Minerals and Secondary Aggregate Technical Planning Group
AMMR 2020 Technical Report on 2019 Minerals Data

Status of the Technical Report

This is the 9th Annual Mineral Monitoring Report, AMMR 2020, and it 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 Government by the mineral operators and is compiled from half yearly mining lease returns. It covers the period from 1st December 2018 to 30th November 2019.

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

Report Summary

Primary Aggregate Sales
- Total primary aggregate sales for 2019 were 261,405 tonnes compared to 252,990 tonnes in 2018. This is an overall increase of 8,415 tonnes from 2018.
- Sand and gravel sales decreased by 1,623 tonnes relative to 2018.
- Hard rock aggregate sales increased by c. 10,050 tonnes compared to 2018.
- During 2019, the contribution to the Island's primary aggregate supply was split 51:49 between the commercial and government operated quarries.
- The use of locally sourced crushed limestone as an agricultural fertilizer continues although the tonnage applied to land decreased by 2,490 tonnes during 2019.

Reserves
- The total planned reserves of sand and gravel as at 30th November 2019 was c. 1,717,650 tonnes.
- The hard rock planned reserves (all quarries) amount to c. 3,751,500 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 30th November 2019, the landbank for Sand & Gravel (based on a 10-year average) stands at 15 years.
- The equivalent Hard Rock landbank (including Government reserves) is 17 years. When Government reserves are excluded, the landbank reduces to 9 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 17 years, the Hard Rock landbank (including Government reserves) is 22 years and 13 years when Government reserves are excluded.

AMMR 2020
Technical Report 2019 Data

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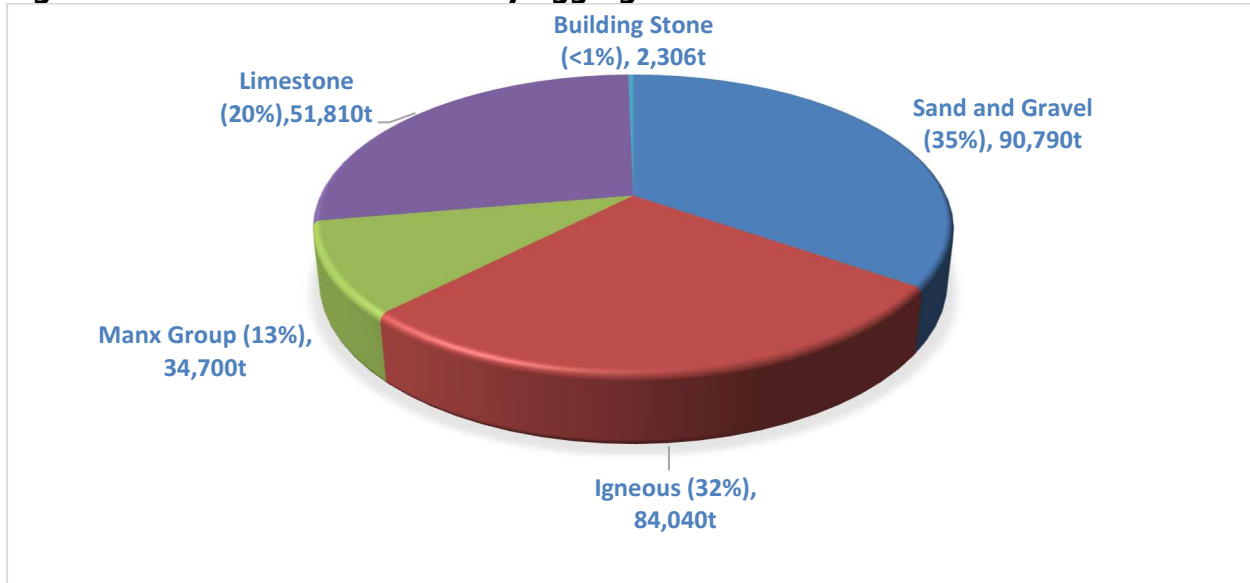
Tables:

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 2018 and 30th November 2019). This information was provided to the Department of Environment, Food and Agriculture (DEFA).

