water-damaged upper parts; also cracked masonry. Major repairs to rainwater goods required.
Opera House	K	11	Extensive to exposed upper areas of masonry.	Extensive soiling where wet; much plant growth and guano	Completely failed	Damp upper levels	Scaling where masonry is damp, and to salt-damaged basal courses.	Linostone to basal courses	Localised cracking				To areas of water penetration	Unprotected wallhead with extensive water penetration to façade; replacement to water-damaged masonry required.
Handling Hair	K	12	Much to upper parts beneath damaged timber cornice, and other prominent elements, and adjacent to failed downpipes.	Soiling of masonry adjacent to failed downpipes	Extensive failure	Localised areas related to water penetration of upper masonry	Scaling and splitting of masonry elements subjected to water penetration.							Replacement stone required to masonry damaged by water penetration.
Golden Phoenix/Homeless House	K	13	Prominent masonry elements (e.g. cornices, string courses) and adjacent stonework.	Dark soiling of saturated prominent elements; some plant growth.		Mostly associated with saturated upper masonry elements	Splitting of prominent masonry elements e.g. mullions; scaling and granular decay to adjacent water damaged masonry (e.g. dentils). Scaling to side elevation rubblework.		Locally intense cracking		Some spalling	Mullions splitting	Yes	Stone replacement required to saturated prominent elements (e.g. string courses).
Laigh Kirk	K	14	Much of façade affected especially prominent masonry elements and adjacent stonework.	Where damp; some guano.		Present in masonry subjected to water penetration	Much scaling where water penetration; granular decay to decorative stone.	Cement repairs to basal courses					To areas of water penetration	Much stone replacement required, and protection of exposed water-saturated masonry.
Atrium Homes	K	15	Some to upper parts, in particular prominent masonry elements.	To damp prominent elements at high level.			Extensive granular decay due to water penetration.	Cement patches						Protection of prominent elements required, with stone replacement of damaged masonry.
Railway arches	K	16	Much to exposed masonry elements at upper levels.	Extensive soiling from water penetration at upper levels; plant growth in areas of water penetration.		Associated with water penetration at high levels	Some granular decay and loss of drip detailing to cornices and string courses.	Cement patches to decayed blocks	Some, mostly at high levels				Previous cement repointing causing damage to stone.	Work needed to address high level water penetration to structure, causing unsightly soiling and damage to stone.
Victoria Wine	K	17	Some prominent elements.	Much dark soiling to water saturated prominent elements and adjacent stonework			Scaling where water penetration to masonry.	Possible cement repairs at high level			Some dressed stone spalled		To water shedding features (e.g. cornice, string course)	Protection of prominent elements required, and stone replacement to adjacent damaged stone.
Post Office	K	18	Exposed upper stonework and prominent elements, and in masonry adjacent to blocked downpipes.	Much green soiling to base courses; some guano on decorative elements.	Blocked downpipes in several places	In masonry adjacent to areas of water penetration	Splitting of damp sills and scaling of masonry associated with water penetration.		Localised areas of cracked masonry	Abrasive; etched appearance with loss of details.			To areas of water penetration	Minor stone repairs to cracked areas; requires protection of exposed masonry from rainwater penetration.
Tannahills	K	19	Severe affecting much of façade.	Extensive soiling to damp façade	Very poor condition -most failing to function.	Areas of façade associated with water penetration; also to basal courses	Extensive areas of granular decay on facade due to long term water penetration.						Extensive repointing required	Long term water penetration to facade with need for extensive stone repairs.
Paper Roses	K	20	Much to exposed and prominent elements (e.g. cornice and adjacent stonework); also basal courses.	Dark soiling to wet areas; some plant growth.	Failed in places	Associated with water penetration e.g. beneath cornice	Water penetration causing granular decay to cornice; splitting of sills etc.		Present throughout		Large dressed stones spalling			Stone replacement required, mostly associated with severe water penetration to cornice. Protection of prominent features required.
Balti	K	21	Much to prominent elements and areas of walling adjacent to failed rainwater goods.	Soiling to wet prominent elements, and where rainwater goods have failed.	Failed in places with much saturation of masonry	Associated with areas of water penetration	Scaling of water damaged masonry, including salt damage to basal courses. Granular decay to masonry adjacent to failed downpipe.	Cement patches present	Present throughout				To areas of water penetration	Repairs required to cracked stone and water-damaged areas. Maintenance required including protection of water shedding elements.
Mason Murphy	K	22	Much to exposed areas (e.g. parapet), cornices and other prominent elements.	Dark soiling to prominent elements and to masonry around blocked rainwater goods.	Failed in places		Scaling and granular decay.	Localised patches of coloured cement	Common, previous "stitch" repairs				To localised areas of water penetration	Requires repairs to prominent masonry elements e.g. damaged drip detailing. Parapet needs protected from water penetration.
Garden Street back wall	K	23	Much to entire wall due to poor condition of copestones and loss of pointing.	Soiling at base; some plant growth; some graffiti.	n/a		Much scaling and granular decay of saturated bocks.	Some cement patching	Present				Yes	Many blocks need replaced due to severe water penetration.
Johnnie Walkers	K	24	Much to prominent elements and masonry adjacent to failed rainwater goods; also basal courses	Much soiling and plant growth where damp; some graffiti and guano.	Some failed with extensive damage to adjacent stone	Related to rainwater penetration, and splash to basal courses	Much granular decay due to water penetration and salts at all levels	Large areas of decayed stone have been painted; some cement repairs				Decay of dentils beneath parts of cornice and other high level masonry.	Extensive repointing required to much of the stonework	Extensive replacement to exposed masonry and prominent water-shedding elements; and to basal courses.
Torbets	K	24	Much to exposed and prominent elements (e.g. parapet and cornices).	Dark soiling associated with general water penetration.	Damage to stonework adjacent to blocked downpipe	In masonry adjacent to areas of water penetration	Scaling and splitting due to water penetration of prominent elements, and granular decay of adjacent damp masonry.	Much cement to gable	Present		Spalling of blocks, in particular on gable	Loose cement and face bedded stone.	To damp areas of façade; extensive to gable	Replacement of scaled blocks due to water penetration and face bedding; protection of water shedding features. Gable needs repair also.
Goodfellows	K	25	Much to projecting masonry and adjacent stonework; also basal courses.	Dark soiling related to areas of water penetration	Failing on rear elevation	In basal courses, and masonry adjacent to failed downpipes on rear.	Scaling to water-saturated stone and basal courses affected by salt splash. Granular decay of rear rubble granular adjacent to failed rainwater goods.	Linostone to basal courses and cement patches					Much required to areas damaged by water penetration	Replacement of stone mostly associated with water damage to prominent or ornate elements, and to basal courses from salt splash.

6. BUILDING STONE USED IN KILMARNOCK: GEOLOGICAL SOURCES AND HISTORIC QUARRIES

6.1 Background

The building stone used in Kilmarnock is dominated by two distinct geological source areas; the local pale coloured 'blonde' Carboniferous sandstones that underlie the town and its immediate surroundings, and the Permian 'red sandstones' that were obtained from the Mauchline Basin to the south. In this section both source areas are described in terms of their geology and the records of historic building stone quarries that existed. All the main quarries are individually documented and their current status is described. There are currently no active sandstone building stone quarries in Ayrshire or West Central Scotland.

6.2 Geology of the Kilmarnock district and sources of building stone

The bedrock geology of the Kilmarnock area is dominated by sedimentary rocks of Carboniferous age. The topography of the district reflects the underlying geology, with hard volcanic rocks forming the upland areas to the north and softer sedimentary rocks creating the lowlands to the south. The town of Kilmarnock lies on the Coal Measures Group rocks of the Kilmarnock Basin which form a wedge shaped-outcrop, decreasing in size from west to east (Fig. 34). These rocks consist of mudstones, siltstones, sandstones, coals and ironstones, laid down as a series of repeated 'cycles' over time by large river systems (fluvial-deltaic deposits). The Coal Measures of the region were extensively mined in Kilmarnock, as well as in Crosshouse and Galston.

The geology of the Kilmarnock district is shown in Fig. 34. Immediately to the north of the town older rocks of the Clackmannan Group (part of which is known as the Passage Formation) are dominated by mudstones, limestones and coals, with local sandstones and siltstones; and the Strathclyde Group, consisting of impure red-purple or brown mudstones and siltstones with volcanic debris, and rare sandstones. Lower Carboniferous rocks of the Inverclyde Group and older rocks of Silurian-Devonian age of the Lanark Group crop out to the south of the Kilmarnock Basin. The strata consist of predominantly pale yellow to reddish sandstones and grey silty mudstones. Extensive areas further to the north and east (stretching from Stewarton to Eaglesham) are basaltic volcanic rocks ('whinstone') of the Clyde Plateau Volcanic Formation. Throughout the region numerous small igneous intrusions cut through the sedimentary rocks, providing local sources of whinstone.

Throughout the district the most commonly used building stone is sandstone. Small quarries ('borrow pits') would have provided early sources of stone for local use where the geology was favourable. Across the district larger scale quarrying exploited various parts of the sedimentary sequence, most notably in the Cockbee Sandstone (lower Clackmannan Group) near Stewarton, in the Shillford Quarry sandstone (middle Clackmannan Group) near Uplawmoor. In Kilmarnock sandstone suitable for building purposes was obtained from the local Coal Measures Group, quarried at a number of localities on the outskirts of the town (e.g. Dean Castle Quarry and Holmes Quarry).

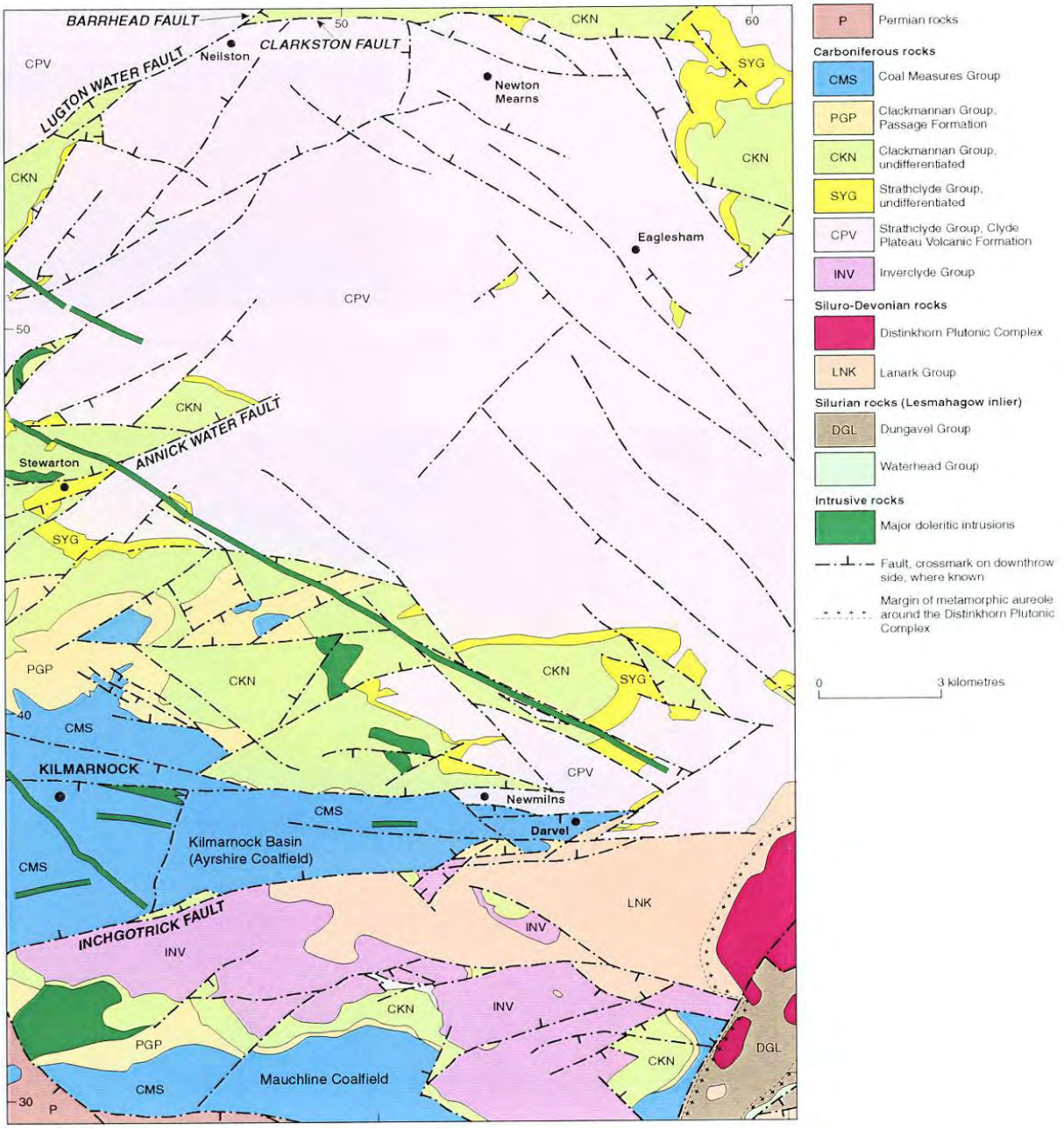

Fig. 34. Geological map of the Kilmarnock district from MacPherson et al. (2000), showing the complex bedrock geology. The Coal Measures Group which provided most of the blonde sandstone used for the early construction in the town is shown in blue.

The volcanic rocks of Carboniferous and Devonian age have been quarried locally largely for hard rock aggregate, and mostly in small quarries for local use. This material is likely to be variable in quality and difficult to work, most probably used for infill and roadstone, etc. Several of the quarries within the dolerite sills are thought to have been of sufficient quality to provide kerb stones or setts, but they were likely to have been relatively small scale operations. A number of significant hard rock ('whinstone') aggregate quarries still exist in the area today, e.g. at Craigie Quarry and Tincornhill (Sorn), supplying crushed aggregate and road stone.

Throughout the district the geology is largely overlain with glacial sand and boulder clay deposits. Brickclays occur within the superficial deposits of valley floors, mainly

interbedded with sand and gravel, and were utilized in local potteries, brickworks and tileworks. Small clay pits were worked in the Irvine valley, the largest of which was Gargieston Brick and Tile Works immediately southwest of Kilmarnock. This is shown as an extensive quarry on the 1860 Ordinance Survey map, but is not present on the 1938 map suggesting production had ceased. Today the site is infilled and covered by a recent housing development.

6.3 Building stone quarries in the Kilmarnock area

A number of building stone quarries are known to have operated in Kilmarnock and the immediate surrounding area exploiting the Carboniferous ('blonde') sandstones of the Coal Measures Group (Fig. 35).

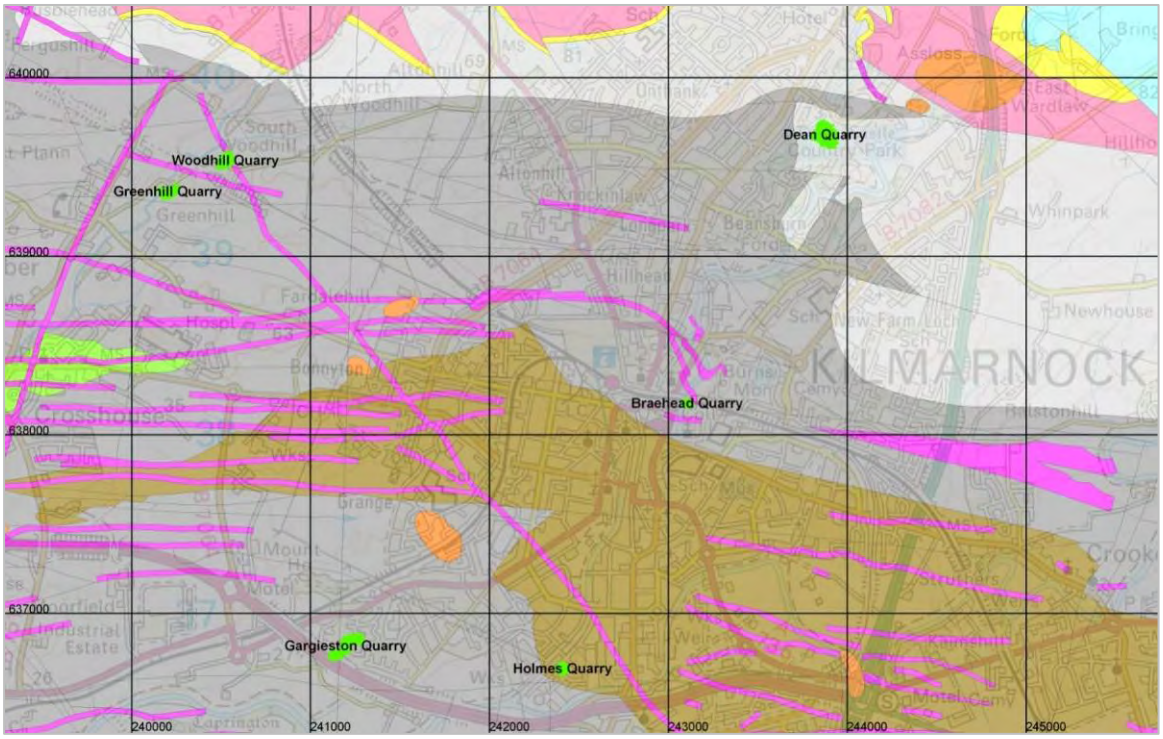

Fig.35. Location of the main building stone quarries in the Kilmarnock district. Areas of extraction are highlighted in dark green. The quarries exploited different sandstone beds within the Coal Measures Group of the Carboniferous rocks of the Kilmarnock Basin. Key: Lower Coal Measures = Light grey; Middle Coal Measures = Dark grey; Upper Coal Measures = Brown. Light green area to west of the town is basic igneous rock ('whinstone'). From MacPherson et al. (2000).

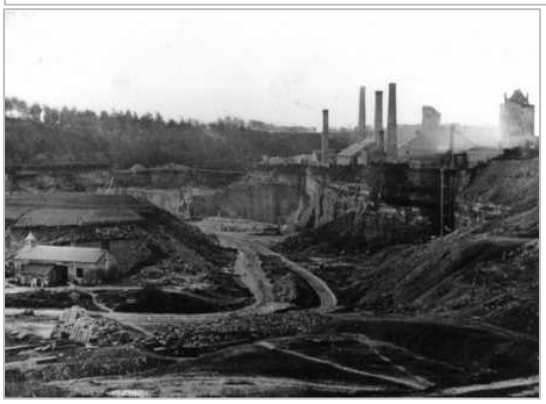

Fig. 36. Dean Quarry whilst still active in the mid-19th century. The large scale of the quarry operation is evident from this photograph. (http://www.geographyhigh.connectfree.co.uk).

The most significant quarry by far in Kilmarnock was Dean Quarry, which was used for many early buildings in the town, and ceased production in the second half of the 19th century. Most of the other local quarries appear to have been smaller and relatively short-lived, providing lesser quality stone or stone for specialist use. By 1925 no building stone was quarried in the Kilmarnock area (Anderson and Wilson 1925).

6.3.1 Dean Quarry

Dean Quarry (NS438396; Lower Coal Measures) is recorded as having been the most important source of building stone in the eastern part of Ayrshire (Anderson and Wilson 1925). The quarry was described as containing close to 18 m thickness of sandstone. It was worked by J & M Craig from the early 1800s until it closed in the 1870s, when it was apparently exhausted. It is likely that many of the early buildings in Kilmarnock were built using stone from this quarry. The original quarry site existed as both a freestone quarry and a fireclay brickworks, and historically many houses were constructed on the site for the workers and their families.

Fig. 37. The disused and flooded Dean quarry in 1906. The tops of the working faces are visible. (http://www.kilmarnock.org.org.uk).

Fig. 38. Dean Quarry in 2008, mostly infilled and flooded and used as a nature reserve. The former quarry faces are now heavily overgrown by trees and scrub and largely inaccessible.

The historical development of Dean Quarry is illustrated in Figs. 36 to 38 and shown in Fig. 40. The quarry is identified as an active freestone quarry on the 1860 Ordnance Survey map, but by 1897 it is marked as 'Dean Quarry Pond', and by 1938 it appears to have been partially infilled and planted with trees. Today the quarry site exists within the Dean Castle Country Park, forming part of a wildfowl reserve. A section of the original quarry face is still visible, although it is very overgrown and almost inaccessible. Large faces up to 10 m high remain with individual beds of sandstone several metres thick. The stone is a coarse-grained, blonde sandstone marked with impersistent thin black bedding planes. The quarry has been worked to the limits of the site and is now enclosed by urban development.

Fig. 39. The former Braehead quarry in Kilmarnock (2008), now forming part of Kay Park. The railway line lies behind the trees in the background, and much of the stone was probably used to construct the viaduct in the 1840s.

6.3.2 Braehead Quarry

Braehead Quarry (NS431382; Middle Coal Measures) was located immediately north of Kilmarnock town centre, near to the southwest edge of Kay Park. No indication of the quarry exists on the historic Ordnance Survey maps. It is likely that the quarry was used to provide stone for the adjacent railway viaduct in 1848. It is possible the same stone was also used for other buildings and structures in the town at this time. Today the site forms a grassed and wooded embankment with no stone exposed (Fig. 39).

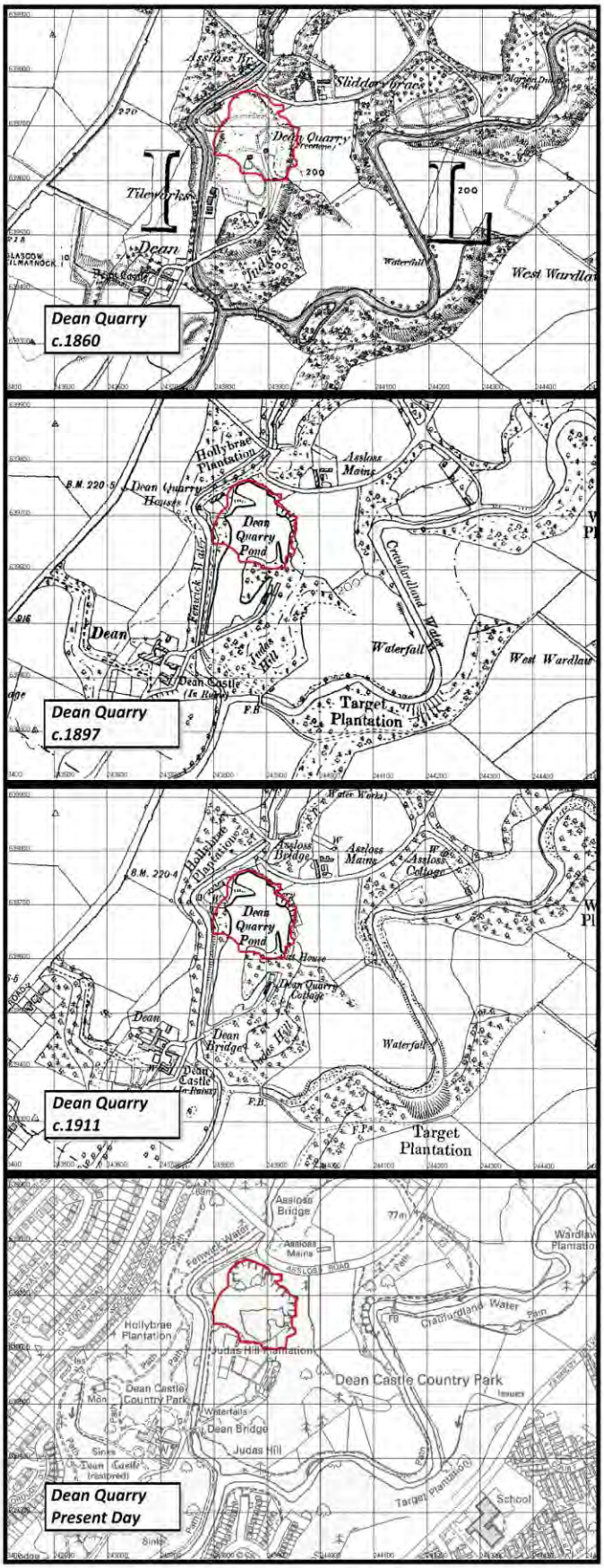

Fig. 40. Historical development of the Dean Quarry seen from Ordinance Survey maps. The quarry was still active in 1860, but appears flooded by 1897.

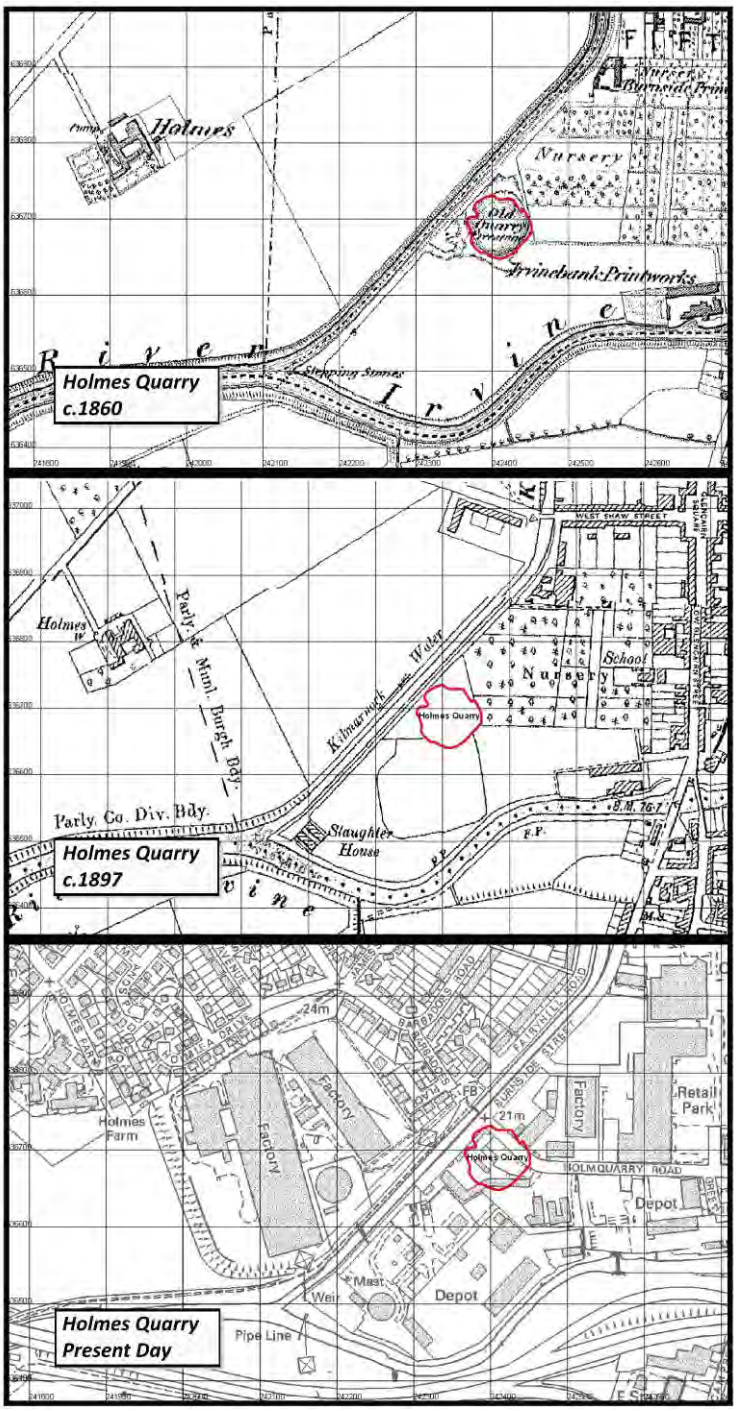

Fig. 41. Historical map sequence for Holmes Quarry, likely to have been one of the early town quarries supplying building stone for Kilmarnock, showing it was abandoned by 1860 and infilled by 1897.

6.3.3 Woodhill and Greenhill Quarries

To the west of Kilmarnock, two early sandstone quarries operated in Middle Coal Measures rocks at Woodhill [NS404395] and Greenhill [NS400393] near Crosshouse. Both quarries were adjacent to a (now disused) railway line. Quarrying at these sites appears to have ceased by the early 20th century. On the 1860 Ordnance Survey maps Woodhill Quarry was already marked as an "old quarry" and is absent from the 1897 edition. Woodhill Quarry is recorded as having producing a freestone, but under a thick cover of superficial deposits, which probably ultimately made quarrying uneconomical (Anderson and Wilson 1925).

Greenhill Quarry appears to be active on the 1860 map (marked as 'freestone') and also on the 1897 map. It is recorded as operating later than Woodhill Quarry, and producing bedded material rather than massive (as in Woodhill) for use as lintels and oven soles (Anderson and Wilson 1925). Nearby farm buildings are built from a very fine grained, light greyish-blue, finely bedded sandstone; a stone type not seen in Kilmarnock. This quarry also had a heavy cover of superficial deposits, which is likely to have limited its production. Both these quarries are now infilled and used as agricultural land. Neither appears to have been significant quarry operations, and their link to buildings in Kilmarnock is doubtful.

6.3.4 Holmes Quarry

There are a number of old building stone quarries in uppermost Carboniferous rocks (Upper Coal Measures) on the south side of Kilmarnock, for example Holmes Quarry and Gauchalland Quarry.

Holmes Quarry [NS424366] is likely to have been one of a number of early town quarries, possibly operating as early as the 18th century (see Chapter 2). It appears on the 1860 Ordnance Survey map as "old quarry—freestone", but it is not present on the 1897 maps (Fig. 41). It is described as producing a coarse grained sandstone with a variable white to red colour (Anderson and Wilson 1925). Today Holmes Quarry is completely infilled and forms part of an industrial estate. Gauchalland Quarry produced a coarse red feldspathic sandstone, likely to be of relatively poor quality and of less significance.

6.3.5 Ardeer Quarry

Although located outside of the Kilmarnock area, the Carboniferous sandstone worked at Ardeer Quarry [NS273417] was an important building stone within Ayrshire. Ardeer (or Stevenston) Quarry was the largest building stone quarry operated in Ayrshire. Situated on the south side of Stevenston, the quarried building stone was known to be of a high quality, fine grained, white sandstone from the Coal Measures Group. 'Stevenson Stone' was well regarded and reputedly capable of taking a fine polish and able to be sawn into marble-like slabs, providing columns up to 6 m long (Landsborough 1845). The sandstone was used locally and also taken by railway to Ardrossan for export to Ireland (Dublin and Belfast). The quarry provided both external ashlar and rubble, as well as stone for decorative work, including internal stairs, paving, and chimney-pieces.

It is recorded that Ardeer Quarry was the most valuable source of white freestone sandstone in the west of Scotland (Landsborough 1845). The average number of men employed in the quarry in 1845 was 35. However, by the early 20th century the workable sandstone was noted to occur beneath poor quality material (Anderson and Wilson 1925), implying that it had become difficult to quarry, and it was largely worked out within the current quarry boundary. The quarry site exists on Ordnance Survey maps dating from 1860 up until 1938, although it does not appear to have increased in size beyond 1897 and may not have been particularly active after this time. Today the quarry is completely infilled and used as public parkland with a lake, and is a Site of Special Scientific Interest and a designated North Ayrshire Wildlife Site.

A number of other significant building stone quarries were in operation on the north Ayrshire coast (Anderson and Wilson 1925). Craiksland Quarry [NS353315] near Troon provided a fine-grained sandstone from the Coal Measures Group, known as 'Ayrshire Blue Stone'. It was used for monumental work and church interiors as well as a building stone. The nearby Collenan Quarry [NS348329] produced a similar building stone, although it was recorded as a lesser quality stone to Craiksland. It is possible that blonde sandstone from these Ayrshire quarries was used in Kilmarnock, although no records have been found to confirm this.

6.4 Mauchline red sandstone: Geology of the district and sources of stone

Approximately 15 km to the south of Kilmarnock, rocks of Permian age lie within the Mauchline basin. They consist of volcanic rocks overlain by red coloured sandstones (Fig. 42), and occupy an area of approximately 46 square km, forming a relatively flat landscape with a slight downwards slope to the south. The sandstones are typically strongly red in colour, and are geologically much younger than the 'Old Red Sandstone' of Devonian age which crops out in many parts of the UK; hence the name 'New Red Sandstone' for these rocks.

The sandstones of the Mauchline Basin represent a vast accumulation of ancient sand-dunes, formed mostly by windblown activity in a desert environment. They are thought to be c.450 m thick where the major quarries operated immediately south of the village of Mauchline (Fig. 43) (Eyles 1949). The stone is typically uniform and massive with characteristic large scale cross bedding, and a generally consistent colour ranging from brick-red to bright orange. It is dominated by well rounded quartz grains (c.97% silica), and almost free from mica (Eyles 1949). Grainsize can vary markedly with alternating thin layers ('beds') of fine and coarse grained material. Occasional grey-white or reddish-grey bands, and more common circular white, grey, or greenish spots, typically less than 50mm in diameter, can occur.

