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Abstract: Connemara Marble, a well-known distinctive decorative stone from the west of Ireland, is herein proposed as a Global Heritage Stone Resource. Connemara Marble is a sillimanite-grade phyllicarbonate, dominated by dolomite and calcite with varying proportions of serpentine, diopside, forsterite, tremolite clinochlore and phlogopite. The marble displays intricate corrugated layers that range in colour from white through sepias to various shades of green. These features impart unique characteristics that set the marble apart from other ornamental stones. Characteristics reflect amphibolite-grade metamorphism of an impure siliceous dolomitic lime- stone during the Grampian orogeny (475–463 Ma). Olivine, diopside, tremolite along with calcite and dolomite were formed during the peak of metamorphism which was followed by a later pervasive hydrothermal metamorphism that led to the extensive growth of serpentine after olivine and diopside. It has been used since Neolithic times, but has been quarried and fashioned in Connemara since the eighteenth century, and widely utilized in buildings in Ireland and the UK, for cladding, banisters, columns and church fittings. Later in the late nineteenth and early twentieth centuries it was exported in large quantities to the USA for use in civic and educational buildings. Its many uses as an ornamental stone in the interiors of buildings and in Irish jewellery commands worldwide acclaim.

Connemara Marble is a stone type that is unique, and strongly identified with Ireland from where it is quarried. Nationalistic affinity of this stone is prompted and reinforced through its green coloration (Fig. 1). Geologically the genesis and generation of this metamorphic rock is complex, producing a mineralogically-rich petrography (Fig. 2).

The rock descriptor marble is derived from the Greek, meaning shining rock. Petrologists define marble as a metamorphic rock dominantly composed of calcite and/or dolomite whose protolith was a carbonate sediment, e.g. a limestone. In the dimension-stone industry, however, all calcareous rocks that can be polished are usually classed as marble. Therefore, it is within this context that the descriptor ‘marble’ was applied to the Connemara Marble even though it is composed of significant abundances of silicate minerals along with calcite and dolomite. Max (1985) notes that only a small part of the Connemara Marble horizons has a large enough proportion of carbonate minerals to be called a true marble and, furthermore, it is the other minerals that give the marble its unique and highly commercial characteristics. Eight colour varieties are described by Max (1985) that range from dark green to white, all reflecting the varying proportions of green (e.g. diopside and serpentine) and white to grey minerals (e.g. calcite).

The Connemara stone first became popular in the early 1800s and, over time, quarries were opened in at least five adjacent districts in Co. Galway in the west of Ireland between the coastal town of Clifden and Galway city to the east (Figs 3 & 4). Adopted widely as a decorative stone by Victorian architects, it was employed for columns (Fig. 5) and wall and floor-panels in ecclesiastical buildings (Fig. 6) and in large country residences and public buildings (see lists below), particularly in Ireland and Britain. Aside from such utilization, the stone was also popular for altars (Fig. 7), chimneypieces (Fig. 8), table

https://doi.org/10.1144/SP486.6
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tops, tazzas (Fig. 9), church memorials and as plinths for marble busts. Connemara Marble was a decorative stone of choice for many stone workers who carried out their trade in various marble works and studios in Dublin, Cork, Killaloe in Ireland and also in London. Initial markets for the stone were Ireland and the UK, but in the 1890s it underwent a significant revival in the USA (Figs 10 & 11).

The stone has been adopted by both native Irish and returning tourists as a symbol of Ireland. During the First World War Irish soldiers serving in France wore pendants of Connemara Marble shaped into four-leafed shamrocks (Anon. 1918), no doubt as good luck charms. Following fluctuations in extraction in the early to mid-twentieth century due in part to the unsuitability for cladding exterior walls (Fig. 12), quarrying recommenced in some quarries in the last 30 years with some production being for use as flooring, but most stone being worked into tourist souvenirs, small decorative pieces (Fig. 13) and even as small cubes that can be chilled to keep Irish whiskey cool.

Connemara Marble is a unique stone type that has fascinated and enthralled sculptors, architects and discerning owners of buildings for nearly 200 years. Its appeal as a decorative stone was summed up beautifully by the American Art critic Charles Caffin in 1897: ‘[its] stateliness, the exquisite mystery of graded greens and grays and black, their tempestuous streakings and tender veining, and the perfect texture of their polished surface’.

**Global Heritage Stone Resource nomination/citation requirements**

For the purpose of Global Heritage Stone Resource (GHSR) nomination, the Heritage Stone Task Group Terms of Reference state that citations should contain specific information. The stone should have most of the following attributes: have been in use for over 50 years; had a wide geographical use and application; be identified for its iconic nature and have a national symbolic significance; still be quarried and available commercially; and have potential cultural, heritage and scientific benefits arising out of GHSR designation. Connemara Marble fulfils all these criteria. These and other necessary information are further discussed in Cooper et al. (2013) and Cooper (2015), where a check list of requirements is
provided. In order to nominate Connemara Marble as a GHSR the following definitive details are summarized below.