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 2017 – 2019

	2017	2018	2019
Mineral Operation	Tonnes ('000)	Tonnes ('000)	Tonnes ('000)
Ballaharra Sand Pit	10.58	9.93	7.41
Point of Ayre	97.20	82.48	83.38
Cronk y Scotty Sand Pit	0.34[1]	0.00	0.00
Billown Quarry	48.87	39.93	51.81
Cringle Quarry (Crushed Rock)	34.98	31.88	31.60
Cringle Quarry (Building Stone)	1.00	0.94	0.51
Earystane Quarry (Crushed Rock)	2.31	2.74	2.39
Earystane Quarry (Building Stone)	0.45	0.29	0.20
Pooil Vaaish Quarry (Crushed Rock)	0.00	0.32	0.00
Pooil Vaaish Quarry (Building Stone)	0.04	0.06	0.06
Poortown Quarry (crushed rock - Government Sales)	29.64	36.24	20.92
Poortown Quarry (crushed rock - Private Sales)	38.00	25.18	40.71
Stoney Mountain Quarry (crushed rock - Government Sales)	10.15	10.35	12.80
Stoney Mountain Quarry (crushed rock - Private Sales)	7.90	12.65	9.57
Starch Mill Quarry (Crushed Rock)	0.01[2]	0.00	0.00
Starch Mill Quarry (Building Stone)	0.08	0.00	0.00
Ancillary Mining Total	0.00	0.00	0.00
TOTAL	281.55	252.99	261.41

Notes:
1.   Cronk Scotty ceased operations on 27.06.2017
2.   Starch Mill ceased operations on 30.11.2017

Figure 1   2019 Sales of Primary Aggregate

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

Table 2:   Total Sales as Primary Aggregate 2010 – 2019 *('000 tonnes)*

Mineral Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Sand & Gravel	146.53	146.98	101.8	94.66	98.80	101.01	116.99	108.13	92.41	90.79
Limestone	352.38	83.73	72.74	57.86	51.84	57.87	50.06	48.87	40.25	51.81
Manx Group	25.83	59.94	22.91	15.35	24.29	34.24	26.95	37.28	34.62	34.00
Igneous	110.58	100.2	89.17	110.26	100.45	93.23	91.67	85.69	84.43	84.04
TOTAL	**635.32**	**390.85**	**286.62**	**278.13**	**275.38**	**286.35**	**285.67**	**279.97**	**251.71**	**260.64**

Table 3:   Total Sales as Building Stone 2010 – 2019 *('000 tonnes)*

Mineral Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Limestone	0.14	0.36	0.12	0.06	0.00	0.00	0.00	0.04	0.06	0.06
Manx Group	1.35	0.77	0.66	0.65	0.40	0.72	0.99	1.53	1.23	0.71
TOTAL	**1.49**	**1.13**	**0.78**	**0.71**	**0.40**	**0.72**	**0.99**	**1.57**	**1.28**	**0.77**

Table 4:   Total Sales Primary Agg & Building Stone 2010 – 2019 *('000 tonnes)*

Mineral Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Primary Agg	635.32	390.85	286.62	278.13	275.38	286.35	285.67	279.97	251.71	260.64
Building Stone	1.49	1.13	0.78	0.71	0.4	0.72	0.99	1.57	1.28	0.77
TOTAL	**636.81**	**391.98**	**287.4**	**278.84**	**275.78**	**287.07**	**286.66**	**281.54**	**252.99**	**261.41**

Figure 2: **Total 10 Year Sales of Primary Aggregate and Building Stone (tonnes) 2010 to 2019**

