

# 5th Devon Local Aggregate Assessment 2006-2015

Version 2

August 2016



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**Cover photographs** (© Devon County Council unless stated otherwise)

Top left: Processing of china clay by-products for secondary aggregates, Lee Moor

Top right: Sand and gravel from the Budleigh Salterton Pebble Beds, Venn Ottery Quarry

Bottom left: Processing of construction and demolition waste for recycled aggregates, Trood Lane, Exeter

Bottom right: Working of limestone at Linhay Hill Quarry, Ashburton (© Dartmoor National Park Authority)

**Acknowledgements**

The assistance of Devon's mineral operators in providing the necessary data for the preparation of the Local Aggregate Assessment is gratefully acknowledged, as is the input of other stakeholders including other mineral planning authorities and interest groups.

**Further Information**

This Local Aggregate Assessment has been prepared by Devon County Council on behalf of the five Devon mineral planning authorities (and, for land-won sand and gravel, in discussion with Cornwall Council and Somerset County Council), and is based on aggregates data for the period to 31 December 2015. Reference should be made to Appendix A of the 1st Devon Local Aggregate Assessment for an explanation of the data collection methodology. All editions of the Local Aggregate Assessment are available [here](#)

To discuss the Local Aggregate Assessment further, please contact Andy Hill of Devon County Council on 01392 383000 or [mineralsplanning@devon.gov.uk](mailto:mineralsplanning@devon.gov.uk)

Further information on the Local/Minerals Plans being prepared by the Devon mineral planning authorities is available through the details provided below:

[Dartmoor National Park Authority](#)

[Devon County Council](#)

[Exmoor National Park Authority](#)

[Plymouth City Council](#)

[Torbay Council](#)

**Version 2** includes additional data on movements of aggregates in section 5.1 that became available shortly after publication of the original version of this Assessment

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## EXECUTIVE SUMMARY

- E.1 Devon’s diverse geology results in a wide range of land-won aggregate resources being available. By-products from the quarrying of china clay, ball clay and slate produce secondary aggregates that, together with processing of construction, demolition and excavation waste for recycled aggregates, provide alternatives to the use of land-won aggregates. The average sales of the different types of aggregates (other than recycled aggregates) over the ten and three year periods are illustrated in Table E.1.

Aggregate stream	10 year average sales (million tonnes) (2006-2015)	3 year average sales (million tonnes) (2013-2015)
Land-won Crushed Rock	2.352	2.699
Land-won Sand & Gravel	0.560	0.520
Marine	0.047	0.038
Secondary	0.470	0.432
Recycled	N/A	0.419*

**Table E1: Annual Average Aggregate Sales** [\* estimated]

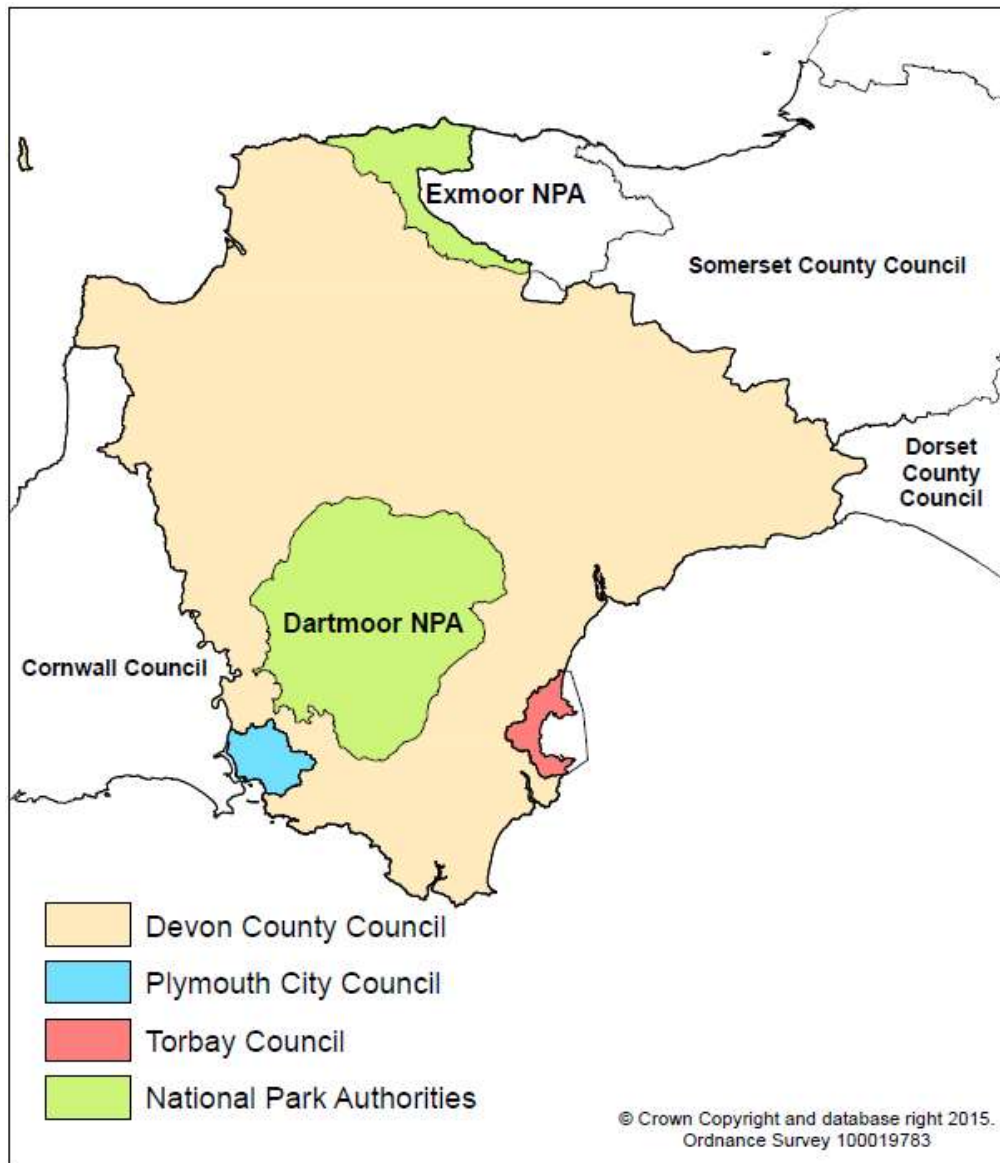
- E.2 Trends in aggregates sales over the past 10 years show a general decline to 2009, with crushed rock accounting for much of the recovery since then as indicated by its three year average being higher than the 10 year figure. Limestone has accounted for an increasing proportion of crushed rock sales, largely displacing igneous materials.
- E.3 At the end of 2015, Devon had crushed rock reserves of 115.0 million tonnes, giving a landbank of 49 years, although the landbank for limestone is a little lower at 41 years. Sand and gravel reserves amounted to 7.0 million tonnes, with the landbank being 12.5 years. The emerging Devon Minerals Plan proposes two new sand and gravel sites with a combined potential yield of up to 9.2 million tonnes, while the Somerset Minerals Plan allocates an unquantified resource at Whiteball.
- E.4 Sales of secondary aggregates show a gradual increase from 2009, but have yet to return to their peak of 2007 and 2008, while recycled aggregates show an upward trend over the last four years.
- E.5 The AM2014 survey shows that 89% of land-won aggregates quarried in Devon are sold to destinations within the county, with Somerset accounting for most of the remaining sales. However, 15% of secondary aggregates were sold to destinations outside the South West, largely due to demand for their decorative qualities. While Devon met around 80% of its land-won aggregate requirements in 2014 from quarries within the county, it remains a net importer of crushed rock and sand and gravel.
- E.6 Future demand for aggregates will be strongly influenced by the level of construction activity, with Devon’s local plans providing for an annual rate of house construction of 6,040 over the next 10-15 years, almost double the actual rate of the last ten years. However, demand for aggregates will also be influenced by other factors including fiscal measures and trends in the use of other building materials.

- E.7 While Devon has adequate reserves and/or capacity to maintain supply of crushed rock, marine and alternative aggregates over the next 15-20 years, there is a likely need for delivery of further resources of land-won sand and gravel. In addition to monitoring of sales and reserves, consideration will also need to be given to the possibility of permissions for existing reserves lapsing; the need to maintain the supply of the different sands and gravels required for the range of aggregate products; and the relationship between the distribution of reserves and main markets.

## 1. INTRODUCTION

### 1.1 Preparation of the Local Aggregate Assessment

- 1.1.1 The National Planning Policy Framework [NPPF] [DCLG (2012)] introduced a requirement for the preparation of an annual Local Aggregate Assessment [LAA] by mineral planning authorities [MPAs] working individually or jointly. This fifth edition provides updated information using data for the ten year period to the end of 2015.



**Figure 1: Mineral Planning Authorities in Devon and adjoining areas**

- 1.1.2 The county of Devon comprises four separate MPAs – Devon County Council, Plymouth City Council, Torbay Council and Dartmoor National Park Authority – together with that part of the area covered by Exmoor National Park Authority lying within Devon (with the remainder of Exmoor falling within Somerset and being included in the Somerset LAA), as shown by the coloured areas in Figure 1. The sub-regional apportionment of the National and Regional Aggregates Guidelines used this ‘Devon’ grouping rather than

individual MPAs, recognising the small number of quarries within some of the MPA areas and the close relationship between quarries and markets in those areas.

- 1.1.3 For land-won sand and gravel, the Devon LAA includes sales and reserves within the adjoining counties of Cornwall and Somerset, as the limited levels of production and reserves within those areas prevent their separate reporting for confidentiality reasons. This approach reflects the grouping of MPAs previously used in the sub-regional aggregates apportionment for sand and gravel, and which continues to be used in the annual reports of the South West Aggregate Working Party [SWAWP]. To assist in ongoing assessment and monitoring of land-won sand and gravel across the three counties, a Memorandum of Understanding has been signed as explained in 2.5.4.
- 1.1.4 The LAA has been prepared by Devon County Council in discussion with the other Devon MPAs, together with Somerset County and Cornwall Councils, and contributes to the evidence base for each of these MPAs. For the purposes of this assessment, 'Devon' should be taken to refer to the historic county comprising the four whole MPAs and part of a fifth referred to in 1.1.2.
- 1.1.5 Preparation of this LAA has also had regard to the practice guidance produced jointly by the Planning Officers Society and Mineral Products Association (2015).
- 1.1.6 A draft of this LAA was forwarded to SWAWP for their consideration, following which their endorsement was received. This final version incorporates a number of corrections and minor amendments suggested by SWAWP and other interested parties.

## **1.2 Purpose of the Local Aggregate Assessment**

- 1.2.1 In the context of the guidance provided in the NPPF and DCLG's Planning Practice Guidance [PPG]<sup>1</sup>, it is considered that the purpose of the Devon LAA is to provide a rolling evidence base to inform the approach to be taken in the Local Plans of the individual MPAs to the supply of aggregates. This evidence should include information on:
  - ◆ a forecast of the demand for aggregates based on a rolling average of 10 years sales data and other relevant local information;
  - ◆ an analysis of all aggregate supply options, including the extent of landbanks for land-won aggregates and availability of other forms of aggregates;
  - ◆ an assessment of the balance between demand and supply, and the economic and environmental opportunities and constraints that might influence the situation.
- 1.2.2 The LAA does not itself propose the level or composition of aggregate supply to be delivered in Devon or identify the locations from which any new supply should be achieved. Such decisions are the responsibility of the individual MPAs to deliver through their Minerals/Local Plans, informed by the evidence presented in the LAA.

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<sup>1</sup> Available at <http://planningguidance.planningportal.gov.uk/blog/guidance/minerals/>

- 1.2.3 The LAA will continue to be published annually to inform development and monitoring of Local Plans, including recent sales and revisions to levels of reserves and the length of landbanks.