Citations of its use in buildings are scattered throughout trade journals and in books and articles describing either building stones used in particular locations (Galway, Feely 2002, Feely & Costanzo 2014; Dublin, Wyse Jackson 1993; Belfast, Manning 1965, Gaffikin 1999; London, Elsdon & Howe 1923, Robinson 1985), those that describe decorative stone collections (Watson 1916; Price 2007), or on Connemara Marble itself (Walsh 2014).

**Formal name**

Connemara Marble
Origin of name

Named after the district in western Ireland where it has been quarried since the early 1800s.

Stratigraphic (or geological) name

Connemara Marble Formation, Blair Atholl Sub Group, Appin Group, Dalradian Supergroup, Precambrian.

Commercial designations

Connemara Marble, Irish Green Marble, Galway Green, Galway Serpentine, Royal Irish Green, Lissoughter Marble, Recess Marble (from Lissoughter), Lissoughter Green Marble, Irish White, Pinka Grenna (a very pale variety known from Streamstown), Sepia Marble (a commercial variety that was relatively new in the 1980s, only quarried at Streamstown).

Area of occurrence

In isolated outcrops in an east–west-aligned trend from Clifden to Lissoughter, Co. Galway, Ireland (Fig. 3).

Principal location of current and former quarries

The following are the principal locations of quarries: Streamtown, Lettenoosh near Clifden (Fig. 4) (active); Cregg Hill near Letterfrack (inactive); Ballinahinch (Barnanoraun), near Recess (active); Derrycclare (inactive); and Lissoughter, near Recess (inactive).

Fig. 3. Geological map of Connemara, Co. Galway, Ireland showing the locations of the principal quarries of Connemara Marble from Clifden in the west along strike to Lissoughter in the east (modified from Max 1985, fig. 2).

Fig. 4. (a) Streamstown Quarry, Co. Galway. (b) Detail of highly-banded marble.
Fig. 5. Museum Building, Trinity College, Dublin. (a) Entrance hall with Connemara Marble columns and banisters. (b) A Connemara Marble pilaster (right).

Fig. 6. St Canice’s Cathedral, Kilkenny. (a) Marble tiled floor in chancel with Connemara Marble (green) representing the province of Connaught, Cork Red Limestone (red) representing Munster, Armagh Limestone (grey) representing Ulster and Kilkenny Limestone (black) representing Leinster. (b) Caen Stone (whitewashed) pulpit with Connemara Marble and Cork Red Limestone columns by Dublin sculptor Charles W. Harrison.
Geological age and geological setting

Connemara Marble crops out in County Galway in western Ireland and is part of the Grampian Connemara Metamorphic Complex (Leake & Tanner 1994; Friedrich & Hodges 2016). The Connemara marble belongs to the Lower Dalradian (= Appin Group) and forms part of the Connemara Marble Formation which lies between the older Clifden Formation and the younger Barnanoraun Formation. These three formations along with those in the Middle (= Argyll Group) and Upper Dalradian (= Southern Highland Group) of Connemara are correlated with Dalradian successions in Donegal and Scotland (Kilburn et al. 1965). Indeed, this Dalradian lithostratigraphy reflects a continuum from the rocks of the Connemara Metamorphic Complex, through Mayo and Donegal to the Central Highlands of Scotland. They were deposited on the southeastern continental margin of Laurentia. The older Dalradian rocks of Connemara (Appin Group) were deposited in a shelf environment and the younger Argyll and Southern Highland Groups formed in a series of fault-bounded basins.

All of the commercially (Max 1985) significant marbles are concentrated in one stratigraphic horizon, the Connemara Marble Formation (Fig. 3), which belongs to the uppermost part of the Blair Atholl Subgroup of the Lower Appin Group. Connemara Marble protoliths comprised both calcareous and clastic lithologies; it is a metamorphosed impure dolomitic limestone, or ophicarbonate, interbedded with Dalradian schists and quartzites (Leake et al. 1975; Tanner & Shackleton 1979; Treloar 1982; Max 1985) that is often referred to as a serpentine marble. This ophicarbonate marks the

Fig. 7. Altar area St Peter and St Paul’s Church, Athlone, Co. Westmeath. The pilasters, the column on the right and four smaller columns with broken tops at the rear of the altar are executed in Connemara Marble.

