

Minerals and Secondary Aggregate Technical Planning Group AMMR 2016 Technical Report on 2015 Minerals Data

Status of the Technical Report

The AMMR Technical Report 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 DED by the mineral operators and is compiled from half yearly mining lease/licence returns. It covers the period from 1st December 2014 to 30th November 2015.

The AMMR is supported by baseline geological data and historical information contained within the Department of Economic Development's (DED) Minerals Resources Plan.

Report Summary

Primary Aggregate Sales

Total primary aggregate sales for 2015 were 287,072 tonnes compared to 275,784 tonnes in 2014. This is an overall increase of 11,288 tonnes (c. 4% of total demand) from 2014 and reverses the downward trend in production since 2008. Sand and gravel sales increased by 2,202 tonnes (c. 2% of total demand). Hard rock aggregate sales increased by 9,084 tonne compared to 2014. Overall, commercial quarries contributed 68% 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 decreased slightly during 2015. DEFA have assessed the neutralising value and performance of different forms of limestone and conclude that Billown lime, if crushed sufficiently and applied in a timely and targeted manner, is an effective liming agent for Manx soils.

Landbanks

The reduction in the demand of primary aggregate and increased usage of recycled material is not surprisingly impacting on the length of landbanks. As at 30th November 2015, the landbank for Sand & Gravel (based on a 10-year average) stands at 14.2 years, decreasing from 22.8 years in AMMR2014. This is primarily due to the operator at Point of Ayre revising the remaining landbank at the quarry. The equivalent Hard Rock landbank (including Government reserves) is 17.4 years. When Government reserves are excluded, the 10 year landbank reduces to 9.81 years.

However, 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 21.7 years, Hard Rock landbank (including Government reserves) is 24.6 years and 18.32 years when Government reserves are excluded.

AMMR 2016 Technical Report 2015 Data

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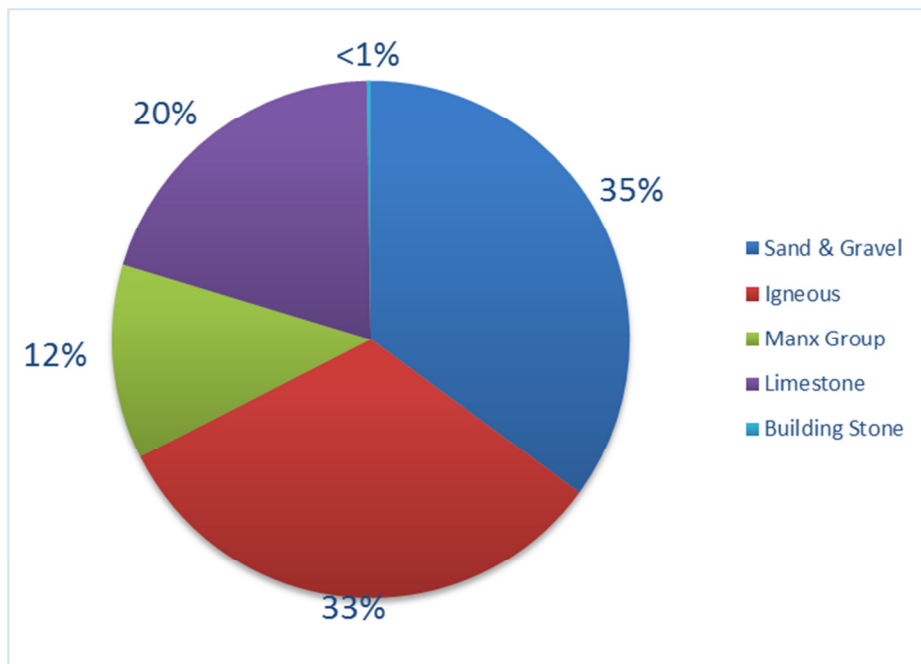
1. Sale of Primary Minerals

- 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 2014 and 30th November 2015) 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 S&G and Hard Rock (see Section 5 - Forecast Need for Minerals).