Sandstone quarrying in the Mauchline region dates as far back as the early 18th century (Lyell, 1986). One of the earliest quarries in the region was the Haughyett Quarry [NS499262]; c.1km south of Mauchline, Fig. 43), which was initially run by a W. Gibson and then subsequently by Marcus Bain, reaching its climax by the turn of the 19th century. By 1909 a number of additional quarries bordering Haughyett, known as the Ballochmyle Quarries, were also operated by Bain. Over two hundred men were employed at one time in the three quarries, and demand was such that operations ran late into the evenings using artificial light. The stone was widely used for building purposes throughout the United Kingdom and Ireland, and it was also shipped as far as the United States. The nearby large Barskimming Quarry [NS489260] was operated by Baird & Stevenson and produced a very similar stone. Following the First World War the quarries declined due to a combination of economic hardship and increasing availability of man-made materials. By the 1930s only one quarry in Ballochmyle remained in operation (Anderson and Wilson 1925). Quarries recorded as being closed by this time are Barskimming Quarry, Montgomerie Quarry at Failford (c.5km west of Mauchline), and a quarry at Trabboch Mains Farm (c.5km southwest of Mauchline). Quarrying at Ballochmyle continued in a reduced capacity until the 1950s, and most of the abandoned quarries were infilled with waste from coal mining (Lyell 1986).

The success of the Mauchline quarries can be attributed to two reasons. Firstly, they exploited large quantities of consistent, high quality red sandstone, which was both relatively easy to extract and also relatively easy to work as a building stone. Secondly, the major Mauchline Quarries were located directly beside the Glasgow-Carlisle railway line which opened in the 1840s. This location allowed the easy transportation of the stone, which became widely used throughout the country as the railway system expanded. Initially, the construction of the railway system itself created a demand for building stone; most of the red sandstone used for the Ballochmyle Viaduct and bridge (c.1846-1848) was quarried onsite (stone for the arches was brought by rail from a quarry near Dundee) (Boyle 1909; Smith 1994).

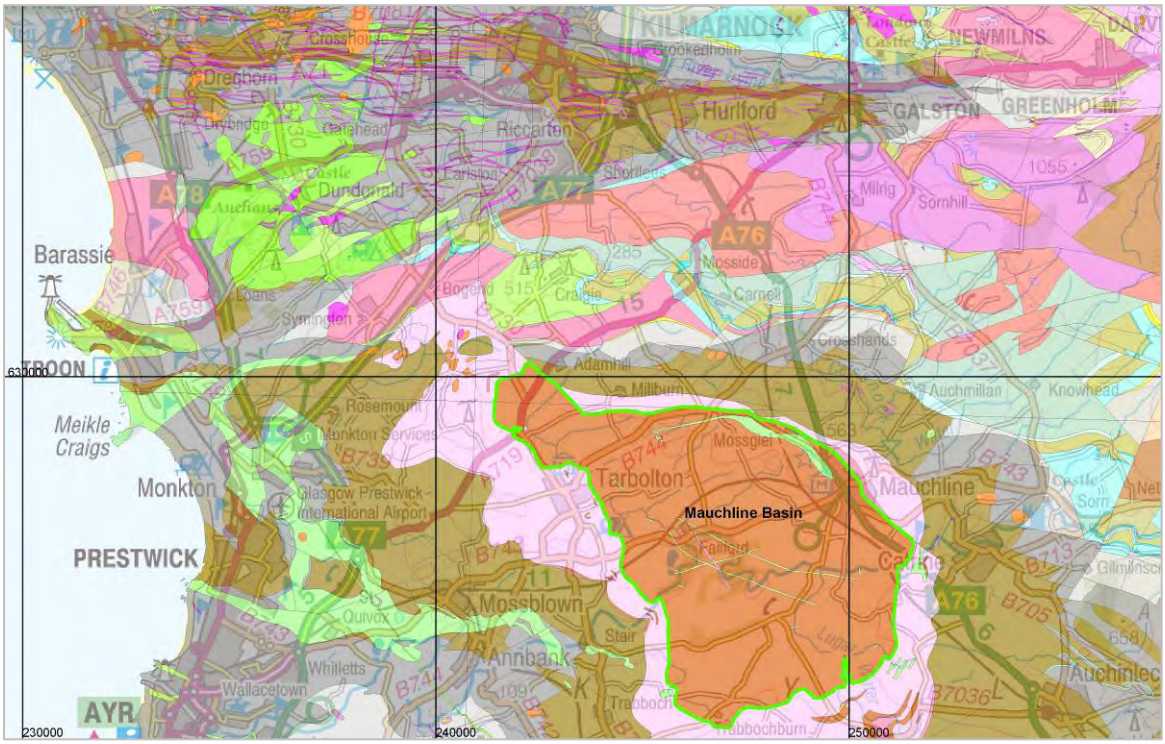

Fig. 42. Geological map of part of southern Ayrshire showing the Mauchline Basin, comprising thick red sandstones of Permian age (orange on map) surrounded by (and overlying) volcanic rocks (shown in pink), lying within the complex sequence of mostly Carboniferous sedimentary rocks of the region (Source: BGS).

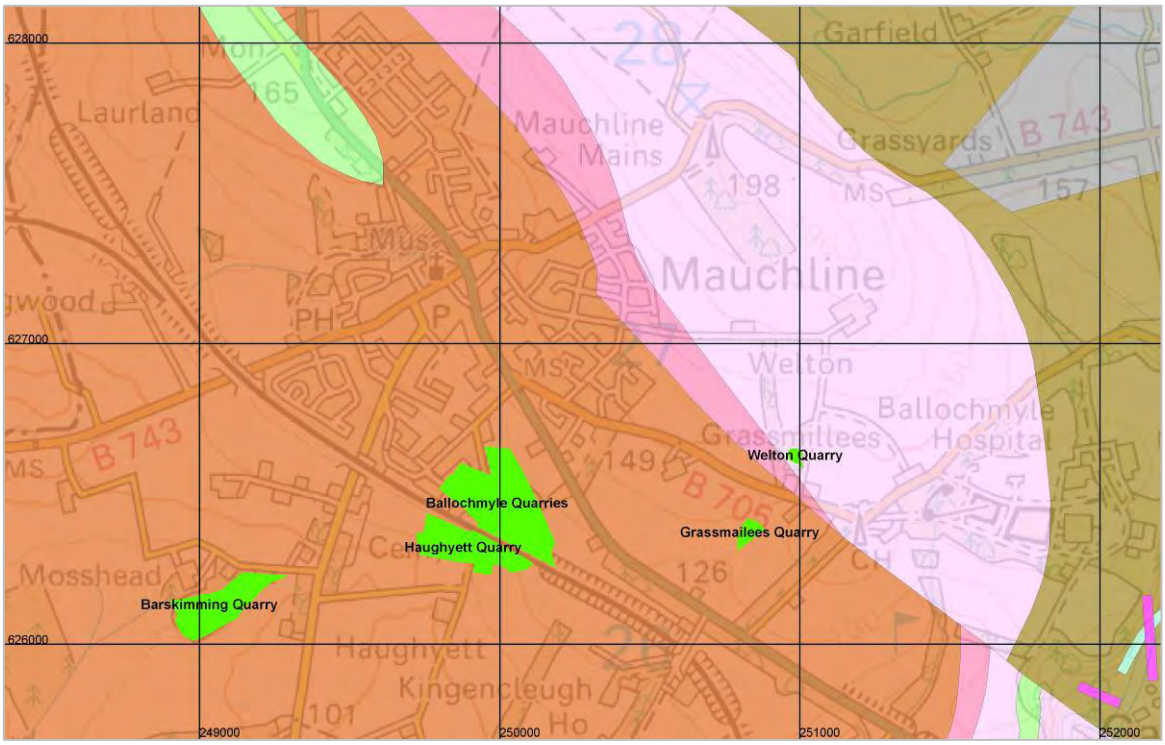

Fig. 43. Locations and areas of the major quarries operating to the south of Mauchline village, including the Ballochmyle quarries. Note the proximity of the major quarries to the railway (Source: BGS).

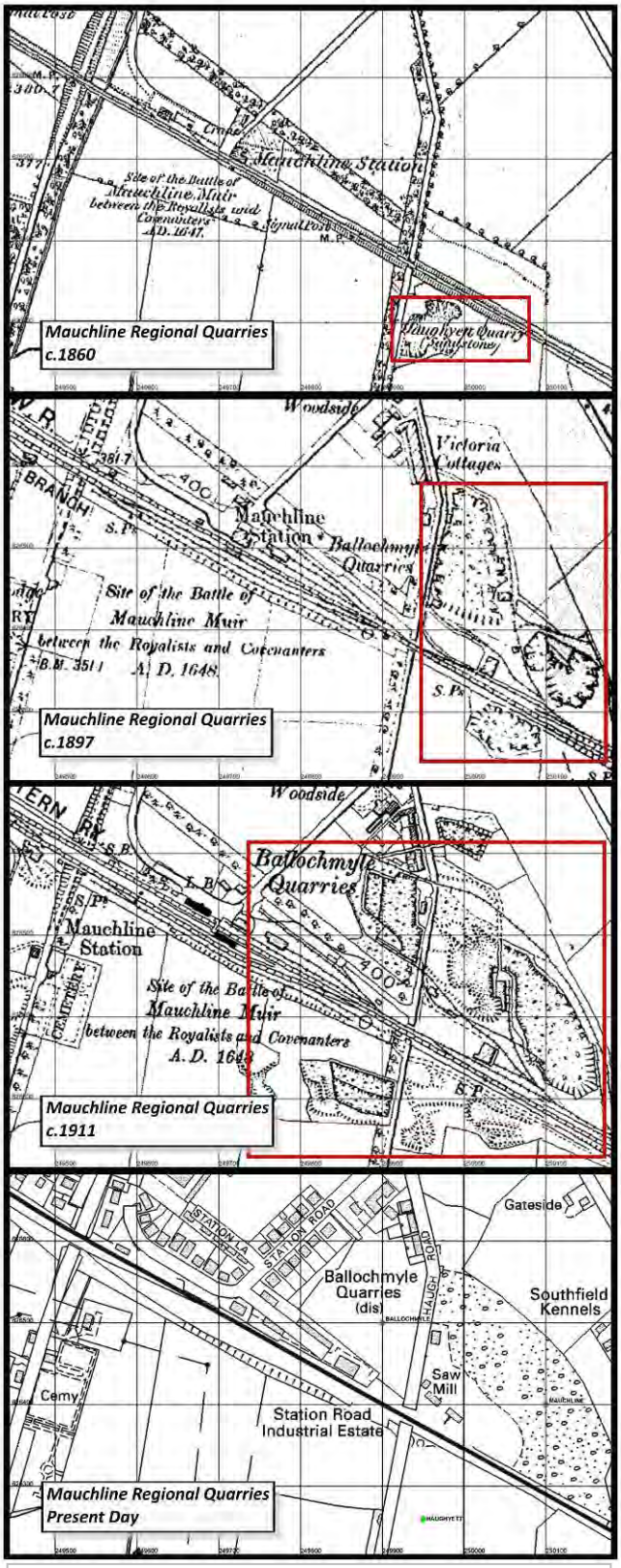

Fig. 44. The historical development of the Ballochmyle quarries, as shown by a sequence of images from Ordinance Survey maps. Haughyett quarry, immediately south of the railway, was the earliest quarry prior to development of the larger Ballochmyle quarries on the north side.

6.5 Building stone quarries in the Mauchline district

There are no active building stone quarries in the Mauchline district today. A selection of some the most important former sandstone quarries for which documentary evidence has been found are described below. The production of red sandstone in the Mauchline area was dominated by a few large quarries, all located close to the railway line just south of Mauchline village; the Ballochmyle Quarries, Haughyett Quarry and Barskimming Quarry.

6.5.1 Ballochmyle Quarries

The historical development of the Ballochmyle Quarries is shown in Fig. 44 and illustrated in Figs. 45 to 47. Haughyett Quarry was the earliest sandstone quarry, operating on the east side of Haugh Road immediately south of the Mauchline railway tracks. It is shown as operating on both the 1860 and 1897 Ordnance Survey maps, but by 1911 it appears to be no longer in production and was possibly used as a tip for spoil when quarrying activity expanded to the west side of the road. The largest quarries at Ballochmyle were immediately north of the railway, initially extending from the east side of Haugh Road towards the railway, close to the Mauchline Railway Station. Nothing is shown on the 1860 Ordnance Survey sheet, but by 1897 the quarry was in operation and forms an extensive area on the map. It was still active, and had further expanded by 1911. On the 1911 map, extensive quarrying is also shown on the adjacent west side of Haugh Road.

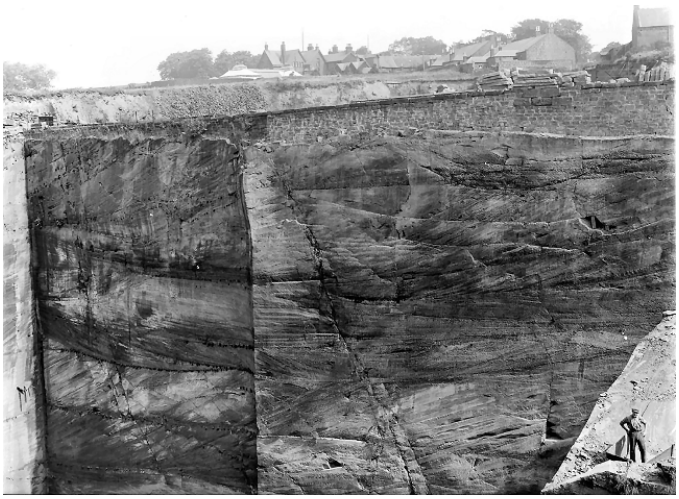

Fig. 45. One of the Ballochmyle quarries (west of Haugh Road), when still operating in 1921 (BGS Photo P000073).

Fig. 46. Image from 2008 showing the infilled quarry at Ballochmyle (west of Haugh Road) in Fig. 45 (note the buildings are the same as those in the previous figure).

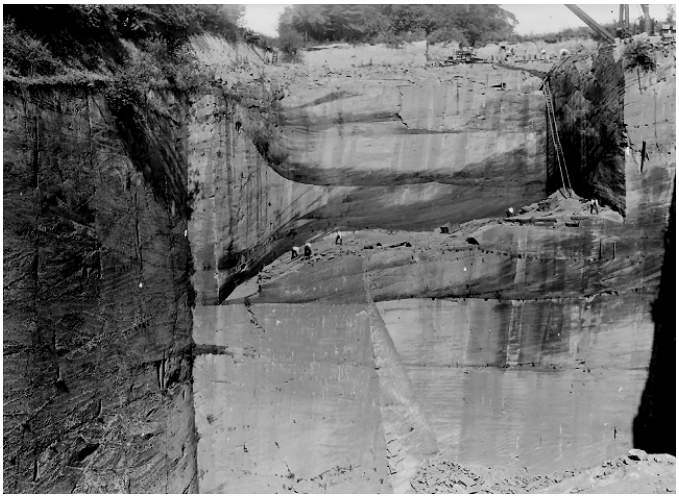

Fig. 47. One of the Ballochmyle quarries in 1921, showing the scale of the workings and depth of quarry. The curved bases of the thick dune sandstone beds are clearly seen. (BGS Photo P000071).

Today the Ballochmyle Quarries are closed and infilled. The site of Haughyett Quarry is a hollow with scrub vegetation and arable fields (Fig. 48). Much of the area is now quarry spoil up to 8 m thickness in places (Fig. 49). The Ballochmyle Quarries north of the railway lines are completely infilled, forming scrub land and fields for livestock. No exposures of stone remain at any of the sites.

Fig. 48. Haughyett quarry (east) in 2008. The quarry is almost completely infilled and no stone is exposed.

Fig. 49. Part of Haughyett quarry (east) in 2008, showing recent trial excavation revealing extensive infill of red sandstone quarry spoil. Most of the stone is too small to be of use for building purposes, and no bedrock is exposed.

Fig. 50. Barskimming quarry near Mauchline in 2008. The quarry is completely flooded and the former faces are inaccessible.

6.5.2 Barskimming Quarry

The Barskimming quarry, about 1km southwest of Mauchline, is shown on the 1860 Ordnance Survey map as an 'old freestone quarry', and is not marked on the 1897 edition. However, by 1911 the quarry appears re-opened and much expanded. It is likely that the earliest quarrying at Barskimming predated the railways (it may have supplied building stone for Mauchline village), and the quarry was reopened in the late 19th century as the market for Mauchline sandstone increased. Today the quarry is abandoned and exists as a large water-filled hole (Fig. 50).

Fig. 51. Grassmailees quarry in 2008, now partially infilled and flooded, with no stone exposed. The quarry site is now agricultural land.

6.5.3 Grassmailees and Welton Quarries

These two quarries are recorded on the early Geological Survey map from the late 19th century (Fig. 52). Grassmailees (alternatively spelt Grassmillees) Quarry is a small quarry situated approximately 2.5 km to the southeast of Mauchline [NS508263]. Unlike the others it is located away from the railway (which it probably predates) and it is unlikely ever to have developed as a major quarry. It is shown as a freestone quarry on the 1860 Ordnance Survey map, but is not present on the maps after 1897. Today no stone is exposed and the site forms a flooded depression in an area of open fields (Fig. 51).

A small quarry at Welton, immediately to the north of Grassmailees, is marked on the 1860 Ordnance Survey map as a whinstone quarry (Fig. 52) [NS509266]. It also appears to have ceased production by 1897 and today forms a partially infilled hollow in an area of woodland with exposures of fresh (albeit intensely fractured) dolerite. It is likely that both of these quarries predated the railway, and because of their distance from the railway, it is probable that they became unable to compete with the new larger quarries which were opened up adjacent to the line at Ballochmyle.

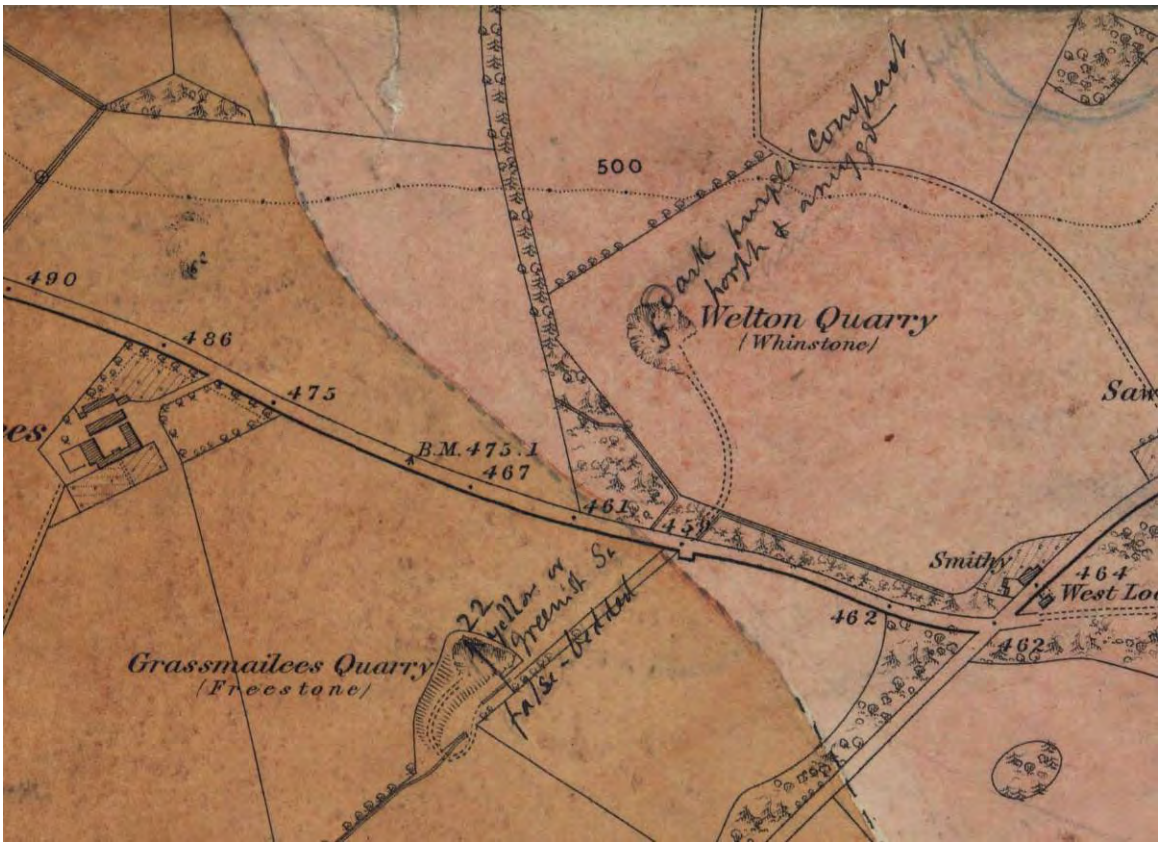

Fig. 52. Detail from the early Geological Survey map c.1860, recording exposures in the Grassmailees and Welton quarries. The comment for Grassmailees is "yellow or greenish sandstone, false bedded [i.e. cross-bedded]", shown to be dipping to the northwest at 22 degrees; for Welton "dark purple compact porphyritic and amygdaloidal quartz-dolerite". (Source: BGS)

6.5.4 Auchinweet Quarry

Auchinweet Quarry [NS455268] is situated near Tarbolton approximately 6 kilometres to the west of Mauchline. It is likely to have been an early quarry developed prior to the railway and is shown on the 1860 Ordnance Survey map. The sandstone is recorded as used for the original c.1850 Kilmarnock Station House (Hunt 1860), although oddly it is described as a building of "austere grey sandstone" (Close 1992). The quarry was over 2 km distance from the nearest railway line which is likely to have restricted its further development, and by 1897 the Auchinweet Quarry is marked as disused on the OS map.

6.6 Summary of the main stone types used in Kilmarnock's stone built heritage

Three distinct generic types of building stone have been identified from the Kilmarnock buildings surveyed in this study:

1. Local 'blonde' sandstone from Kilmarnock.
2. 'Imported' high quality pale coloured freestone sandstone.
3. 'Red' sandstone from the Mauchline Basin ('Mauchline Sandstone').

6.6.1 Local stone from Kilmarnock (predominantly 'blonde' sandstone)

Prior to the railways and improved transportation, stone was obtained from a number of very local sources in and around Kilmarnock. The earliest buildings (e.g. K2; 1-3 Dunlop Street) were built using random rubble consisting of relatively low quality sandstone and whinstone boulders, probably obtained very locally as field or river boulders, or from shallow quarries likely situated close to the site of construction. Several small town quarries such as Holmes and Gauchalland Quarries would have supplied early construction in Kilmarnock. Continued growth of the town through the early 19th century, along with an increasing demand for better quality stone, led to the opening of larger quarries such as Dean Quarry. The presence of such a large quarry producing high volumes of relatively good quality stone is likely to have caused the demise of the earlier quarries, and there is little doubt that Dean Quarry became the dominant source of blonde sandstone in the town. Braehead Quarry, located immediately north of the town centre, may have been opened specifically to service the demand for stone for the adjacent railway viaduct in 1848, and possibly supplied stone for other building in the town at this time.

6.6.2 'Imported' pale coloured high quality sandstone

A few of the surveyed buildings are constructed from blonde sandstone which is of a much higher quality than the local sandstone. It has been used in higher status buildings where ashlar quality masonry and detailed carving is present (e.g. K25; Goodfellows building). A similar stone is used in high volumes in the large Johnnie Walker Warehouse Building (c.1897) in combination with brick. It is unlikely that the local Dean Quarry could have supplied stone for either building—a freestone which was fine grained enough for sculptural work, or such high volumes of consistent quality stone—so it is probable that blonde freestone was sourced from outside the district. By the turn of the 20th century railway transportation would have been used, and it is likely that the stone was brought in from other parts of Ayrshire or the Scottish Central Belt.

The most significant sandstone quarries in Scotland at this time were the large operations in Glasgow (e.g. Giffnock and Bishopbriggs) and Edinburgh (Craigleith and other Lothian Quarries). The blonde freestone used in Kilmarnock does have similarities to some of the higher quality sandstones in the Glasgow area, but it is also possible that the stone was obtained from the major Ayrshire quarries that are reputed to have been producing high volumes of high quality blonde freestone at this time, such as Ardeer Quarry in Stevenston. Unfortunately, records are poor and these quarries are now infilled and no samples exist. A further possibility is that the stone was imported by railway from northeast England, as a number of large scale freestone quarries are known to have been supplying stone to the Scottish Central Belt at this time.

6.6.3 Red sandstone from the Mauchline basin

The Mauchline sandstone was used in Kilmarnock from the 1850s onwards following connection to the railway network. The stone rapidly came to dominate construction in the town, particularly with the planned John Finnie Street development, for which it was the material of choice (Gracie, 1992). The major quarries in Mauchline were located adjacent to the railway and were entirely dependent on rail transport for their rapid expansion and subsequent success (they supplied stone throughout the Scottish Central Belt and beyond). The availability of large quantities of consistent and high quality stone, which was ideal for complex masonry work and carving, suited the architectural aspirations of the time. The local blonde sandstone quarries were smaller in scale and could not produce such high quality stone, and probably declined rapidly. Red sandstone dominated the late 19th and early 20th century buildings in the town.

6.7 Potential for reopening historic quarries

All of the quarries that supplied building stone for the historic buildings in Kilmarnock are closed today, and there are no active quarries producing sandstone building stone in Ayrshire or throughout West Central Scotland. Of the handful of active sandstone quarries in fulltime production in Scotland, only three produce blonde sandstone (Swinton, Cullalo and Clashach) and five produce red sandstone (Corncockle, Corsehill, Cove, Knowehead and Locharbriggs). However, none of these quarries produce stone of identical characteristics to the stone types used historically in Kilmarnock.

In this report, stone samples taken from the surveyed buildings have been used to identify the range of sandstone types present in Kilmarnock buildings (Table 2). Although none of the original quarries are open, it has been necessary to identify currently available alternative stone types from active quarries to provide suitable materials for forthcoming repairs as part of the Conservation Area/Townscape Heritage Initiative schemes. The best way of ensuring that appropriate matching stone is used for the repairs over the longer term is to obtain stone from the original quarry sources. To this end, the former quarries described in the previous section were investigated to establish the potential for reopening or for obtaining new stone from adjacent areas. The quarries are described below and grouped into the three generic stone types identified earlier that characterise the stone-built heritage of Kilmarnock.

6.7.1 Local Kilmarnock 'blonde' sandstone

Six former quarry sites in Kilmarnock and the surrounding area were visited (Dean, Braehead, Holmes, Gauchalland, Woodhill and Greenhill). All are infilled and redeveloped, or have been landscaped. Braehead and Dean Quarries appear to have been the most significant sources of stone. Braehead is now the site of a public park and immediately adjacent to the railway, so future extraction of stone is not possible. Dean Quarry has been worked out to the limits of the site and is currently a nature reserve. However, the geological formation in which the Dean Quarry sandstone occurs continues over an area of about 4 km^2, immediately to the east of the town. The rocks are mostly mudstones, siltstones, and sandstone belonging to the Lower Coal Measures Formation. Although this formation extends over a much wider area across the Kilmarnock district, there is likely to be a better chance of similar sandstones closer to the site of Dean Quarry. This area has been proposed as a possible 'area of search' should further deposits of this sandstone be sought (see below). The geological nature of such sandstone deposits is typically highly variable, occurring as lensoid bodies formed as channel infills within former river systems. The variability of the

rock types within the Lower Coal Measures Formation means that the distribution of workable sandstones may be complex and cannot be guaranteed.

6.7.2 'Imported' high quality pale coloured freestone

The only significant 'local' high quality freestone quarry identified is Ardeer Quarry at Stevenston. Today this is completely infilled and used as a public park and nature reserve. It seems highly unlikely that any part of the existing quarry site could be reopened, due to the current use of the site and the proximity to housing.

6.7.3 Mauchline basin 'red' sandstone

The major quarries in the Mauchline area were visited. The Ballochmyle Quarries are either infilled or lie close to housing, such that further quarrying is unlikely to be possible. The adjacent Haughyett Quarry (also infilled) lies in open farmland and has some potential for extension into open ground to the south. However, recent excavations at the site reveal extensive areas of thick former quarry spoil, making it unclear which areas have already been exploited. Given the large scale of the previous quarrying operations in the Ballochmyle area, spoil deposits could prove an impediment to further stone extraction, and further investigation would be required.

The nearby large Barskimming Quarry has not been infilled, although its depth and flooded nature would make it very difficult to reopen due primarily to groundwater issues. Open agricultural land immediately to the south may provide potential areas for exploitation, where continuity of the geology is likely.

The small Grassmailees Quarry to the east of Mauchline is also in agricultural land and may provide an area for renewed stone production. However, this was not a major quarry, and the quality of the stone is unknown and further investigation would be required. The early Geological Survey map records a "yellow or greenish sandstone", which suggests the stone may be different from the more familiar red Mauchline sandstone (Fig. 52). The fact that the quarry lies very close to the edge of the sandstone basin, and the nearby presence of a major northwest-southeast trending fault bringing volcanic rocks in close proximity, could adversely affect the quality of the sandstone at this locality, and further investigation of these issues would be required.

Despite the apparent lack of potential at the former quarry sites, there are likely to be extensive reserves of high quality building stone in the Mauchline Basin, given the large extent and uniformity of the sandstone. The principal geological constraints for quarrying are likely to be the presence of faulting and igneous intrusions, which are most likely to occur at the margins of the sandstone outcrop. Areas adjacent to previous quarries are likely to be potential locations for future extraction since aspects such as stone quality and block size are more likely to be suitable. A potential area of search has been identified for further investigation in rural land to the south of the Ballochmyle and Barskimming Quarries, where stone of similar quality to that previously extracted may be present (see below). This should not preclude the potential of high quality building stone being present in other parts of the Mauchline basin.

6.8 Securing future stone supply

For all three historic stone types described above, none of the existing historic quarry sites appear capable of being reopened. Therefore, in order to secure supplies of appropriate stone types for the future maintenance of Kilmarnock's built heritage the best course of action is the opening of new quarries in ground adjacent to the original extraction sites following detailed geological investigations. For the local blonde sandstone in Kilmarnock this is particularly difficult since the principal quarries are now enclosed within urban areas. In order to address this, a potential 'area of search' has been identified on adjacent rural land on the north and east side of the town in the same geological unit as Dean Quarry sandstone (Fig.53). Detailed investigations involving geological mapping, searching of former borehole and mine records, and possibly new boreholes and/or geophysical techniques would need to be employed to identify potential sites within the area. Small-scale surface excavations could then be undertaken to establish the feasibility of stone extraction from individual localities.

It is important to note that Dean Quarry sandstone has distinctive characteristics such that there are very few quarries in the UK currently producing similar laminated coarse grained sandstones. There is a need for such a stone type in many areas to replicate historic 'local' sandstones both for repair to existing structures and for new build. The potential market for such a stone is therefore likely to be considerable.

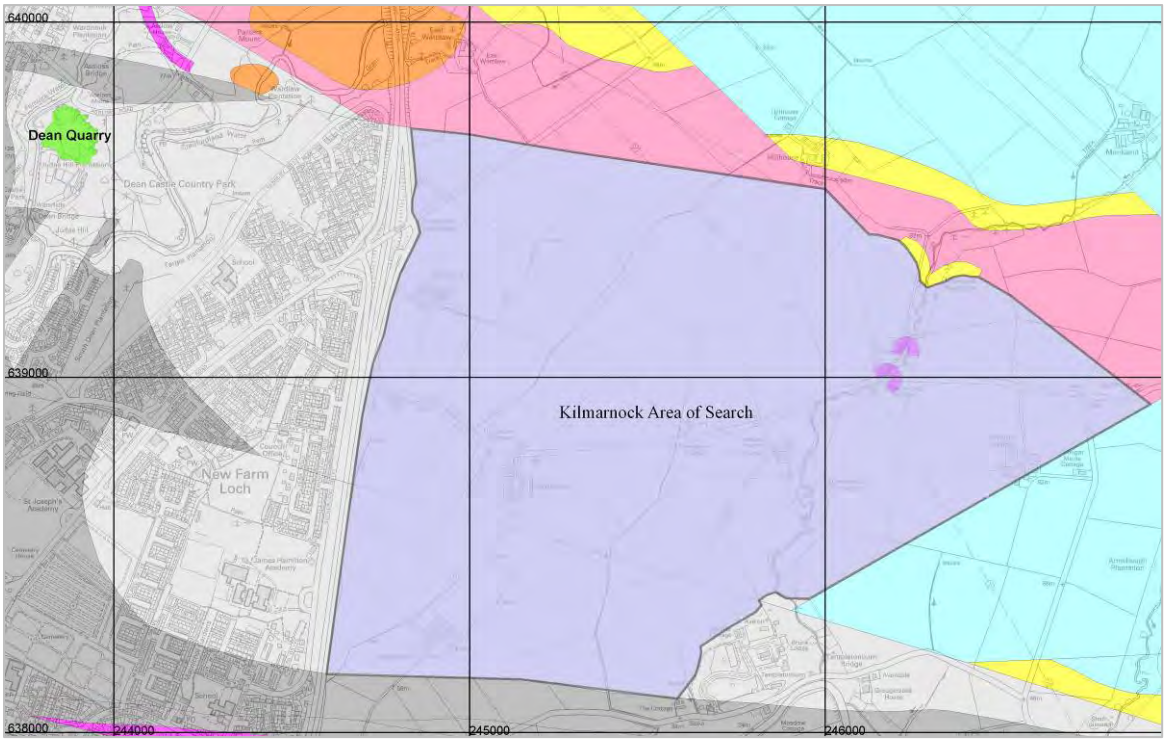

Fig.53. A potential 'area of search' (shown in dark blue) in rural land immediately to the east of Kilmarnock, in rocks of the Lower Coal Measures Formation of the Coal Measures Group. This is a continuation of the same geological formation as the Dean Quarry sandstone (refer to Fig. 35).

