**Minerals and Secondary Aggregate Technical Planning Group
AMMR 2017 Technical Report on 2016 Minerals Data**

## Status of the Technical Report

This is the 6th Annual Mineral Monitoring Report, AMMR 2017, and is published as the official Government statement on minerals, including mineral reserves and need. It is intended to advise the interpretation of need within the Isle of Man Strategic Plan 2007 policies: Minerals Policy 1 and Waste Policy 1.

The baseline data used in this Report is provided from the data on primary aggregate sales submitted to the Department of Economic Development's (DED) by the mineral operators and is compiled from half yearly mining lease returns. It covers the period from 1st December 2015 to 30th November 2016.

The AMMR is supported by baseline geological data and historical information contained within the DED's Minerals Resources Plan.

## Report Summary

Primary Aggregate Sales
- Total primary aggregate sales for 2016 were 286,665 tonnes compared to 287,072 tonnes in 2015. This is an overall decrease of 407 tonnes (c. 0.1% of total demand) from 2015.
- Sand and gravel sales increased by c. 15,980 tonnes although this was largely due to the dredging of the river gravels in Peel and Douglas harbours.
- Hard rock aggregate sales decreased by c. 16,390 tonnes compared to 2015.
- In 2016, commercial quarries contributed 46% of the primary hard rock aggregates required on Island, with the balance being met through sales from Government quarries.
- The use of locally sourced crushed limestone as an agricultural fertilizer continues and the tonnage applied to land increased by 885 tonnes during 2016.

Reserves
- The total planned reserves of sand and gravel as at 30$^{th}$ November 2016 was c. 2,026,000 tonnes.
- The hard rock planned reserves (all quarries) amount to c. 4,367,000 tonnes.

Landbanks
- The reduction in the demand of primary aggregate and increased usage of recycled material continues to impact on the length of landbanks. As at 30$^{th}$ November 2016, the landbank for Sand & Gravel (based on a 10-year average) stands at 14 years.
- The equivalent Hard Rock landbank (including Government reserves) is 17 years. When Government reserves are excluded, the 10-year landbank reduces to 10 years.
- Having given due consideration to the short-term demand of aggregates based on the annual aggregates demand over the past three years, the landbank for Sand & Gravel is 19 years, Hard Rock landbank (including Government reserves) is 24 years and 18 years when Government reserves are excluded.

**AMMR 2017**
**Technical Report 2016 Data**

## 1. Sale of Primary Minerals

1.1 All mineral operators provide information on the actual tonnage of primary mineral sold (in the form of sand and gravel, crushed rock and building stone between 1st December 2015 and 30th November 2016) to the Department of Economic Development (DED). This information is managed and monitored by DED.

1.2 Data on quarry and ancillary mineral extraction is available dating back to 1993 which has been used to calculate the rolling 10-year averages of sand and gravel (S&G) and hard rock (HR) (see Section 5 - Forecast Need for Minerals).

**Table 1: Summary of Primary Aggregate & Building Stone Sales 2014 – 2016**

| Mineral Operation | 2014 Tonnes ('000) | 2015 Tonnes ('000) | 2016 Tonnes ('000) |
|---|---|---|---|
| **Ballaharra Sand Pit** | 11.99 | 10.86 | 11.02 |
| **Point of Ayre** | 85.84 | 89.71 | 95.09 |
| **Cronk y Scotty Sand Pit** | 0.46 | 0.44 | 0.23 |
| **Billown Quarry** | 51.84 | 51.73 | 50.06 |
| **Cringle Quarry** (Crushed Rock) | 23.34 | 33.51 | 22.79 |
| **Cringle Quarry** (Building Stone) | 0.26 | 0.19 | 0.41 |
| **Earystane Quarry** (Crushed Rock) | 0.49 | 0.03 | 4.09 |
| **Earystane Quarry** (Building Stone) | 0.08 | 0.47 | 0.58 |
| **Pooil Vaaish Quarry** (Crushed Rock) | 0.00 | 0.00 | 0.00 |
| **Pooil Vaaish Quarry** (Building Stone) | 0.00 | 0.00 | 0.00 |
| **Poortown Quarry** (crushed rock - Government Sales) | 29.77 | 25.51 | 32.18 |
| **Poortown Quarry** (crushed rock - Private Sales) | 48.24 | 51.35 | 42.43 |
| **Stoney Mountain Quarry** (crushed rock - Government Sales) | 12.53 | 9.18 | 10.53 |
| **Stoney Mountain Quarry** (crushed rock - Private Sales) | 9.90 | 7.20 | 6.53 |
| **Starch Mill Quarry** (Crushed Rock) | 0.47 | 0.70 | 0.07 |
| **Starch Mill Quarry** (Building Stone) | 0.06 | 0.05 | 0.00 |
| **Ancillary Mining Total** | 0.51 | 6.14 | 10.65 [1] |
| **TOTAL** | 275.78 | 287.07 | 286.66 |

Notes:
1. The minerals obtained from the ancillary mining operations were river gravels extracted from Peel Harbour and Douglas Harbour. For the purpose of this Report these minerals will assigned to the 'sand and gravel' category.