Building Stone (<1%), 9,861

Sand and Gravel (35%), 1,098,098

Igneous (28%), 875,093

Manx Group (10%), 315,236

Limestone (27%), 867,592
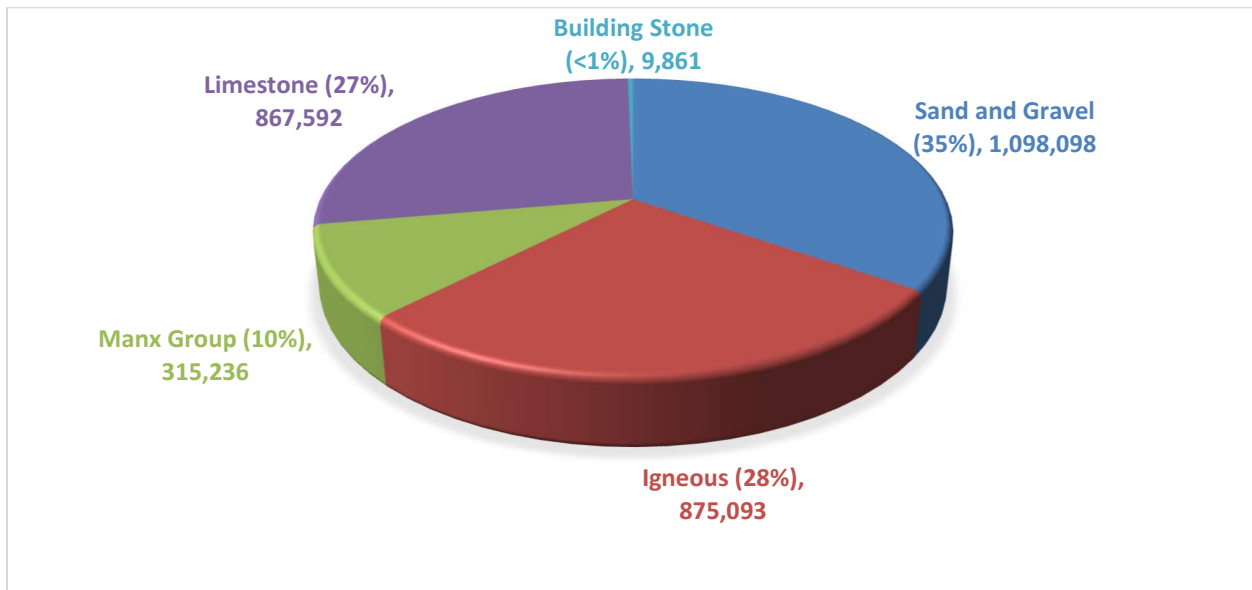
2. End Use of Extracted Minerals

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 2013 – 2019 *('000 tonnes)*

Product Category	2013	2014	2015	2016	2017	2018	2019	Total	7yr Average
Sand & Gravel	94.66	98.80	101.01	116.99	108.12	92.41	90.79	**702.78**	100.40
PSV / High Grade	22.56	37.11	25.11	32.06	28.76	32.21	40.58	**218.39**	31.20
Graded Aggregate/ Bitumen Affinity	52.00	30.22	34.53	27.59	20.94	19.42	31.68	**216.64**	30.95
Type 1 and Bulk Fill	108.90	109.25	125.70	109.03	122.15	107.66	97.59	**780.56**	111.51
Building / Dimension Stone	0.72	0.40	0.72	0.99	1.57	1.28	0.77	**6.45**	0.92
TOTAL	**278.84**	**275.78**	**287.07**	**286.66**	**281.54**	**252.99**	**261.41**	**1924.83**	274.98