There is a large potential market (and need) for a high quality blonde freestone sandstone such as was formerly quarried widely throughout Central Scotland, particularly in the Glasgow area (Scottish Stone Liaison Group, 2006). There are currently no quarries in the UK supplying identical stone of this type, and most stone used today comes from quarries in the north of England supplying sandstone that is similar but not identical. The former Ardeer (Stevenston) Quarry is the only site identified as previously supplying large quantities of this

stone type in Ayrshire, although it is considered unlikely that a quarry could be reopened in that locality. A wider scale (regional) investigation of former quarry sites throughout Central Scotland is necessary in order to identify potential sites for reopening.

In the Mauchline Basin, most of the large former red sandstone quarries are unlikely to be capable of renewed production. However, given the large extent and uniformity of the sandstone deposits, it is almost certain that suitable stone reserves are present in the area. The location of many of the original quarries was determined by their proximity to the railway, which need not be a factor today given the dominance of road transport, and much of the Mauchline area is rural. Despite this, any geological investigations into potential sites for future extraction are probably best focused in areas adjacent to the former quarries where factors such as stone quality, faulting and groundwater conditions are more likely to be favourable. A potential 'area of search' in rural ground immediately south of the former Ballochmyle Quarries has been identified for future investigation, and is indicated in Fig. 54. As described above, a range of investigative techniques, including geological mapping, searching of borehole records, and new subsurface investigations would be required in order to identify specific sites with the potential for extraction of stone. The identification of an area of search close to the former quarry sites does not rule out the potential for good quality stone reserves in other parts of the Mauchline basin, which may have other advantages such as distance from centres of population (e.g. Auchinweet quarry; section 6.5.4. above).

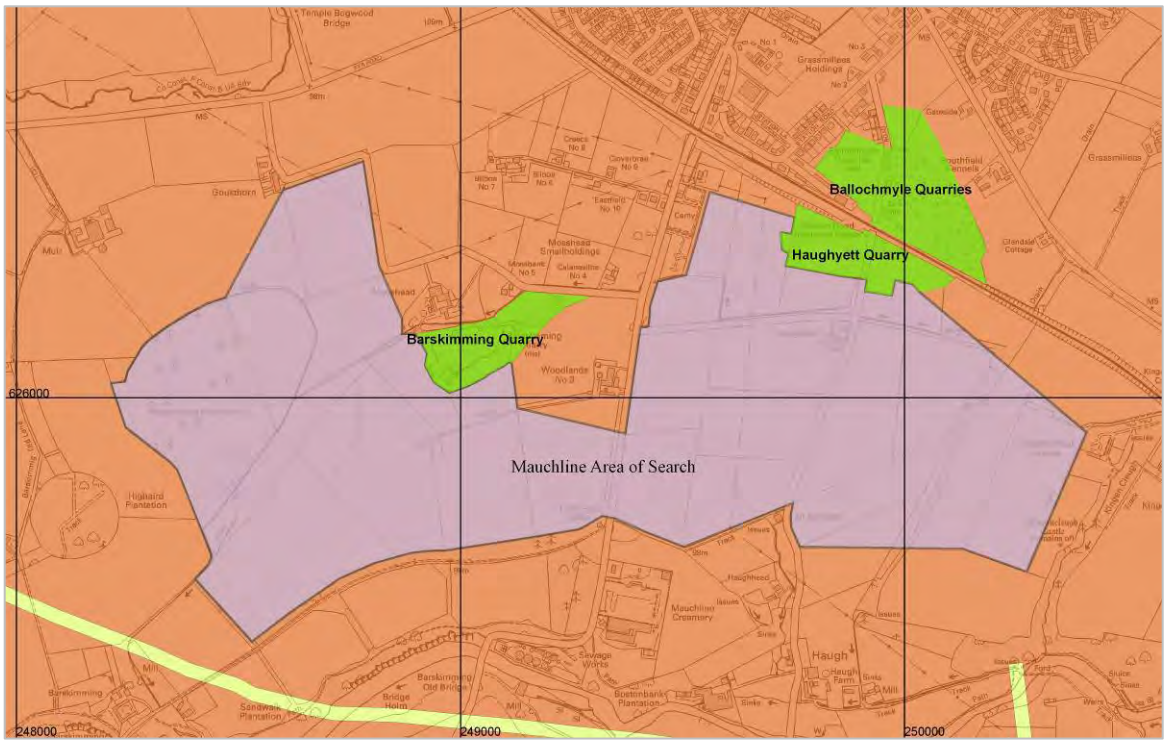

Fig.54. A potential 'area of search' (shown in purple) in rural land immediately south and east of the former quarries at Ballochmyle and Barskimming (marked in green), in Permian sandstone likely to be similar to that previously quarried.

7. SUMMARY AND CONCLUSIONS

7.1 History of use of stone

The town of Kilmarnock has been an important place for trade and commerce since at least the 16th century, eventually developing into an important regional centre. The main period of growth occurred during the 19th century at the peak of the town's wealth from industry and trade, and promoted by the early development of a railway system. At this time the improving wealth and status led to increasingly ambitious architecture and infrastructural improvements to the town. This evolving story of Kilmarnock's history is reflected in its remaining historic buildings. Today the town displays a juxtaposition of buildings of different age and styles, recording its historical development and producing a distinctive local character and sense of place.

The building material of choice was stone; the earliest buildings record the use of field and river boulders of lesser quality sandstone and 'whinstone', followed by higher quality blonde sandstone obtained from small quarries in and around the town. Kilmarnock lies upon a geological basin dominated by sedimentary rocks of Carboniferous age –mostly a mixture of mudstones, siltstones, sandstone and coals. Relatively few of the sandstone beds are of sufficient quality for building stone and these were exploited in a number of quarries, the most important of which was the Dean Quarry which rapidly expanded in the early 19th century and supplied higher quality blonde sandstone for much of the early architecture. The local blonde sandstone was also much used for the town's infrastructure, e.g. bridges, boundary and retaining walls and the railway viaduct. From the 1840s Kilmarnock was connected to the wider railway network and from this time onwards red sandstone was imported from quarries in the nearby Mauchline basin, some 15 km to the south. These large industrial-scale quarries used the latest technology and were directly linked to the railway network. The red sandstone was available as larger block sizes and of more consistent quality than the local blonde sandstone, allowing decorative carving and sculptural work, and the longer bed lengths were suitable for larger openings, increasing the size of sills, lintels, jambs etc. This high quality stone suited the increasingly ambitious architecture of the time, and rapidly became the dominant stone type. John Finnie Street, built from the 1860s onwards, typifies this period of time and records the wealth of the town during the late 19th and early 20th centuries. The range of historic stone buildings that define Kilmarnock's history reflect a direct connection with the geology of the district.

7.2 Stone condition surveys

Surveys of the condition of the stone masonry in 25 buildings and structures were undertaken to provide information to guide forthcoming repairs projects and inform future maintenance strategies. The principal reason for stone decay and damage in the surveyed buildings is water penetration, seen to a variable extent in all the surveyed buildings. Water damage ranges from surface soiling (typically biogenic growth) to breakdown and loss (scaling) of the stone surface caused by extreme water saturation, and disaggregation of the stone resulting from salt contamination.

Almost all buildings show water penetration to exposed and projecting masonry elements such as parapets or copestones, cornices, string courses, sills and hood mouldings. Many of these elements are primarily designed to keep water off the face of the building, thus protecting other parts of the masonry. These prominent elements are subjected to increased exposure and essentially act in a sacrificial way relative to other parts of the masonry. This functional role is critical to ensure the longevity of the masonry as a whole, and it is vital that

these features are maintained in good condition, and repaired or replaced where necessary (or their functionality improved using lead flashing etc.).

One of the most important causes of water penetration in stone is lack of maintenance, and in particular failed rainwater goods. This can concentrate very large amounts of water into the masonry, producing relatively rapid stone decay –not only damaging the masonry but in many cases introducing dampness into the building fabric. The most commonly observed failures are blocked or broken gutters and downpipes, non-functioning internal drainage systems (e.g. through parapet walls), and blocked or damaged rainwater hopper-heads. A further consequence of lack of maintenance and water penetration is the washing-out of mortar, leading to the opening of masonry joints allowing further water penetration and exploitation by higher plants.

Other significant problems are stone decay at ground level from the use of de-icing salts on roads and pavements that contaminate adjacent stone masonry and cause the disaggregation of stone. Other less common types of decay are splitting of stone along natural bedding planes in strongly bedded blocks, particularly where exposed to water saturation (e.g. prominent horizontal elements such as sills). Fractures are observed in some buildings where structural movement has caused masonry blocks to crack. A number of buildings show damage from previous stonecleaning, some of which has resulted in extreme loss of masonry details, degrading the appearance of the building. Face bedding is only occasionally observed, and decay associated with cement patches and other coatings is present in a number of buildings.

The different geological characteristics of red and blonde sandstones used in Kilmarnock influence the way they perform over time. The red sandstone is typically a quartz-rich sandstone with a well developed silica mineral cement, generally of better quality than most of the local blonde stone which are more variable in quality and may contain ‘weak’ minerals such as clays and carbonate. The lesser quality blonde stone would have mostly been available in smaller block sizes, restricting its use to relatively simple masonry such as squared rubble or plain ashlar with simple moulded details. An important feature of the red sandstone from the Mauchline area is its relatively high porosity and permeability–it is more prone to water saturation than blonde sandstone–causing relatively rapid biogenic soiling (greening and blackening) and subsequent decay in locations where it is exposed to water penetration. This vulnerability to water saturation makes the maintenance of rainwater goods particularly important in Kilmarnock, in order to protect masonry from soiling and stone decay.

7.3 Sampling and stone matching

Stone samples were taken from all the surveyed buildings and structures. In some cases several samples were collected to represent different stone types used in different parts of a building. Each stone type was characterised by petrographic analysis (BS EN 12407:2000), and where possible the original quarry origin is identified. For each sample the closest-matching currently available stone type(s) were identified as suitable for repairs.

Three main groups of stone type are identified as being used historically in Kilmarnock:

Local blonde sandstone was used for the earliest buildings in the town, seen mostly as bedded lesser-quality stone, probably originally obtained from local surface outcrops or the river bed. Some of the very earliest buildings were constructed using a mixture of sandstone rubble and whinstone boulders. With increasing demand over time it was supplied from a number of relatively small-scale town quarries, but by the early 19th century Dean Quarry to the north of the town centre was providing large quantities of higher quality blonde sandstone for building in the town and surrounding area. Blonde sandstone continued to dominate into the mid-19th century, used both for buildings (e.g. c.1850 former George Hotel–now Mason Murphy) and infrastructure (e.g. Kilmarnock railway viaduct 1848). These locally sourced stones strongly define the character of early buildings and structures in Kilmarnock.

Red sandstone was imported in significant quantities by railway from the 1870s onwards, mostly from large quarries in the Mauchline area. This high quality stone type was ideal for the more ambitious late Victorian architecture in the second half of the 19th century, and it quickly supplanted the local blonde stone. These quarries used the latest mechanisation and were directly linked to the rail network enabling large volumes of superior stone to be supplied. This stone type dominated the major John Finnie Street development, completed from the 1870s onwards.

Blonde sandstone freestone was used in a number of later buildings (e.g. Goodfellows c.1875; Johnnie Walker warehouse 1890s) and is likely to have been imported into Kilmarnock from large scale quarries elsewhere in Ayrshire or the Glasgow area. These high quality freestones were used for decorative ashlar with moulded and sculptural detailing. It is not clear why a high quality blonde sandstone was used at a time when Mauchline red sandstone was dominant; perhaps being specifically selected by the architect for aesthetic reasons (e.g. alongside pale-coloured brickwork in the Johnnie Walker building).

None of the original quarries that supplied building stone to Kilmarnock are open today, and there are no building stone quarries in either blonde or red sandstone in Ayrshire or the wider Glasgow and West Central Scotland region. A number of stone types from currently active quarries throughout the UK have been identified which have similar characteristics to the original local blonde sandstone used in Kilmarnock. However, because this stone originally came from several small quarries it is variable in nature: blonde sandstone in one building can be quite different to another. Therefore a number of different currently active quarry sources are recommended for obtaining matching stone types for repairs. Suitable bedded sandstone of similar characteristics occurs at Drumhead (Doghillock) quarry near Falkirk and Blaxter quarry, Northumberland (variety ‘Northumberland Buff’); coarse grained blonde sandstones from a number of quarries in the north of England (Bearl, Catcastle Buff); and finer grained uniform pale buff sandstone from Millknock, High Nick and Birchover quarries (also north of England).

Red sandstone with similar characteristics to Mauchline sandstone can be obtained from Corncockle and Knowehead quarries, or the recently-closed Gatelawbridge and Newton quarries (all in Dumfriesshire). Darker coloured varieties of Locharbriggs sandstone may also be similar. For a few surveyed buildings Corsehill and Locharbriggs sandstone are the closest matching stone types (and may have been used originally).

Similar stone to the high quality imported blonde sandstone freestone is available from a number of currently active quarries (reflecting the fact that the original stone was likely to have been imported from several quarries). The large Johnnie Walker building (K24) appears to contain blonde freestone from more than one quarry source, and the Goodfellows building (K25) contains a third type of blonde freestone. Stone with similar characteristics is available from a number of quarries including Darney, High Nick, Blaxter, Birchover, Dunhouse Buff, Stanton Moor, Swinton (and several others).

All of the documented former quarry sites that supplied building stone to Kilmarnock were visited as part of this study. Today they are all completely or partly infilled, built over, or hemmed in by development, with the result that none are considered capable of being reopened. The extent of the geological formation which contains the Dean quarry sandstone (the best quality of the local blonde sandstones) has been identified, and a potential 'area of search' of c.25 km^2 has been highlighted immediately to the NE of Kilmarnock in open agricultural land. Further geological examination within this area may identify specific sites with the potential for future stone extraction.

All of the significant former quarries in the Mauchline area are likewise infilled or flooded, and several are adjacent to housing. A large area immediately to the south of the main Ballochmyle quarries has been identified where the geology is likely to be similar. This area of c.1.5 km^2 would require more detailed investigation to identify potential sites for future extraction. The uniformity of the geology throughout much of the c.46 km^2 outcrop of the Mauchline red sandstone suggests that there are likely to be other sites which have potential for future quarrying of the Mauchline red sandstone.

7.4 Securing supply of stone for the future

The closure of all the original sandstone quarries that supplied the range of stone types used historically in Kilmarnock necessitates the use of alternative sources of stone for future repairs, at least in the short term. A number of currently active quarries in Scotland and northern England provide reasonable matching stone types. Reopening of the former quarry sites is unlikely, but the opening of new quarries in adjacent areas of the same geology is considered the best way of ensuring continuity of supply for future repairs (and also for new build projects which are 'in keeping' with traditional buildings). The sourcing of stone from local quarries would also satisfy issues of sustainability. The shortage of active quarries supplying historically-appropriate building stone in Scotland as a whole means that for both local blonde and red sandstones the opening of new quarries will not only provide a renewed source of stone for Kilmarnock, but will provide valuable stone meeting a national need. Mauchline red sandstone was widely used throughout the Central Belt of Scotland and beyond during the late 19th and early 20th centuries. Although the local blonde sandstone quarried in Kilmarnock was not used significantly beyond the town, it is of a type once widely quarried in numerous quarries throughout Central Scotland, none of which are active today. The opening of such a quarry is therefore likely to have a wider market beyond Kilmarnock. In summary, the scarcity of building stone quarries in Scotland today means that if a new quarry in red or blonde sandstone was opened to supply Kilmarnock, it is likely to have a larger national role in supplying appropriate stone for the repair and maintenance of the built heritage in Scotland.

7.5 Further work

This study has looked in detail at the condition of stone masonry and the repair and maintenance requirements for 25 buildings and structures within the John Finnie Street and Bank Street Conservation Area. Samples were collected to characterise the various stone types used, and the closest matching currently available stone types have been identified as suitable for repairs. The work has also allowed identification of the main types of stone decay and maintenance issues present within the Conservation Area.

The information obtained is relevant to other buildings in the local area, in particular the vulnerability of red sandstone to water saturation and the need for improved maintenance in order to prevent stone decay. These issues will become more important in the light of current climate change predictions which suggest increasing rainfall and more frequent storm events through the present century. The existing practice of using de-icing salts which are damaging to masonry, and the potential for alternative salt types, merits further attention.

The detailed knowledge gained of the different stone types used in the surveyed buildings and structures could be used as a basis for a 'stone map' of all the buildings in the Conservation Area, and perhaps extending to other stone buildings in Kilmarnock. This would provide a permanent record to enable informed decisions in selecting stone types for future repairs. The documentation could be extended to other parts of East Ayrshire, perhaps targeted on particular towns or villages, or designated conservation areas and heritage buildings and their surroundings.

Identification of the various stone types used historically in Kilmarnock could be used to produce guidance for the selection of appropriate stone for new build constructions that are required to be 'in keeping' with the historic built environment. The use of appropriate materials for both repairs to existing buildings and new build construction would contribute to retaining the historic character of Kilmarnock and East Ayrshire. This could also be

relevant to large new-build and infrastructure schemes, for example the proposed new residential developments associated with Dumfries House, where issues of sustainability and fitting into the local environment are highlighted as being of importance.

The opening of one or more building stone quarries in East Ayrshire would not only provide the right types of stone, but would help towards aspects of sustainability, local sourcing of materials and ethical procurement. Further investigation to identify potential sites for the opening of building stone quarries within East Ayrshire could be undertaken based on the information presented in this study.

GLOSSARY OF TERMS

Some geological, quarrying, architectural and historical terms used in the text are given. For further guidance the following references are recommended:
Chambers Earth Science Dictionary. P M B Walker (General editor) 1991 (Edinburgh: W & R Chambers).
Dictionary of Scottish Building. Glen L Pride. 1996 (Edinburgh: The Rutland Press and Historic Scotland).

Ashlar Hewn or sawn blocks of masonry finely dressed to size and normally laid in regular courses.

Ballochmyle sandstone Red sandstone from the Permian rocks of the Mauchline basin, obtained from quarries in the Ballochmyle area.

Basalt Dark coloured, fine-grained, basic igneous rock consisting of silicate minerals including feldspar, pyroxenes and iron oxides. The term 'basaltic' is commonly used.

Bedding Natural layers formed during deposition of sediments.

Biogenic growth Biological coatings on masonry surfaces, commonly algae or moss. Typically green where active/alive, and black where the growth is dry/dead

Blonde sandstone Common term in the west of Scotland used to describe pale coloured sandstone masonry, mostly from 'local' sandstones of Carboniferous age.

Carboniferous Geological period extending from approximately 345 to 280 million years ago, forming much of the bedrock of Central Scotland. Conditions at this time resulted in a wide range of sedimentary and basic igneous rocks, including deposits of fluvial sandstones which have been exploited as building stones.

Coal Measures The sequence of rocks forming the uppermost Carboniferous, divided into the Lower, Middle and Upper, and giving the major stratigraphic divisions for much of the sedimentary rocks in Ayrshire and other parts of Central Scotland..

Conglomerate Sedimentary rock consisting of water-worn pebbles bound together in a sandy matrix.

Course Continuous horizontal layer of stones of uniform height.

Cross-bedding A series of inclined sedimentary bedding planes having a relationship to the direction of current flow (also current-bedding).

Crust General term used to describe a coating on the external surface of masonry, commonly formed from a combination of biogenic growth and products of air pollution (e.g. gypsum and soot).

Dimensioned Stone Ashlar or measured stone.

Dip Inclination of strata to the horizontal.

Disaggregation Loss of individual sand grains from sandstone due to weathering, stone decay etc.

Dolerite Medium-grained basic igneous rock.

Dressed Stone with any kind of worked finish.

Dune Bedding Large-scale cross-bedding typical of windblown sands deposited in desert and beach settings.

Dyke Sheet-like body of igneous rock which cuts across the bedding of the host rock

Fault Fracture in rock along which there has been an observable amount of displacement.

Feldspar The most important single group of rock-forming silicate minerals including silicates of sodium, potassium and calcium.

Flagstone Fissile, micaceous, laminated sandstone and siltstone used for paving or roofing.

Fluvial sandstone A sandstone deposited in a river system. Fluvial sandstones tend to have specific characteristics such as cross bedding and an overall lensoid geometry derived from the original river channels.

Freestone Generally a fine grained stone which can be freely worked in any direction, suitable for carving.

Harling Scots term for roughcast; plaster mixed with small stones used to coat walls

Higher plants Larger plants (as distinct from algae, moss etc.) with root systems that can become established on damp areas of buildings, commonly exploiting mortar joints and blocked gutters etc.

Joint A fracture with no displacement. Joints often occur in two sets, more or less vertical and at right angles to each other.

Laminated sandstone Sandstone with abundant thin parallel bedding planes

Lithic grains Rock fragments forming a constituent of a sandstone

Lithology Character of rock in terms of composition, structure and grain size.

Liver Rock A massive sandstone without discernible bedding which can be worked in all directions (also freestone).

Mauchline sandstone Red sandstone obtained from the Permian rocks of the Mauchline basin.

Mica Layered complex hydrated silicate mineral.

Micro- Prefix used to describe an igneous rock of unusually fine grainsize e.g. microgranite.

Permian A period of geological time extending from approximately 280 to 225 million years ago, in Scotland marked mostly by sandstones deposited in desert conditions.

Petrographic analysis Systematic description of a rock type in both hand specimen (macroscopic) and thin section (microscopic).

Pinning(s) Small stone or stones inserted into the void(s) between larger rubble stones to make up the height of a course and tighten the construction.

Plastic repair General term used for a repair to masonry made using a material that can be applied in a plastic state and moulded or shaped prior to hardening. Most commonly used to describe cement repairs and patches.

Pointing The mortar inserted between masonry blocks.

Quartz Common rock-forming glassy mineral, silica in sedimentary, metamorphic and igneous rocks.

Quoin Stone at external angle of wall, usually bonded with tails extending, alternately, onto both faces.

Rainwater goods Items such as gutters, downpipes, hopper-heads etc. used to catch and remove rainwater from the upper parts of buildings.

Random rubble Walling of irregular, unsquared stones not laid in courses.

Red sandstone Term used to describe a sandstone with a strong orange-red-pink colour, usually from deposits of Devonian or Permian-Triassic age.

Rubble Uncut stone of variable and irregular shape and size which was traditionally laid in rough courses.

Sandstone Sedimentary rock composed of detrital sand grains naturally cemented. Sandstones vary widely in composition and can be classified according to grain mineralogy. A sandstone with high clay content may be referred to as argillaceous.

Sill A sheet of igneous rock intruded along the bedding planes of pre-existing rocks.

Soiling General term used for unsightly discolouration of masonry.

Squared rubble Irregularly formed stones, roughly worked to a more consistent shape so that they can be built more readily into courses.

Tooled Dressed stone with hewing mason's tool marks evident on the surface. A wide range of textures can be produced.

Whinstone Colloquial term for any hard, dark stone in the Scotland and the north of England, although geologically restricted to dark compact igneous rocks such as basalt or dolerite.

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APPENDIX 1
KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEETS

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: W. White & Co.	**Address:** 60 Bank Street	**Building No:** K1
Building type: Commercial	**Status:** In use	**Façade orientation:** West, south, southwest corner
Date built/Listing: 1903	**Date of previous repairs:**	**Date surveyed:** 4/7/2008

Masonry Style:
Smooth ashlar with ornamentation (moulded details and carving).

Stone type:
Red sandstone, with a strong orange colour. Planer bedded with some large scale cross bedding. Variable grainsize with thinner beds of coarse grained open texture.

Sample: ED10357

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	√
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√**A**	Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding	√	No action required	

Comments:
Some areas require immediate attention due to cracks and water penetration; in particular the upper cornice to the right-hand side of the corner appears damaged, plus two smaller areas on the west elevation. The building has been aggressively cleaned (probably by grit-basting) resulting in loss of surface detail, in particular carved work around the entrance area. Rainwater goods are in poor condition with current water penetration to the masonry. Water penetration and organic soiling is present at ground level, on protruding features (cornices, string courses, balcony etc.) and around failing rainwater goods. Migration of salts has occurred beneath prominent features, and present around the corner entrance where it is associated with thin surface scaling. Cracks are present throughout probably from previous minor subsidence and although open, most appear stable. Some blocks show delamination/splitting, particularly the large slabs on balconies. Large ornate brackets beneath balconies have lost carved details due to splitting along vertical bedding. There are many open joints which require repointing, in particular on the parapet and copestones. Common minor abrasive damage present on moulded details, drips etc. Localised guano present.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Harled cottage	**Address:** 1 Dunlop Street	**Building No:** K2
Building type: Commercial	**Status:** Unoccupied	**Façade orientation:** South
Date built/Listing: Early 19th century	**Date of previous repairs:** ?	**Date surveyed:** 4/7/2008

Masonry Style:
Building harled obscuring masonry. Adjacent building (harled removed) is random rubble ground floor with brick first floor.

Stone type: (Adjacent building)
Rubble is mixture of whinstone boulders (c.30%) and sandstone (c.70%). Whinstone is split black and grey rounded boulders typically up to 400 mm size. Sandstone rubble is variable, mostly thinly bedded or ripple laminated, blonde or grey (some purple), typically weathering orange. Blocks are generally elongate, most up to 400 x 200 mm size. Dressed stone is blonde-cream coloured freestone; quoins up to 600 x 400 mm, lintels/sills typically 1500 mm length.

Sample: ED10359 (from neighbouring property)

Matching Stone:

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	√
Water penetration	√	Stone repair (required)	√
Salts present		Stone damage (optional replacement)	
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments: (Description for adjacent building)
Previously harled. Rainwater goods all defective resulting in water penetration to entire façade. Sandstone shows some surface scaling and granular decay (due to water penetration) but much can be dressed back to sound stone. Occasional sandstone blocks are face bedded. Blonde freestone dressings are relatively soft and have weathered back (granular disintegration). If building is to be re-harled them much of the existing masonry can probably be retained as most of rubble is in relatively good condition, although some replacement of weathered sandstone will be required. Pale sandstone dressings (in particular window surrounds) are badly decayed in places. Areas of brick repairs are present where stone dressings have failed (e.g. to window surrounds).

K2 Harled cottage 1 Dunlop Street

Adjacent cottage to K2 1 Dunlop Street

K2 Harled cottage 1 Dunlop Street

Rubble wall to building immediately adjacent to 1 Dunlop Street (harled building to right-hand side), showing mixture of stone types built as random rubble.

Detail of rubble wall adjacent to 1 Dunlop Street, showing elongate blocks of bedded sandstone (pale colours weathering to orange) and rounded boulders of split basaltic rock (whinstone) of black to grey colour). The sandstone is of relatively poor quality and shows extensive scaling and granular disintegration.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Kilmarnock Club	**Address:** 2 Dunlop Street	**Building No:** K3
Building type: Commercial	**Status:** In Use	**Façade orientation:** East (and corners)
Date built/Listing: 1899/B	**Date of previous repairs:** Unknown	**Date surveyed:** 9/7/2008

Masonry Style:
Smooth ashlar with rusticated pilasters and ornate upstanding central arch with carvings and balustrade. Moulded cornice and window surrounds. Pediments at each corner.

Stone type:
Red sandstone, strong orange colour, planer bedded with large scale cross-bedding.

Sample: None (see ED10358)

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	√
Water penetration	√	Stone repair (required)	√
Salts present		Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Upper cornice shows splitting to underside with loss of stone –requires immediate attention. Similar damage to underlying thin string course. Much scaling to arch with some granular erosion and cracked blocks at base; also some loss of carved details. Surface scaling to ashlar below cornice caused by previous water penetration. Damage to base of mullions due to water penetration on sills. Ground floor masonry hidden by shop front. Localised dark soiling to parts of facade.
Corners show similar damage due to water penetration to pediments, cornice and string courses, plus decay of window sills and mullion bases.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Kilmarnock Club	**Address:** 2 Dunlop Street	**Building No:** K3
Building type: Commercial	**Status:** In Use	**Façade orientation:** Northwest
Date built/Listing: 1899/B	**Date of previous repairs:** Unknown	**Date surveyed:** 11/7/2008

Masonry Style:
Red brick with sandstone dressings. Simple moulded window surrounds, cornice and string course, with elaborate pedimented entrance with carved details.

Stone type:
Red sandstone with strong orange colour, mostly planer bedded.

Sample: ED10358

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√	Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Previous repairs using coloured plastic repair to coat basal masonry courses (where sandstone badly scaled) and split sills and mullion bases. Most plastic repairs are well executed and in good condition. Significant maintenance problems with water penetration, salts, organic soiling and plant growth around failed downpipes, and prominent pedimented entrance and cornice. Drip course beneath upper cornice is damaged in places and requires some stone replacement and detailed inspection along entire length. Some sills have been redressed to sound stone and are performing satisfactorily. Some general granular decay is present in places. Although much of the masonry shows surface loss, it is mostly cosmetic and many blocks may be able to be repaired using lime-based plastic repairs.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Station Wall	**Address:** Garden Street	**Building No:** K4
Building type: Retaining wall	**Status:** n/a	**Façade orientation:** Mostly south
Date built/Listing: Post-1930s	**Date of previous repairs:** Recent stone repairs	**Date surveyed:** 4/7/2008

Masonry Style:
Regularly coursed squared rubble, with crudely stugged finish. Rounded cope with overhanging drip. Wall has battered profile. Blocks range from 600 to 1650 mm length; course height typically 300 to 350 mm. Smaller blocks present at western end of wall.

Stone type:
Red sandstone with strong colour where clean. Strong parallel bedding with some large scale cross bedding. Generally coarse grained; grainsize variable in beds.

Sample: ED10379

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	
Salts present		Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Generally good condition and structurally sound with very minor damage to occasional blocks. Soiled in places, particularly where sheltered (e.g. eastern parts) with much black staining and green moss. Some water penetration (unavoidable in a retaining wall) with localised surface scaling of stone. Cracked blocks and rare decayed stones patched using cement mortar. Repointed using hard grey cement, mostly intact. Some signs of increased granular decay of stone immediately adjacent to (impervious) grey cement. This could lead to damage to stone in the longer term, but will cause more damage to remove; suggest repoint with permeable mortar once the existing begins to fail. Stone replacement required is very minor. Removal of organic soiling and growth would prolong life of the stone and improve overall appearance of wall.

K4	Station Wall	Garden Street

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Kilmarnock Standard	**Address:** 10 Grange Place	**Building No:** K5
Building type: Commercial	**Status:** Largely vacant	**Façade orientation:** North, south elevations and corner
Date built/Listing: Late 19th century/B	**Date of previous repairs:** Unknown	**Date surveyed:** 17/7/2008

Masonry Style: Smooth ashlar with much decoration including carving. Common use of long masonry blocks. South elevation is red brick with sandstone dressings.
Stone type: Red sandstone, medium orange colour, mostly planer bedded, mostly medium grained with coarser grained beds grading to fine grained tops over several centimetres bed thickness.
Sample: ED10361

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√**A**	Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments:
North elevation and corner: Basal courses below sill level are badly decayed from damp and salt-splash, showing much granulation and stone loss. Groundfloor sill course shows much physical damage. Water penetration common to protruding elements with organic soiling; in particular the upper parts, with plant growth on cornice and areas of salt penetration to underlying masonry. Much damage due to water saturation resulting in splitting to horizontal elements (e.g. sills and string courses). General loss of masonry details (e.g. carvings) suggests building has been abrasively cleaned by grit blasting.
South elevation: Common splitting of horizontal blocks (sills and string course), with localised cracking. Repointing required. Water penetration to cornice.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: East Ayrshire Council Offices	**Address:** 19 John Dickie Street & John Finnie Street	**Building No:** K6
Building type: Commercial	**Status:** In Use	**Façade orientation:** South and west
Date built/Listing: 1880/B	**Date of previous repairs:** Unknown	**Date surveyed:** 8/7/2008

Masonry Style:
Smooth ashlar with much moulded detailing and some carving. Red granite base course to west elevation.

Stone type:
Red sandstone, medium grained. Generally uniform, some parallel bedded. Much linostone along ground floor, including patch of replacement sandstone (Locharbriggs?).

Sample: ED10362

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	√
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√	Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Cracks above entrance on southwest corner require urgent inspection as some masonry appears unsound. Water penetration, organic soiling, salts and localised plant growth with minor scaling is common on prominent elements (i.e. cornices, string courses, window hoods etc. as well as decorative elements at corner) –requires repointing and localised stone replacement. Cracks are present in parts of the facade, with some stone replacement required. Occasional blocks in sills and string courses show splitting. Some areas of (mostly) minor spalling to ashlar blocks are present particularly on the south elevation. Ground floor (at least) appears to have been cleaned by grit blasting with loss of details and degradation of the masonry surface. Ground floor has extensive 'linostone' coating, with evidence for previous sandstone scaling at lower levels, particularly on south elevation. Linostone shows cracking in places. Common abrasive damage (chips) to window surrounds on south elevation, and localised areas of small surface holes from previous fixings to ashlar on west elevation. Northwest corner has area of cracked masonry, with water penetration and some deterioration to tower, which requires inspection. Dunlop Street elevation has plastic repairs and linostone to ground floor in poor condition, with relatively minor damage to stone from localised cracks and breakage of string courses etc.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Network Rail Station	**Address:** John Finnie Street	**Building No:** K7
Building type: Commercial	**Status:** Occupied	**Façade orientation:** Mostly south
Date built/Listing: 1878/B	**Date of previous repairs:** Recent stone repairs	**Date surveyed:** 4/7/2008

Masonry Style:
Low level entrance: Broached ashlar with smooth dressings and moulded detailing.
Main building: Lower floor rusticated smooth ashlar; upper floor broached ashlar. Smooth dressings and parapet, and moulded detailing.