**Figure 1**      **2016 Sales of Primary Aggregate**
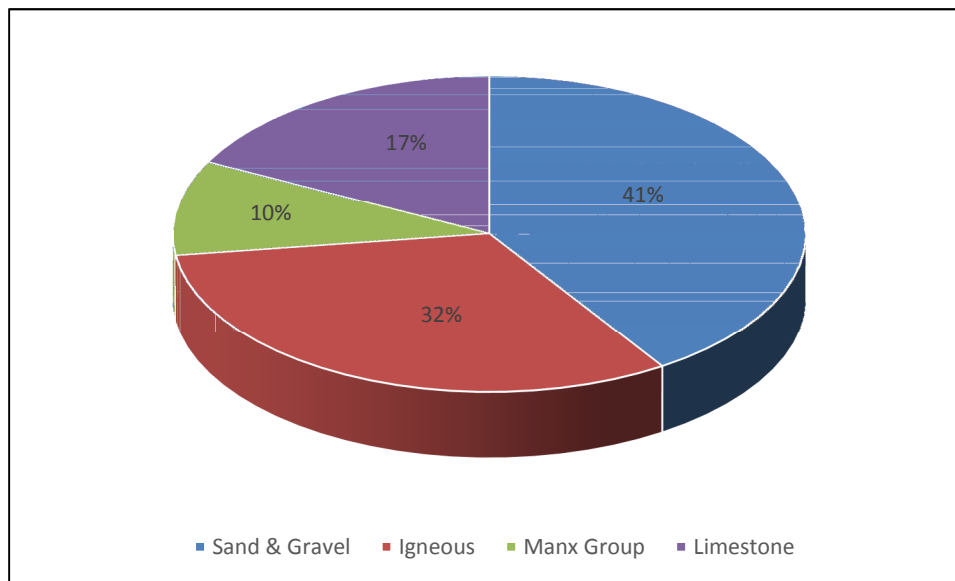


## Primary Mineral Extraction by Mineral Type: Sand and Gravel; Limestone; Manx Group; Igneous

**Table 2:**      **Total Sales as Primary Aggregate 2007 – 2016** *('000 tonnes)*

| Mineral Type | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sand & Gravel | 203.41 | 201.78 | 178.32 | 146.53 | 146.99 | 101.80 | 94.66 | 98.80 | 101.01 | 116.99[3] |
| Limestone | 116.46 | 115.87 | 76.59 | 352.38[2] | 84.28 | 72.86 | 57.92 | 51.84 | 57.87 | 50.06 |
| Manx Group | 56.76 | 65.01 | 48.58 | 25.83 | 60.50 | 23.57 | 16.00 | 24.69 | 34.96 | 27.94 |
| Igneous | 98.21 | 157.71 | 140.56 | 110.58 | 101.33 | 89.21 | 110.26 | 100.44 | 93.23 | 91.67 |
| **TOTAL** | **474.84** | **540.37** | **444.05** | **635.32** | **393.10** | **287.44** | **278.84** | **275.77** | **287.07** | **286.66** |

2      Includes 274kt of stone supplied to RESA project from Turkeyland Quarry

3      Includes of 10.65kt of river gravels from Peel Harbour and Douglas Harbour

**Table 3:**      **Total Sales as Building Stone 2007 – 2016** *('000 tonnes)*

| Mineral Type | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Limestone | 0.42 | 1.17 | 0.08 | 0.14 | 0.36 | 0.12 | 0.06 | 0.00 | 0.00 | 0.00 |
| Manx Group | 1.33 | 1.63 | 1.49 | 1.35 | 0.77 | 0.66 | 0.65 | 0.40 | 0.72 | 0.99 |
| **TOTAL** | **1.75** | **2.80** | **1.57** | **1.49** | **1.13** | **0.78** | **0.71** | **0.40** | **0.72** | **0.99** |

**Table 4:**      **Total Sales Primary Agg & Building Stone 2007 – 2016** *('000 tonnes)*

| Mineral Type | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Primary Agg | 470.88 | 540.38 | 438.46 | 635.33 | 390.61 | 286.66 | 278.13 | 275.38 | 286.35 | 285.67 |
| Building Stone | 1.75 | 2.80 | 1.57 | 1.49 | 1.13 | 0.78 | 0.71 | 0.40 | 0.72 | 0.99 |
| **TOTAL** | **472.63** | **543.18** | **440.03** | **636.82** | **391.74** | **287.44** | **278.84** | **275.77** | **287.07** | **286.66** |

**Figure 2:       Total 10 Year Sales of Primary Aggregate and Building Stone 2007 to 2016**



987
50,059
26,956
116,987
91,673

■ Sand and Gravel (36%)  ■ Igneous (28%)  ■ Manx Group (10%)  ■ Limestone (26%)  ■ Building Stone (<1%)
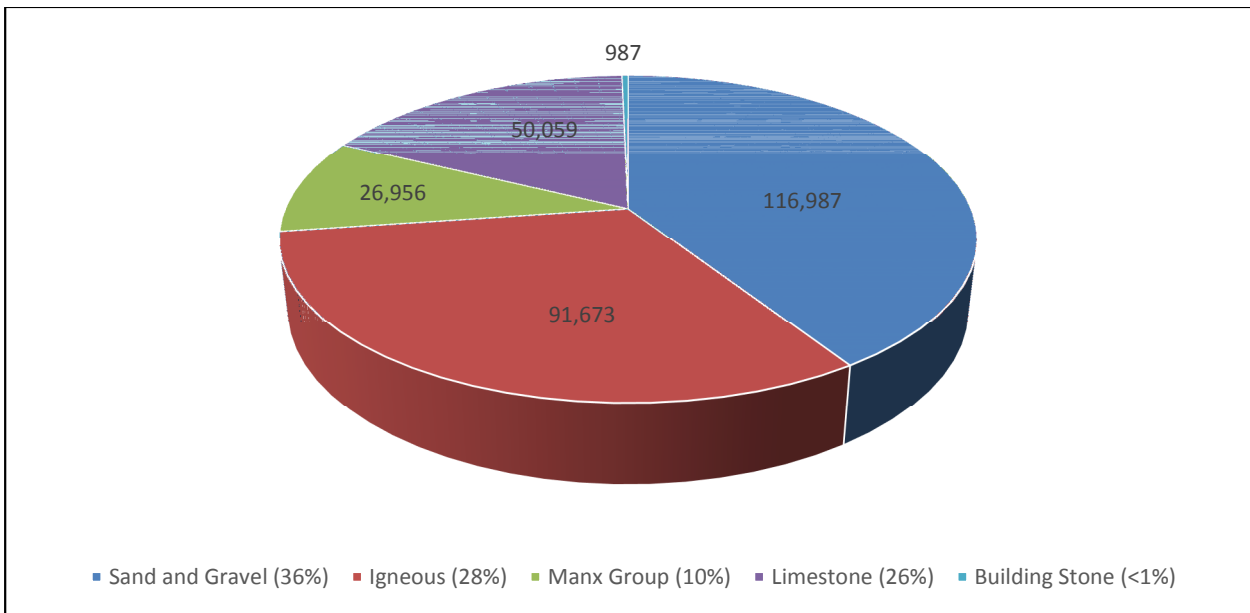
## 2. End Use of Extracted Minerals