Fig. 8. One of a pair of Connemara Marble chimneypieces in the former National Bank of Ireland, Foster Place, Dublin.
base of the formation and a thin bed of grey or buff marble, locally a siliceous dolomite but generally serpentine free, marks the top of the formation (Treloar 1982). An early petrographic description of the marble is to be found in Cronshaw (1923) where serpentinization of olivine is described. Amphibolite-grade metamorphism of the marble’s protoliths, during the Grampian Orogeny (c. 475–463 Ma, Friedrich & Hodges 2016 and references therein) triggered the growth of olivine, diopside, tremolite, talc, calcite and dolomite along with phlogopite. The relative proportions of these minerals can vary widely due to the layered nature of the protoliths. Later, pervasive hydrothermal metamorphism led

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**Fig. 9.** Tazza in the Natural History Museum, London. This was manufactured at Killaloe Marble Works, Co. Clare. (Photograph courtesy Andrew Tierney.)

**Fig. 10.** Chicago Cultural Center staircase, Chicago, USA. The central circular panel set into Carrara Marble is of Connemara Marble and a small proportion of the surrounding decorative mosaic pieces are of the same stone.
to wholesale serpentinization of the earlier formed, high-grade silicates, e.g. olivine and diopside (Fig. 2). This process essentially led to the greening of the marble and the serpentine-rich zones are referred to by the local quarrymen as the jewellery-grade marble (Leake et al. 1975; Max 1985; Feely 2002; Feely & Costanzo 2014). The hydrothermal metamorphism may have been linked to the generation of hydrothermal fluids during emplacement of the Galway Granites and/or a regional temperature decrease after the metamorphic peak (Long et al. 1986; O’Reilly et al. 1997). The green serpentine ophicarbonate of the Connemara Marble Formation has been extensively extracted and worked as ornamental stone.

**Petrographic name and mineralogy**

Connemara Marble is a sillimanite-grade ophicarbonate dominated by dolomite and calcite with varying proportions of serpentine, diopside, forsterite, tremolite clinohlore and phlogopite (Leake et al. 1975; Leake & Tanner 1994). The petrography of a sample of green marble from the Streamstown quarry is presented in Figure 2. This highlights the presence of diopside (rarely fresh), serpentine, calcite, dolomite and clinohlore. Furthermore, mineralogically defined micro-layers are visible (Fig. 2a, b and c), a feature also evident at outcrop scale and in the Streamstown quarry faces (Fig. 4). Evidence for serpentinization of the earlier-formed
amphibolite-facies diopside (and probably forsterite and tremolite) is also present (Fig. 2e, f). In Figure 2e islands of relatively unaltered diopside are surrounded by serpentine. Noteworthy also is the presence throughout the thin section, particularly evident in Figure 2c, of patches now almost totally composed of serpentine that reflect the original presence of higher-grade Ca–Mg silicates, e.g. forsterite, diopside and tremolite.

Primary colour(s) and aesthetics of the stone

The Connemara marbles exhibit interwoven bands of pale to dark green, white, sepia, with occasional bands of black or grey (Figs 1 & 5b). An early description of its colour was given by Giesecke who referred to it as a mixture of siskin-green and yellowish-green or a pale verdigris (Giesecke 1832). Another later account by Hull (1872, p. 103) captures the wild and almost erratic beauty of Connemara Marble, ‘bands and laminae, often twisted and tangled, of varying shades of green, from deep sap-green to translucent pale yellowish-green, and interlaced with bands of white calcite, or crystalline dolomite’.

The shades of Connemara Marble are determined by the extent and diversity of the coloured minerals present, varying from white to green with increasing serpentine content. Maximum hydration of magnesium silicates creates the deepest green coloured ophicarbonates, which occur particularly in the Lisoughter area in Connemara. Magnesium silicates also occur to the west, but phyllosilicates become more common (Max 1985). A white variety with hints of green is found at Cregg Hill Quarry, while another, Pink Grenna, shows traces of pink coloration (Watson 1916). Typically, calcite, which is a white to grey colour (sometimes with traces of pink), and dolomite, which is creamy white, form the groundmass in which metamorphic minerals create decorative bands and blebs of green colour. The metamorphic minerals include amphiboles, serpentinized olivine, chlorite, talc, mica, diopside and chalcedony (Leake et al. 1975; Treloar 1982; Max 1985). Only a small part of the Connemara marbles has a large enough proportion of carbonate minerals (calcite and dolomite) to be classed a true marble. However, this impure chemistry, resulting in the variable proportions of the metamorphic minerals mentioned above, is highly important to economic value of the Connemara Marble (Max 1985).

The texture of the marble influences its aesthetic qualities and determines its structural capabilities, both of which impact commercial value. Giesecke (1828, pp. 13–14) wrote, at the beginning of the nineteenth century:

It is impossible to describe the immense varieties of delineations, shades, and colours of this beautiful rock; the serpent-like varieties of some of them must excite particular admiration. Some are bent in a spiral form, others are dotted and spotted with different shades of green, grey brown, and yellow.

