The Identification of Heritage Quarries

Minerals Safeguarding DPD Evidence Report

November 2016
Local Plans
Acknowledgement

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Executive summary

Cornwall has an extraordinarily rich heritage of several thousand building and ornamental stone quarries and pits which were worked to supply mainly local needs but also national and international markets. Some of the most iconic structures in Britain, such as Tower Bridge and Trafalgar Square in London owe much of their character to Cornish stone. The local landscape and build environment has been shaped significantly by the use of stone in buildings throughout Cornwall.

Only a few of these old quarries remain in operation for building stone extraction. During the mid to late 20th Century the almost universal use of mass-produced brick and concrete in buildings has tended to detract from the character of the built landscape in Cornwall. There is now a greater awareness about local identity and this has seen a renewed interest in local building materials.

The purpose of this report is to identify, examine and assess potential sources of building and ornamental stones for future architectural and heritage purposes, particularly where stone is likely to be needed to repair or complement important (or vernacular) buildings and structures in Cornwall, or beyond. The report is based upon a desk study supplemented, where appropriate, by field visits.

Assessments of approximately 70 sources of stone have been undertaken using a methodology to indicate their significance. The results are summarised in Table 1 List of Source Quarries Grouped According to Type of Stone and Table 2 Ranked List of Source Quarries.
Part 1: Overview and Geology

Background

Mankind's use of stone has a long history stretching back to the times when Stone Age peoples first utilized stone for their monuments and buildings. Over the course of millennia these, together with the moors and quarries from which the stone was obtained, have integrated into the landscape of Cornwall to create the rich diversity of our present-day landscape. Most of the early workings which were abandoned a century or more ago were relatively small and many have been filled in; subsequent revegetation has merged these early workings back into the landscape often with little indication that a pit or quarry once existed. However, in spite of this, many old quarries still exist, some still in operation, which supplied stone for buildings which are now a valued part of our architectural heritage.

Cornwall enjoys a wide variety of building stones, ranging from strong granites used to build lighthouses in some of the most exposed situations around the British Isles, to durable freestones for use in masonry such as Cataclews, Pentewan and Newham. In the past, stone production was a highly significant part of the Cornish economy: in the late 19th century the industry employed about half the number of men that the metalliferous mining industry did, with stone being exported all over Britain and, in some cases, overseas.

The use of these stones contributes character to our local built environment. Restoration specialists, developers, architects, builders and planners should have regard to the outstanding heritage of building materials: many high quality stones have been shipped all over the world and used in important buildings all over Britain. Iconic structures, such as Tower Bridge and Trafalgar Square in London, owe much of their character to Cornish granite. Equally, many ornamental stones, some so unusual that they can truly be described as unique, such as Luxullianite, Lizard serpentine, Tremore Porphyry and Polyphant Stone have found prominent application in cathedrals, palaces and other high status buildings all over Britain and beyond. Local stone is an important asset which has potential to play a greater role in the local environment and economy.

This study deals with the most important of the thousands of old stone quarries in Cornwall. In many cases the stone used in buildings is of a relatively common type which could have come from any one of a number of sources, so it may be impossible to identify links with any particular quarry. This project has been predominantly a desk study, supplemented with field visits as necessary.

Review of earlier research and publications

There has been no systematic attempt to provide a comprehensive description of the building stones of Cornwall in recent years.

A bibliography of all the works consulted during the preparation of this report is included at the end of this report. These range from Carew's outline of the principal building stones of the County in 1602 to more recent
publications including those by Colin Bristow (2001, 2002 and 2005) and Selwood, Durrance & Bristow, 1998. A particularly rich resource is the series of reports by Cornwall Council archaeologists on the industrial archaeology left behind by the extractive industries in Cornwall, for example on the granite quarries on Kit Hill (Herring and Thomas, 1990) and the slate quarries in the cliffs near Tintagel (Sharpe, 1990).

The memoirs published by the Geological Survey of Great Britain provide mapping of Cornwall in the late 19th century and are helpful in defining the current academic interpretation of the geology.

Buildings are covered systematically in Pevsner’s classic review (1951). Additionally, two books on the churches of Cornwall (Cox, 1912 and Miles Brown, 1973) contain useful information, but the descriptions of the stones used are not always reliable. Equally, the descriptions of the stone used in the particulars for Listed Buildings are useful, but are necessarily more concerned with the architecture than the full range of the stone used and it’s sourcing.

**Conservation and abandoned pits and quarries**
Abandoned pits and quarries are often associated with greater biodiversity and more unusual habitats than the farmland or moorland which formerly existed before the quarry was opened and often accrue conservation value.

Quarries can also provide valuable geological information about the underlying rock types particularly through rock exposures which can be extremely valuable. Many geological Sites of Special Scientific Interest in Cornwall are therefore in abandoned pits and quarries. In the context of this report, they can also provide a stone resource for restoration of significant buildings and “new build” within a sensitive built environment where local stone has been extensively used.

There are many threats to small abandoned pits and quarries: they are convenient receptacles to dispose of unwanted material, whether it be building waste, garbage or just stones from an old hedge which has been removed e.g. the elvan quarries between Penrice House and Castle Gotha, near St Austell (SX 027/498), which were open 100 years ago, but are now completely invisible (the stone to build Georgian Penrice House (Figure 1 Georgian Penrice House, near St Austell, built from an elvan similar to (but not the same as) Pentewan Stone) may well have come from these quarries). Also natural processes cause infill of material washed in from the surrounding area and the revegetation of quarry faces and floors, obscuring previous exposures of stone. The stone may have come from quarries (now filled in) about 0.5 km east of the house.

**Figure 1** Georgian Penrice House, near St Austell, built from an elvan similar to (but not the same as) Pentewan Stone
The Cornwall Geoconservation Group identifies regionally important sites: many small abandoned pits and quarries are classed as County Geology Sites. In planning decisions these are material considerations. In some instances there may be a case for clearing vegetation, soil and rubbish from the faces of a quarry so the geological features can be properly seen; Polpuff pegmatite quarry, near Trezaise, Roche (SW 9965/86) was cleared and is now a geological nature reserve leased by Cornwall Wildlife Trust from Goonvean the china clay company. Planned partial backfilling of a quarry need not be incompatible with maintaining its geological interest. In a few cases there may be conflict between the interests of biological and geological conservation, but generally the two can happily live alongside one another, as at the example quoted at Trezaise above.

Another conservation aspect relates to the Cornish built environment. The First Edition (ca. 1880) of the 1:2500 series of Ordnance Survey maps indicates many more small quarries than now exist: many villages had a quarry for building stone and/or a borrow pit to extract material to mend the roads. Local building stone contributed significantly to local character. Some quarries provided building and ornamental stones for wider markets. With the almost universal use of concrete and brick building materials over the last fifty years, most of the quarries which supplied Cornish stone for Cornish buildings have gone out of use, with some notable exceptions such as Delabole slate and De Lank granite.

This study provides background evidence which will inform planning policy including policy to safeguard sources of important stone supplies for maintenance of listed buildings and for projects reflecting the local tradition of building. This will assist conservation of the built environment and will complement any requirements to use Cornish materials. Use of locally sourced building materials will also help to support the Cornish economy.
Methodology

This study is largely a desk study supplemented by limited field visits where possible. A list of important buildings was produced and information on sources of building and ornamental stones derived from the available data. This is not intended to be an exhaustive list of the building stones of Cornwall.

Each stone was researched and the literature reviewed for information about its occurrence and use.

Information was collated under the following headings to provide a consistent analysis of sites:

- Quarry name/stone type (with date visited if appropriate)
- Location (including grid reference)
- Site description
- Operational and planning status and history
- Geology and mineralogy
- Architectural characteristics
- Significant buildings and structures using stone
- Environmental considerations
- Heritage Value Indicator
- References

Heritage Value Indicator guidelines

The values will reflect the potential significance of each source of stone in terms of the ‘need’ for that stone to be used for:

- restoration or,
- special projects requiring the use of appropriate local stone in order to maintain the character of the built environment or, in some cases,
- ‘heritage value’ of the quarrying operation.

The following scoring guidance, whilst not wholly objective, provides consistency to the analysis:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
</table>
| 10    | Unique stone, used in many prominent buildings locally and nationally  
Excellent appearance and durability.  
Useful resources available.  
Active quarry able to supply a full range of dimension stone products.  
Cutting, shaping & polishing facilities available. |
| 9     | Valuable stone used in many prominent buildings  
Excellent appearance and durability.  
Useful resource probably available from an operational quarry. |

1 Heritage Value Indicators were derived from the completed assessments of each stone/quarry. Although the indicators are subjective assessments of a combination different factors including:

- The use of the stone in significant buildings
- The realistic possibility of extracting stone in the future
- The architectural characteristics of the stone
- The uniqueness of the stone
- The ‘heritage value’ of the quarry itself
- Environmental aspects
In some special cases, accessing the stone may involve re-opening a disused quarry. Re-opening should be a practical proposition.

7-8 Valuable stone used in a number of buildings of some architectural merit (i.e. listed) Quarry either operational or easy to re-open. May be some useful resources.

5 Useful stone, probably no operating quarry. Re-opening an old quarry not out of the question. Some local buildings use the stone. May be some useful resources, but further investigation needed.

3 Stone used for purely local (not listed) buildings. Stone has no special quality or character. Small quarry, probably overgrown and long disused. Few of these will be covered by the present survey.

1 Poor quality stone, not unique Re-opening difficult or impossible. None of these will be covered by this survey.

**Study Findings**

The results of the survey are given in the following Table 1 List of Source Quarries Grouped According to Type of Stone and Table 2 Ranked List of Source Quarries (bold indicates that the site is currently working).

**Table 1 List of Source Quarries Grouped According to Type of Stone**

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Elvans and Volcanic Flows</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Pentewan Stone (felsitic elvan) quarry</td>
<td>9/10</td>
</tr>
<tr>
<td>2.</td>
<td>Newham Stone (felsitic elvan) quarry, nr. Truro</td>
<td>9/10</td>
</tr>
<tr>
<td>3.</td>
<td>Tremore Porphyry (felsitic elvan) quarry, nr. Lanivet</td>
<td>9/10</td>
</tr>
<tr>
<td>4.</td>
<td>Treveddoe (felsitic elvan), nr. Warleggan</td>
<td>6/10</td>
</tr>
<tr>
<td>5.</td>
<td>Polgoth, Trelowth and Hewas Water felsitic elvan quarries</td>
<td>4/10</td>
</tr>
<tr>
<td>6.</td>
<td>Penrice Woods felsitic elvan quarry</td>
<td>6/10</td>
</tr>
<tr>
<td>7.</td>
<td>Castle Gotha cross-roads felsitic elvan quarries</td>
<td>3/10</td>
</tr>
<tr>
<td>8.</td>
<td>West of St Kew elvan quarry</td>
<td>7/10</td>
</tr>
<tr>
<td>9.</td>
<td>Watergate rhyolite quarry, Kingsand</td>
<td>8/10</td>
</tr>
<tr>
<td></td>
<td><strong>Granites</strong></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>De Lank/Hantergantick granite quarries</td>
<td>10/10</td>
</tr>
<tr>
<td>11.</td>
<td>Kessel Downs, Chywoon, Trenoweth, Trannack quarries, Mabe²</td>
<td>7/10</td>
</tr>
<tr>
<td>12.</td>
<td>Tregarden granite quarry, Luxulyan (inc. Luxullianite)</td>
<td>10/10</td>
</tr>
<tr>
<td>12a</td>
<td>Carbean and Colcerrow granite quarries, Luxulyan valley</td>
<td>8/10</td>
</tr>
<tr>
<td>13.</td>
<td>Carn Grey granite quarries, nr. Trethurgy</td>
<td>8/10</td>
</tr>
<tr>
<td>14.</td>
<td>St Stephen’s Stone granite quarries, Nanpean</td>
<td>8/10</td>
</tr>
</tbody>
</table>

² Some of these quarries may need to be upgraded to 8/10, when we have clarified which are capable of quarrying and producing cut dimension stone
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Kit Hill granite quarries</td>
<td>8/10</td>
</tr>
<tr>
<td>15a.</td>
<td>Hingston Down granite quarry, nr. Gunnislake</td>
<td>7/10</td>
</tr>
<tr>
<td>16.</td>
<td>Cheesewring granite quarry, Bodmin Moor</td>
<td>8/10</td>
</tr>
<tr>
<td>16a.</td>
<td>Gold Diggings granite quarry, Bodmin Moor</td>
<td>7/10</td>
</tr>
<tr>
<td>16b.</td>
<td>Kilmar and Bearah Tor granite quarries</td>
<td>8/10</td>
</tr>
<tr>
<td>17.</td>
<td>Lamorna granite quarries nr. Mousehole</td>
<td>7/10</td>
</tr>
<tr>
<td>17a.</td>
<td>Sheffield and Castallack granite quarries, nr. Newlyn</td>
<td>6/10</td>
</tr>
<tr>
<td>17b.</td>
<td>Castle-an-Dinas granite quarry, Land’s End</td>
<td>7/10</td>
</tr>
<tr>
<td>17c.</td>
<td>Tregonning Hill granite quarries</td>
<td>8/10</td>
</tr>
<tr>
<td></td>
<td><strong>Greenstones</strong></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Cataclews greenstone (dolerite) quarry, nr. Harlyn Bay</td>
<td>9/10</td>
</tr>
<tr>
<td>19.</td>
<td>Polyphant Stone (talc-carbonate rock), west of Launceston</td>
<td>9/10</td>
</tr>
<tr>
<td>19a.</td>
<td>Duporth Stone (talc-carbonate rock), nr. St Austell</td>
<td>7/10</td>
</tr>
<tr>
<td>20.</td>
<td>Tregongeeves greenstone (dolerite) quarry, nr. St Austell</td>
<td>6/10</td>
</tr>
<tr>
<td>20a.</td>
<td>Molingey greenstone (dolerite) quarry, nr. St Austell</td>
<td>3/10</td>
</tr>
<tr>
<td>20b.</td>
<td>Lean greenstone (basalt) quarry, nr. Liskeard</td>
<td>7/10</td>
</tr>
<tr>
<td>20c.</td>
<td>Tubb’s Mill basalt quarry, nr. Caerhays</td>
<td>3/10</td>
</tr>
<tr>
<td>21.</td>
<td>Tintagel greenstone</td>
<td>6/10</td>
</tr>
<tr>
<td>22.</td>
<td>Greystone greenstone (dolerite) quarry, nr. Launceston</td>
<td>7/10</td>
</tr>
<tr>
<td>22a.</td>
<td>Blackhill greenstone (dolerite) quarry, nr. Launceston</td>
<td>7/10</td>
</tr>
<tr>
<td>23.</td>
<td>Porthoustock and Dean gabbro/dolerite quarries, The Lizard</td>
<td>7/10</td>
</tr>
<tr>
<td>24.</td>
<td>Serpentine workings, The Lizard</td>
<td>9/10</td>
</tr>
<tr>
<td>24a.</td>
<td>Serpentine/peridotite quarries, the Lizard</td>
<td>7/10</td>
</tr>
<tr>
<td>25.</td>
<td>Countybridge/Trevassack tremolite serpentine quarries, The Lizard</td>
<td>5/10</td>
</tr>
<tr>
<td></td>
<td><strong>Sandstones</strong></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Pigsdon sandstone quarry, North Cornwall</td>
<td>8/10</td>
</tr>
<tr>
<td>26a.</td>
<td>Cansford and Herdbury sandstone quarries, North Cornwall</td>
<td>7/10</td>
</tr>
<tr>
<td>27.</td>
<td>Tredinnick sandstone quarry, Grampound</td>
<td>7/10</td>
</tr>
<tr>
<td>27a.</td>
<td>Portscatho Formation sandstones</td>
<td>7/10</td>
</tr>
<tr>
<td>27b.</td>
<td>Staddon Grit Formation sandstones, east Cornwall</td>
<td>5/10</td>
</tr>
<tr>
<td>28.</td>
<td>Sandrock</td>
<td>7/10</td>
</tr>
<tr>
<td></td>
<td><strong>Slates</strong></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Delabole slate quarry, North Cornwall</td>
<td>10/10</td>
</tr>
<tr>
<td>30.</td>
<td>Trevillet slate quarry, nr. Tintagel</td>
<td>7/10</td>
</tr>
<tr>
<td>30a.</td>
<td>Prince of Wales slate quarry, nr. Tintagel</td>
<td>5/10</td>
</tr>
</tbody>
</table>

3 No specific source identified
4 This entry covers the use of serpentine for manufacturing ornaments, etc.
5 This entry covers the use as building stone
6 No specific source identified
7 No specific source identified
8 No specific source identified

The Identification of Heritage Quarries Minerals Safeguarding DPD Evidence Report
November 2016.
### Table 2 Ranked List of Source Quarries

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10/10</strong></td>
<td>De Lank/Hantergantick granite quarries, St Breward</td>
</tr>
<tr>
<td></td>
<td>Tregarden granite quarry, Luxulyan (includes luxullianite)</td>
</tr>
<tr>
<td></td>
<td>Delabole slate quarry, North Cornwall</td>
</tr>
<tr>
<td><strong>9/10</strong></td>
<td>Pentewan Stone (felsitic elvan) quarry</td>
</tr>
<tr>
<td></td>
<td>Newham Stone (felsitic elvan) quarry, nr. Truro</td>
</tr>
<tr>
<td></td>
<td>Tremore Porphyry (felsitic elvan) quarry, nr. Lanivet</td>
</tr>
<tr>
<td></td>
<td>Cataclews greenstone (dolerite) quarry, near Harlyn Bay</td>
</tr>
<tr>
<td></td>
<td>Polyphant Stone (talc-carbonate rock) quarry, west of Launceston</td>
</tr>
<tr>
<td></td>
<td>Serpentine workings, the Lizard</td>
</tr>
</tbody>
</table>

Alternatively, the sources of stone can be listed in groups according to their marks:

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Lank/Hantergantick granite quarries, St Breward</td>
</tr>
<tr>
<td>Tregarden granite quarry, Luxulyan (includes luxullianite)</td>
</tr>
<tr>
<td>Delabole slate quarry, North Cornwall</td>
</tr>
</tbody>
</table>

More research is needed to clarify what these quarries can offer, this may result in some upgrading.
<table>
<thead>
<tr>
<th>Quarry Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbean and Colcerrow granite quarries</td>
<td>Luxulyan valley</td>
</tr>
<tr>
<td>Watergate rhyolite quarry</td>
<td>Kingsand</td>
</tr>
<tr>
<td>Carn Grey granite quarries</td>
<td>nr. Trethurgy</td>
</tr>
<tr>
<td>St Stephen’s Stone granite quarries</td>
<td>Nanpean</td>
</tr>
<tr>
<td>Kit Hill granite quarries</td>
<td></td>
</tr>
<tr>
<td>Cheesewring granite quarries</td>
<td>Bodmin Moor</td>
</tr>
<tr>
<td>Kilmar and Bearah Tor granite quarries</td>
<td></td>
</tr>
<tr>
<td>Tregonning Hill granite quarries</td>
<td></td>
</tr>
<tr>
<td>Pigsdon sandstone quarry</td>
<td>North Cornwall</td>
</tr>
<tr>
<td>Callywith slate quarry</td>
<td>Bodmin</td>
</tr>
<tr>
<td>Carnglaze slate caverns</td>
<td>St Neot</td>
</tr>
<tr>
<td>Boscastle slate quarries</td>
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<tr>
<td>Moorstone 16</td>
<td></td>
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<tr>
<td>Minestone 17</td>
<td></td>
</tr>
<tr>
<td>7/10</td>
<td></td>
</tr>
<tr>
<td>Pilsamoor chert quarry</td>
<td>Egloskerry</td>
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<tr>
<td>West of St Kew felsitic elvan quarry</td>
<td></td>
</tr>
<tr>
<td>Hingston Down granite quarry</td>
<td>nr Gunnislake</td>
</tr>
<tr>
<td>Gold Diggings granite quarry</td>
<td>Bodmin Moor</td>
</tr>
<tr>
<td>Kessel Downs, Chywoon, Trenoweth and Trannack granite quarries, Mabe 18</td>
<td></td>
</tr>
<tr>
<td>Lamorna granite quarries</td>
<td>nr Mousehole</td>
</tr>
<tr>
<td>Castle-an-Dinas granite quarry</td>
<td>Land’s End</td>
</tr>
<tr>
<td>Duporth Stone (talc-carbonate rock), nr St Austell</td>
<td></td>
</tr>
<tr>
<td>Lean greenstone (basalt) quarry, near Liskeard</td>
<td></td>
</tr>
<tr>
<td>Greystone greenstone (dolerite) quarry, nr Launceston</td>
<td></td>
</tr>
<tr>
<td>Blackhill greenstone (dolerite) quarry, nr Launceston</td>
<td></td>
</tr>
<tr>
<td>Porthoustock and Dean quarries, The Lizard</td>
<td></td>
</tr>
<tr>
<td>Serpentine/Peridotite quarries, The Lizard 19</td>
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</tr>
<tr>
<td>Cansford and Herdbury sandstone quarries, North Cornwall</td>
<td></td>
</tr>
<tr>
<td>Tredinnick sandstone quarry, Grampound</td>
<td></td>
</tr>
<tr>
<td>Portscatho Formation sandstones 20</td>
<td></td>
</tr>
<tr>
<td>Sandrock 21</td>
<td></td>
</tr>
<tr>
<td>Trevillet slate quarry, nr Tintagel</td>
<td></td>
</tr>
<tr>
<td>Tintagel cliff slate quarries</td>
<td></td>
</tr>
<tr>
<td>Tredinnick slate quarry, St Issey</td>
<td></td>
</tr>
<tr>
<td>Westwood slate quarry, Doublebois</td>
<td></td>
</tr>
<tr>
<td>Lantoom slate quarry, Dobwalls</td>
<td></td>
</tr>
<tr>
<td>6/10</td>
<td></td>
</tr>
<tr>
<td>Treveddoo felsitic elvan quarry, Warleggan</td>
<td></td>
</tr>
<tr>
<td>Penrice Woods felsitic elvan quarry, nr St Austell</td>
<td></td>
</tr>
<tr>
<td>Sheffield and Castallack granite quarries, nr Newlyn</td>
<td></td>
</tr>
<tr>
<td>Tintagel greenstone 22</td>
<td></td>
</tr>
</tbody>
</table>

16 No specific source identified
17 No specific source identified
18 Some of these quarries may need to be upgraded to 8/10, when we have clarified which are capable of quarrying and producing cut dimension stone.
19 This entry covers the use as building stone
20 No specific source identified
21 No specific source identified
22 No specific source identified
The Identification of Heritage Quarries
Minerals Safeguarding DPD Evidence
Report 19
November 2016.

<table>
<thead>
<tr>
<th>Quarry Details</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tregongeeves greenstone (dolerite) quarry</td>
<td>nr St Austell</td>
</tr>
<tr>
<td>Trecarne, Tynes, Trebarwith and Merrifield slate quarries</td>
<td>nr Tintagel</td>
</tr>
<tr>
<td>Cannalidgey slate quarry</td>
<td>nr Wadebridge</td>
</tr>
<tr>
<td>Kestle slate/dolerite quarry</td>
<td>nr Sladesbridge</td>
</tr>
<tr>
<td>California, Welltown, Grower and Boscastle cliff quarries</td>
<td>nr Boscastle</td>
</tr>
</tbody>
</table>

### 5/10
- Countybridge/Trevassack tremolite serpentine quarries, The Lizard
- Staddon Grit Formation quarries, east Cornwall
- Prince of Wales slate quarry, nr Tintagel
- Holmbush/St Blazey Gate red slate quarry

### 4/10
- Polgooth, Trelowth and Hewas Water felsitic elvan quarries

### 3/10
- Castle Gotha cross roads felsitic elvan quarries
- Tubb’s Mill basalt quarry, nr Caerhays
- Molingey greenstone (dolerite) quarry
- Bangor slate quarry, Launceston
- Barracadoes chert quarry, Launceston
- Calc-flintas quarries, mid-Cornwall

The Geological Background to Cornish Building Materials

Whilst the deep cleft of the Tamar valley forms a clear boundary, both on geographical and cultural grounds, to Cornwall, the same cannot be said of the geology. The entity to which Cornwall belongs is the Cornubian Massif, which includes all of the South-west peninsula area west of a line from Minehead to Torquay.

The Cornubian Massif is a much eroded stump of a mountain range composed of folded and faulted Devonian and Carboniferous rocks, which was thrown up during the Variscan mountain building episode (orogeny), when two gigantic tectonic plates collided. Cornwall lay in the northern part of the collision zone. The Cornubian Massif extends offshore out under the Atlantic, but millions of years of erosion by the sea have reduced this part of the massif to a level below the waves.

The Devonian and Carboniferous rocks were laid down as sediments in a sea which formerly existed between the tectonic plates from about 400 million years ago up to the time of the Variscan orogeny, which took place around 350-290 million years ago. These sediments were largely deposited under the sea, at a time when Cornwall lay close to the Equator. They were laid down mainly as muds and sands, now converted into slates and sandstones by the heat and stresses of the Variscan orogeny. There was also extensive volcanicity, which resulted in lavas such as basalts being extruded onto the sea floor. Sometimes the volcanicity was explosive and beds of agglomerate and volcanic ash settled onto the bottom of the sea. Some of the volcanic magma did not reach the surface and was intruded.

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23 More research is needed to clarify what these quarries can offer, this may result in some upgrading
24 No specific source identified
into the sediments underlying the sea floor, typically forming dolerite intrusions. Basalts, dolerites and related rocks are basic (low silica content) igneous rocks and are known colloquially as ‘greenstones’. Occasionally the greenstone has an even lower silica content and it is then called ‘ultrabasic’. Polyphant Stone is an ultrabasic greenstone which has been converted by later carbon dioxide rich fluids circulating through the rock to a talc-carbonate rock.