2.1 Extracted minerals can be processed into aggregate products which are suitable for a variety of end uses. The range of potential aggregate end uses is, in general, determined by the mineralogy of the S&G and Hard Rock.

2.2 Data on mineral end-use over time can, where available, provide a useful indication of the demand for specific mineral products on Island. While at the strategic level forecasting the need for S&G and Hard Rock is based on a ten-year average annual sales, a more detailed interpretation of product end-use can advise the assessment of individual mineral planning applications.

2.3 For analysis purposes, the demand for minerals has been subdivided into the following categories:
- Sand and Gravel
- Polished Stone Value (PSV) / High grade aggregates
- Graded aggregates / bitumen affinity
- Type 1 and Bulk Fill
- Building and Dimension stone

2.4 Table 5 below illustrates the variations in product categories over the past 7 years.

**Table 5:      Aggregate Sales by Sub Categories 2010 - 2016** *('000 tonnes)*

| Product Category | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Total | 7yr Average |
|---|---|---|---|---|---|---|---|---|---|
| Sand & Gravel | 146.53 | 146.99 | 101.80 | 94.66 | 98.30 | 101.01 | 116.99 | **806.28** | 115.18 |
| PSV / High Grade | 33.58 | 38.60 | 36.41 | 22.56 | 37.11 | 25.11 | 32.06 | **225.43** | 32.20 |
| Graded Aggregate/ Bitumen Affinity | 51.67 | 51.13 | 44.16 | 52.00 | 30.48 | 34.53 | 27.59 | **291.56** | 41.65 |
| Type 1 and Bulk Fill | 404.76 | 155.04 | 105.19 | 108.90 | 109.51 | 125.70 | 109.05 | **1118.15** | 159.74 |
| Building / Dimension Stone | 1.49 | 1.15 | 0.78 | 0.72 | 0.40 | 0.72 | 0.99 | **6.25** | 0.89 |
| **TOTAL** | **638.03** | **392.91** | **288.34** | **278.84** | **275.80** | **287.07** | **286.68** | **2447.67** | 349.67 |

**Figure 3:      Percentile Summary of Aggregate Sales by Sub Categories
(7-year average 2010-2016)**
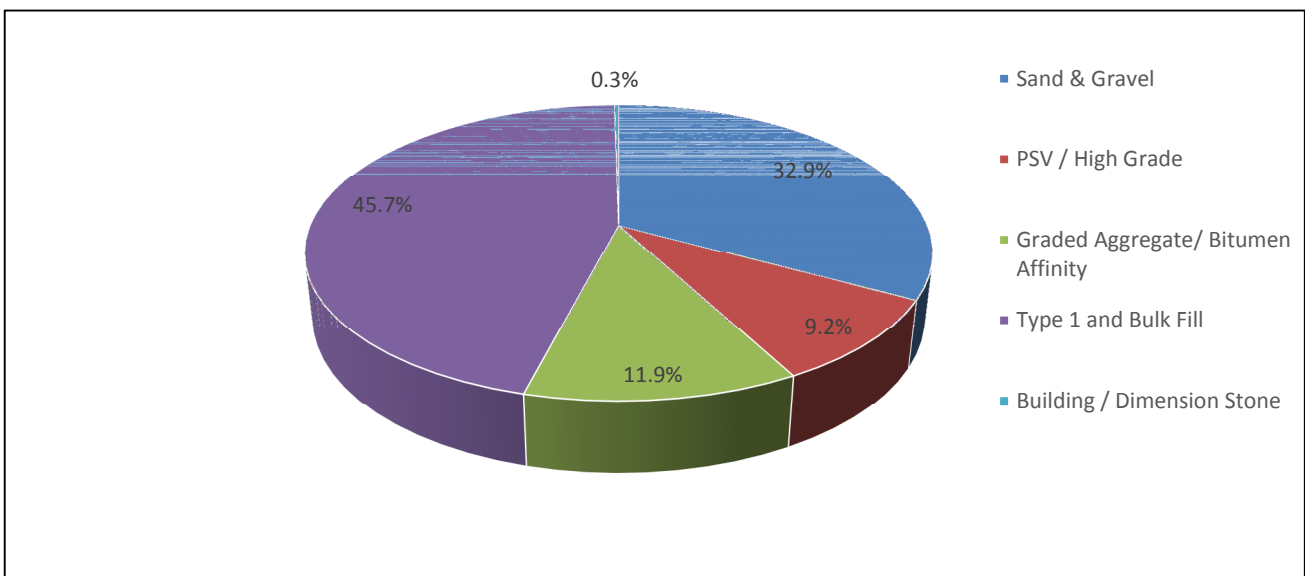
**Agricultural Lime**

2.5     All agricultural land used for crop production requires the soil to have a pH in the region of 5.8 to 6.2 to maintain good levels of production and ensure that any fertilisers applied are utilised efficiently. The majority of the Island's soils are acidic and therefore require the periodic application of lime to increase and/or maintain pH. Sources of lime used on the Island commonly includes crushed limestone and imported pelletised lime, historically crushed limestone has also been imported.  Limestone used for agricultural purposes is not classified as an 'aggregate' for the purposes of forecasting need for Hard Rock. However, as the tonnage used is minimal in comparison with total aggregate sales it has not been excluded from the calculation of Hard Rock need.