### 1.3 Definitions

- 1.3.1 This assessment uses the following terminology for aggregate resources:

Aggregates	Granular materials used in construction
Land-won aggregates	Aggregates quarried from limestone, sandstone and igneous/metamorphic rocks (collectively termed crushed rock) and from sand and gravel formations and superficial deposits (including beach and estuarial deposits). Also referred to as primary aggregates
Marine aggregates	Sand and gravel dredged from the sea
Secondary aggregates	Aggregates derived from the extraction and processing of non-aggregate minerals (e.g. china clay and ball clay), or as a by-product of industrial processes (e.g. blast furnace slag, incinerator bottom ash)
Recycled aggregates	Aggregates derived from the processing of inorganic construction, demolition and excavation waste [CDEW]
Alternative aggregates	A grouping of secondary and recycled aggregates



## 2. LAND-WON AGGREGATE RESOURCES AND SUPPLY

### 2.1 Land-won Aggregate Resources

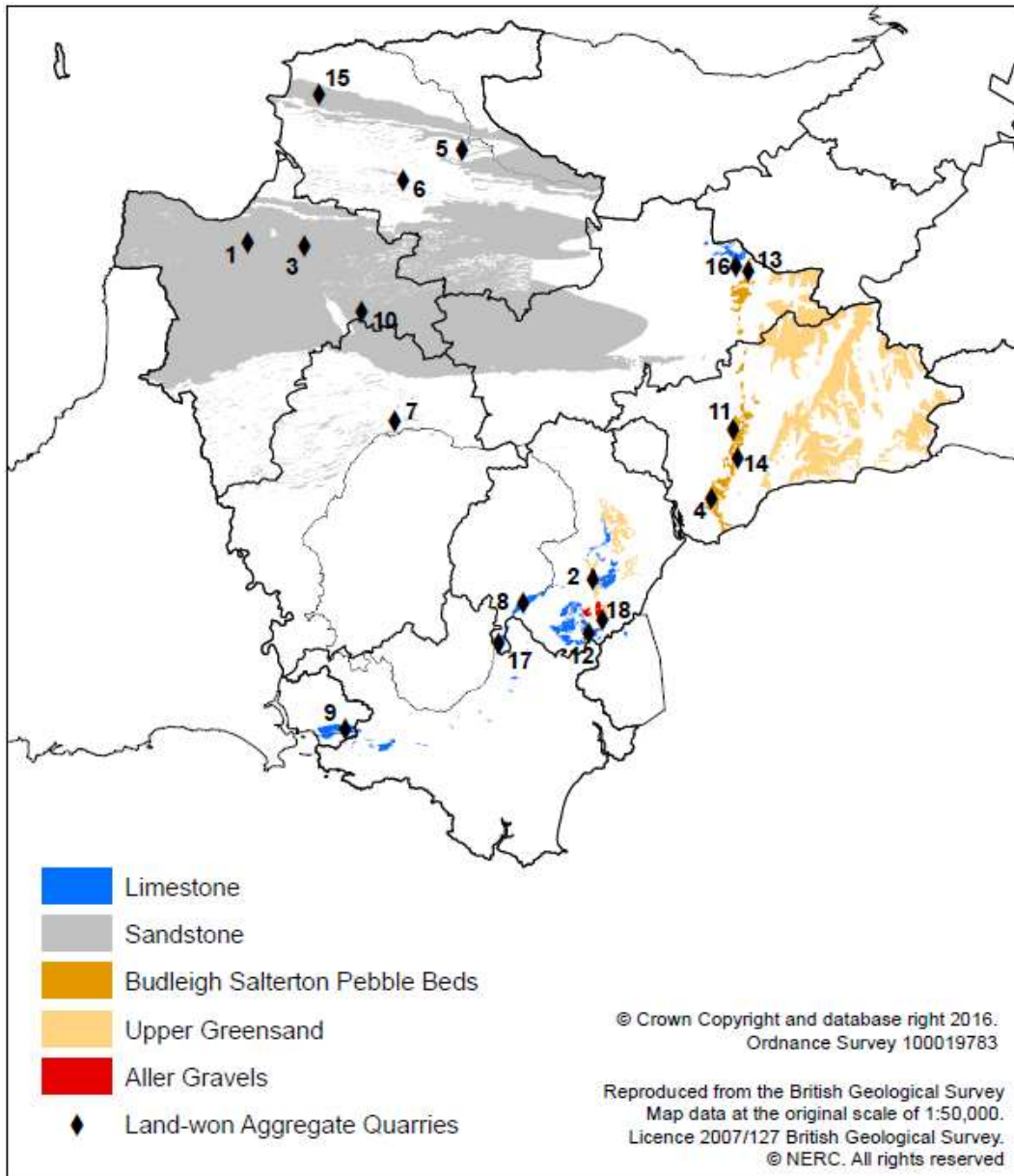
- 2.1.1 Devon has arguably the most diverse geology of any English county, resulting in a wide range of mineral resources having been exploited for use not only as aggregates but also for a range of industrial purposes, brick manufacture and as building stone.
- 2.1.2 Crushed rock aggregates are currently produced from a range of sandstone, limestone and igneous resources, while sand and gravel is quarried from various 'bedrock' deposits with no superficial deposits presently worked.
- 2.1.3 An assessment of the land-won and secondary aggregate resources in Devon [Scrivener, R & Miles, A J (2010)] was commissioned by Devon County Council, and reference should be made to this for a detailed account of current and potential resources. The resources yielding land-won aggregates within Devon in 2015, together with relevant quarries operational in that year, are outlined in Table 1.

Resource	Geological Formation	Quarries
Limestone	Chercombe Bridge Limestone (Devonian)	Linhay Hill
	East Ogwell Limestone (Devonian)	Stoneycombe
	Plymouth Limestone (Devonian)	Moorcroft
	Westleigh Limestone (Carboniferous)	Westleigh
Sandstone	Pickwell Down (Devonian)	Vyse
	Pilton Shales (Devonian / Carboniferous)	Bray Valley
	Bude (Carboniferous)	Beam, Newbridge, Bableigh Wood
	Crackington (Carboniferous)	Knowle
Igneous	Dolerite (Devonian / Carboniferous)	Whitecleaves
Sand and Gravel	Budleigh Salterton Pebble Beds (Triassic)	Rockbeare Hill, Venn Ottery, Blackhill, Town Farm
	Upper Greensand (Cretaceous)	Zig Zag, Babcombe Copse
	Aller Gravels (Eocene)	Zig Zag

**Table 1: Land-won aggregate resources in Devon, 2015**

- 2.1.4 The extent of the geological formations currently yielding sand and gravel, limestone and sandstone is illustrated in Figure 2.1, together with the location of aggregate quarries operational in 2015. While the extent of sandstone resources appears large, it should be noted that these are very variable in quality, and the outcrops with potential economic viability will be much more limited. No indication is given of the location of the currently quarried igneous rocks as their limited extent will not be apparent at this scale of mapping.
- 2.1.5 Up to the early 2000s, sand and gravel had been worked from superficial deposits, notably the river terrace deposits of the Axe valley at Kilmington. While this and other river valleys in Devon have potential river terrace and alluvial resources, their commercial viability is restricted by their limited depth and areal extent. Similar constraints, together with environmental

designations, limit the likelihood of estuarine dredging (formerly undertaken in the Taw/Torridge and Teign estuaries) recommencing.



**Figure 2: Location of currently-quarried geological formations and land-won aggregate quarries operational in 2015 (key to quarries in Appendix A)**

2.1.6 Figure 2 illustrates the uneven distribution of aggregate resources within Devon, with sand and gravel formations occurring in the younger rocks of the south east of the county, and sandstone formations in the north west. The limestone resources that deliver the bulk of Devon’s crushed rock output are clustered around Plymouth, Newton Abbot and adjacent to the Somerset border.

## 2.2 Past Sales of Land-won Aggregates

2.2.1 The NPPF requires a LAA to be based on a rolling average of sales over ten years (together with other relevant local information and an assessment of all supply options), and sales figures for this period are provided in Table 2 and

illustrated in Figure 3. For sand and gravel, the figures include small quantities extracted in Cornwall as that county was previously grouped with Devon for reasons of commercial confidentiality.

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CR	2.599	2.352	2.240	1.711	2.082	2.023	2.412	2.246	2.853	2.998
S&G	0.797	0.710	0.662	0.479	0.455	0.443	0.493	0.485	0.532	0.542

Table 2: Sales of land-won aggregates in Devon, 2006-2015 (million tonnes)

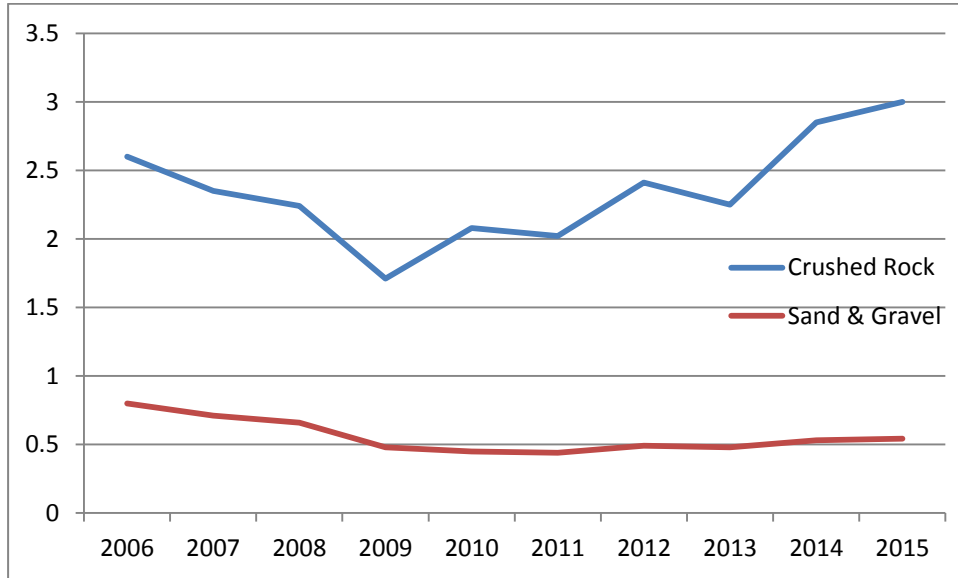
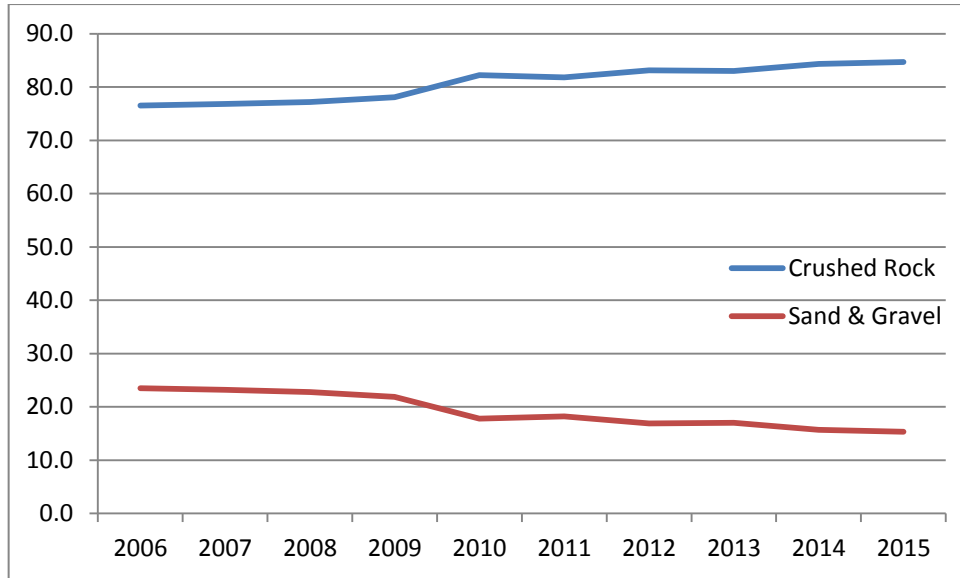


Figure 3: Sales of land-won aggregates (million tonnes) in Devon, 2006-2015

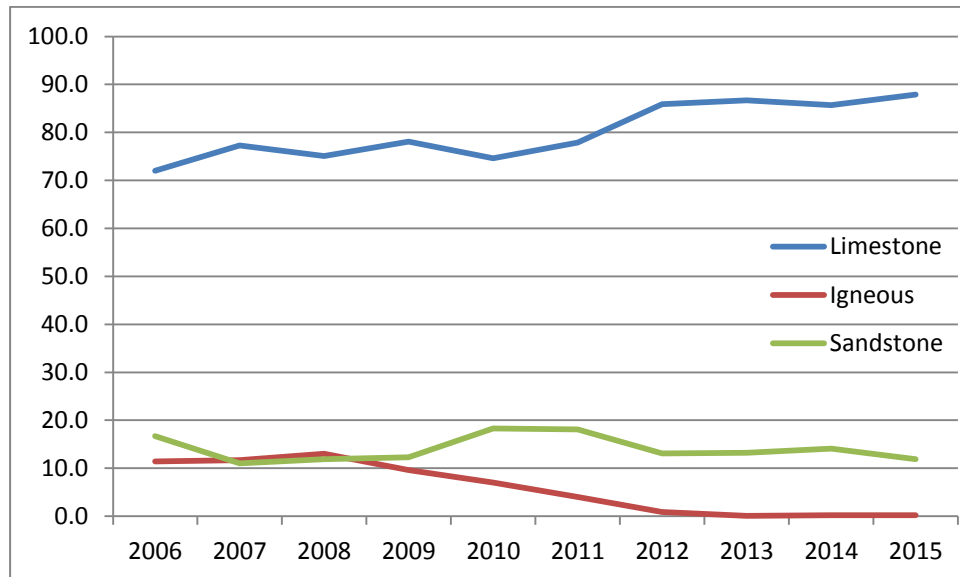
- 2.2.2 Sales of crushed rock over the past 10 years show a decline from 2006 to 2009, followed by an overall increase since then, with sales in 2015 being the highest since 2005. In contrast, sand and gravel sales remained flat from 2009 to 2011, with a gradual increase to 2015 when sales still failed to reach 2008 levels.
- 2.2.3 The figures in Table 2 provide ten year averages of **2.352 million tonnes for crushed rock [CR]** and **0.560 million tonnes for sand and gravel [S&G]**.
- 2.2.4 The PPG advises that, in addition to the ten year rolling supply, MPAs should consider average sales over the last three years “to identify the general trend of demand as part of the consideration of whether it might be appropriate to increase supply”<sup>2</sup>. For the three years to 2015, the average sales were **2.699 million tonnes for crushed rock** (higher than the ten year average) and **0.520 million tonnes for sand and gravel** (lower than the ten year average).
- 2.2.5 During the past ten years, the proportion of land-won aggregates accounted for by crushed rock has increased from 76% to 85%, as illustrated in Figure 4, reflecting the pattern of sales highlighted in 2.2.2.