Table 1: Summary of Primary Aggregate & Building Stone Sales 2013 – 2015

	2013	2014	2015
Mineral Operation	Tonnes ('000)	Tonnes ('000)	Tonnes ('000)
Ballaharra Sand Pit	12.84	11.99	10.86
Point of Ayre	81.50	85.84	89.71
Cronk y Scotty Sand Pit	0.32	0.46	0.44
Billown Quarry	57.31	51.84	51.73
Cringle Quarry (Crushed Rock)	15.18	23.34	33.51
Cringle Quarry (Building Stone)	0.13	0.26	0.19
Earystane Quarry (Crushed Rock)	0.15	0.49	0.03
Earystane Quarry (Building Stone)	0.39	0.08	0.47
Pooil Vaaish Quarry (Crushed Rock)	0.55	0.00	0.00
Pooil Vaaish Quarry (Building Stone)	0.06	0.00	0.00
Poortown Quarry (crushed rock - Government Sales)	38.08	29.77	25.51
Poortown Quarry (crushed rock - Private Sales)	38.48	48.24	51.35
Stoney Mountain Quarry (crushed rock - Government Sales)	18.23	12.53	9.18
Stoney Mountain Quarry (crushed rock - Private Sales)	15.47	9.90	7.20
Starch Mill Quarry (Crushed Rock)	0.02	0.47	0.70
Starch Mill Quarry (Building Stone)	0.13	0.06	0.05
Ancillary Mining Total	0.00	0.51	6.14
TOTAL	278.84	275.78	287.07

Figure 1 2015 Sales of Primary Aggregate & Building Stone



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

Table 2: Total Sales as Primary Aggregate 2006 – 2015 ('000 tonnes)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Sand & Gravel	223.91	203.41	201.78	178.32	146.53	146.99	101.80	94.66	98.80	101.01
Limestone	104.92	116.46	115.87	76.59	352.38 ¹	84.28	72.86	57.92	51.84	57.87
Manx Group	68.46	56.76	65.01	48.58	25.83	60.50	23.57	16.00	24.69	34.96
Igneous	58.86	98.21	157.71	140.56	110.58	101.33	89.21	110.26	100.44	93.23
TOTAL	456.15	474.84	540.37	444.05	635.32	393.10	287.44	278.84	275.77	287.07

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

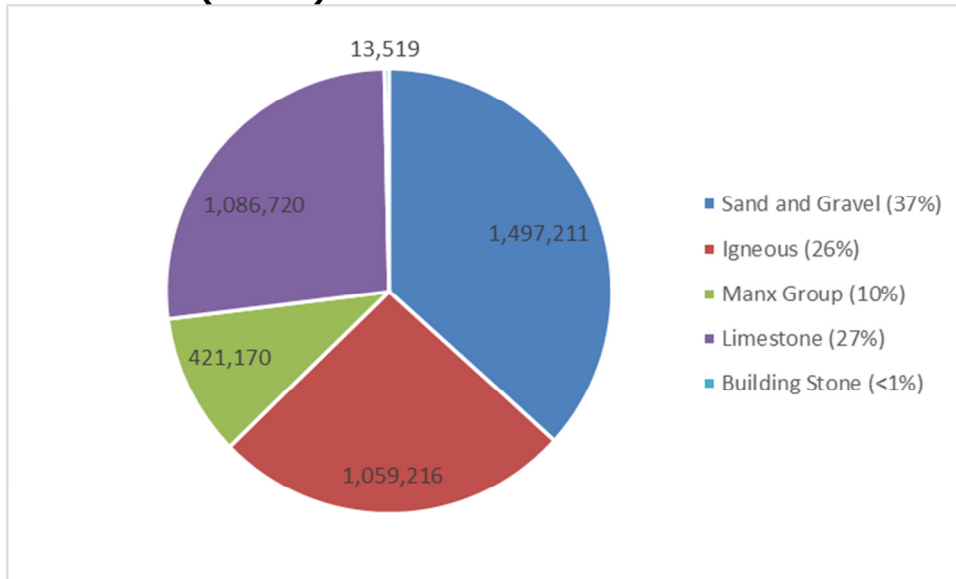
Table 3: Total Sales as Building Stone 2006 – 2015 ('000 tonnes)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Limestone	0.28	0.42	1.17	0.08	0.14	0.36	0.12	0.06	0.00	0.00
Manx Group	1.86	1.33	1.63	1.49	1.35	0.77	0.66	0.65	0.40	0.72
TOTAL	2.14	1.75	2.80	1.57	1.49	1.13	0.78	0.71	1.12	0.72