**Figure 4: Agricultural Lime Production 2004 – 2016 (Billown Quarry)**
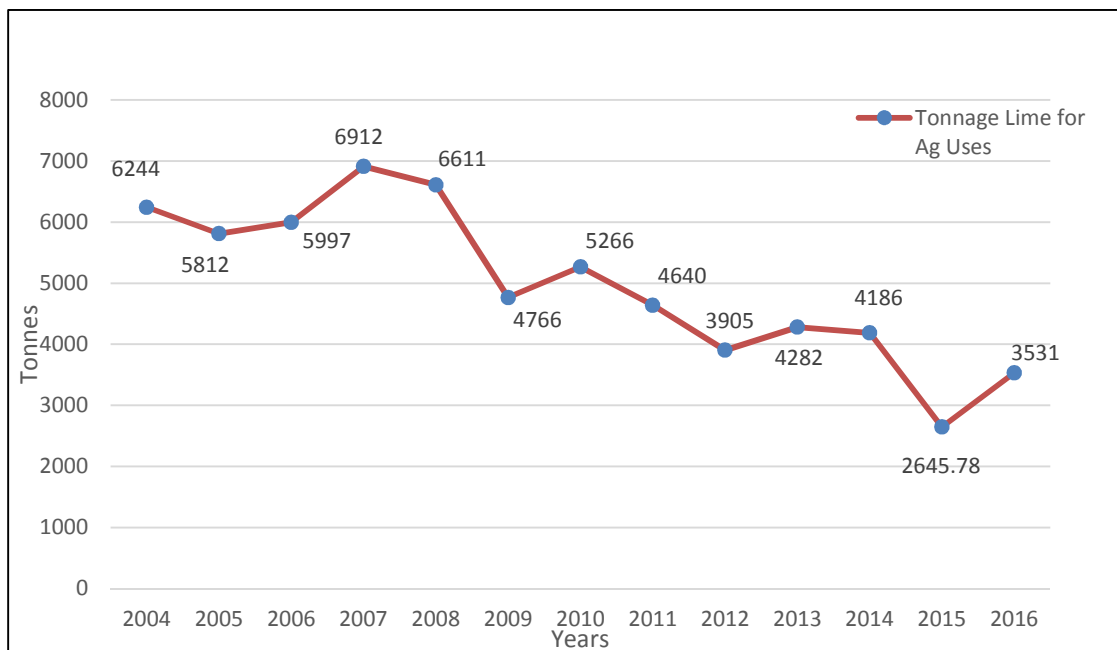
## 3. Mineral Reserves and Aggregate Reprocessing Capacity

3.1 A mineral reserve is the total tonnage of mineral that is permitted to be extracted under a planning permission. Mineral reserves have been calculated for all existing mineral operations. The mechanism for determining mineral reserves is based on two options:
a) any re-assessment of reserves carried out by the mineral operator; or
b) assessment of reserves based on the total tonnage of minerals permitted to be extracted by an approved planning permission and adjusted by deducting the total tonnage of sales between the date of activation of the planning permission and November 2016.

3.2 The reserve calculations have been undertaken by DED which collates information on annual mineral sales as part of the licencing of mineral extraction and collection of mineral royalties. The following mineral reserves reflect the situation at each mineral operation as at the end of November 2016.

### TABLE 6: Sand and Gravel Reserves at 30th November 2016

| Operation | 2013 Tonnes ('000) | 2014 Tonnes ('000) | 2015 Tonnes ('000) | 2016 Tonnes ('000) |
|---|---|---|---|---|
| Point of Ayre | 2,904,780 | 2,818,940 | 1,589,000 [4] | 1,493,909 |
| Ballaharra Sand Pit | 548,590 | 536,600 | 525,740 | 514,720 |
| Cronk y Scotty Sand Pit | 18,670 | 18,210 | 17,770 | 17,542 |
| TOTAL | 3,472,040 | 3,373,750 | 2,132,510 | 2,026,171 |

[4] Based on latest reserve estimate by Island Aggregates

### TABLE 7: Hard Rock Reserves at 30th November 2016

| Mineral | Operation | 2013 Tonnes ('000) | 2014 Tonnes ('000) | 2015 Tonnes ('000) | 2016 Tonnes ('000) |
|---|---|---|---|---|---|
| Limestone | Billown Quarry | 170,340 | 118,500 | 66,770 | 67,621 [5] |
| | Pooil Vaaish Quarry | 107,680 | 100,000 | 100,000 | 100,000 |
| Manx Group | Cringle Quarry | 1,200,080 | 1,176,480 | 1,142,780 | 1,119,579 |
| | Earystane Quarry | 133,970 | 133,400 | 139,900 | 135,230 |
| | Starch Mill Quarry | 37,320 | 36,790 | 36,040 | 35,968 |
| Igneous | Poortown Quarry | 921,420 | 843,410 | 766,550 | 691,939 |
| | Stoney Mountain Quarry | 2,272,910 | 2,250,480 | 2,234,100 | 2,217,038 |
| | TOTAL | 4,843,720 | 4,659,060 | 4,486,140 | 4,367,375 |

[5] Based on latest reserve estimate by Colas

## 4. Forecast Need for Minerals, and Review of Mineral Production

4.1 Key for business planning in the minerals industry is certainty about the availability of reserves. Forecasting need for minerals based on changes in measures of economic activity (e.g. GDP) has historically proven to be unreliable. Using a 10-year rolling average of annual aggregate sales from all quarries to forecast the future 12 months' minerals need is considered the most accurate method. This mitigates the potential of a one-off major infrastructure construction project to skew average aggregate demand.