<sup>2</sup> PPG for Local Aggregate Assessments available [here](#)



**Figure 4: % Share of Devon's Land-won Aggregate Production, 2006-2015**

2.2.6 Over the past 10 years, the proportion of crushed rock aggregates sold in Devon accounted for by limestone has increased, reaching 88% in 2015. This reflects the lower levels of waste and ease of working in comparison with other rock types, together with the location of the limestone quarries in relation to the main settlements and transport routes. Figure 5 shows the proportions of crushed rock sales accounted for by the three types of rock.



**Figure 5: % share of Devon's crushed rock sales by rock type, 2006-2015**

2.2.7 For sand and gravel, Figure 6 indicates that the proportion of sales derived from the Budleigh Salterton Pebble Beds gradually increased during the last ten years to around 87% in 2013 before dropping to 81% in 2014 and 2015, as a result of increased output at a quarry elsewhere in Devon rather than a drop in output from the Pebble Beds. However, the relative proportions derived from the northern (i.e. Whiteball/Town Farm and Hillhead Quarries) and southern (i.e. Blackhill, Venn Ottery and Rockbeare Hill Quarries) parts of the Pebble Beds have changed significantly as shown in Figure 7. While Hillhead Quarry was the largest contributor to supply from the Pebble Beds in

the early part of the 10 year period, extraction has not been undertaken there since 2009, with subsequent sales limited to materials from stockpiles.

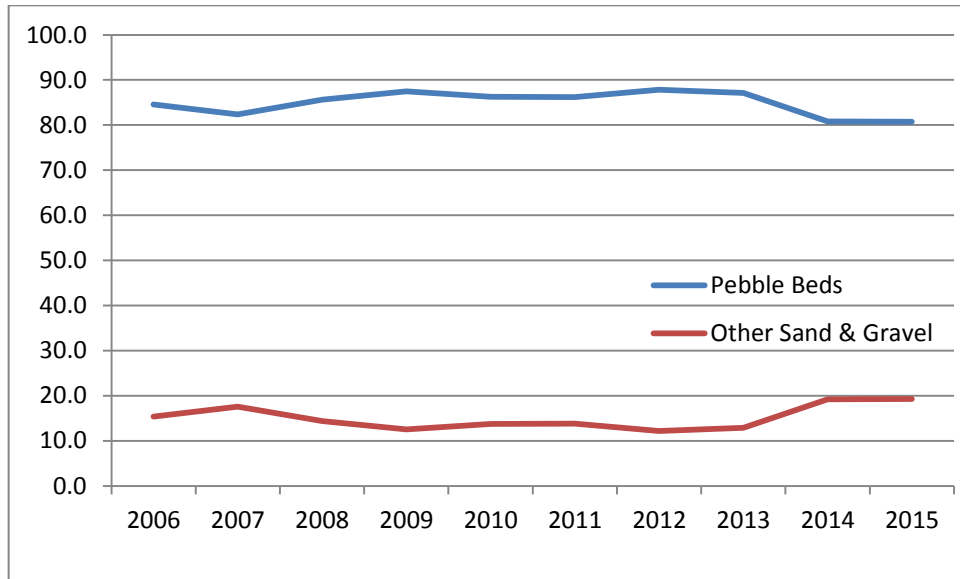


Figure 6: % share of Devon's sand and gravel sales by type, 2006-2015

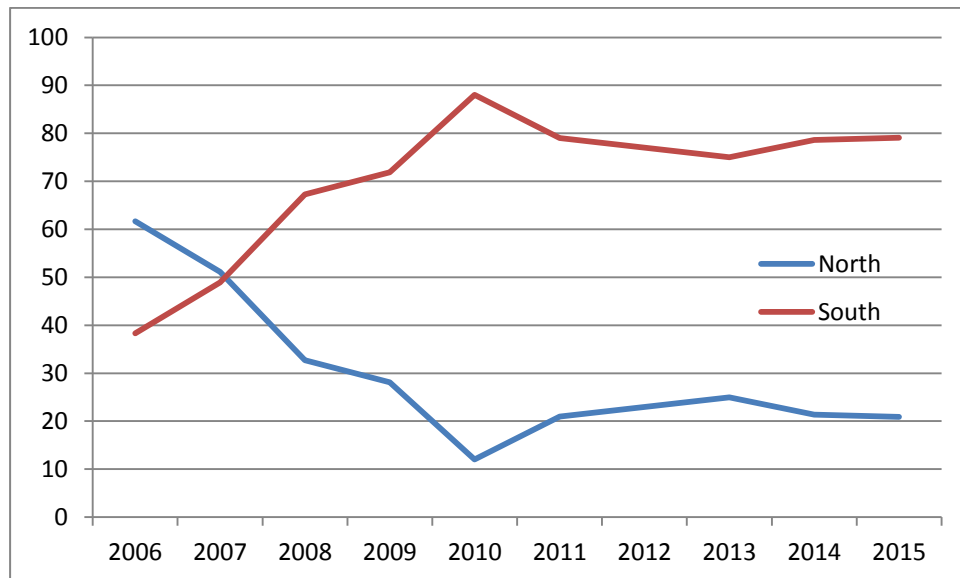


Figure 7: % share of sales from Budleigh Salterton Pebble Beds in northern and southern areas, 2006-2015

## 2.3 Current Availability of Land-won Aggregate Resources

- 2.3.1 Devon's existing aggregate quarries (listed in Appendix A) have substantial permitted reserves of crushed rock aggregates, but more limited reserves of sand and gravel. Table 3 shows the permitted reserves available at 31<sup>st</sup> December 2015 in Devon<sup>3</sup>.

<sup>3</sup> Excluding Dormant sites

Resource		Permitted Reserves (million tonnes)
Crushed Rock	Limestone	77.164
	Sandstone	16.948
	Igneous/Metamorphic	20.878
	<b>Total Crushed Rock</b>	<b>114.990</b>
Sand & Gravel		<b>7.010</b>

**Table 3: Permitted reserves of land-won aggregates in Devon at 31 December 2015**

- 2.3.2 The NPPF seeks the maintenance of landbanks of land-won aggregates of at least seven years for sand and gravel and at least ten years for crushed rock. Using the averages of sales over the past ten years (2006-2015) as indicated in paragraph 2.2.3, the land-won aggregate landbanks at the end of 2015 can be calculated from these permitted reserves as follows:

**Crushed rock landbank                      48.9 years**

**Sand and gravel landbank                      12.5 years**

## 2.4 The Crushed Rock Landbank

- 2.4.1 The crushed rock landbank is well in excess not only of the ten year minimum required by the NPPF, but also the time horizons of the adopted or emerging Minerals/Local Plans of the Devon MPAs. As shown in Table 4, substantial landbanks exist for the individual types of crushed rock.

Resource	10 Year Average Sales (million tonnes)	Landbank (Years)
Limestone	1.894	40.7
Sandstone	0.329	51.5
Igneous/Metamorphic	0.129	161.8

**Table 4: Landbanks for crushed rock aggregates in Devon at 31 December 2015**

- 2.4.2 While the overall crushed rock landbank is extensive, there are limited available reserves of high-specification aggregates [HSAs] from Devon's operational quarries. HSAs provide materials with polished-stone values [PSV] in the mid to high 60s that are suitable for skid-resistant road-surfacing. Within Devon, only Bray Valley Quarry (sandstone) and Blackhill Quarry (processing gravel materials extracted elsewhere in the Budleigh Salterton Pebble Beds) are currently producing materials with a PSV above 60. A further significant source of HSAs for the Devon market is Pigsdon Quarry in Cornwall, located close to the Devon boundary near Bude and with an extension permitted in 2013 that will extend its life by 20 years, while HSAs have also been transported from quarries elsewhere in England and in South Wales and Ireland.
- 2.4.3 Research [Thompson *et al* (2004)] indicates that Devon's sandstone resources, notably the Bude Formation that outcrops between the Cornwall border and the Exe Valley, are capable of yielding HSAs with PSV above 60 and, in some cases, above 65. While Scrivener & Miles (2010) identified those parts of the Bude and Crackington Formations with potential for high-PSV resources, these areas will need further refinement through site investigation by the minerals industry before the presence of economic resources can be established. The airborne survey work undertaken for the

Tellus SW Geophysical Survey may enable the British Geological Survey to refine their mapping of the northern Devon sandstones to assist in identifying formations with potential for high-PSV resources<sup>4</sup>.

- 2.4.4 The NPPF (paragraph 145) suggests the use of separate landbanks for “aggregate materials of a specific type or quality which have a distinct and separate market”, which could encompass HSAs. However, the variability of sandstone resources within a quarry renders it difficult to calculate specific reserves for HSAs, while there are confidentiality issues with identifying a landbank to which a limited number of quarries contribute. It is therefore not proposed to identify a separate landbank for HSAs, but the delivery of further resources is an issue being addressed in Devon County Council’s Minerals Plan<sup>5</sup>.
- 2.4.5 The current round of periodic reviews of mineral permissions required by Schedule 14 of the Environment Act 1995 is seeing a small number of permissions for crushed rock quarries lapsing due to operators or landowners not submitting new working schemes (including New England and Kersdown Quarries). Notwithstanding these losses of reserves, the considerable length of the crushed rock landbank provides an adequate buffer to ensure it can be maintained for at least the Plan periods for Devon’s MPAs.
- 2.4.6 The operator of one of Devon’s four limestone quarries, Linhay Hill Quarry in Dartmoor National Park, has submitted a planning application in June 2016 to extend the quarry vertically and laterally to increase its effective life beyond its remaining 10 years (at current rates of output) by a further 50 years.

## 2.5 The Sand and Gravel Landbank

- 2.5.1 In contrast to the position with crushed rock, the landbank for sand and gravel calculated using the average of sales over the past ten years, although greater than the seven years minimum required by the NPPF, does not extend to the 2033 end date of Devon County Council’s emerging Minerals Plan<sup>6</sup>.
- 2.5.2 While some MPAs distinguish between sharp sand and soft sand in their landbanks and LAA, the nature of Devon’s sand and gravel resources does not warrant such a distinction, with resources such as the Budleigh Salterton Pebble Beds and Aller Gravels being capable of providing concreting (sharp) and building (soft) sand together with gravel fractions. Paragraph 145 of the NPPF does, however, also highlight that longer periods for landbanks may be warranted to take account of “locations of permitted reserves relative to markets”.
- 2.5.3 Reflecting the pattern of sand and gravel production highlighted in paragraph 2.2.7, approximately 90% of the current sand and gravel reserves are located within the Budleigh Salterton Pebble Beds. However, the major proportion of these is located within the northern area of the Pebble Beds (i.e. Town Farm

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<sup>4</sup> Further information on Tellus SW is available at <http://www.tellusgb.ac.uk>

<sup>5</sup> Potential HSA resources in Devon are limited to the area for which Devon County Council is MPA

<sup>6</sup> The absence of sand and gravel resources from Plymouth, Torbay and the two National Parks limits the scope of existing and potential supply in Devon to the area for which Devon County Council is the MPA, although resources also exist in Somerset

and Hillhead (Houndaller) quarries) with more limited reserves remaining in the southern area. Devon County Council's emerging Minerals Plan [Devon County Council (2015)] proposes sites within the southern and northern areas of the Pebble Beds that together would provide up to 9.2 million tonnes of sand and gravel, while also allowing for maintenance of supply from the Newton Abbot and Exeter areas.