Figure 3: Percentile Summary of Aggregate Sales by Sub Categories (7-year average 2013-2019)
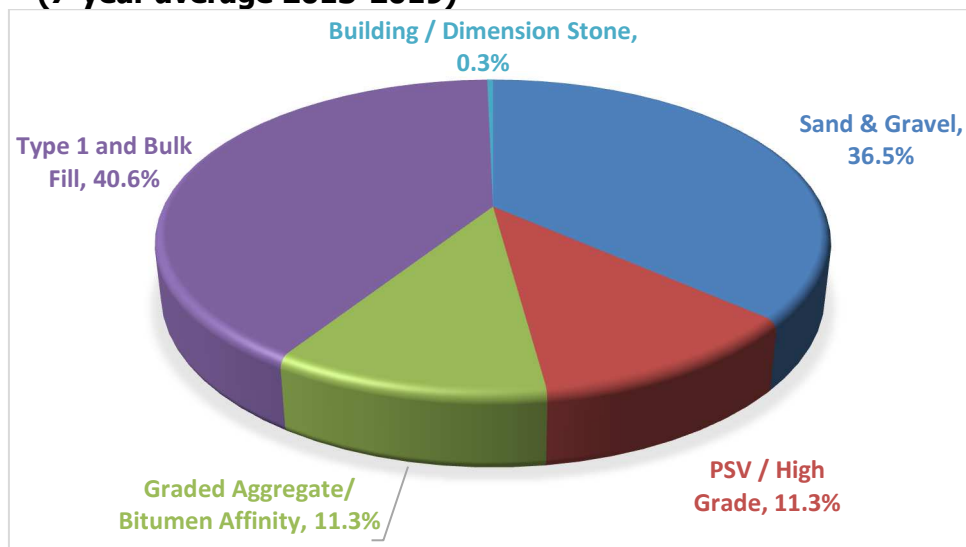
Agricultural Lime

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 – 2019 (Billown Quarry)
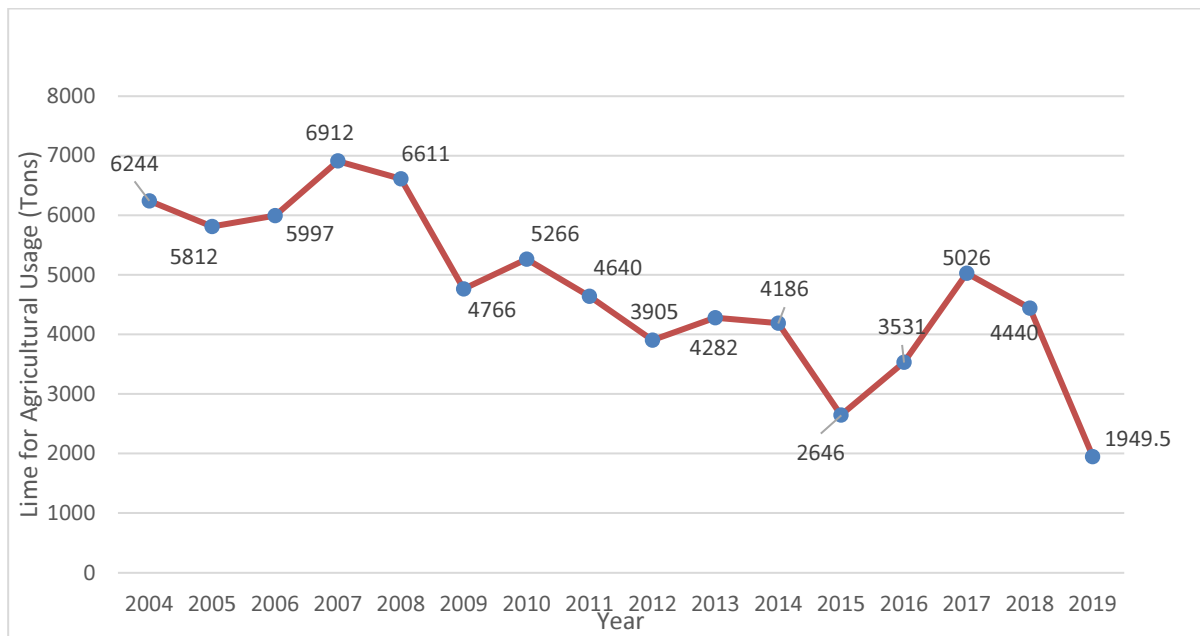
3.   Mineral Reserves and Aggregate Reprocessing Capacity

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 2019.