Table 4: Total Sales Primary Agg & Building Stone 2006 – 2015 ('000 tonnes)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Primary Aggregate	456.15	470.88	540.38	438.46	635.33	390.61	286.66	278.13	275.38	286.35
Building Stone	2.14	1.75	2.80	1.57	1.49	1.13	0.78	0.71	0.40	0.72
TOTAL	458.29	472.63	543.18	440.03	636.82	391.74	287.44	278.84	275.77	287.07

Figure 2: Total 10 Year Sales of Primary Aggregate and Building Stone 2006 to 2015 (tonnes)



2. End Use of Extracted Minerals

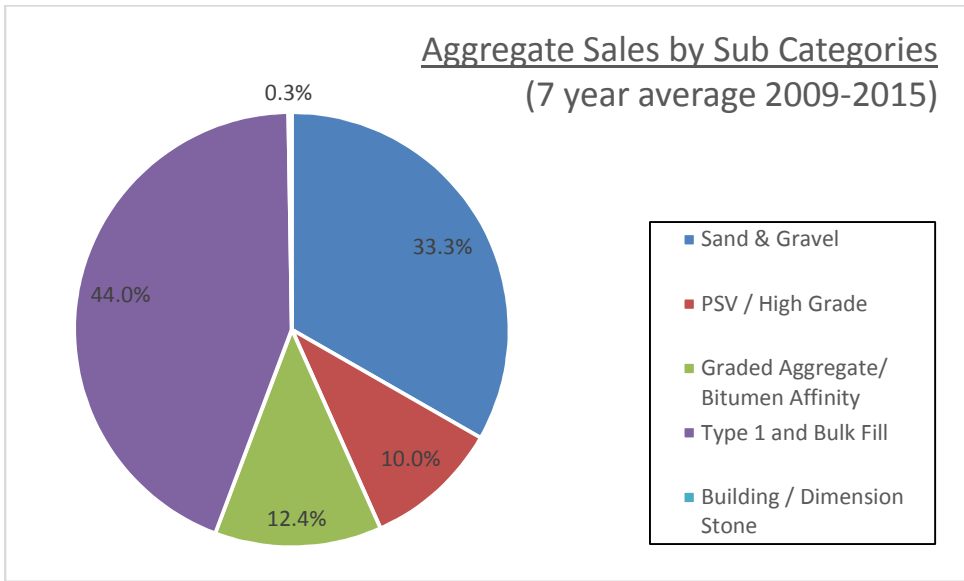
- 2.1 Extracted minerals can be processed into aggregate products which are suitable for a variety of end uses. The range of potential aggregate end uses is, in general, determined by the mineralogy of the S&G and Hard Rock.
- 2.2 Data on mineral end-use over time can, where available, provide a useful 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 However caution needs to be applied to detailed interpretation of end use for forecasting need for the following reasons:
- end-use data is not reported for all quarries;
 - there are no reliable data on the amount and end-use of imported minerals (e.g. dimension stone);
 - the demand for road aggregate is driven by the design guide for residential roads on the Island, Manx Roads 2 (MR2). MR2 is currently a prescriptive road construction design which specifies the amount and type of primary aggregate required. A move to a product performance led road design would reduce the demand for primary aggregate, including high grade polished stone value (PSV) igneous mineral¹, and therefore the amount and end use of mineral;
 - although not precluded from use, recycled aggregates are only accepted within sub-base layer for road construction. A move to a more sustainable use of aggregate, together with agreed method for performance testing for recycled aggregate, should realise a reduction in demand for primary aggregate.