4.2 For example the table below compares the forecast 10-year annual aggregates demand (S&G and Hard Rock) based on annual aggregate sales from 2006 (red line), and the actual annual aggregate sales (blue line). The spike in sales in 2010 is due to the one-off extraction of 274,000t of aggregate for use in the airport runway extension and sourced from New Turkeyland Quarry (see Table 2).  The linear trend line (orange line) indicates the decrease in sales of primary aggregate since 2006. The gap between forecast (10 yr. rolling average) and actual tonnage sales highlights the increased rate of decline in annual sales, although the rate of decline has reduced since 2013.

**Figure 5:    Comparison of Actual Aggregate Sales with Forecast Aggregate Sales Based on a 10-year rolling average**
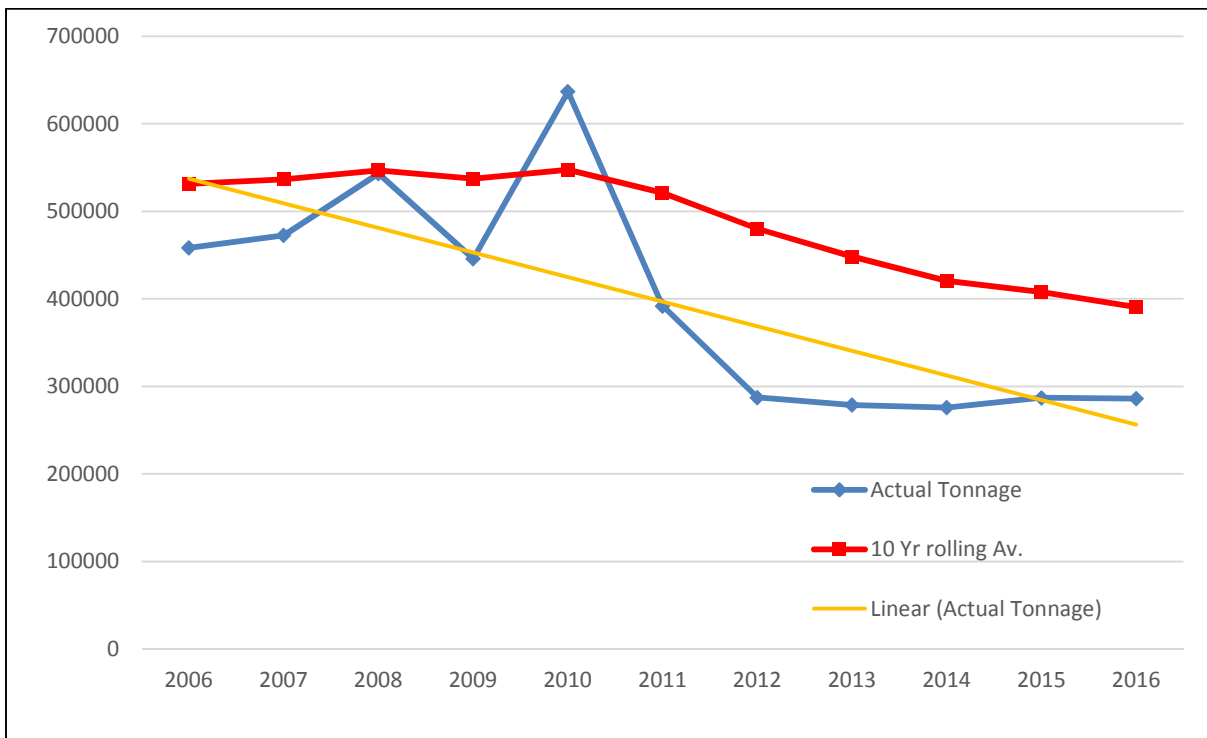


4.3 Given the difference between the Actual tonnage and the 10-year rolling average (i.e. 104,500t), the AMMR 2017 has also assessed the short-term demand for aggregates looking at the three-year annual aggregates demand which provides an indication of how the Island may develop in the short-term.

## 4.4    Forecast of Aggregate Need in 2017

The AMMR reports on mineral sales and reserves for all quarries on the Island. On the Isle of Man, the Government owns and operates two hard rock quarries, namely Poortown Quarry and Stoney Mountain Quarry. This is to ensure that the Island can meet its national need for highest grade aggregate and rock for Government infrastructure works. If reviewed against the factors used for financial reporting for commercial mining operations, neither Poortown Quarry nor Stoney Mountain Quarry would be considered commercial quarries.

Most of the high-quality aggregate produced from Poortown and the granite from Stoney Mountain is utilised by Government. However lower quality mineral from both Poortown and Stoney Mountain is supplied to the commercial sector which includes certain mineral operators. At present it is only possible to confirm the tonnage of aggregate used in DOI civil engineering works. In seeking to reflect the situation the AMMR currently reports the aggregate data including and excluding Government sales and reserves. It is acknowledged however that removing Government reserves entirely from the calculation of the Hard Rock landbank does not accurately represent the availability of aggregate to the commercial market.