3.2   The reserve calculations have been undertaken by DEFA 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 2019.

TABLE 6: Sand and Gravel Reserves at 30th November 2019

Operation	2016 Tonnes	2017 Tonnes	2018 Tonnes	2019 Tonnes
Point of Ayre	1,493,909	1,396,708	1,314,223	1,230,846
Ballaharra Sand Pit	514,720	504,144	494,215	486,801
Cronk y Scotty Sand Pit	17,542	17,202	0[1]	N/A
TOTAL	**2,026,171**	**1,901,000**	**1,808,438**	**1,717,647**

[1] Excludes Cronk y Scotty reserves now the quarry has permanently closed.

TABLE 7: Hard Rock Reserves at 30th November 2019

Mineral	Operation	2016 Tonnes	2017 Tonnes	2018 Tonnes	2019 Tonnes
Limestone	Billown Quarry	67,621 [2]	18,756	39,000[3]	50,000[4]
	Pooil Vaaish Quarry	100,000	99,956	99,584	99,500
Manx Group	Cringle Quarry	1,119,579	1,083,596	1,050,781	820,000[5]
	Earystane Quarry	135,230	132,476	129,444	127,000
	Starch Mill Quarry	35,968	35,878	0[6]	N/A
Igneous	Poortown Quarry	691,939	624,305	562,881	501,000
	Stoney Mountain Quarry	2,217,038	2,198,987	2,175,982	2,154,000
	TOTAL	**4,367,375**	**4,158,000[3]**	**4,057,672**	**3,751,500**

[2] Readjusted reserve by Colas in 2016, [3] Reserves re-adjusted to make allowance for additional reserves located within existing quarry, [4] Estimates based on recent discussions with Colas Management and DEFA, [5] Recent reserve estimate by Wardell Armstrong based on recent topographical survey of quarry (Feb 2019), [6] Reserves at Starch Mill completely removed from landbank,

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 2010 (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 2010. 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
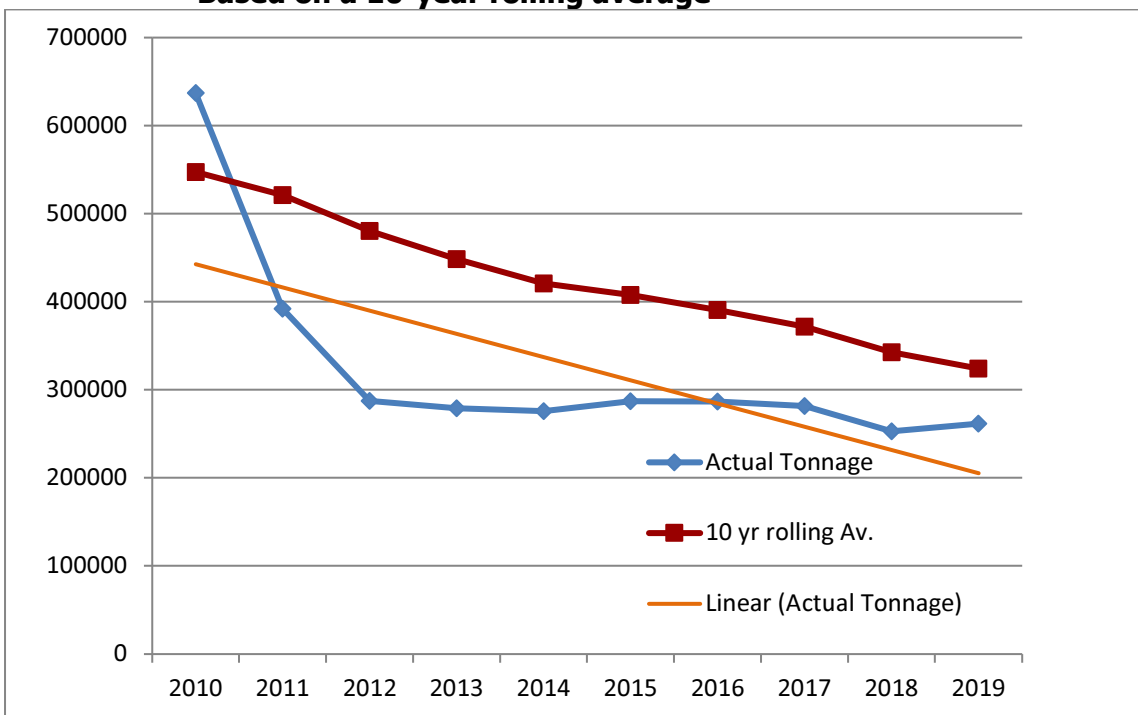
4.3   Given the difference between the Actual tonnage and the 10-year rolling average (i.e. 62,644t), the AMMR 2020 has also assessed the short-term demand for aggregates looking at the three-year annual aggregates demand which provides an indication of how the Island may develop in the short-term.