- 2.5.4 The Somerset Minerals Plan also allocates land for sand and gravel extraction, as explained in 2.5.10, although the potential resource is not quantified. No further provision for land-won sand and gravel is made in the emerging Cornwall Local Plan, reflecting the lack of such resources and the abundance of secondary aggregates within Cornwall. Arrangements for the contribution of Somerset and Cornwall to sub-regional supply, and for joint working on assessing and monitoring this supply, are set out in a Memorandum of Understanding signed by the three MPAs.
- 2.5.5 A characteristic of the Budleigh Salterton Pebble Beds within Devon is that the proportion and size of gravel decreases from south to north, while the proportion of fines (i.e. silt) increases [Scrivener R & Miles A J (2010) p21]. As the size of the quartzite pebbles decreases northwards, it follows that the proportion of the gravel that is crushable, and therefore capable of yielding the higher-specification road surfacing materials, will reduce further. This is illustrated in Table 5 using data for Aggregate Industries' sites in the Pebble Beds, which highlights the higher crushable gravel content at the more southern sites and, notably, the very low proportion of crushable gravel at Houndaller.

Site	Total Gravel %	Total Crushable Gravel %
Blackhill	70	39
Venn Ottery	60	38
Straitgate Farm	54	26
Houndaller (Hillhead)	25	5
Penslade	42	13

**Table 5: Gravel Content at Pebble Beds Quarries**

- 2.5.6 Potential constraints on the maintenance of the sand and gravel landbank are (a) the limited duration of planning permissions for some of the existing quarries, and (b) the scope for permissions to lapse if the periodic review schemes required by Schedule 14 of the Environment Act 1995 are not submitted. While there are opportunities for operators to seek the extension of these time limits, failure to do so would lead to lapsing of planning permissions and consequent loss of permitted reserves. Table 6 identifies those sand and gravel reserves for which planning permission is due to expire prior to 2033.

Quarry	Permission Time Limit
Hillhead (Houndaller)	31 <sup>st</sup> December 2018
Uplyme	31 <sup>st</sup> December 2019
Zig Zag	31 <sup>st</sup> December 2020
Haldon	31 <sup>st</sup> December 2022
Town Farm	27 <sup>th</sup> June 2023
Babcombe Copse/Sands Copse	31 <sup>st</sup> October 2025

**Table 6: Sand and gravel planning permission expiry dates**



2.5.7 For some of the quarries listed in Table 6, the extent of remaining reserves and recent levels of sales suggest that the reserves will be worked out by the expiry date. However, as indicated in Table 7, no extraction has taken place over the last six calendar years at Hillhead or Haldon, and it may therefore be the case that, unless working recommences at these sites, some or all of their remaining reserves will ‘disappear’ unless permission is obtained to extend the life of current consents.

Quarry	Resource	Current Status
Babcombe Copse / Sands Copse, Kingsteignton	Upper Greensand & Aller Gravels	A new operator recommenced working in July 2014, and permission was granted in October 2015 for extraction of the remaining reserves.
Blackhill, Woodbury	Budleigh Salterton Pebble Beds	Extraction of remaining reserves was completed in 2015. Plant is retained for processing materials transported from other sites until December 2016.
Haldon, Kennford	Haldon Gravels	Inactive since 2005, since when the site has changed hands. An application for a revised working scheme and increased annual output was approved in April 2013.
Hillhead, Uffculme	Budleigh Salterton Pebble Beds	No extraction undertaken since 2009, although small quantities were sold from stockpiles until 2014. Potential extraction in 2016 (see 2.5.8).
Rockbeare Hill, Rockbeare	Budleigh Salterton Pebble Beds	The last remaining reserves were worked in 2015 and transported to Blackhill for processing.
Town Farm, Burlescombe	Budleigh Salterton Pebble Beds	Working has moved into the extension area approved in 2010. Materials are transported to Whiteball (Somerset) for processing.
Uplyme	Upper Greensand	No extraction of sand and gravel is currently undertaken, but small quantities have been taken from a stockpile of previously-excavated material that is now exhausted. Working of the overlying chalk for agricultural purposes continues.
Venn Ottery	Budleigh Salterton Pebble Beds	Extraction recommenced in April 2011, with materials transported to Blackhill for processing.
Zig Zag, Kingskerswell	Upper Greensand & Aller Gravels	Extraction continuing with processing on site.

**Table 7: Status of permitted sand and gravel sites in Devon**

2.5.8 The following planning applications were submitted during 2015 to enable sand and gravel extraction and processing within the Budleigh Salterton Pebble Beds:

- extraction of sand and gravel at Straitgate Farm, Ottery St Mary (withdrawn in March 2016);
- retention of processing plant at Blackhill Quarry to end of 2021 to process imported sand and gravel from Straitgate Farm (withdrawn in March 2016); and

- variation of existing permission at Blackhill Quarry to allow for importation of sand and gravel from Houndaller (Hillhead) Quarry for processing to end of 2016 (approved in July 2016 subject to completion of a legal agreement).
- 2.5.9 In May 2016, an application was submitted for the extension of Zig Zag Quarry to enable an additional 500,000 tonnes of sand and gravel to be extracted, and this is awaiting determination.
- 2.5.10 In addition, the review of conditions for Hillhead Quarry submitted under Schedule 14 of the Environment Act 1995 seeks to extend the time limit for the Houndaller part of the quarry from the end of 2018 to 2033; however, the review is presently in abeyance awaiting submission of an Environmental Statement.
- 2.5.11 Town Farm forms part of Hanson's Whiteball operation, for which the processing plant lies in Somerset adjacent to its border with Devon. In recent years, extraction of sand and gravel for Whiteball has taken place within Devon, most recently at Town Farm where planning permission was granted in 2010 for an extension with an anticipated life of ten years<sup>7</sup>.
- 2.5.12 Following completion of extraction at Town Farm, it is anticipated that the Whiteball processing plant will be supplied from materials extracted in Somerset, for which Somerset County Council's Minerals Plan identifies a Preferred Area and an Area of Search through the following policy:
- Policy SMP4: Provision of sand and gravel***  
*Land adjacent to Gipsy Lane, Greenham has been identified as a Preferred Area and an Area of Search as shown in Map 2 to contribute towards sand and gravel supply in conjunction with Devon County Council.*
- Planning permission for the extraction of sand and/or gravel in Somerset which is outside the Preferred Area and Area of Search will be granted subject to the applicant demonstrating that the proposed site offers net environmental benefits over those within the Preferred Area or Area of Search.*
- 2.5.13 This suggests that, during the latter part of the period to 2033 covered by the LAA, some of the sand and gravel supply previously delivered from Devon will be met from Somerset through continued working at Whiteball.
- 2.5.14 However, this supply from Somerset will be offset by the likely cessation of supply of sand and gravel from Dorset, as Chard Junction Quarry, located close to the boundary with Devon (see Figure 13) and supplying materials into the east of the county, together with Somerset, is anticipated to cease working in 2022/23.
- 2.5.15 Dorset County Council consulted on its Draft Mineral Sites Plan in 2015, which proposes the allocation of nine sites to ensure delivery of the county's supply of sand and gravel is maintained. These sites are all in central or eastern Dorset, with the closest at Woodsford being 55 km by road from the

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<sup>7</sup> The application identified a reserve of 2 million tonnes with an annual extraction rate of 200,000 tonnes

easternmost town in Devon, Axminster. For comparison, Axminster is 10.5 km by road from Chard Junction Quarry, which also adjoins the county boundary with Somerset. Given that the average road transportation distance for aggregates is about 40 km [British Geological Survey (2007)], it would appear that the scope for supply of sand and gravel into Devon from Dorset after the closure of Chard Junction Quarry is very limited.

### 3. MARINE AND ALTERNATIVE AGGREGATES

#### 3.1 Background

3.1.1 In addition to its resources of land-won aggregates, Devon is able to utilise a range of other aggregate resources, with the processing and wharf locations illustrated in Figure 9:

- ♦ marine sand and gravel dredged from the Bristol Channel and landed in northern Devon in small quantities for the local market;
- ♦ secondary aggregates from the processing of by-products of china clay operations at Lee Moor and, to a lesser extent, from ball clay in the Bovey Basin and slate at Mill Hill Quarry; and
- ♦ recycled aggregates from the processing of CDEW at a network of recycling facilities, some of which are located at operational quarries, and at construction sites.

3.1.2 This part of the assessment reviews the nature of these sources of aggregates, their recent levels of supply and the current availability of resources and/or capacity for their processing. Figure 8 illustrates the levels of sales of marine and secondary aggregates over the past ten years, together with recycled aggregates over the past four years for which data are available [see 3.4.2].

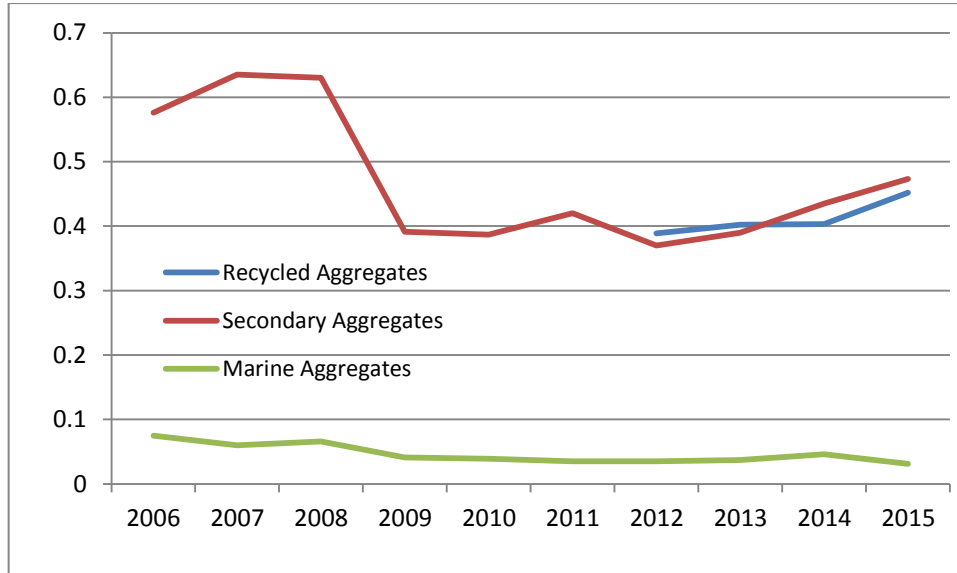
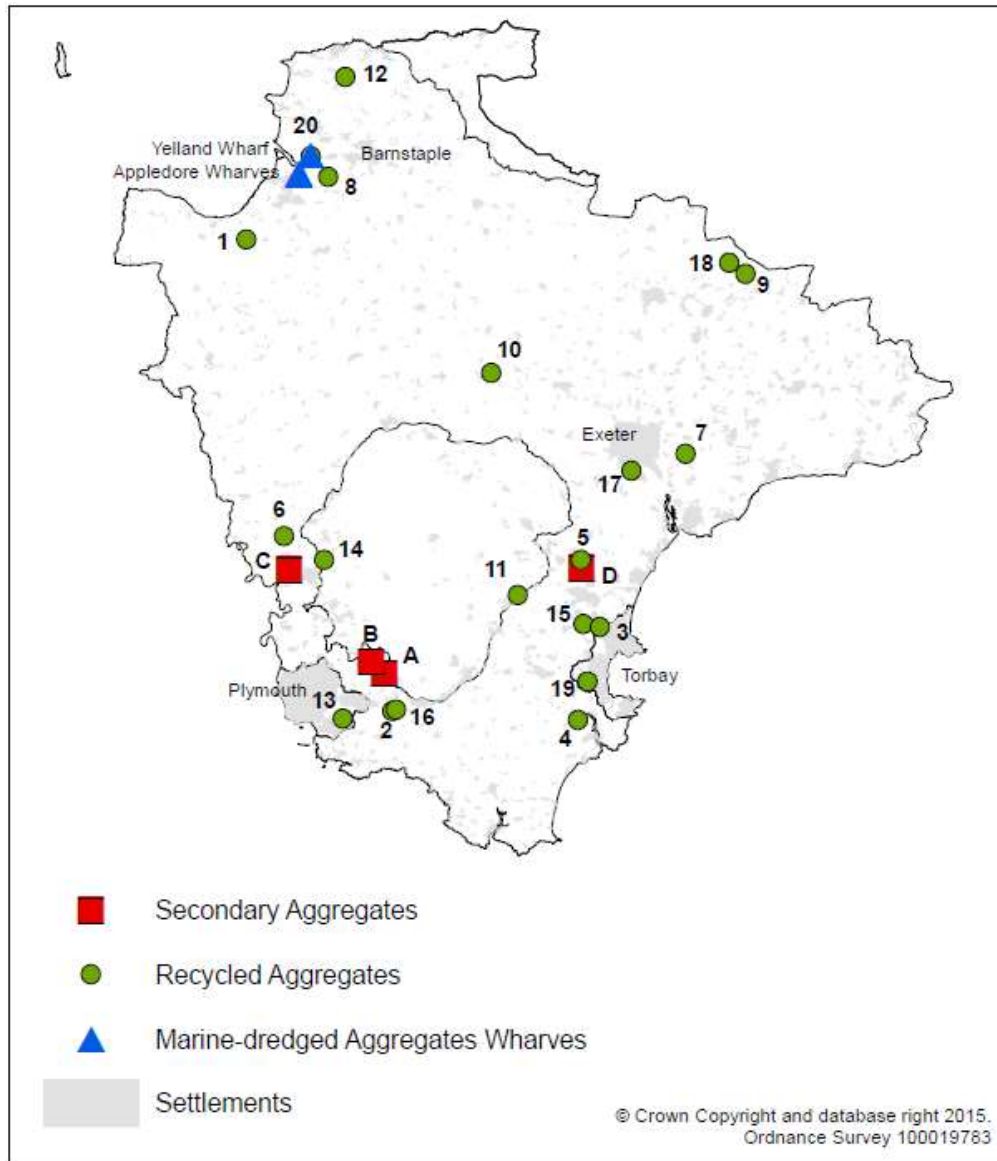


Figure 8: Sales of Marine and Alternative Aggregates in Devon (million tonnes), 2006-2015

#### 3.2 Marine Aggregates

3.2.1 Small quantities of marine-dredged sand and gravel originating from the Bristol Channel are landed at Appledore and Yelland, and sold mainly to the local North Devon market. The total quantity landed in 2015 amounted to 31,550 tonnes. The ten year average landings of marine aggregates for Devon is **47,274 tonnes** (rounded to 0.047 million tonnes, with the three year

average being 0.038 million tonnes). This resource thus makes only a small contribution to Devon’s aggregates supply (around 1%), in contrast to the national picture whereby 21% of England and Wales’ sand and gravel supply is from marine sources [Mineral Products Association (undated)].