Stone type:
Sandstone with strong red-orange colour. Parallel bedded, medium to coarse grained with large scale cross bedding.

Sample: ED10379

Matching Stone:

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	√
Water penetration	√	Stone repair (required)	
Salts present		Stone damage (optional replacement)	
Stone cleaning: **A**brasive/**C**hemical	A	Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Low level entrance: Recently repaired with replacement stone (probable Locharbriggs) of smaller block size than original. Probably abrasively cleaned (grit-blasted) with some loss of original detail. Most loss stone (scaling) removed (blocks redressed). Generally in good condition, with some water penetration to parapet and salt/damp to lower courses, leading to minor scaling and cracking.
Main building: Recent repairs involving stone replacement, redressing of scaled stone and extensive lead flashing to protect parapet copes and cornice. Possible plastic patch repair coatings to parapet. Replacement stone (probable Locharbriggs) is paler and more orange in colour than original. Generally in good condition, although large area of water penetration on eastern part of main façade with failed rainwater goods leading to extensive saturation of stone with much organic growth and scaling of stone. Minor plastic repairs to damaged stone.
In general: Well maintained with localised area of severe water penetration and surface scaling. Urgent maintenance required to address rainwater penetration to main building.

K7 Station John Finnie Street

General view of part of main station building showing masonry in generally good condition, following relatively recent maintenance, including instatement of lead flashing on the cornice and copestones.

Part of main station wall showing area of water penetration due to failing downpipe. The sandstone masonry is saturated with much green organic growth and active scaling of the stone.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Central Evangelical Church	**Address:** John Finnie Street	**Building No:** K8
Building type: Church	**Status:** In Use	**Façade orientation:** East
Date built/Listing: 1900/C(s)	**Date of previous repairs:** Unknown	**Date surveyed:** 8/7/2008

Masonry Style:
Stugged irregularly coursed squared rubble with smooth ashlar and simple moulded details.

Stone type:
Red sandstone, mostly planer bedded with rare cross-bedding. Mostly medium to coarse grained, variable in different beds.

Sample: ED10364

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Extensive moisture penetration to upper parts and prominent elements, showing organic soiling and plant growth with salts and superficial scaling. All stones on parapet, copes, balustrade, cornice and balcony require detailed inspection. Balusters above entrance appear badly decayed and need to be replaced with inspection of adjacent blocks. Water penetration to window sills has resulted in some splitting and structural integrity needs to be checked. Dampness to masonry at ground level and around side entrances -some replacement required, though much can be redressed. Rubble blocks with minor scaling may be redressed. Guano present around central keystone. There has been previous extensive replacement of squared rubble at ground level using paler sandstone.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Finnie NW wall	**Address:** John Finnie Street	**Building No:** K9
Building type: Retaining wall	**Status:** n/a	**Façade orientation:** East
Date built/Listing: ?	**Date of previous repairs:** ?	**Date surveyed:** 4/7/2008

Masonry Style: Irregularly coursed roughly squared rubble with crude chiselled finish. Common large block size typically 360 x 670 mm with smaller blocks used to build up courses. Rounded copestone blocks up to 1300 mm length.
Stone type: Variable blonde sandstone, generally coarse grained and micaceous with common orange iron oxide speckling.
Sample: ED10365
Matching Stone:

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration		Stone repair (required)	√
Salts present		Stone damage (optional replacement)	
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling		Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Much of wall is heavily soiled with organic growth and damp. Decay of stone by granular disintegration due to water penetration and structural movement (much bulging along length). Several rubble blocks show weathering and decay. Localised areas of brick repairs with grey cement patches over decayed/damaged stone. Many copestones are weathered and cracked, requiring replacement. Extensive grey cement pointing throughout, missing in many places. Requires general raking out of loose cement pointing and repointing with more permeable mortar. Will require significant repairs/rebuilding in short to medium term.

K9 Finnie NW wall John Finnie Street

Area of wall in poor condition with structural movement resulting in displacement of blocks and loss of pointing, and areas of decayed stone repaired using brick and cement patches.

Typical area of wall showing loose cement pointing much of which is missing, and some decay of sandstone masonry.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Allen & Harris	**Address:** 26 West George Street	**Building No:** K10
Building type: Commercial	**Status:** In use	**Façade orientation:** East
Date built/Listing: 1883 C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 22/8/2008

Masonry Style:
The ground level of the northern part of the east elevation is smooth ashlar, the remainder is squared rubble.

Stone type:
Red sandstone, fine to medium grainsize, mostly uniform with some cross bedded blocks.

Sample: None (see ED10366)

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Northern part: Generally good condition, although minor scaling at ground level. Lintel over large window at lower level is cracked. Squared rubble to south is decayed at ground level due to granular disintegration from salts and cement pointing. Lower cornice is broken in parts, with water penetration and organic soiling. Upper cornice also damp with plant growth. Repointing is required.
Middle section to south is squared rubble, which is badly decayed at ground level. Much water penetration with scaling throughout (may be possible to re-dress if stone is sound). Gutters appear blocked, with plant growth and abundant salt. Occasional cement patches.
Southernmost part has damage to rubble at ground level with loss of pointing. Much of the rubble shows scaling and may require re-dressing. Broken window surrounds have been poorly repaired using cement. Gutters blocked. Top left-hand side corner shows evidence for movement with open joints, and repointing is required.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Allen & Harris	**Address:** 26 West George Street	**Building No:** K10
Building type: Commercial	**Status:** In use	**Façade orientation:** North
Date built/Listing: 1883 C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 2/5/2008

Masonry Style:
Smooth ashlar, large block size, decorative detail to upper parts.

Stone type:
Red sandstone, with a slight pinkish tinge, fine to medium grainsize. Mostly uniform with some laminated blocks.

Sample: None (see ED10366)

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√**A**	Maintenance required	√
Scaling		Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Ground floor appears to have been cleaned (method uncertain). Lowermost courses show extreme loss due to granular disintegration (probable de-icing salts). Much water penetration to cornices and upper floor sill course with extensive biogenic staining. Repointing required to upper parts where water penetration (with biogenic growth) and salts present. Minor face bedding in some blocks causing scaling. Metal fixings below bay window appear corroded. Stone brackets below bay window need detailed inspection. Upper parts in poor condition with flashings partially detached from copestones and damp/salt penetration to upper left-hand side. Some graffiti at lower levels.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Allen & Harris	**Address:** 2 John Finnie Street	**Building No:** K10
Building type: Commercial	**Status:** In use	**Façade orientation:** West (northern part)
Date built/Listing: 1883 C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 2/5/2008

Masonry Style: Smooth ashlar, with some squared rubble.
Stone type: Red sandstone, fine to medium grained, often softly laminated, other blocks are uniform.
Sample: ED10366

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√**A**	Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments:
Ground floor appears to have been cleaned (method uncertain). Lowermost courses show extreme loss due to granular disintegration (probable de-icing salts) and deep scaling. Water penetration to cornices with green biogenic soiling. Balcony has water penetration with salts and plant growth, and shows scaling. Brackets require detailed inspection. Some face bedded blocks show minor scaling. Water and salt penetration related to defective central downpipe. Black soiling (possible gypsum crust) to sheltered areas in upper part. Cement render to parts of base course plus other coatings (Linostone?).

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Orientan Restaurant & Bar	**Address:** 4 John Finnie Street	**Building No:** K10
Building type: Commercial	**Status:** In use	**Façade orientation:** West (southern part)
Date built/Listing: 1883 C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 2/5/2008

Masonry Style:
Smooth ashlar, with abundant but simple decorative details.

Stone type:
Red sandstone, fine to medium grained, both faintly laminated and extremely uniform.

Sample: None (see ED10366)

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√**A**	Maintenance required	√
Scaling (minor)	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments:
Ground floor appears to have been cleaned (method uncertain). Lowermost courses show damp and biological growth, as well as requiring repointing. Open hole for vent pipe. Minor scaling and granular disintegration to top left- and right-hand sides with dark crusts and salts. Water penetration and biological growth (including higher plants) to protruding features. Minor face bedding throughout.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Opera House	**Address:** 6 John Finnie Street	**Building No:** K11
Building type: Commercial	**Status:** Derelict (façade only)	**Façade orientation:** West
Date built/Listing: 1874/B	**Date of previous repairs:** Unknown	**Date surveyed:** 2/5/2008

Masonry Style: Smooth ashlar with moulded details and carving.
Stone type: Red sandstone, parallel bedded, medium grained.
Sample: ED10367

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	A	Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Extensive moisture and salt penetration to upper courses (repointing required). Very common organic soiling with growth of higher plants. Pigeon guano present. Cracking to some blocks. Some spalling from ashlar blocks, and extensive areas of coated ashlar at lower levels (linostone?) perhaps masking decayed stone. Ashlar around right-hand side entrance has been tooled to give ‘key’ for a coating. Façade appears to have been previously cleaned by abrasive methods. Some previous stone replacement.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Handling Hair	**Address:** 16 John Finnie Street	**Building No:** K12
Building type: Commercial	**Status:** In Use	**Façade orientation:** West
Date built/Listing: 1880/B	**Date of previous repairs:** Unknown	**Date surveyed:** 4/7/2008

Masonry Style:
Rusticated ashlar with large central area containing ornate pilasters with carvings. Timber cornice.

Stone type:
Inaccessible from ground floor as it is covered by shop fronts. Red sandstone, with relatively abundant cross-bedding slightly orangeish colour.

Sample: ED10368

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Timber cornice is damp and decayed in places due to water penetration. Salt is present down right-hand side pilaster and other areas where water has run down from damaged cornice. Some splitting (along bedding) of parts of pilasters. The lower string course is badly damaged (spalling and splitting), and needs much replacement and repointing. Organic soiling and stone decay at failed downpipes to both left- and right-hand sides. Occasional damage (expansion and scaling) caused by rusted metallic fixtures at lower window level. Some minor decay (crumbling) to capitals of pilasters and top part of central ornate area. Ground floor masonry hidden by shop fronts.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Former Homeless House	**Address:** 5 Dunlop Street	**Building No:** K13
Building type: Commercial	**Status:** Mostly vacant	**Façade orientation:** South
Date built/Listing: 1895/B	**Date of previous repairs:** Unknown	**Date surveyed:** 4/7/2008

Masonry Style:
Squared, coursed rock-faced rubble with smooth ashlar dressings and minor moulded details.

Stone type:
Both ashlar and rubble appear to be the same; red sandstone, medium grained, mostly uniform with some planer lamination.

Sample: ED10369B

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Rubble masonry shows surface scaling –requires inspection and possible redressing. Water penetration to string courses, cornice etc. with organic soiling –require repointing. Localised cracks, most not requiring stone replacement. Minor stone replacement. Minor physical damage to masonry at ground level (chips, scratches etc.). Scaling to ashlar masonry mostly superficial.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Golden Phoenix	**Address:** 30-36 John Finnie Street	**Building No:** K13
Building type: Commercial	**Status:** Part in use	**Façade orientation:** West and southwest corner
Date built/Listing: 1895/B	**Date of previous repairs:** Unknown	**Date surveyed:** 4/7/2008

Masonry Style:
Squared, rock-faced rubble with smooth ashlar surrounds and basic moulded details with minor carving. Corner is smooth ashlar with minimal decoration.

Stone type:
Red sandstone, medium to fine grained, generally uniform with some cross-bedding.

Sample: ED10369A

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	√
Water penetration		Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments:
Several mullions show splitting of stone –left-hand side first-floor window requires immediate attention. Water penetration to prominent elements such as string courses, cornices, pediments and copes (organic soiling, plant growth and salts) –all require repointing and some require significant stone replacement, particularly to string courses. Dentils below upper cornice appear badly decayed in places and all require detailed inspection. A few face bedded blocks show spalling. Rubble masonry appears generally sound with minor scaling. Little masonry exposed on ground floor (hidden by shop fronts). Common holes to masonry from previous fixings. Corner shows similar damage to prominent elements, with localised cracks requiring some stone replacement.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Laigh Kirk Mission Hall	**Address:** 33-37 John Finnie Street	**Building No:** K14
Building type: Commercial/Public	**Status:** In use	**Façade orientation:** East
Date built/Listing: 1880/B	**Date of previous repairs:** Unknown	**Date surveyed:** 2/5/08

Masonry Style: Squared rubble with tooled finish, with smooth ashlar and moulded surrounds and ornate carvings inside the arch-heads.
Stone type: Red sandstone, fine to medium grainsize, with faint lamination.
Sample: none

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration		Repairs to carving	√
Face bedding		No action required	

Comments:
Squared rubble shows scaling due to extensive water penetration and salts, mostly concentrated above and to side of arched windows. Water penetration to stone above central entrance with biogenic growth and salts, with damage to decorative stone and carvings. Guano present on carved heads. Central string course in poor condition due to damp and biogenic growth. Ground floor stone obscured by facings and cement render. Repointing required in areas of water penetration.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Atrium Homes	**Address:** 39 John Finnie Street	**Building No:** K15
Building type: Commercial	**Status:** In use	**Façade orientation:** East
Date built/Listing: 1870/B	**Date of previous repairs:** Unknown	**Date surveyed:** 24/5/2008

Masonry Style:
Mostly smooth ashlar with moulded details. Finely stugged coursed squared rubble to upper part of central apex. Some carved details.

Stone type:
Red sandstone, dull orange brown colour, mostly parallel bedded, fine to medium grained.

Sample: none

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present		Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling		Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
General dark soiling particularly to upper parts, also green organic staining to upper part of apex, although most stone in reasonable condition. Granulation of stone surfaces, severe on some blocks. Several generations of cement repair coatings to damaged stone, some grey over ashlar block, others thin purple skim related to repointing. Upper finial carving has part missing and needs checking.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Railway Arches	**Address:** Green Street	**Building No:** K16
Building type: Bridge	**Status:** In use	**Façade orientation:** South and north
Date built/Listing: 1848	**Date of previous repairs:** ?	**Date surveyed:** 4/7/2008

Masonry Style:
Regularly coursed pitch-faced rubble with crude tooling. Dressed stone and copes are smooth droved with rounded drip detailing. Arch dressings rusticated.

Stone type:
Highly variable sandstone, ranging from pale cream and orange, pink, brown or grey colours. Generally medium to coarse grained, typically bedded with common blocks showing contorted bedding (sift sediment deformation). Cross bedding common. Some blocks very coarse grained with quartz pebbles.

Sample: ED10372

Matching Stone:

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling		Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Common water seepage from upper level (probable rail track level) producing extensive dark soiling and salt contamination to stone. Growth of plants in damp areas. Some cracking observed, mostly at high level. Salt penetration also present under arches due to water penetration. Occasional rubble blocks weathered and some moulded drip detailing also shows failure of weathered blocks. Generally in good condition with little stone replacement required. Structure has been previously repointed using hard cement mortar which in places is causing damage to adjacent softer sandstone. Much of the pointing is loose and can be raked out and repointed if necessary by a more permeable mortar (long term maintenance). Dark soiling due to water seepage is unsightly and introducing potentially damaging salts into the structure (maintenance need).

K16 Railway arches Green Street

General view of the railway arches showing unsightly black staining caused by water drainage at high level.

Detail of arch showing the variation of sandstone colours present. Note the condition of the cement pointing, much of which is loose and some is missing.

Detail of part of arch showing grey cement/concrete repairs where stone has decayed. Not also crack to masonry on left-hand side.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Victoria Wine	**Address:** 64 John Finnie Street	**Building No:** K17
Building type: Commercial	**Status:** In use	**Façade orientation:** West
Date built/Listing: Not known	**Date of previous repairs:** Unknown	**Date surveyed:** 24/5/2008

Masonry Style: Smooth ashlar with moulded details.
Stone type: Red sandstone, parallel bedded with large-scale cross bedding.
Sample: none

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present		Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Ashlar generally in good condition, with minor scaling related to areas of water penetration. Moderate dark soiling throughout, with greening and water penetration to prominent elements (string courses, sills, cornice etc). Upper cornice and parapet are soiled and damp with minor associated surface loss. Some loss to stone beneath upper cornice. Central pediment in poor condition with much surface loss to ashlar and moulded stone, particularly above central upper window. Most scaling is detachment of thin crust, such that redressing may be possible without stone replacement. Possible plastic repairs to upper pedimented area. Face bedded blocks adjacent to arch window-heads showing scaling.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Post Office	**Address:** 73 John Finnie Street	**Building No:** K18
Building type: Commercial	**Status:** In Use	**Façade orientation:** North and East
Date built/Listing: 1907/B	**Date of previous repairs:** Unknown	**Date surveyed:** 8/8/2008

Masonry Style:
Smooth ashlar with moulded details and carving at high level.

Stone type:
Red sandstone with orange colour, commonly cross-bedded, grainsize variable - coarse grained in specific beds. Polished and moulded granite base course (very coarse grained, pink colour, with dark quartz and mica, and small dark xenoliths). A later thin granite cladding has been applied around entrance on east elevation (coarse grained, red-orange colour, with black mica).

Sample: ED10374

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical	√**A**	Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
Sandstone has been cleaned using grit blasting with erosion of softer beds giving etched appearance with loss of smooth masonry surface. Prominent and exposed elements such as cornice, pediments, parapets etc. have suffered water penetration with organic soiling and some localised salt staining and surface scaling. Minor splitting along bedding, mostly to sills. Downpipes are blocked in several places with water penetration to surrounding stone. Cracks present, mostly minor, though some on window surrounds need addressing. Carvings and dentils appear generally sound from ground level, but are in exposed areas with potential for water penetration so detailed examination is recommended (some carved areas show minor scaling and splitting). Areas of guano on corner. Green organic soiling also present along base course.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: George Tannahill & Sons	**Address:** 75 John Finnie Street	**Building No:** K19
Building type: Commercial	**Status:** In use	**Façade orientation:** East
Date built/Listing: 1907/C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 24/5/2008

Masonry Style:
Squared coursed rubble, finely stugged, with smooth dressings and carved ornament. Smooth ashlar to ground floor with mouldings and ornamentation.

Stone type:
Red sandstone, mostly parallel bedded (laminated) with minor cross bedding.

Sample: ED10375

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling		Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Much of façade shows water penetration with salt staining and biological soiling (greening). Rainwater goods are in poor condition/not functioning. Damaged stone is mostly related to projecting features (e.g. string courses) or immediate underlying stone. Stone to first floor left-hand side bay window is in particularly poor condition. Damage to base course (salt splash) with some loss of stone.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Paper Roses	**Address:** 100 John Finnie Street	**Building No:** K20
Building type: Commercial	**Status:** In use	**Façade orientation:** South
Date built/Listing: 1876/C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 17/7/2008

Masonry Style:
Smooth ashlar with moulded dressings.

Stone type:
Red sandstone, mostly planer bedded with some large scale cross bedding.

Sample: None (see ED10376)

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling		Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments:
Water penetration and organic soiling to cornice, sill courses, basal courses and below missing downpipe. Cornice is in poor condition, with highly decayed stone immediately above dentils –all requires closer inspection. Much minor cosmetic abrasive damage to lower masonry courses. Cracks present with opening of masonry joints –appears stable, although repointing required. Some sills show splitting along horizontal bedding planes with loss of some stone. Some dressed stone surrounding windows is face bedded and has spalled.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Paper Roses	**Address:** 100 John Finnie Street	**Building No:** K20
Building type: Commercial	**Status:** In use	**Façade orientation:** West
Date built/Listing: 1876/C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 24/5/2008

Masonry Style:
Smooth ashlar, large block size, minimal decoration, prominent upper cornice with dentils.

Stone type:
Red sandstone, pale orange brown colour, mostly parallel bedded, some large scale cross bedding.

Sample: ED10376

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings		Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments:
Chimneys appear to be brick. Damp (dark soiling) to protruding features (cornice, band courses, sills). Much water penetration and salt to cornice (also plant growth), with poor condition to immediate underlying stone -in particular the dentils (some of which are missing). Dentils require closer inspection. Large lintels to upper windows are face bedded with spalling(requires removal of loose material). Some cracking, in particular first floor right-hand side window lintel which shows structural movement. Much minor cosmetic damage to ground floor (although most stone is obscured by shop fronts).

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Balti House	**Address:** 108 John Finnie Street	**Building No:** K21
Building type: Commercial/Residential	**Status:** In Use	**Façade orientation:** North
Date built/Listing: 1890/C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 16/7/08

Masonry Style:
Irregular coursed squared stugged rubble with smooth dressings.

Stone type:
Red sandstone with orange colour; medium grainsize. Blocks mostly planer bedded.

Sample: ED10377

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling		Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Water penetration from failed downpipe has caused granular decay to rubble masonry and associated organic staining and salts. Cement patch repairs are present on masonry around the downpipe, pipework fittings, some sills and masonry surrounding the entrance. The upper window has been infilled and finished with cement render. Cracks are common, and several sill and lintels damaged. Cornice appears in poor condition and requires detailed inspection. Chimney is brick.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Balti House	**Address:** 108 John Finnie Street	**Building No:** K21
Building type: Commercial/Residential	**Status:** In use	**Façade orientation:** West
Date built/Listing: 1890/C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 2/5/08

Masonry Style:
Smooth ashlar with basic moulded string courses and simple pilasters to upper windows.

Stone type:
Red sandstone with planer bedding and rare large scale cross-bedding.

Sample: None (see ED10377)

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration		Repairs to carving	
Face bedding		No action required	

Comments:
String courses, cornice, sills etc. show damp and soiling with organic growth. Several areas of severe downwards water penetration with associated salt staining and scaling of ashlar. Upper left-hand side ashlar shows erosion from surface pitting. Localised areas of pink cement repointing repairs. Common cracks to masonry blocks with some structural bulging to façade. Stone decay at ground level due to splash, with localised cement repairs.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Mason Murphy	**Address:** 78 – 80 Portland Street	**Building No:** K22
Building type: Commercial	**Status:** In use	**Façade orientation:** Main E elevation, corner and smaller S elevation.
Date built/Listing: C(S)	**Date of previous repairs:** Unknown	**Date surveyed:** 28/5/08

Masonry Style:
Smooth ashlar with simple carved decoration.

Stone type:
Blonde sandstone, variable and strongly bedded, with common cross-bedding and possible soft sedimentary deformation. Appears coarse grained (though variable). Colour varies from pale cream buff to strong brown-buff with patches of orange staining. Scroll top to pilasters are a distinct purple-grey sandstone.

Sample: ED10316A

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling (minor)	√	Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	√
Face bedding		No action required	

Comments:
Pilasters on main elevation have soiling to bases around floodlights, and scroll tops (different stone type/artificial stone?) show cracking and require inspection/replacement. Much water penetration and green staining to cornices. Coloured render repairs to several blocks. Previously cracked blocks have been ‘stitched’ and repaired with structural base support -most appear sound with no movement or further deterioration apparent. Parapet on main elevation has areas of downwards water penetration due to damage to detailing on copestones –may need replacing. Condition of copestones in other parts difficult to ascertain from ground level and partially hidden by flashing (flashing damaged in places). Common small holes on façade from previous fixings.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Back wall, Garden Street	**Address:** 98 Portland Street	**Building No:** K23
Building type: Commercial	**Status:** Unoccupied	**Façade orientation:** Northwest
Date built/Listing: ?	**Date of previous repairs:**	**Date surveyed:** 4/7/2008

Masonry Style:
Irregularly coursed roughly squared rubble, with finely droved dressed margins (broached where intended to be harled). Dressed stone is prominent so probably previously harled. Ornate copestone suggests use of reclaimed stone.

Stone type:
Variable sandstone, typically medium grained blonde colour, weathering to pale orange with iron oxide speckling. Common bedded texture.

Sample: ED10379

Matching Stone:

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	√
Water penetration		Stone repair (required)	√
Salts present		Stone damage (optional replacement)	
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	

Comments:
Common scaling, although many blocks can be brushed down or redressed. Most pinning stones appear unsound and require replacement. Moderate number of blocks (estimated 30-40%) are likely to be unsound and require replacement. Copestones highly weathered and in need of replacement. Most pointing is gone, allowing water penetration and plant growth; complete repointing required. Some graffiti. Minor cement patching to weathered stone.

K23 Garden St back wall 98 Portland Street

Part of wall showing lack of mortar with open joints resulting in water penetration and plant growth. Note the very poor condition of copestones.

Detail of the masonry showing prominent margins with fine horizontal tooling (right-hand edge) and coarse broached tooling in recessed area indicating the wall is likely to have been harled.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Johnnie Walker's	**Address:** Strand Street	**Building No:** K24
Building type: Industrial	**Status:** Parts in use/others disused	**Façade orientation:** SW/W/N/NE
Date built/Listing: 1895/B	**Date of previous repairs:** Unknown	**Date surveyed:** 8 & 10 July 2008

Masonry Style:
Ground floor rusticated ashlar; upper floors brick with sandstone dressings. Moulded details to window surrounds and dentilated cornice. Elaborate carved capitols to brick columns.

Stone type:
Blonde sandstone, very pale light orange colour with some variable orange iron oxide banding. Weathers to orange-brown in places. Uniform fine to medium grained freestone. White mica and pale iron oxides present.

Sample: ED10380

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	√
Face bedding		No action required	

Comments:
Deterioration variable on different parts of façade. Some areas of severe stone decay with loss of stone. Dentils in very poor condition in places and all require inspection. Prominent features (e.g. cornices) have water penetration, biogenic soiling and in places open joints. Stone decay commonly present around failed rainwater goods with much plant growth in places. General dark grey-brown soiling common, with streaking to some parts. Common graffiti and vehicle strike damage to parts of ground floor. Localised areas of intense pigeon soiling. General decay to basal courses due to water penetration/de-icing salt, although most stone is sound. Areas of overpainting above shop fronts on southwest elevation with severe stone decay in places; also localised piecing-in of possible cement repairs at high level on west elevations.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: P&R Torbet	**Address:** 13 John Dickie Street	**Building No:** K24
Building type: Commercial	**Status:** In Use	**Façade orientation:** Southwest
Date built/Listing: Unknown	**Date of previous repairs:** Unknown	**Date surveyed:** 22/8/08

Masonry Style:
Mostly plain polished ashlar with some protruding hoods on the windows.

Stone type:
Red sandstone with planar bedding and some large scale cross bedding.

Sample: ED10380B

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	√
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	
Face bedding	√	No action required	

Comments:
Scaling of isolated blocks due to face-bedding and/or water penetration. Upper cornice and dentils have much water penetration and salts -most appear in sound condition but all needs detailed inspection (and repointing). Lower cornice is similar - generally appears sound. Some splitting of blocks on pediment hoods and other protruding horizontal surfaces, with granular decay of some adjacent masonry. Moulded brackets show some loss of stone, but no indication of serious failure. General soiling –cosmetic clean required. Ground floor masonry obscured by shop front and paint.
South (gable) elevation is roughly squared irregularly coursed rubble. Stone is in generally poor condition with spalling of face bedded blocks enhanced by cement pointing (much of which appears loose). Some sandstone repairs are required (same sandstone type as front elevation) although it may be possible to redress much of the existing masonry and repoint using a lime-based mortar.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Goodfellows Estate Agents	**Address:** 13 West George Street	**Building No:** K25
Building type: Commercial	**Status:** In use	**Façade orientation:** South elevation, and western corner
Date built/Listing: 1875/B	**Date of previous repairs:** Unknown	**Date surveyed:** 2 April 2008

Masonry Style:
Ashlar, rusticated ground floor with smooth upper floors. Moulded details and carved decoration.

Stone type:
Blonde sandstone, weathering to variable orange to pale buff colour. Blocks generally uniform, some planer bedding, some containing small brown iron nodules. Basal courses are coarse grained and gritty sandstone; upper are uniform fine to medium grained. White mica present. Parapet appears to be different stone type (or alternative replacement material).

Sample: ED10316A

Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling	√	Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	√
Face bedding		No action required	

Comments:
Most ashlar blocks in reasonable condition. Decay mostly to projecting masonry or underlying stones which have suffered water penetration. Some scaling of ashlar. Strongly decayed along base (salt splash) with coating of ?linostone which may cover damaged stone. Condition of parapet not determined from survey (requires detailed inspection). Maintenance required to projecting elements and related damp areas, and removal of coating at base. An area of rusticated ashlar beneath a column has numerous unsightly holes (from previous signage) which would benefit from filling for aesthetic reasons.

KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEY SHEET

Name: Goodfellows Estate Agents	**Address:** 13 West George Street	**Building No:** K25
Building type: Commercial	**Status:** In use	**Façade orientation:** Northwest elevation (Gordon Street)
Date built/Listing: 1875/B	**Date of previous repairs:** Unknown	**Date surveyed:** 2 April 2008

Masonry Style: Irregular coursed squared rubble with 'picked' tooling.
Stone type: Blonde sandstone, variable pale orange grey to orange brown colour. Soiled to dull grey (washed to paler colour by water runoff). Mostly uniform, some planer and cross-bedded. Mostly fine to medium grained, fairly dense, with white mica and small dark brown iron nodules in some blocks.
Sample: ED10316B

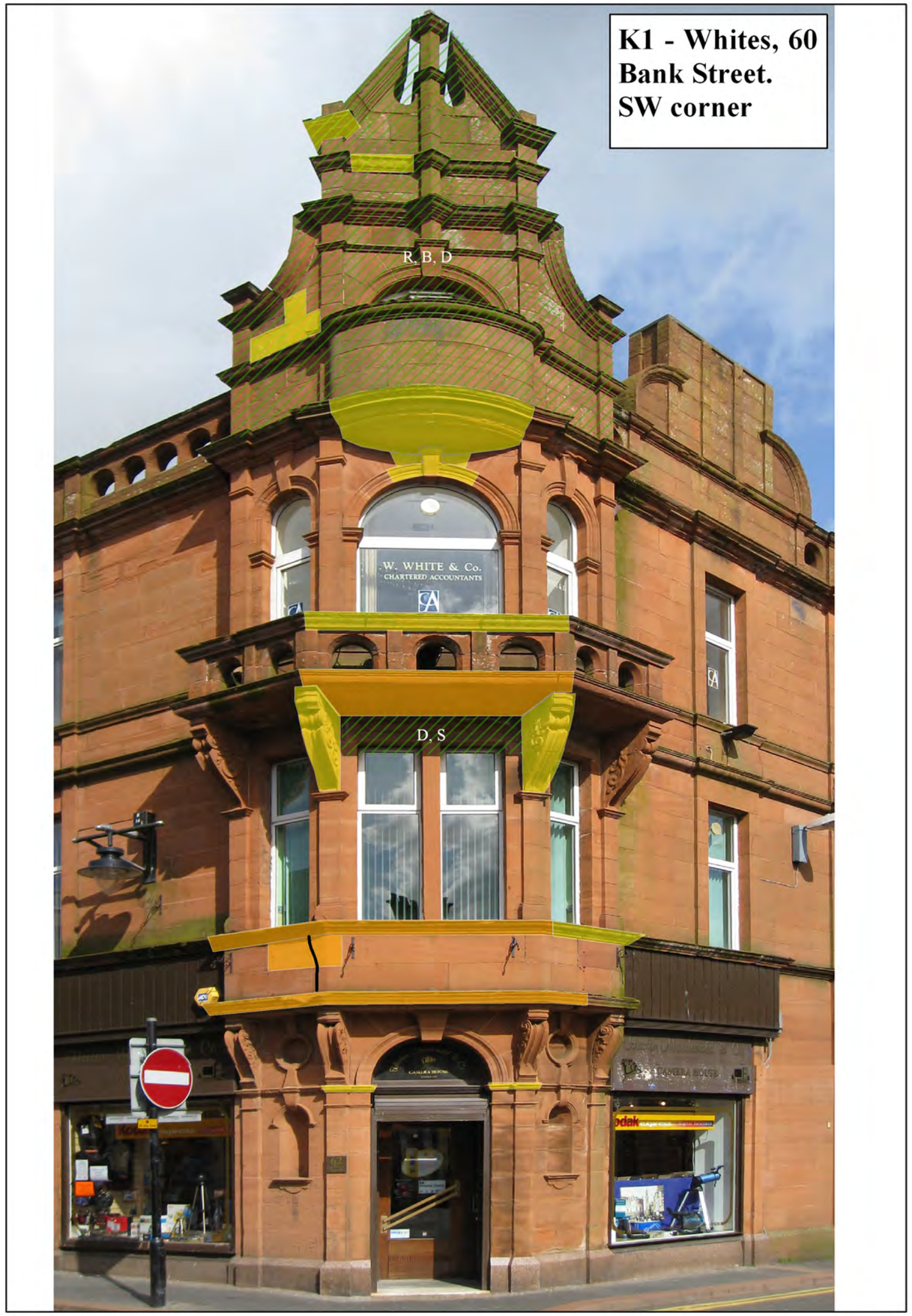
Stone condition: √		**Intervention needs: √**	
Plastic repair/coatings	√	Urgent	
Water penetration	√	Stone repair (required)	√
Salts present	√	Stone damage (optional replacement)	√
Stone cleaning: **A**brasive/**C**hemical		Maintenance required	√
Scaling		Removal of coatings/cement	√
Granular disintegration	√	Repairs to carving	
Face bedding		No action required	
Comments: Mostly good condition. Decayed at base (salt splash). Other decayed blocks mostly granulation due to saturation from failed rainwater goods. Large area of cement patching and repointing at LHS due to previous failure of rainwater goods (possible damaged stone present). Maintenance: Repair rainwater goods; removal of cement coatings and pointing; repointing.			