The Lizard is also composed mainly of basic and ultrabasic igneous rocks, mostly as intrusions, which originally formed the earth’s crust beneath the waters of a long vanished ocean. High temperature metamorphism and thrust faulting affected parts of the Lizard Complex and somehow this battered mass of oceanic crust has been translated by faulting to lie adjacent to the Devonian sediments of the Gramscatho Basin in southernmost Cornwall. Much of the ultrabasic igneous rock (‘peridotite’) has been converted by later lower temperature circulating water into serpentine.

The Gramscatho basin lay in west Cornwall and contains deep water muddy and sandy sediments of Middle and Late Devonian age. The north side of this basin is formed by a major structural feature, probably a dextral fault, which extends from Perranporth on the north coast to Polrudden Cove, near Pentewan on the south coast. Submarine slump breccias are found on the south side of the Gramscatho Basin and separate the Lizard Complex from the main part of the basin; these breccias continue eastwards along the south side of the Roseland peninsula and include large blocks up to 1 km long of quartzite and limestone.

In very general terms, the early part of the Devonian period in the rest of Cornwall is characterised by a mixture of mud and sand deposition, with occasional impure limestones, whilst the middle and later parts of the period are characterised by mud deposition. Curiously, the extensive Middle Devonian limestones of South Devon do not extend into Cornwall, with the exception of tiny patches of limestone near Mt Edgecumbe and at Marble Cliff, near Trevone and some impure limestones south of Liskeard.

The early part of the succeeding Carboniferous Period saw the earliest phase of the Variscan Orogeny affecting the south of Cornwall, whilst in the north of the County we find deep water sediments, mainly of a muddy nature, with other sediments such as chert and very occasionally limestone. Occurrences of limestone are small and confined mainly to the area between Bodmin Moor and Launceston. There is evidence of extensive basic volcanicity in the early Carboniferous. The later part of the Carboniferous is only found in North Cornwall and the muddy and sandy sediments laid down at this time represent the final infilling of the sedimentary basin between the tectonic plates. As a crude generalisation, Devonian rocks are generally found south of an east-west line through Launceston, and Carboniferous rocks are found to the north of this line.

The Variscan Orogeny represents the collision between two huge tectonic plates, one moving up from the south and the other lying north of our
region. It affected the region as a series of pulses, starting in the south in the early Carboniferous and culminated in the north of Cornwall late in the Carboniferous Period. After the Variscan Orogeny molten granites welled up into the heart of the Variscan Mountain Range between 300 and 270 million years ago (late Carboniferous/early Permian Periods), forming a series of large granite intrusions. Granites are ‘acid’ igneous rocks, as they have a high silica content. There were many different types of granite, a classification by Dangerfield and Hawkes (1981) is probably the most helpful from the point of view of building stones. Most of the granites are biotite granites and all the granite masses have been quarried for building stone at some time. However, it is an interesting fact that most of the successful granite quarries worked for dimension stone were in the coarse grained megacrystic biotite-granite – smaller megacryst variant. More exotic granites containing lithium micas are found in the western part of the St Austell granite and at Tregonning Hill. These are associated with china clay deposits but, where these granites are not kaolinized, they can yield a useful building stone.

A final pulse of igneous activity occurred as the granites were cooling down. Deep cracks opened up in the solidified granite and granite magma from the still-liquid reservoir of molten granite magma at depth were forced through these cracks to form ‘dykes’ of elvan. These dykes were relatively narrow, so the magma cooled rapidly, only allowing small crystals to form. The resulting fine grained elvan is an ideal building material, providing it has not been softened by later alteration, and has been widely exploited all over Cornwall as source of building stone. The most famous elvan used for building is Pentewan Stone, which can be seen at Polrudden Cove, just north of Pentewan.

Heat from the cooling granites and from radioactive minerals contained within the granite caused metals to be sweated out from the granite and the surrounding rocks (‘killas’). Hot solutions containing these metals moved through cracks until they reached cooler locations where the ores of tin, copper and other metals crystallized to form veins. When these veins were exploited for metals, large quantities of waste vein material, granite and killas were generated which formed dumps on the surface which could be exploited as sources of building stone known as ‘minestone’. The hot fluids also extensively rotted the granites, so that later altering fluids could penetrate into the granite and convert the feldspars to china clay.

Following the emplacement of the granites in the Permian, the geological periods known as the Triassic, Jurassic and Cretaceous, known collectively as the Mesozoic, began when Dinosaurs ruled the land. For much of the 180 million year time span of the Mesozoic the Cornubian Massif appears to have been an island, although there are no rocks of this age preserved onshore today in Cornwall. Cornwall had a much warmer climate at this time and deep chemical weathering affected the granite and killas to a considerable depth. Most of this weathered material has been removed by subsequent erosion, but some remnants of the deepest pockets of weathering can still be found. This deep weathering also contributed to the formation of the china clay deposits and may have caused silica to be
deposited near the surface to form irregular patches of quartz known as 'silcrete'. This accumulation of surface quartz has been exploited as a building material.

Although the outcrops of the younger Tertiary rocks in Cornwall are quite small, they contain a wide range of ages and give us a useful picture of palaeogeographic and palaeoclimatological conditions. During the Tertiary the present shape of Cornwall’s scenery began to be formed, partly as a result of further deep weathering of the rocks under a sub-tropical climate, and partly as a result of fault movements. The flat-topped Cornish killas plateau seen throughout the County is a product of the long periods of weathering in the Mesozoic and Tertiary. In many building stone quarries the quality of the stone and the amount of jointing significantly improves with depth, the ancient weathering is probably partly responsible for this.

After some very warm and wet conditions at the beginning of the Tertiary, the world’s climate cooled and, at the end of the Tertiary, about 2 million years ago, further cooling took place and the period of the ice ages began. Cornwall was not glaciated but the climate during the coldest periods was comparable to Northern Canada or Siberia today. At the same time, the world’s sea levels fell by up to 120m due to significant quantities of water being locked up in ice sheets on land. Consequently, valleys were cut into the Cornish killas plateau by the torrential mud-laden floods in the spring thaws and, near the coast, were cut well below present sea level.

At times the climate was very dry and dust from the floor of the now-dry areas of what is now the Irish and Celtic seas was blown over Cornwall and deposited as a layer of loess. Much of the best material used for making cob walls has a loessic derivation. The loess, soil and weathered material froze to form a layer of permafrost which became filled with ice to such an extent that it moved like a muddy glacier downslope, causing all the material to become a mass of soft material with large stones in it, which we now call ‘head’. Particularly in the granite areas, these large stones became the ‘moorstones’ which were used as building stone by medieval masons.

As the climate ameliorated after each glaciation, sea level rose and the over deepened valleys were filled with sediments. The first sediment to be deposited at the base of each infill sequence was usually a poorly sorted clayey gravel. In those areas where the catchment area was underlain by rocks containing tin-bearing mineral veins, this resulted in the clayey gravel containing significant quantities of the hard and resistant tin-bearing mineral cassiterite. This was exploited by tin streamers from the Bronze Age onwards and some 40% of all tin produced from Cornwall came from this source. Most of the valleys draining mineralized ground in Cornwall have been turned over at some stage by tin streamers, although in the majority of cases there is little surface evidence to show that this has taken place. The tin bearing gravels contained many large stones, which were cast aside by the tin streamers and often later used for building.

In the short temperate interludes between the glaciations, the sea level rose and flooded the over deepened valleys to produce the estuaries.
reaching into the hinterland of Cornwall, which are such a characteristic feature of present-day scenery. At times during the interglacial sea level was higher than present, which resulted in the formation of raised beaches, some of which are largely composed of sands containing a great deal of broken up shelly debris. These shells were relatively pure calcium carbonate which, in some cases, have been dissolved away near the surface by naturally acid rain and then redeposited lower in the sand accumulation. This results in the sand becoming naturally cemented in places to form ‘sandrock’, which was exploited on a small scale for building. These calcareous sands have also been extensively exploited as a source of lime-rich material for treating the generally acid soils of Cornwall.

The geological history of Cornwall is explained in “Cornwall’s Geology and Scenery” Bristow, C, M (2004).

**Types of Extractive Activity**
Early methods of obtaining supplies of building stone often just meant going out with a horse and cart and collecting stone from the moors (‘moorstone’) or from local tin streaming operations or mines (‘minestone’). Later extractive activity for building materials typically involved the creation of a ‘quarry’ (for hard rocks) or a ‘pit’ (for soft or unconsolidated materials); together with dumps of unwanted material composed of overburden and waste material from the pit or quarry. In addition, there may be buildings associated with the extractive activity which are of interest to the industrial archaeologist. Occasionally, the extractive activity involved underground mining. Most of the larger quarries were carried down below the water table and therefore became partially flooded after working has ceased.

It is also important to differentiate two principal types of quarry:

(1) Aggregate quarries are those which were operated mainly to supply crushed stone for road making material and aggregate for concrete etc.

(2) Building stone quarries which were operated mainly to supply stone, including dimension stone and freestone in the form of large lumps of stone.

In many cases quarries supplied both types of stone and even today still do so, although some quarries are limited by their planning conditions to particular types of extraction.

**Figure 2** The south porch of St Mary Magdalen Church, Launceston, built entirely of granite in 1511
It is rare to find such elaborate carving in a difficult medium like granite, Pevsner (1951) provides details of this tour de force of the granite mason’s art. It is probably that in the 16th Century the granite would have been obtained as ‘moorstone’ from Bodmin Moor or Kit Hill and would not have come from a quarry.

A useful reference which provides a detailed account of current quarrying practice for building stone is the book published by the Geological Society (Smith, 1999, Chapter 5, pp 143-203), although there is little said about building stone in Cornwall, apart from an account of current practice at De Lank quarry on Bodmin Moor. Chapter 9 dealing with the use of stone in different types of masonry is also most helpful, as also Chapter 10 which deals with repair and restoration. These topics will not be dealt with in this report as it would be duplicating the excellent account in this book. The older account of British building stones by Howe (1910, re-published by Donhead 2001) also makes interesting reading.

**Building Stones that Have Been Worked in Cornwall**

In simple terms the extractive activity for building materials in Cornwall can be divided into:

- **Granitic rocks** - including elvans, of ‘acid’ composition
- **Greenstones** - mostly ‘basic’ or ‘ultrabasic’ igneous rocks, both extrusive (lavas and ashes) and intrusive (bodies formed below surface)
- **Slates**
- **Sandstones** - including sandrock
- **Other stones**

It is important to emphasise the importance of ‘moorstone’ and ‘minestone’. As Stanier (1999) makes clear in Chapter 4 of his book on South west...
Granite, granite quarrying did not start before the early 19th century, so that before then all granite for building would have been obtained from moorstone. Limited quarrying for elvans such as Pentewan and special stones such as Cataclews and Polyphant started earlier, as well as for slates such as Delabole. However, all medieval buildings built of granite would have obtained their stone from moorstone sources. Much the same may apply to certain other stones, such as the peridotite/serpentine used in the medieval churches in the Lizard. Mine waste from metalliferous mining provided another widely used building material, which we can call ‘minestone’. This arose not only from underground metalliferous mining, but also from tin streaming operations and openworks on the surface. Minestone was particularly important for low status buildings, but may have been used as rubble fill in more significant buildings.

**Granitic rocks**  
Stone has been extensively used for building in Cornwall since Neolithic times, and the most durable material has been granite. Many of the standing stones and hut circles in Cornwall are made of granite, so the use of granite may well have a history stretching back four thousand years or more. Throughout most of history, working involved retrieving large blocks of loose granite ('moorstone') lying on the surface and then shaping them for use; only in the last two hundred years have quarries been opened to provide stone. Granite quarries have been opened in all the main granite plutons in Cornwall, a useful review of the granite quarrying industry in South-west England is Stanier (1999).

Large boulders of most of the granite types from the St Austell pluton will be found in the Boulder Park at Wheal Martyn Museum.

Two types of granite quarry can be recognised. The quarries which were opened for building stone are usually deep and steep sided, as granite quality tended to improve downwards. They are usually accompanied by tips composed of large flawed blocks of granite. Such tips provide an unusual ecological environment, with gaps between the blocks providing a refuge for small animals. On the other hand, quarries for aggregate are usually more extensive and are often benched. Their tips are composed of overburden, weak granite and unsaleable granite fines, and there may be a small slimes pond as well. Both tips and slimes ponds from aggregate quarries will readily and naturally revegetate.

The granite quarries are reviewed as follows, starting in the east of Cornwall and working westwards.

The easternmost small granite mass in Cornwall, at Hingston Down, has been quarried and one large quarry presently produces granite aggregate for concrete and road construction (SX 410/717). A quarry on the north side of the Kit Hill granite mass (SX 374/716) exploited granite mainly for dimension stone and there is extensive evidence for moorstone working as well.
Figure 3 The granite war memorial in the centre of Launceston, erected in 1921

There are memorials like this one shown in Figure 3 in nearly every town and village in Cornwall which may need restoration with the appropriate stone at some date in the future.

Excellent quality granite, for use as a dimension stone (stone which can be cut into blocks to be used in ashlar masonry or cut to form facing slabs), is still worked in De Lank quarry (SX 101/755) and the nearby Hantergantick quarry (SX 103/757), on the west side of the Bodmin Moor granite. This coarse-grained biotite granite (an iron bearing mica) was used in many famous lighthouses (e.g. Eddystone, Bishop Rock and Beachy Head) and bridges (e.g. Tower and Blackfriars Bridges in London). There are a number of other abandoned quarries in the St Breward area. A large quarry below the Cheesewring (SX 258/723), on the southeast side of Bodmin Moor, also yielded high quality granite which was taken for shipment at Looe via the Caradon railway. Some of the fingertips of reject granite blocks have recently been removed.

In the eastern part of the St Austell granite, high quality coarse grained biotite granite with large megacrysts (large crystal) of orthoclase feldspar, renowned for its strength, was formerly quarried from the Luxulyan area (Tregarden (Luxulyan)[SX 053/590], Carbean [SX 065/579], Colcerrow [SX 063/577] and Orchard [SX 060/568] quarries). Many famous buildings (e.g. the British Museum) and engineering structures (e.g. the old London Bridge and Plymouth Breakwater) were constructed from it. The exterior of Porphyry Hall and the tower at Place, Fowey are of Luxulyan granite. A striking variant of the Luxulyan granite is 'luxullianite', which is made up of black tourmaline and pink orthoclase feldspar. The Duke of Wellington’s
sarcophagus in St Paul’s Cathedral, London is made of luxullianite and this stone is also superbly displayed in polished slabs at Porphyry Hall, Place, Fowey. Luxullianite occurs in Luxuylan (Tregarden) quarry, but the best occurrence is now under water in the flooded quarry. Nearer St Austell, the Carn Grey quarries (SX 034/551 and 035/552) yielded a granite intermediate in character between the Luxulyan type and the more unusual lithium mica types of the western part of the granite. Much of the Carn Grey stone was used in older constructions in the St Austell area. Now abandoned, the main Carn Grey quarry has been made into an amenity area by Restormel Borough Council.

China Stone-type granites come from the western part of the St Austell granite and are low in iron and high in lithium and fluorine containing minerals, hence they are pale coloured. Because of their fine grain, attractive pale colour and slightly softer, more easily worked nature, they are attractive as building stones and are known to architectural historians as ‘St Stephen’s stone’. This has been extensively used in building, notably as the interior stone for Truro Cathedral, which came from Cathedral Quarry, Nanpean (SW 950/560). Also the granite used in St Paul’s church at Charlestown came from a quarry (SX 012/569) in a small boss of china stone-type granite at Stenalees, recognisable by containing occasional turquoise blebs and veins. Small quantities of china stone are still produced from Great Wheal Prosper (Rostowrrack) quarry near Nanpean (SW 954/564) for use in the ceramic industry, walling stone can also be provided from this quarry. There are a number of other derelict granite quarries in the Nanpean-St Stephen area, which have been used as a source of building stone, notably Burthy quarry (SW 917/555), now buried beneath china clay waste.

Granite has also been extensively quarried in the south-eastern part of the Carnmenellis granite, where proximity to loading wharves in the Fal Estuary led to a substantial industry in the nineteenth century and in 1880 there were 129 quarries operating (Stanier, 1999). Although Leveridge et al (1990) reported four quarries still producing some dimension stone; nearly all the currently active quarries (2006) are now only producing crushed aggregate and walling stone. However, limited facilities for dimension stone production do still exist, but the quantity produced is very small. Carnsew Quarry, near Mabe (SW 759/346), provided the stone for the exterior of Truro Cathedral (for a description of the building and ornamental stones used in the Cathedral see Cartwright, 1997). A considerable area of land within the area of the Carnmenellis granite has been affected by granite quarrying, a rough estimate suggests this could be as much as 1.5 km², most of which is currently derelict, with deep, partly water filled quarries and tips composed of large reject blocks of granite. A good example is the quarries and tips at Higher Trolvis (SW 744/345). Quarries in the Carn Marth mass provided stone for the Camborne-Redruth area.

Some granite has been obtained from the Tregonning-Godolphin granite, which includes some high lithian mica granites similar to those in the St Austell granite. Many medieval Churches in west Cornwall are reputed to have used this stone (Worth, 1875).
A derelict quarry at Lamorna Cove (SW 452/243), on the southern side of the Land’s End granite, formerly produced dimension stone from a coarse grained biotite granite, which was used locally and exported from a small harbour in the cove. There are two other quarries between Lamorna and Penzance which also produced dimension stone. There is also a large aggregate quarry at Castle an Dinas (SW 488/347), which currently produces small quantities of building stone. There are many other small quarries in the Land’s End granite, now abandoned; which were used locally for building and walling stone.

**Elvans**

The felsitic elvans of Cornwall (different from ‘blue’ elvans, which are included under ‘greenstones’) are one of Cornwall's finest building materials. They are usually in the form of igneous dykes, typically 2-10m wide, and have the same chemical composition as the granites but, because they cooled more rapidly, are of much finer grain and are often greisened. Greisening is a process which can affect both granites and elvans; it is caused by hydrothermal fluids altering the feldspar to a fine grained mixture of quartz and mica.

The most famous elvan is near Pentewan, where it forms a dyke in the cliffs northeast of Pentewan at Polrudden Cove. This is one of Cornwall's few freestones (a stone which can be carved freely into intricate shapes) and has been worked from medieval times. St Austell parish church and Place, Fowey used this stone. It is a lovely golden yellow colour and stands up to weathering surprisingly well, partly because it is not slowly dissolved away by the rainwater, unlike limestone. Prolonged exposure to the weather, as can be seen at the base of St Austell church tower, leads to the surface layer of the stone developing a fine honeycomb texture, due to the greisened feldspars being washed away by the rain. Mottershead (2000) carried out XRD examinations of Pentewan Stone used in old buildings, and showed that they were extensively greisened. Flett (in Ussher et al, 1909) also commented on the extensive greisening of elvans. The alteration of the feldspar to more resistant quartz and mica may explain the stone’s durability.

There are quarries in the cliffs at Polrudden Cove (SX 027/476) and some larger overgrown quarries inland, north of Pentewan village (SX 022/478). Many buildings which appear to have been built with ‘Pentewan stone’ are of similar stone from small quarries near Sticker (SW 985/505 and 971/506) and Penrice (SX 023/505), hence, if one is not absolutely sure about the source, it is better to refer to the stone as ‘Pentewan-type’. Because a high proportion of the stone removed from the quarry could be used in building, the quarries often appear to be small in relation to the buildings erected from their products.

**Figure 4 Antony House near Torpoint, built in 1721**
According to Pevsner (1951) this is the best example of its date in Cornwall. The house is built of Pentewan Stone (an elvan), which is now beginning to show some signs of deterioration. Stone salvaged from Duporth House, near St Austell has been brought to a stockpile near Anthony House for future restoration work.

Another important elvan was formerly quarried at Newham (SW 829/437) and was extensively used for many of the older properties in Truro. The appearance of Lemon Street, as described by Pevsner (1951) "Lemon Street is one of the most completely Georgian streets preserved anywhere, all two-storeyed, stone-fronted houses of uniform character", owes much to the use of Newham stone. Newham stone frequently contains small veins and often has a foliation; this suggests it belongs to an earlier phase of elvan intrusion, which was subjected to the closing stages of the Variscan orogeny. It can, at times, resemble the more massive silty sandstones from the local Devonian succession, in spite of having a completely different mode of origin. It does not stand up to weathering quite as well as Pentewan stone. This can be seen in the early 16th century St Mary’s church, now incorporated into Truro Cathedral, which is a wonderful hotchpotch of Newham Stone, Pentewan Stone and Bath Stone. Nineteenth century accounts (Thomas, 1889) record that an additional elvan-type stone used in St Mary’s is ‘Wild Duck’, but the source of that stone is unknown.

Another elvan, often referred to as ‘porphyry’, with prominent phenocrysts of white orthoclase feldspar and quartz set in a red fine grained matrix with spherulitic growths of black tourmaline was extensively quarried at Tremore, near Withiel (SX 010/649). This stone was quarried by Joseph Treffry in the 1830s to provide stone for the polished slabs used to line Porphyry Hall in Place, Fowey. On a visit in 1846 Queen Victoria and Prince Albert so admired the stone that Joseph Treffry presented them with a slab, which can now be seen forming sills in ornamental alcoves in the main passageway of Osborne House on the Isle of Wight. There is a large polished slab forming a table top at the rear of Lanlivery Church and a star
in the floor of King Arthur’s Hall, Tintagel. Tiles made of Tremore elvan have been incorporated into the floor of the Baptistry in St Austell Parish Church. The front of West Hill Baptist church in St Austell and part of the facing of a bank at the west end of Boscawen St. are also made of unpolished Tremore elvan.

Felsitic elvan dykes have been worked in many different parts of the county; wherever a suitable one occurs, one frequently finds that it has been quarried along its length, producing a feature like a railway cutting. An elvan which runs from Davidstow Woods to Rock on the Camel estuary was extensively quarried along its length (e.g. near St Kew, SX 014/768), and used for the railway bridges between Camelford and Wadebridge as well as for many chapels, halls and other buildings (Reid et al, 1910), who mention that this stone was sufficiently soft to be cut with an axe. Elvans at Temple (SX 140/734) and near De Lank quarry (SX 100/754 and 101/751) have also been worked but, in these cases, seem to have been crushed and used predominantly as aggregate for roads and concrete.

There are a very large number of elvans which have been worked at some time for building stone. Many are in Cornwall west of Truro and many may well have been used in prominent buildings.

A number of minor elvan occurrences in the St Austell area have been assessed, to provide an idea of what these minor elvan occurrences are like, they may have yielded stone for significant buildings. The medieval main house at Trelowarren Estate was partly granite, probably derived from moorstone sources. The Chapel was built from one of the higher quality elvans; subsequent enquiry established that it was Pentewan Stone, no doubt brought round to nearby Gweek by sea. The gatehouse and various lodges on the estate were also built of elvan, but not Pentewan Stone. The Geological Memoir and map mentioned two elvans near Rosevear which had been used for building. Examination of the 1880 O.S. map confirmed two quarries at Rosevear. The barns were partly built of serpentine (possibly dunite serpentine) and Kennack gneiss.

This report has not investigated all the elvans which have been quarried in Cornwall for building stone. Indeed Worth (1875) says: “Thousands of quarries have been opened, for the supply of immediate local wants, upon the elvans and traps”. The criterion for investigation has been whether the stone has been widely used outside the immediate area of the quarry and whether important (i.e. listed) buildings have used the stone. However, some listed Churches, especially Medieval, incorporate some elvan building stone into their fabric, the origin of which is very difficult to ascertain. In many cases it may have been moorstone. Table 3 Other Elvans Mentioned in the Older Memoirs (1839-1912) of the British Geological Survey as Sources of Building Stone gives some idea of the large number of quarries mentioned in the literature, mostly very small, that appear to have worked various kinds of elvan. Most of these quarries have yielded only small quantities of stone which has been locally used in undistinguished buildings.
A small quarry at Withnoe (SX 404/517), above Whitsand Bay, shows volcanic rocks which appear to be related to the Bodmin Moor elvans. It is a unique occurrence and is exactly the kind of quarry that could easily be inadvertently backfilled, so it has been designated a County Geology Site. Another small quarry (Watergate quarry) on the hill above Kingsand (SX 433/509) shows Lower Permian rhyolite and most of the older buildings in Kingsand and Cawsand were built of this material.