Table 5: Aggregate Sales by Sub Categories 2009 - 2015 ('000 tonnes)

	2009	2010	2011	2012	2013	2014	2015	Total	7yr Average
Sand & Gravel	178.32	146.53	146.99	101.80	94.66	98.30	101.01	867.61	123.94
PSV / High Grade	68.57	33.58	38.60	36.41	22.56	37.11	25.11	261.94	37.42
Graded Aggregate/ Bitumen Affinity	59.66	51.67	51.13	44.16	52.00	30.48	34.53	323.63	46.23
Type 1 and Bulk Fill	138.84	404.76	155.04	105.19	108.90	109.51	125.70	1147.94	163.99
Building / Dimension Stone	1.58	1.49	1.15	0.78	0.72	0.40	0.72	6.84	0.98
TOTAL	446.97	638.03	392.91	288.34	278.84	275.80	287.07	2607.96	372.57

¹ (PSV): The Polished Stone Value gives a measure of the resistance of an aggregate to the polishing action of a pneumatic tyre under conditions similar to those occurring on the surface of a road. The PSV number determines an aggregates resistance to skidding when used in the surface course of a road.
http://aggregain.wrap.org.uk/terminology/polished_stone.html

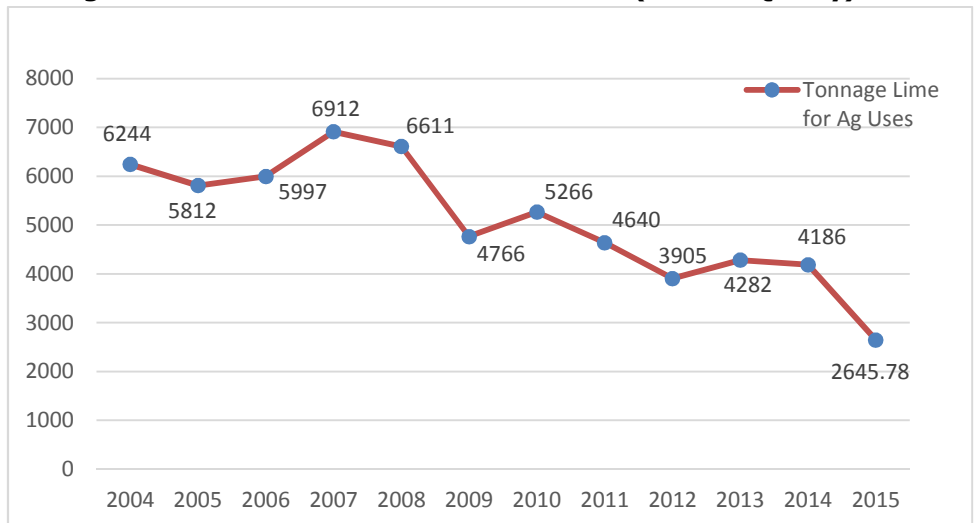
Figure 3: Percentile Summary of Aggregate Sales by Sub Categories (7-year average)



Agricultural Lime

2.4 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 – 2015 (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:
- any re-assessment of reserves carried out by the mineral operator; or
 - 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 2015.
- 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 2015.

TABLE 6: Sand and Gravel Reserves at 30 Nov 2015

Operation	2012	2013	2014	2015
	Tonnes ('000)	Tonnes ('000)	Tonnes ('000)	Tonnes ('000)
Point of Ayre	2,986,280	2,904,780	2,818,940	1,589,000
Ballaharra Sand Pit	561,430	548,590	536,600	525,740
Cronk y Scotty Sand Pit	18,990	18,670	18,210	17,770
TOTAL	3,566,700	3,472,040	3,373,750	2,132,510