The complex patterns exhibited in the marbles are due to folding of original parallel sedimentary banding and secondary foliation formed during several phases of deformational events (Max 1985).

Natural variability of stone

This stone is rather variable with both dark and pale varieties encountered at the same location (Fig. 1) (Watson 1916, p. 57).

Technical properties

Density: 2600 kg m\(^{-3}\)  
Water absorption: 0.62 by weight%  
Flexural strength: 8.1 MPa  
Compression strength: 99.3–100.1 MPa  
(Data from StoneContact 2013.)
Suitability

Internal work, flooring, cladding, columns, jewellery. Not suitable for external use as the stone loses its polish most likely due to rain washing (see Fig. 12).

Vulnerability and maintenance of supply

The Geological Survey of Ireland (GSI 2014) estimates that reserves in various quarries could last between 20 and 1600 years at current production levels.

Historical use and geographical area of utilization

Connemara Marble has been intermittently quarried and used since the 1820s and the quarries have been operated by different entrepreneurs and landlords since then (see Table 1). It has been largely employed as a decorative stone in Ireland, Britain and the USA.

The earliest utilization of Connemara Marble appears to be during the Neolithic Period for stone axes (Cooney & Mandal 1998). However, it was first quarried in any significant volume in the early 1820s by John D’Arcy (1785–1839) of Clifden Castle, and founder of the town of Clifden, and initial exports to London were dispatched in mid-1824 (Anon. 1824). These quarries were situated at Streamstown Bay, in the valley near Loughauna where raised blocks were carted to Clifden for shipment, and at Loughnahillion where the blocks were transported more easily northwards by road to Barnaderg Bay (Kinahan 1889). The stone was described as being superior to the verde antico, and its discovery was heralded with enthusiasm, as the only green marble known in Britain at that time was a variety in Wales that was not suitable for use (Anon. 1824). D’Arcy leased the Streamstown Quarry (Fig. 4) to the Hibernian Marble Company but this arrangement only lasted a short while after which the operation was run by the landlord himself (Walsh 2014).

In the early 1820s another local landlord Richard Martin (1754–1834) of Ballinahinch opened a quarry on his estate, which employed between 150 and 170 men engaged in extracting and sawing the stone. The area was visited in 1826 by Sir Charles Lewis Giesecke, Professor of Mineralogy of the Royal Dublin Society, who reported that Martin’s quarry produced ‘solid masses of an enormous size’ and which were cut into slabs on the site for

Fig. 13. Souvenirs and jewellery made of Connemara Marble. (a) Brooch with shamrock details. (b) Rings with various polished cuts and cabochons. (c) Worry Stone (diameter of coin 16.25 mm).
tables (Giesecke 1828, p. 14). Good examples can be found in the National Museum of Ireland and in the Scottish National Gallery. It is probable that the Connemara Marble that was presented to George IV and which is now in the Carlton Club, London (Bird 1852) came from Ballinahinch. Martin, who was more readily known as ‘Humanity Dick’ on account of his championing of animal welfare, laid out a road to Cloonisle six miles away and had the noted engineer Alexander Nimmo construct a pier. Such investment reflected confidence in the long-term viability and future of the family quarrying trade, but this was not to be and both the Martins as well as the D’Arcys were forced to sell their estates, including the quarries, due to debts accrued during the Great Irish Famine.

The Victorian travel writers, Samuel Carter Hall and his wife Anna Maria, toured Ireland during the 1840s, during which time they visited Connemara and remarked upon the precious serpentine, of various shades of green and yellow, often mottled and striped… precisely the same in structure and appearance as the verde antico of Italy [although this stone is darker in hue], and undoubtedly the richest and finest ornamental stone yet found in these kingdoms (Hall & Hall 1843, pp. 462-463).

They commented that the most beautiful green marble varieties occurred in Ballynahinch and Clifden, where extensive quarries were partially worked. Aware of an existing prejudice against the marble in the English market, they suggested that only ‘time and perseverance’ would overcome, and furthermore they observed a treatment of neglect for the stone in Ireland (Hall & Hall 1843, p. 464).

Sir Robert Kane (1809–90), a Dublin-born chemist and educationalist, published his influential volume The Industrial Resources of Ireland in 1844. In it, Kane referred to beautifully variegated green and white marbles being exported in considerable quantities and wrote that the most valuable quarries were situated on the D’Arcy estate near Clifden (Kane 1844).

George Wilkinson (1814–90), a noted architect, observed a decline in the use of Connemara Marble in the 1840s; in his book, Practical Geology and
Ancient Architecture of Ireland (1845a) which did much to promote the use of natural stone in building both in Ireland and abroad. He stated that Connemara Marble was much more extensively used in the past and lamented that it was not likely that this marble would come into general use again at that present time at least:

owing to the great facility of obtaining foreign marble, in favour of which there is a strong popular prejudice, and which the marble workers also prefer. The inconvenient locality, and the bad roads to the quarries where these native marbles are raised, make the cost of obtaining them considerable; in addition to which, it is considered that the proprietors ask too high a price for the material (Wilkinson 1845a, p. 275).