Table 3 Other Elvans Mentioned in the Older Memoirs (1839-1912) of the British Geological Survey as Sources of Building Stone

<table>
<thead>
<tr>
<th>DE LA BECHE, (1839)</th>
</tr>
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<tbody>
<tr>
<td>Porkellis, near Wendron</td>
</tr>
<tr>
<td>Trewarles and Roscrow, near Wendron</td>
</tr>
<tr>
<td>Between Barton and Ennis, near Indian Queens</td>
</tr>
<tr>
<td>Seveock Water, near Camborne</td>
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<tr>
<td>Mayon and Bosava, near Land’s End</td>
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<thead>
<tr>
<th>PADSTOW AND CAMELFORD Sheets 335/336 (Reid, Barrow and Dewey 1910)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elvans are not mentioned under ‘Building Stones’, but quarries mentioned in the general account of elvans are as follows:</td>
</tr>
<tr>
<td>De Lank</td>
</tr>
<tr>
<td>South side of De Lank Water</td>
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<tr>
<td>Shell Wood</td>
</tr>
<tr>
<td>Temple</td>
</tr>
<tr>
<td>Warleggan</td>
</tr>
<tr>
<td>Camelford – St Kew – Bray Hill</td>
</tr>
<tr>
<td>Bodrigan Wood</td>
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</tbody>
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<thead>
<tr>
<th>TAVISTOCK &amp; LAUNCESTON MEMOIR Sheet 337 (Reid et al, 1911, p 127)</th>
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</thead>
<tbody>
<tr>
<td>(Not all these quarries may be in Cornwall.)</td>
</tr>
<tr>
<td>Between Landreyne and Tremollet</td>
</tr>
<tr>
<td>S of East Tremollet</td>
</tr>
<tr>
<td>Colquite Wood, S of Kersbrook</td>
</tr>
<tr>
<td>S of Pengelly</td>
</tr>
<tr>
<td>N of Linkinhorne</td>
</tr>
<tr>
<td>S of Rillamill</td>
</tr>
<tr>
<td>S of Plushabridge</td>
</tr>
<tr>
<td>S of Sutton</td>
</tr>
<tr>
<td>W of Longridge, nr. Common Wood</td>
</tr>
<tr>
<td>Browda, SW of Linkinhorne</td>
</tr>
<tr>
<td>Top of Kit Hill</td>
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<table>
<thead>
<tr>
<th>NEWQUAY MEMOIR Sheet 346 (Reid and Scrivenor 1906)</th>
</tr>
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<tbody>
<tr>
<td>St Columb Minor - Trerice</td>
</tr>
<tr>
<td>Northeast of Perranporth</td>
</tr>
<tr>
<td>North of St Enodor</td>
</tr>
<tr>
<td>Retyn</td>
</tr>
<tr>
<td>Near Cubert Church (two)</td>
</tr>
<tr>
<td>Wheal Prudence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BODMIN AND ST AUSTELL Sheet 347 (Ussher, Barrow and MacAlister 1909)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not specifically mentioned under ‘Building Stones’, but the following are</td>
</tr>
</tbody>
</table>
mentioned as sites of quarries in the general description of elvans:
Pentewan (King’s Wood), Polgooth – St Stephen’s Coombe,
Penrice elvans (two),
Northeast of Arvose
Gover
Carnwinnick
Trethullan Castle
Brannel Tolgarrick
South of Lostwithiel
Dyer’s quarry (probably Burthy quarry)
Chytane
Wheal Remfry
Trelavour Downs
Kestle’s quarry
Bodwannick Wood, north of Lanivet
Tremore, already dealt with above

PLYMOUTH AND LISKEARD Sheet 348 (Ussher 1907)
Collytown

LAND’S END MEMOIR Sheet 351/358 (Reid and Flett 1907)
The authors note that:
"Throughout the killas area the elvans have been extensively used for building, and it is noticeable that the engine-houses of most of the abandoned mines are built of elvan rather than of killas. The elvans are commonly freestones, only obtainable in blocks of moderate size, for these dykes are much and irregularly jointed. The stone, varies greatly, from a whitish or buff material resembling a fine sandstone, to a coarse purple igneous rock, or true porphyry, with large scattered crystals of orthoclase and pinite. No quarry is worked on a large scale."

FALMOUTH AND CAMBORNE MEMOIR Sheet 352 (Hill and MacAlistair 1906)
Porkellis, nr Wendron
Kerling Downs, nr Chacewater
S of Nine Maidens
Saveock Water, E of Chacewater
Enys
Towntanna and Trevales
Tresevern Croft
Calvadnack
N of Crelly
Between Little Trewinc and Tregolls
Greenwith and Pencoose
Lower Carnon
Kea, nr. Truro
Nansavallan, nr. Truro
Higher Cardrew nr. Redruth
East of Carn Brea Castle
Northern flanks of Carn Brea
Bolenowe Crofts and Bolenowe Moor, E of Troon
Half a mile NE of Gregwartha
Cregbrose (Cregbrawse according to Worth, 1875), nr. Chacewater
Praze Station
Greenstones

Greenstone is a colloquial term for a variety of basic and occasionally ultrabasic igneous rocks. Basic rocks are low in silica and high in magnesium and iron, ultrabasic even more so. Sometimes a band of dark greenish-blue basic igneous rock will be called 'blue elvan', particularly in West Cornwall, so the term elvan has to be used with care.

Figure 5 The remaining gate to the town of Launceston, of late medieval origin shows that much of the stone used is a greenstone, almost certainly from a local source.

Greenstones were some of the earliest building stones to be used in Cornwall. Lower Carboniferous tuffs (hardened volcanic ash) were used in North Cornwall in the Tintagel and Launceston areas in Norman structures. The similar Hurdwick stone was used extensively for Medieval and later buildings in Tavistock.

Cataclews stone is a dolerite (basic igneous intrusion) which was intruded into Upper Devonian rocks at Cataclews Point (SW 873/761), about 3 miles...
west of Padstow, near Harlyn Bay. It has been used in a number of churches, such as St Merryn and St Petroc, Padstow and in many other churches and older buildings in and around Padstow. It is a tough dark green stone, resistant to weathering, which is capable of being carved into intricate shapes. Many of the carvings in the Padstow area appear to be the work of a single 15th century sculptor, whose name is unknown, so he is referred to by the architectural historians as ‘The Master of St Endellion’. At present, the quarries at Cataclews Point house a sewage outlet. A disused quarry at Stepper Point (SW 915/784), north of Padstow also exploited a dolerite intruded into Upper Devonian slates.

Active aggregate quarries exploit a dolerite east of Polyphant (SX 268/817 and 269/820) and a small quarry exploits both a dolerite and associated metamorphic rocks at Tregunnon (SX 223/833). However, the most famous stone in this area is an exotic type of greenstone which has been worked at Polyphant (SX 260/826), near Launceston since Norman times. This was originally intruded as an ultrabasic igneous rock, and then subsequently altered so the original olivines and other minerals were converted to a mixture of talc, chlorite and various carbonates (Power and Scott, 1995). The resulting rock is quite soft, but is suitable for carving and polishing. Many churches in East Cornwall and farther afield have interior features made of Polyphant stone. The Boer War Memorial adjacent to the West Door of Truro Cathedral is a fine piece of carving in Polyphant Stone. Launceston Priory and Castle also contain much Polyphant stone, but it does not weather well in exterior use, presumably because it is so soft and porous, and therefore susceptible to frosts. After a fire severely damaged Newquay Parish Church, it was found that the Polyphant Stone in the building would have to be replaced. The quarry at Polyphant, which had not been worked for many years, was reopened and supplies of stone obtained.

A similar talcose stone occurs at Duporth, near St Austell and has been used locally for the wall at St Paul’s church, Charlestown and for some of the columns in Truro Cathedral. A quarry at Menheniot (Clicker Tor Quarry SX 285614), now partially flooded, formerly exploited another intrusion of ultrabasic rock, it now a SSSI.

A series of quarries between Pentewan and Trewoon (Molingey SX 013/499, Tregongeeves SX 000/515 and near Trewoon SX001/522) exploit dolerite intrusions into Lower Devonian rocks. All are no longer in use, although Tregongeeves is used as a Highway Depot. The Black Head dolerite is part of the same series of intrusions.

Greenstones are extensively quarried nowadays as a source of good quality strong aggregate, and are often used in the wearing course of main roads, where good skid resistance is needed, which requires that the stone does not become polished as it is worn away by the traffic. Greystone Quarry (SX 365805), near Launceston, provides much of the stone required for road maintenance in east Cornwall. Penlee Quarry (SW 468278), near Newlyn, formerly performed the same function for west Cornwall.
Two large coastal quarries in the Lizard exploit basic rocks of the Lizard complex in the form of coarse-grained gabbros and finer grained dolerite dykes. Dean (SW 803207) near St Keverne and West of England (SW 808215) at Porthhoustock, exploit this stone, which is used locally and is also shipped out via loading jetties alongside the quarries. There are other abandoned coastal quarries between Porthhoustock and Porthallow.

As well as the gabbro and dolerite, there are three main types of ultrabasic rocks in the Lizard complex: bastite serpentine, tremolite serpentine and dunite serpentine. All have been partly or wholly serpentinized. The more highly serpentinized bastite serpentines are used for turning to produce the well-known ornamental stone products; raw material is obtained every few years from quarries temporarily opened for the purpose. There are two large disused quarries in the tremolite serpentine, but this type is really only suitable for aggregate production. The dunite serpentine, especially the less serpentinized varieties, appear to be the best for building and many old Churches in the Lizard are constructed from this stone.

Tubbs Mill quarry (SW 962432), near Veryan, currently not active, is also of considerable interest, as it exposes pillow lavas with MORB (Mid Ocean Ridge Basalt) affinities within the Roseland Breccia Formation.

**Slates**

Slate is extensively used in Cornwall for building, both for walls and roofing. It is the natural material to use for building throughout most of Cornwall’s non-granite areas. The typical Cornish house outside the granite moors is usually constructed of slate rubble masonry, sometimes coursed, with granite or elvan used for the quoins and window surrounds, lintels, etc. Grander houses may have a facing of elvan or granite ashlar, but with slate rubble masonry forming the core of the wall. Where an igneous rock is locally available, it may replace the slate.

The best slate for building seems to have been derived from a silty or sandy mudrock, such as may have been formed by a turbidity current. Recrystallization during the heat and stresses of the Variscan Orogeny undoubtedly helps to make the rock tougher. Pure mudrocks with a strong cleavage are best for roofing slates. Strictly speaking, modern geological terminology uses the term ‘slaty mudrocks’ for what we are accustomed to call ‘slates’.

Delabole quarry (SX 075/840) in North Cornwall is the largest and best known source of high quality roofing slate, which has a pleasant pale grey colour. The large quarry at Delabole works Upper Devonian slates and is said to have been continuously worked since Tudor times, with a considerable export trade already in existence by 1602. Other quarries in the area between Delabole and Tintagel have extensively exploited Upper Devonian slates. Trewillet Quarry (SX 082/881), near Tintagel, is still active. The Prince of Wales quarry (SX 0748/62) has been turned into a country park with a quarry trail by North Cornwall District Council. Coastal cliff quarries south of Tintagel (SX 048884), last worked in 1936, provide much interest in this area.
Active quarries in Middle Devonian slates near Wadebridge, Bodmin and Liskeard area yield large quantities of slate (e.g. Tredinnick SW 935/688), which is used for constructing ‘Cornish hedges’ alongside roads and for a variety of purposes where a natural stone finish is desired. The building trade often refers to this type of stone as “St Issey Stone”. There are a large number of other small abandoned quarries throughout Cornwall which yield Devonian slate that have been used locally for walling and construction.

There are a series of former quarries in the valley side on the east side of the Truro River between Truro and Malpas. These seem to have provided the silty mudstones which were used extensively in the pre-early 20th century buildings in Truro. Poltisco (sometimes spelt Poltesco) quarry is one of these.

A number of old quarries exploit the Middle and Lower Devonian slates in south-east Cornwall and the St Austell Bay area. An example would be the quarries in Lower Devonian Bovis and Formation slates at Gerran’s Point on the west side of St Austell Bay (SX 040/488). Some of the slates belonging to this formation are pyritic and weathering of these slates can cause problems analogous to those caused by the oxidation of sulphides in ‘mundic blocks’.

A series of disused coastal slate quarries southwest of Boscastle (Grower SX 085/907, Welldown SX 088/908 and California SX 090/908 quarries) worked the uppermost Devonian and Transition Group slates covering the Devonian/Carboniferous boundary.

Many old quarries in the Launceston area yielded roofing and building slate from Carboniferous rocks, but these are nearly all now abandoned. The slate was poorly cleaved; the siltier and sandier beds were used for building and flagstones. A refuse and recycling facility near Launceston is on the site of the filled-in Bangor slate quarry (SX 319/834).

**Sandstones**

Sandstone has been worked on a small scale from a few localities in the Gramscatho Beds in mid-Cornwall (e.g. Grampound (Tredinnick) SW 931/492 and Treworgans SW 899/495 quarries). Mottershead (2000) studied the durability of various building stones used in south Cornwall in coastal locations. Somewhat surprisingly, the Devonian Portscatho Formation sandstones, as used in St Mawes castle, turned out to be one of the most durable, according to Mottershead’s study (2000). Syntectonic recrystallization of all finer grained material in these turbidite sandstones (Leveridge et al, 1990) must have created a very tough rock which is resistant to the weathering conditions in this area. The Staddon Grits in southeast Cornwall have also been quarried in a small way; the main use has been as a local building and walling stone. Quarries in North Cornwall (e.g. Pigsdon SS 278/092 and Cansford Quarry, SS 168/931) provide a useful source of aggregate, but have been extensively used in the past as a source of building stone. It is interesting that villages in Cornwall
constructed from sandstone, whether it is Lower Devonian or Upper Carboniferous, tend to have a similar appearance because of the use of sandstone in building. Ordovician quartzites from the Roseland Breccia Formation (e.g. small quarries at Carne, SW 913/380) have been used locally and have been considered as sources of high purity silica.

Figure 6 The Coinage Hall in Truro, largely constructed from a local silty fine-grained sandstone belonging to the Devonian Portscatho Formation

Quarries on the east bank of the Truro River between Truro and Malpas supplied the kind of stone shown in Figure 6. The window tracery and quoins are of granite, most likely sourced as moorstone from the Carnmenellis granite. This combination of rubble masonry composed of local silty, sandy, slaty rocks (killas) for the main walling (occasionally greenstone or a volcaniclastic rock), with granite (or elvan) for the window tracery and quoins is very typical of much of Cornish building.

Figure 7 Mount Edgecumbe House, southeast Cornwall, originally built in the 1550s, but burnt out during the Second World War and subsequently rebuilt after the war
Figure 7 is built of local silty slate probably belonging to the Lower/Middle Devonian Staddon Grit Formation. The distinctive red colour is due to desert weathering during the Period, 290 million years ago. The window tracery, quoins, etc. are of granite.

Sands in the Hayle and Padstow estuaries have been worked as a local source of fine sand for building purposes. The deficiency in lime-bearing rocks in Cornwall was also overcome by using beach sands which are composed of sea-shells which have been pounded up to a fine sand on the beach by wave action (bioclastic sand) and which typically contain 40-70% CaCO3, locally up to 90%. This type of sand forms the dunes north of Hayle and at Perranporth and many of the beaches on the north coast. Raised beaches containing this type of sand can become cemented by calcium carbonate e.g. Godrevy Point, Trebetherick and Fistral Bay to form ‘sandrock’. They have been used as a building stone in some of the older churches, as at Crantock and Padstow. This must be one of the geologically youngest freestones to be used anywhere in Britain.

Other stones

Limestone is almost absent from Cornwall. There are a few lenses of Upper Devonian or Lower Carboniferous age in the Launceston area, which were intensively exploited in the 18th and 19th centuries, mainly for lime-burning. Some of the workings were underground, as at Trenault near Launceston (SX 262/830). A book on lime kilns and lime burners in Cornwall (Isham, 2000) includes useful details of limestone quarrying in Cornwall.

Masses of Devonian limestone occur in the Roseland Breccia Formation east of Veryan. Sporadic limestones occur in the Bovisand Formation along the coast from Rame Head to Fowey and have been exploited for lime burning in a small way, notably in small quarries north of Looe (Isham, 2000). In the past, much limestone from the Plymouth area was brought into the coastal areas of Cornwall for lime-burning (Isham, 2000) and occasionally
for building (e.g. the station building in Fowey and Methleigh House in St Austell).

A peculiar variant of calcareous rock is **calc-flinta**, which is found in a series of east-west bands in and around the Goss Moor depression. This type of rock has been produced by the effects of heat from the St Austell granite on a mixture of limestones, slates and sandstones, which have chemically reacted to form various calcium silicate minerals (Ussher et al, 1909). They are relatively brittle and cannot be obtained in good sized blocks, so are not widely used for building. However, they have been widely exploited as a source of aggregate as, for example, at Glebe quarry near Roche (SW 9885930). Other small quarries are found on the north side of the Belowda - Castle an Dinas ridge and at Tremore.

Radiolarian **cherts** occur in the Lower Carboniferous of North Cornwall, and are presently worked in Pilsamoor quarry (SX 276/857). The chert splits into conveniently sized blocks for building and is mainly marketed for this application. Cherts were also formerly exploited in the now abandoned Barracadoes Quarry, near Launceston (SX 322/862).

**Schorl rock** is a dark bluish-black rock composed of tourmaline and quartz, it occurs as blobs in the granite ranging in size from a gooseberry to a mass the size of Roche Rock, which is composed of schorl rock. St Michael’s Chapel on Roche Rock is built of schorl rock. It is a very resistant stone and is a significant component of the boulders and stones which were encountered by the tin streamers. The famous breccia in Wheal Remfry china clay pit is a kind of schorl rock formed by an explosive event during the cooling of the granite, but it has not been widely used for building since it was uncovered in the 1970s.

**Greisening** is a late-stage hydrothermal process which affects the granites, in which the feldspar in the granite is converted to a mixture of quartz and mica, making it a resistant rock to weathering. This type of rock is frequently seen in buildings in the china clay areas. Greisened granite boulders, often intimately associated with quartz-tourmaline veins, can also form an important component in stones derived from tin streaming operations which have been used for building, a form of ‘minestone’. Greisen was a favoured material for making mortaria in Roman times and earlier bowl-lamps also use greisen, one principal source of this material was St Michael’s Mount (Thomas, 1985, p88).

A greisen mass, rich in **topaz**, was formerly exploited in a small quarry at St Mewan Beacon (an SSSI) for making the floor of grinding pans for china stone (Collins and Coon, 1914). Topaz is a very hard material (hardness of 8 on Moh’s scale). Some of the floors at Place, Fowey are made of polished slabs of topazfels, which will almost certainly have excellent hardwearing characteristics.

**Minestone** is waste materials from metalliferous mining and has been widely used for building in Cornwall. In most of the mining areas, large cobbles of mining waste, typically slate and quartz vein material, have been
used for rough stone walls and for engine houses, domestic cottage construction, etc. Sometimes metalliferous sulphide minerals occur in these stones and can cause staining and unwanted reactions in any masonry built with them.

Boulders from tin streaming operations also provided a ready source of building material in past times. Quartz-tourmaline vein material and schorl rock are very stable materials which are resistant to weathering and these can form an important component of the boulders from tin streaming.

Waste materials from the china clay industry now represent some of the most widely used raw materials for the construction industry in SW England and, in the past, much waste rock from china clay working was used as building stone, in the form of unkaolinized granite, quartz-tourmaline vein material, greisened granite and schorl rock.

**Moorstone** most of the granite building up to the early 19th century used ‘moorstone’ collected from the granite moors. Much the same probably happened in the Lizard, where boulders of serpentine and gabbro were collected from the moorland to build the many medieval Churches in the Lizard.
Part 2: Building Stones of Cornwall
Heritage Quarry Assessments

KEY TO INSET MAPS

- Areas with planning permission for mineral development
- Strategically important mine shafts or other mine access points
- Other important mine access points
- Special Areas of Conservation
- Cornwall West Devon Mining Landscape WHS
- Areas of Outstanding Natural Beauty
- Sites of Special Scientific Interest
- National Nature Reserves
- Areas of Great Scientific Value
- County Wildlife Sites
- Areas of Great Landscape Value
- Areas of Great Historic Value
- County Geology Sites (RIGS)
- Listed Buildings
- Scheduled Monuments
- Conservation Areas
- Historic Parks & Gardens
- Historic Settlements

Public Rights of Way
- These maps are not the definitive Rights of Way Maps

FLOODING CONSTRAINTS

- Problem Drainage Areas - Yellow
- Flood Zone 3
- Flood Zone 2
Elvans and Flows
Pentewan Quarries (Elvan1)
Figure 8 Map of Pentewan Quarries (Elvan1)

Location
There are two quarries:
(1) Coastal, adjoining coastal path and in the cliffs at Polrudden Cove. (SX 025/475)
(2) Inland on east side of valley running north from Pentewan (SX 022/478), working the western continuation of the elvan seen in quarry (1).

Site description
Figure 9 Quarry 1 at Pentewan, looking along the excavation south-eastwards towards the sea
This quarry has not been worked for at least 100 years. Quarry 1 is an WNW-ESE cutting at the top of the cliffs above Polrudden Cove.

**Figure 10 Quarry 2 at Pentewan, looking up the excavation from near the bottom**

The hanging wall is on the left. Quarry 2 is a NW-SE ravine-like feature 700m north of Pentewan Square on the eastern side of a steep sided valley. Both quarries are not more than 10m deep.

**Operational and planning status and history**
Not worked since late 19th C.
No planning permission.

**Stone type/name**
Pentewan (Pentuan) Stone

**History**
A 5th/6thC inscribed slab in St Cuby (Tregony) Church is Pentewan Stone. Both Leland (1534) and Carew (1602) mention Pentewan Stone as one of the finest freestones in Cornwall, quarrying continued up to the late 19thC, Worth (1875) says there was still some working at that time, but by the time the Survey Memoir was written (Reid, 1907) working had ceased. An adit just north of Quarry 2 may have been opened to drain the quarry, but its offset position to the north of the quarry (i.e. down-dip) suggests that it might represent an attempt at underground working of the stone.

**Geology and mineralogy**

Pentewan Stone is a felsitic elvan dyke dipping in a northerly or northeasterly direction at about 30-40°. In the cliffs it is seen to be about 2-5m thick but, based on observations elsewhere, it may branch or pinch out altogether in places. Teall in Reid (1907) describes it "A light grey or cream-coloured quartz-porphyry composed of phenocrysts of quartz and more or less altered orthoclase in a micro-crystalline felsitic matrix. A few scattered plates of muscovite occur also as phenocrysts and minute flakes of the same mineral form a not inconsiderable portion of the ground mass".

Mottershead (2000) reported that XRD studies of Pentewan Stone taken from buildings showed only quartz and mica, which suggests the elvan has been greisened. This is a common feature of felsitic elvans and will increase durability because, after greisening, there is little or no feldspar left in the rock for weathering to erode. However, some elvans also suffer from patchy weathering or kaolinization, so care has to be taken to avoid areas which might have suffered in this way.

**Architectural characteristics**

A pale grey or creamy coloured stone, not unlike Bath Stone when viewed from a distance. Very durable (see Mottershead, 2000) and used extensively in 14th-16thC Churches as well as many other high status buildings. It is a true freestone, as can be seen in the carvings on St Austell Church tower and at Place House, Fowey. When freshly cut the stone has a yellowish tinge, but extended weathering over many centuries transforms the stone into a silvery-grey colour, as can be seen at Antony House and other country mansions. In more polluted surroundings the stone takes on a yellowish-grey colour with time. De la Beche (1839) noted "For durable stone, the harder elvans of the district, particularly when of cream or other light colours, may be considered as the best building materials in it; their durability and appearance may be seen in many churches and old mansions, where the finer carvings of the ornamental parts are as sharp as the day they were put up... Pentuan stone is more readily sculptured than might be expected”.

Pentewan (Pentuan) is probably the most desirable building stone in Cornwall.

**Significant buildings and structures using stone**

Antony House, Torpoint (Grade I).

**Figure 11 Antony House near Torpoint, built in 1721**
According to Pevsner (1951) this is the best example of its date in Cornwall. The house is built of Pentewan Stone (an elvan), which is now beginning to show some signs of deterioration. Stone salvaged from Duporth House, near St Austell has been brought to a stockpile near Antony House for future restoration work. The later porch is built of a Jurassic freestone.

**St Austell Parish Church (Grade I)**

Figure 12 The ‘Sermon in Stone’ on the west side of the tower of Holy Trinity, St Austell, entirely carved in the late 15th century from Pentewan Stone

**The Chapel, Trelowarren (Grade I)**
Figure 13 Window tracery carved from Pentewan Stone in the 19th century extension to the Chapel at Trelowarren

Figure 14 Close-up of the Pentewan Stone used in the 19th century extension to the Chapel at Trelowarren

Note how the Pentewan Stone has weathered to a very pale, almost silvery grey colour. This is typical of buildings composed of this stone in the country. In an urban setting it weathers to a much darker colour. Place House, in the centre of Fowey, shows much the same effect of discoloration by town smoke.

- Place House, Fowey (Grade I)
- St Mawes Castle (Grade I)
- Bodmin Parish Church (Grade I)
- Charlestown Chapel (Grade II*)
- Numbers 1/1a, High Cross Street, St Austell, plus many others, particularly churches.
- Used as far afield in the Middle Ages as North Cornwall (St Endellion).

**Potential for future resources and exploitation**
The elvan may continue through the down-dip beyond the historic limits of quarrying and may improve with depth, but this would require confirmation through exploratory drilling. The continuation of the elvan in depth is seen in the 70m high cliff adjoining Quarry 1, where it is seen to be about 2m in thickness at sea level.

**Potential for alternative stone sources**
Where colour/texture matching is critical, as with a listed building, then these two quarries may be a unique source. Where these qualities are less critical, then there are other elvans which might be used, but none are currently exploited with a valid planning permission.

**Heritage Value Indicator**
9/10

**References**
Principal references are: Leland (1534), Carew (1602), De la Beche (1839), Worth (1875), Ussher et al (1907), Reid (1907), Mottershead (2000), Bristow (2001 & 2002). Unfortunately none of the references give a description of how the stone was worked.

**Newham Quarry (Elvan2)**
Figure 15 Map of Newham Quarry (Elvan2)
**Location**
(SW 830/437)
About 1km south of Truro City centre. Quarry in ENE-WSW elvan has worked back into hillside on the west bank of the Truro River estuary. A gasholder was situated in the quarry.

**Site description**
Figure 16 Newham quarry, south of Truro, west face about 10-15m high in Newham Stone, an elvan
This stone is much used in Truro, notably in Georgian Lemon Street. This represents a face with potential for reopening

**Operational and planning status**
Disused.
No planning permission.

**Stone type/name**
Newham Stone (elvan)

**History**
The early 16thC St Mary’s aisle of the Cathedral appears to use Newham Stone. Extensively used in 18thC and 19thC buildings in Truro, especially Lemon Street. Mentioned by De la Beche (1839); Collins in 1876 describes Newham as ‘formerly worked’. Probably not worked since the railway and gasworks were built across the entrance.