4.4   Forecast of Aggregate Need in 2020

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 2020 (10 years)

Mineral Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Sand & Gravel	146.5	147.0	101.8	94.7	98.8	101.0	117.0	108.1	92.41	90.79	1098. 1	109.81

The annual sand and gravel requirement for 2020 using the 10-year aggregate forecast is c.**110,000 tonnes**. This represents an increase of 9,000 tonnes compared to the 119,000 tonnes forecast for 2019.

Table 9: Forecast of Need for Sand and Gravel in 2020 (3 years)

	2017	2018	2019	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Sand & Gravel	108.1	92.41	90.79	**291.3**	**97.1**

The annual sand and gravel requirement for 2020 using the 3-year aggregate forecast is c.**97,100 tonnes**. This represents a decrease of 8,900 tonnes compared to the 106,000 tonnes forecast for 2019.

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 2020 - All HR Quarries (10 years)

Mineral Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Limestone	352.4	83.7	72.8	57.9	51.8	57.9	50.1	48.9	40.3	51.9	867.7	86.8
Manx Group	25.8	59.7	23.6	16.0	24.7	35.0	27.9	38.8	35.9	34.8	322.2	32.2
Igneous	110.6	100.2	89.2	110.3	100.4	93.2	91.7	85.7	84.4	84.0	949.7	95.0
TOTAL	**488.8**	**243.6**	**185.6**	**184.2**	**176.9**	**186.1**	**169.7**	**173.4**	**160.6**	**170.6**	**2139.5**	**213.9**

The total HR requirement for 2020 (based on all HR sales) using the 10-year aggregate forecast is **c.213,950 tonnes**. This represents a decrease of 10,050 tonnes compared to the 224,000 tonnes forecast for 2019.

Table 11: Forecast of Need – HR 2020 - All HR Quarries (3 years)

Mineral Type	2017	2018	2019	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Limestone	48.9	40.3	51.9	141.1	47.0
Manx Group	38.8	35.9	34.8	109.5	36.5
Igneous	85.7	84.4	84.0	254.1	84.7
TOTAL	**173.4**	**160.6**	**170.6**	**504.6**	**168.2**

The total HR requirement for 2020 (based on all HR sales) using the 3-year aggregate forecast is **c.168,200 tonnes**. This represents an increase of 200 tonnes compared to the 168,000 tonnes forecast for 2019.