Wilkinson (1845a) also attributed the use of gunpowder during the removal of overburden, which damaged the raised marble blocks, to a prejudice in sales of the Connemara Marble at that time. He was a key advocator of Irish stone use during the mid-nineteenth century, along with Kane, founder and Director of the Museum of Irish Industry (1845), as well as being a Council Member of the Geological Society of Dublin during a period in the 1840s; in 1845 he lectured to the Society on the Marbles of Ireland and presented their museum with specimens of Irish building stones (Wyse Jackson 2017). Through his actions he aimed to encourage architects to employ Irish stone in preference to imported continental marbles. Aside from being published in the Society’s journal (Wilkinson 1845b) the text was also circulated by the Victorian building journal, The Builder (Wilkinson 1845c), and so was made available to a wide audience.

In 1846 Prince Albert, the Prince Consort examined samples of Connemara Marble and recommended the stone for artistic and ornamental use to the Society of Arts and this led to increased exports to England (Anon. 1846). Following his death, the stone was used in a commemorative altar at Windsor Castle.

Two industrial exhibitions were held in Ireland during the early 1850s with promotion of Irish industry being the primary objective. First, the National Exhibition of the Arts, Manufacturers and Products of Ireland took place in Cork in June 1852 (Anon. 1852), where a green slab of Connemara Marble was exhibited by Edward Staunton, and several Irish marbles, including a green marble chimney-piece, were displayed by William Manderson of the Killaloe Marble Works. Manderson was also responsible for the large tazza now in the Natural History Museum, London (Fig. 9). At that time marble works were situated in Galway, Cork, Limerick and Dublin and produced plinths, church fittings and chimneypieces (Fig. 8). Secondly, a year later in 1853 the Great Industrial Exhibition, organized by the railway entrepreneur William Dargan, took place in Dublin. At the northern side of the Great Hall stood the Irish Marble Court, which contained a ‘fine collection of Irish marbles’ exhibited in a glass case by the Museum of Irish Industry (Anon. 1853, p. 454) alongside various manufactured pieces. Connemara Marble was well represented and promoted and three varieties – the hard white, the black and the green – were displayed. The green was described by an anonymous correspondent writing in The Illustrated London News as varying much in colour, ‘sometimes it is almost white; again, pale yellow; at other times, bright yellow, or dark green, almost black’, while the most valuable specimens were generally bright green (Anon. 1853, p. 454). This correspondent praised the green variety, stating we are convinced, if this marble existed only in the ruins of some Italian temple, it would not be less valued than the celebrated Verd-antique, that which it is not inferior in beauty (Anon. 1853, p. 454).

The article reiterated that the marble amply occurs near Ballynahinch and Clifden and that it is easily worked, and echoed Wilkinson’s report of the difficulty in obtaining unflawed slabs on account of the blasting techniques applied to remove overlying waste rock. However, readers were assured that this defect issue arises only as a result of small demand for the marble, and if quarries were working to full capacity a depth could be reached at which perfect marble abounds (Anon. 1853, p. 454). Irish marble, including Connemara Marble, was highly endorsed at The Great Exhibition, because the potential of this lucrative manufacturing industry in Ireland was recognized. A passage from Henry Bird, published in The Builder in July 1852, describes the neglected marble trade and the ‘only slightly worked’ quarries of Connemara, ‘Occasionally one meets with a “slab” or “chimney-piece”, but only often enough to create regret that so much real beauty lies for the most part neglected’ (Bird 1852).

Abroad the stone was also exhibited at industrial exhibitions; John Costello displayed material at the 1855 Paris Exhibition for which he was presented with a medal by the French Emperor for his display (Anon. 1855a). Newspaper reports stated that ‘From the moment those specimens were opened they have attracted the attention and elicited the praise of all who are capable of appreciating their beauty and superiority’, and that the ‘marble workers of Paris have asserted the superiority of the Galway marbles to the produce of the marble quarries of the Apennines and the Alps’ (Anon. 1855b). Furthermore it was noted that these qualities are ‘now universally admitted, and yet England would discountenance it’. The reason suggested was simply because Connemara Marble was Irish; as a result, Costello intended to ship his output to Paris rather than to London (Anon. 1855b). This and similar reports
CONMEMARA MARBLE: IRISH HERITAGE STONE

appeared in Irish newspapers, so the nationalistic tone is hardly surprising. In reality stone continued to be shipped from Galway and contemporaneous reports has it being sent to Glasgow (Anon. 1854).