### 4.4.1  Sand and Gravel

**Table 8: Forecast of Need for Sand and Gravel in 2017 (10 years)**

| Mineral Type | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 10 Year Total Tonnes ('000) | 10 Year Ave. Tonnes ('000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sand & Gravel | 203.4 | 201.8 | 178.3 | 146.5 | 147.0 | 101.8 | 94.7 | 98.8 | 101.0 | 117.0 | 1390.3 | 139.0 |

The annual sand and gravel requirement for 2017 using the 10-year aggregate forecast is c.**139,000 tonnes**. This represents a decrease of 10,700 tonnes compared to the 149,700 tonnes forecast for 2016.

**Table 9: Forecast of Need for Sand and Gravel in 2017 (3 years)**

| | 2014 | 2015 | 2016 | 3 Year Total Tonnes ('000) | 3 Year Ave. Tonnes ('000) |
|---|---|---|---|---|---|
| Sand & Gravel | 98.8 | 101.0 | 117.0 | **316.8** | **105.6** |

The annual sand and gravel requirement for 2017 using the 3-year aggregate forecast is c.**106,000 tonnes**. This represents an increase of 7,800 tonnes compared to the 98,200 tonnes forecast for 2016.

### 4.4.2  <u>Hard Rock (aggregate/building stone)</u>

Hard Rock (HR) quarries are operated on Island by both the commercial sector and by Government. To reflect how this impacts on commercial need for, and availability of, aggregate, the AMMR reports the aggregate data in a number of formats, including and excluding Government sales and reserves.

**Option A  All Sales from all Hard Rock quarries**

Based on a 10-year rolling average of annual aggregate/building stone sales from **all HR quarries,** including all sales (to private and commercial sectors) from Poortown (PT) and Stoney Mountain (SM) quarries.

**Table 10: Forecast of Need – HR 2017 - All HR Quarries (10 years)**

| Mineral Type | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 10 Year Total Tonnes ('000) | 10 Year Ave. Tonnes ('000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Limestone | 116.5 | 115.9 | 76.6 | 352.4 | 83.7 | 72.8 | 57.9 | 51.8 | 57.9 | 50.1 | 1,035.5 | 103.6 |
| Manx Group | 56.8 | 65.0 | 48.6 | 25.8 | 59.7 | 23.6 | 16.0 | 24.7 | 35.0 | 27.9 | 383.1 | 38.3 |
| Igneous | 98.2 | 157.7 | 140.6 | 110.6 | 100.2 | 89.2 | 110.3 | 100.4 | 93.2 | 91.7 | 1,092.1 | 109.2 |
| **TOTAL** | **271.5** | **338.6** | **265.8** | **488.8** | **243.6** | **185.6** | **184.2** | **176.9** | **186.1** | **169.7** | **2,510.7** | **251.1** |

The total HR requirement for 2017 (based on all HR sales) using the 10-year aggregate forecast is **c.251,000 tonnes**. This represents a decrease of 6,300 tonnes compared to the 257,300 tonnes forecast for 2016.

**Table 11: Forecast of Need – HR 2017 - All HR Quarries (3 years)**

| Mineral Type | 2014 | 2015 | 2016 | 3 Year Total Tonnes ('000) | 3 Year Ave. Tonnes ('000) |
|---|---|---|---|---|---|
| Limestone | 51.8 | 57.9 | 50.1 | 159.8 | 53.3 |
| Manx Group | 24.7 | 35.0 | 27.9 | 87.6 | 29.2 |
| Igneous | 100.4 | 93.2 | 91.7 | 285.3 | 95.1 |
| **TOTAL** | **176.9** | **186.1** | **169.7** | **532.7** | **177.6** |

The total HR requirement for 2017 (based on all HR sales) using the 3-year aggregate forecast is **c.178,000 tonnes**. This represents a decrease of 4,400 tonnes compared to the 182,400 tonnes forecast for 2016.

**Option B  Excludes All Sales from Poortown and Stoney Mountain Quarries**

Based on a 10-year rolling average of annual aggregate/building stone sales from all HR quarries but excluding **all** sales from Poortown and Stoney Mountain quarries.

**Table 12: Forecast of Need – HR in 2016 – excludes all sales from PT and SM (10 years)**

| Mineral Type | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 10 Year Total Tonnes (`000) | 10 Year Ave. Tonnes (`000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Limestone | 116.5 | 115.9 | 76.6 | 352.4 | 83.7 | 72.8 | 57.9 | 51.8 | 57.9 | 50.1 | 1,035.5 | 103.6 |
| Manx Group | 56.8 | 65.0 | 48.6 | 25.8 | 59.7 | 23.6 | 16.0 | 24.7 | 35.0 | 27.9 | 383.1 | 38.3 |
| TOTAL | 173.3 | 180.9 | 125.2 | 378.2 | 143.4 | 96.4 | 73.9 | 76.5 | 92.8 | 78.0 | 1,418.6 | 141.9 |

The total HR requirement for 2017 (excluding sales from Poortown and Stoney Mountain) using the 10-year aggregate forecast is **c.142,000 tonnes**. This represents a decrease of 9,500 tonnes compared to the 151,500 tonnes forecast for 2016.

**Table 13: Forecast of Need - HR in 2017 – excludes all sales from PT and SM (3 years)**

| Mineral Type | 2014 | 2015 | 2016 | 3 Year Total Tonnes (`000) | 3 Year Ave. Tonnes (`000) |
|---|---|---|---|---|---|
| Limestone | 51.8 | 57.9 | 50.1 | 159.8 | 53.3 |
| Manx Group | 24.7 | 35.0 | 27.9 | 87.6 | 29.2 |
| TOTAL | 76.5 | 92.8 | 78.0 | 247.3 | 82.4 |

The total HR requirement for 2017 (excluding sales from Poortown and Stoney Mountain) using the 3-year aggregate forecast is **c. 82,500 tonnes**. This represents an increase of 1,400 tonnes compared to the 81,100 tonnes forecast for 2016.