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 2020 – excludes all sales from PT and SM (10 years)

Mineral Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Limestone	352.4	83.7	72.8	57.9	51.8	57.9	50.1	48.9	40.3	51.9	867.7	86.8
Manx Group	25.8	59.7	23.6	16.0	24.7	35.0	27.9	38.8	35.9	34.8	322.2	32.2
TOTAL	**378.2**	**143.4**	**96.4**	**73.9**	**76.5**	**92.8**	**78.0**	**87.7**	**76.2**	**86.7**	**1189.9**	**119.0**

The total HR requirement for 2020 (excluding sales from Poortown and Stoney Mountain) using the 10-year aggregate forecast is **c.119,000 tonnes**. This represents a decrease of 4,000 tonnes compared to the 123,000 tonnes forecast for 2019.

Table 13: Forecast of Need - HR in 2020 – excludes all sales from PT and SM (3 years)

Mineral Type	2017	2018	2019	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Limestone	48.9	40.3	51.9	141.1	47.0
Manx Group	38.8	35.9	34.8	109.5	36.5
TOTAL	**87.7**	**76.2**	**86.7**	**250.6**	**83.5**

The total HR requirement for 2020 (excluding sales from Poortown and Stoney Mountain) using the 3-year aggregate forecast is **c. 83,500 tonnes**. This represents an increase of 2,500 tonnes compared to the 81,000 tonnes forecast for 2018.

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 2020 - All HR Quarries excluding Poortown (10 years)

Mineral Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10 Year Total Tonnes ('000)	10 Year Ave. Tonnes ('000)
Limestone	352.4	83.7	72.8	57.9	51.8	57.9	50.1	48.9	40.3	51.9	867.7	86.8
Manx Group	25.8	59.7	23.6	16.0	24.7	35.0	27.9	38.8	35.9	34.8	322.2	32.2
Igneous - SM	34.9	22.5	28.4	33.7	22.4	16.4	17.1	18.1	23.0	22.4	238.9	23.9
TOTAL	**413.1**	**165.9**	**124.8**	**107.6**	**98.9**	**109.2**	**95.1**	**105.8**	**99.2**	**109.1**	**1428.8**	**142.9**

The total HR requirement for 2020 (based on all HR sales excluding Poortown Quarry) using the 10-year aggregate forecast is **c.142,900 tonnes**. This represents a decrease of 5,100 tonnes compared to the 148,000 tonnes forecast for 2019.

Table 15: Forecast of Need – HR 2020 - All HR Quarries excluding Poortown (3 years)

Mineral Type	2017	2018	2019	3 Year Total Tonnes ('000)	3 Year Ave. Tonnes ('000)
Limestone	48.9	40.3	51.9	141.1	47.0
Manx Group	38.8	35.9	34.8	109.5	36.5
Igneous - SM	18.1	23.0	22.4	63.5	21.2
TOTAL	**105.8**	**99.2**	**109.1**	**314.1**	**104.7**

The total HR requirement for 2020 (based on all HR sales excluding Poortown Quarry) using the 3-year aggregate forecast is **c.104,700 tonnes**. This represents an increase of 4,700 tonnes compared to the 100,000 tonnes forecast for 2019.

Table 16   Summary of Aggregate Need in 2020

Forecast annual need from:	Annual tonnage based on 10 years average sales	Annual tonnage based on 3 years average sales
Sand & Gravel quarries	**110,000**	**97,100**
Hard Rock quarries – all	**213,950**	**168,200**
Hard Rock quarries - excluding Government Quarries	**119,000**	**83,500**
Hard Rock quarries - excluding Poortown Quarry	**142,900**	**104,700**

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:

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

2019 Landbank Assessments at 30th November 2019

Sand and Gravel Landbank – 10 Year

Sand and Gravel Landbank of permitted reserves	=	1,717,647 tonnes	
10-year forecast of annual production	=	110,000 tonnes	
Landbank Requirement (10 years)	=	1,100,000 tonnes	(i.e. 110,000 tonnes x 10 years)
Status of Landbank	=	617,647 tonnes	(SURPLUS)
S&G Landbank	=	**15.6 Years**	(i.e. 1,717,647 ÷ 110,000)