APPENDIX 2
KILMARNOCK BUILDING STONE AUDIT
FAÇADE SURVEYS

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.



R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

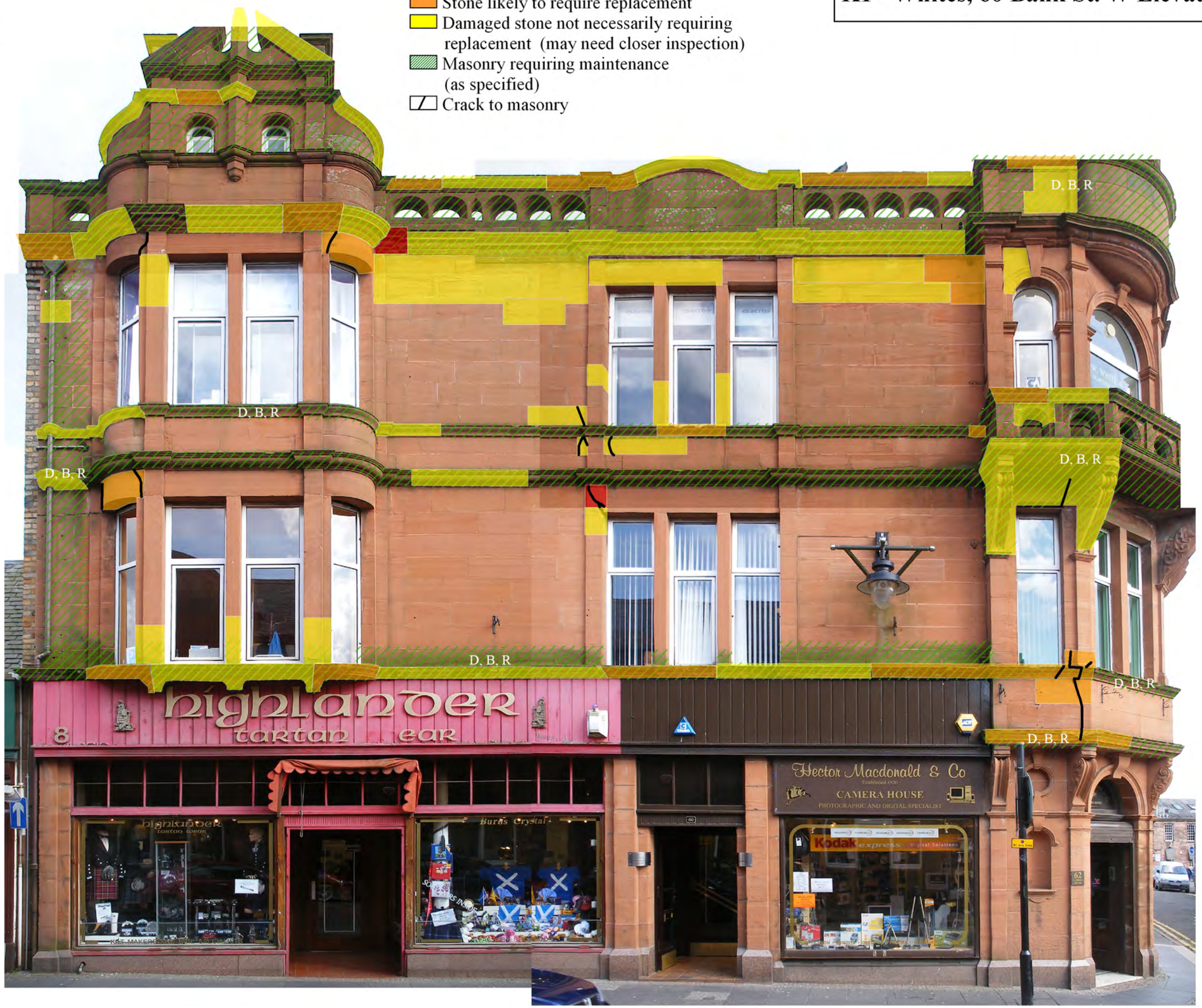
K1 - Whites, 60 Bank Street.
S Elevation

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K1 - Whites, 60 Bank St. W Elevation.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry



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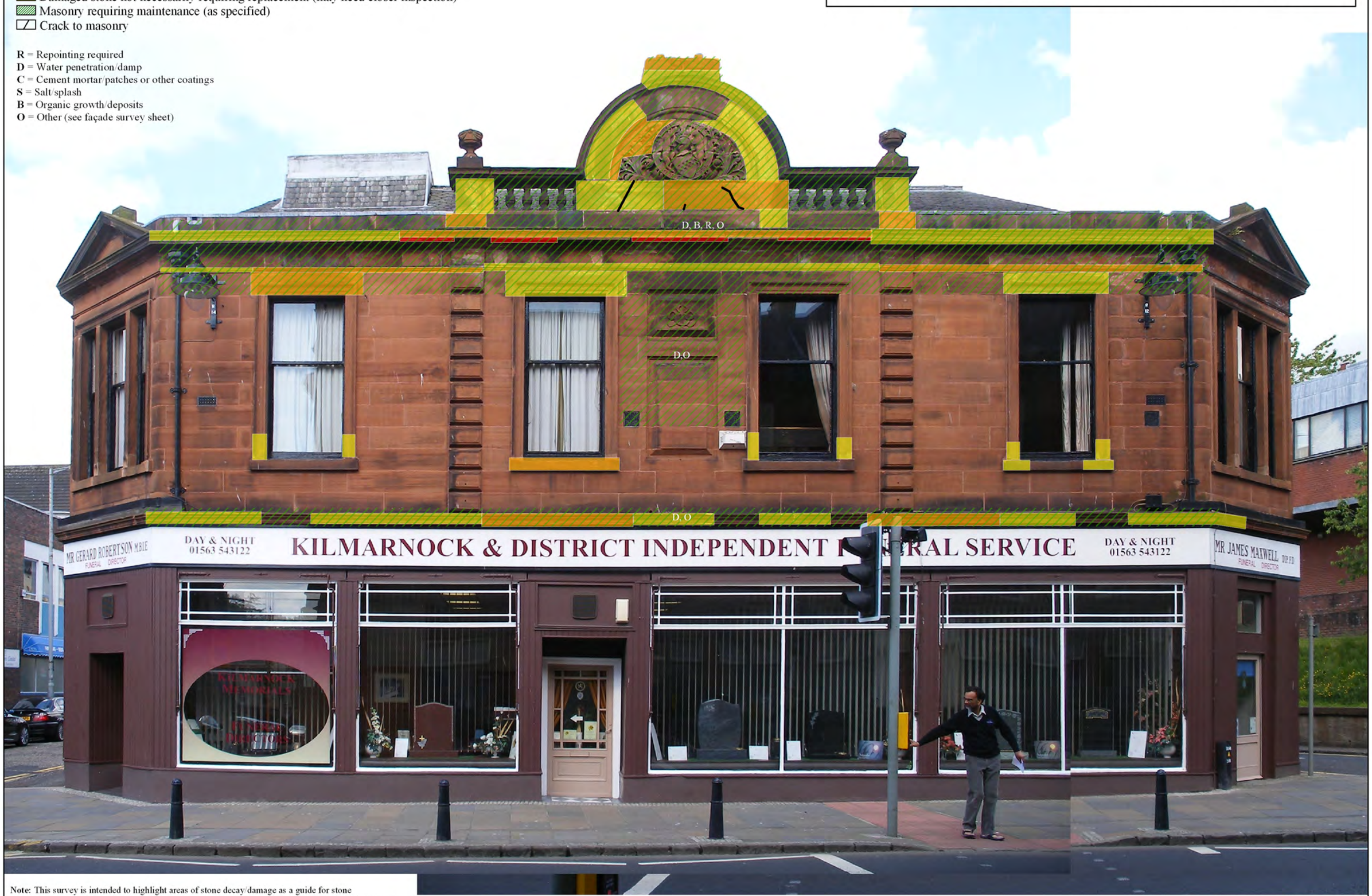
K3 - Kilmarnock Club, 3-9 Dunlop St. E elevation.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)



Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K3 - Kilmarnock Club, 3-9 Dunlop St. NE corner.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K3 - Kilmarnock Club, 3-9 Dunlop Street. NW elevation

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K3 - Kilmarnock Club, 3-9 Dunlop St. SE corner.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K5 - Kilmarnock Standard, 10 Grange Place. Main facade.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K5 - Kilmarnock Standard, 10 Grange Place. Corner.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

K5 - Kilmarnock Standard, 10 Grange Place. Back (SW) elevation.

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K6 - EAC - 19 John Finnie Street.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K6 - EAC, 19 John Dickie Street. W elevation.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K6 - EAC, 19 John Dickie Street. SW corner (JFS/JDS)

K6 - EAC, 19 John Dickie Street. S elevation (JDS-West)

K6

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K6 - EAC, 19 John Dickie Street. S elevation (JDS-East)

K6

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K8 - Central Evangelical Church, John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K10 - Allen & Harris, 2 John Finnie St

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K10 - Allen & Harris.
Rear Elevation (Strand Street).

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

K10 - Orientan & Papa Iz, rear elevation (Strand Street)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

K11 - Opera House - 6-14 John Finnie St.

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

K12 - Handling Hair, 16-28 John Finnie St.

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K13 - Old Homeless House, 30-38 John Finnie St.

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K13 - Old Homeless House - JFS corner/ 5 Dunlop Street.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K13 - Old Homeless House, 5 Dunlop St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K14 - Laigh Kirk, 31-37 John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements.
Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K15 - Atrium Homes, 39-41 John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K17 - Victoria Wine, 64-70 John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K18 - Post Office, 73 John Finnie (E) elevation

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K18 - Post Office, 73 John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K18 - Post Office, 73 John Finnie St.
Nelson St (NE) Elevation.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K19 - Tannahills, 75-79 John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K20 - Paper Roses, 100 - 106 John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K20 - Paper Roses, 100-106 John Finnie St.
S Elevation

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K21 - Balti, 108-114 John Finnie St.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

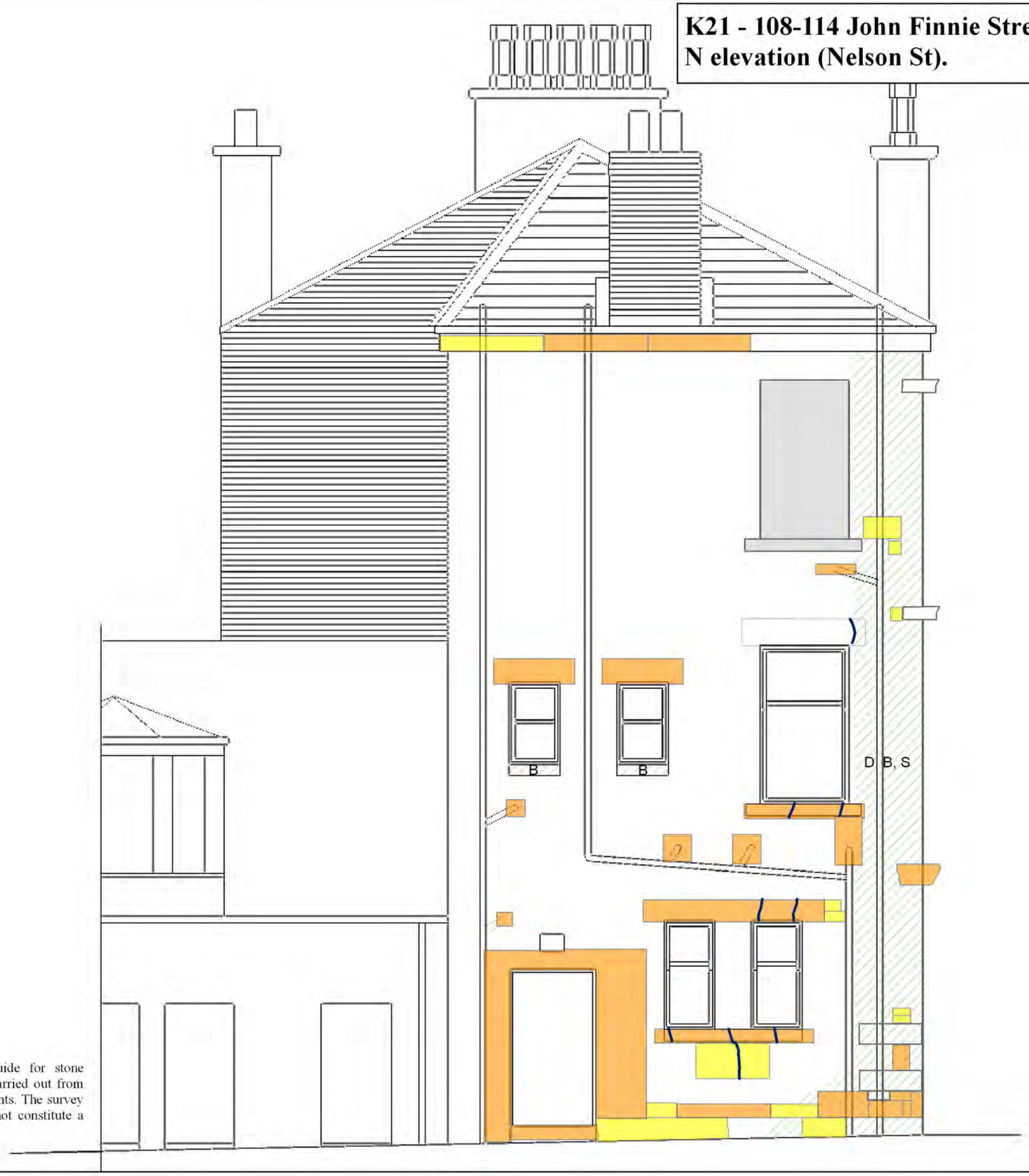
Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

K21 - 108-114 John Finnie Street.
N elevation (Nelson St).

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)



Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K22 - Mason Murphy, 78-80 Portland St.

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K22 - Mason Murphy, 78-80 Portland Street. Corner.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

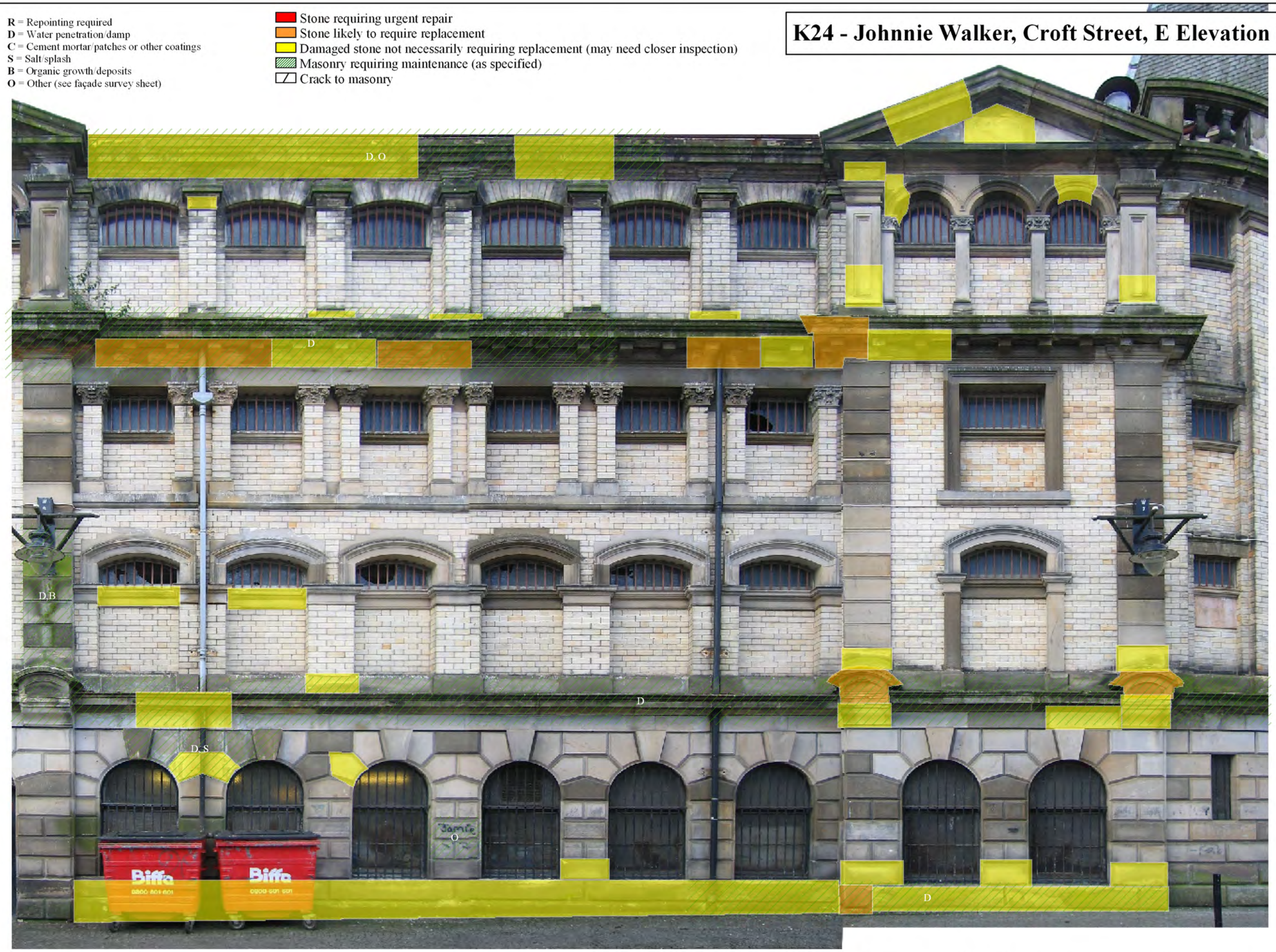
K24 - Johnnie Walker, Croft Street, E Elevation (1)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K24 - Johnnie Walker, Croft Street, E Elevation (2)

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry



Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K24 - Johnnie Walker, North Elevation (3)

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

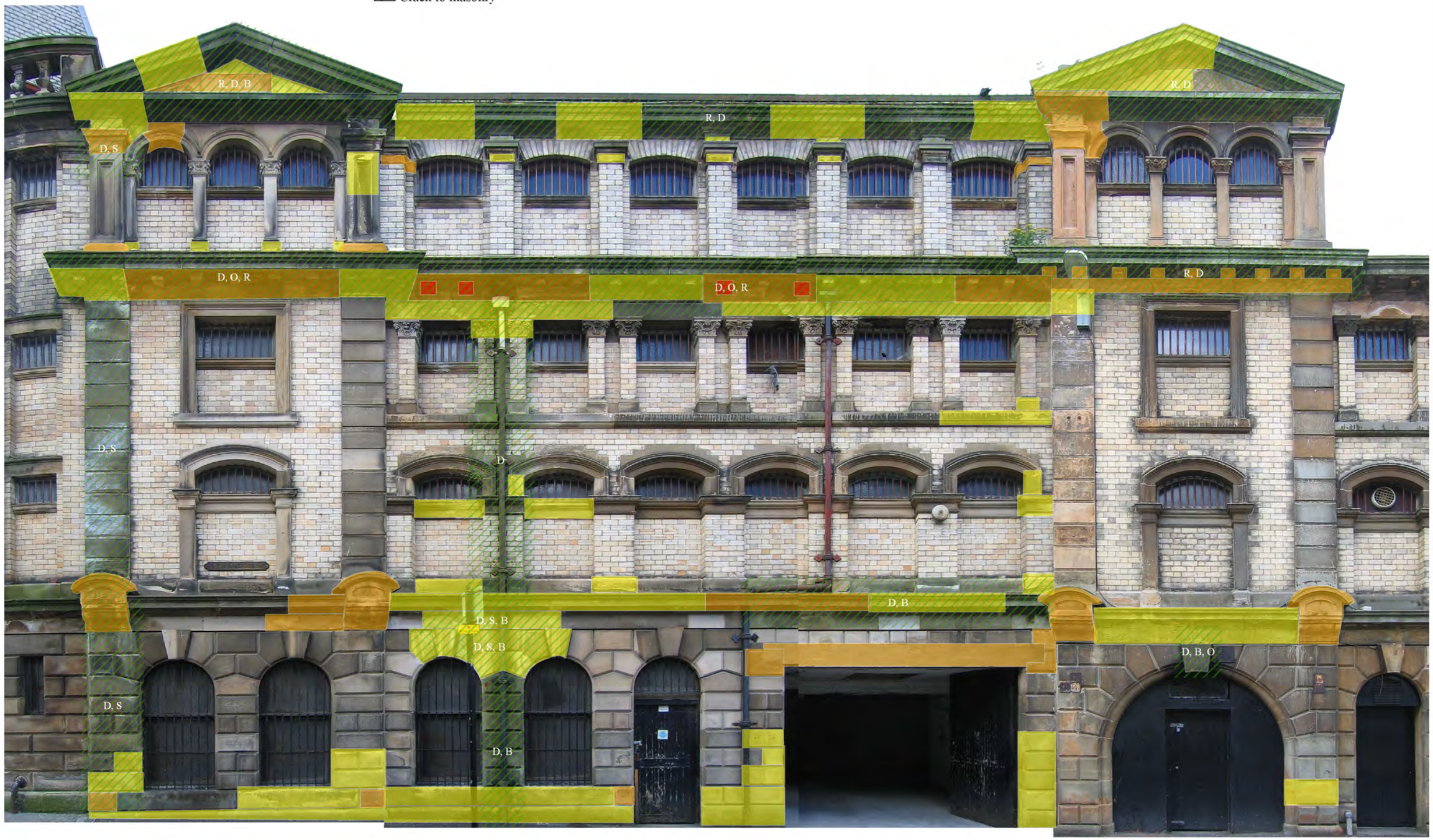
- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K24 - Johnnie Walker,Strand Street, W Elevation (4)



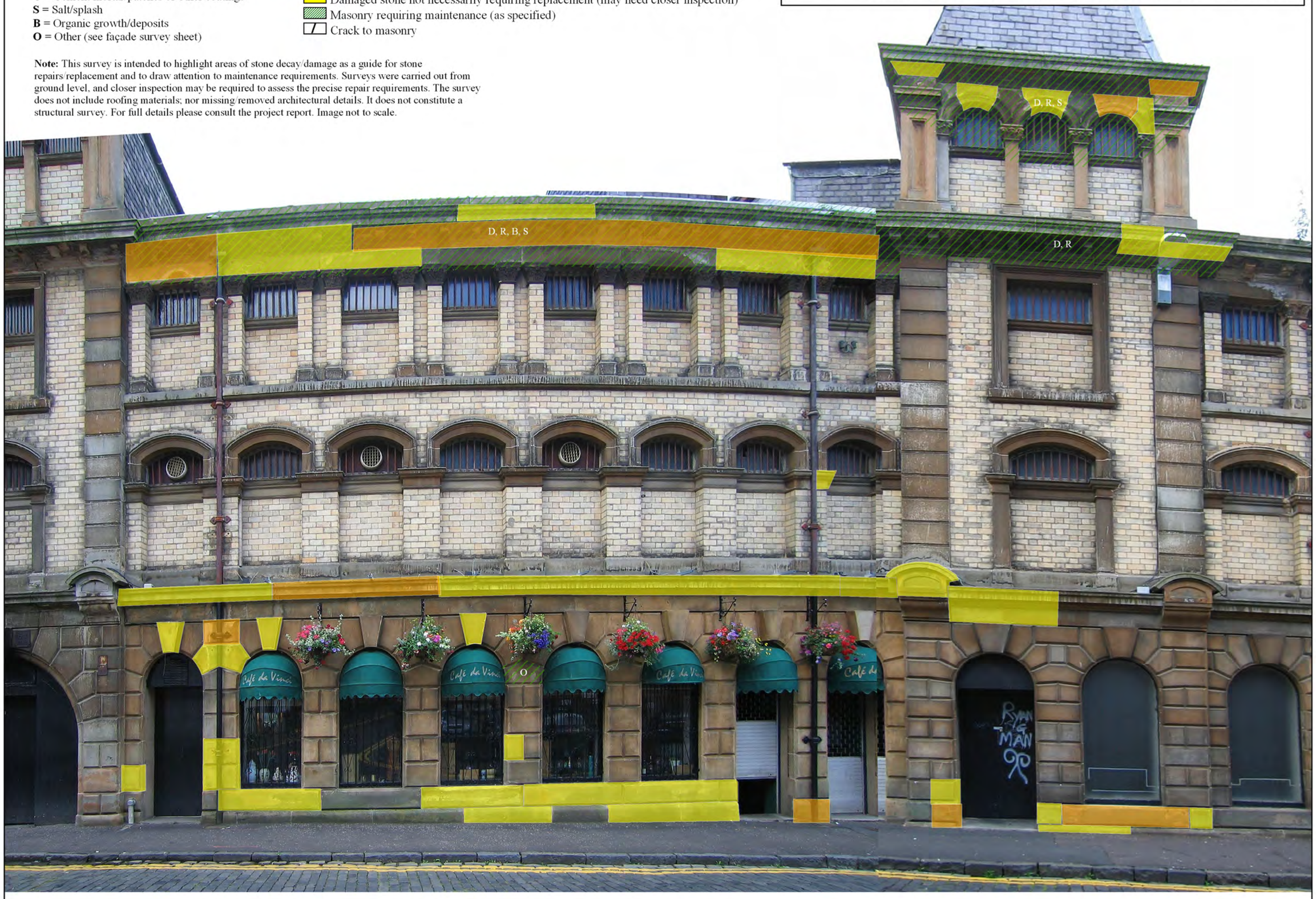
Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K24 - Johnnie Walker, Strand Street, W Elevation (5)

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

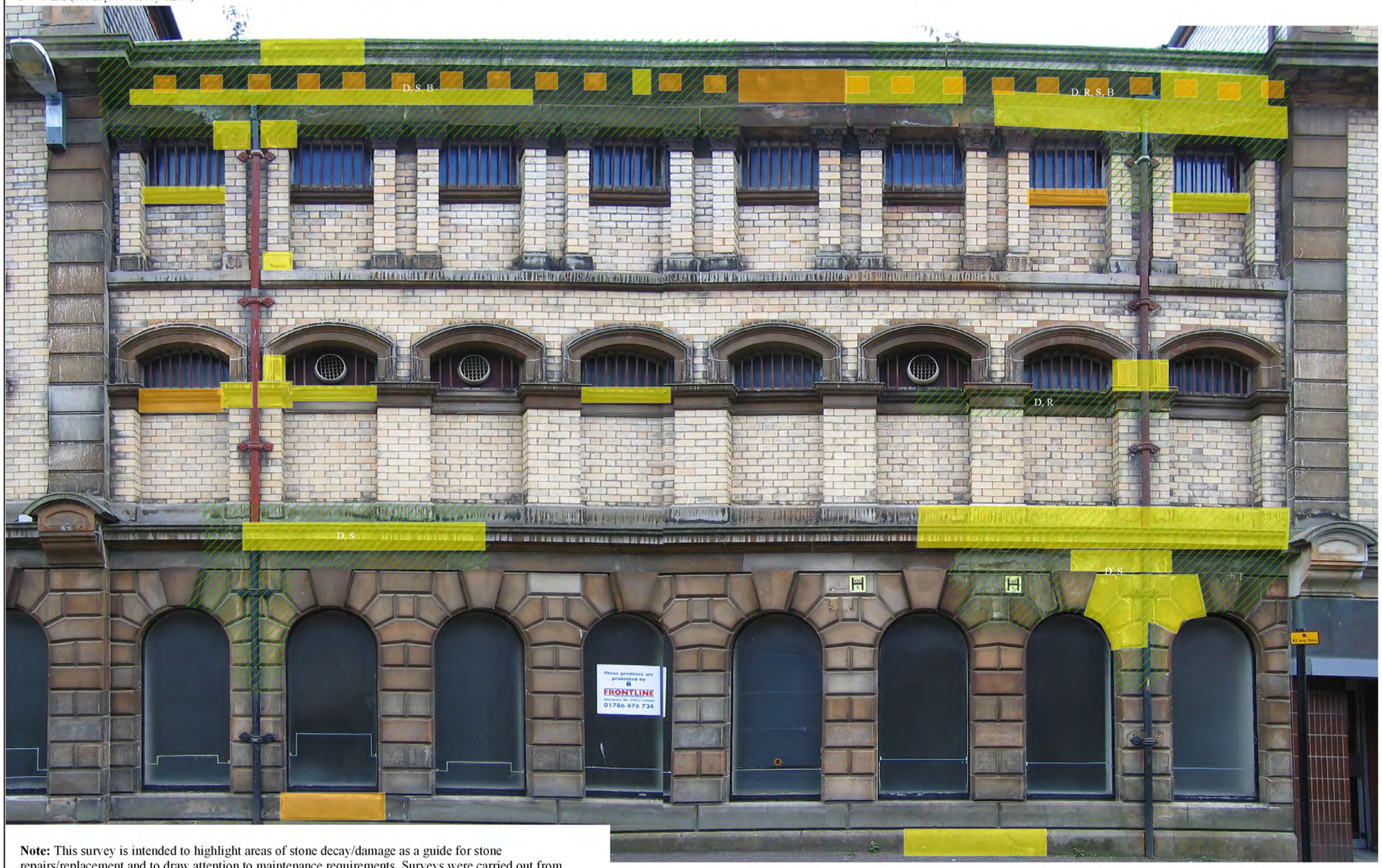
Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.



R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K24 - Johnnie Walker, Strand Street, W Elevation (6)



Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K24 - Johnnie Walker,Strand Street, W Elevation (7)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K24 - Johnnie Walker, Strand Street, W Elevation (8)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

K24 - P & R Torbet, Strand St.

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

K25 - Goodfellows, 13-15 West George St. Corner.

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

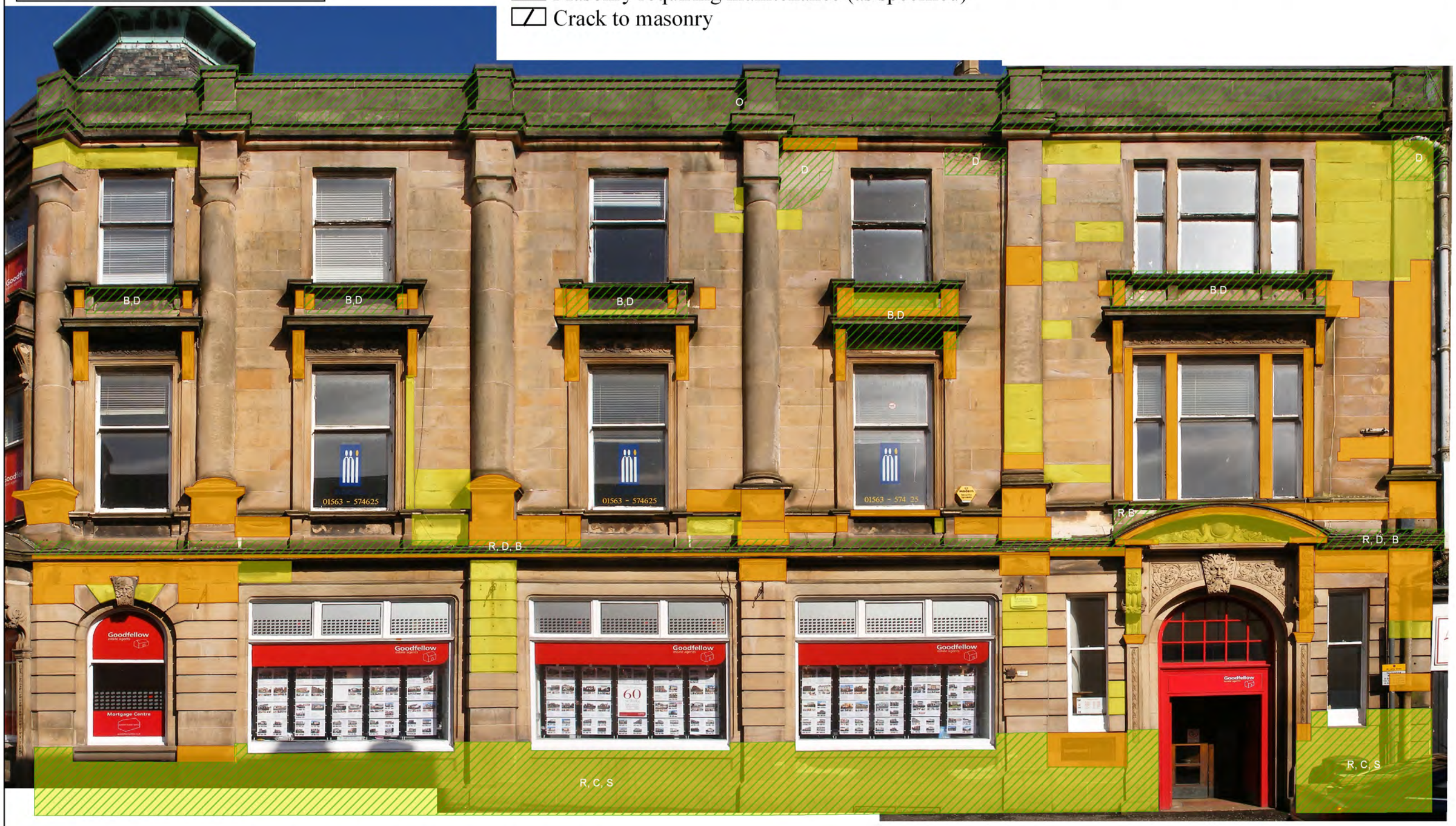
R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements.
Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/ removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Stone requiring urgent repair
Stone likely to require replacement
Damaged stone not necessarily requiring replacement (may need closer inspection)
Masonry requiring maintenance (as specified)
Crack to masonry

K25 - Goodfellows, 13-15 West George St.



Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report.

K25 - Goodfellows, NW elevation (Gordon Street)

- Stone requiring urgent repair
- Stone likely to require replacement
- Damaged stone not necessarily requiring replacement (may need closer inspection)
- Masonry requiring maintenance (as specified)
- Crack to masonry

R = Repointing required
D = Water penetration/damp
C = Cement mortar/patches or other coatings
S = Salt/splash
B = Organic growth/deposits
O = Other (see façade survey sheet)

Note: This survey is intended to highlight areas of stone decay/damage as a guide for stone repairs/replacement and to draw attention to maintenance requirements. Surveys were carried out from ground level, and closer inspection may be required to assess the precise repair requirements. The survey does not include roofing materials; nor missing/removed architectural details. It does not constitute a structural survey. For full details please consult the project report. Image not to scale.

APPENDIX 3
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEETS

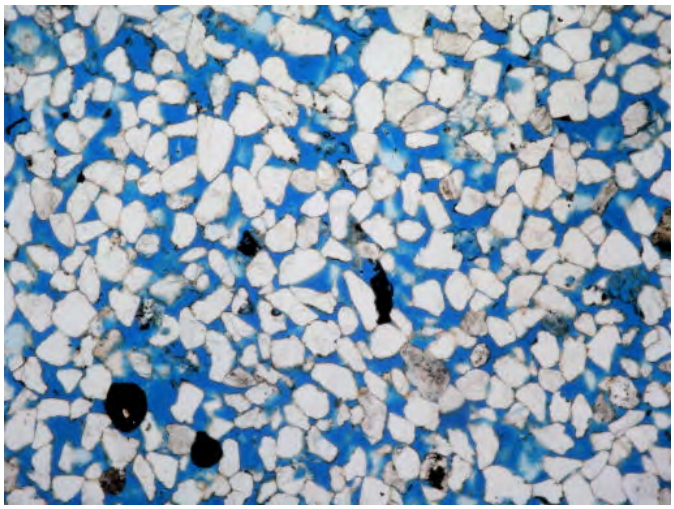
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K1	W. White & Co, 60 Bank St.	ED10357

Macroscopic Description	
General Description:	Uniform, fine grained red sandstone.
Colour: (*Munsell)*	2.5YR 5/4 to 5/6, dull to bright reddish brown.
Grainsize	Uniform 'fine to medium', small fraction of 'fine'.
Texture	Uniform.
Composition	Quartz, with thin iron oxide coating. Feldspars, (some powdery and weathered). Lithic grains. Some black ?manganese spots.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid.
10% HCl Test	None.

Microscopic Description

Well sorted, mostly 'fine to medium' grainsize (0.25-0.30mm) with smaller fractions of 'fine' and occasional 'coarse' grains. Quartz comprises c.90%, mostly monocrystalline, from subangular to subrounded, with some feldspars (mostly twinned, some untwinned), often fresh. Relatively abundant lithic grains of undetermined metamorphic and sedimentary origin. Minor opaque discrete iron oxide grains, solid and fresh. Occasional accumulations of opaque probable manganese spots, enclosing some framework grains. Tourmaline appears as accessory mineral. Abundant, clean and open porosity, well communicated, making this a relatively permeable stone. Contacts between grains are mainly punctual and long.



Comments/Possible Original Sources:
Relatively fine grained sandstone with uniform grainsize and open texture. Similar to sandstone from Corsehill.

Currently available matching stone:
Corsehill (uniform variety; not banded), Gatelawbridge/Newton, (Corncockle).

KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K2A	Harled cottage, 1 Dunlop Street.	ED10359A (sample from adjacent property No. 3)

Macroscopic Description	No thin section
General Description:	Black igneous whinstone (dolerite), very tight grained, 'dense'.
Colour: (*Munsell)*	N3, dark grey.
Grainsize	Fine
Texture	Uniform.
Composition	Unable to determine macroscopically. No thin section.
Grain Hardness	Strong.
Grain Texture	Tight.
Water Absorption	None.
10% HCl Test	None.
Possible source	Probable very local field boulders or from river.
Currently available matching stone	Reclaimed whinstone (e.g. from kerbstones, setts etc.) or from active aggregate quarry supplying block (e.g. Hillhouse quarry, Troon; TincornHill/Sorn quarry, East Ayshire; Cairneyhill/Caldercruix quarry, North Lanarkshire).

Building No.	*Building*	**Sample No**.
K2B	Harled cottage, 1 Dunlop Street.	ED10359B (sample from adjacent property No. 3)

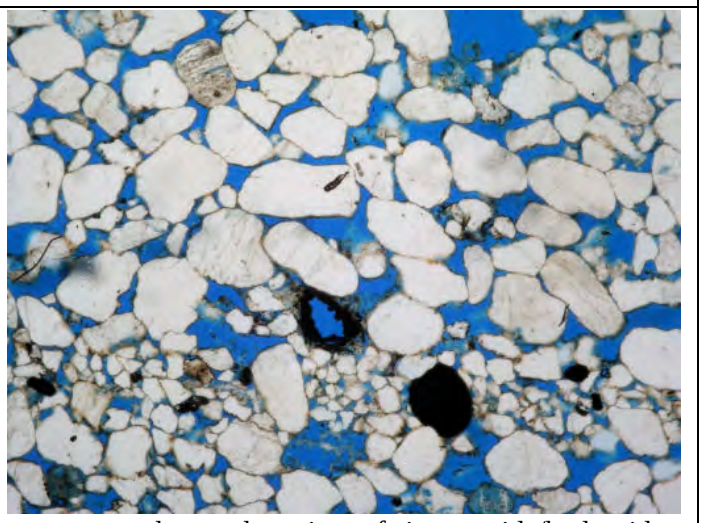
Macroscopic Description	No thin section
General Description:	Pale grey when fresh, buff when weathered, strongly laminated, micaceous sandstone.
Colour: (*Munsell)*	7.5Y 8/1 to 7/1.
Grainsize	'Fine' to 'fine to medium'.
Texture	Strongly laminated.
Composition	Quartz, feldspars, lithic grains, iron oxides, muscovite, clays, carbonates.
Grain Hardness	Strong.
Grain Texture	Tight.
Water Absorption	Low.
10% HCl Test	Weak.
Possible source	Probably from very local field or river stones, or from nearby small quarry excavation.
Currently available matching stone	Sandstone in this building is highly variable (generally low quality) and is likely to have been lime harled for protection. Because of the variability a wide range of replacement sandstones could be used e.g. Stanton Moor, Ravensworth, Scotch Buff, and various others.

KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K3	Kilmarnock Club, 2 Dunlop Street	ED10358

Macroscopic Description	
General Description:	Uniform red sandstone, with orange colour, and slight fabric.
Colour: (*Munsell)*	c.2.5YR 5/4 to 5/6, dull to bright reddish brown.
Grainsize	Almost bimodal, 'fine' and 'medium'.
Texture	Uniform.
Composition	Quartz, with pale iron oxide patina, occasional feldspars, lithics and large iron oxides.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid to moderate, directional.
10% HCl Test	None.

Microscopic Description



Uniformly laminated sandstone, with laminae consisting of alternate layers of medium and fine grained sand grains. Two different grain sizes, the fine typically 0.1 to 0.15mm and medium, typically 0.4-0.5, with some grains in between. Grains are coated by a red coating of iron oxides/hydroxides and have subangular to rounded shapes. The iron oxides/hydroxides acts also as cement. Composition is mostly quartz, with a few feldspars and some lithics. Relatively abundant, generally competent and round grains of iron oxide/hydroxides, occasionally corroded. Porosity is abundant and open where the grainsize is coarser and much lower where the grains are finer giving the stone a directional permeability, higher parallel to the bedding. Contacts tend to be punctual and long.

Comments/Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries) sandstone.

Currently available matching stone:
Redder varieties of Corncockle, Knowehead, (Locharbriggs).

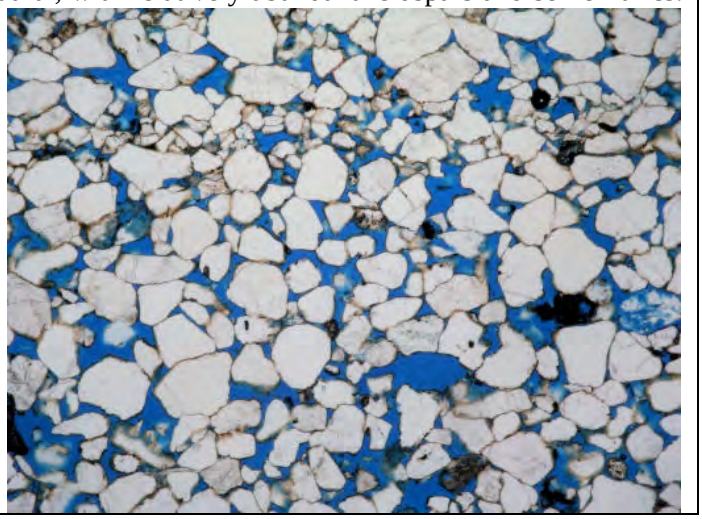
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K4	Station wall, Garden St. Copestone.	ED10360

Macroscopic Description	
General Description:	Fairly uniform red sandstone with lighter coloured thin laminae (parallel bedding).
Colour: (*Munsell)*	Between 2.5YR 5/6 and 4/6, bright reddish brown to reddish brown.
Grainsize	'Medium' and 'fine', almost bimodal.
Texture	Bedded, with thin laminae.
Composition	Quartz, coated by a patina of iron oxides/hydroxides. Abundant white round, medium grainsize feldspar grains. Minor iron oxide/hydroxide grains.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid to moderate, directional.
10% HCl Test	None.

Microscopic Description

Sandstone, formed by almost bimodal, 'fine' and 'medium' grains, with laminae constituted by layers where fine grainsizes are more abundant. Grain sizes are typically 0.1 to 0.15mm for the finer fraction and 0.4-0.5mm for the medium fraction, with some grainsizes in between. Grains are coated by red iron oxides/hydroxides and have subangular to rounded shapes. Composition is over 85% quartz, with relatively abundant feldspars and some lithics. Quartz grains are covered in a thin patina of iron oxides/hydroxides. This patina of iron oxides/hydroxides acts also as cement. Minor, small, irregularly shaped grains of iron oxide/hydroxide, occasionally corroded. Porosity is abundant and open where the grainsize is coarser and lower where the grains are finer giving the stone a directional permeability, higher parallel to the bedding. Moderate compaction, with contacts tending to be punctual and long.



Comments/Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Gatelawbridge/Newton, redder variety of Knowehead, (Corncockle)

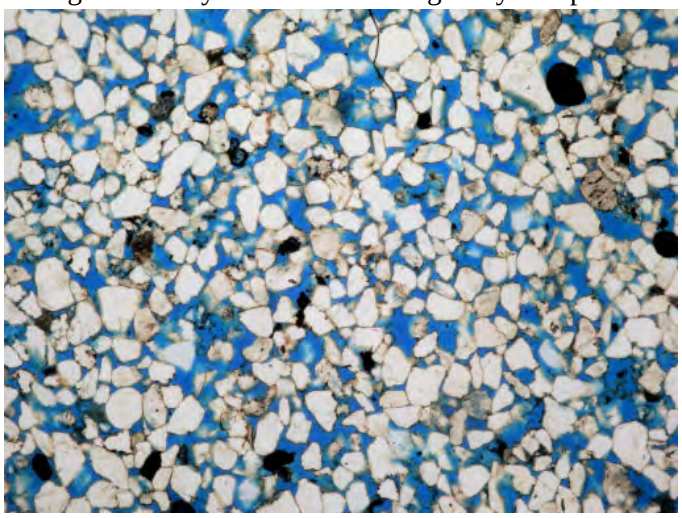
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K5 – sample A: String course	Kilmarnock Standard, 10 Grange Place.	ED10361A

Macroscopic Description	
General Description:	Uniform fine grained red sandstone. Some clay content.
Colour: (*Munsell)*	Between 2.5YR 5/4 to 5/6, dull to bright reddish brown.
Grainsize	'Fine' and 'fine to medium', occasional 'medium'.
Texture	Uniform with a minor hint of bedding (fabric).
Composition	Quartz, coated in a patina of iron oxides/hydroxides. Minor feldspars and iron oxides, both in small sizes.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid to moderate, directional.
10% HCl Test	None.

Microscopic Description

Sandstone, mostly 'fine to medium' grained, typical grainsize 0.25 - 0.3mm, also with a finer fraction and moderately well sorted, with subangular to rounded grains. Uniform texture. Composed mainly of quartz, feldspar (mostly untwinned varieties) appearing rather fresh and some lithic grains of unidentified origin. Mostly small size irregularly shaped iron oxide/hydroxide grains with some being occasionally round and discrete. Quartz grains are covered in a thin patina of iron oxides/ hydroxides. This patina acts also as cement. Small amount of clays, partially infilling some of the porosity. Open texture with high and well communicated porosity (c.20%) and highly permeable. Moderately compact sandstone, the contacts between grains are mostly long and with occasional punctual and pressure-solution.



Comments/Possible Original Sources:
Uniform fine grained sandstone similar to Corsehill, or finer grained uniform varieties of Mauchline sandstone.
Currently available matching stone:
Corsehill (uniform variety), Gatelawbridge/Newton.

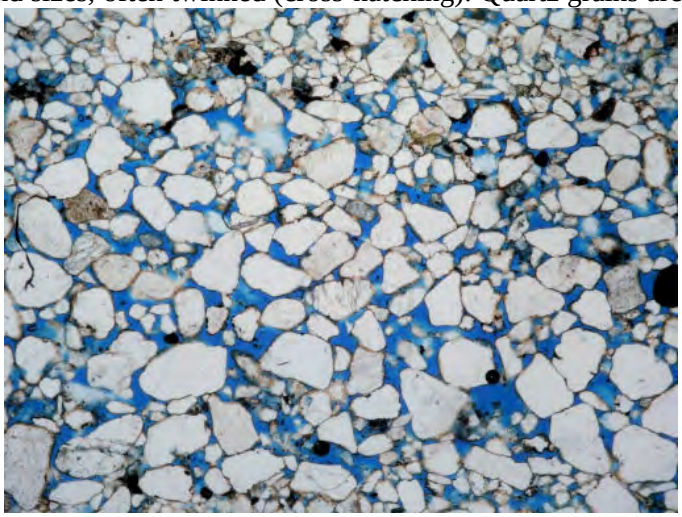
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K5 – sample B	Kilmarnock Standard, 10 Grange Place.	ED10361B

Macroscopic Description	
General Description:	Bedded red sandstone. Slightly clay content. Occasional dark spots of ?manganese.
Colour: (*Munsell)*	c.2.5YR 4/4, dull reddish brown.
Grainsize	Bimodal, 'fine' and 'medium'.
Texture	Bedded.
Composition	Quartz, coated in a patina of iron oxides. Relatively abundant white feldspar. Some iron oxide grains. Minor clays.
Grain Hardness	Intermediate to friable.
Grain Texture	Intermediate.
Water Absorption	Moderate to slow. Directional, higher parallel to bedding.
10% HCl Test	None.

Microscopic Description

Fine and medium grained sandstone, bimodal. The fine grains are commonly contained in thin, less porous laminae. Typical grainsizes are 0.1-0.15 for the fine fraction and 0.4-0.5 for the medium fraction of the grains. Quartz is dominant, with presence of feldspars, both fresh and weathered, some with large round sizes, often twinned (cross-hatching). Quartz grains are covered in a thin patina of iron oxides/hydroxides and range from subangular to rounded. A small amount of generally small size, round, discrete iron oxides/hydroxides. Minor clays partially infill some of the pore spaces. Rather open texture where the grainsize is coarser and more closed where the packing is tighter and the grainsize is finer. Some silica cement is present, occasionally as 'meniscus' cement. The patina of iron oxides/ hydroxides acts also as cement.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

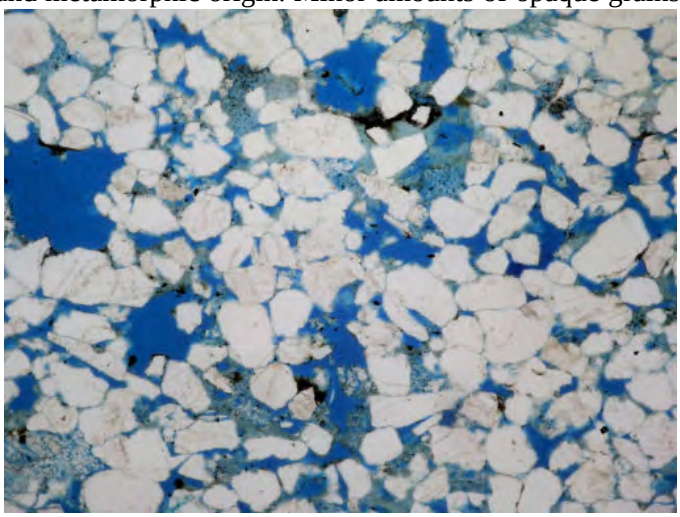
Currently available matching stone:
Knowehead, redder variety of Locharbriggs, (Gatelawbridge)

KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K6A (blonde sandstone sample)	(East Ayrshire Council Offices) - Citizen's Advice Bureau	ED10362A
Macroscopic Description		
General Description:	Pale, yellowish buff, near white ('blonde') sandstone.	
Colour: (*Munsell)*	2.5Y 8/2, light grey.	
Grainsize	'Fine' to 'medium', occasional 'coarse'.	
Texture	Uniform.	
Composition	Quartz, feldspar, lithic grains, clays, minor iron oxides.	
Grain Hardness	Friable.	
Grain Texture	Open.	
Water Absorption	Rapid.	
10% HCl Test	None.	

Microscopic Description

Fine to medium with occasional coarse grains, poorly sorted sandstone. Framework grains are mostly angular to subrounded, dominated by quartz, commonly strained. Feldspar grains often have parallel twinning and commonly weathered to skeletal remains. Lithic grains are both of fine and medium grainsize, and metamorphic origin. Minor amounts of opaque grains (organic matter and iron oxides/hydroxides). Muscovite present, often crushed and altered into clays. Clays are abundant, infilling partially or totally some of the pore spaces, mostly of secondary origin due to alteration of minerals, occasionally greenish in colour. Tourmaline appears as accessory. Silica cement is relatively abundant. Open and well communicated porosity (relatively highly permeable) with a range of pore sizes from fine to large.



Comments/Possible Original Source:
High quality blonde freestone, uniform texture suitable for polished ashlar and carving.
Likely to be from good quality West Central Scotland quarry.

Currently available matching stone:
Darney, Dunhouse Buff, Black Pasture

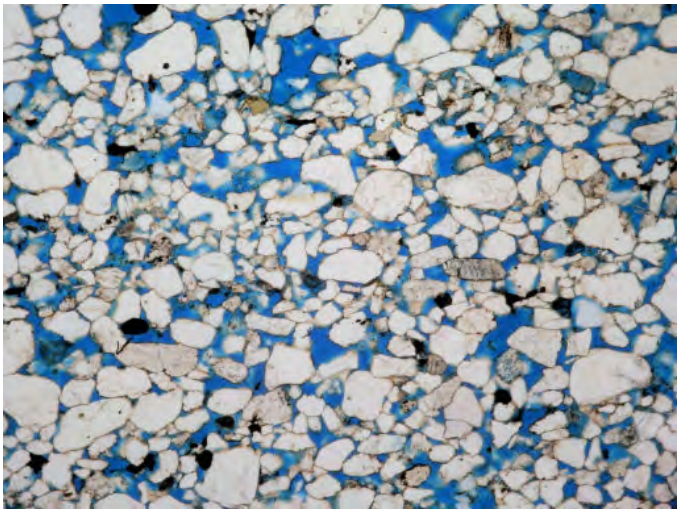
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K6 – sample B	East Ayrshire Council Offices, 19 John Dickie Street & John Finnie Street	ED10362B

Macroscopic Description	
General Description:	Red sandstone, faintly laminated with small white feldspars and some manganese spots.
Colour: (*Munsell)*	c.2.5YR 5/6, bright reddish brown.
Grainsize	Poorly sorted 'fine', 'fine to medium' and 'medium' with occasional 'coarse' grains.
Texture	Uniform, with a hint of fabric.
Composition	Quartz, coated in a patina of iron oxides/hydroxides. Minor lithics, feldspars and iron oxides. Feldspars appear weathered. Minor dark ?manganese spots.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

Poorly sorted fine to coarse, planar bedded sandstone. Grainsize varies in different beds, but these are not clearly differentiated. Fine grainsize is c.0.1-0.15mm, medium is c.0.3-0.4mm and the occasional coarse grains can reach 0.9mm. Dominated by quartz (>80%) with several percent of feldspar and lithics. Abundant small size round iron oxide/hydroxide grains. Minor clays partially infilling the porosity. Tourmaline appears as accessory mineral. Moderate compaction with mostly punctual and sporadic pressure-solution contacts. Moderate porosity and permeability. Irregularly developed, scarce silica cement. The patina of iron oxides/hydroxides act also as cement.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Gatelawbridge/Newton, Knowehead, Corncockle.

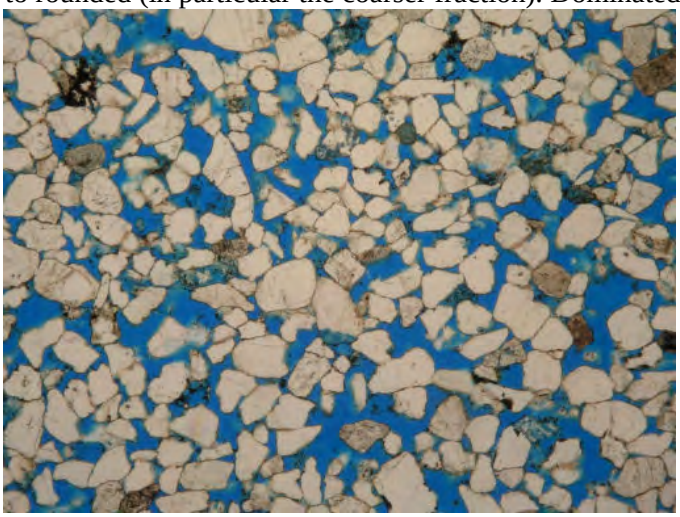
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K6 – sample C	East Ayrshire Council Offices, 19 John Dickie Street & John Finnie Street	ED10362C

Macroscopic Description	
General Description:	Red sandstone, rather uniform. Minor manganese spots.
Colour: (*Munsell)*	c.2.5YR 5/6, bright reddish brown.
Grainsize	Mostly 'fine to medium', moderately well sorted.
Texture	Uniform.
Composition	Quartz, grains coated in a patina of iron oxides. Minor lithics, feldspar and iron oxides.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

Uniform, moderately sorted 'fine to medium' sandstone with minor fractions of 'fine' and coarse grains. Grains are subangular to rounded (in particular the coarser fraction). Dominated by quartz (>85%) with relatively abundant twinned feldspar, mostly fresh, and lithic grains. Scarce iron oxide grains, both altered and mobilized as well as discrete and round. Moderate to low compaction, contacts are mostly punctual and long, occasionally pressure-solution. Porosity is abundant and moderately open, giving moderate to high permeability. Scarce, irregular silica cement, the patina of iron oxides that covers the grains acts as cement.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries.

Currently available matching stone:
Gatelawbridge/Newton, Knowehead, Corncockle.

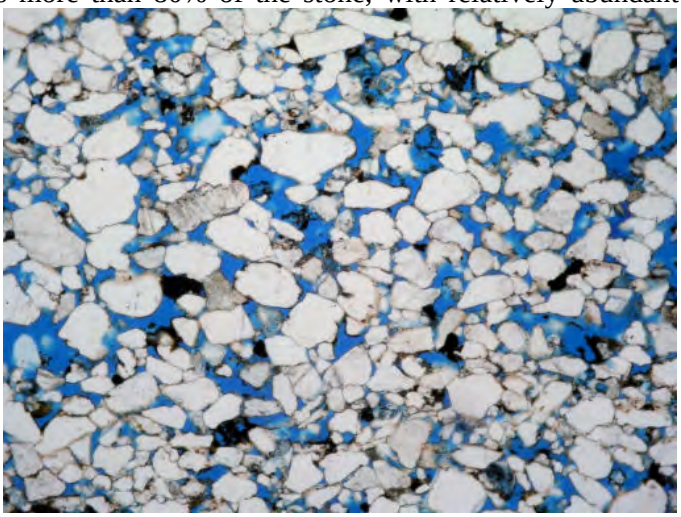
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K7	Railway Station (main building)	ED10363

Macroscopic Description	
General Description:	Faintly laminated dark red sandstone, relatively 'dense'.
Colour: (*Munsell)*	Between 2.5YR 5/6 and 4/6, bright reddish brown to reddish brown.
Grainsize	'Fine' to 'medium'.
Texture	Uniform.
Composition	Quartz coated in patina of iron oxides/hydroxides. Relatively abundant white feldspar, round discrete iron oxides/hydroxides.
Grain Hardness	Strong.
Grain Texture	Intermediate to tight.
Water Absorption	Slow.
10% HCl Test	None.

Microscopic Description

Uniform, poorly sorted 'fine' to 'medium', almost bimodal. Grainsize ranges from c.0.1mm for the finer sizes (subangular) to 0.4-0.5mm for the medium sizes. These medium size grains are well rounded. Quartz comprises more than 80% of the stone, with relatively abundant feldspar (both fresh and weathered) and there are abundant small size iron oxide grains, some discrete and others altered and mobilized. Occasional white mica (muscovite). Irregular layer of silica cement partially coats some of the framework grains. The patina of iron oxides/hydroxides act also as cement. Contact between the grains are mostly punctual with some long and pressure. Moderately compact, with moderate porosity and permeability.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Gatelawbridge, Knowehead, (redder uniform variety of Locharbriggs).

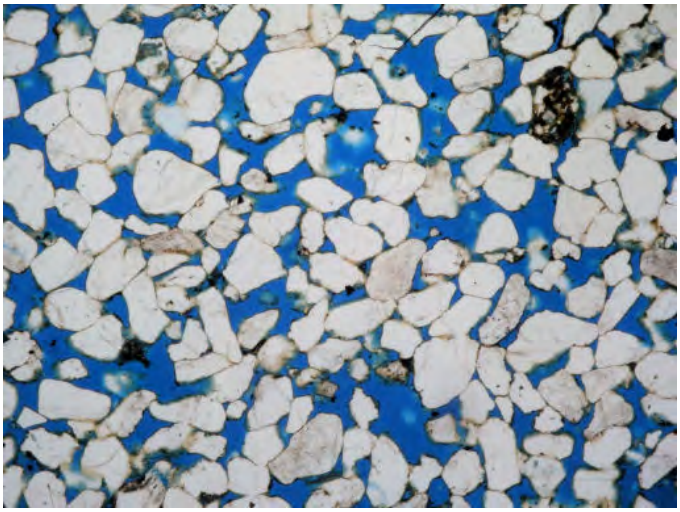
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K8	Central Evangelical Church, John Finnie Street	ED10364

Macroscopic Description	
General Description:	Orange-red, uniform sandstone.
Colour: (*Munsell)*	c.2.5YR 5/6, bright reddish brown.
Grainsize	Mostly 'medium'.
W	Uniform.
Composition	Quartz coated in patina of iron oxides/hydroxides. A few white feldspar grains, lithics and minor iron oxides/hydroxides.
Grain Hardness	Intermediate.
Grain Texture	Open.
Water Absorption	Moderate to rapid.
10% HCl Test	None.

Microscopic Description

Uniform sandstone, moderately sorted, mostly medium (typical 0.35-0.5mm) with some minor randomly scattered finer and coarser grainsizes. Grains are mostly subangular to subrounded, occasionally rounded. Quartz comprises >90%, often polycrystalline. Feldspar grains show twinning and they appear occasionally weathered. Lithics are of undetermined sedimentary origin. The uncommon iron oxides/hydroxide grains appear moderately altered. The patina of iron oxides/hydroxides act also as cement. Open texture with abundant porosity and high permeability.



Comments/Possible Original Sources:
Probable coarser grained, uniform variety of 'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, Knowehead, (red Locharbriggs).

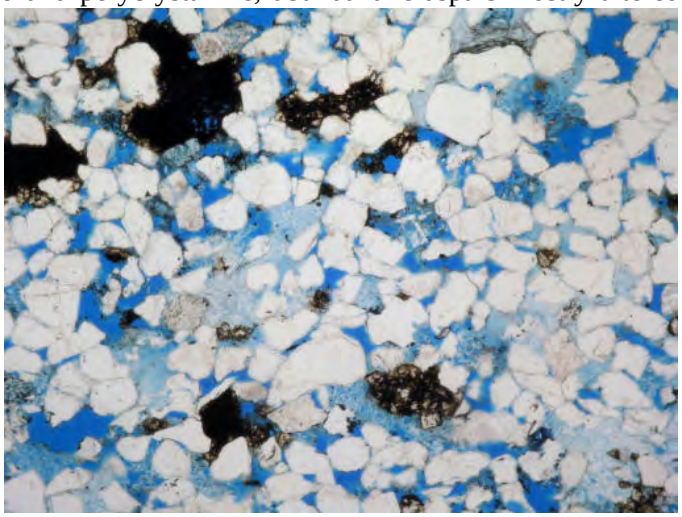
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No.**
K9	John Finnie Street, NW wall	ED10365

Macroscopic Description	
General Description:	Whitish grey, micaceous, 'impure' clay-bearing sandstone with relatively abundant orange iron oxide/hydroxide grains, giving a slightly speckled appearance, sometimes in accumulations giving a slight lamination.
Colour: (*Munsell)*	2.5Y 8/1, light grey.
Grainsize	'Fine to medium' to 'medium'.
Texture	Bedded.
Composition	Quartz, F?, clays, muscovite, iron oxides, carbonates (possibly calcite).
Grain Hardness	Intermediate to strong.
Grain Texture	Intermediate to open.
Water Absorption	Rapid.
10% HCl Test	Strong.

Microscopic Description

Mostly 'fine to medium' with smaller 'fine' and 'coarse' fractions, moderately sorted. Mostly angular to subrounded grains, grainsize varying from 0.05 to 0.8mm, mostly between 0.3 to 0.4mm. Dominated by quartz, mono and polycrystalline, abundant feldspars mostly altered (sericitized) into clays, leaving only skeletal remains. Relatively abundant lithic grains of metamorphic (microquartzite) origin. Muscovite appears crushed and broken. Relatively abundant primary and secondary clays. Porosity is mostly infilled by clay although there are also abundant large clean pore spaces. Carbonate is clear, often in rhombic shapes, though often associated with mobilised iron oxides. Well developed silica cement, which appears to have suffered some dissolution making it a poor cementing agent.