**Figure 9: Location of secondary and recycled aggregate facilities and marine-dredged aggregate wharves operational in 2015 (key to sites in Appendix A)**

- 3.2.2 Marine aggregates are landed in greater quantities at Poole in Dorset, and at similar levels at Bridgwater in Somerset, but are understood not to supply markets in Devon to any significant degree.
- 3.2.3 The two main constraints on the level of marine aggregate supply are the extent and location of licensed dredging areas and the capacity of wharves for landing the materials.

Licensed Dredging Areas

- 3.2.4 Dredging for marine aggregates is licensed by the Crown Estate, which licenses several areas within the Bristol Channel including that from which

materials are landed at Appledore. Within the English Channel, the closest licensed area to Devon is just west of the Isle of Wight, but no materials from this area are landed at any port west of Poole.

- 3.2.5 The Crown Estate's statistical summary for 2015 [Crown Estate (2015)] indicates that 1.137 million tonnes were dredged that year from the Bristol Channel, amounting to 49% of the annual licensed tonnage, with 0.484 million tonnes being landed at English wharves, of which Avonmouth accounted for the majority, and the remainder in Wales. The intensity of use of the licensed areas would therefore not appear to be an obstacle to an increased level of dredging to supply Devon if demand warranted it.

#### Wharf Capacity

- 3.2.6 No figures are available on the maximum annual throughput of the wharves at Appledore and Yelland that are, or have been, used for landing marine aggregates. However, there are two wharves within the port of Appledore that have been used for unloading marine aggregates in greater quantities than is the case recently, which suggests that, together with the additional capacity at Yelland, adequate capacity is available provided that these remain unconstrained by other development.

### **3.3 Secondary Aggregates**

- 3.3.1 The major source of secondary aggregates in Devon over the past ten years is the by-products derived from the extraction and processing of **china clay** in the Lee Moor area of Devon, which accounts for around 90% of the county's production of secondary aggregates. For each tonne of saleable china clay, up to nine tonnes of other materials are produced, with two main elements capable of use as secondary aggregate:

- ◆ stent (rock), which can be used as general fill or, after crushing and screening, for other aggregate purposes; and
- ◆ tip sand (washed material comprising quartz, unaltered feldspar and mica) which, with grading and washing, can be used for a variety of aggregate purposes including concrete and building sand.

- 3.3.2 In previous years, secondary aggregate operations at china clay sites have been fed from 'as dug' materials, and this remains the case with Tarmac's operation at Headon. Since the contraction of Imerys' Lee Moor china clay operations, Aggregate Industries have supplemented 'as dug' materials with processing of materials from Tip T1 under a planning permission granted in 2009, with an estimated five million tonnes to be worked over 20 years.
- 3.3.3 In May 2015, Ocean Block & Aggregates commenced processing of materials from Tip T2 at Lee Moor for secondary aggregates under permitted development rights, with a view to seeking permission for larger scale working. The company received permission in January 2016 for a concrete block manufacturing facility at Lee Moor to utilise secondary aggregates from that site.
- 3.3.4 Within the **ball clay** workings of the Bovey and Petrockstowe Basins, sand occurs as interburden within the clay seams and has been tipped as waste.

Sand from the Bovey Basin is processed for secondary aggregate and horticultural use by Sibelco at their Preston Manor works. Since 2014, sand is also removed from Imerys' Stover quarry for use by a local aggregates supplier.

- 3.3.5 Mill Hill Quarry works **slate** for building stone purposes, and processes some of the by-products for secondary aggregate purposes, albeit on a small scale in comparison with the china clay secondary aggregate operations.
- 3.3.6 The annual sales of secondary aggregates shown in Table 8 give a ten year average of **0.470 million tonnes** (and a three year average of 0.432 million tonnes). Figure 8 illustrates these sales alongside those for marine-dredged and recycled aggregates.

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0.576	0.635	0.630	0.391	0.387	0.420	0.370	0.387	0.435	0.473

**Table 8: Sales of secondary aggregates in Devon, 2006-2015 (million tonnes)**

- 3.3.7 In addition to the existing sources of secondary aggregates outlined above, other potential sources that may be available from within Devon in the future are:
- ♦ the recycling of incinerator bottom ash derived from waste incineration in Devon, although no facility for the processing of this material currently exists within Devon; and
  - ♦ secondary aggregates from the processing of waste from tungsten and tin extraction at Drakelands Mine, near Plymouth, which commenced extraction in summer 2015. The planning permission allows for the sale of up to 150,000 tonnes of secondary aggregates each year, although future production will be limited by constraints of quality and competition from other secondary aggregate sources in the area, together with a requirement for much of the waste rock to be used in the construction of the mine waste facility.
- 3.3.8 A further source of secondary aggregate imported into Devon at present is blast furnace slag from Port Talbot in South Wales. This is transported by sea and landed at Teignmouth for use as a cement additive/substitute, and is also capable of use as an aggregate.
- 3.3.9 The location of the facilities for production of secondary aggregates is illustrated in Figure 9. With production of land-won sand and gravel concentrated in the eastern part of Devon, the china clay operations in the Lee Moor area are well-placed to supply sand and other secondary aggregates to Plymouth and south west Devon.
- 3.3.10 Potential physical constraints on future growth in the level of supply of secondary aggregates include the continued availability of raw materials for processing and the capacity of the processing plant. However, neither of these are anticipated to limit potential growth in secondary sales in Devon due to the ready availability of tipped materials in addition to 'as dug' material, together with the spare capacity of plant.

### 3.4 Recycled Aggregates

3.4.1 The waste arising from construction, demolition and excavation activity comprises a range of materials, of which the ‘hard inert’ elements (e.g. concrete, bricks, stone, road planings, rail ballast and glass) can be recycled for use as aggregates. Other elements of CDEW, due to their ‘soft’ and/or organic nature (e.g. soil, timber and plasterboard), are unsuitable for aggregate use but can be recovered or recycled for other beneficial uses. The most recent national report on CDEW [Defra (undated)] estimated that around 45% of the total arisings have been recycled for aggregate use.

3.4.2 Robust data on arisings of CDEW and the quantities of recycled aggregates derived from it are difficult to obtain, particularly for the county level. It is disappointing that the Government has not undertaken any recent surveys of these materials, and that some site operators have not responded to surveys by Devon County Council. Estimates for the past four years’ surveys have therefore been developed from the partial results of the County Council’s surveys, with assumptions made regarding the contribution of other recycling and construction sites. The methodology used to calculate recycled aggregate sales in this iteration of the LAA therefore differs from that used in previous years, although it has been possible to update the results of the surveys from 2012 onwards using data from operators. These estimated figures show an upward trend from 2012 to 2015.

2012	2013	2014	2015
0.389	0.402	0.403	0.452

**Table 9: Estimated sales of recycled aggregates in Devon, 2012-2015 (million tonnes)**

3.4.3 The recycling of CDEW in Devon is undertaken at two main types of site:

- ◆ fixed recycling sites, usually at a quarry, inert landfill site or waste transfer station, with aggregates sold on the open market and/or utilised in materials such as concrete produced at the same site; and
- ◆ temporary construction sites, with mobile plant being used to process the materials arising from demolition for use either on the same site (e.g. as construction fill or hardcore) or for sale off-site.

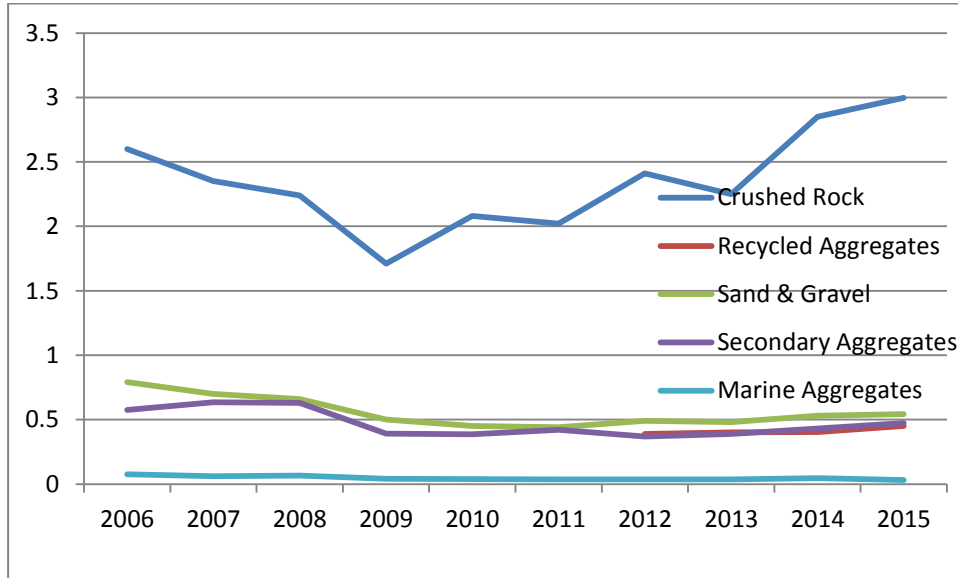
3.4.4 As indicated in Figure 9, facilities for recycled aggregate are generally clustered close to the main urban areas of Plymouth, Torbay/Newton Abbot, Exeter and Barnstaple, providing a comprehensive network that helps in providing local supplies.

3.4.5 Analysis based on the partial survey results from recycling site operators together with review of limits in planning permissions and/or environmental permits suggests that Devon’s operational CDEW recycling sites have a capacity for production of recycled aggregates in the region of 2 million tonnes. This capacity is comfortably above the highest annual production given in Table 9, although it should be borne in mind that fixed recycling sites only account for a proportion (estimated at two thirds) of the total volume of recycled aggregates produced in Devon. The existing fixed recycling sites therefore have substantial spare capacity to cater for any increased demand that may occur in the future.



### 3.5 Synthesis of Aggregate Sales

3.5.1 To enable comparison of trends for land-won, marine and alternative sources of aggregates, Figure 10 illustrates the total annual sales for each aggregate stream.



**Figure 10: Total sales in million tonnes of land-won, marine and alternative aggregates in Devon, 2006-2015**

3.5.2 Figure 10 illustrates the stronger recovery in sales of crushed rock aggregates since 2009 in comparison with other aggregates, for which sales remained generally flat to around 2012 before a more gradual increase.