**Geology and mineralogy**
This is an ENE-WNW trending felsitic elvan. It is a pale cream coloured fine grained rock when freshly cut and appears relatively uniform (compared to some other elvans) across the width of the dyke of elvan. The face is 25-30m in width and about 18-20m high (including overburden). Slaty rocks are exposed on the south side but the northern face appears to be still in elvan. Joints dip steeply (approximately 60-70o) northwards in the main face, suggesting the elvan may dip at this angle as well. In some buildings (but not in the quarry) this stone can resemble a siltstone, as it has a certain amount of fissility, which suggests a strain was placed on the elvan during or soon after emplacement. Occasional thin quartz veins are also seen. Some buildings using this stone are inclined to show signs of
incipient decomposition (St Mary’s part of the Cathedral) and this may have made it more easily worked, but this stone does not stand up to the weather as well as Pentewan Stone.

**Architectural characteristics**
Attractive pale cream fine grained stone, not unlike Bath Stone when seen from a distance. Superficially resembles Pentewan Stone, but does not appear as resistant to weathering. Can be easily carved: sometimes fissile, with occasional quartz veins.

**Significant buildings and structures using stone**
Several examples in Lemon Street, Truro including Royal Hotel. This is a Conservation Area with many Listed Buildings.

**Figure 17 Detail of a doorway in Lemon Street, built from Newham Stone**

Note how well the tooling marks are preserved after nearly 200 years of exposure. Many other older buildings in Truro, including some 19thC terraces.

**Potential for future resources and exploitation**
The width of the face at the west end of the quarry suggests a potential for substantial resources. There is a reasonable possibility that this elvan could extend westwards under farmland. A face of stone some 15m high and 25-30m wide exists at the western end of the quarry and would be relatively easy to re-activate as access could be available through the former gas holder site. Clearance of fly tipping (agricultural chemical containers, plastic, etc.) in the quarry would be required. Potential to remove stone from quarry floor or from an extension to west, subject to confirmation through exploratory drilling.
**Potential for alternative stone sources**
For listed buildings this quarry can be regarded as a unique source, but for other uses where the stone is not needed to match with existing stonework another elvan may be an alternative.

**Heritage Value Indicator**
9/10

**References**
De la Beche (1839)
Collins
Hill and MacAlister (1906)

**Tremore quarries (Elvan3)**
**Figure 18 Map of Tremore Quarries (Elvan3)**

**Location**
Two quarries on either side of the valley a few hundred metres below Tremorebridge. (West) SX 010/648, (East) SX 010/647

**Site description**
Overgrown. Visible faces in quarries appear to be mainly in calc-flintas.

**Operational and planning status**
Disused.

**The Identification of Heritage Quarries** Minerals Safeguarding DPD Evidence Report
November 2016.
No planning permission.

**Stone type/name**
Tremore porphyry (elvan)

**History**
Not known in detail, but active quarrying mentioned by De la Beche (1839) and in the Bodmin and St Austell Memoir (1909). The use of Tremore porphyry in King Arthur’s Hall at Tintagel (built late 1920s – early 1930s) and in the Baptistry at St Austell Parish Church (1923) suggests that some extractive capability may have extended up to just before the Second World War.

**Geology and mineralogy**
The Tremore elvan extends for over a kilometre either side of the quarries at Tremore and is part of an extensive set of east-west elvans which are associated with bands of calc-flintas (calc-flintas is a kind of metamorphic rock produced by the action of thermal metamorphism on impure calcareous rocks). All of the rock which can presently be seen in the quarry faces at Tremore is calc-flintas, which may have been worked as a source of aggregate and hard-core. The Tremore elvan appears to be a steeply dipping feature, but none of the accounts say how wide it was.

The Tremore elvan is highly variable in appearance. The chilled margins are distinctive, but the main rock of interest is the coarser grained interior of the elvan which shows white feldspar (orthoclase, up to 3-4 cm in length) and grey quartz (up to 0.5cm in diameter) phenocrysts set in fine grained reddened matrix. Spherulitic aggregates of black tourmaline up to several mm in diameter are variably present, sometimes being as important a component of the rock as the feldspar or quartz phenocrysts. Microscopic examination of the rock shows that there is much fine fluorspar and fine mica, presumably indicating greisenisation. The red colour is due to fine iron oxide particles. Tremore elvan is sometimes pink, sometimes dark red, occasionally without oxide staining and pale grey. All these variations are displayed as polished panels and tiles in Porphyry Hall, Place, Fowey. For a detailed discussion of the geology and mineralogy see Barrow and Flett in Ussher et al 1909, pages 73-79.

The Treffry records say that the porphyry at Place came from ‘Brynn’, but there is no record of an elvan there; in view of De la Beche’s clear confirmation that the stone came from Tremore, we must assume that the reference to ‘Brynn’ is misleading. However, other writers do seem to suggest that some stone may have been obtained from other points along the line of the elvan outside the Tremore valley.

**Architectural characteristics**
De la Beche (1839, pages 501-502) describes this stone at the time it was being worked and used to build Porphyry Hall "many of the hard elvans are very beautiful, when worked and polished, particularly those which are most porphyritic, and in which there is much contrast between the base and the contained crystals. The most remarkable are, probably, those which are..."
obtained from the dykes extending from Tremore, near Bodmin, towards the east, on the south of Withiel and St. Wenn. They vary much in colour, but that with a reddish or flesh-coloured base, in which there are white crystals of feldspar, and occasionally some of quartz and schorl (schorl = tourmaline), is the most beautiful, and occurs in large quantities at Tremore village, and in the ravine through which a brook flows to Ruthern Bridge. Mr. Austen Treffry has caused this reddish porphyry to be cut and polished by means of water power, at Fowey Consols Mine, for his house at Fowey, where it is employed, mixed with the schorl rock above noticed, for pavement and steps (the main period of building at Porphyry Hall was shortly after this was written by De la Beche). It has a very handsome appearance, and may be obtained of large size, blocks being found up to five or six tons in weight... ...There is one variety which may be obtained in fair quantities at Tremore, in which light pink crystals of feldspar, with others of quartz and schorl, are embedded in a brownish flesh-coloured felspathic base. Another, of which we only found small portions, contains greenish feldspar crystals in a light coloured base.”

Shortly after De la Beche’s time Queen Victoria and Prince Albert visited Place and the Queen was very impressed by the beauty of the polished stone in Porphyry Hall. Tremore Porphyry can be regarded more as an ornamental stone, rather than just a building stone, being particularly attractive when slabs are polished for use in facing or as tiles.

**Significant buildings and structures using stone**
Porphyry Hall, Place, Fowey (Grade I) (polished slabs).

**Figure 19 Polished Tremore Porphyry in Porphyry Hall, Fowey**

The white orthoclase phenocrysts stand out clearly from the red matrix, in which black spherulitic aggregates of tourmaline are visible. A pale pink and a red variant can be seen.
The interior is lined with polished slabs of Tremore Porphyry and Luxullianite and the fireplace is a textured Luxulyan granite. Queen Victoria, on a visit in 1846, much admired this fantastic assemblage of granite and elvan types from in and around the St Austell granite; as a result a polished slab was sent to Her Majesty and incorporated into the fabric of Osborne House, on the Isle of Wight, which was under construction at that time.

- Osborne House, Isle of Wight (polished slabs).
- West Hill Baptist Church, St Austell (cut stone).
In Figure 21 the pink stone is Tremore Porphyry (unpolished). The window tracery, quoins, string courses, etc. are of St Stephen’s Stone, a pale coloured granite from the western part of the St Austell granite mass.

- King Arthur’s Hall, Tintagel (large insets in floor, Grade II).
- Barclays Bank building, Truro (cut stone).
- Lanlivery Church.
- Some of the red tiles on the floor of the baptistery in St Austell Parish Church also appear to be Tremore Porphyry.

**Potential for future resources and exploitation**

The Tremore elvan was mapped by the British Geological Survey as extending for over 1 km eastwards and westwards from the quarries, but whether the quality remains similar is unknown. In theory, it may be possible to extend the quarries away from the valley to locate more stone. The western quarry is very deep (up to 20m) and overgrown; the calc flintas forming the sides appears unstable; there have been several recent falls.

**Potential for alternative stone sources**

None, this is a unique stone.

**Heritage Value Indicator**

9/10

**References**

Ussher et al, 1909, pp 73-79.
Treveddoe Quarries (Elvan 4)

Figure 22 Map of Treveddoe Quarries (Elvan4)

Location
(SX 149/693)
SW of Bodmin Moor, 0.5km SW of Treveddoe mine and opencast and quarry and near Milland.

Site description
Small quarry on east side of the valley of the Warleggan River. Outcrops of similar elvan in woods to the south of the quarry and elsewhere in the Warleggan area.

Operational and planning status
Disused.
No planning permission.

Stone type/name
Warleggan elvan

History
Quarry appears to have been worked in the not too far distant past and has been landscaped.

Geology and mineralogy

The Identification of Heritage Quarries
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November 2016.
Felsitic elvan with abundant phenocrysts of feldspar and quartz, with occasional fluorite and tourmaline. Said to be sill-like by Reid et al (1910). A thin section indicates an estimated 40% alkali feldspar, which means the elvan has not been greisened.

**Architectural characteristics**
From a distance appears similar to Pentewan Stone in colour, but closer inspection shows crystals of quartz and feldspar. Lack of greisening may indicate that this elvan will not be as durable as Pentewan Stone, but might substitute for it in some internal situations.

**Significant buildings and structures using stone**
St Bartholomew’s Church, Warleggan (Phillips, 1999), plus possibly some other Churches in the area. Used internally only – which may indicate a lack of durability.

**Potential for future resources and exploitation**
The quarry has a reasonable face and physically would be relatively easy to re-activate. Subject to further investigations a future resource of stone may be available through extension back into the hill, and improvement of the access road.

**Potential for alternative stone sources**
This is a similar stone to that used for St Levan’s, Porthpean (sourced from a quarry in Penrice Woods).

**Heritage Value Indicator**
6 /10

**References**
Reid et al 1910
Selwood et al 1998
Phillips, P.R.  1999
Reid et al 1910
Selwood et al 1998
Phillips, P.R.  1999

**Brannel Quarry (Elvan5)**
*Figure 23 Map of Brannel Quarry (Elvan5)*
Location
0.5 km north of Coombe, near St Stephen. Adjacent to minor road (SW 953/519).

Site description
Quarry has been worked back into wooded hillside for about 200m. Quarry floor about 10m above level of road/valley floor. At the back of the quarry is a face on the northern side about 15m high, showing fresh elvan. This is not strongly jointed.

Operational and planning status
Disused
No planning permission

Stone type/name
Brannel Elvan

History
A very small quarry existed here in the late 19th/early 20th century. During the Second World War there was a period of intense quarrying to supply stone for the construction of St Mawgan and St Eval airfields. This was crushed and graded at the quarry and then taken by lorry to the airfield sites.

Geology and mineralogy

The Identification of Heritage Quarries
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November 2016.
Little information in the Bodmin and St Austell Memoir by Ussher. Hand specimens show a pale buff stone with prominent bi-pyramidal quartz xenocrysts and occasional small phenocrysts of feldspar and dark mica. Minute glistening flakes of colourless mica in the groundmass suggest the elvan has suffered extensive greising. In appearance this elvan is not unlike Pentewan Stone. There is no visible evidence of kaolinization. The elvan appears to be near vertical and at least 10m wide. Jointing is not prominent, but breaking the stone (which is very tough) reveals many cracks in the stone are lined with dark coloured Fe/Mn oxides.

**Architectural characteristics**
In appearance this stone is similar to, but not identical, to Pentewan Stone.

**Significant buildings and structures using stone**
None known.

**Potential for future resources and exploitation**
Partly because this quarry was worked at a late date, it may not be that difficult to re-start: it has a good face and a level quarry floor. There is an access track from the adjoining public highway. No water or drainage problems. Useful resources may exist if the quarry was to be worked into the hill (subject to confirmation by exploratory drilling).

**Potential for alternative stone sources**
Possibly this quarry could offer the most practical substitute for Pentewan Stone, where close matching is not required.

**Heritage Value Indicator**
8/10

**References**

**Polgooth, Treloweth and Hewaswater Quarries (Elvan6)**
Figure 24 Map of Polgooth, Treloweth and Hewaswater Quarries (Elvan6)
Location
Hewas quarries – SW 972/507
Trelowth quarry– SW 984/505
Polgoth – SW 997/503.

Site description
Hewas quarries infilled, but elvan observed during construction of Sticker by-pass.
Trelowth quarry - infilled.
Polgoth quarry

Operational and planning status
Disused.
No planning permissions.

Stone type/name
Polgoth- Hewas elvan

History
Very little known, Trelowth marked on manuscript 6” geological map as 'Old quarry’; Trelowth Stone used for St Austell Cottage Hospital (early 20th century). De la Beche (1839) mentions a roseate tinted elvan which might be useful for ornamental purposes occurring between Tyecombe and Dowgas near St Austell.
**Geology and mineralogy**

From a distance this elvan resembles Pentewan Stone, but closer inspection shows that there are often (but not always) abundant feldspar phenocrysts, which are often kaolinized. The matrix of the elvan is also variably kaolinized.

Polgooth quarry said to yield stone ‘in a rather decomposed condition’ (Ussher et al, 1909). An inferior softer variant of elvan has been used in the side wall of 1/1a High Cross Street, St Austell and in the large arches at the rear of the Market House, this may be the softer variant obtained at Polgooth.

**Architectural characteristics**

Although apparently similar to Pentewan Stone, this elvan is variably kaolinized and has prominent feldspar phenocrysts. It is therefore not as useful a stone as Pentewan, but quite distinctive.

**Significant buildings and structures using stone**

- The old cottage hospital in St Austell.
- St Austell Market House (Listed) arches
- It is possible that many buildings and houses in St Austell also use this stone (possibly Moorland Road).
- Many older houses in Sticker and Polgooth are probably constructed with stone from these quarries.
- A polished cube of ‘Dowgas’ elvan is in the Geological Section of the Natural History Museum, London.

**Potential for future resources and exploitation**

Not known.

**Potential for alternative stone sources**

Many elvans such as Penrice would appear similar, but none have planning permission for stone to be extracted.

**Heritage Value Indicator**

4/10

**References**


**Penrice Woods Quarry (Elvan7)**

Figure 25 Map of Penrice Woods Quarry (Elvan7)
**Location**  
(SX 023/505)  
Approximately 400m north of Penrice House

**Site description**  
Very small quarry in bank beside track through Penrice Woods.

**Operational and planning status**  
Disused.  
No planning permission.

**Stone type/name**  
Penrice Elvan.

**History**  
Not known, quarry possibly developed to build St Levan’s Church in the late 19th C.

**Geology and mineralogy**  
Creamy beige elvan not unlike Pentewan Stone, but with prominent feldspar phenocrysts.

**Architectural characteristics**  
A creamy-beige fine grained elvan. At first sight this stone is deceptively like Pentewan Stone, but closer inspection reveals that the elvan is crowded.
with platy feldspar phenocrysts up to 3cm in length. Close inspection of St Levan’s Church shows that this stone is weathering quite well.

**Significant buildings and structures using stone**
St Levan’s Church, Pentewan.

**Potential for future resources and exploitation**
On geological maps, the elvan is marked as only continuing for a short distance either side of the quarry; Ussher confirms this and says he could not trace it far from the quarry. However, to obtain sufficient stone to build St Levan’s Church and other buildings in the neighbourhood the quarry must have been deep (for its area). This probably implies that the best stone is at depth.

**Potential for alternative stone sources**
No alternatives for an exact match. Could substitute for Pentewan Stone where it is not going to have to match existing stone.

**Heritage Value Indicator**
6/10

**References**
Unknown, apart from a very brief reference in Ussher et al 1909, p68.
Location
(SX 027/498)
Two quarries, either side of the road, about 100m southwest of where the track to Castle Gotha Farm leaves the Pentewan-Mt. Charles road and about 300m north of Lobb’s Shop.

Site description
Infilled quarries.

Operational and planning status
Disused.
No planning permissions.

Stone type/name
Castel Gotha Stone (elvan)

History
Marked by W.A.E. Ussher on manuscript 6” map (1903), but otherwise nothing known. Now filled in and level farmland with no trace that quarries ever existed. These two quarries appear to have been much larger than the small quarry in Penrice Woods.

Geology and mineralogy
On manuscript 6” map the quarries have the following comment: ‘whitish elvan, occurring in slates’. It may be the same elvan as the one seen in the cliffs at Phoebe’s Point.

Architectural characteristics
Unknown

Significant buildings and structures using stone
Georgian Penrice House is built of a whitish elvan and these quarries could be the source as they are only 500m from the house (see Figure 1). Certainly the quarry in Penrice Woods looks quite different, as does Pentewan Stone. A silvery-white elvan is seen in a number of buildings in south Cornwall and seems to have been frequently been used for string courses.

Potential for future resources and exploitation
Limited. The quantity of fill is unknown as well as the extent and the exact character of the elvan.

Potential for alternative stone sources
Not known.

Heritage Value Indicator
3/10

References
None other than Ussher’s comments on the 6” map.
St Kew Quarry (Elvan9)

Figure 27 Map of St Kew Quarry (Elvan9)

Location
(SX 105 768)
1 km west of St Kew Church adjacent to road.

Site description
Long narrow quarry rather like a railway cutting.
Very overgrown with vegetation.

Operational and planning status
Western part of quarry used as Cornwall Council depot for aggregate.
No planning permission.

Stone type/name
St Kew Elvan.

History
Not known in detail, the Cornwall Council quarry forming the western end of the working may have been worked relatively recently and is still used as a depot for aggregate. The eastern end (nearest St Kew) is very overgrown.

Geology and mineralogy
Reid et al in the Padstow and Camelford Memoir (1910):
"In the hand-specimen the rock is light brown, often with green oval blotches, is fairly soft, and can be trimmed with an axe. Under the microscope it is seen to be allied to the minettes, but is usually decomposed and permeated by calcite; all the biotite is green with decomposition products arranged along the cleavage planes. Near St Kew globular inclusions of aplite, over a foot in diameter, are seen in the large quarries. At this locality the joint planes dividing the dyke are curved”. It is clear that this elvan is rather different to many of the other elvans, such as Pentewan, which are used for building stone. It may be the result of mixing of granitic and lamprophyric magmas.

**Architectural characteristics**
This stone is rather drab greyish-green stone with joint faces showing brown oxide films. It is rather blocky and it does not look as if it would be at all easy to carve.

**Significant buildings and structures using stone**
Figure 28 A farmhouse near St Kew, built from the St Kew elvan

Reid et al (1910) “The stone supplied material for building the railway bridges between Wadebridge and Camelford, and is much employed for building chapels and halls”.

Many of the older buildings in St Kew and the surrounding country use St Kew elvan, including the Church (Grade 1).

**Potential for future resources and exploitation**
It may be possible to extend the quarry and develop further resources of this stone. A face up to 5m high is seen at the western end of the Cornwall Council quarry.

**Potential for alternative stone sources**
This is probably unique.

**Heritage Value Indicator**

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References
Reid et al (Padstow and Camelford Memoir), 1910, p. 90.

Watergate Quarry (Elvan10)
Figure 29 Map of Watergate Quarry (Elvan10)

Location
(SX 433 509)
North of Kingsand.

Site description
Small disused quarry adjoining road.

Operational and planning status
Disused.
No planning permission.

Stone type/name
Kingsand rhyolitic volcanic flow.

History
Not known

Geology and mineralogy
A fault bounded extrusive flow of rhyolite (or possibly welded tuff) is seen over an area of just under 1 km\(^2\) at Kingsand/Cawsand. It is exposed on the foreshore at Kingsand and in the Watergate quarry. The magma from which this flow was derived appears to be similar to the magma which formed the Bodmin Moor granite, radiometric dating confirms that both were formed at about the same time (earliest Permian). It has been stained red and altered by Permian weathering. Thin sections show that it originally crystallized as a glass or as a very fine grained lava. The lava shows columnar jointing and autobrecciation as well as other flow features (Leveridge et al 2002).

**Architectural characteristics**

A reddish not very hard stone which can be readily trimmed for use in rubble masonry. Older buildings in Kingsand and Cawsand suggest it is reasonably durable in a similar way to the Permian volcanic rocks of the Exeter area.

**Significant buildings and structures using stone**

*Figure 30 The foreshore is composed of a rhyolite flow, which has been used for a many of the older buildings in Kingsand and Cawsand*

This flow is a unique representative of the volcanicity that took place when the granites were intruded 290 million years ago, which has nearly all been eroded away in the geological past. The climate at that time was hot and arid and the flow has been stained red by desert.

Many of the older buildings in the Kingsand/Cawsand area use this stone, which gives a very distinctive character to the local built environment. It is likely that the stone was sourced from this quarry and the foreshore.

**Potential for future resources and exploitation**

The lava in the quarry is somewhat rubbly and weathered. There may be potential for further resources of stone in the hill to the rear of the quarry.
Potential for alternative stone sources
Although this is a unique source, a similar stone could be obtained from a small disused quarry near Withnroe (SX 404/518), which is a County Geology Site. Similar stone occurs in the foreshore.

Heritage Value Indicator
8/10

References
Leveridge et al, 2002 has a quite detailed account of this fascinating area of geology, but does not specifically mention Watergate Quarry.

Granites
Bodmin Moor Granite Quarries (De Lank and Hantergantick (Granite1))

Location
(SX 100/755)
Approximately 1 km south east of St Breward.

Site description
Figure 32 De Lank quarry near St Breward, Bodmin Moor
This quarry is still producing dimension stone. Blocks are extracted by drilling a series of holes and then splitting the granite along the line of holes. This quarry is famous for producing the stone for lighthouses and many important London landmarks.

De Lank quarry is to west of the De Lank River
Hantergantick Quarry is on the north bank of the De Lank River

**Operational and planning status**
Both quarries have planning permissions.
De Lank Quarry is operational. The adjacent Hantergantick Quarry is "mothballed".

**Stone type/name**
De Lank Granite.

**History**
Granite quarrying for dimension stone started in mid 19thC and has continued up to the present. A good account of the quarry in 1907 is in Stanier (1995 pages 44-45), and a full history is given in Stanier 1999 pages 32-33 and 151-152). Current quarrying practice is described in Smith (1999), pages 243-244.
Hantergantick opened in 1918 and closed in 1997.

Several felsitic elvans cross the site, it is understood that they have been used in the past as a source of aggregate for roadstone. A deep cutting along the line of one of the elvans provides access to the site.

**Geology and mineralogy**
Floyd, Exley and Styles (1993) pages 167-169 provide a good description of the quarries’ geology and mineralogy. They describe De Lank granite as "These quarries contain fresh, coarse-grained, poorly megacrystic biotite granite, characteristic of the Bodmin Moor intrusion, strongly foliated and jointed, and containing pegmatite patches, minor granite veins and
xenoliths. They also incorporate typical Cornubian, fine grained, megacrystic biotite granite and granite porphyry dykes (‘elvans’).”

De Lank granite, although described above as coarse grained is not as coarse grained as many other granites, such as those from the Luxulyan valley. Although the granite is ‘strongly jointed’ one of the features of the quarry is the lack of closely spaced joints, especially at depth in De Lank Quarry, where current extractive activity is concentrated. Indeed, Smith (1999) described the joints as ‘widely spaced’. The foliation is one of the distinguishing characteristics of De Lank granite, which differentiates it from many other Cornubian granites. The foliation has a deformation, not an igneous, origin, and is related to late strain during cooling on an adjacent major strike-slip fault.

**Architectural characteristics**

*Figure 33 De lank Quarry, a diamond circular saw cuts through a block of granite to produce ‘dimension’ stone*

![Image of De Lank Quarry](image)

Strong silver-grey granite suitable for high-status architectural and engineering applications. Facilities on site allow granite to be cut, shaped and polished.

**Significant buildings and structures using stone**

*Figure 34 London’s Tower Bridge*
• Eddystone, Smalls, Beachy Head and Bishop’s Rock lighthouses.
• Many buildings and structures in London including: Tower and Blackfriars Bridges, Royal Opera House, Trafalgar Square and, more recently, the Princess Diana fountain and the courtyard at Burlington House, Piccadilly. Many other buildings and engineering constructions such as the docks in Hull and Mumbai (Bombay).
• See Appendices of Stanier (1999) for full list of buildings and engineering structures which used De Lank granite.

Potential for future resources and exploitation
Excellent prospects for continuation of extraction, using existing infrastructure and access.

Potential for alternative stone sources
For this particular type of fresh, strong foliated granite there are really no alternative sources with planning permission. There are several other alternative sources of similar (but not the same) granite which have planning permission. The granite which is currently being obtained from the bottom of De Lank Quarry is largely free of any weathering effects and hence is particularly fresh and strong; there are few, if any, quarries in SW England which can supply such fresh granite.

Heritage Value Indicator
10/10

References
Stanier, 1995 and 1999
Floyd, Exley and Styles, 1993
Selwood et al, 1998
Smith 1999

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**Carnmenellis Granite Quarries (Granite2)**

**Granite 2a: Kessel Downs Quarry**

**Figure 35 Map of Kessel Downs Quarry (Granite2a)**

**Location**

(SW 739/339)

0.5km southwest of Longdowns.

**Site description**

Straddles the unclassified road between Longdowns and Constantine

**Operational and planning status**

Not currently working.

Planning permission lapsed.

**Granite 2b: Chywoon and Carnsew Quarries**

**Figure 36 Map of Chywoon and Carnsew Quarries (Granite2b)**
**Location**
(Chywoon SW 748/348 and Carnsew SW 761/347)
Chywoon - north east of Longdowns
Carnsew – north west of Mabe Burnthouse

**Site description**
Chywoon – within hillside north of A394
Carnsew – within elevated ground S of A394

**Operational and planning status**
Both quarries are operational.
Both quarries have extant planning permissions.

**Granite 2c: Trenoweth Quarry**
*Figure 37 Map of Trenoweth Quarry (Granite2c)*
**Location**
(SW 759/339)
South west of Mabe Burnhouse.

**Site description**
Small quarry close to Mabe primarily used for dressing imported stone.

**Operational and planning status**
Currently working.
Planning permission extant.

**Granite 2d: Trannack Quarry**
Figure 38 Map of Trannack Quarry (Granite 2d)
Location
(SW 666/300)
2km north of Helston.