Comments/Possible Original Source:
Standard quality local sandstone, suitable for rubble building and walling. Bedded texture. Likely to be from local Kilmarnock quarries (e.g. Dean quarry; other local quarries such as Braehead)

Currently available matching stone: No identical stone types are available.
Banded or coarse sandstones: Bearl, Drumhead (Doghillock), Northumberland Buff, Catcastle Buff. Uniform sandstones: Birchover, High Nick, (Blaxter)

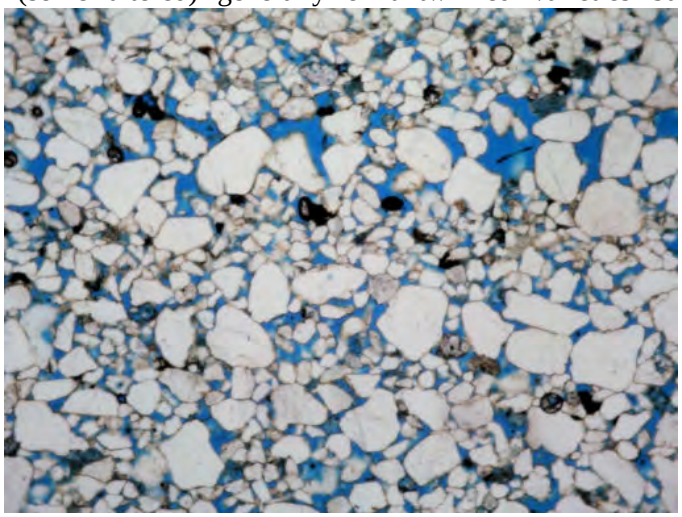
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K10	Allen & Harris, 2 John Finnie Street	ED10366

Macroscopic Description	
General Description:	Red sandstone with small, white feldspars.
Colour: (*Munsell)*	2.5YR 5/4 and 5/6, dull to bright reddish brown.
Grainsize	Extremely variable, from uniform 'fine to medium' with some 'medium' to bedded and bimodal 'fine' and 'medium'.
Texture	Uniform to bedded.
Composition	Quartz covered in a red patina of iron oxides/hydroxides. Abundant feldspars, angular and broken. Minor black iron oxide/hydroxides.
Grain Hardness	Friable to intermediate.
Grain Texture	Tight to intermediate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

Variable from uniform to mostly bedded, bimodal 'fine' and 'medium'. The 'fine' fraction is typically c.0.1-0.15mm and the 'medium' fraction is typically c.0.4-0.5mm, distributed sometimes homogeneously and some other times separated into different bedding laminae (c.1mm thickness). Coarser grainsizes tend to be rounder than the finer grainsizes. Dominated by quartz (>90%) with feldspars (some altered) generally of untwinned varieties but occasionally twinned. Minor lithics are of unknown sedimentary and metamorphic origin. Minor small, fairly competent iron oxides are present. The patina of iron oxides/hydroxides act also as cement. The stone is moderately 'dense', with long, punctual and pressure solution contacts between the grains. Porosity and permeability tend to be variable, depending on the distribution of the grainsizes, but overall they both can be considered moderate.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
redder varieties of Knowehead, Corncockle, (Locharbriggs, Gatelawbridge/Newton)

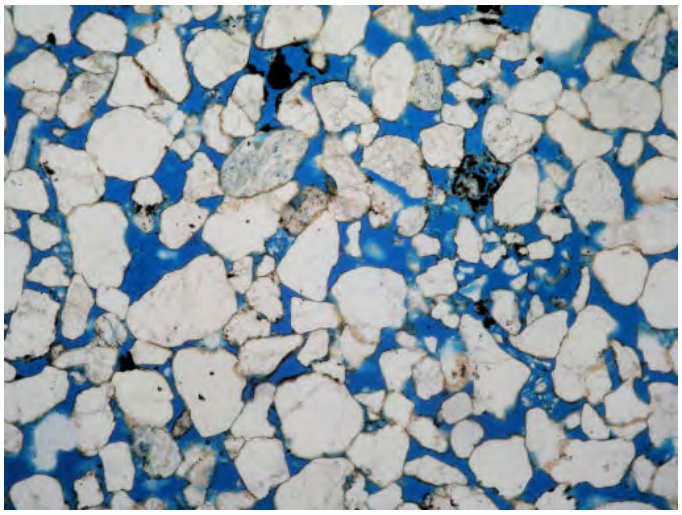
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K11	Opera House, 6 John Finnie Street	ED10367

Macroscopic Description	
General Description:	Orange-red sandstone, white feldspar grains with dark ?manganese spots on bedding planes. Fairly well rounded grains are apparent macroscopically.
Colour: (*Munsell)*	2.5YR 5/5-5/6, bright reddish brown.
Grainsize	'Fine' to 'coarse'.
Texture	Uniform with a hint of bedding.
Composition	Quartz covered in red iron oxide patina with medium size round feldspars. Minor iron oxide grains.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

Poorly sorted 'fine' to 'coarse' sandstone, tending to bimodal grain distribution. Grains range from fine, typical 0.1-0.15mm to coarse c.0.8mm, average 0.45-0.5mm. Medium and coarse grains tend to be round, the finer sizes more angular. Mostly constituted by quartz with some relatively abundant feldspar, both twinned and untwinned varieties, generally fresh. Uncommon, slightly altered small iron oxide/hydroxide grains. The patina of iron oxides/hydroxides acts as cement. Abundant and open porosity, rather well communicated, making this a relatively permeable stone. Minor silica cement is present.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, red Locharbriggs, Knowehead.

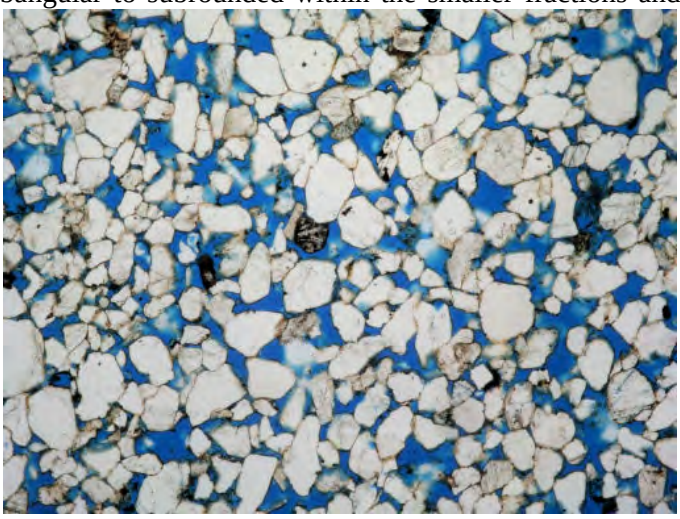
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K12	Handling Hair, 16 John Finnie Street	ED10368

Macroscopic Description	
General Description:	Uniform red, slightly orange-red sandstone.
Colour: (*Munsell)*	Between 2.5YR 5/6 and 4/6, bright reddish brown –reddish brown.
Grainsize	Moderately to poorly sorted 'fine' to 'medium'.
Texture	Uniform.
Composition	Mostly quartz, covered in red iron oxide patina. Minor feldspars/lithics and iron oxide grains.
Grain Hardness	Intermediate.
Grain Texture	Tight to intermediate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

'Fine' to 'medium', mostly 'fine to medium' and 'medium' sandstone, typical average grainsize c.0.3-0.4mm, the coarser 'medium' fraction reaching 0.5mm. Uniform and poorly sorted, with grains varying from subangular to subrounded within the smaller fractions and subrounded to rounded within the coarser fraction. Dominated by quartz (>90%), with minor lithic and feldspars grains, mostly fresh. Scarce, generally corroded small iron oxide/hydroxide grains. A small amount of clays partially infills some of the pore spaces. Moderately compacted, with fairly open porosity, contacts are punctual, long and pressure-solution. Poorly developed silica cement. The patina of iron oxides/hydroxides acts also as cement.



Comments/Possible Original Sources:
Probable variety of 'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/ Barskimming quarries)

Currently available matching stone:
Gatelawbridge/Newton, Knowehead.

KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K13 – sample A1 Dressed stone from south (side) elevation	Old Homeless House, Dunlop Street.	ED10369A1

Macroscopic Description	
General Description:	Orange-red sandstone, coarse grained and friable with white feldspars and patchy dark mottles of black ?manganese.
Colour: (*Munsell)*	2.5YR 5/6, bright reddish brown.
Grainsize	Mostly medium grained, some fine fraction, well sorted and well rounded.
Texture	Uniform.
Composition	Abundant quartz covered in red patina of iron oxides/hydroxides. Scarce orange/pinkish feldspars/lithics and some with white colour, more broken. Black spots of ?manganese giving a mottled aspect.
Grain Hardness	Friable.
Grain Texture	Open.
Water Absorption	Variable from rapid to moderate.
10% HCl Test	None.

Microscopic Description
No thin section.

Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, orange-red varieties of Knowehead or Locharbriggs.

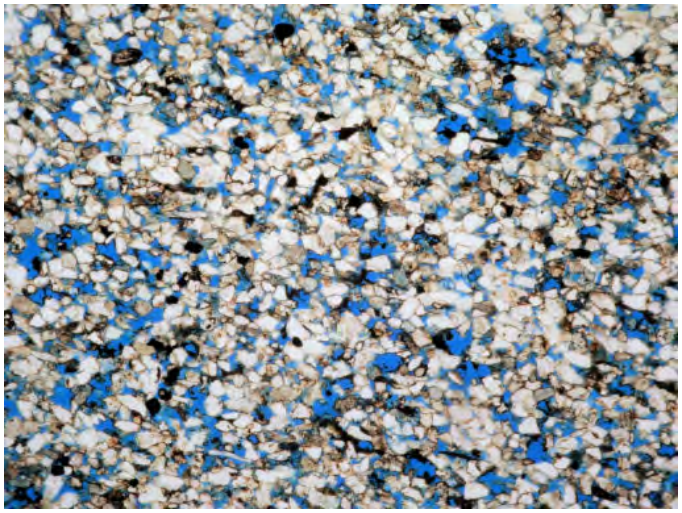
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K13 – sample A2 West (front) elevation	Blue triangle café/Yick Fai Lee, 30-36 John Finnie Street.	ED10369A

Macroscopic Description	
General Description:	Fine grained uniform red sandstone.
Colour: (*Munsell)*	2.5YR 5/4, dull reddish brown.
Grainsize	Well sorted 'fine' grainsize.
Texture	Uniform.
Composition	Quartz, coated in an iron oxides/hydroxides patina. Small size micas. Small size iron oxide/hydroxide grains.
Grain Hardness	Strong.
Grain Texture	Intermediate.
Water Absorption	Rapid.
10% HCl Test	None.

Microscopic Description

Uniform 'fine' grained sandstone with occasional 'fine to medium' grains. Typical grainsizes are 0.1-0.2mm, subangular to subrounded. Contains abundant small feldspars (twinned and untwinned varieties, slightly weathered) and lithic grains as well as abundant small size, discrete iron oxide grains, well preserved. Occasionally quartz grains may contain rutile needles. Small, well oriented broken muscovite flakes. Moderately compacted, but rather porous and permeable through a range of small pores and micropores and conduits. Cemented by well developed silica cement overgrowth.



Comments/Possible Original Sources:
Unusual finer grained sandstone similar to Corsehill, or possible fine grained variety of Mauchline sandstone.

Currently available matching stone:
Corsehill

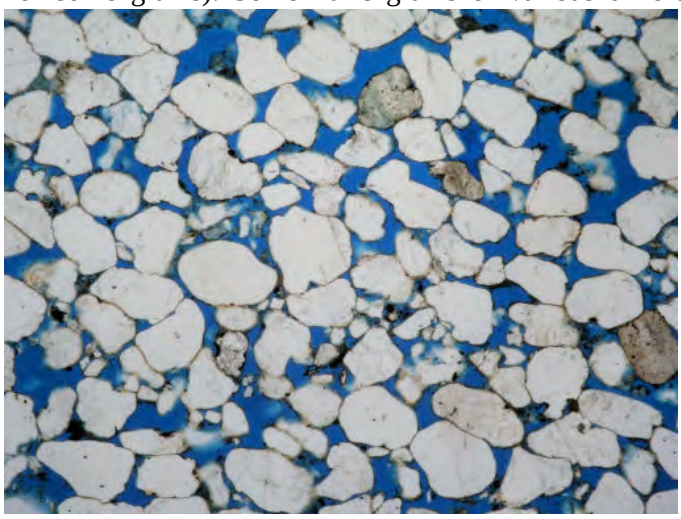
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K13 – sample B Rubble from south (side) elevation	Old Homeless House, 5 Dunlop Street.	ED10369B

Macroscopic Description	
General Description:	Red sandstone, faintly bedded.
Colour: (*Munsell)*	c.2.5YR 5/6-5/5?, reddish brown.
Grainsize	Mostly 'medium', some 'fine'.
Texture	Faintly bedded.
Composition	Quartz, coated in a patina of iron oxides/hydroxides. Relatively abundant, white, round feldspars and black round iron oxide grains.
Grain Hardness	Intermediate towards hard.
Grain Texture	Intermediate.
Water Absorption	Rapid.
10% HCl Test	None.

Microscopic Description

Mostly 'medium' grained sandstone, well sorted, with a small 'fine' fraction randomly scattered throughout the stone. Typical grainsize is c.0.4 to 0.5mm. Quartz dominated (>85%) with fresh and weathered feldspar grains and fairly uniform microscopic texture although with a faint hint of fabric (orientation of some grains). Some lithic grains of various different origins are present. Feldspar and lithic grains comprise up to 10% of the stone. Minor small iron oxide/hydroxide grains, generally altered and mobilized. The patina of iron oxides/hydroxides that covers the quartz grains acts as cement. Some clays, product of the alteration of feldspar grains, partially infill some of the porosity, but the stone has a very open texture, with abundant and well communicated porosity giving it relatively high permeability.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, orange-red varieties of Knowehead or Locharbriggs.

KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K14	Laigh Kirk/Slater Hogg Howison, 31 John Finnie Street	ED10494

Macroscopic Description	
General Description:	Uniform orangeish red sandstone.
Colour: (*Munsell)*	2.5YR 5/4 to 5/6, dull to bright reddish brown.
Grainsize	Poorly sorted 'very fine' to 'coarse'.
Texture	Uniform.
Composition	Quartz, coated in a red patina of iron oxides/hydroxides. Feldspars. Some small round iron oxides.
Grain Hardness	Intermediate towards friable.
Grain Texture	Intermediate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

Uniform, poorly sorted sandstone, mostly 'fine to medium' and 'medium' grainsize, typically 0.25-0.35mm with a range from 'very fine' to occasional 'coarse' grains. Grains are subangular to subrounded, occasionally rounded. Quartz, coated with iron oxide, comprises over 90% of the stone, with many being polycrystalline and the medium sizes more rounded. Relatively abundant feldspars appear both as twinned and untwinned varieties, generally fresh. There is also a small percentage of small size lithic grains of fine sedimentary origin. Iron oxides are rounded, often slightly corroded. The patina of iron oxides/hydroxides that covers the quartz grains acts as cement. Minor clays partially infilling some of the porosity. Zircon and tourmaline as accessories. Only a small amount of silica cement holding the grains, but the contacts between grains are long and pressure-solution. The stone has an intermediate texture, with a range of small to medium pore sizes, moderately communicated.

Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, Knowehead, (Gatelawbridge).

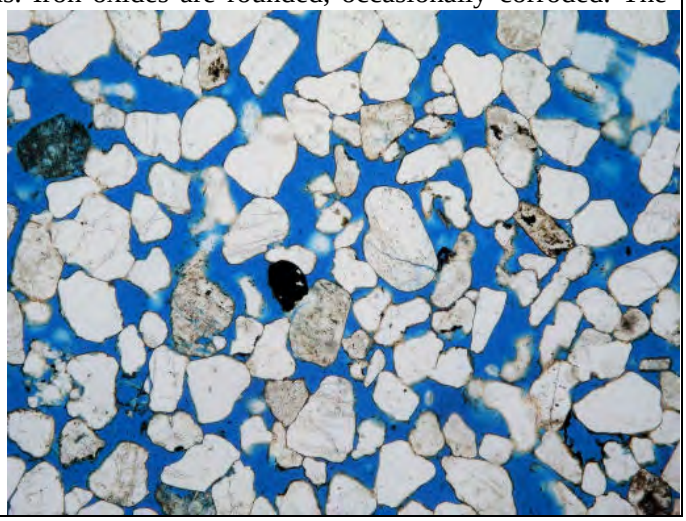
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K15	Atrium Homes, 39 John Finnie Street	ED10495

Macroscopic Description	
General Description:	Uniform red sandstone, rather coarse grained, with some white feldspars and black iron oxides.
Colour: (*Munsell)*	2.5YR 5/4 to 5/6, dull to bright reddish brown.
Grainsize	Fine to coarse.
Texture	Uniform.
Composition	Quartz, coated in a red patina of iron oxides/hydroxides. Relatively abundant altered feldspars. Some grains of iron oxide/hydroxide.
Grain Hardness	Friable.
Grain Texture	Moderate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

Uniform, rather poorly sorted, with a bimodal tendency, 'fine' to 'coarse', mostly within the range of 'medium' grainsizes, typically 0.3-0.5mm with finer and coarser grains. Grains are subangular to rounded. Mono and polycrystalline quartz, coated with iron oxide, comprises c.85% of the stone. Relatively abundant feldspar and lithic grains. Feldspars appear both as twinned and untwinned varieties, both fresh and weathered to clays. Lithic grains are of fine sedimentary and metamorphic origins. Iron oxides are rounded, occasionally corroded. The patina of iron oxides/hydroxides that covers the quartz grains acts as cement. There is also a small amount of irregular silica cement holding the grains. Contacts between grains are long and pressure-solution, sometimes interlocked. Minor clays partially infilling some of the porosity. The stone has an moderate texture, with a range of small to large pore sizes, moderately communicated due to the packing of the different grainsizes, making this stone moderately permeable.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, Knowehead, (red Locharbriggs).

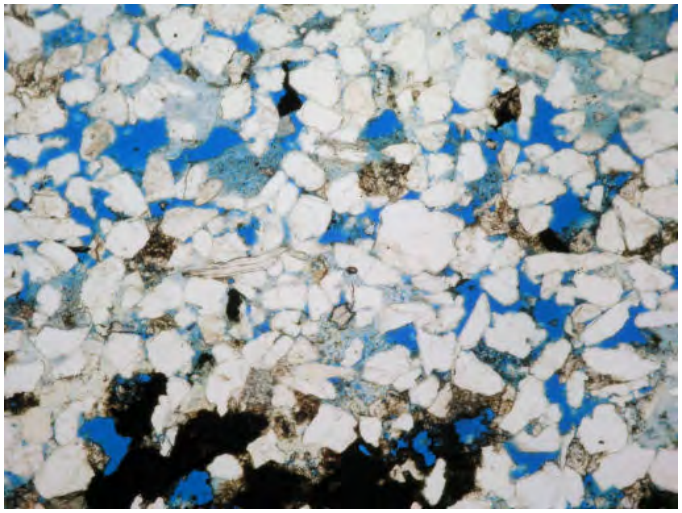
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No.**
K16	Railway Arches	ED10372

Macroscopic Description	
General Description:	Blonde, coarse grained and impure greyish buff sandstone, with some thin dark grey laminae.
Colour: (*Munsell)*	Between 2.5Y 8/1 and 8/2, light grey.
Grainsize	Poorly sorted fine to coarse, mostly medium.
Texture	Bedded.
Composition	Quartz, feldspar, lithic grains, iron oxides/hydroxides, organic matter, clays and carbonates, muscovite.
Grain Hardness	Intermediate to strong.
Grain Texture	Intermediate to open.
Water Absorption	Rapid to moderate. Directional.
10% HCl Test	Strong.

Microscopic Description

Mostly 'medium' grained sandstone, with 'fine' and 'coarse' fractions, poorly sorted with angular to subrounded framework grains. Composition is over 80% quartz, mostly mono-, occasionally polycrystalline, with relatively abundant, commonly fresh, small twinned feldspar grains (some altered) and minor lithic grains of unknown (metamorphic?) origin. Several percent of mobilized and altered iron oxide/hydroxide grains, sometimes accumulated into laminae, often associated with abundant carbonate which appears as microsparite, both euhedral (with crystalline shape) and anhedral. Muscovite flakes appear crushed. Abundant primary and secondary clays (from weathering of feldspars and muscovite). Contacts are mostly long and punctual, with abundant, well developed silica cement. Porosity is relatively abundant (with large size pores) with moderate permeability due to the rather high content of matrix minerals.



Comments/Possible Original Source:
Standard quality sandstone, variable composition and texture, probably from local Kilmarnock quarries e.g. Dean quarry. Possibly obtained from immediate vicinity (former Braehead quarry in Kay Park).

Currently available matching stone: No identical stone types are available.
Banded or coarse sandstones: Drumhead (Doghillock), Northumberland Buff, Bearl, Catcastle Buff. Uniform sandstones: Millknock, High Nick, Birchover

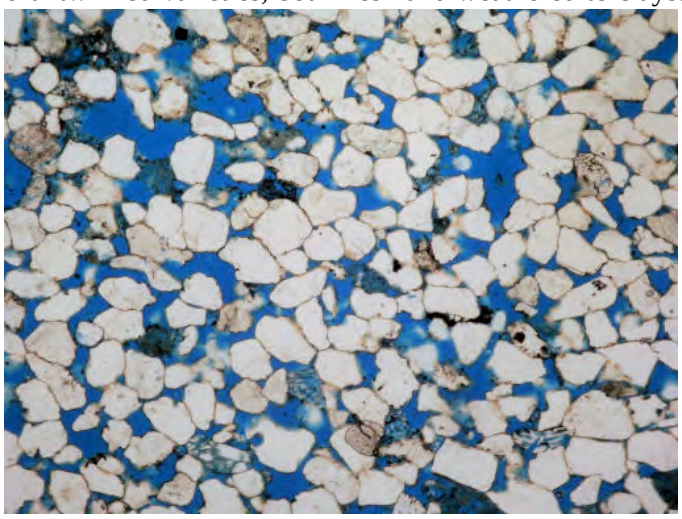
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K17 – sample A	Victoria Wine, 64 John Finnie Street.	ED10373A

Macroscopic Description	
General Description:	Fairly uniform red sandstone, with occasional black spots of ?manganese.
Colour: (*Munsell)*	2.5YR 5/4 to 5/6, dull to bright reddish brown.
Grainsize	Mostly 'medium', some 'fine to medium'.
Texture	Uniform.
Composition	Quartz, coated in a red patina of iron oxides/hydroxides. Relatively abundant feldspars of small size. Some grains of iron oxide/hydroxide.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid.
10% HCl Test	None.

Microscopic Description

Uniform, moderately to well sorted sandstone, mostly 'medium' grainsize, typically 0.4-0.5mm with occasionally slightly finer or coarser grains. Grains are subangular to subrounded, occasionally rounded. Quartz, coated with iron oxide, comprises over 90% of the stone. Feldspars appear both as twinned and untwinned varieties, both fresh and weathered to clays. There is also a small percentage of lithic grains of unknown origin. Iron oxides are rounded, occasionally slightly corroded. The patina of iron oxides/hydroxides that covers the quartz grains acts as cement. There is also a small amount of irregular silica cement holding the grains. Minor clays partially infilling some of the porosity. The stone has an open texture, with a range of small to large pore sizes, well communicated making this stone relatively permeable.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, Knowehead, (red Locharbriggs, Gatelawbridge).

KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K17 – sample B	Victoria Wine, 64 John Finnie Street	ED10373B

Macroscopic Description	
General Description:	Red sandstone, slightly banded/laminated with dark mottles of ?manganese.
Colour: (*Munsell)*	2.5YR 5/4, dull reddish brown.
Grainsize	'Medium' and 'fine', bimodal.
Texture	Faintly bedded.
Composition	Quartz, covered in an iron oxides patina. Round, medium size white feldspar. Occasional small to medium iron oxide grains.
Grain Hardness	Intermediate to strong.
Grain Texture	Intermediate.
Water Absorption	Rapid.
10% HCl Test	None.

Microscopic Description
No thin section.

Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, Knowehead, (redder Locharbriggs).

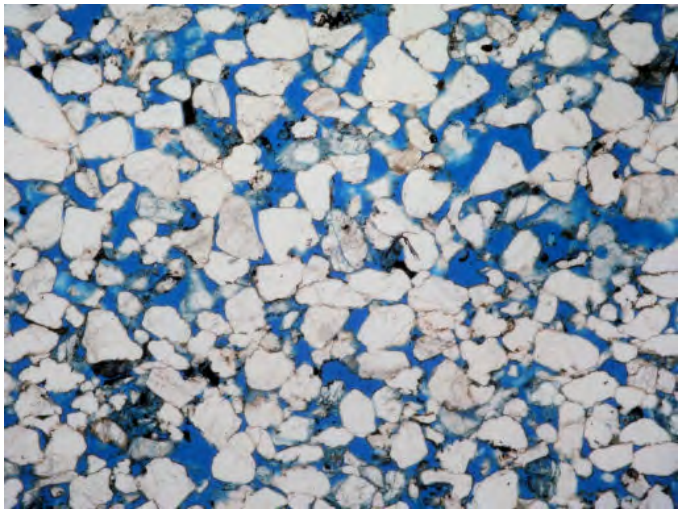
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K18	Post Office, 73 John Finnie Street	ED10374

Macroscopic Description	
General Description:	Red sandstone with very abundant white feldspars and a pinkish shade. Well cemented.
Colour: (*Munsell)*	2.5YR 6/4, 'dull orange'.
Grainsize	'Fine to medium' and 'medium', some small 'fine' fraction.
Texture	Bedded, thinly laminated.
Composition	Quartz, covered in an iron oxide patina. Abundant round, medium size white feldspars. Some possible clays. Dark round iron oxides, scattered throughout.
Grain Hardness	Strong.
Grain Texture	Intermediate to tight.
Water Absorption	Very slow.
10% HCl Test	None.

Microscopic Description

Mostly 'fine to medium' and 'medium' grained with some thin laminae (<1mm) constituted by 'fine' grains (c.0.1mm). Typical average grainsize ranges from 0.35-0.5mm. Grains are mostly angular to subrounded. The stone is dominated by quartz (>90%) with a small percentage of feldspar, often weathered and with uncommon lithic grains of mostly metamorphic origin with some of fine sedimentary origin. Iron oxides are abundant, very small sizes scattered throughout. Grains are well compacted, often with pressure-solution and long contacts as well as having a well-developed silica cement coating strongly cementing all the grains. Although moderately porous, the pores are badly communicated, due to the abundant silica cement, making this a stone with a relatively low permeability.



Possible Original Source:
Possible Locharbriggs.

Currently available matching stone:
Locharbriggs, Knowehead.

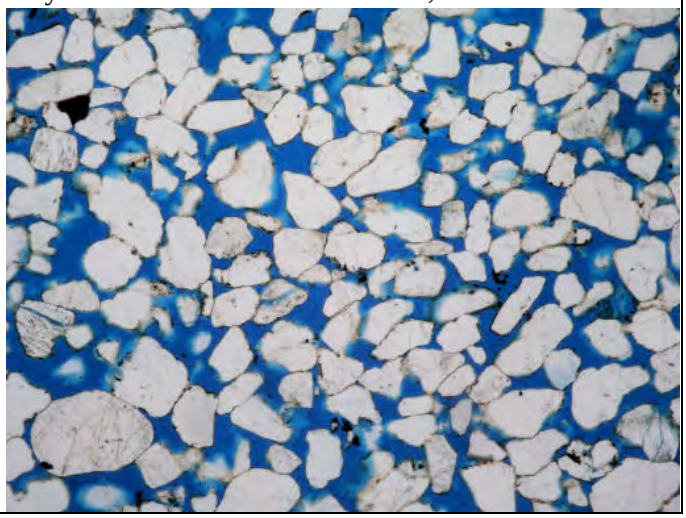
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K19	Tannahills, 75 John Finnie Street	ED10375

Macroscopic Description	
General Description:	Red slightly orange sandstone, with white feldspar grains and occasional medium size black mottles of ?manganese.
Colour: (*Munsell)*	Between 2.5YR 6/6 and 6/5, bright reddish brown to orange.
Grainsize	Mostly 'medium' to 'coarse', well rounded with a 'fine' fraction within laminae.
Texture	Uniform.
Composition	Mostly quartz, grains coated in a patina of iron oxides/hydroxide. Some white feldspars, medium size. Occasional round black iron oxide grains.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid to slow, directional.
10% HCl Test	None.

Microscopic Description

Slightly laminated (although mostly uniform) sandstone, generally 'medium' grainsize (0.3-0.5mm), except for a fine laminae of more abundant 'fine' grainsizes (0.1-0.15mm) and occasional 'coarse' grains, no larger than 0.7mm. Quartz is over 90%, rather rounded. Some feldspar grains, many weathered into clays. Minor fine and medium size, discrete iron oxide grains. Relatively abundant lithic grains of both fine sedimentary and metamorphic origin. Contacts are mostly punctual and long, with some irregularly distributed silica cement. Minor, irregularly distributed silica cement. The patina of iron oxides/hydroxides that coats the quartz grains acts as cement. Open and abundant porosity, highly permeable where the grainsizes are medium, and relatively impervious through the fine grained laminae (as they are densely packed).



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, red Locharbriggs, Knowehead.

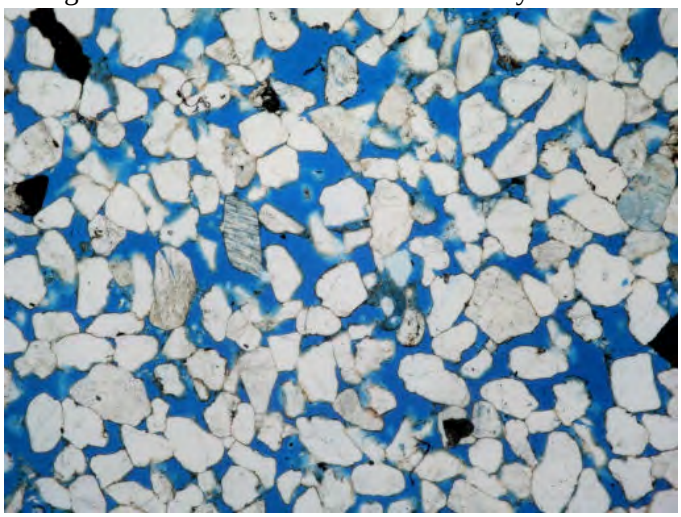
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K20	Paper Roses, 100 John Finnie Street	ED10376

Macroscopic Description	
General Description:	Red sandstone with some dark spotting due to ?manganese on the bedding planes. Fairly uniform.
Colour: (*Munsell)*	c.2.5YR 5/6, bright reddish brown.
Grainsize	'Medium', some 'fine to medium', rounded and well sorted.
Texture	Uniform with a hint of fabric.
Composition	Quartz, coated in an iron oxide/hydroxide patina. Minor white, medium size, angular and broken feldspars.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid.
10% HCl Test	None.

Microscopic Description

Uniform, well sorted, mostly medium grained sandstone. Grainsize is mostly 0.35-0.45mm. Grains vary from subangular subrounded. Quartz is c.90% with relatively abundant feldspar and lithic grains. Feldspar appears both twinned and untwinned, generally fresh. Minor well preserved iron oxides/ hydroxide grains. Open texture with abundant porosity, highly permeable. Contacts are punctual and long, with an irregular and poorly developed layer of silica cement. The patina of iron oxide/hydroxide that covers the quartz grains acts as cement.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, Knowehead, (redder Locharbriggs, Gatelawbridge/Newton).

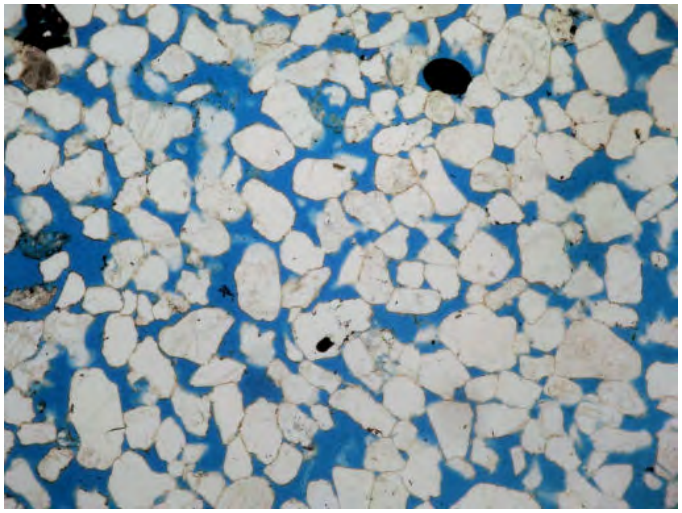
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No.**
K21	Balti, 108 John Finnie Street	ED10377

Macroscopic Description	
General Description:	Red sandstone with some small white feldspar and black spots of ?manganese. Slightly laminated, with parallel lamination.
Colour: (*Munsell)*	Between 2.5YR 6/4-5/6, dull orange to bright reddish brown.
Grainsize	'Medium'.
Texture	Faintly bedded, almost uniform.
Composition	Quartz, coated in a red patina of iron oxides/hydroxides. Small amount of feldspars.
Grain Hardness	Intermediate to strong.
Grain Texture	Tight.
Water Absorption	Moderate to rapid.
10% HCl Test	None.

Microscopic Description

Moderately to well sorted, mostly medium grainsize, typically 'fine to medium' c.0.25 and 'medium' c. 0.4-0.45mm. Uniform at microscopic scale. Quartz appears over 90%, with feldspars (both twinned and untwinned varieties), rather fresh. There is a number of lithic grains (rock fragments) of both sedimentary and metamorphic origin. Framework grains vary between subangular to rounded (in the larger sizes). Relatively common opaque detrital iron grains, kidney-shaped, both as very fine grains and medium sizes. Contacts between grains are mostly punctual and long, with occasional pressure-solution. Open texture with abundant and well communicated porosity. Minor silica cement. The patina of iron oxides/hydroxides that covers the quartz grains acts as cement.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Knowehead, Gatelawbridge/Newton.

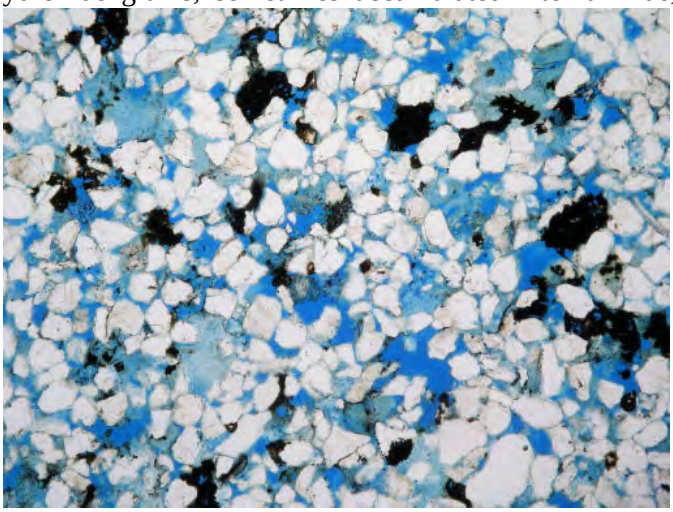
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No.**
K22	Mason Murphy, 78 Portland Street	ED10496

Macroscopic Description	
General Description:	Blonde, fine to coarse grained, rather impure greyish buff sandstone, with some grey laminae.
Colour: (*Munsell)*	2.5Y 8/2, light grey.
Grainsize	Poorly sorted fine to coarse, mostly medium.
Texture	Bedded.
Composition	Quartz, feldspar, lithic grains, iron oxides/hydroxides, organic matter, clays and carbonates, muscovite.
Grain Hardness	Intermediate to friable.
Grain Texture	Intermediate.
Water Absorption	Rapid to moderate.
10% HCl Test	Weak.