In Dublin the stone was used in two important buildings: the Museum of Economic Geology (later termed the Museum of Irish Industry), established in 1847, had the hallway of its premises at 51 St Stephen’s Green in Dublin clad in 1850 with panels of Connemara Marble and decorative limestones; and the Museum Building of Trinity College Dublin, erected between 1853 and 1857, utilized stone from Streamstown and Ballinahinch for banisters and columns in the main hallway (Wyse Jackson 1995) (Fig. 5). This was the earliest use of Connemara Marble for structural construction.

In 1859 Joseph Holdsworth published Geology, Minerals, Mines, & Soils of Ireland in reference to the Amelioration and Industrial Prosperity of the Country. His key aim was to present natural evidence to prove that Ireland boasted ample, exploitable natural resources. He pointed to the elaborate displays of marble at The Great Exhibition in London, specifically the Connemara Green which he described:

from Connemara – the Irish Highlands – were derived the unique and exquisitely beautiful green marble, of various shades, and finely grained. It may, indeed, be said that there is not a county in Ireland, of which marbles of greater or less excellence may not be found, and a choice collection from them would vie with the most esteemed marbles of the Apennines and Pyrenees, and where the author, in all his geological rambles in those Alpine regions, may correctly affirm that he never met with (in situ) any marble surpassing in beauty and richness the green marbles of Connemara. We may add, that Irish marbles are now coming into very general use for chimney-pieces, ornamental slabs and tables, door cases, bust pedestals, &c.; the green ones being manufactured into a variety of fancy articles, as beads, bracelets, watch-cases, &c.; and it is highly probable that as they become more generally known and appreciated they will be largely exported, not only to England, but to the Continent and even America (Holdsworth 1859, pp. 19–20).

George Henry Kinahan (1829–1908) of the Geological Survey of Ireland, in 1889 documented in great detail the ophiocarbonate marble quarries in Connemara (see Fig. 3 for locations). By this time the Streamstown quarries were leased by Mr Colles of Kilkenny (Kinahan 1889). The McDonnells of Clifden were self-taught artists, one of whom, Alick (or Alexander) McDonnell, manufactured ornaments, brooches and various other decorative objects by hand using the Streamstown marble (Anon. 1858). South of the Loughauna valley and nearly parallel to it there is another valley, at Barnanoraun, where the famous Ballynahinch Marble Quarries are situated. These quarries were opened in the 1820s and extensively worked by the Martins of Ballynahinch

Castle. Messrs Sibthorpe and Son, marble and stone merchants of Dublin, leased the quarries in about 1870 (Kinahan 1889). Stone from this locality was used in the columns of the Museum Building, Trinity College, Dublin (1853), and in the Oxford University Museum of Natural History (1860) (Kinahan 1889). During the early–mid-nineteenth century most of the Connemara Marble was raised from this location. However, later in the century ‘these quarries got into disrepute, on account of the severe road from them, a steep ridge intervening between Owenglin and Ballynahinch, over which the blocks had to be carted’ (Kinahan 1889, p. 154), and sufficient stone for the market could be raised cheaper at Lissoughter (Kinahan et al. 1878). The raised blocks at Barnanoraun were either manufactured by water power at the quarries or left raw, transported to the pier at Cloonisle and from there sent by sea to various destinations (Kinahan 1889). Close to Recess, on the SW slope of Lissoughter, there is another quarry, formerly worked to a limited extent by the Martins since the early 1820s, but more extensively wrought by Sibthorpe and Son from the 1870s until the end of the century (Kinahan et al. 1878; Kinahan 1889). Like those raised at Barnanoraun/Ballinahinch, some of the blocks of Lissoughter green marble were squared at the quarry and then carted to Cloonisle Pier where they were shipped to be finished at Sibthorpe’s stone yard on Great Brunswick Street in Dublin (Kinahan et al. 1878).

However, the large blocks of stone were of such high quality that it was more profitable to send them unsquared to Cloonisle (Kinahan 1889). During Sibthorpe’s ownership of the quarry the average value for Lissoughter green, in the rough in Dublin was about 16s per cubic foot for fair-sized blocks (Kinahan et al. 1878). There was high demand for Connemara Green Marble between the 1860s and 1880s primarily for ecclesiastical installations such as altars and pulpits and for flooring (Fig. 6a). Unfortunately, architects’ insistence on using Connemara Green, as well as other Irish marbles, on the exterior of buildings soon generated a bad reputation for the stone. They weathered badly and became unsightly due to the loss of polish and the adhering of soot and particulate matter when exposed to the elements, and undeserved prejudice against the green marbles emerged (Kinahan 1889) (Fig. 12).