Site description
Small quarry in Cober Valley primarily used for dressing imported stone.

Operational and planning status
Not currently working
Planning permission lapsed

Granite 2e: Other Quarries in Mabe/Longdowns/Constantine Area
Location
Various.

Site description
Figure 39 Polkanuggo Quarry in about 1900. A traction engine, granite slabs and a crane can be seen
Figure 40 Trolvis quarry, near Longdowns in the Carnmenellis granite

A typical scene of a deep dimension stone quarry, now flooded, with a tip of flawed blocks alongside. Abandoned quarries such as this provide an interesting range of habitats which creates valuable biodiversity.

Various disused building stone quarries within the Carnmenellis Granite. Some with poor access.

**Operational and planning status**
Not currently working.
Several quarries have dormant planning permissions.

**All Granite 2**
**Stone type/name**
Carnmenellis Granite.

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History
Not mentioned as ‘Kessel Downs’, ‘Chywoon’, ‘Trenoweth’ or ‘Trannack’ in Stanier’s Appendices, but probably active dimension stone quarries in the 19thC, which were reported under ‘Freeman’s’. ‘Trannach’ reported to be active and employing three persons in 1895. Carnsew certainly active in 19thC.

Geology and mineralogy
Carnmenellis granite Ga variety. To quote Leveridge et al (1990) “The Ga granite is composed of 15-120 mm alkali feldspar megacrysts in a coarse-grained matrix of alkali feldspar, plagioclase, biotite, quartz and white mica + chlorite, epidote and tourmaline…. The alkali feldspar megacrysts in some places show a pronounced linear or planar alignment”.

Carnsew and Trenoweth: Carnmenellis granite Gc variety. To quote Leveridge et al (1990) “This coarse grained granite contains abundant white alkali feldspar megacrysts, generally less than 15 mm, displaying a preferred alignment in some places……. It consists of alkali feldspar, plagioclase, quartz, biotite, white mica + tourmaline”.

Architectural characteristics
Typical granite from the Mabe/Longdowns/Constantine/Sithney area. Hill and MacAlistair (1906) refer to several different qualities being obtained from Carnsew.

Significant buildings and structures using stone
Figure 41 Granite buildings in the centre of Helston built from the nearby Carnmenellis granite

Nothing listed in the Appendices to Stanier (1999) for Kessel Downs, Chywoon, Trenoweth and Trannack, but this may be because the quarries had another name previously, or were included under the title ‘Freemans’. Carnsew was used as the main structural stone for the exterior of Truro.
Cathedral and for many other buildings and engineering structures both nationally and internationally, often in combination with other granites from SW England, see Appendices in Stanier (1999). These include Keyham Dockyard, Plymouth, Les Hanois and Wolf Rock lighthouses, London Bridge, parts of the British Museum and New Scotland Yard, the Crimea War Memorial (in the Crimea) and was also used in the European Parliament Building in Brussels.

**Potential for future resources and exploitation**

Good in the case of Kessel Downs, Chywoon and Carnsew, but these quarries main business is supplying aggregate. Trannack and Trenoweth are smaller.

These quarries are situated in the midst of a large granite intrusion, so the ultimate resource is probably very large. The main restrictions will be those imposed by other considerations.

Trenoweth offers full workshop facilities for sawing, polishing and re-dressing granite, as does Trannack which produces monumental and dimension stone with a range of cutting and polishing facilities, mainly working with stone brought in from elsewhere.

**Potential for alternative stone sources**

There are several options in this area. There are many other derelict quarries in this area (e.g. Trolvis, Polkauggo, Spargo, etc.) which have produced significant quantities of dimension stone in the past from what appears to be a similar type of granite.

**Heritage Value Indicator**

7/10 (for all quarries) with some potential to increase to 8/10.

**References**

Leveridge et al 1990
Stanier, 1999
Hill and MacAlistair, 1906

**Luxulyan Area Granite Quarries (Granite3)**

Granite 3a: Luxulyan Quarry (Tregarden Quarry)

Figure 42 Map of Luxulyan Quarry (Tregarden Quarry) (Granite3a)
Location
(SX 055/590)
1 km north of Luxulyan village.

Site description
Figure 43 Luxulyan (Tregarden) quarry, Luxulyan, before it was flooded, luxullianite could be found in situ just to the left of the excavator.
Originally this was a dimension stone quarry; latterly it became an aggregate quarry. A former dimension stone quarry, used predominantly for aggregate extraction in the second half of the 20th century.

**Operational and planning status**
Not operational.
Planning permissions extending both sides of valley are extant.

**Granite 3b: Carbean and Colcerrow Quarries**

*Figure 44 Map of Carbean and Colcerrow Quarries (Granite3b)*

**Location**
(Carbean SX 065/579 Colcerrow SX 064/578, Rock Mill SX 061/567 and Orchard SX 059/568
North east of Luxulyan Valley.

**Site description**
Disused quarries worked extensively in 19th century.

**Operational and planning status**
Disused
No planning permissions.

**All Granite 3**

**Stone type/name**
Luxulyan granite including Luxullianite.
History
Quarrying in the Luxulyan valley began around 1835 and was associated with the development of a major industrial complex involving, Fowey Consols copper mine, Par Harbour and the railway from Par to Newquay (see Keast 1982, Stanier 1999 and Smith’s Luxulyan Valley report 1988). Formerly called Goldenpoint Quarry, Luxulyan (Tregarden) quarry was initially a dimension stone quarry, later it became an aggregate quarry. Production of aggregate has now terminated.

The Luxulyan Valley Quarries heyday was in the mid-19thC, when they were one of the most important quarrying areas (for dimension stone) in South-west England. A special feature of the granite was its ability to be split into long narrow pieces, which could be used as gateposts, lintels, and pillars. The last dimension stone quarry closed just before the Second World War.

Geology and mineralogy
A very coarse grained biotite granite usually described as ‘coarse megacrystic’ or ‘big feldspar granite’. To quote from Floyd, Exley and Styles (1993) “It is characterised by biotite and zoned oligoclase (An 25-30) and contains abundant K-feldspar megacrysts between 20 and 100 mm in length....other minerals include muscovite, tourmaline, and trace quantities of apatite, topaz, andalusite, fluorite, zircon and iron ore (oxides and sulphides)”.

The quarries in the Luxulyan valley, such as Carbean and Colcerrow, yielded a similar type of granite.

Luxullianite is a coarse grained granite which has been metasomatically modified by boron containing fluids, so the rock is typically composed of pink orthoclase feldspar set a tourmalinotic matrix with some quartz. The vein of luxullianite recently exposed in the quarry bottom also contains blobs of pyrite. The luxullianite used for the Duke of Wellington’s tomb and for Porphyry Hall is reported to have come from loose boulders found in the fields at Trevanney Farm, about a mile and a half south of Luxulyan (Ussher et al 1909, pages 66-67 and Collins 1878, page 4) and only in the 1980s was luxullianite found in situ in Luxulyan (Tregarden) Quarry.

Architectural characteristics
A very distinctive coarse grained granite, which has a conspicuous ‘black and white’ texture. It would be difficult to satisfactorily restore a building built of Luxulyan granite with another kind of granite. Polished slabs can be quite dramatic, especially where the feldspar phenocrysts are aligned in flow patterns.

Significant buildings and structures using stone
Figure 45 The tower above Porphyry Hall, Place, Fowey, built from granite quarried at Treffry’s quarries in the Luxulyan valley – Carbean and Colcerrow
These are now part of a World Heritage site.

**Figure 46 The central rose in the floor of Porphyry Hall, Place, Fowey**

The central ‘bullseye’ is normal Luxulyan granite, surrounded by a ring of luxullianite. North, south, east and west segments are pale coloured topazfels from St Mewan Beacon. The black segments are schorl rock, largely composed of tourmaline and the other reddish segments are red stained Luxulyan granite. In the bottom right hand corner, outside the circle, is some Tremore Porphyry.
The famous Treffry viaduct in the Luxulyan valley is reputed to have been entirely constructed from moorstone boulders, before the opening of Carbean and Colcerrow quarries.

Stanier (1999) lists the following constructions which were made of ‘Luxulyan’ or Colcerrow granite:

- London, Glasgow, Gibraltar, Cardiff, Hull, Liverpool, Southampton and Tyne docks;
- Devonport, Portsmouth, Chatham, Woolwich and Pembroke naval dockyards;
- Plymouth (including the lighthouse), Dover and Alderney breakwaters;
- the Crystal Palace (Sydenham);
- Pryor’s (Petty Cury), Cambridge;
- Osborne House, I.O.W.;
- and the Caledonian Market (London).

Ussher et al (1909) also report that Luxulyan granite has been used in public buildings in Oxford, London and Rome as well as in London Bridge (not the present one), the British Museum, the Crystal Palace and Exeter Market Place.

Some Luxulyan (Tregarden) granite may also appear under the heading ‘Freeman’s’.

**Luxullianite:** The Sarcophagus for the Duke of Wellington’s tomb in the crypt of St Paul’s Cathedral, London is made of luxullianite. Porphyry Hall, Place, Fowey has polished slabs of luxullianite lining the walls. These slabs, together with the above mentioned Sarcophagus, were cut and polished in the 1830s at the Porphyry works situated at Fowey Consols copper mine, where the machinery was driven by water power.

**Figure 47 Polished luxullianite (red and black) and Tremore Porphyry in Porphyry Hall, Place, Fowey**
Polished columns of luxullianite and of a similar granite from Lanlivery, with yellow-buff, not red, feldspar and of red schorlaceous and grey porphyritic granite from St Blazey were reported by Ussher et al in 1909 to be in the Geological Museum and are now in the Geological Section of the Natural History Museum, London.

**Potential for future resources and exploitation**

Subject to technical, geological and economic assessment, Luxulyan granite could be supplied from the upper benches of the quarry above the flooded part. Possibly some large blocks could be obtained. Large boulders of granite in the overburden may be useable in situations where a ‘moorstone’ version of Luxulyan granite is required. Some rather poor luxullianite is also exposed above the water level, but the best luxullianite is believed to occur in the flooded quarry bottom (NE part).

It would be difficult to re-open quarries in the Luxulyan Valley, which produced a similar type of granite to Luxulyan (Tregarden), such as Carbean, Colcerrow, Orchard, etc. Luxulyan (Tregarden) represents the only practical source for this type of granite for restoration work.

Currently the lower part of Luxulyan (Tregarden) quarry is flooded to a depth of about 6m. However, the upper benches are available.

**Potential for alternative stone sources**

Little potential to substitute this unique stone.

**Heritage Value Indicators**

Luxulyan (Tregarden quarry) 10/10 Luxulyan valley quarries  8/10

**References**

Collins 1878
Ussher et al 1909
Smith 1988
Stanier 1999
Floyd, Exley and Styles 1993

**Carn Grey Quarry (Granite4)**

**Figure 48 Map of Carn Grey Quarry (Granite4)**
Location
(western quarry SX 034/551 eastern quarry SX 035/552)
Quarry 1 700m south west and Quarry 2 500m south west of the centre of the village of Trethurgy.

Site description
Figure 49 Face in Carn Grey granite, quarry below the Carn, now an amenity area. Most of the blotches on the faces are lichen not crystals
Both quarries are disused and partially flooded. The westernmost (Quarry 1) is a public amenity area by with only a small area of the quarry floor flooded. The eastern quarry (Quarry 2) has steep faces dropping down below water: there is no unflooded area of the quarry floor.

The tor known as Carn Grey lies immediately adjacent and above the western face of Quarry 1.

**Operational and planning status**
Disused quarries.
No planning permissions.

**Stone type/name**
Carn Grey granite

**History**
The Treffry Estate held the quarry in the mid-1840s, but do not appear to have engaged in intensive quarrying. Later Freeman’s (1880-1911) operated the quarry and Selleck, Nicholls & Co Ltd produced kerbs and building stone later still. Mentioned by Collins (1878), but otherwise there is little reference in the literature. Not mentioned by De la Beche (1839). Very little activity since the Second World War.

**Geology and mineralogy**
Medium-grained granite (never as coarse as Luxulyan granite), with a few scattered megacrysts of feldspar up to 40mm in length and quartz in rounded grains. Megacrysts of a dark mica (biotite) up to 10mm are also seen and seem to be characteristic of this granite. Exley (in Floyd, Exley
and Styles 1993) interprets this granite as having the textural characteristics of the granites forming the western part of the St Austell pluton, but the chemistry of the eastern part of the intrusion. Thin veins of tourmaline common and are characteristic of this granite.

**Architectural characteristics**
When fresh this granite is a pleasing silvery-grey colour and has a fine even grain making it suitable for the finer kinds of work (see the Market House, St Austell), but weathers to a buff colour, often with brown iron stains.

**Significant buildings and structures using stone**
*Figure 50 The Market House, St Austell, built from Carn Grey granite*

Note the reticulated finish of the granite fronting the ground floor and the details of the cornice. The Market House, St Austell (Grade 2*) and many of the older buildings in St Austell and neighbouring villages are constructed from this stone. The size of the quarries indicates that it must have been widely used. Some is believed to have been exported for use outside Cornwall and may well be included under ‘Freemans’ in Stanier’s (1999) appendices.

**Potential for future resources and exploitation**
The western quarry is now an amenity area, but it is likely to be technically feasible to extract some useful blocks of stone from this quarry. The eastern quarry would require dewatering.

**Potential for alternative stone sources**
Where it is required to match existing stone, this quarry (1) can be regarded as unique.

**Heritage Value Indicator**
8/10

**References**

*The Identification of Heritage Quarries* Minerals Safeguarding DPD Evidence Report
November 2016.
Nanpean, St Stephen and St Dennis area Quarries (Granite5)

Figure 51 Map of Nanpean, St Stephen and St Dennis area Quarries (Granite5)

**Location**
Gt. Wheal Prosper (Restowrack) SW 955/564, Cathedral Quarry SW 951/557, Burthy SW 919/555

**Site description**
Figure 52 China Stone boulders, freshly quarried in Great Wheal Prosper china stone quarry, near St Austell
China stone is a pale coloured granite with hardly any dark minerals, which is used in ceramics. It can also be used as a building stone, when it becomes known as ‘St Stephen’s Stone’. The interior of Truro Cathedral uses this stone because it is so light in colour.

Various quarries in the Nanpean-St Stephen-St Dennis area yield a pale coloured (leucocratic) low iron granite with Li-mica replacing biotite. Another small patch of this type of granite occurs between Hensbarrow and Stenalees. Many of the quarries have been worked for ‘china stone’ which is used as a flux in ceramic bodies, but not all granites which have been termed ‘St Stephen’s Stone’ are china stones. The most famous source of building stone was Cathedral quarry, near Nanpean, now long disused. Cathedral quarry yielded the stone for the interior of Truro Cathedral (Listed Grade 1).

Most of the china stone quarries have now been abandoned, such as Tregargus Quarry, near St Stephen, some backfilled. Some examples of this type of granite are to be found in the Boulder Park at Wheal Martyn Museum.

Li-mica granites also occur between Stenalees and Hensbarrow and there were several quarries which worked this occurrence, both for china stone and as a building stone. The upper, northernmost stopes of Gunheath china clay pit show weakly kaolinised granite typical of this area. St Paul’s Church, Charlestown (Listed Grade 2) used granite from this source.

Also included in this entry is Burthy Quarry (sometimes known as Dyer’s), 2km south of Fraddon, now infilled. Burthy granite is one of the earliest quarries in the St Austell area and is sometimes referred to by architectural historians.

**Operational and planning status**
- Cathedral Quarry – disused.
- Tregargus Quarry near St Stephen – disused and partially backfilled.
• Great Wheal Prosper china stone quarry – operational and included within china clay related planning permissions.
• Burthy Quarry – infilled.

**Stone type/name**
St Stephen’s Stone

**History**
Cathedral quarry is so named because it was used as the source of stone for the interior of the Cathedral. This was because it was a very light coloured (leucocratic) kind of granite. All buildings up to the beginning of the 19thC built of what the architectural historians call ‘St Stephen’s Stone’ were probably constructed using moorstone gathered from the moors between Nanpean, St Dennis and St Stephen’s.

The Stenalees/Hensbarrow quarries are now largely filled, but are known to have been active in the 19thC.

Burthy Quarry appears to have supplied a rather different kind of stone for local building purposes in the St Stephen’s area (see Stanier, 1999, p37).

Boulders of Hensbarrow/Gunheath granite, Gt Wheal Prosper china stone and various other types of stone from the china clay area are to be seen in the Boulder Park at Wheal Martyn.

**Geology and mineralogy**
The main china stone area yields a pale coloured (leucocratic) low iron granite with Li-mica replacing biotite, normally containing (when fresh) some tourmaline, topaz and fluorite. Usually, but not always, non-porphyritic. A good description of Tregargus china stone will be found in Floyd, Exley and Styles (1993).

The Stenalees/Hensbarrow quarries yield a non-porphyritic granite with an unusually high lithium content, giving the granite a feint purplish hue, with occasional inclusions of vividly coloured turquoise

Burthy Quarry was probably a biotite granite and not a true Li-mica granite, although Ussher (1909) refers to it containing apatite, topaz and fluorspar, a polished specimen of this granite is known to have existed in the collection of the Museum of Practical Geology in London and is now in the Natural History Museum collection in London.

**Architectural characteristics**
Most of these granites are pale coloured with a fine even grain and are reputed to be easier to work (i.e. softer) than most other granites. However, they may not resist weathering quite as well, although some 16thC Churches (e.g. Probus Church Tower) built of St Stephen’s Stone seem to be in relatively good condition. This type of granite (from Cathedral Quarry) was used to line the interior of Truro Cathedral because of its almost white colour, enabling the interior to be lightened.
Significant buildings and structures using stone

Figure 53 Probus Church tower, built of a pale coloured granite which the architectural historians call 'St Stephen’s Stone'

- Probus Church and tower (Listed Grade 1)
- Truro Cathedral (Listed Grade 1 – Cathedral Quarry),
- Some buildings in Lemon Street, Truro (Listed an in Conservation Area), St Paul’s, Charlestown (Grade 2 – Hensbarrow/Stenalees granite).

Potential for future resources and exploitation

Great Wheal Prosper china stone quarry may have the potential to supply walling stone. There may be potential at Tregargus china stone quarry, near St Stephen, which is disused and an SSSI (SW 949/541). Supplies of the high Li-mica granite from the Hensbarrow/Stenalees area may possibly be obtainable from the upper stopes of Gunheath china clay pit (about SX 005/572). However, care would have to be taken to ensure that any granite from this source has not been weakened by kaolinization. Burthy quarry is now infilled.

Potential for alternative stone sources

This is a unique stone type: most other operating granite quarries in SW England are working a biotite granite, which is distinctly different in appearance.

Heritage Value Indicator

8/10

References

The Identification of Heritage Quarries Minerals Safeguarding DPD Evidence Report

November 2016.
Location
Northern quarries: SX 374/717, southern quarries SX 376/712.
About 2 km north east of Callington.

Site description
A complex of three large quarries on the southern slopes of Kit Hill and a complex of two large quarries on the northern side of the hill.

Operational and planning status
Abandoned moorstone and quarrying activities: the last quarry closed in 1955.
No planning permission.

Stone type/name
Kit Hill Granite

History
Quarries worked from the early 19th century until the mid-20th century. There is also abundant evidence all over the hill of early moorstone working (see Herring and Thomas 1990).

**Geology and mineralogy**
Comparatively little has been published concerning the Kit Hill granite. This may be because it is a standard non-porphyrritic biotite granite, typical of the Cornubian batholith. It is medium to coarse grained (Reid et al, 1911).

**Architectural characteristics**
The best stone came from the northern quarries, possibly because they are deeper, giving access to fresher granite. The quarries had the reputation of yielding large blocks of stone (Reid et al, 1911).

**Significant buildings and structures using stone**
Herring and Thomas (1990) report "Kit Hill granite was used on a number of important public works: Millwall and Tilbury docks, Lambeth and Putney bridges in London, and Singapore docks (Venning, 1934, 6); London Bridge (1935) (Bishop, 1987, 52); Blackfriars, Battersea, Chelsea, and Waterloo bridges; Bishop’s Rock and Hanois (Guernsey) lighthouses, Devonport dockyards, Plymouth streets, Thames embankment, Beatty and Jellicoe memorial in Trafalgar Square, Gibraltar dockyards (W.M.N. 28.10.1955 and the last major project, Battersea Park Wall (Tom Symans, recorded by Ann Eade).”

In addition MacAlister in Reid et al, 1910 reports "The quarry on Kit Hill which is in the hands of the Kit Hill Granite Company has been worked continuously for upwards of 25 years, and occasionally as many as 200 men have been employed in raising and dressing the stone. Blocks of great size can be supplied from these quarries. The manager, Mr. F.R.L. Chalk, informs us that the stone has been employed by the Admiralty, Metropolitan Board of Works, Trinity House, and many other corporations, etc. The whole of the stone, some 70,000 cubic feet, for the bridge over the Thames at Battersea was supplied from these quarries. When contracts for stone are not being carried out, the men are employed in making brick-shaped setts for roads and buildings”.

**Potential for future resources and exploitation**
As most of Kit Hill is underlain by granite, the ultimate resources must be large. Re-opening may be technically feasible, but the environment is sensitive. Some moorstone may be available.

**Potential for alternative stone sources**
This is not a very distinctive type of granite, so substitution by granite from elsewhere in Cornwall is a possibility. Kit Hill may be a source of moorstone where this is specifically required.

**Heritage Value Indicator**
8/10

**References**

The Identification of Heritage Quarries Minerals Safeguarding DPD Evidence Report
November 2016.
Herring and Thomas (1990)
Reid et al (1911)
Stanier (1999)

**Hingston Down Quarries (Granite7)**

**Figure 55 Map of Hingston Down Quarries (Granite7)**

![Map of Hingston Down Quarries](image)

**Location**
Several Quarries to the north of St Anne’s Chapel

**Site description**

*Figure 56 Hingston Down Quarry Aggregate Operations*
The Hingston Down granite contains a number of granite quarries (Stanier, 1999 24-26), but this granite has not been extensively exploited as a dimension stone. This is partly because of significant kaolinization in places and partly because of much variation in granite type.

**Operational and planning status**
Hingston Down Quarry has extant planning permissions and is operational, producing aggregate. The remaining quarries are disused and have no planning permissions.

**Stone type/name**
Hingston Down Granite

**History**
There is evidence of early moorstone cutting and, when railways reached the area quarries at Gunnislake (Pearson’s) and on Hingston Down itself (Whiterocks) developed.

Hingston Down Quarry was never a significant dimension stone producer as its fine grained granite was more suited to the production of granite setts and aggregate: it is now a large aggregate quarry.

Gunnislake (Pearson’s) Quarry was a more significant dimension stone producer and, at times, up to 200 men were employed in the early 20thC.

**Geology and mineralogy**
There is little published information about the granite in Gunnislake (Pearson’s). Several other small quarries were active in the Hingston Down granite, for what information there is see Stanier (1999).

**Architectural characteristics**
Little known

**Significant buildings and structures using stone**
Not known

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The Identification of Heritage Quarries Minerals Safeguarding DPD Evidence Report
November 2016.
**Potential for future resources and exploitation**  
Not known

**Potential for alternative stone sources**  
Not known

**Heritage Value Indicator**  
7/10.

**References**  
Stanier (1999)

**South East Bodmin Moor Quarries (Granite8)**  
Granite 8a: Cheesewring Quarry and Gold Diggings Quarries  
**Figure 57 Map of Cheesewring Quarry (Granite8a)**

**Location**  
Cheesewring Quarry SX 258/723  
1 km north of Minions

**Site description**  
**Figure 58 The Cheesewring quarry, southeast Bodmin Moor**
Granite from here was exported via the Liskeard and Caradon railway through the port of Looe to destinations all over Britain and the world. Large disused granite quarry, immediately below the Cheesewring Tor.

**Operational and planning status**
Disused quarry.
Dormant planning permission.

**Stone type/name**
Cheesewring Granite

**History**
Moorstone cutting took place on a considerable scale in the Cheesewring sett in the mid-19thC, the cut granite was removed by the Liskeard and Caradon railway. By 1844 quarrying at the Cheesewring had commenced and continued on a substantial scale until the railway closed in 1916. Some small-scale quarrying continued until the mid-fifties and more recently some reject blocks of granite were removed from the finger tips for armourstone work. An excellent account of the present state of the quarry and associated archaeological remains will be found in Sharpe (1993, 122-132), also Martin Eddy’s article in Spalding et al 1999 contains useful information about the history.

**Geology and mineralogy**
Little has been published on the petrology of the Cheesewring granite, although this is known to be a fairly ‘standard’ non-porphyritic biotite granite. Barrow (in Reid et al 1911) reports "The granite of the Cheesewring is a durable rock of medium grain, with feldspars about an inch long, intermediate between the fine and coarser types of coarser granite. Its colour is pale.”
Occasional foliation is sometimes seen and there is a strongly developed ‘bedding’ jointing developed parallel to the present land surface, which becomes less pronounced in depth.

Hawkes and Dangerfield (1978) describe this kind of granite as ‘coarse mesocrystic granite’; they define this granite type as “The mesocrystic type is characterised by feldspar crystals, here termed mesocrysts, which are smaller on average than megacrysts, and commonly arranged to give the rock a distinctive linear (foliated) texture…..with a typical mesocryst length from 15 to 40mm. The mesocrysts are generally more closely packed than are the megacrysts of other coarse-grained varieties, but because of their smaller size constitute a relatively small proportion of the whole rock”.

Later Hawkes et al (1987) revised their classification and used the term ‘smaller megacryst variant’ instead of ‘mesocryst’.

**Architectural characteristics**

This is a fairly ‘standard’ granite, typical silver-grey in colour and medium to coarse grained. It is similar, but not exactly the same, as De Lank, Kit Hill and many of the granite quarries in the Carnmenellis granite.