Sand and Gravel Landbank – 3 years

Sand and Gravel Landbank of permitted reserves	=	1,717,647 tonnes	
3-year forecast of annual production	=	97,100 tonnes	
Landbank Requirement (3 years)	=	971,000 tonnes	(i.e. 97,100 tonnes x 10 years)
Status of Landbank	=	746,647 tonnes	(SURPLUS)
S&G Landbank	=	**17.7 Years**	(i.e. 1,717,647 ÷ 97,100)

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	=	3,751,500 tonnes	
10-year forecast of annual production	=	213,950 tonnes	
Landbank Requirement	=	2,139,500 tonnes	(i.e. 213,950 tonnes x 10 years)
Status of Landbank	=	1,612,000 tonnes	**(SURPLUS)**
Hard Rock Landbank – all quarries	=	**17.5 Years**	(i.e. 3,751,500t ÷ 213,950t)

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

Hard Rock Landbank of permitted reserves	=	3,751,500 tonnes	
3-year forecast of annual production	=	168,200 tonnes	
Landbank Requirement	=	1,680,200 tonnes	(i.e. 168,200 tonnes x 10 years)
Status of Landbank	=	2,071,300 tonnes	**(SURPLUS)**
Hard Rock Landbank – all quarries	=	**22.3 Years**	(i.e. 3,751,500 ÷ 168,200t)

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

Hard Rock Landbank of permitted reserves	=	1,096,500 tonnes	
10-year forecast of annual production	=	119,000 tonnes	
Landbank Requirement	=	1,190,000 tonnes	(i.e. 119,000 tonnes x 10 years)
Status of Landbank	=	-93,500 tonnes	**(SHORTAGE)**
Hard Rock Landbank excl PT & SM	=	**9.2 Years**	(i.e. 1,096,500t ÷ 119,000t)

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

Hard Rock Landbank of permitted reserves	=	1,096,500 tonnes	
3-year forecast of annual production	=	83,500 tonnes	
Landbank Requirement	=	835,000 tonnes	(i.e. 83,500 tonnes x 10 years)
Status of Landbank	=	261,500 tonnes	**(SURPLUS)**
Hard Rock Landbank excl PT & SM	=	**13.1 Years**	(i.e. 1,096,500t ÷ 83,500t)

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

Hard Rock Landbank of permitted reserves	=	3,250,500 tonnes	
10-year forecast of annual production	=	142,900 tonnes	
Landbank Requirement	=	1,429,000 tonnes	(i.e. 142,900t x 10 years)
Status of Landbank	=	1,821,500 tonnes	**(SURPLUS)**
Hard Rock Landbank – all HR Excl. Poortown	=	**22.7 Years**	(i.e. 3,250,500t ÷ 142,900t)

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

Hard Rock Landbank of permitted reserves	=	3,250,500 tonnes	
3-year forecast of annual production	=	104,700 tonnes	
Landbank Requirement	=	1,047,000 tonnes	(i.e. 104,700 tonnes x 10 years)
Status of Landbank	=	2,203,500 tonnes	**(SURPLUS)**
Hard Rock Landbank – all HR Excl. Poortown	=	**31.0 Years**	(i.e. 3,250,500t ÷ 104,700t)

6. Need for Aggregate Reserves - 2019

6.1   A review of the landbanks indicates that at November 2019:

i.   There is **no requirement** to seek to identify further reserves of sand and gravel for aggregate purposes as the landbank is c. **16 years** using the 10-year average sales analysis. The landbank based on 3-year average sales is c. **18 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. **18 years** using the 10-year average sales analysis. The landbank based on 3-year average sales is c. **22 years**.

iii.   With the reserves of the Government quarries excluded, the landbank for Hard Rock is c. **9 years** and so a call for sites is required. The landbank based on 3-year average sales is c. **13 years**.

iv.   The Hard Rock landbank with Poortown Quarry reserves excluded is c. **23 years**. The landbank based on 3-year average sales is c. **31 years**.

6.2   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).