Throughout the late nineteenth and early twentieth centuries production fluctuated, and some quarries became inactive for periods before being reopened. Interest at times from abroad and from Royalty helped increase awareness of the stone and production increased for a period. During the two decades from the 1890s Connemara Marble was championed in the USA by Robert C. Fisher & Co., marble works, New York who imported over $1m-worth of marble. Prior to this it was said that
the stone was imported into the USA in small quantities and sold by the pound (weight) (Caffin 1897). Fine examples of its use in Chicago include the south entrance and staircase and Delivery Room of the Public Library (now the Chicago Reading Room) (Fig. 10), and in New York the interior of the University Club, 5th Avenue, the main rotundas of the Gould Memorial Library of New York University in the Bronx (Fig. 11) and the ‘Low Memorial Library’ of Columbia University where material for only two of the planned 18 columns could be obtained. However, they inspired the critic Charles Caffin to exclaim: ‘The most heedless visitor cannot pass them unadmired, the connoisseur will be enthusiastic’ (Caffin 1897; Gray 2002). In 1906 the Pennsylvania Capitol Building was dedicated in Harrisburg and the Senate Chamber was clad with marble from Streamstown. In the same city, the cathedral contains significant quantities of this Irish stone.

On 29 July 1903 the quarry at Recess was visited by King Edward VIII and Queen Alexandra and they were shown wire saws in operation before being presented with a harp and inkstand manufactured from the marble (Walsh 2014).

After a post-First World War decline in popularity, a brief revival of the Streamstown Quarries occurred from 1932 due to the efforts of Captain Wyndham Waithman, proprietor of the limestone quarry at Merlin Park, Galway. He interested various marble merchants in London (including Messrs Whitehead of Kennington Oval), Antwerp, the USA and Canada and demonstrated to them the value of the stone for sculptural use (Shandon 1935). In 1930 eight men were employed in the quarry, and for the first time an air drill was used which allowed blocks to be removed that didn’t shatter when sawn. It was anticipated that an additional 16 men would be taken on and terrazzo tiles would be manufactured (Anon. 1930). Much of this stone was transported to the marble works at Merlin Park where it was fashioned into drums for columns and panels by Waithman. Much of the material was used at this time in churches (Fig. 7).

In the 1960s Lord Mayo developed a lightweight panel of stone glued to a thin aluminium backing. These were principally used for decorative purposes in aircraft and boats.

Today most of the stone extracted from Streamstown and Bananoraun goes to produce tourist souvenirs (Fig. 13), while some is used for high-grade jewellery, furniture and decorative cladding.

**Buildings etc.**

**Ireland**

- 1853–57: Museum Building, Trinity College, Dublin [Deane, Woodward & Deane, architects] – columns, banisters (Fig. 5), external lunets (Wyse Jackson 1993; Parkes et al. 2014). The stone was used for the first time for columns that had a structural function. Prior to 1853 the stone was used for smaller decorative work, chimneypieces and wall panels.
- 1859: National Bank, Foster Place, Dublin [Charles Geoghegan, architect] – two chimneypieces (Fig. 8).
- 1866: St Peter’s Church now Cathedral, Belfast – baptistery.
- 1899: City Hall, Dublin – floor replaced with Connemara Marble and Cork Red limestone and black marble from Sicily.
- 1864–70: St Canice’s Cathedral, Kilkenny [restoration by Thomas Newenham Deane, architect] – pulpit and floor tiles (Fig. 6).
- 1877–81: Memorial Church, Kylemore Abbey, Co. Galway – decorative columns [Samuel Ussher Roberts, architect].
- 1907–22: Used as a decorative feature in various rooms in Tatania’s Palace dolls house, particularly in the oratory which was executed by Thomas Lennon probably to the designs of Sir Nevile Wilkinson (1869–1940). The Palace, built in Dublin over 15 years from 1907, was sold by Wilkinson’s heirs and eventually purchased by Legoland of Denmark. It is now on display at Egeskov Castle, Denmark.
- 1920s: Dail Eireann (Irish Parliament House), Kildare Street, Dublin – reception.
- 1928: General Post Office – main hall columns, pilasters and flooring.
• 1930s: St Michael’s Church, Ballinasloe, Co. Galway – Connemara Marble altar by Albert Power (1881–1945).
• 1937: Ss Peter and Paul’s Church, Athlone [Ralph Byrne, architect] – altar area and 20 columns (Streamstown) (Fig. 7).
• 1950s: Pen Corner, Dame Street, Dublin – external panelling which has blackened and lost its polish (Fig. 12).