**Significant buildings and structures using stone**

Sharpe (1993) mentions that stone for the Spithead, Thames and Medway forts was supplied from the Cheesewring in 1868 and in the 1870s stone was used for the Albert Memorial and the Guards Memorial in the Crimea. In the 1920s Cheesewring stone was used for the King George V dock in Calcutta and for Lambeth Bridge.

Reid et al (1911) report that the stone was used in the Bull’s Point Powder Magazine and the Pier on the Tamar at Plymouth, for the Guard’s Memorial in Waterloo Place and for the pilasters of Westminster Bridge. Stanier (1999) also lists Birkenhead, ‘London’, Southampton and Copenhagen Docks; Devonport Dockyard, Portland and Alderney Breakwaters, Great Basses (Ceylon) and Fastnet lighthouses, Tower, Lambeth and Rochester Bridges, the Embankment and the Great Exhibition Memorial, London.

**Potential for future resources and exploitation**

In view of the presence of the Cheesewring and other archaeological remains, the options for re-working this quarry may be limited, but it should be physically possible to remove small quantities of stone for special restoration projects.

**Potential for alternative stone sources**

This stone may be required where a close match with stone in an existing listed structure is needed. Otherwise, many other quarries in Cornwall could supply similar stone.

**Heritage Value Indicator**

8/10
**Gold Diggings Quarry**
About half a mile west of the Cheesewring quarry, presents a similar situation to the Cheesewring quarry except much of the dimension stone working layout is preserved. Potentially more sensitive site from the industrial archaeological point of view.
**Heritage Value Indicator 7/10.**

**References**
Sharpe 1993
Stanier 1999
Reid et al 1911
Spalding et al 1999, 91-93.

**Granite 8b: Notes on Kilmar Tor and Bearah Tor Quarry**
**Figure 59 Kilmar Tor and Bearah Tor Quarry (Granite8b)**

**Location**
Approximately 1.5 km North West of Henwood

**Site description**
Figure 60 Finger dumps at Bearah Tor Quarry
Workings for moorstone in this area have been extensive, with a small amount of real quarrying. Bearah Tor Quarry is still active, extracting small quantities of dimension stone or reworking stone from old deposits and processing blocks for monumental use. This could be a useful and practical source of moorstone.

**Operational and planning status**
Bearah Tor Quarry is operational with an extant planning permission.

**Heritage Value Indicator**
8/10

**References**
Sharpe 1993
Stanier 1999
Reid et al 1911
Spalding et al 1999, 91-93.

**Tregoning Hill Granite Quarries: Tolmennor and Gluyas (Granite9)**
Figure 61 Map of Tregonning Hill Granite Quarries (Granite9)
Location
(SW 606/293)
Approximately 1.7 km north east of Germoe.

Site description
Tolmennor Quarry is on the east and Gluyas Quarry is on the west of Tregonning Hill.

Operational and planning status
Disused.
No planning permissions.

Stone type/name
Tregonning Granite.

History
Possibly worked from the Medieval period.

Geology and mineralogy
The Tregonning granite is of a similar type to the lithium mica granites of the St Austell granite mass.

Architectural characteristics
The Tregonning granite was highly prized as a creamy coloured building stone which had the reputation of being easy to work, possibly because it was weakly kaolinized.

**Significant buildings and structures using stone**
Borlase (1758) and Worth (1875) report that it was widely used for medieval and later Church building in West Cornwall.

**Potential for future resources and exploitation**
Not known

**Potential for alternative stone sources**
Not known

**Heritage Value Indicator**
8/10.

**References**
Borlase (1758) and Worth (1875)

**Lands End Granite Quarries (Granite10)**
Granite10a: Lamorna Quarry

**Figure 62 Map of Lamorna Quarry (Granite10a)**

**Location**
(SW 452/243)

The Identification of Heritage Quarries Minerals Safeguarding DPD Evidence Report
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Lamorna Cove

**Site description**
Large dimension stone granite quarries on hillside above Lamorna Cove.

**Operational and planning status**
Disused.
No planning permission.

**Stone type/name**
Lamorna granite.

**History**
The Freemans developed a quarry on the east side of the valley above the cove which continued into the early 20thC. Most of the granite was shipped away through a small harbour in the cove.

**Geology and mineralogy**
The Land’s End granite is some 10-15 million years younger than the much more intensely quarried Carnmenellis and Bodmin Moor granites. Several writers comment that these older granites yield better quality granite and it is true that the Land’s End granite does not contain large area of the ‘coarse grained megacrystic biotite-granite – smaller megacryst variant’ (Hawkes et al 1987) which is the type widely exploited at Carnmenellis and on Bodmin Moor. However, mineralogically Lamorna is a typical Cornubian abundantly megacrystic biotite granite.

**Architectural characteristics**
A very coarse grained grey granite with large feldspar crystals. The crystals interlock and lie in all directions, which give the rock strength, but make it difficult to quarry. Several writers comment that the Land’s End granites are not such good quality as those from Carnmenellis.

**Significant buildings and structures using stone**
Mitchell (1977) states "Lamorna granite was used in the building of the Embankment in London, the new pier at Mousehole, the Wolf Rock lighthouse, the base of Sir Humphry Davy’s monument in Market Jew St., Penzance; the steps of St John’s Hall were also from Lamorna, in one case a block 18 feet in length was used”.

Local tradition says that the whole of the St John’s Hall building was built with Lamorna granite.

In addition Stanier (1999) lists Devonport Dockyard, Portland and Alderney breakwaters, Bishop Rock (first) lighthouse, Bank of New Zealand (Moorgate, London), Café Monico (Piccadilly), Lloyd’s Bank (Lombard St.), New Scotland Yard (the old one!) buildings as having used some Lamorna granite.

**Potential for future resources and exploitation**
As with most of the granite quarries in the South-west, the ultimate resources of quarry able granite are very large, but practical and environmental considerations suggest that working in this scenic location may not be acceptable.

**Potential for alternative stone sources**
Lamorna granite is a little different to most of the other granites in the Carnmenellis, Bodmin Moor and Kit Hill masses, so may have a certain uniqueness. There are, however, other quarries (Sheffield and Castallack,) which have also worked a similar granite.

**Heritage Value Indicator**
7/10

**References**
Stanier, 1999
Reid and Flett, 1907
Goode and Taylor 1988
Mitchell 1977

**Granite10b: Notes on Castallack Quarry**
**Figure 63 Castallack Quarry (Granite10b)**

**Location**
(SW 447/254)
1 km north east of Lamorna

The Identification of Heritage Quarries Minerals Safeguarding DPD Evidence Report
November 2016.
**Site description**
Large dimension stone granite quarry

**Operational and planning status**
Disused.
Dormant planning permission.

**Stone type/name**
Lamorna granite.

**History**
Castallack Quarry produced a significant amount of stone judging by the size of the quarries. Stanier (1999, 47-48) gives some operational details.

**Geology and mineralogy**
The Land’s End granite is some 10-15 million years younger than the much more intensely quarried Carnmenellis and Bodmin Moor granites. Several writers comment that these older granites yield better quality granite and it is true that the Land’s End granite does not contain large area of the ‘coarse grained megacrystic biotite-granite – smaller megacryst variant’ (Hawkes et al 1987) which is the type widely exploited at Carnmenellis and on Bodmin Moor. However, mineralogically Lamorna is a typical Cornubian abundantly megacrystic biotite granite.

**Significant buildings and structures using stone**
Granite appears to have mainly been used for local buildings and monuments.

**Heritage Value Indicator**
6/10

**References**
Stanier (1999)

Granite10c: Notes on Sheffield Quarry
Figure 64 Map of Sheffield Quarry (Granite10c)
**Location**
(SW 454/268)
1.5 km west of Mousehole.

**Site description**
Large dimension stone granite quarry

**Operational and planning status**
Disused.
No planning permission.

**Stone type/name**
Lamorna granite.

**History**
Sheffield Quarry produced a significant amount of stone judging by the size of the quarries. Stanier (1999, 47-48) gives some operational details.

**Geology and mineralogy**
The Land’s End granite is some 10-15 million years younger than the much more intensely quarried Carnmenellis and Bodmin Moor granites. Several writers comment that these older granites yield better quality granite and it is true that the Land’s End granite does not contain large any of the ‘coarse grained megacrystic biotite-granite – smaller megacryst variant’ (Hawkes et al 1987) which is the type widely exploited at Carnmenellis and on Bodmin
Moor. However, mineralogically Lamorna is a typical Cornubian abundantly megacrystic biotite granite.

**Significant buildings and structures using stone**
Granite appears to have mainly been used for local buildings and monuments including the Penzance War Memorial.

**Heritage Value Indicator**
6/10

**References**
Stanier (1999)

**Granite10d: Castle-an-Dinas Quarry**
**Figure 65 Map of Castle-an-Dinas Quarry (Granite10d)**

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**Location**
(SW 487/347)
2.5 km North West of Ludgvan.

**Site description**
Large granite quarry producing predominantly aggregates with some building and hedging stone. In elevated position at northern lobe of Land’s End granite intrusion.
Operational and planning status
Operational
Planning permissions extant.

Stone type/name
Land’s End granite.

History
Not known.

Geology and mineralogy
Fine grained granite with some Kaolinisation. The Land’s End granite is some 10-15 million years younger than the much more intensely quarried Carnmenellis and Bodmin Moor granites. Several writers comment that these older granites yield better quality granite and it is true that the Land’s End granite does not contain large area of the ‘coarse grained megacrystic biotite-granite – smaller megacryst variant’ (Hawkes et al 1987) which is the type widely exploited at Carnmenellis and on Bodmin Moor.

Significant buildings and structures using stone
Not known.

Heritage Value Indicator
7/10

References
Stanier (1999)

Greenstones
Cataclews Quarry (Greenstones1)
Figure 66 Map of Cataclews Quarry (Greenstones1)
**Location**
1.7 km north east of Constantine Bay on the north coast. Quarry 1 is at Cataclews Point: SW 873/762, Quarry 2 between Cataclews Point and Mother Ivey’s bay: SW 870/761.

**Site description**
Figure 67 Quarry 1, Cataclews Point, North Cornwall
This looks as if it is the older quarry used by the medieval masons to obtain the greenstone called Cataclews Stone, which is a steeply dipping dolerite dyke intruded into Upper Devonian slates and limestones.

**Figure 68 Quarry 2, near Cataclews Point, North Cornwall**

This looks as if it has been worked up until relatively recent times and it would not be too difficult to obtain small supplies of the dolerite called ‘Cataclews Stone’ from here. Quarries in cliff top locations.

**Operational and planning status**
Disused quarries.
No planning permission.

**Stone type/name**
Cataclews (Catacleuse)

**History**
Stone was extracted in the early 15thC to provide many beautifully carved features in the churches of this area. Pevsner suggests that these carvings are all by the same hand which he calls ‘The Master of St Endellion’. Arches and window tracery in many churches also use this stone. It is supposed that the early extraction was from Quarry 1 which is hollowed out from Cataclews Point itself, the floor of this quarry is only just above HWM and there is no access track into the quarry. Quarry 2 looks much more recent and must have been active up to post WW2 times.

**Geology and mineralogy**
An Upper Devonian (Givetian/Frasnian) sill of hydrous alkali dolerite with a primary magmatic assemblage of olivine, strongly pleochroic colourless to pink clinopyroxene, plagioclase, brown kaersutite amphibole, dark brown biotite, ilmenite and cored apatite needles, with small, entrained, granular textured, olivine-clinopyroxene (wehrlite) xenoliths. The sill is variably altered and partially altered to prehnite-pumpellyite-facies assemblages (Selwood et al, 1998 – Trevose Head and Camelford Memoir, Reid et al, 1910). The sill bifurcates, with Quarry 1 in the southern branch and Quarry...
2 in the northern. Some crystal fractionation has taken place and there are coarse- and fine-grained parts to the intrusion, as well as chilled margins. For sculpting the more massive uniform central portion of the sill seems to have been preferred.

**Figure 69 Close up of the surface of Cataclews Stone in the floor of quarry 1**

The white streaks are veins of calcite, which the medieval masons appear to have avoided.

**Architectural characteristics**
This is a hard dark green stone which can take a polish when required. On polishing it becomes a very dark green. Judging by many external features, such as window tracery, it resists weathering very well, with many 500 year old windows in Churches looking almost as sharply carved as the day they were incorporated into the building. For this reason, the need for stone to replace rotten and weathered old stone is going to be minimal. It is very hard and probably quite difficult to carve.

**Significant buildings and structures using stone**
Figure 70 Window tracery made of Cataclews Stone at St Mellion Church
This valuable stone is one of the ‘classic’ building stones of Cornwall. It is used mainly for special features rather than whole buildings. See Pevsner (1951) for details: features of Cataclews stone seen in St Mabyn (west doorway, Grade 1), St Merryn (windows, pillars, arches, font, etc.), St Issey (Reredos, etc.), Padstow (Grade 1, font, porch), St. Endellion (Grade 1, tomb chest, stoop, etc.).

**Potential for future resources and exploitation**
There may be potential to access Quarry 2 to remove small quantities of stone for restoration work.

**Potential for alternative stone sources**
This is a very important and distinctive stone. There are no substitutes for restoration of special features.

**Heritage Value Indicator**
References
Carew (1602), page 17
Pevsner (1951).
Reid et al (1910) – Padstow and Camelford Memoir, pages 42, 46, 91.

Polyphant Quarry (Greenstones2)
Figure 72 Map of Polyphant Quarry (Greenstones2)

Location
(SX 260/825 “New Quarry”)
About 0.5 km northwest of the village of Polyphant

Site description
Figure 73 The quarry in talc-carbonate rock known as ‘Polyphant Stone’, near Launceston
This quarry supplied stone for the restoration of Newquay Parish Church. Small supplies of stone are still being obtained from this quarry.

Located within the wooded, steeply sloping west side of the River Inny valley.

**Operational and planning status**
Intermittent and small scale extraction of stone: mainly for sculpting and ornamental use. Planning permission extant.

**Stone type/name**
Polyphant Stone.

**History**
Polyphant Stone appears to have been first exploited by the Normans, it has since then been quarried on a small scale right up to the present. It is reported that the quarry is only worked 3 - 4 weeks a year and all material is processed at Yelvertoft near Northampton. There is an older quarry (SX 256/826) which is now overgrown.

**Geology and mineralogy**
Complex geology and mineralogy. The Polyphant Ultrabasic Complex is just over 2m long and about 0.5 km wide, elongated NW-SE. It is thought to be a thrust slice of no great thickness; Chandler et al (1984) suggest it is just over 30m in thickness. It is mainly composed of peridotite, with some gabbro and dolerite. The older descriptions use the term ‘picrite’ for this ultrabasic rock; the latest descriptions suggest that the original rock would

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have been close to an ultrabasic rock type called ‘lherzolite’. No really fresh peridotite is seen; the freshest material contains serpentinized olivine, pyroxene, brown hornblende and biotite. Secondary tremolite after olivine, biotite and primary amphibole is commonly present. (Floyd, Exley and Styles 1993 and Power and Scott 1995). Fluids rich in carbon dioxide passing along fault planes and other lines of weakness have altered the original peridotite to a mixture of talc, carbonate (usually dolomite) and chlorite, plus other minor constituents, a process known as ‘carbonatization’. The extent of the alteration is highly variable, with nearly fresh peridotite often occurring within a few metres of carbonatized rock. It is the soft, easily carved talc-rich material which is usually referred to as ‘Polyphant Stone’. However, some of the harder, fresher peridotite may also have been quarried for use as building stone as well, being described as stone from Polyphant. There are two quarries about 0.5km SE of Polyphant village in completely separate dolerite masses (Blackhill Quarry - SX 268/818 and a former C.C.C. quarry - SX 269/820) but these have only been used for building locally.

**Architectural characteristics**
Polyphant Stone is a soft, easily carved stone which will take a polish to become a dark green rock. It is not suitable for exterior work. One of the ‘classic’ building stones of Cornwall.

**Significant buildings and structures using stone**
Figure 74 Part of the Boer War Memorial in Truro Cathedral, carved from Polyphant Stone

Polyphant Stone is found in many medieval and later Churches throughout central and east Cornwall (Worth 1875). Reid et al (1911) mention that
Polyphant Stone was extensively used in Launceston Castle and Priory, but has not lasted well where it is now at the mercy of the elements in ruined buildings. The Roman Catholic Church has a font made of a spheroidally weathered hemisphere of Polyphant Stone. The Boer War Memorial, just inside the west door of Truro Cathedral, is made of polished Polyphant Stone. Outside Cornwall, Reid et al (1911) report that it has been used as a decorative stone in the tomb of Archbishop Temple in Canterbury Cathedral and some of the columns in Exeter Cathedral are said to be of Polyphant Stone. He also mentions that the stairway at the offices of the Ecclesiastical Commissioners in London used Polyphant Stone. About 20 years ago a sculpture was commissioned for the Cathedral at Christchurch in New Zealand, which was created from Polyphant Stone. St Paul’s Church in Truro is said to be built of Polyphant Stone, but this does not look like a proper Polyphant Stone and it may be a less altered ultrabasic or basic rock from Polyphant (‘stone from Polyphant’, as opposed to proper ‘Polyphant Stone’) which has been used. The quarry supplied stone for the restoration of Newquay Parish Church.

**Potential for future resources and exploitation**
Drilling in the 1980s indicated that the extent of the talc-carbonate rock is limited. However there is probably sufficient stone in the vicinity of ‘New Quarry’ to supply limited requirements for restoration and small scale applications for some time to come.

**Potential for alternative stone sources**
Practically unique stone especially if matching with existing stone work is required. However, there may be potential to source dissimilar talc carbonate rock from Greystone Quarry.

**Heritage Value Indicator**
9/10

**References**
Worth 1875
Reid et al 1911
Chandler et al 1984
Floyd Exley and Styles 1993
Power and Scott 1995

**Duporth (Greenstones3)**
Figure 75 Map of Duporth (Greenstones3)
**Location**  
(SX035/510)  
0.5km south west of Charlestown

**Site description**  
Occurs within the Cliffs at Duporth Bay

**Operational and planning status**  
No operations.  
No planning permission.

**Stone type/name**  
Duporth Stone.

**History**  
There is no quarry, stone having been excavated from the exposure in the cliffs.

**Geology and mineralogy**  
A sheet of dolerite occurring in the cliffs at Duporth Bay near St Austell has been altered to a talc-carbonate assemblage (Power and Scott 1995) and this is known as ‘Duporth Stone’. It is similar to Polyphant Stone, but is slightly paler in colour and, in places has a pronounced spotty appearance caused by the talc, chlorite and dolomite forming spherical aggregates.
Architectural characteristics
Soft, easily carved rock suited to interior uses.

Significant buildings and structures using stone
According to a report on a Geologist’s Association field Excursion to Cornwall in 1887 (Anon, 1889), during which the party paid a visit to Truro Cathedral building site, it is reported that Duporth Stone was being used extensively for the columns and other works in the Cathedral. This can be seen today, in the form of greenish-grey shafts forming part of the columns around the baptistery and in other pillars. Duporth Stone was also used (in the 20thC) in the Rood Wall in St Paul’s Church, Charlestown.

Potential for future resources and exploitation
The cliffs at present are soft and crumbling, but, subject to further assessment a small headland within the Bay might be able to provide some very limited supplies of stone.

Potential for alternative stone sources
Very limited. Polyphant stone is darker.

Heritage Value Indicator
7/10.

References
Report on a Geologist’s Association field Excursion to Cornwall in 1887 (Anon, 1889)

Tregongeeves Quarry (Greenstones4)
Figure 76 Map of Tregongeeves Quarry (Greenstones4)
Location
(SX 000/515)
0.7km south west of St Austell

Site description
Backfilled, disused quarry. Currently used as Council Depot.

Operational and planning status
No quarrying operations.
Dormant mineral planning permission.

Stone type/name
Dolerite (greenstone) – sometimes erroneously called blue elvan.

History
Little known. Tregongeeves and Tregongews quarries reported to be operated by St Austell Rural District Council in 1895 list of quarries. Tregongeeves mentioned in Bodmin and St Austell Memoir as operational around 1900.

Geology and mineralogy
Large dolerite (greenstone) intrusion, very dark green in colour. Ophitic structure. Composed of oligoclase, hornblende (often as tufted bundles of sub-radiate needles) and augite, with smaller amounts of granular epidote and sphene or leucoxene after titaniferous iron oxides. Veins of axinite

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suggest it is just within the metamorphic aureole of the St Austell granite. See Flett in the Bodmin and St Austell Memoir (1909).

Architectural characteristics
A very dark green, almost black, stone. Probably not easy to shape and work. (The main use for stone from this quarry would probably have been as crushed aggregate).

Significant buildings and structures using stone
Local use only:
- Public Rooms in Truro Road, St Austell.
- Freemasons Hall, South Street, St Austell.
- Row of houses at the south end of Pondhu Road, St Austell.

Potential for future resources and exploitation
In 2002 a small face at the south end of the quarry was still visible, which could yield some blocks of this stone without too much difficulty, but active backfilling was in progress, so this may not exist much longer. Stone may be weathered.

Potential for alternative stone sources
Other possible sources for a dolerite would include Greystones quarry near Launceston, Lean Quarry near Liskeard, Blackhill quarry at Polyphant and Cataclews Stone from North Cornwall.

Heritage Value Indicator
6/10

References

Further note
Tregongeeves quarry is part of a group of disused quarries west of St Austell, all of which worked dolerite intrusions. Trewhiddle quarry (SX 003/517 – now filled in), Hill’s quarry (SX 002/522, partially filled in), Chipponds quarry (SX 003/523 – filled in) and an un-named quarry (SX 003/521) form the rest of this group. Most appear to have been worked as roadstone aggregate.

Molingey Quarry (Greenstones5)
Figure 77 Map of Molingey Quarry (Greenstones5)
Location
(SX 013/499)
2 km south of St Austell.

Site description
Flooded quarry in wooded eastern side of valley

Operational and planning status
No extraction in recent past.
Dormant planning permission.

Stone type/name
Dolerite.

History
Worked up to 1960’s by ECC Group.

Heritage Value Indicator
3/10

Tubbs Mill Quarry (Greenstones6)
Figure 78 Map of Tubbs Mill Quarry (Greenstones6)
Location
(SW 962/433)
2km northwest of Caerhays Castle, on Roseland Peninsula.

Site description
Two quarries in wooded eastern side of valley with limited access on minor roads.

Operational and planning status
Disused.
Dormant planning permission.

Stone type/name
Greenstone.

History
Not known.

Geology and mineralogy
In a greenstone mass, probably an olistolith of basaltic pillow lava, contained within the Upper Devonian Roseland Breccia Formation.

Architectural characteristics
Not known.
Significant buildings and structures using stone
None known.

Heritage Value Indicator
3/10

Lean Quarry (Greenstones7)
Figure 79 Map of Lean Quarry (Greenstones7)

Location
Horningtops, about 3 km south of Liskeard

Site description
Former quarry now a landfill site.

Operational and planning status
No quarrying operations. Landfilling of the quarry void being undertaken.
No planning permission for extraction.

Stone type/name
Dolerite.

History
Quarry worked in the past primarily for aggregate, but also for walling and landscaping stone (Leveridge et al 200) pp4 and 87).
**Geology and mineralogy**
Basaltic lava and associated dolerite. To quote from Leveridge et al "The lava which is well cleaved, commonly comprises well developed pillows up to 0.5m, with chlorite and calcite infilling vesicles. The intimate association of the dolerite, which consists of granular and subophitic plagioclase, augite and opaque iron oxide, points to the possibility that it represents magmatic feeders."

**Architectural characteristics**
Unknown.

**Significant buildings and structures using stone**
Unknown.

**Potential for future resources and exploitation**
Landfilling will potentially sterilise any remaining resources.

**Potential for alternative stone sources**
Unknown

**Heritage Value Indicator**
7/10

**References**

**Tintagel Greenstones (Greenstones8)**
Figure 80 Map of Tintagel Greenstones (Greenstones8)
Location
Unknown.

Site description
Potentially sources from cliffs in the vicinity of Trebarwith.

Operational and planning status
No current extraction.
No planning permission.

Stone type/name
Tintagel Greenstone.

History
Unknown.

Geology and mineralogy
Basaltic tuffs, agglomerates and lavas of Lower Carboniferous age. Highly variable in appearance and suitability as a building stone. Intense regional metamorphism has caused the original minerals to recrystallize to platy minerals such as sericite (illite) and chlorite with much carbonate and iron oxides. This stone has some similarity to Hurdwick Stone, which was extensively used for buildings in the centre of Tavistock.

Architectural characteristics
The finer grained tuffs appear to be the most suitable building stones. They are green in colour and appear to be readily carved (c.f. Hurdwick Stone).

**Significant buildings and structures using stone**

Figure 81 The stone around this doorway in Tintagel Castle is carved from ‘Tintagel Greenstone’

![Image of Tintagel Greenstone doorway](image)

This is a Lower Carboniferous volcanic rock, rather similar to ‘Hurdwick Stone’, exploited near Tavistock, where it has been widely used in the older buildings in the town centre.

Important stone used in local buildings. The arches in Tintagel Castle are cut from this stone and it is also seen in Tintagel Church (St. Materiana, Grade 1) and the Old Post Office (Grade 1). Churches elsewhere in North Cornwall also often contain features made of this stone, because of its workability.

**Potential for future resources and exploitation**

Very sensitive environment, where stone extraction, other than micro extraction for restoration purposes is likely to be unacceptable.

**Potential for alternative stone sources**

Hurdwick Stone may be a possible substitute. The Hurdwick quarry is 1 mile north of Tavistock in Devon and is listed as being operated by R.J. Cullen of Callington (01822 612746).

**Heritage Value Indicator**

5/10

**References**

Freshney et al, 1972, 42-47.

**Greystone Quarry (Greenstones9)**

Figure 82 Map of Greystone Quarry (Greenstonese9)
**Location**
(SX 365/804)
5 km south east of Launceston

**Site description**
Figure 83 Greystone dolerite quarry (Lower Carboniferous) near Launceston
Upper Devonian slate (brown) can be seen forming the face behind the upper bench, above a major thrust fault. This quarry’s mainly produces aggregate.