## 4. USES OF DEVON'S AGGREGATE RESOURCES

### 4.1 Uses of Aggregates

- 4.1.1 Aggregates are used for a wide range of construction uses, with concrete (both ready-mixed concrete and the manufacture of concrete products) and road construction and maintenance being the major uses for Devon's land-won and secondary aggregates. Other uses include mortar, armourstone and constructional fill.
- 4.1.2 As explained in more detail in British Geological Survey (2007), an aggregate's suitability for a specific use is dependent on its physical and mechanical attributes, including strength, durability, porosity, particle shape, presence of impurities and abrasion resistance. The desired combination of these qualities will vary between different uses, with the most stringent specifications for structural concrete and road surfacing only capable of being met by a limited range of aggregate resources. For lower-specification uses, requirements can be met by a wider range of materials including secondary and recycled aggregates.
- 4.1.3 In addition to the relative physical properties, the choice of aggregate to be used for a particular purpose will also be influenced by matters such as ease of working and the proportion of waste generated, together with economic factors including proximity of the resource to markets (influencing transport costs), fiscal measures such as the Aggregates Levy, and the compliance of aggregates with technical standards.
- 4.1.4 The AM2014 survey provides an indication of the uses to which Devon's aggregates were put:
- ◆ the main uses for land-won sand and gravel were for screened and graded gravels (36%), concrete (28%), other constructional uses (25%), mortar (6%) and asphalt (4%);
  - ◆ crushed rock aggregates were used for 'other constructional uses' (34%), uncoated roadstone (23%), other screened and graded aggregates (23%), concrete (12%) and asphalt (7%);
  - ◆ secondary aggregates were mainly used for concrete (48%), with other uses being 'other constructional uses' (29%), screened and graded aggregates (15%), road construction (2%) and mortar (2%).
- 4.1.5 The limited quantity of marine-dredged sand and gravel was used for concrete. While no comprehensive data are available for the uses of recycled aggregates, information from the site operators in the limited number of survey forms returned indicates that a range of aggregates were supplied ranging from dust through pipe-bedding sand, grit and gravel through 20mm, 40mm and up to 75mm products. Some sites sold materials to recognised standards for sub-base aggregates.

## 4.2 Potential for Substitution of Aggregates

- 4.2.1 Within Devon, there is potential for increased substitution between the different types of aggregate, including the use of crushed rock fractions instead of sand and gravel, as well as secondary and recycled aggregates replacing land-won sand, gravel and crushed rock. However, it would be unwise to assume that full substitution of one resource by another is feasible, or always desirable, as technical requirements may constrain this. One example of the implications of substitution of aggregates is that secondary aggregates from china clay by-products require an increased level of cement when used in concrete than is the case with land-won aggregates [British Geological Survey (2007)]. A further example is that, while secondary and recycled aggregates include a wide range of aggregate materials that may be suitable for use in road construction, they may not possess the exacting physical properties, including resistance to polishing, that are required for road surfacing.
- 4.2.2 In addition, the limited spatial occurrence of some resources, such as secondary aggregates (the major proportion of which are derived from the china clay operations near Plymouth) would result in increased transport costs (both financial and environmental) if they were to be substituted for land-won resources that are located closer to areas of demand in other parts of Devon.
- 4.2.3 Paragraph 2.5.1 highlighted that the land-won sand and gravel landbank in Devon did not extend to the 2033 end date of Devon County Council's Minerals Plan, suggesting a shortfall in supply during that period. Since over 80% of Devon's land-won sand and gravel supply is derived from the Budleigh Salterton Pebble Beds (paragraph 2.2.7), it is useful to consider the scope for substitution of that resource by other aggregates available within Devon.
- 4.2.4 Information from the minerals industry [Devon Stone Federation (2012)] highlights the particular qualities of the Pebble Beds resource:

*The extracted mineral is crushed and the resulting constituents are blended in a controlled manufacturing process to provide exactly what is required to comply with the various EN standards required by markets which include concrete and concrete screeds, Hot Rolled Asphalt, Asphaltic Concrete and building sands...The pebble beds provide a consistent feed both in terms of grading and geological makeup with >95% of the extracted mineral being quartzite.*

*The quartzite aggregate of the pebble beds has a significantly lower water absorption than its competitors due to its uniform mineralogy, overall grading and grain shape, lack of composite grains and lack of mica, making it a much more efficient and durable material than other local aggregates, especially when used in Asphalt materials. It has proven to provide excellent skid resistance when used in surface course applications and this material will outperform most other aggregates available within the South West.*

*Furthermore, due to the sharp and hard nature of the quartzite mineral from the pebble beds, the grit material that is produced from the*

*manufacturing process is the only material that Devon County Council has approved and specified for the gritting of SMA [Stone Mastic Asphalt] on Devon's road network.*

- 4.2.5 Of the potential alternatives to this resource, the Devon Stone Federation advise that china clay secondary aggregates have a more limited grading (biased in the 2-4mm size fraction), together with a more variable mineral make-up and weathering. One outcome of these properties is the increased water demand and proportion of cement required in concrete.
- 4.2.6 Another alternative resource, crushed rock fines, are also considered to be gap-graded, for which rebalancing to match product grading would result in significant volumes of unusable waste. While better in terms of water absorption than china clay aggregates, this is still a significant factor for crushed rock fines.
- 4.2.7 The information provided by the Devon Stone Federation has been verified by Devon County Council's Materials Laboratory, which also advises that quartzite from the Pebble Beds has been trialled and approved for use in high friction surfacing. When used as a surface dressing aggregate (8mm through grade), the quartzite achieves an effective PSV of 60-64, reducing Devon's reliance on gritstone imported from elsewhere in the UK.

## 5. AGGREGATE MOVEMENTS

5.0.1 This Chapter considers two aspects relating to the movement of aggregates: firstly, the pattern of movements of aggregates between Devon and other parts of the UK and, secondly, the means by which aggregates are transported within and beyond Devon, including the use of rail and sea.

### 5.1 Pattern of Aggregate Movements

5.1.1 Information on the destinations of aggregates sold from Devon’s quarries and inward movements of aggregates is available for 2014 from the AM2014 aggregates survey. Broadly speaking, these data suggest that Devon is relatively self-sufficient in aggregates with around 80% of land-won aggregates consumed in the county being supplied from its quarries, and with lower levels of imports and exports than many other counties.

5.1.2 Table 10 indicates that Devon met 83% of its crushed rock requirements in 2014 from quarries within the county, and 80% of the sand and gravel that it consumed<sup>8</sup>. Information from the British Geological Survey shows that almost all imports of sand and gravel were derived from Dorset, but that crushed rock was imported from a wider range of sources, with Cornwall, Somerset and North Somerset being the most significant but with small quantities from further afield including Wales, Leicestershire and Yorkshire.

	Crushed Rock		Sand & Gravel	
	mt	%	mt	%
Devon Consumption	3.058		0.595	
Supplied from Devon	2.533	82.8	0.474	79.7
Imports from outside Devon	0.525	17.2	0.121	21.3

**Table 10: Origins of aggregates consumed in Devon, 2014** (mt = million tonnes)

5.1.3 The BGS data also indicate that Somerset consumed 0.526mt of sand and gravel, with around three quarters originating in Dorset, supplemented by landings of marine aggregates in Somerset and a small amount of land-won sand and gravel imported from Devon. Unsurprisingly given its abundant secondary aggregate resources, Cornwall consumed only 0.013mt of land-won or marine sand and gravel, with most imported from Devon.

5.1.4 Table 11 provides details of the destinations of land-won, secondary and marine aggregates sold from Devon’s quarries and wharves in 2014. Around 89% of land-won materials remained in Devon, with most of the ‘exported’ materials being sold to markets within the adjoining counties of Somerset and, to a lesser extent, Cornwall.

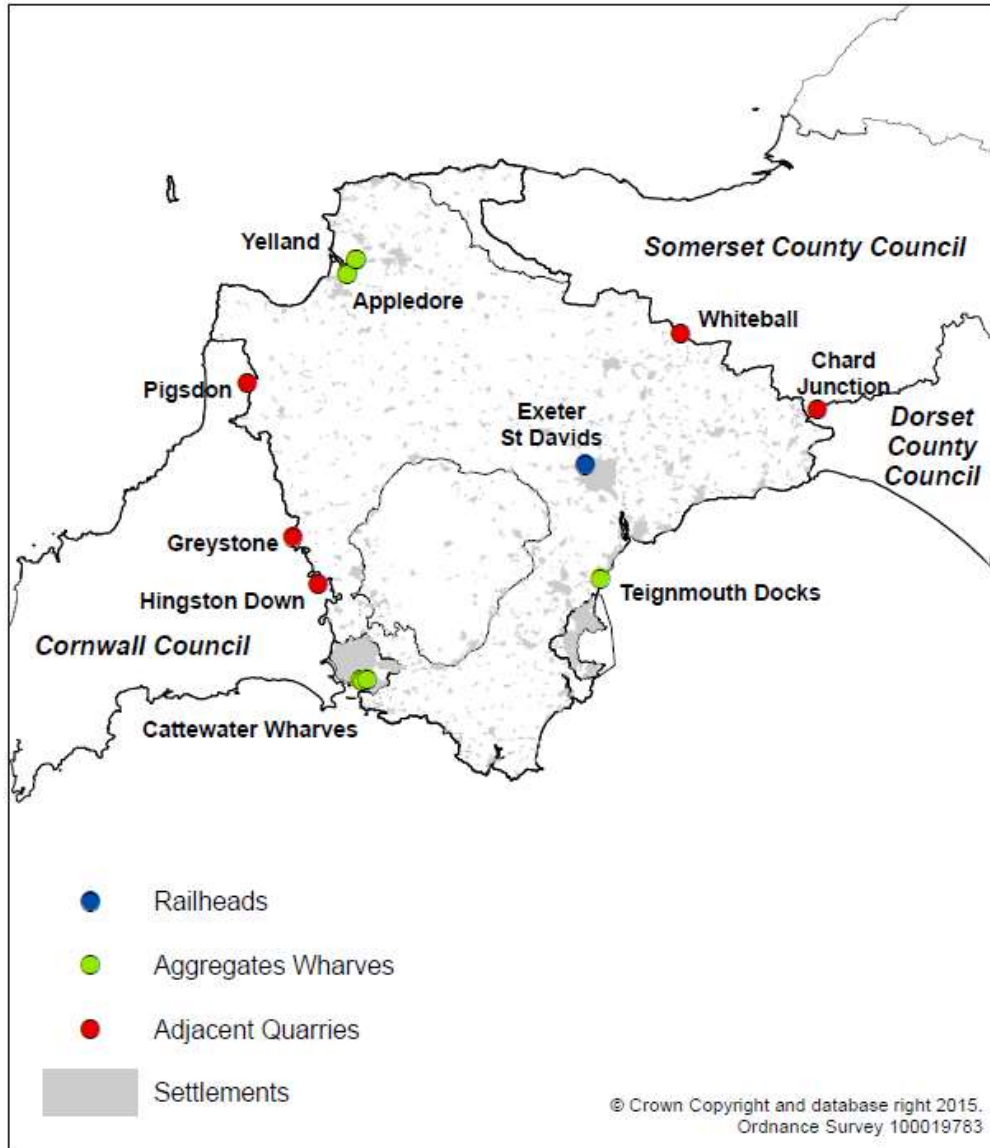
5.1.5 Comparison of Tables 10 and 11 indicates that, while Devon produced the majority of the aggregates that it consumed, it was a net importer of these materials. Imports of crushed rock (0.525mt) exceeded Devon’s exports (0.320mt) by 0.205mt, while imports of sand and gravel (0.121mt) exceeded exports (0.069mt) by 0.052mt. Levels of inward movements have grown since the AM2009 survey, with imports of crushed rock up by 23% and imports of sand and gravel growing by 30%.

<sup>8</sup> The figures for sand and gravel in Table 10 include small quantities of marine-dredged materials as the BGS data includes these with land-won sand and gravel.

Resource		Total	Devon	Cornwall, Dorset & Somerset	Rest of South West Region	Outside South West Region
Sand and Gravel	mt	0.532	0.474	0.056	<0.01	<0.01
	%		89.2	10.5	0.2	0.1
Crushed Rock	mt	2.853	2.533	0.288	<0.01	0.032
	%		88.8	10.1	0	1.1
Secondary Aggregates	mt	0.435	0.333	0.018	0.016	0.067
	%		76.6	4.1	3.8	15.5
Marine Aggregates	mt	0.046	0.035	0.011	0	0
	%		75.7	24.3	0	0

**Table 11: Destinations for land-won and secondary aggregates from Devon, 2014** (mt = million tonnes)

- 5.1.6 For secondary aggregates, sales within Devon accounted for a significantly lower proportion, 77%, with sales to destinations outside the South West region being 15% of the total (in contrast to 2009 when the equivalent figure was 3%). Discussion with mineral operators suggests that sales of china clay by-products to more distant markets outside the South West are as a result of block manufacturers placing a premium on the decorative qualities of these sands and grits, rather than them being used for more general aggregate purposes.
- 5.1.7 No comprehensive information is available on the destination of recycled aggregates produced in Devon, but the limited responses received from operators of recycling facilities indicate that their products were sold to destinations within that part of Devon surrounding the site.
- 5.1.8 Discussions with other MPAs and the minerals industry provide some further detail on cross-boundary flows of aggregates within the constraints of commercial confidentiality:
- ◆ the main destinations for the relatively small quantities of sand and gravel and crushed rock aggregates exported from Devon are Somerset (mainly the south west of the county around Taunton) and, to a lesser extent, Cornwall;
  - ◆ the main destinations for secondary aggregates from Devon are Cornwall (most likely the eastern part of the county in the light of the availability of substantial secondary aggregate resources in the St Austell area), and a range of destinations outside the South West region as noted in 5.1.3;
  - ◆ much of the sand and gravel imported into Devon is likely to have originated in Dorset, which has an operational quarry located close to the eastern boundary of Devon (see Figure 11) in an area of the latter where there no operational quarries;
  - ◆ the substantial quantity of crushed rock aggregates imported into Devon is partly due to an absence of quarries producing the highest specification aggregates, with Cornish quarries close to the boundary with Devon being the main source (see Figure 11), supplemented by imports from elsewhere in England and South Wales; in addition, limestone from the Mendips is transported by rail to Exeter.