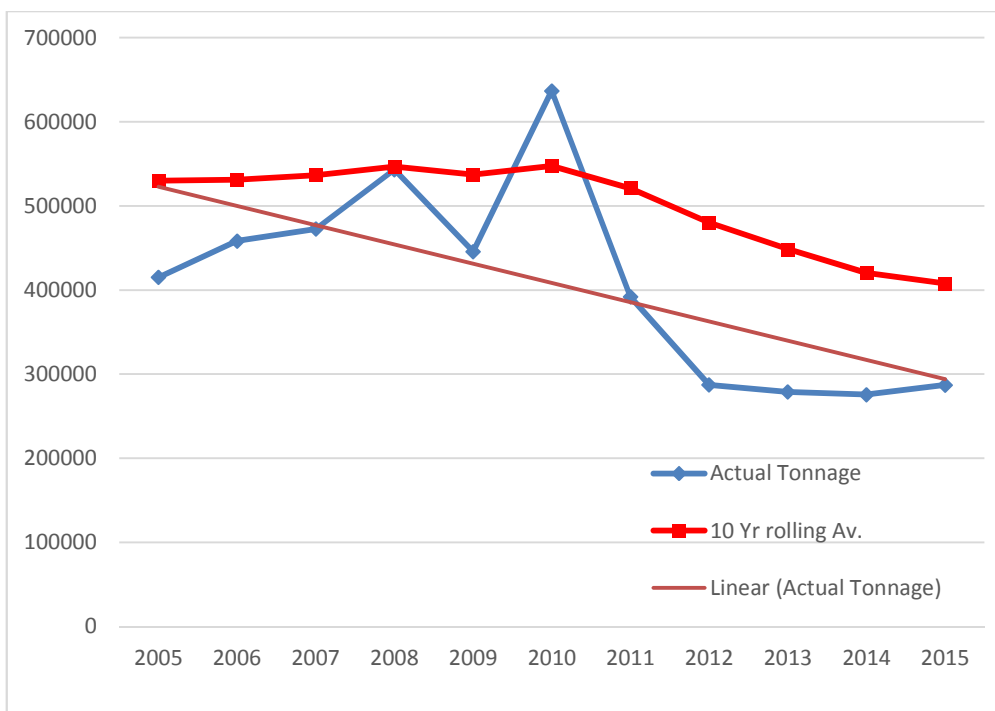
TABLE 7: Hard Rock Reserves at 30 Nov 2015

Mineral	Operation	2012	2013	2014	2015
		Tonnes ('000)	Tonnes ('000)	Tonnes ('000)	Tonnes ('000)
Limestone	Billown Quarry	227,650	170,340	118,500	66,770
	Pooil Vaaish Quarry	108,290	107,680	100,000	100,000
Manx Group	Cringle Quarry	1,215,390	1,200,080	1,176,480	1,142,780
	Earystane Quarry	134,510	133,970	133,400	139,900
	Starch Mill Quarry	37,470	37,320	36,790	36,040
Igneous	Poortown Quarry	997,980	921,420	843,410	766,550
	Stoney Mountain Quarry	2,306,610	2,272,910	2,250,480	2,234,100
	TOTAL	5,027,900	4,843,720	4,659,060	4,486,140

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 2002 (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 2002. 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, the AMMR 2015 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 2016

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 2016 (10 years)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Sand & Gravel	223.91	203.41	201.78	178.32	146.53	146.99	101.8	94.66	98.80	101.01	1497.2	149.7

The annual sand and gravel requirement for 2016 using the 10 year aggregate forecast is **c.149,700 tonnes**.

Table 9: Forecast of Need for Sand and Gravel in 2016 (3 years)

	2013	2014	2015	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Sand & Gravel	94.66	98.80	101.01	294.5	98.2

The annual sand and gravel requirement for 2016 using the 3 year aggregate forecast is **c.98,200 tonnes**.

4.4.2 Hard Rock (aggregate/building stone)

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 2016 - All HR Quarries (10 years)

Mineral Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Limestone	104.9	116.46	115.9	76.6	352.4	83.7	72.8	57.9	51.8	57.87	1,090.3	109.0
Manx Group	68.5	56.8	65	48.6	25.8	59.7	23.6	16	24.7	34.96	423.7	42.4
Igneous	58.9	98.2	157.7	140.6	110.6	100.2	89.2	110.3	100.4	93.23	1,059.3	105.9
TOTAL	232.2	271.4	338.6	265.7	488.8	246.1	185.6	184.2	176.9	186.06	2,573.3	257.3

The total HR requirement for 2016 (based on all HR sales) using the 10 year aggregate forecast is **c.257,300 tonnes**.