The quarry occupies a well screened position on the west side of the valley of the River Tamar, immediately west of Greystone Bridge. The hard dolerite which is exploited in the quarry forms a constriction in the valley at this point.

**Operational and planning status**
Operational aggregate quarry.
Extant planning permissions.

**Stone type/name**
Greystone dolerite.

**History**
A long established active quarry, which provides high quality aggregate.

**Geology and mineralogy**
A dolerite intrusion of Lower Carboniferous age, bounded above and below by low angle faults. Associated with slates and cherts. The dominant intrusives are mildly altered, subophitic-textured metadolerites with variable secondary assemblages of chlorite, white mica, albite and carbonate (Floyd, Exley and Styles, 1993, 130-132). Some carbonatization to produce talc-carbonate-chlorite assemblages are present in one corner of the quarry – which might be a possible substitute for Polyphant Stone.

**Architectural characteristics**
Dark green hard ‘greenstone’, probably of good durability, but not easily to work into shapes.

**Significant buildings and structures using stone**
Greystone bridge (Grade 1).

**Potential for future resources and exploitation**
Although this is primarily an aggregate quarry, small quantities of selected walling stone can be produced. Resources may be significant.

**Potential for alternative stone sources**
Other quarries such as Blackhill quarry, near Launceston, may yield a similar type of stone.

**Heritage Value Indicator**
7/10

**References**

**Blackhill Quarry (Greenstones10)**
Figure 84 Map of Blackhill Quarry (Greenstones10)
**Location**
6 km south west of Launceston
0.5 km south east of Polyphant.

**Site description**
Operational and planning status
Extant planning permission.

Stone type/name
Blackhill dolerite

History
Quarry re-opened in 1961 and worked predominantly for roadstone and construction aggregates.

Geology and mineralogy
Not known.

Architectural characteristics
Hard ‘greenstone’, probably of good durability, but not easily to work into shapes.

Significant buildings and structures using stone
Unknown.

Potential for future resources and exploitation
Potential to source stone from quarry.

Potential for alternative stone sources
May be potential to substitute for stone extracted from Greystone Quarry.

Heritage Value Indicator
7/10

References
N/A

West of England (Porthoustock) Quarry (Greenstones11)
Figure 85 Map of West of England (Porthoustock) Quarry (Greenstones11)
**Location**
(SW 808/215)
0.2 km south of Porthoustock

**Site description**
Coastal quarry in land to the rear of cliffs on eastern coastline of the Lizard.
**Operational and planning status**
Current extraction for aggregate.
Extant planning permission.

**Stone type/name**
Gabbro and dolerite.

**History**
Long established quarry which has exported stone via its own quay for aggregate uses and supply of armourstone for coastal protection works.

**Geology and mineralogy**
Gabbro with about 50% sheeted dolerite.

**Architectural characteristics**
Hard, high density stone, but not easy to work for architectural applications. Can be used as walling stone and is well suited for use as armourstone.

**Significant buildings and structures using stone**
None known.

**Potential for future resources and exploitation**
Quarry operational.

**Potential for alternative stone sources**
Dean Quarry

**Heritage Value Indicator**
7/10

**References**
Floyd, Exley and Styles, 1993, 58-60
Flett and Hill, 1912

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Dean Quarry (Greenstones12)

*Figure 86 Map of Dean Quarry (Greenstones12)*

**Location**
(SW 803/205)
1 km south east of St Keverne.

**Site description**
Coastal quarry within eastern coastline of the Lizard.
**Operational and planning status**
Current extraction for aggregate. Extant planning permission.

**Stone type/name**
Gabbro and dolerite.

**History**
Long established quarry which has exported stone via its own quay for aggregate uses and supply of armourstone for coastal protection works.

**Geology and mineralogy**
Gabbro with a few pegmatitic patches and dolerite dykes.

**Architectural characteristics**
Hard, high density stone, but not easy to work for architectural applications. Can be used as walling stone and is well suited for use as armourstone.

**Significant buildings and structures using stone**
None known.

**Potential for future resources and exploitation**
Potentially significant resources but quarry not operational.

**Potential for alternative stone sources**
West of England Quarry

**Heritage Value Indicator**
7/10

**References**
Floyd, Exley and Styles, 1993, 58-60

Serpentine Quarries (including Gwendreath) (Greenstones13)

Figure 87 Map of Serpentine Quarries (including Gwendreath) (Greenstones13)

**Location**
Southern part of the Lizard peninsula.

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Site description
There is no single extractive site for the serpentine used for turning, as blocks of serpentine are extracted from over a large area (see Sagar-Fenton, 2005, pp53-56 for a description of modern extractive operations). There are many old quarries scattered over a wide area, each yielding a stone with particular characteristics of colour, texture, etc. Sagar-Fenton (2005) provides the following list of quarries which have provided serpentine suitable for turning:

- Signal Staff Quarry, Cadgwith, famous for its red striped stone.
- Flagstaff Point.
- Ruan Major, near the ruined Church.
- Treal Quarry, by Ruan Minor.
- Long Alley Quarry, opened in 1854.
- Kellawyn and Poltesco Quarries, close to the Carleon Cove works.
- Holestrow Quarry, near Kynance Cove.
- Balk Quarry, north of Church Cove.
- Gwendreath Quarry, north of Kennack Sands.

Operational and planning status
2038ha of land with planning permission to allow for small scale and short term extraction of serpentine blocks for use in making serpentine ornaments, etc.

Stone type/name
Lizard Serpentine (building and turning stone).

History
Extraction of blocks of serpentine for ornament manufacture in workshops in Lizard Town has been going on since the early 19th century. Sagar-Fenton (2005) provides in his book on serpentine a useful description of the history and current methods of working of the Lizard serpentine industry. Flett and Hill (1912 pp 254-257) also provide a helpful account of the Serpentine Industry in the first decade of the 20thC, with many of the small quarries identified, together with their characteristics when polished. At Poltesco (SW 722/158) a serpentine factory existed in the late 19th century capable of producing polished serpentine slabs, panels, columns, mantelpieces, etc.; there were also serpentine works in Penzance which exported their products all over the country. A few small old abandoned quarries in the dunite-serpentine appear to have been used primarily for building stone. However, many of the large blocks of serpentine used in Listed Churches may well have come from moorstone–type blocks lying on the surface.

Geology and mineralogy
Serpentinized peridotites belong to the Lizard Complex. The peridotite originated deep in the mantle (Bristow 2005, Chapter 5) and was probably originally a mixture of olivine, orthopyroxene and spinel. As the peridotite was brought up to the surface and into contact with water, various mineral changes occurred, culminating in the serpentine seen at the surface today. Serpentine group minerals are hydrated magnesium silicates.
There are three principle varieties of serpentine (see map in Flett and Hill, 1912). Most of the serpentine used for turning is enstatite - or bastite-serpentine and was originally a lherzolite composed of a dark green fine-grained matrix of olivine with large crystals of bastite (enstatite pyroxene) scattered through it. This has been variably altered to a dark green or reddish serpentines mass, but most specimens contain some fresh olivine. The bastite-serpentine appears to be more suitable for turning and for building stone than the tremolite-serpentine. A third variety of serpentine is dunite-serpentine, originally largely composed of olivine, which occurs along the northern margin of the Lizard ultrabasic complex. There is some suggestion that the dunite-serpentine makes the best building stone and some small quarries appear to have exploited this stone in the past for building.

**Architectural characteristics**

When polished, the best serpentine for ornamental use typically shows a variegated dark green/dark red surface, with occasional paler coloured veins running through the rock. For turning to produce ornaments, etc. the best material was the softer more highly serpentinized rock, which usually also offered a more variegated and interesting texture when polished. The harder and denser less serpentinized dark green, almost black, peridotite was favoured for building stone, although it had the reputation of allowing damp to pass through, possibly through minor cracks in the stone. A hard dense rock may also be liable to form condensation on its surface. However, the state of the masonry forming the Church towers listed below suggests that, providing the right type of serpentine is selected, that it resists weathering well.

**Figure 88 Serpentine ornaments in a shop in Lizard Town**

The strongly serpentinized bastite serpentine is the favourite medium for carving these sort of ornaments.
**Significant buildings and structures using stone**

Figure 89 The Lych-gate of St Keverne Church is constructed from blocks of serpentine.

![Image of St Keverne Church Lych-gate](image)

The Church behind is constructed from granite, presumably obtained in the form of moorstone from the Carnmenellis granite.

Figure 90 Serpentine blocks form the main part of the wall of the late 17th century stables at Trelowarren, with Kennack gneiss forming the quoins.
Old reports suggest that less serpentinized dunite serpentine was the most favoured of the serpentines for building. It was probably a difficult stone to work, which may help to explain the peculiar hackly surface to the blocks of serpentine.

The following Churches incorporate serpentine into their fabric, mainly in the towers: Grade Church (Grade 1), St Ruan Major (Grade 1), St Melanus, Mullion (Grade 1). The Lych Gate of St Keverne Church (Grade 1), St Winwalaus Church at Landewednack (Grade 1) and several other churches in the Lizard area also incorporate serpentine, usually in the form of large blocks, into their structure. The late 17th C stables at Trelowarren are mainly built of large blocks of (dunite) serpentine. Flett and Hill (1912) report that facades of polished serpentine from the Poltesco works were to be seen in London in shop fronts and many interior features, such as mantelpieces, were exported from the Poltesco works for use all over the country. However, serpentine is probably best known nowadays for its use in the manufacture of turned and polished ornaments, such as lighthouses, vases and bowls.

**Potential for future resources and exploitation**
Unknown

**Potential for alternative stone sources**
Lizard serpentine is a unique material. There are no other comparable deposits in Cornwall.

**Heritage Value Indicator**
9/10 – for the serpentine workings providing stone for turning

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References
Sagar-Fenton, 2005 – Serpentine
Flett and Hill 1912, 254-257, Floyd Exley and Styles 1993, 31-73

Further notes
Serpentine as an ornamental stone, nowadays Lizard serpentine should be regarded more as an ornamental stone than as a building stone. The methods of sourcing stone employed by the serpentine turners are probably adequate for their purposes. Serpentine/peridotite as building stone. If small quantities of building stone are required for restoration, then Trevassack quarry is one possible source, but it is not ideal as the rock in the quarry is tremolite-serpentine and rather soft and friable. If small old quarries in the dunite-serpentine can still be found (quarry near Chygarkie SW 713/230, and quarries near Traboe SW 736/215 and 742/209), this may be a better source for restoration work. Rating 7/10.

Countybridge and Trevassack Quarries (Greenstones14)
Figure 91 Map of Countybridge and Trevassack Quarries (Greenstones14)

Location
Countybridge (SW 721/220) – immediately north of the Goonhilly Satellite Station.
Trevassack (SW 712/222) – 1.5km NW of the Satellite Station

Site description
This stone is not ideal for building or turning to make ornaments as it shatters easily into many small fragments. Its main use was as aggregate.

**Operational and planning status**
Countybridge disused, no planning permission.
Trevassack Quarry, disused, planning permission lapsed.

**Stone type/name**
Serpentine

**History**
It is not known when quarrying started at these quarries, but both are now quite large quarries with the lower benches flooded. Trevassack was closed in the late 20th century.

**Geology and mineralogy**
Both quarries are in tremolite-serpentine (Flett 1912 and 1926). This dark greenish rock, when relatively fresh, consists mainly of a rather fine grained aggregate of tremolite and olivine, with occasionally a little plagioclase (Flett, 1912, 1946). However, it is extensively serpentinized.

**Architectural characteristics**
Figure 93 Tremolite serpentine in Countybridge quarry, The Lizard
This stone is not ideal for building or turning to make ornaments as it shatters easily into many small fragments. Its main use was as aggregate.

The tremolite-serpentine seen in both these quarries has been mainly used as aggregate and other rocks in the Lizard Complex are considered to be more suitable for turning to make ornaments or as building stones. The rock is rather friable and liable to crack (Flett and Hill, 1912, 1946).

**Significant buildings and structures using stone**
Not known.

**Potential for future resources and exploitation**
Potentially large resources and not difficult to exploit, subject to further assessment, but may be limited by sensitive environment in which the quarries are situated.

**Potential for alternative stone sources**
These quarries do represent a location where large blocks of serpentine might be obtained, but the stone is not as good as other rocks in the Lizard Complex for use as a building stone.

**Heritage Value Indicator**
5/10

**References**
Sagar-Fenton, 2005
Flett and Hill 1912, 254-257,
Floyd Exley and Styles 1993, 31-73.

**Sandstones**
Pigsdon, Cansford and Herdbury Quarries (Sandstone1)
Pigsdon Quarry (Sandstone 1a)
Figure 94 Map of Pigsdon Quarry (Sandstone1a)
Location
(SS 278/095)
7km northeast of Bude

Site description
Figure 95 Dipping beds of Late Carboniferous greywacke sandstone in Pigston quarry, near Bude
The sandstone is Westphalian in age and belongs to the Bude Formation. Although the quarry is mainly an aggregate producer, some building stone is also produced.

**Operational and planning status**
Operational quarry with extant planning permissions.

**Stone type/name**
Sandstones in the Upper Carboniferous, ‘Culm Measures’.

**History**
Not known.

**Geology and mineralogy**
Figure 96 Beds of Carboniferous greywacke sandstone in Cansford quarry, near Otterham Station, North Cornwall
The sandstone is Namurian in age and belongs to the Crackington Formation (slightly older than the Westphalian sandstones, but formed in a similar environment).

Mid- to Late-Carboniferous sandstones of a turbiditic character. In Bude Formation (Westphalian).

**Cansford Quarry (Sandstone 1b)**

*Figure 97 Map of Cansford Quarry (Sandstone1b)*
Location
(SS 168/931)
West side of A39, 4km north of Otterham Station

Site description
Cansford quarry is located on the north site of the A39 between Otterham Station and Wainhouse Corner. It is accessed from the A39 by a shared road which also provides access to the neighbouring concrete plant and a farm.

Operational and planning status
Quarry with extant planning permissions.

Stone type/name
Sandstones in the Upper Carboniferous, ‘Culm Measures’.

History
Not known.

Geology and mineralogy
Mid- to Late-Carboniferous sandstones of a turbiditic character. In Crackington Formation (Namurian).

Herdbury Quarry (Sandstone 1c)
Figure 98 Map of Herdbury Quarry (Sandstone1c)
**Location**
(SS 242/083)
4km northeast of Bude.

**Site description**
Site is currently used as a ready-mix concrete plant.

**Operational and planning status**
Non-operational quarry. No extractive planning permissions.

**Stone type/name**
Sandstones in the Upper Carboniferous, ‘Culm Measures’.

**History**
Not known.

**Geology and mineralogy**
Mid- to Late-Carboniferous sandstones of a turbiditic character. In Bude Formation (Westphalian).

**All Quarries**
**Architectural characteristics**
When absolutely fresh these sandstones are a greyish-blue colour, but they rapidly weather to a buff/brown colour. Joint faces are always buff/brown
in colour. The bedded nature of the sandstones makes them break into convenient sized and shaped blocks for building.

**Significant buildings and structures using stone**
Figure 99 St James Church, Kilkhampton, built of Late Carboniferous greywacke sandstone

Many listed Churches in North Cornwall use this type of stone.

**Potential for future resources and exploitation**
Potentially significant resources subject to further assessment.

**Potential for alternative stone sources**
Several other quarries in Devon could supply similar stone.

**Heritage Value Indicator**
Pigsdon 8/10
Cansford and Herdbury 7/10

**References**
The Bude and Bradworthy (Freshney et al 1979, sheets 307 and 308) and the Boscastle and Holsworthy Memoirs (McKeown et al 1973, Sheets 322 and 323) do not mention the quarries described above. They are rather academic works describing the structure and sedimentology of the areas concerned. More general account in Selwood et al (1998, pages 76-81).

**Tredinnick Quarry (Grampound) (Sandstone2)**
Figure 100 Map of Tredinnick Quarry (Grampound) (Sandstone2)
Location
(SW 932/493)
1km north of Grampound.

Site description
Figure 101 Tredinnick quarry, near Grampound
The Devonian Grampound Grit consists of slaty and silty mudstones with sandstones of varying degrees of coarseness. This quarry exploits an area where sandstones predominate. In the west side of the Fal Valley.

**Operational and planning status**
Not currently operational. Extant planning permission.

**Stone type/name**
Grampound Grit

**History**
Not known. A quarry on the opposite bank of the Fal closer to Grampound, adjoining the old mill, probably produced most of the stone used in the village.

**Geology and mineralogy**

*Figure 102 Broken stones from the Grampound Grit at Tredinnick*

The grits are blue when first broken but weather to a brown colour.

The Grampound Grit consists of slaty and silty mudstones and sandstones of various degrees of coarseness. Ussher (1909) says “The grit of Grampound is a hard compact greyish grit, of moderately coarse grain, but containing larger pebbles of slate. It is composed mainly of rounded quartz grains; but yields a considerable number of grains of quartzite”. It is of late Lower Devonian or early Middle Devonian age and may be the equivalent of the Staddon Grit on the north crop of the Dartmouth antiform. The clasts of slate (as described by Ussher from Mill Quarry) are visible in samples from Tredinnick quarry; some fine conglomeratic material was also seen. The grit is greyish-blue when fresh but weathers to a rusty brown; all the older buildings using this grit in Grampound are rusty brown in colour.

**Architectural characteristics**
A durable stone widely used in the older buildings in Grampound and adjoining areas, but much of this stone may have come from the Mill Quarry. Greyish-blue when freshly broken, it weathers to a rusty brown.

**Significant buildings and structures using stone**

*Figure 103 Cottages in the main street at Grampound built from the sandstones of the Grampound Grit Formation*

In the foreground quoins of St Stephen’s granite can be seen. Older buildings in the main street, Grampound. This stone probably used (with granite quoins) in St Crida Church, Creed (Grade 1).

**Potential for future resources and exploitation**

Subject to further assessment, additional resources may be available by working further into the hill.

**Potential for alternative stone sources**

Treworgans quarry, but this is not operational. Otherwise Carboniferous sandstones from North Cornwall may be able to substitute (as a building stone).

**Heritage Value Indicator**

7/10

**References**

Ussher et al, 1909

**Further Notes**

*Figure 104 St Mawes Castle built from sandstones from the Portscatho Formation, together with elvan from Pentewan and granite, presumably obtained as moorstone from the Carnmenellis area*
The stones in this castle have resisted weathering remarkably well.

Mottershead (2000) reported that the Portscatho Formation sandstone together with Pentewan Stone, used in St Mawes Castle (Grade 1), was one of the most resistant building stones to weathering; in a study of the rates of weathering of various stones used in historic building along the south coast of Cornwall and Devon. This sandstone performed in a comparable way to the Carnmenellis granite, which was the best of the granites examined. It is not known if a quarry supplied the stone for 16th C St Mawes Castle.

The Staddon Grit Formation occupies a large area of mid- and east-Cornwall, but there do not appear to be any currently active quarries exploiting this formation. Leveridge et al (2002) record quarries in the Staddon Gits at Landlooe Bridge (SX 249/596) and Hendergulling (SX 225/530). Ussher (1907) in the Plymouth Memoir also reports a number of small quarries in the Staddon Grits in the West Looe valley, south of Herodsfoot, south of St Keyne, between Clicker Tor and Tregastick Wood, south of Polbathic and near Maker. Ussher et al (1909) in the Bodmin and St Austell Memoir also mentions a large number of quarries in the Staddon Grits, notably around Bodmin. Flett et al (1906) in the Newquay Memoir says the Staddon Grit is too hard for building and is mainly used as aggregate. All in all, one gets the impression that the Staddon Grits are not particularly distinguished building stones and were worked for local use only.

**Sandrock – no specific quarry (Sandstone3)**

**Location**
No specific sites known. See section on geology below for areas of occurrence.

**Site description**
No specific sites known.

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Operational and planning status
No operational sites or planning permissions

Stone type/name
Sandrock

History
Sandrock was used in various medieval churches as an easily worked 'stone', it is also mentioned by De la Beche (1839). It is difficult to link the buildings using this stone to present day locations on the coast where sandrock occurs. In some cases erosion may have removed the sandrock and in other cases blown sand may have covered them up.

Geology and mineralogy
Sandrock occurs at various places along the northern coast of Cornwall. It is known to occur at Godrevy, Fistral, Harlyn Bay and around the Camel Estuary. It is essentially a cemented blown or beach sand, frequently occurring in the raised beaches seen along the coast. Most of the raised beaches are thought to date from the last or the penultimate interglacial. All the sands along the north coast of Cornwall contain substantial proportions of broken up shells of marine organisms, with calcium carbonate contents of up to 90%. Where a substantial deposit of sand occurs, the naturally acid rain falling on the upper part dissolves away some of the calcium carbonate, which is precipitated in the lower part of the sand accumulation, thus cementing it to make a kind of calcareous sandstone. This can be sufficiently strong to be used as a building stone.

Locations where sandrock is known to occur are as follows: Godrevy Point (Scourse and Furze, 1999, 93-102) - The Godrevy Formation extends for 840m southwards from Godrevy Point (SW 581/430) to Megow Rocks (SW 582/423) on the eastern side of St Ives Bay. The sandrock occurs in a raised beach and is up to 3.5m thick. It is a pale yellowish cream coarse cross bedded sand and the cementation is strongest at the northern end.

Crantock - No occurrence of sandrock can be seen here, but the use of sandrock in the nearby St Carantocus Church in Crantock suggests there may be an occurrence of sandrock under the dunes behind Crantock beach.

Fistral - (Scourse and Furze, 1999, 174-183) Both occurrences are in raised beach sequences: Fistral A: On the west side of Fistral Bay (SW 799/625-SW 801/623) there was formerly an exposure 160m long which showed sandrock up to 5m thick. This has now been bulldozed over because of the risk to children playing in tunnels in the sand. Fistral B: This is immediately south of the Headland Hotel and is presently accessible (SW 798/617-SW 795/616). It is slightly thicker than Fistral A, but the cementation is patchy. It is a designated RIGS site.

Harlyn Bay - Intertidal zone (SW 875/755). This, and some of the occurrences in the Camel estuary, are the only known sandrock occurrence which are not in a raised beach.
Trebetherick (Scourse and Furze, 1999, 188-196) - At Trebetherick Point (SW 926/779) raised beach sediments are exposed for about 0.75km around the Point and show a patchily cemented sandrock up to 6m thick.

Daymer Bay (Reid, 1910 – Padstow & Camelford Memoir) - Reid reports: “Cemented sand-reefs identical with the material forming these [Trebetherick] cliffs are found at sea level in Daymer Bay and upon this the submarine forest is rooted”.

**Architectural characteristics**

Sandrock is a pale yellowish-cream sandstone, often containing quite coarse shelly debris. Cementation is patchy, but the best cemented stone, resembles a soft Jurassic limestone.

A very unusual stone which is probably one of the geologically youngest building stones to be used in this country. The best locality to obtain sandrock may be Fistral A.

**Significant buildings and structures using stone**

*Figure 105 Sandrock being used to form an arch at St Carantocus’ Church at Crantock*

This Church was built in the 15th century with a tower, but this collapsed soon after it was built, indicating that there are probably structural limitations with what can be done with such a weak rock as sandrock.

St Carantocus at Crantock (Grade 1); St Petroc at Padstow (Grade 1), Rev. B.B. Clark reported that the fabric contains much sandrock hidden behind...
the plaster, some can be seen in the porch; St Enodoc (Grade 1) the font is carved from sandrock.

Older cottages etc. in Newquay, Padstow and Trebetherick are also known to contain sandrock, mostly hidden behind render, etc.

**Potential for future resources and exploitation**
Likely to be limited.

**Potential for alternative stone sources**
No existing quarries.

**Heritage Value Indicator**
7/10

**References**
Scourse and Furze 1999
Reid 1910, 81-82
De la Beche, 495-496.

**Slates**

**Delabole Quarry (Slate1)**

**Figure 106 Map of Delabole Quarry (Slate1)**

![Map of Delabole Quarry](image)

**Location**
(SX 075/840) Immediately southeast of the village of Delabole.

**Site description**

*Figure 107 Delabole slate quarry, looking down the incline, 1875*

![Delabole slate quarry, looking down the incline, 1875](image)

*Figure 108 Delabole Slate quarry in the 1990s*

![Delabole Slate quarry in the 1990s](image)

The working area is on the right hand side. Blocks of slate are now cut out, rather than being obtained by blasting, thereby cutting down considerably on the amount of waste slate produced.

Very large, 500 foot deep quarry on edge of village.

**Operational and planning status**

Operational with extant planning permission.

**Stone type/name**

Delabole Slate

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November 2016.
History
Mentioned by Carew (1602), who writes of a considerable export trade to British and Continental ports. Borlase (1758) speaks of an excavation 300 yards long by 100 yards wide and by 1910 the quarry was 1600 yards long by 350 yards wide and 150 yards deep (Reid et al 1910). Present activity is concentrated in the northern part of the quarry.

Geology and mineralogy
Upper Devonian slate, verging on a phyllite. To quote from Selwood in the Trevose Head/Camelford Memoir (1998) "The Delabole Slate consists of a well-cleaved, very fine grained, bluish grey, chlorite- muscovite (illite) slate that is hard, close-textured and commonly with a silky lustre".

Reid et al (1910) say "Under the microscope the rock is seen to be a typical sericite phyllite with some chlorite and numerous secondary white micas (illite), rutile in rods, grains and beautiful networks. There are also small garnets and zircons. Small prisms of tourmaline occur scattered through the slide, with quartz grains and obscure almost isotropic granular matter”.

In present day terminology the slate is seen to belong to the epizone (greater than 300°C level of metamorphism), based on the illite crystallinity (Robinson in Selwood, Durrance and Bristow, 1998, pp114-119).