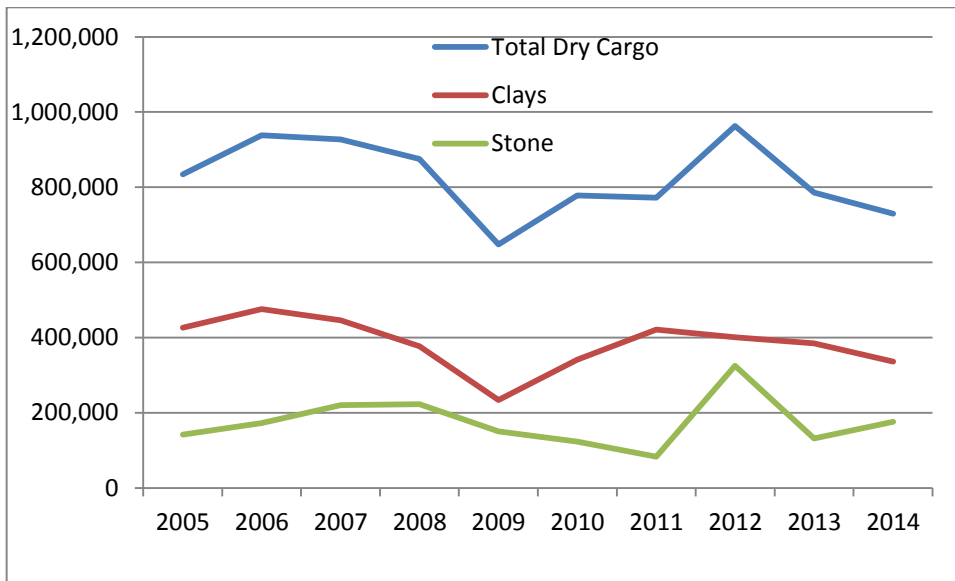
**Figure 11: Operational Aggregate Transportation Infrastructure in Devon and Location of Nearby Aggregate Quarries**

5.1.9 Adjoining counties provide marine aggregates through landings at Poole (Dorset) and Dunball, near Bridgwater (Somerset). The AM2009 collation report indicates that, while 94% of the 32,000 tonnes landed at Dunball was sold to destinations within Somerset, only 44% of the 78,000 tonnes landed at Poole stayed within Dorset, with 34% going elsewhere in the South West (although this is unlikely to include Devon) and 22% to destinations outside the region.

## 5.2 Transportation of Aggregates

5.2.1 Movement of aggregates between quarries and markets within Devon is wholly by road due to the short distances involved and the general lack of suitable rail infrastructure at quarries. However, there are examples of the use of rail and water for aggregate transport to and from the county (locations indicated in Figure 11). As indicated in Figure 12, wharves in Plymouth are used for the shipping of limestone from Moorcroft Quarry, secondary

aggregates from china clay operations together with ball clay and china clay minerals, cement and, on occasion, aggregates from Cornwall.



**Figure 12: Dry Cargo handled at Cattewater Wharves, Plymouth 2005-2014 (tonnes)**

- 5.2.2 Secondary aggregates in the form of blast furnace slag are imported through Teignmouth Docks, and imports of crushed rock from Scotland through Yelland Wharf commenced in 2013. Limestone from Whatley Quarry in Somerset is brought by rail to Exeter for local sale.

#### Rail Infrastructure

- 5.2.3 The viability of using rail for the transportation of aggregates tends to be limited to the movement of materials in bulk on an inter-regional basis, with examples being major crushed rock quarries in Somerset and Leicestershire supplying markets in the South East of England. In Devon, the relatively small output of its quarries, the distance to major markets and presence of intervening supply areas such as the Mendips, and constraints with the county's rail infrastructure together limit the feasibility of transporting aggregates by rail.
- 5.2.4 Only one aggregate quarry in Devon – Meldon Quarry in Dartmoor National Park – is rail-linked, and this has supplied rail ballast for use in the south of England. The operator secured a variation to its planning permission to allow minerals from its operations elsewhere in Devon and Cornwall (including secondary aggregates) to be brought to Meldon by road for onward movement by rail. However, the quarry and railhead were mothballed in 2011.
- 5.2.5 Devon currently has one rail depot used for the importation of aggregates from outside the county, with Hanson transporting limestone from their Whatley Quarry in Somerset to Exeter St Davids.
- 5.2.6 Of the non-aggregate mineral resources that yield secondary aggregates from their by-products, only the ball clay resource in the Bovey Basin has the potential for being rail-linked. The Heathfield branch line north west of Newton Abbot has been used in the past for transportation of ball clay, and is



currently used for the outward movement of timber; it could potentially be used for the transportation of ball clay sand. However, the small quantities of these secondary aggregates that are currently produced would limit the viability of movement by rail.

## 6. FUTURE AGGREGATES SUPPLY

6.0.1 The National Planning Policy Framework requires that a LAA be “based on a rolling average of 10 years sales data and other relevant local information, and an assessment of all supply options (including marine, secondary and recycled sources)”. It is anticipated by the NPPF that MPAs will make provision for the land-won and other aggregates sources identified in their LAA in their minerals plan.

### 6.1 The Future Context

6.1.1 Future demand for aggregates as a whole will be influenced by two main factors:

- ♦ the future level of construction activity, including new development and maintenance of existing infrastructure in Devon (and, to a more limited extent, in adjoining areas served by Devon’s aggregate producers); and
- ♦ the intensity of aggregate use in construction activity, including the extent to which aggregates are replaced by other materials such as timber, steel and glass.

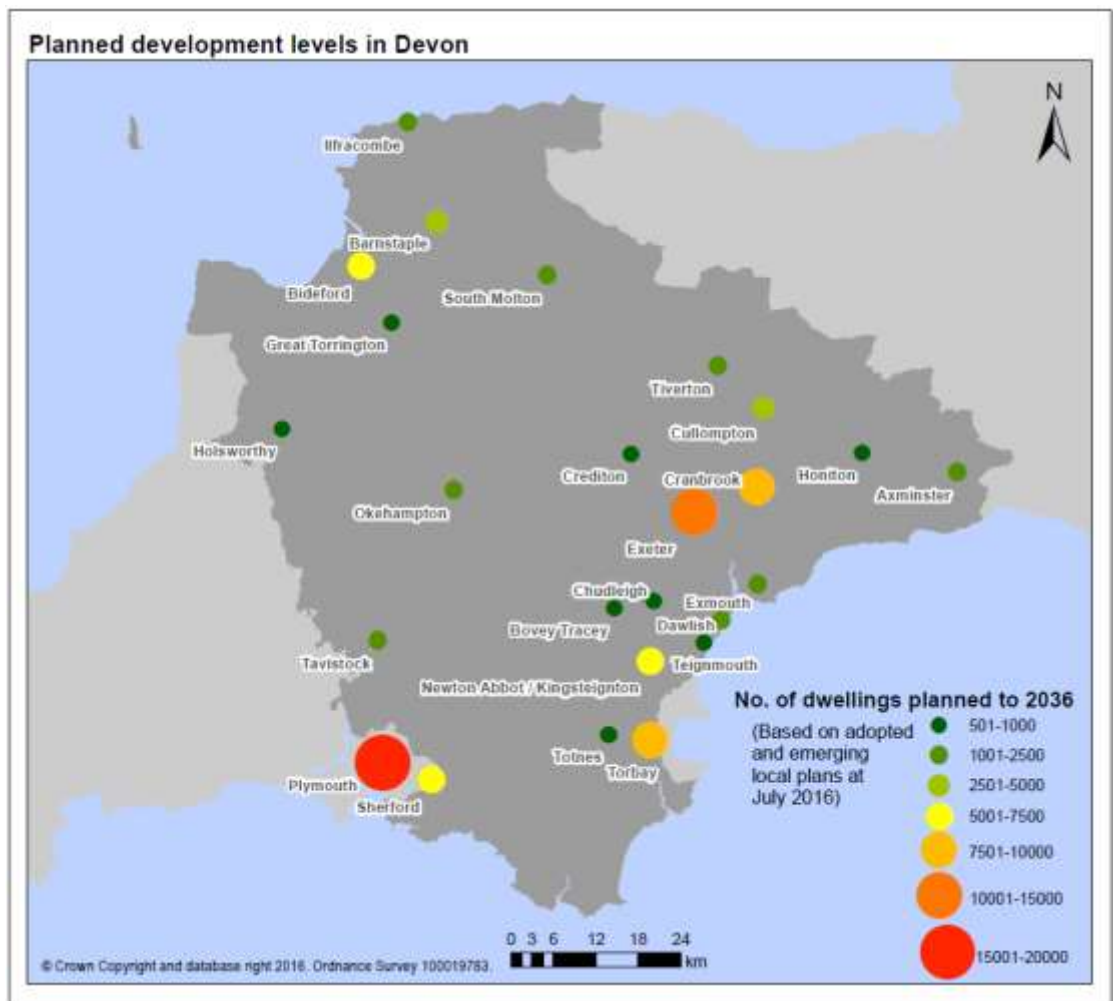


Figure 13: Planned housing development levels in Devon to 2036

- 6.1.2 Forecasts produced by Devon County Council indicate that the county's population is likely to grow from 1,153,149 in 2013 to 1,334,261 in 2031, an increase of 16%. Accommodating this forecast population increase, together with associated employment and other development and infrastructure, will be achieved through development planned for by Devon's district, unitary and national park authorities. The adopted and emerging Local Plans within Devon provide for an annual level of house construction of 6,040 over the next 10-15 years, which is almost double Devon's actual average of 3,060 dwellings constructed per year for the 10 years to 2014/15. Figure 13 illustrates the location and scale of the main areas of housing development identified in Devon's Local Plans for the period to 2036 (although Local Plans in most parts of Devon have shorter timescales than this).
- 6.1.3 A further influence on local demand for aggregates is the provision of infrastructure conceived and/or funded nationally. The December 2014 edition of the Government's National Infrastructure Plan [HM Treasury (2014)] identifies several projects within or close to Devon, including the A303/A30/A358 corridor; the Met Office supercomputer at Exeter; South Devon Link Road; resilience of the rail line at Dawlish and potential alternative routes; and Hinkley Point C power station. In addition, the National Infrastructure Plan identifies general initiatives in fields including communications, waste and energy that may have implications for Devon. The National Infrastructure Delivery Plan 2016-2021 [Infrastructure and Projects Authority (2016)] includes reference to the A303/A30/A358 Corridor, Hinkley Point C nuclear power station and funding for the Dawlish rail line and North Devon link road.
- 6.1.4 The National Infrastructure Plan will be monitored as an influence on demand for aggregates within Devon and adjoining areas; however, its value in considering future aggregate requirements in Devon is limited by its lack of detail on the scale and timing of development.
- 6.1.5 In addition to overall demand for aggregates, future supply requirements in Devon will be influenced by factors affecting the market share of the different streams available (i.e. land-won crushed rock and sand and gravel, and marine and alternative aggregates). These factors include:
- ◆ the influence of national fiscal measures such as the Aggregates Levy and Landfill Tax;
  - ◆ the procurement decisions of developers in specifying materials;
  - ◆ the development of quality protocols for aggregates and their influence on perceptions of alternative aggregates;
  - ◆ the costs of transporting alternative aggregates to markets more distant from their area of production; and
  - ◆ the extent to which it is technically feasible to substitute one aggregate stream for another.
- 6.1.6 The range of factors identified above indicates that it would be difficult to accurately model future demand for aggregates at the county level as a refinement of the basic ten year average, particularly as some of these factors are not easily quantifiable. However, the projected rate of house construction

in Devon and anticipated infrastructure works, if realised, would suggest strong growth in future demand for aggregates. The scope for the maintenance and, if warranted by future demand, enhancement of recent levels of production is assessed below.

## 6.2 Land-won, Marine and Alternative Aggregates Supply

6.2.1 Preceding chapters have presented data on past sales of land-won aggregates and alternative sources, and Table 11 collates the 10 year average sales for the different streams of aggregates supply in Devon between 2004 and 2013. The ability for these levels of supply to be maintained for the Devon MPA’s plan periods, or to meet increased demand if it were to occur, is considered below for individual aggregate streams. Table 12 also includes averages for sales over the last three years to enable identification of “the general trend of demand as part of the consideration of whether it might be appropriate to increase supply” as advocated by DCLG’s Planning Practice Guidance.