Table 11: Forecast of Need – HR 2016 - All HR Quarries (3 years)

Mineral Type	2013	2014	2015	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Limestone	57.9	51.8	57.9	167.6	55.9
Manx Group	16.0	24.7	35.0	75.7	25.2
Igneous	110.3	100.4	93.2	303.9	101.3
TOTAL	184.2	176.9	186.1	547.2	182.4

The total HR requirement for 2016 (based on all HR sales) using the 3 year aggregate forecast is **c.182,400 tonnes**.

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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Limestone	104.9	116.5	115.9	76.6	352.4	84.3	72.9	57.9	51.8	57.9	1091.0	109.1
Manx Group	68.5	56.8	65.0	48.6	25.8	60.5	23.6	16.0	24.7	35.0	424.4	42.4
TOTAL	173.4	173.2	180.9	125.2	378.2	144.8	96.4	73.9	76.5	92.9	1515.4	151.5

The total HR requirement for 2016 (excluding sales from Poortown and Stoney Mountain) using the 10 year aggregate forecast is **c.151,500 tonnes**.

Table 13: Forecast of Need - HR in 2016 – excludes all sales from PT and SM (3 years)

Mineral Type	2013	2014	2015	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Limestone	57.9	51.8	57.9	167.6	55.9
Manx Group	16.0	24.7	35.0	75.7	25.2
TOTAL	73.9	76.5	92.9	243.3	81.1

The total HR requirement for 2016 (excluding sales from Poortown and Stoney Mountain) using the 3 year aggregate forecast is **c. 81,100 tonnes**.

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 2016 - All HR Quarries excluding Poortown (10 years)

Mineral Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Limestone	104.9	116.5	115.9	76.6	352.4	84.3	72.8	57.9	51.8	57.9	1091.0	109.1
Manx Group	68.5	56.8	65.0	48.6	25.8	60.5	23.6	16.0	24.7	35.0	424.5	42.5
Igneous	31.5	41.5	65.1	38.5	35.0	22.5	28.4	33.7	22.5	16.4	335.1	33.5
TOTAL	204.9	214.8	246.0	163.7	413.2	167.3	124.8	107.6	99.0	109.3	1850.6	185.1

The total HR requirement for 2016 (based on all HR sales excluding Poortown Quarry) using the 10 year aggregate forecast is **c.185,100 tonnes**.

Table 15: Forecast of Need – HR 2016 - All HR Quarries excluding Poortown (3 years)

Mineral Type	2013	2014	2015	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Limestone	57.9	51.8	57.9	167.6	55.9
Manx Group	16	24.7	35.0	75.7	25.2
Igneous	33.7	22.5	16.4	72.58	24.2
TOTAL	107.6	99.0	109.3	315.9	105.3

The total HR requirement for 2016 (based on all HR sales excluding Poortown Quarry) using the 3 year aggregate forecast is **c.105,300 tonnes**.

Table 16 Summary of Aggregate Need in 2016

Forecast annual need from:	Annual tonnage based on 10 years average sales	Annual tonnage based on 3 years average sales
Sand & Gravel quarries	149,700	98,200
Hard Rock quarries – all	257,300	182,400
Hard Rock quarries - excluding Government Quarries	151,500	81,100
Hard Rock quarries - excluding Poortown Quarry	185,100	105,300

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.

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:

$$\text{Landbank for Hard Rock} = \frac{\text{Total Mineral reserves remaining at Hard Rock quarries}}{\text{Average 10 year (or 3 year) annual mineral production from Hard Rock quarries}}$$

2015 Landbank Assessments at 30th November 2015

Sand and Gravel Landbank – 10 Year

Sand and Gravel Landbank of permitted reserves	=	2,132,510 tonnes	
10 year forecast of annual production	=	149,700 tonnes	
Landbank Requirement	=	1,497,000 tonnes	(i.e. 148,700 tonnes x 10 years)
Status of Landbank	=	635,510 tonnes	(SURPLUS)
S&G Landbank	=	14.2 Years	(i.e. 2,132,510 ÷ 149,700)