**Option C      All Sales from All HR quarries excluding Poortown Quarry**
Based on a 10-year rolling average of annual aggregate/building stone sales from **all HR quarries** including Stoney Mountain Quarry but excluding all sales (to private and commercial sectors) from Poortown (PT).

**Table 14: Forecast of Need – HR 2017 - All HR Quarries excluding Poortown (10 years)**

| Mineral Type | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 10 Year Total Tonnes (`000) | 10 Year Ave. Tonnes (`000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Limestone | 116.5 | 115.9 | 76.6 | 352.4 | 83.7 | 72.8 | 57.9 | 51.8 | 57.9 | 50.1 | 1,035.5 | 103.6 |
| Manx Group | 56.8 | 65.0 | 48.6 | 25.8 | 59.7 | 23.6 | 16.0 | 24.7 | 35.0 | 27.9 | 383.1 | 38.3 |
| Igneous - SM | 41.5 | 65.1 | 38.5 | 34.9 | 22.5 | 28.4 | 33.7 | 22.4 | 16.4 | 17.1 | 320.5 | 32.1 |
| TOTAL | 214.8 | 246.0 | 163.7 | 413.1 | 165.9 | 124.8 | 107.6 | 98.9 | 109.2 | 95.1 | 1,739.1 | 173.9 |

The total HR requirement for 2017 (based on all HR sales excluding Poortown Quarry) using the 10-year aggregate forecast is **c.174,000 tonnes**. This represents a decrease of 11,100 tonnes compared to the 185,100 tonnes forecast for 2016.

**Table 15: Forecast of Need – HR 2017 - All HR Quarries excluding Poortown (3 years)**

| Mineral Type | 2014 | 2015 | 2016 | 3 Year Total Tonnes ('000) | 3 Year Ave. Tonnes ('000) |
|---|---|---|---|---|---|
| Limestone | 51.8 | 57.9 | 50.1 | 159.8 | 53.3 |
| Manx Group | 24.7 | 35.0 | 27.9 | 87.6 | 29.2 |
| Igneous - SM | 22.4 | 16.4 | 17.1 | 55.9 | 18.6 |
| **TOTAL** | **98.9** | **109.2** | **95.1** | **303.2** | **101.1** |

The total HR requirement for 2017 (based on all HR sales excluding Poortown Quarry) using the 3-year aggregate forecast is **c.101,000 tonnes**. This represents an decrease of 4,300 tonnes compared to the 105,300 tonnes forecast for 2016.

**Table 16       Summary of Aggregate Need in 2017**

| Forecast annual need from: | Annual tonnage based on 10 years average sales | Annual tonnage based on 3 years average sales |
|---|---|---|
| Sand & Gravel quarries | **139,000** | **106,000** |
| Hard Rock quarries – all | **251,000** | **178,000** |
| Hard Rock quarries - excluding Government Quarries | **142,000** | **82,500** |
| Hard Rock quarries - excluding Poortown Quarry | **174,000** | **101,000** |

## 5. Landbanks

5.1 A mineral landbank is defined as the stock of permitted reserves that have a valid planning permission. Landbanks are needed to ensure a continuous supply of minerals. Conventional advice is that minimum length of the landbank should reflect the time needed to obtain planning permission and bring the operations into full production. The landbank required for both HR and S&G is set at 10 years as agreed by the MSATPG.

5.2 It is acknowledged that landbanks are only an indication of the availability of minerals. The interpretation and management of landbanks should be based on considerations of real need and real supply taking into account factors such as: the nature and quality of the aggregate which may change within a quarry and over time; known constraints on the availability of consented reserves that might limit output over the landbank period; significant future increases in demand that can be forecast with reasonable certainty.

5.3 Whilst the hard rock landbank may indicate a sufficient amount of reserves remaining without the need for new planning applications to replenish depleted reserves, this may mask a situation where a shortfall in the availability of certain minerals, i.e. graded aggregates/bitumen affinity products may exist.

## Classification

5.3 The standard protocol adopted by Aggregate Working Parties across the UK for classifying landbanks is by the two main mineral types HR and S&G. There is some sub- classification but this is for minerals with a specialised end use e.g. silica sand.

5.4 The option of sub-dividing the reserves of these two main mineral types was considered. For example, HR reserves could be sub-divided into high grade aggregate (PSV/ bitumen affinity), Type 1/graded aggregate, and building stone. However, the option was discounted as being both impracticable and imprecise. A HR reserve may produce a range of aggregate types due to local variations in mineralogy, weathering along faults lines, intrusions or bedding planes. Reserves can also be processed into a range of products according to demand. The landbank for HR on the Island is therefore calculated as follows:

Landbank for Hard Rock =   Total Mineral reserves remaining at Hard Rock quarries
Average 10 year (or 3 year) annual mineral production

## 2016 Landbank Assessments at 30th November 2016

## Sand and Gravel Landbank – 10 Year

| | | | |
|---|---|---|---|
| Sand and Gravel Landbank of permitted reserves | = | 2,026,171 tonnes | |
| 10-year forecast of annual production | = | 139,000 tonnes | |
| Landbank Requirement (10 years) | = | 1,390,000 tonnes | (i.e. 139,000 tonnes x 10 years) |
| Status of Landbank | = | 636,171 tonnes | (SURPLUS) |
| **S&G Landbank** | = | **14.6 Years** | (i.e. 2,026,171 ÷ 139,000) |

## Sand and Gravel Landbank – 3 years

| | | | |
|---|---|---|---|
| Sand and Gravel Landbank of permitted reserves | = | 2,026,171 tonnes | |
| 3-year forecast of annual production | = | 106,000 tonnes | |
| Landbank Requirement (3 years) | = | 1,060,000 tonnes | (i.e. 106,000 tonnes x 10 years) |
| Status of Landbank | = | 966,171 tonnes | (SURPLUS) |
| **S&G Landbank** | = | **19.1 Years** | (i.e. 2,026,171 ÷ 106,000) |

## Hard Rock

HR quarries are operated on Island by both the commercial sector and by Government. To reflect how this impacts on commercial need for, and availability of, aggregate, the AMMR reports aggregate data including and excluding Government sales and reserves.