Architectural characteristics
Durable grey slate suitable for roofing, building, ornamental and monumental uses. Waste slate used to produce a slate powder which is used in a variety of industrial applications. Borlase (1758) states "that for its lightness and enduring of weather, it is generally preferred to any slate in Great Britain”.

Significant buildings and structures using stone
A high proportion of the older roofs in Cornwall use Delabole slate.

Potential for future resources and exploitation
Large resources, the best slate is in the lower part of the quarry. Wire sawing is used to cut out large blocks, which minimizes wastage; in the past blasting produced a much higher proportion of waste.

Potential for alternative stone sources
For listed buildings where it is necessary to match with existing Delabole slate, it is unique. It is the best roofing slate available in Southwest England.

Heritage Value Indicator
10/10

References
Carew (1602)
Borlase (1758)
De la Beche (1839)
Tintagel Slate Quarries (Slate 2)
Slate 2a: Trevillet Quarry
Figure 109 Map of Trevillet Quarry (Slate2a)

Location
(SX 082/882)
2.5km east of Tintagel

Site description
Figure 110 Trevillet quarry, near Tintagel
Upper Devonian slates are quarried to produce a range of products, including bluish-grey and brown floor tiles, as seen in this photograph. The brown colour is due to iron oxide being deposited on cleavage and bedding planes, as well as joints. Most quarries in Devonian slate in Cornwall show a similar contrast between the paler colour of the slate itself and the brown colour of iron oxide coatings on cleavages, joints, etc.

In the valley side to the south of St Nectan’s Kieve.

**Operational and planning status**
Operational area to north of road. Extant planning permission includes large areas to north and south of road.

**Stone type/name**
Tredorn Slate Formation.

**History**
Old quarry dating back until at least the 19th century.

**Geology and mineralogy**
In contemporary terminology the Trevillet quarry would be regarded as belonging to the Upper Devonian (Famennian) Tredorn Slate Formation. Freshney et al (1972) mapped it as the Upper Delabole Slate Formation and report “Trevillet quarry... is about 140 ft. (42m) deep in grey and greenish grey slates which at the top contain scattered sandstones up to three inches (76mm) thick and at the bottom abundant large quartz veins with which the best-quality slates are associated”. There are silty bands in the slates and there is also much brown oxide staining on cleavage planes and joints. Prince of Wales is also in the Tredorn Slate Formation.

**Architectural characteristics**
Greyish green slates with brown oxide coatings on cleavage and joint planes.

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Significant buildings and structures using stone
Widely used in Cornwall and beyond. Used in restoration work at Bourneville.

Potential for future resources and exploitation
Trevillet is an active quarry exploiting a useful resource of slate, with significant resources within the planning permission.

Potential for alternative stone sources
Several other quarries in the Delabole – St Teath area yield a similar slate.

Heritage Value Indicator
7/10

References
Reid et al 1910.

Further notes
Prince of Wales Quarry (SX 072/860) is also in the Tredorn Slate Formation. Following restoration of the quarry, it operates as a recreational and educational site. (Article by Charlie David in Spalding et al 1999). Heritage Value Indicator 5/10

Slate 2b: Tintagel cliffs (SX 050/870 – SX 053/887)
Figure 111 The Tintagel slate quarries in the cliffs at Tintagel in the 1930s, shortly before closure

The ladders and the figure on the right give an idea of the scale and the hazardous nature of these workings.

A series of quarries along the cliffs between Trebarwith Strand and Tintagel extracted good quality roofing slate, possibly dating back to the 17th C. Working from south to the north the quarries were: West, Lanterdan, Dria,
Gull Point, Lambshouse, Long Grass and Gillow. The last quarry to work (Long Grass Quarry) closed in 1937. The slates were generally greyish-green well cleaved slates belonging to the Upper Devonian Tredorn Slate Formation, with occasional thin beds of limestone and siltstone. Photographs and descriptions of these cliff quarries suggest that they were dangerous operations. A useful reference is the National Trust booklet on the Tintagel Coast.

Provisional rating of 7/10, reflecting both the ‘heritage’ aspect but also taking into account the impractability of re-starting operations at such hazardous sites, which are also in an environmentally highly sensitive area.

**Slate 2c: Trecarne Quarry (SX 069/847 – 2 sites)***

*Figure 112 Map of Trecarne Quarry (Slate2c)*

2.5 km WNW of Delabole quarry. It is in the Upper Devonian Tredorn Slate Formation. Produces building and hedging stone.

Provisionally 6/10.

**Slate 2d: Tynes and Merrifield quarries (SX 045/819)**

*Figure 113 Map of Tynes and Merrifield Quarries (Slate2d)*
3.5km SW of Delabole quarry
In the Upper Devonian Slate Formation. Produces building (non-roofing slate).

Provisionally 6/10.

**Slate 2e: Trebarwith Road Rustic Quarry (SX 069/850)**
Figure 114 Map of Trebarwith Road Rustic Quarry (Slate2e)
Re-opened at the site of the former “Jenkin’s Quarry. In the Tredorn Slate formation. Provisionally 6/10.

Further notes
There are also a number of small old quarries in the area between Treknow, Trelake and Trebarwith Strand. Most are in Tredorn Slates, some may be in the Tintagel Volcanic Formation, some may be simply natural outcrops.

St Issey Slate Quarries (Slate3)
Slate 3a: Tredinnick (St Issey) Quarry
Figure 115 Map of Tredinnick (St Issey) Quarry (Slate3a)
Location
3km south of St Issey

Site description
Figure 116 Tredinnick slate quarry, near the Royal Cornwall Showground, Wadebridge

Middle Devonian silty slate is being quarried here, mainly for use in rustic walling (Cornish hedges).

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On the edge of the St Breock Downs.

**Operational and planning status**
Operational. Extant planning permission.

**Stone type/name**
St Issey Stone.

**History**
Neither the Memoir (Reid et al, 1910) nor the 1895 List of Quarries lists this quarry, so one must assume that it is of no great age.

**Geology and mineralogy**
Interbedded slaty greyish-green mudstone, siltstone and sandstone, mostly weathered buff/brown. Selwood et al (1998) say “There are several slate quarries in the district, although some are not in continuous production. The Tredinnick Rustic Slate Quarry (SW 935/688) produces slate mainly for walling, fireplaces and other decorative use. The slate is produced from the [Middle Devonian] Bedruthan Formation, and has a density of 1493 kg/m3. The nearby Cannalidgey Farm Quarry (SW 939/699) produced similar material from the same formation, as does the St Jidgey Farm Quarry (SX 941/698).”

**Architectural characteristics**
Figure 117 Cornish hedge at Scredda on the A391 just north of St Austell, showing how slate is used to make a Cornish hedge

In time, the whole wall will grow over, so the slate from which it is constructed is barely visible.

General building and walling stone. When fresh the slaty mudstone is greyish green, but most of the stone which is recovered is weathered to a rusty brown colour. Much stone from Tredinnick has been used for Cornish hedges built alongside new road schemes, etc.

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**Significant buildings and structures using stone**
None known

**Potential for future resources and exploitation**
Potential resource.

**Potential for alternative stone sources**
Other sources include Callywith Quarry.

**Heritage Value Indicator**
7/10

**References**

**Slate 3b: Cannalidgey Quarry (SX 938/700)**
*Figure 118 Map of Cannalidgey Quarry (Slate3b)*

2km southeast of St Issey.
Similar characteristics to Tredinnick Quarry.
Provisional assessment 6/10

**Further notes**
There are a large number of other small quarries in the St Issey area, such as Penrose, Little Petherick, Trevillador Wood, Trevibban, etc., which in the
past have probably yielded slaty materials from the Trevose Slate Formation (Bedruthan Formation in the case of Trevibban).

**Slate 3c: Kestle quarry**  
*Figure 119 Map of Kestle Quarry (Slate3c)*

3km southeast of Sladesbridge.

This is a large quarry which is now disused. The quarry is in Trevose slate which has been intruded by two dolerites with associated adinoles (a form of thermal metamorphism of the slates adjoining the dolerite). Reid et al (1910, p42) report that the dolerite is relatively fresh. It is not known if any significant buildings used this dolerite.

Provisional assessment *6/10*.

**Callywith Quarry (Slate4)**  
*Figure 120 Map of Callywith Quarry (Slate4)*
**Location**
(SX 080/683)
2km northeast of Bodmin, just to the west of the A30.

**Site description**
Figure 121 Callywith quarry, near Bodmin
Exploits slates belonging to the Middle Devonian Bedruthan Formation. The more blocky slate (pile on right in foreground) is selected for use in building.

**Operational and planning status**
Operational.
Extant planning permission.

**Stone type/name**
Bedruthan Formation slate.

**History**
Not mentioned in the Survey Memoir (Reid et al, 1910), so most of the quarry development is 20th C.

**Geology and mineralogy**
The latest Memoir (Selwood et al, 1998, p87) states that the slates being worked in Callywith Quarry belong to the Bedruthan Formation; however the geological map accompanying the memoir indicates that the slates belong to the Trevose Slate Formation. The slate is a fine uniform greyish-green. There is dark brown iron staining on joints, but only rarely on the cleavages.

**Architectural characteristics**
**Figure 122 Callywith quarry, cutting ‘blocky’ slate to make flat faced stone for building**

The resulting masonry can be attractive and long lasting. Cut faces are a greyish-green which weathers to an attractive paler khaki colour. Walling stone displays this colour or, more commonly, the rusty coloured iron oxide on the joints. It looks to be a compact strong stone which stands up to weathering well.

**Significant buildings and structures using stone**
Extensively used in 20th C and contemporary building. Not known if any of these buildings have achieved Listed status.
**Potential for future resources and exploitation**
Large quarry which, subject to further assessment, appears to have plenty of resource available by deepening the quarry.

**Potential for alternative stone sources**
Not unique.

**Heritage Value Indicator**
8/10

**References**
Selwood et al 1998

**South East Cornwall Slate Quarries (Slate5)**
Slate5a: Westwood Quarry
Figure 123 Map of Westwood Quarry (Slate5a)

**Location**
(SX 185/645)
3 km west of Dobwalls immediately south of the main railway line

**Site description**
Site is adjacent to the main railway line.

**Operational and planning status**

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Operational.
Extant planning permission.

**Stone type/name**
Slate/Middle Devonian – Saltash Formation

**Slate 5b: Lantoom Quarry**
**Figure 124 Map of Lantoom Quarry (Slate5b)**

![Map of Lantoom Quarry (Slate5b)](image_url)

**Location**
(SX 225/649)
1km east of Dobwalls, immediately south of the A38.

**Site description**
Active quarry adjacent to A38.

**Operational and planning status**
Operational.
Extant planning permission.

**Both Quarries**
**Stone type/name**
Middle Devonian slate – Saltash Formation

**History**
Westwood quarry was mentioned by Ussher et al (1909) in the Bodmin & St Austell Memoir, but neither or Westwood were mentioned in the 1895 List of Quarries.

**Geology and mineralogy**
Westwood is mentioned by Ussher et al (1909): "In Westwood Quarry, by the railway west of Doublebois Station, dark-grey slates, weathering buff, and pale-grey, with planes of schistosity nearly horizontal, afford an indication, in one place, of vertically undulating puckered bedding. They contain calcareous bands, not easily distinguishable, and are traversed by north and south joints". Leveridge et al (2002) have this to say about Lantoom Quarry: “Only one quarry in these rocks [Saltash Formation mudstones], at Lantoom, is currently active extracting dark grey slaty mudstone from the Saltash Formation for decorative walling, landscaping and paving”.

**Architectural characteristics**
Enter in Cornwall County Council’s ‘Guidance on the sources and uses of local building stone and slate’ 2007 “Dimensional products, building stone, walling stone, landscaping or rockery stone, paving, setts, guillotined and sawn to size, sculpture stones and special and one-off products. Typical of Cornwall and Devon areas, traditional construction mixing of rusty and silver grey colouring or individual colours. Very hard texture, high frost resistance and high crushing strength”.

**Significant buildings and structures using stone**
Not known.

**Potential for future resources and exploitation**
Not known.

**Potential for alternative stone sources**
Several other sources.

**Heritage Value Indicator**
Both Quarries 7/10

**References**
Ussher et al 1909, p 33 (Westwood)
Leveridge et al 2002, p4 (Lantoom)

**Slate 5c: Carnglaze slate caverns, near St Neot**
Figure 125 Map of Carnglaze Slate Caverns (Slate5c)
**Location**  
(SX 188/668)  
2km north of Westwod quarry, near St Neot.

**Site description**  
A series of underground slate workings in the Glyn Valley, adjacent to the A38.

**Operational and planning status**  
Non-operational: currently the slate caverns are a tourist attraction.  
No planning permission for extraction.

**Stone type/name**  
Middle Devonian Saltash Formation

**History**  
Dating back to at least the early 19th C, underground operations ceased in about 1903, but some extractive activity continued for some years afterwards, as the dumps were exploited for fill, etc.

**Geology and mineralogy**  
The slates probably belong to the Middle Devonian Saltash Formation and were said to be blue in colour. There is much evidence of iron oxide staining in the caverns, along the joints and some cleavages. Although outside the metamorphic aureole proper of the Bodmin Moor granite,

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nevertheless these slates were, to an extent, affected by the heat from the granite.

**Architectural characteristics**
Used primarily for roofing slate.

**Significant buildings and structures using stone**
The slate was used for roofing over a wide area from Plymouth to Penzance.

**Potential for future resources and exploitation**
Unknown

**Potential for alternative stone sources**
Unknown.

**Heritage Value Indicator**
8/10

**Miscellaneous sources of slate (Slate 6)**
Slate 6a: Boscastle black slate quarries (above village) and sandstones.

**Figure 126 Map of Boscastle Black Slate Quarries (Slate6a)**

**Location**
(SX 098/916)
Immediately north of Boscastle.

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Site description

Figure 127 Trevalga – Gower quarry near Boscastle in the 1880s (Print from the collection of the Royal Institution of Cornwall)

The arrangement for raising the slate from the base of the cliffs can be seen on the right. The best slate was found at the base of the cliffs where the least weathered Upper Devonian slate was extracted. This emphasises that the effects of weathering are much deeper than most people would imagine, much the same applies to granite quarries.

Several old quarries lie high up on the valley side, but there does not appear to be one particularly significant one.

Operational and planning status
Disused.
No planning permission.

Stone type/name
Not known

History
Unknown.

Geology and mineralogy
This formation is mainly of Lower Carboniferous age, but may range down into the Upper Devonian and up into the Namurian. The black colouration is due to the fact that the slates and sandstones contain pyrite and carbon. Black cherty rocks are also present in the area.

Architectural characteristics
As roofing slates, these beds are not of any special quality, there are better roofing slates elsewhere in Cornwall and not all that far away.

Significant buildings and structures using stone
Behind the building, on the left hand side, a quarry face can be seen, possibly the slate for this building came from the quarry in which it was built.

Most of the buildings in the Boscastle area use black slates and sandstones belonging to the Boscastle Formation. Much of the distinctive character of the built environment of Boscastle derives from the use of these black sandstones and slates.

**Potential for future resources and exploitation**
Limited.

**Potential for alternative stone sources**
Several old quarries above Boscastle.

**Heritage Value Indicator**
8/10.

**Slate 6b: California, Welltown, Grower and Boscastle Cliff Quarries.**
Figure 129 Map of California, Welltown, Grower and Boscastle Cliff Quarries (Slate6b)
Location
South west of Boscastle.
California SX 090/908
Welltown SX 088/908
Grower SX 085/907
Boscastle SX 082/905.

Site description
These four quite large quarries lie along the coast west of Boscastle.

Operational and planning status
Disused.
No planning permission.

Stone type/name
Tredorn Slate.

History
The finer and harder greenish grey slates belonging to the Upper Devonian Tredorn Slate Formation were quarried from the unweathered rock at the base of the cliffs and hauled up the cliff by a cable arrangement to the cliff top. The quarries here are reminiscent of the quarries on the cliffs southwest of Tintagel.

Geology and mineralogy

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Rocks of the Transition Group spanning the boundary between the Devonian and the Carboniferous form a cap on the high ground at Welltown quarry, a thin outlier at Grower Quarry and dip northwards down the slope towards California Quarry.

**Architectural characteristics**
No specific information.

**Significant buildings and structures using stone**
Not known. Presumably the slate was either used locally or, more likely, exported through Boscastle Harbour.

**Potential for future resources and exploitation**
Difficult

**Potential for alternative stone sources**
Several alternatives.

**Heritage Value Indicator**
6/10.

**Slate 6c: Bangor Slate quarry.**

**Figure 130 Map of Bangor Slate Quarry (Slate6c)**

**Location**
(SX 319/833)

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1.5 km South West of Launceston

**Site description**
Infilled quarry close to industrial estate.

**Operational and planning status**
This quarry is now filled in and used as a recycling centre. No extractive planning permission.

**Stone type/name**
Siltstones and slates

**History**
Not known

**Geology and mineralogy**
The quarry is in Crackington Formation siltstones and slates, although Reid et al (1911, pp 24-25, 129) point out that the cleavage is weak.

**Architectural characteristics**
Reid adds "A good deal of roofing slate was at one time made here; but although of good colour and fairly sound it does not stand the weather well and cannot compete with the Delabole slate; the material is better suited for flagstones."

**Significant buildings and structures using stone**
Large slabs parallel to the bedding have been raised and used extensively for flooring and general building work in Launceston and the vicinity.

**Potential for future resources and exploitation**
Limited due to infilling

**Potential for alternative stone sources**
Several alternatives.

**Heritage Value Indicator**
3/10

**Slate 6d: Holmbush – St Blazey Gate red slate quarry.**
Figure 131 Map of Holmbush (Slate6d)
Location
Not certain, but it believed this stone came from a quarry adjacent to St Mary’s Church, St Blazey.

Site description
Local tradition says that this stone came from a quarry in front of St Mary’s Church, where a car park is now.

Operational and planning status
Disused quarry, now used for parking.
No extractive planning permission.

Stone type/name
Red slate.

History
Unknown.

Geology and mineralogy
The reddening is due to the local slates belonging to the Meadfoot Group being impregnated by iron oxide, possibly due to iron in solution moving out from the St Austell granite along ‘The Great Cross-Course’.

Architectural characteristics
Figure 132 Red slate being used for houses at Holmbush, near St Austell
This Lower Devonian slate has been impregnated with iron oxide, caused by iron-rich solutions migrating along and out from ‘The Great Course’ fault nearby. The quarry from which this slate came was just below St Mary’s Church at St Blazey Gate.

One rather unusual feature of a number of buildings in the Holmbush – St Blazey Gate area is that they are built with a peculiar red slate.

**Significant buildings and structures using stone**
St Mary’s Church at St Blazey is also built of this unusual stone.

**Potential for future resources and exploitation**
May be limited.

**Potential for alternative stone sources**
There may well be other similar occurrences in Cornwall.

**Heritage Value Indicator**
5/10

**Miscellaneous Sources of Stone**

Pilsamoor Quarry (Chert1)
Figure 133 Map of Pilsamoor Quarry (Chert1)
Location
(SX 276/857)
1.5km southeast of Egloskerry, 8km west of Launceston.

Site description
Figure 134 Pilsamoor quarry in Lower Carboniferous cherts, near Launceston
Operational and planning status
Operational quarry
Extant planning permission

Stone type/name
Chert

History
Reid et al (1911) mention that a quarry existed here with a face 90 feet high. Present quarry is large with faces up to 40-50m high, so must have been active for some time.

Geology and mineralogy
Thinly bedded cherts and slaty mudstones belonging to the Lower Carboniferous Firebeacon Chert Formation. Reid et al (1911) say "At the east end of Red Down the rail and high road pass through a deep transverse valley, and close to the high road we find a quarry which gives an excellent idea of the thickness of the chert at this place. At least 90 feet of chert is seen, and in the middle of it is a thin band of volcanic tuff".

Architectural characteristics
Figure 135 Blocky chert pile on the quarry floor at Pilsamoor quarry ready for use in building

Dark grey cherts which readily break into useful sized and shaped blocks suitable for walling, etc. Occasionally the cherts are banded dark grey/white.

Significant buildings and structures using stone
Not known.

Potential for future resources and exploitation
Subject to further geological and assessment, there may be potential to extend.
Potential for alternative stone sources
This is the only active quarry in the Firebeacon Chert Formation in Cornwall.

Heritage Value Indicator
7/10

References
Reid et al, 1911, p31.

Further notes
Barracadoes quarry, just north of Launceston, also exploited cherts of the Firebeacon Chert Formation, but is now long abandoned.
Provisional rating 3/10.

Notes on further building stones
Calc-flintas.
Bands of ‘calc-flints’ run across central Cornwall from south of Bodmin towards Perranporth. This rock has been produced by the heat from the St Austell granite causing an impure limestone to react with clayey and sandy material mixed in with it, to form calcium silicate minerals. The resulting rock is a hard flinty rock which is closely jointed and easily shattered. Several quarries have been opened in this stone, mainly to supply stone for use in roads and for hard-core. Very little seems to have been used for building, partly because it does not occur in sufficiently large pieces to make it a worthwhile stone for building. Rating 4/10.

Schorl rock and related types
Figure 136 Roche Rock with St Michael’s Chapel on top
Both the rock and the Chapel are composed of schorl rock, which is made up of the minerals quartz and tourmaline. Schorl rock is frequently found in buildings in china clay country, where it can originate as ‘minestone’ from tin streaming and from waste (‘stent’) from china clay working.

Granite masses such as St Austell sometimes contain blobs and irregular shaped masses up to several hundred metres across, which are composed of the minerals quartz and tourmaline, this is known as schorl rock. Roche Rock is the classic example and St Michael’s Chapel (Grade 1, SW 199/596) on top of the rock is built of schorl rock (not granite!), presumably picked up by the medieval masons as loose boulders from the area surrounding the rock itself – so that would make it a form of moorstone. The tanks and pan kiln belonging to an early china clay works in the valley below Ruddlemoor (SX 010/545) are almost entirely built of schorl rock, but there is no clue as to where this was obtained from. Schorl rock is a very stable rock which is extremely resistant to weathering and it frequently occurs as a form of minestone from tin streaming and china clay working. The famous ‘Mengu Stone’ at the foot of the tower of Holy Trinity, St Austell is schorl rock. The equally famous Wheal Remfry breccia is a stone related to schorl rock (Bristow, 2005), but has rarely been used in building, probably because it was not exposed in Wheal Remfry china clay pit until the 1970s. Rating 7/10.

**Topazfels**

An even more esoteric type of granite-related rock is ‘topazfels’, which consists of quartz and topaz, usually with a little tourmaline. Because topaz is extremely hard (Hardness 8 on Moh’s Scale), this rock is very resistant to wear. It occurs at St Mewan Beacon (SW 985/535, S.S.S.I.) and Carliquoiter Rocks (SW 920/577). A small quarry at the west end of the St Mewan Beacon outcrop (Collins & Coon, 1914) yielded a topaz-rich stone which was used for flooring in china stone grinding mills and was also used for flooring at Place, Fowey (Grade 1). Rating 7/10.

**Quartz**

Early commentators mention the abundance of quartz stones and boulders at the surface in Cornwall. They also say that much of this quartz was used for road making and mending. This quartz is derived either from vein material or from knots of quartz weathered out from the various Devonian and Carboniferous sedimentary rocks. Some may even have been produced by a form of weathering which created silica in the weathering profile – silcrete. These quartz boulders are frequently used, especially in North Cornwall, to cap a wall and are a very characteristic feature of the rural built environment. Rating 7/10.

**Moorstone**

Figure 137 Launceston Parish Church (St Mary Magdalene), dating from the late 14th century
Almost certainly the granite for this elaborately carved Church was not quarried but collected as ‘moorstone’ from the granite moors, most likely the nearest part of Bodmin Moor.

Before the early 19th C there would have been no quarrying of granite. This is because the masons would have gone out onto the granite moors to collect loose boulders of granite called ‘moorstone’ for their buildings. In many cases the masons split these boulders in situ, before transporting them to the building site. Stanier (199, Chapter 3, pp53-64) describes this kind of activity very well. This means that virtually every building built before about 1830 (and quite a number after) would have been constructed from moorstone, with no specific source capable of being identified, although it is clear that certain types of granite were preferred. This is important from the point of view of this survey. At the present day, workings at Kilmar and Bearah Tor may be capable of supplying a stone which resembles the moorstone used in the past. Also, weathered boulders from the overburden at Tregarden quarry will be a form of moorstone and overburden tips at other granite quarries are another possibility. Moorstone is a very important building material in many older listed Cornish buildings. Rating 8/10.

Serpentine ‘moorstone’
Similarly, boulders of serpentine may well have been collected from the moors of the Lizard for use in the medieval churches of the Lizard. Rating 7/10.

Other rocks, such as some elvans, greenstones, etc. may have been similarly scavenged from the surface all over Cornwall. As an example, look at the mixture of stones used in the older 13th C Chantry Church which now forms part of Holy Trinity, St. Austell.
Minestone
When old buildings in Cornwall are studied, one certainly gets the impression that, in many cases, the builders used whatever stone came to hand. This is particularly true of buildings such as cottages, although there are instances (the 13th C part of Holy Trinity, St Austell is an example) where this applies to high status structures. Much local stone was salvaged from mine dumps, where mineral vein material, granite and slate from the driving of levels, etc. were to be found. In the early days, such as would have been the case for St Austell Church, most of the material would have been stones thrown aside from tin streaming operations. Tourmalinized killas from tin streaming is one of the most resistant stones to weathering in Cornwall, but is very difficult to work into shaped blocks for building. Similarly, many buildings in the china clay area are constructed wholly or partially from stent (the residue of large rocks left after the monitor has washed out the china clay) and other rocks produced as waste by the china clay industry. Even now minestone may still be required. When an early lathe, donated to the Science Museum in London by ECC from Charlestown Engineering, had to be installed in the Machine Hall of the Museum, a masonry plinth was required. In order to ensure authenticity, stone from the dumps of Polmear mine near Charlestown Engineering was collected and sent up to London for the plinth to be constructed. Minestone is an important building material. Rating 8/10.
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