Sand and Gravel Landbank – 3 year

Sand and Gravel Landbank of permitted reserves	=	2,132,510 tonnes	
3 year forecast of annual production	=	98,200 tonnes	
Landbank Requirement	=	982,000 tonnes	(i.e. 98,200 tonnes x 10 years)
Status of Landbank	=	1,150,510 tonnes	(SURPLUS)
S&G Landbank	=	21.7 Years	(i.e. 2,132,510 ÷ 98,200)

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	=	4,486,140 tonnes	
10 year forecast of annual production	=	257,300 tonnes	
Landbank Requirement	=	2,573,000 tonnes	(i.e. 257,300 tonnes x 10 years)
Status of Landbank	=	1,913,140 tonnes	(SURPLUS)
Hard Rock Landbank – all quarries	=	17.4 Years	(i.e. 4,486,140t ÷ 257,300t)

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

Hard Rock Landbank of permitted reserves	=	4,486,140 tonnes	
3 year forecast of annual production	=	182,400 tonnes	
Landbank Requirement	=	1,824,000 tonnes	(i.e. 182,400 tonnes x 10 years)
Status of Landbank	=	2,662,140 tonnes	(SURPLUS)
Hard Rock Landbank – all quarries	=	24.6 Years	(i.e. 4,486,140t ÷ 182,400t)

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

Hard Rock Landbank of permitted reserves	=	1,485,490 tonnes	
10 year forecast of annual production	=	151,500 tonnes	
Landbank Requirement	=	1,515,000 tonnes	(i.e. 151,000 tonnes x 10 years)
Status of Landbank	=	-29,510 tonnes	(DEFICIT)
Hard Rock Landbank excl PT & S M	=	9.81 Years	(i.e. 1,485,490t ÷ 151,500t)

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

Hard Rock Landbank of permitted reserves	=	1,485,490 tonnes	
3 year forecast of annual production	=	81,100 tonnes	
Landbank Requirement	=	811,000 tonnes	(i.e. 81,100 tonnes x 10 years)
Status of Landbank	=	674,490 tonnes	(SURPLUS)
Hard Rock Landbank excl PT & SM	=	18.32 Years	(i.e. 1,485,490t ÷ 81,100t)

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

Hard Rock Landbank of permitted reserves	=	3,719,590 tonnes	
10 year forecast of annual production	=	185,100 tonnes	
Landbank Requirement	=	1,851,000 tonnes	(i.e. 185,100t x 10 years)
Status of Landbank	=	1,868,590 tonnes	(SURPLUS)
Hard Rock Landbank – all HR Excl. Poortown	=	20.1 Years	(i.e. 3,719,590t ÷ 185,100t)

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

Hard Rock Landbank of permitted reserves	=	3,719,590 tonnes	
3 year forecast of annual production	=	105,300 tonnes	
Landbank Requirement	=	1,053,000 tonnes	(i.e. 105,300 tonnes x 10 years)
Status of Landbank	=	2,666,590 tonnes	(SURPLUS)
Hard Rock Landbank – all HR Excl. Poortown	=	35.3 Years	(i.e. 3,719,590t ÷ 105,300t)

Need for Aggregate Reserves - 2015

- 6.8 A review of the landbanks indicates that at November 2015:
- i. there is **no need** to seek to identify further reserves of **sand and gravel** for aggregate purposes, the landbank standing at **14.2 years** using the 10-year average sales analysis. The landbank based on 3-year average sales is in excess of **21.7 years**.
 - ii. there is **no need** 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 stands at **17.4 years** using the 10-year average sales analysis. The landbank based on 3-year average sales is in excess of **24 years**.
 - iii. With the reserves of the Government quarries excluded, the landbank for Hard Rock is **9.81 years**. As the landbank is **below 10 years** a call for sites is required. The landbank based on 3-year average sales is **18 years**.
 - iv. The Hard Rock reserves with only Poortown Quarry excluded, the landbank for Hard Rock is **20.1 years**. The landbank based on 3-year average sales is in excess of **35 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 2.4).