UK
• 1850s: Museum of Practical Geology (late the Geological Museum; now part of the Natural History Museum), Exhibition Road, London – wall panels, and large tazza with interwoven serpent handles (Fig. 9) supplied by William Manderson of Killaloe Marble Works, Co. Clare, Ireland (Balinahinch Quarry).
• c. 1850s: Scottish National Gallery – table.
• 1862: Albert Memorial Chapel, Windsor Castle, Windsor – altar.
• 1866: Great St Mary’s Church presbytery – floor. This was seriously decayed within 50 years (Watson 1916).
• 1868: St Pancras Station booking office [William Henry Barlow, architect] – decorative columns (Lissoughter Quarry)
• 1869: Columbia Market, Bethnal Green. This building paid for by Angela Burdett-Coutts as a market-trading place, had 24 shops on the ground floor panelled with Connemara Marble selling poultry, meat and fish. [Henry Darbishire, architect] Demolished 1960s.
• 1873: St Pancras Hotel [George Gilbert Scott, architect] – decorative columns (Lissoughter Quarry)
• 1877: Worcester Cathedral presbytery – steps. These showed signs of serious decay within 40 years (Watson 1916).
• 1886: Truro Cathedral – chancel floor.
• 1892: Peterborough Cathedral – chancel floor.
• 1895: Bristol Cathedral – chancel floor.
• 1895–1903: St Patrick’s Chapel (floor and altar frontal), Lady Chapel, St Joseph’s Chapel (panel in altar frontal), Vaughan Chantry in the Chapel of St Thomas of Canterbury, Westminster Cathedral, London [J.F. Bentley, architect] – examples of stone from Lissoughter, Barnanoraun and Streamtown Quarries (Rogers 2017b).
• Nineteenth century: St John’s Church, Waterbeach, Cambridge – pillars supporting reredos canopies.
• 1901: Lloyd’s Registry, Fenchurch Street, London – General Committee Room and Boardroom.
• 1910: General Post Office, King Edward’s Buildings (now part of Bank of America Merrill Lynch London Headquarters), London [Henry Tanner, architect] – interior walls (Streamtown Quarry).
• 1912: Sidney Sussex College Chapel, Cambridge – floor.
• 1916: Heal’s Building, Tottenham Court Road, London [Smith and Brewer, architects] – floor panels and inlay in external glass skylights (Robinson 1985).
• 1973: Sandown Park racecourse, Surrey – aggregate in fascia panels in stand.
• Undated: St Anselm’s Church, Mayfair, London.
• Undated: Kensington Palace, London.
• Undated: Gloucester Cathedral.

France
• 1899: Sacred Heart Basilica, Paris.

Africa
• 1863: St Mary’s Cathedral, Capetown, South Africa – altar with Connemara Marble pillars and cornice by Michael Kirwan, Bolton Street, Dublin.

USA
• 1851: St Malachy’s Church, 11th Street, Philadelphia, Pennsylvania – shamrock decoration in chancel.
• 1893: Chicago Public Library now the Chicago Cultural Centre, 78 E Washington Street, Chicago, Illinois [Shepley, Rutan and Coolidge, architects] – entrance lobby and staircase (Fig. 10) and in the Delivery Room.

• 1895: ‘Low Memorial Library’, Columbia University, Broadway/West 117 Street, New York [Charles Follen McKimm, architect]. Only two columns were erected; others planned were not produced as too great a diameter had been desired.

• 1906: Capitol Building, Harrisburg, Pennsylvania (Kollar et al. 2017).

• 1907: Cathedral of St Patrick, Harrisburg, Pennsylvania [G. I. Lovatt, Sr, architect].

• 1909: Cathedral of St Patrick, Mission Street, San Francisco, California [rebuilt after 1906 fire] – columns in nave and wall panels.

• 1914: St Patrick’s Church, Mission Street, San Francisco, California [rebuilt after 1906 fire] – columns in nave and wall panels.

• 1920s: Dime Savings Bank, Brooklyn, New York [designed interior].


Other designations

Global Ornamental Stone.

Related dimension stone

Similar to Iona Marble from Scotland (Viner 1992; Rogers 2017a) and Dunlewy Marble, Donegal. It has been likened to green marbles from Southern California (Anon 1907, p. 160).

Conclusions

Ireland has had a long geological history and yields a wide range of different lithologies. Without doubt the best known of these is Connemara Marble, probably due to its distinctive green coloration and beautiful texture. Its colour has helped secure its place in the national psyche of those living in Ireland and among the Irish diaspora. The stone is an ophiocarbonate with a complex mineralogy which crops out in a small geographical area in Co. Galway in the west of Ireland. Promoted as a decorative stone since its first extraction in the 1820s, it has been utilized in many locations, principally in Ireland, the UK and the USA, on account of its beauty. Quarrying continues to the present day and stone is utilized for jewellery, decorative pieces and cladding and architectural installations. These factors merit its designation as a Global Heritage Stone Resource.

Acknowledgements

The authors are grateful to many colleagues who have provided information on Connemara Marble over a period of many years. In particular, we thank Niall Washburn (New York) for information on some of its uses in the USA.

Funding

The authors are grateful to the Irish Research Council for funding their ‘Making Victorian Dublin’ project of which this is an output.

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