### Option A:   Hard rock Landbank all reserves and all sales – 10 Year

| | | | |
|---|---|---|---|
| Hard Rock Landbank of permitted reserves | = | 4,367,375 tonnes | |
| 10-year forecast of annual production | = | 251,000 tonnes | |
| Landbank Requirement | = | 2,510,000 tonnes | (i.e. 251,000 tonnes x 10 years) |
| Status of Landbank | = | 1,857,375 tonnes | **(SURPLUS)** |
| **Hard Rock Landbank – all quarries** | = | **17.4 Years** | (i.e. 4,367,375t ÷ 251,000t) |

### Option A:   Hard rock Landbank all reserves and all sales – 3 Year

| | | | |
|---|---|---|---|
| Hard Rock Landbank of permitted reserves | = | 4,367,375 tonnes | |
| 3-year forecast of annual production | = | 178,000 tonnes | |
| Landbank Requirement | = | 1,780,000 tonnes | (i.e. 178,000 tonnes x 10 years) |
| Status of Landbank | = | 2,587,375 tonnes | **(SURPLUS)** |
| **Hard Rock Landbank – all quarries** | = | **24.5 Years** | (i.e. 4,367,375t ÷ 178,000t) |

### Option B:  Hard Rock Landbank excluding reserves and sales for Poortown & Stoney Mountain -10 Year

| | | | |
|---|---|---|---|
| Hard Rock Landbank of permitted reserves | = | 1,458,398 tonnes | |
| 10-year forecast of annual production | = | 142,000 tonnes | |
| Landbank Requirement | = | 1,420,000 tonnes | (i.e. 142,000 tonnes x 10 years) |
| Status of Landbank | = | 38,398 tonnes | **(SURPLUS)** |
| **Hard Rock Landbank excl PT & SM** | = | **10.3 Years** | (i.e. 1,458,398t ÷ 142,000t) |

**Option B:  Hard Rock Landbank excluding reserves and sales for Poortown & Stoney Mountain – 3 year**

| | | | |
|---|---|---|---|
| Hard Rock Landbank of permitted reserves | = | 1,458,398 tonnes | |
| 3-year forecast of annual production | = | 82,500 tonnes | |
| Landbank Requirement | = | 825,000 tonnes | (i.e. 82,500 tonnes x 10 years) |
| Status of Landbank | = | 633,398 tonnes | **(SURPLUS)** |
| **Hard Rock Landbank excl PT & SM** | = | **17.7 Years** | (i.e. 1,458,398t ÷ 82,500t) |

**Option C:   Hard rock Landbank excluding reserves and sales for Poortown – 10 Year**

| | | | |
|---|---|---|---|
| Hard Rock Landbank of permitted reserves | = | 3,675,436 tonnes | |
| 10-year forecast of annual production | = | 174,000 tonnes | |
| Landbank Requirement | = | 1,740,000 tonnes | (i.e. 174,000t x 10 years) |
| Status of Landbank | = | 1,935,436 tonnes | **(SURPLUS)** |
| **Hard Rock Landbank – all HR Excl. Poortown** | = | **21.1 Years** | (i.e. 3,675,436t ÷ 174,000t) |

**Option C:   Hard rock Landbank excluding reserves and sales for Poortown – 3 Year**

| | | | |
|---|---|---|---|
| Hard Rock Landbank of permitted reserves | = | 3,675,436 tonnes | |
| 3-year forecast of annual production | = | 101,000 tonnes | |
| Landbank Requirement | = | 1,010,000 tonnes | (i.e. 101,000 tonnes x 10 years) |
| Status of Landbank | = | 2,665,436 tonnes | **(SURPLUS)** |
| **Hard Rock Landbank – all HR Excl. Poortown** | = | **36.4 Years** | (i.e. 3,675,436t ÷ 101,000t) |

**Need for Aggregate Reserves - 2017**

6.8    A review of the landbanks indicates that at November 2016:

   i.    There is **no requirement** to seek to identify further reserves of sand and gravel for aggregate purposes as the landbank is c. **14 years** using the 10-year average sales analysis. The landbank based on 3-year average sales is c. **19 years**.

   ii.    There is **no requirement** to seek to identify further reserves of Hard Rock for aggregate purposes if the reserves of the Government operated quarries are included as the landbank is c. **17 years** using the 10-year average sales analysis. The landbank based on 3-year average sales is c. **24 years**.

   iii.    With the reserves of the Government quarries excluded, the landbank for Hard Rock is c. **10 years** and so a call for sites is required. The landbank based on 3-year average sales is c. **18 years**.

   iv.    The Hard Rock landbank with Poortown Quarry reserves excluded is c. **21 years**. The landbank based on 3-year average sales is c. **36 years**.

6.9    This assessment of need for aggregate does not take account of the need for agricultural lime which is a non-aggregate product (see Section 2.5).