Microscopic Description

Slightly laminated, poorly sorted 'fine' to 'coarse' grained sandstone, grainsize mostly within the 'fine to medium' except in some bands where tends to be more 'medium' and occasionally 'coarse' with angular to subrounded framework grains. Composition is over 80% quartz, both mono and polycrystalline, with relatively abundant, fresh and altered twinned feldspar grains and lithic grains of unknown (metamorphic?) origin. Several percent of mobilized and altered iron oxide/hydroxide grains, sometimes accumulated into laminae, mostly associated with carbonates (ankerite?), both euhedral (with crystalline shape) and anhedral. Muscovite flakes appear crushed. Abundant primary and secondary clays (from weathering of feldspars and muscovite). Contacts are mostly long and punctual, occasional pressure-solution, with abundant, well developed silica cement. Porosity is relatively abundant (with large size pores) with moderate permeability due to the rather high content of matrix minerals.



Comments/Possible Original Source:
Stone reputed to come from Dean Quarry. Highest quality local blonde sandstone (uniform texture and grainsize).

Currently available matching stone: No identical stone types are available.
Banded coarse sandstones: Drumhead (Doghillock), Northumberland Buff, Bearl, Catcastle Buff
Uniform sandstones: Millknock, High Nick, Birchover.

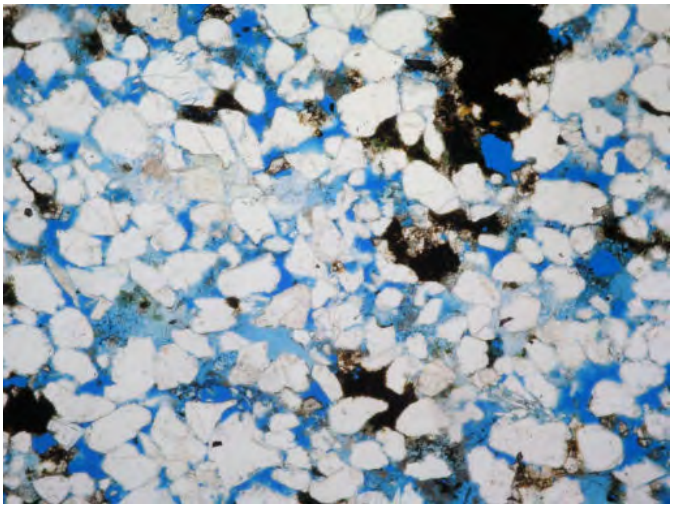
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No.**
K23A	98 Portland Street, representative sample from rear boundary wall.	ED10379A, from stone dressing.

Macroscopic Description	
General Description:	Pale greyish buff sandstone, laminated and with 'speckled' appearance due to iron oxides/organic matter.
Colour: (*Munsell)*	2.5Y 8/1, light grey.
Grainsize	Poorly sorted 'fine' to 'medium'.
Texture	Bedded.
Composition	Quartz, feldspar, lithic grains, opaque grains (organic matter/iron oxides), muscovite, clays, carbonates.
Grain Hardness	Intermediate to strong.
Grain Texture	Open.
Water Absorption	Rapid.
10% HCl Test	Strong.

Microscopic Description

Poorly sorted 'fine' to 'medium' grained sandstone. Grainsize ranges from 0.1 to 0.45mm, mostly c.0.3mm, angular to subrounded. Although dominated by quartz, there are several percent of feldspars, both twinned and untwinned varieties. These appear often altered into clays, leaving skeletal remains. Lithic grains are scarce, of undetermined metamorphic origin. Muscovite flakes, moderately aligned, appear often crushed. Mobilized iron oxides are relatively abundant, sometimes appearing as elongated aggregates (with muscovite) forming the laminae. Carbonates are scattered throughout as small sparry crystals, yellowish brown, sometimes euhedral, occasionally associated with iron oxides. Primary (platy) and secondary clays are relatively abundant, partially infilling much of the pore spaces. Porosity (c.20-25%) is well communicated (high permeability). Moderately cemented by silica cement, mostly long contacts between grains.



Comments/Possible Original Source:
Local blonde sandstone of standard quality. Banded texture. Probably obtained from the local Kilmarnock quarries (e.g. Dean quarry, or others such as Braehead).

Currently available matching stone: No identical stone types are available.
Banded sandstones: Drumhead (Doghillock), Northumberland Buff.
Uniform sandstones: Millknock, High Nick, Birchover.
Coarse sandstones: Bearl, Catcastle Buff.

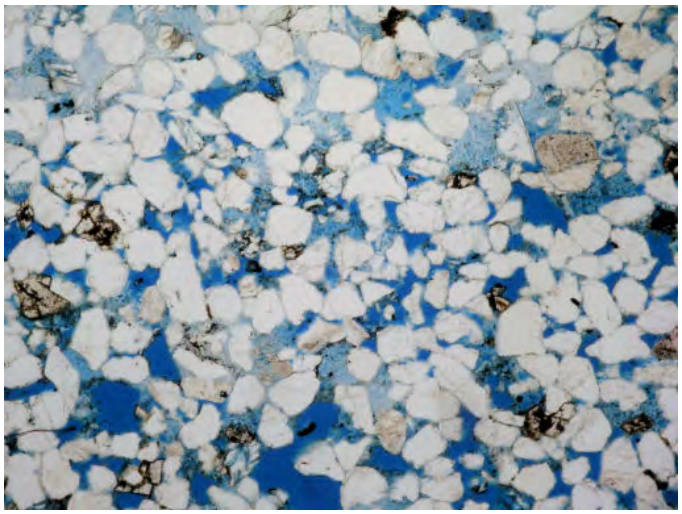
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K23B	Portland Street, sample from rear boundary wall.	ED10379B, from rubble masonry.

Macroscopic Description	
General Description:	Pale greyish buff, impure sandstone with faint irregular laminae of organic matter/iron oxides.
Colour: (*Munsell)*	2.5Y 8/1, light grey.
Grainsize	Poorly sorted, 'fine' to 'medium'.
Texture	Bedded.
Composition	Quartz, feldspar, lithic grains, iron oxides, organic matter, clays, carbonates. Minor muscovite.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid to moderate.
10% HCl Test	None.

Microscopic Description

Moderately sorted, 'fine' to 'medium' grained sandstone. Grainsize ranges form 0.1 to 0.35mm, mostly c.0.25-0.3mm, angular to subrounded. Dominated by quartz, with feldspars (both twinned and untwinned varieties) often altered into clays. Lithic grains are scarce, of undetermined metamorphic origin. Muscovite flakes, moderately aligned, appear often crushed. Very fine grainsize opaque grains (iron oxides/organic matter) present in small amounts, scattered throughout, occasionally faintly aligned. Carbonates appear as small sparry crystals, yellowish brown, sometimes euhedral, occasionally associated to iron oxides. Primary (platy) and secondary clays are relatively abundant, partially infilling most porosity. Porosity (c.25%) is well communicated (high permeability). Moderately cemented by silica cement, mostly long contacts between grains.



Comments/Possible Original Source:
Variable local blonde sandstone of standard quality, suitable for rubble building. Banded texture. Probably obtained from the local Kilmarnock quarries (e.g. Dean quarry, or others such as Braehead). Because of the variable quality the wall is likely to have been lime harled for protection.

Currently available matching stone: No identical stone types are available.
Banded sandstones: Drumhead (Doghillock), Northumberland Buff.
Uniform sandstones: Millknock, High Nick, Birchover.
Coarse sandstones: Bearl, Catcastle Buff.

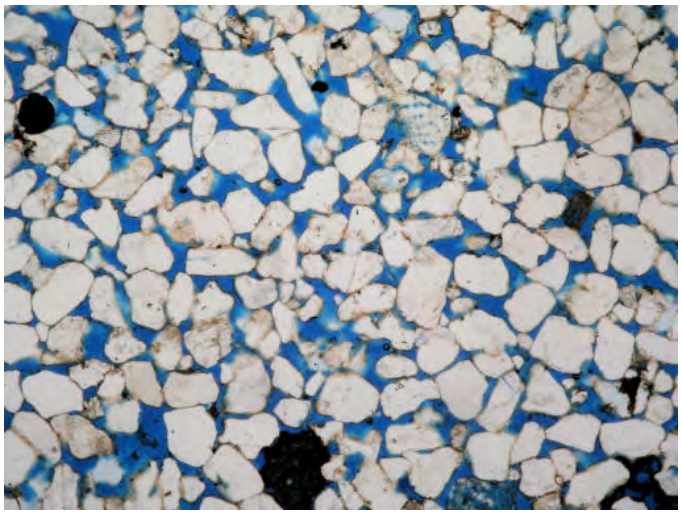
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

No.	*Building*	**Sample No**.
K24 – red sandstone, sample B.	P&R Torbet, 13 John Dickie Street.	ED10380B

Macroscopic Description	
General Description:	Orange-red sandstone, fairly uniform. Occasional black spots of ?manganese.
Colour: (*Munsell)*	Between 2.5YR 5/4 and 5/6, dull to bright reddish brown.
Grainsize	Mostly 'medium', some 'fine to medium'.
Texture	Uniform.
Composition	Mostly quartz, coated by a thin red iron oxide/hydroxide patina. Scarce white feldspars, lithic grains and black iron oxide/hydroxide grains.
Grain Hardness	Intermediate.
Grain Texture	Intermediate.
Water Absorption	Rapid.
10% HCl Test	None.

Microscopic Description

Uniform mostly 'fine to medium' and 'medium' grained sandstone, with a small 'fine' fraction. Grainsize average is 0.3-0.4mm. Dominated by quartz (>85%) with medium size feldspars and some lithic grains. Grains are generally subrounded to fairly rounded. There is a small amount of discrete round iron oxide/hydroxide grains together with larger size mobilized iron or manganese oxide/hydroxides which enclose quartz grains, giving the distinct mottled aspect. The patina of iron oxides/hydroxide that coats the quartz grains acts also as cement. Moderately compact, the stone has moderate porosity with generally medium to small pore sizes, but well communicated by relatively wide and clean conduits. Contacts between grains are mostly punctual, with some being pressure-solution. Some thin, irregular, amount of silica cement partially coats some of the grains.



Comments/Possible Original Sources:
'Mauchline sandstone type' (e.g. Mauchline/Ballochmyle/Barskimming quarries)

Currently available matching stone:
Corncockle, red Locharbriggs.

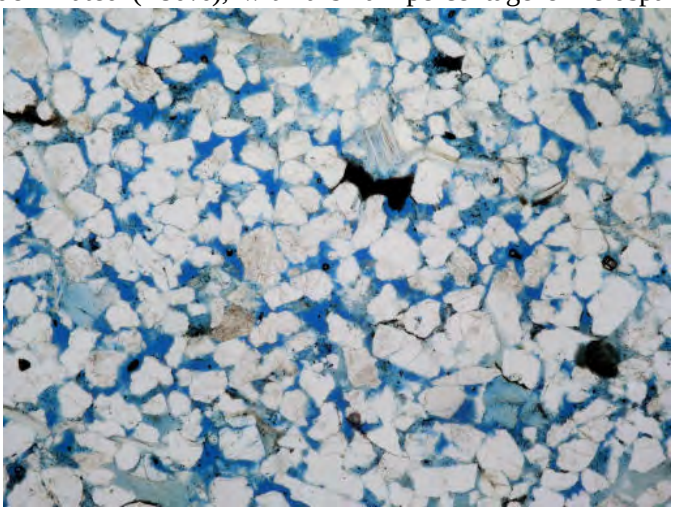
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K24A	Johnnie Walker, Croft Street.	ED10380. From first floor cornice decoration.

Macroscopic Description	
General Description:	White, 'pure' and quartz-rich sandstone, with muscovite flakes and minor organic matter/iron oxide speckles.
Colour: (*Munsell)*	10YR 8/1, white.
Grainsize	Well sorted, mostly 'medium', some 'fine to medium'.
Texture	Uniform.
Composition	Quartz, muscovite, minor opaque grains (organic matter/iron oxides).
Grain Hardness	Strong.
Grain Texture	Intermediate.
Water Absorption	Moderate.
10% HCl Test	None.

Microscopic Description

Quartz rich sandstone, moderately to well sorted, mostly 'fine to medium' and 'medium', average grain sizes 0.2-0.25mm, occasionally coarse (c.0.5mm) or fine (c.0.1mm). Grains are subangular to subrounded. Quartz dominated (>80%), with a small percentage of feldspars (twinned and untwinned varieties) and minor lithic grains. Feldspars are fresh, occasionally weathered. Abundant well oriented muscovite flakes. Scarce small mobilized iron oxides/organic matter. Abundant oval-shaped, fairly large zircon grains. Moderate amount of mainly secondary clays (from weathering of muscovite and feldspars). Abundant well communicated porosity (through small pore sizes with fairly large conduits) with abundant silica cement and long and punctual contacts.



Comments/Possible Original Source:
High quality fine grained uniform sandstone freestone suitable for polished ashlar and carved work. Likely to have been imported into Kilmarnock, either from high quality Ayrshire sandstone quarry (source not identified) or further afield (e.g. major quarries in West Central Scotland or Glasgow area). Also similar to certain Northumberland sandstones (quarries in northeast England connected to Scottish Central belt by rail from mid-19th century).

Currently available matching stone:
Uniform pale buff/orange sandstones: Darney (uniform pale variety), Dunhouse Buff, Stanton Moor (High Nick, Birchover, Blaxter).

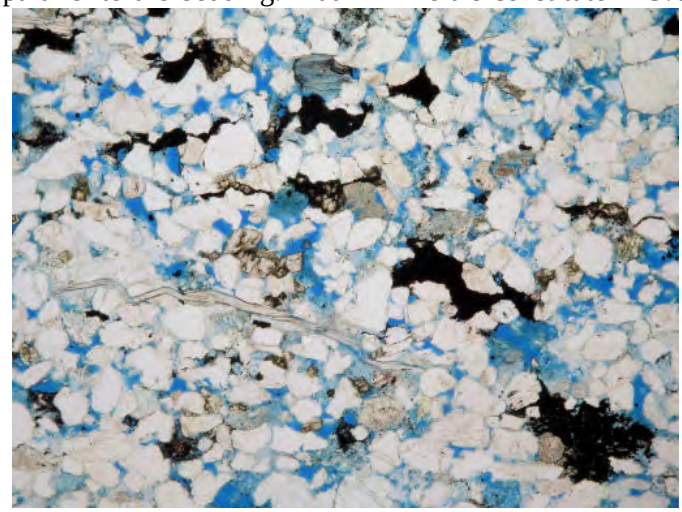
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No.**
K24B	Johnnie Walker, Strand Street	ED10497. From first floor cornice decoration.

Macroscopic Description	
General Description:	Pale, whitish sandstone, with a strongly speckled appearance caused by brown iron oxides.
Colour: (*Munsell)*	c. 10YR 8/1, white.
Grainsize	'Fine' to 'medium', poorly sorted.
Texture	Uniform, with some minor fabric.
Composition	Quartz, feldspars, iron oxides/organic matter, muscovite, carbonate.
Grain Hardness	Strong.
Grain Texture	Intermediate.
Water Absorption	Moderate to rapid.
10% HCl Test	Moderate.

Microscopic Description

'Fine to medium' grained sandstone, poorly sorted with relatively abundant iron oxides/organic matter and clays and a certain amount of carbonates. Slight fabric parallel to the bedding. Framework grains are generally subangular to subrounded. Dominated by quartz (c.80%) ranging from 0.04 to 0.8mm, mostly 0.20-0.35mm in size, generally monocrystalline. Lithic grains are very scarce. Various types of feldspar appear well preserved, both K-feldspar and plagioclase, in twinned and untwinned varieties. Occasionally feldspars are altered. Muscovites appear abundantly, well oriented, often crushed. Opaque grains (iron oxides/hydroxides and organic matter) appear scattered throughout, mobilized into pore spaces, of variable sizes, stretched parallel to the bedding. Matrix minerals constitute >15%. Abundant primary (well preserved minute platy crystals) and secondary clays appear partially infilling porosity. Small amount of carbonate, appears as sparry crystals, occasionally euhedral. Round zircon and tourmaline as accessory minerals. Moderate porosity; permeability reduced due to the infilling of the matrix minerals. Cemented by well developed and abundant silica overgrowth as well as matrix minerals. Contacts long and punctual.



Comments/Possible Original Source:
Moderate quality freestone sandstone similar to sandstones from West Central Scotland area.

Currently available matching stone: No identical stone types are available.
Pale sandstone: High Nick, Birchover, Blaxter, Darney. Buff sandstones (to replicate weathered surface): Peak Moor, Stanton Moor, Swinton, Dunhouse Buff.

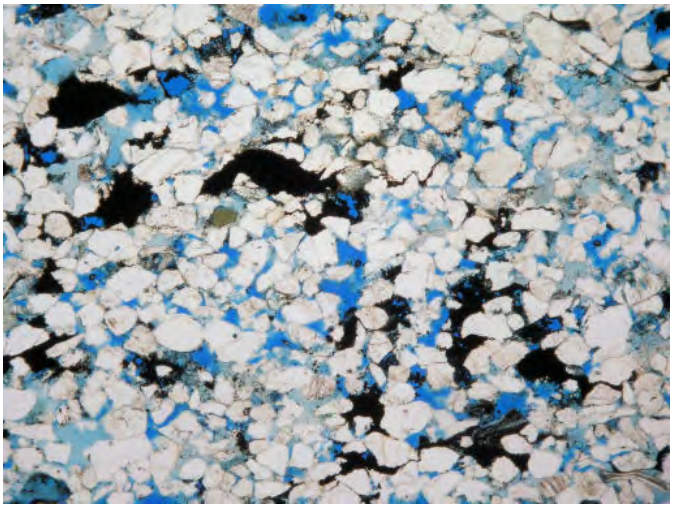
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No.**
K24C	Johnnie Walker, junction of Strand St/Croft St.	ED10497. First floor cornice.

Macroscopic Description	
General Description:	Fine grained, dense in appearance, brownish grey sandstone, with a strong, finely speckled appearance caused by orange iron oxides.
Colour: (*Munsell)*	c. 5Y 7/1, greyish yellow.
Grainsize	Mostly 'fine to medium'.
Texture	Uniform freestone.
Composition	Quartz, feldspars, iron oxides/organic matter, muscovite.
Grain Hardness	Strong.
Grain Texture	Tight.
Water Absorption	Moderate.
10% HCl Test	No reaction.

Microscopic Description

'Fine' to 'medium', mostly 'fine to medium' grained sandstone, moderately to well sorted with relatively abundant iron oxides, organic matter and clays. Bedding marked only by alignment of mica flakes. Framework grains are subangular to rounded. Dominated by quartz (>80%) ranging from 0.06 to 0.4mm, mostly 0.25-0.3mm in size, generally monocrystalline. Both feldspar and lithic grains are relatively scarce. Feldspar appears well preserved, occasionally altered leaving skeletal remains. Muscovites appear in small sizes, well oriented, often crushed and altered into clays. Often large opaque grains (iron oxides/hydroxides and organic matter) appear scattered throughout, mobilized and stretched parallel to the bedding. Matrix minerals constitute slightly less than 15%. Mostly secondary clays with some well preserved primary clays appear partially infilling porosity.



Round and faceted zircon appear as accessory minerals. Porosity and permeability are moderate. Cemented by some thin and irregularly distributed silica overgrowth as well as the matrix minerals. Contacts are a mixture of long, punctual and pressure-solution.

Comments/Possible Original Source: Moderate quality freestone sandstone similar to some sandstones from Glasgow area and West Central Scotland.

Currently available matching stone: No identical stone types are available. Uniform pale buff/orange sandstones: Darney, Dunhouse Buff, Stanton Moor (High Nick, Birchover, Blaxter).

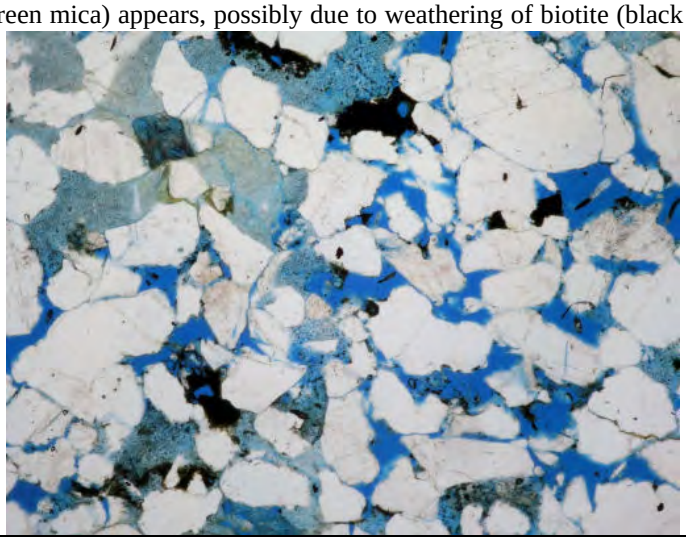
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K25A	Goodfellows, 13-15 West George St.	ED10316A. Ground level, front elevation.

Macroscopic Description	
General Description:	Quartz-rich, coarse grained ('gritty'), buff coloured sandstone, with orange iron oxides and clays.
Colour: (*Munsell)*	2.5Y 8/3-7/3, greyish yellow.
Grainsize	Fine to very coarse.
Texture	Uniform (though small sample).
Composition	Quartz, yellowish feldspar, lithic grains, iron oxides, white clays/carbonates.
Grain Hardness	Friable.
Grain Texture	Open.
Water Absorption	Rapid.
10% HCl Test	Strong, due to lime mortar/cement contamination.

Microscopic Description

Poorly sorted (fine to very coarse grained) quartz sandstone with relatively abundant feldspar (both fresh and weathered) and clay minerals. Framework grains are subangular to subrounded. Dominated by quartz c.75%, ranging from 0.1 to 1.5mm, average grains 0.4-0.6mm (medium to coarse) generally monocrystalline, occasional polycrystalline, often strained. Small percentage of lithic grains of metamorphic origin. Abundant feldspar grains, often altered, appear as relicts now replaced by clays. A small percentage of irregularly shaped iron oxides are present, corroded, others have idiomorphic shape. Abundant primary and secondary clays are present, patchily distributed partially or totally infilling the porosity. Minor chlorite (green mica) appears, possibly due to weathering of biotite (black mica), releasing iron oxides. Scarce randomly oriented muscovite (white mica) is present, crushed and altered. Greyish tourmaline appears as accessory mineral. Matrix minerals constitute less than 15%. Porosity is high (20-25%) and well communicated. Porosity is both primary and secondary (due to weathering of feldspars) although partially infilled by clays. There is cracking along grain boundaries, explaining the friable nature of the sample. Poorly cemented, although contains some silica cement, now partially dissolved.



Comments/Possible Original Source:
Unusual very coarse grained sandstone possibly used for base course only (i.e. not representative of rest of masonry on this building). Source unknown.

Currently available matching stone:
Witton Fell Coarse Grit, Rockingstone, Stoke Hall, Millknock.

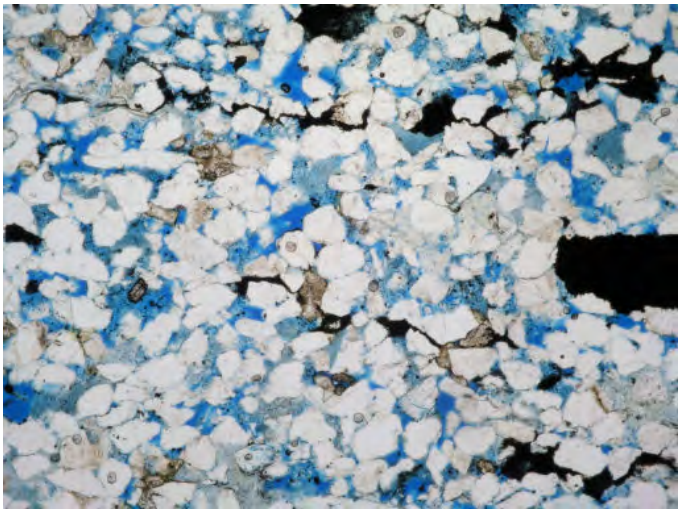
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K25B	Goodfellows, 13-15West George St.	ED10316B. Ground level, rear elevation rubble.

Macroscopic Description	
General Description:	Quartz rich pale (whitish) sandstone, with a strongly speckled appearance caused by orange iron oxides.
Colour: (*Munsell)*	c. 10YR 8/1, white.
Grainsize	'Fine to medium'.
Texture	Uniform, with some fabric.
Composition	Quartz, feldspars, iron oxides/organic matter, muscovite, carbonate.
Grain Hardness	Strong.
Grain Texture	Intermediate.
Water Absorption	Moderate.
10% HCl Test	Moderate.

Microscopic Description

'Fine to medium' grained sandstone, well sorted with relatively abundant iron oxides, organic matter and clays. Slight fabric parallel to the bedding. Framework grains are generally subangular to subrounded. Dominated by quartz (c.75-80%) ranging from 0.05 to 0.5mm, mostly 0.25-0.3mm in size, generally monocrystalline. Lithic grains are very scarce. Various types of feldspar appear rather well preserved, both K-feldspar and plagioclase, in twinned and untwinned varieties. Occasionally feldspars are altered. Muscovites appear abundantly, well oriented, often crushed. Opaque grains (iron oxides/hydroxides and organic matter) appear scattered throughout, often mobilized into other pore spaces, in variable sizes, stretched parallel to the bedding. Matrix minerals constitute >15%. Primary (with well preserved minute platy crystals) and secondary clays appear partially infilling porosity. Minor carbonate, possibly dolomite appears as sparry crystals, occasionally euhedral. Round zircon and tourmaline appear as accessory minerals. Porosity is moderate and permeability is reduced due to the infilling of the matrix minerals. Cemented by some silica overgrowth as well as the matrix minerals. Contacts are long and punctual.



Comments/Possible Original Source: Moderate quality freestone sandstone similar to many types of sandstone in the Glasgow area, but possibly also from an Ayrshire quarry.
Currently available matching stone: No identical stone types are available.
Pale sandstone: High Nick, Birchover, Blaxter. Buff sandstones (to replicate weathered surface): Peak Moor, Stanton Moor, Swinton, Dunhouse Buff.

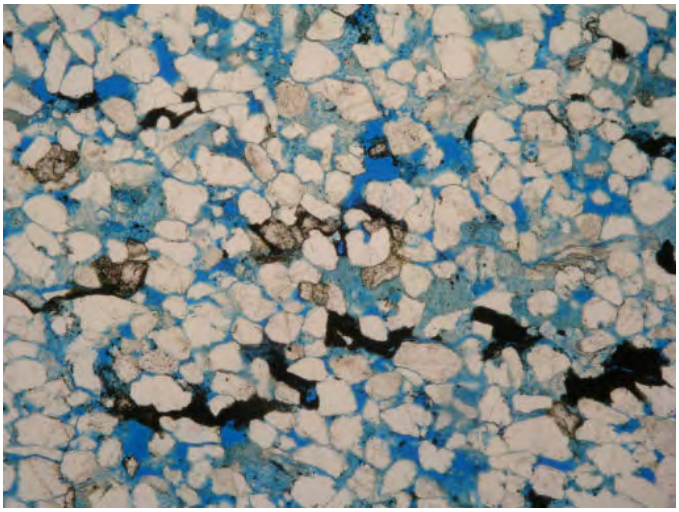
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K25C	Goodfellows, 13-15West George St.	ED10316C. String course.

Macroscopic Description	
General Description:	Blonde sandstone, pale greyish buff colour, impure and relatively clay-rich. Some orange iron oxide speckling.
Colour: (*Munsell)*	c. 2.5Y 8/1, light grey.
Grainsize	'Fine to medium' and 'medium', rather well sorted.
Texture	Uniform.
Composition	Quartz, feldspars, lithic grains, iron oxides, clays.
Grain Hardness	Intermediate
Grain Texture	Intermediate
Water Absorption	Moderate to rapid.
10% HCl Test	None. Yellow staining after this test.

Microscopic Description

'Fine to medium' and 'medium' grained sandstone, moderately sorted with abundant iron oxides, organic matter, muscovite and clays. Framework grains are generally angular to subrounded. Quartz (c.70%) ranges from 0.1 to 0.5mm, mostly 0.25-0.35mm in size, generally monocrystalline (some undulating extinction) and occasionally containing rutile needles, although there are polycrystalline grains. Rare lithic grains of sedimentary origin, well rounded. Feldspars appear well preserved, mostly untwinned varieties, occasionally altered. Well oriented muscovite, accessory biotite often crushed can be long (over 1mm). Abundant iron oxides and organic matter appear scattered throughout, often mobilized into pore spaces, in variable sizes and stretched parallel to the bedding. Matrix minerals constitute >15%. Primary clays (with well preserved minute platy crystals) and secondary clays virtually infill the porosity. Relatively abundant carbonate, possibly dolomite, appears as yellowish sparry crystals, occasionally euhedral, sometimes associated with iron oxides. Round zircon and tourmaline appear as accessory minerals. Porosity is moderate and permeability is reduced due to the infilling of the matrix minerals. Contacts are long and punctual. The sandstone is cemented with silica overgrowth, but it has been partially dissolved and there is dislocation of grain boundaries, making the stone friable and prone to breakage. The stone is currently cemented mostly by the matrix minerals.



Comments/Possible Original Source:
Moderate to high quality sandstone freestone. Similar to 'blonde' sandstone from quarries in Glasgow area and West Central Scotland (including high quality Ayrshire quarry).
Currently available matching stone: Pale varieties of: High Nick, Blaxter, Birchover, Stanton Moor, Dunhouse Buff, Black Pasture, (pale Swinton).

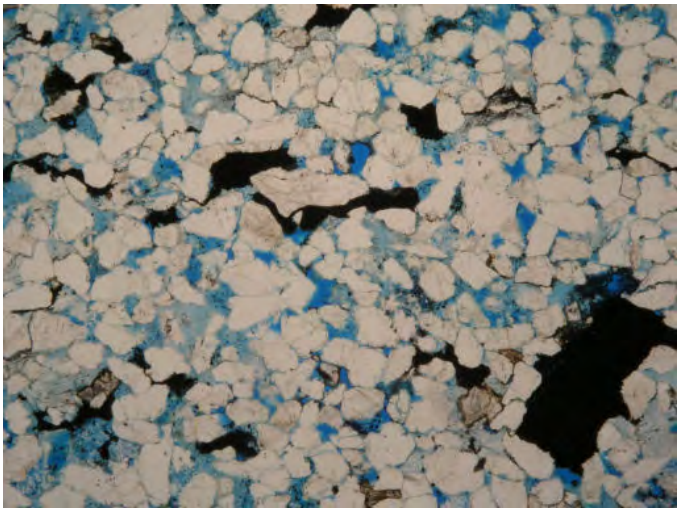
KILMARNOCK BUILDING STONE AUDIT
SAMPLE DESCRIPTION SHEET

Building No.	*Building*	**Sample No**.
K25D	Goodfellows, 13-15 West George St.	ED10316D Ashlar masonry

Macroscopic Description	
General Description:	Pale grey 'blonde' sandstone, micaceous, with a strongly speckled appearance. Fe mud clasts up to 1cm long.
Colour: (*Munsell)*	c. 10YR 8/1, white.
Grainsize	'Fine' to 'medium'.
Texture	Uniform.
Composition	Quartz, feldspars, lithic grains, iron oxides/organic matter, muscovite, clays, possibly some carbonates.
Grain Hardness	Strong.
Grain Texture	Intermediate.
Water Absorption	Moderate to rapid.
10% HCl Test	Weak.

Microscopic Description

'Fine to medium' and 'medium' grained sandstone, moderately sorted with abundant opaques, muscovite and clays. Framework grains are generally angular to subrounded. Dominated by quartz (c.70%) ranging from 0.1 to 0.7mm, mostly 0.25-0.35mm in size, generally monocrystalline although there are polycrystalline grains. Lithic grains are rare. Relatively abundant feldspars appear well preserved, mostly untwinned varieties. Abundant long muscovite well oriented, often crushed. Abundant opaque grains, sometimes in large sizes over 2mm, appear scattered throughout often mobilized into pore spaces and stretched parallel to the bedding. Muscovite flakes are long, often over 1mm, mostly crushed. Matrix minerals constitute >15%. Primary clays (with well preserved minute platy crystals) and secondary clays appear infilling the porosity. Relatively abundant carbonate, possibly dolomite appears as yellowish sparry crystals, occasionally euhedral. Zircon and tourmaline appear as accessory minerals. Porosity is moderate and permeability is reduced due to the infilling by matrix minerals. Contacts are long and punctual. Moderately cemented with some silica overgrowth, with minor dislocation of the grain boundaries, making the stone rather friable. The stone is currently cemented mostly by the matrix minerals.



Comments/Possible Original Source:
Moderate to high quality sandstone freestone, suitable for ashlar and carved work. Similar to 'blonde' sandstone from quarries in Glasgow area and West Central Scotland (including high quality Ayrshire quarry).
Currently available matching stone: Pale varieties of High Nick, Blaxter, Birchover pale, Dunhouse Buff, Stanton Moor (pale Swinton).