Aggregate stream	10 year average sales (million tonnes) (2006-2015)	3 year average sales (million tonnes) (2013-2015)
Land-won Crushed Rock	2.352	2.698
Land-won Sand & Gravel	0.560	0.520
Marine	0.047	0.038
Secondary	0.470	0.432
Recycled	N/A	0.419*

**Table 12: Annual Average Aggregate Sales** (\* estimated)

### Land-won Crushed Rock

6.2.2 As indicated in Table 4, all types of crushed rock resource (i.e. limestone, sandstone and igneous/metamorphic rock) have landbanks of 40 years or more, indicating that not only can recent levels of production be maintained, but significant increases in output could be accommodated if warranted by demand, provided that sufficient capacity is available at the existing quarries and that existing reserves remain capable of being exploited. Average sales over the past three years are higher than for the ten year period, indicating an upward trend in sales of crushed rock that will need to be monitored. However, there is limited supply of high-specification aggregates from quarries within Devon, resulting in a need to import these materials from elsewhere in the UK, and this is an issue to be addressed by Devon County Council in its Minerals Plan.

### Land-won Sand and Gravel

6.2.3 Table 3 identifies the quantity of permitted reserves of land-won sand and gravel at the end of 2015 as 7.010 million tonnes which, using the ten year average sales of 0.560 million tonnes in Table 10, provides a landbank of 12.5 years. While average sales over the past three years of 0.520 million tonnes suggest that there is not a significant upward trend in sales, this landbank does not extend to the 2033 horizon of Devon County Council’s Minerals Plan, indicating a potential need for this Plan to provide for further sand and gravel resources if the minimum landbank of seven years is to be maintained to and beyond 2033.

- 6.2.4 While sand and gravel requirements will be subject to monitoring through future iterations of the LAA, projecting the current ten year average of 0.560 million tonnes forward over the Minerals Plan period from 2016 to 2033 (18 years) gives a potential requirement of 10.080 million tonnes which, after accounting for the existing permitted reserves (7.010 million tonnes), leaves a potential shortfall of 3.070 million tonnes. Maintenance of a seven year landbank at 2033 would require a further 3.920 million tonnes.
- 6.2.5 While any future reduction in sales of sand and gravel will have the effect of lowering the rolling ten year average and therefore extending the length of the landbank, any future increase in demand for land-won sand and gravel would conversely have the effect of shortening the landbank further.
- 6.2.6 Three further issues concerning future supply of land-won sand and gravel identified in Chapter 2 that will require monitoring by Devon County Council are:
- ♦ the renewal or otherwise of the planning permissions identified in Table 6 that are due to expire in the early part of the Devon Minerals Plan period, together with the potential for permissions to lapse in the event of non-submission of schemes required under Schedule 14 of the Environment Act 1995;
  - ♦ maintaining the supply of the different sands and gravels required to deliver the necessary range of aggregate products, notably the higher-specification materials from crushed gravel; and
  - ♦ the relationship between the distribution of sand and gravel reserves and the approach to be pursued in Devon County Council's Minerals Plan to the spatial pattern of aggregates supply.

#### Marine Aggregates

- 6.2.7 Comparison of actual and licensed rates of dredging within the Bristol Channel indicates that there is scope for a significant increase in the volume of marine sand and gravel to be achieved. Provided that wharves in North Devon remain available for the landing of dredged materials, the maintenance of the recent level of supply or a significantly increased level of up to double the rate identified in Table 11, appears to be achievable.

#### Secondary Aggregates

- 6.2.8 The continued or increased supply of secondary aggregates through the processing of by-products arising from Devon's resources of china clay, ball clay and slate is dependent on the continued availability of the source materials. While the china clay operations at Lee Moor that supply the bulk of Devon's secondary aggregates have contracted in recent years, they remain a source of 'as dug' by-products that is being supplemented through the excavation of previously-tipped materials, and a new operator commenced processing in 2015. Working of ball clay in the Bovey Basin remains buoyant, while the small slate quarry at Mill Hill has extensive waste tips that can be re-worked to supplement by-products from building stone processing.

### Recycled Aggregates

- 6.2.9 As indicated in paragraph 3.4.3, the level of supply of recycled aggregates is influenced by the volume of arisings of CDEW and the proportion of this waste that is recycled for aggregate use. A potential constraint on increased production is the availability of adequate capacity at recycling facilities located in close proximity to sources of CDEW and markets for the recycled aggregates derived from that waste.
- 6.2.10 The limited information available suggests that Devon’s fixed CDEW recycling facilities have adequate capacity for current and potentially greater levels of recycled aggregates production. Figure 9 indicates that the distribution of these sites reflects the location of the major population centres in Devon that will be the sources of CDEW and markets for the aggregates produced.

### **Transportation Infrastructure**

- 6.2.11 Wharves in Plymouth have adequate spare capacity to cater for any increase that may occur in the use of the port for inward or outward movement of aggregates by sea, but the availability of these wharves, together with others in Devon that handle or could handle aggregates, should be safeguarded through relevant MPAs’ Minerals/Local Plans. Similarly, the railheads currently or recently used for the limited volumes of aggregates transported to and from Devon by rail should be safeguarded to maintain their potential.

### **Implications for Individual Mineral Planning Authorities**

- 6.2.12 Each of Devon’s MPAs is providing its own minerals planning policy. Since the distribution of mineral resources and supporting infrastructure across Devon is uneven, not all of the requirements for future provision arising from this LAA are relevant to each of the five MPAs. Table 13 therefore provides a summary of the issues identified above and identifies the MPA(s) to which each is relevant.

<b>Issue</b> (■ – issue is of relevance to MPA)	<b>Dartmoor</b>	<b>Devon CC</b>	<b>Exmoor</b>	<b>Plymouth</b>	<b>Torbay</b>
Safeguarding of crushed rock reserves and processing capacity	■	■		■	
Provision for further supply of high-specification crushed rock aggregates		■			
Safeguarding of sand & gravel reserves and provision for further resources		■			
Safeguarding of wharf capacity for marine aggregates		■			
Maintaining availability of resources and processing capacity for secondary aggregates		■			
Maintaining processing capacity for recycled aggregates	■	■		■	■
Safeguarding of infrastructure for movement of aggregates by rail or sea	■	■		■	

**Table 13: Implications of the Local Aggregate Assessment for Devon’s MPAs**

- 6.2.13 The LAA has identified that Exmoor National Park does not currently produce any form of aggregate, rather it is reliant on imports from the surrounding MPA areas. Given National Park purposes and the geology of the area, and the lack of scope for exceptional circumstances to apply, it is envisaged that no significant level of aggregate production will occur in Exmoor in the foreseeable future. Similarly, Torbay does not produce land-won aggregates and relies on materials from elsewhere, but it does accommodate an operation producing recycled aggregates.
- 6.2.14 Plymouth and Dartmoor National Park each have one operational crushed rock quarry, with a further quarry within Dartmoor (Meldon) having been mothballed. Each of these authorities therefore contributes to Devon's crushed rock production and landbank, with both of the operational quarries also producing recycled aggregates. These two authorities are required to make provision for the safeguarding of their reserves of crushed rock aggregates, together with ensuring the availability of infrastructure for the sustainable transportation of aggregates – the Cattewater wharves in the case of Plymouth, and the mothballed Meldon railhead within Dartmoor.
- 6.2.15 Devon County Council shares responsibility for crushed rock production, recycled aggregates and rail and sea transportation with the other MPAs. However, it has the only capacity in the county for production of land-won sand and gravel, high-specification aggregates and secondary aggregates, and provides the only wharfage in Devon used for the landing of marine aggregates.
- 6.2.16 While not included in Table 13, Somerset County Council shares some responsibility (as provided for in its Minerals Plan) for the safeguarding of sand and gravel resources and provision for their supply.

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## APPENDIX A: AGGREGATE FACILITIES IN DEVON

A.1 Table 14 provides details of the land-won aggregate quarries, processing facilities for secondary and recycled aggregates and facilities for transportation of aggregates within Devon that were operational during 2015, together with inactive aggregate quarries that retain permitted reserves<sup>9</sup>.

<b>Land-won Aggregate Quarries – Operational in 2015</b>				
<b>MPA</b>	<b>Key<sup>10</sup></b>	<b>Quarry</b>	<b>Operator</b>	<b>Mineral</b>
DCC	1	Bableigh Wood	D E & R Chance	Sandstone
DCC	2	Babcombe Copse	Harleyford Aggregates	Sand & Gravel
DCC	3	Beam	Torrington Stone	Sandstone
DCC	4	Blackhill <sup>11</sup>	Aggregate Industries	Sand & Gravel
DCC	5	Bray Valley	Hanson	Sandstone
DCC	6	Hearson	G Horrell	Sandstone
DCC	7	Knowle	Faheys Concrete	Sandstone
DNPA	8	Linhay Hill	E & J W Glendinning	Limestone
PCC	9	Moorcroft	Aggregate Industries	Limestone
DCC	10	Newbridge	Newbridge Stone	Sandstone
DCC	11	Rockbeare Hill	Aggregate Industries	Sand & Gravel
DCC	12	Stoneycombe	Aggregate Industries	Limestone
DCC	13	Town Farm	Hanson	Sand & Gravel
DCC	14	Venn Ottery	Aggregate Industries	Sand & Gravel
DCC	15	Vyse	Braunton Aggregates	Sandstone
DCC	16	Westleigh	Aggregate Industries	Limestone
DCC	17	Whitecleaves	Gilpin Demolition	Dolerite
DCC	18	Zig Zag	Harleyford Aggregates	Sand & Gravel
<b>Land-won Aggregate Quarries – Inactive in 2015</b>				
<b>MPA</b>	<b>Quarry</b>	<b>Operator</b>	<b>Mineral</b>	
DCC	Beer	Hanson	Chalk	
DCC	Haldon	RF Aggregates (SW)	Sand & Gravel	
DCC	Hillhead	Aggregate Industries	Sand & Gravel	
DNPA	Meldon	Aggregate Industries	Dolerite/Hornfels	
DCC	Plaistow	Hanson	Sandstone	
DCC	Trusham	Hanson	Dolerite	
DCC	Uplyme Quarry	E & J W Glendinning <sup>12</sup>	Sand & Gravel	
DCC	Venn	Aggregate Industries	Sandstone	
<b>Secondary Aggregate Processing Facilities</b>				
<b>MPA</b>	<b>Key<sup>13</sup></b>	<b>Site</b>	<b>Operator</b>	<b>Resource</b>
DCC	A	Headon	Tarmac	China clay waste
DCC	B	Lee Moor	Aggregate Industries Ocean Aggregates	China clay waste
DCC	C	Mill Hill Quarry	Mill Hill Quarries Ltd	Slate waste
DCC	D	Preston Manor	Sibelco	Ball clay sand

<sup>9</sup> Dormant quarries that would require the submission of a new scheme of working conditions prior to their reopening are omitted from the list, as are quarries with no remaining reserves that are considered to have closed permanently.

<sup>10</sup> The key relates to Figure 2.

<sup>11</sup> Blackhill Quarry processes materials imported from Venn Ottery Quarry

<sup>12</sup> E & JW Glendinning removed sand and gravel from a stockpile at the site; however, working of the quarry for chalk is undertaken by another operator.

<sup>13</sup> The keys for secondary and recycled aggregate sites relate to Figure 9

<b>Recycled Aggregate Processing Facilities</b>			
<b>MPA</b>	<b>Key</b>	<b>Site</b>	<b>Operator</b>
DCC	1	Bableigh Wood	D E & R Chance
DCC	2	Challonsleigh	Dorton Group
DCC	3	Coventry Farm	ABC Siddalls Skip Hire
DCC	4	Dittisham	D B Skips
DCC	5	Fosterville	Fosterville Ltd
DCC	6	Hayedown	The Sparling Group
DCC	7	Hill Barton	A E Stuart & Sons
DCC	8	Holmacott	John Coles Contractors
DCC	9	Jersey Farm	John Luffman Group
DCC	10	Johnsland	Okehampton & Crediton Skip Hire
DNPA	11	Linhay Hill Quarry	E & J W Glendinning Ltd
DCC	12	Little Stowford	Greenaways
PCC	13	Moorcroft Quarry	Aggregate Industries
DNPA	14	Pitts Cleave Quarry	R P & S Heywood Haulage Ltd
DCC	15	Stoneycombe Quarry	Aggregate Industries
DCC	16	Strashleigh Hams	Jeremy Bishop Haulage Ltd
DCC	17	Trood Lane	B T Jenkins Ltd
DCC	18	Westleigh Quarry	Aggregate Industries
TC	19	Yalberton Tor Quarry	R F Aggregates
DCC	20	Yelland	Notts Contractors Ltd
<b>Aggregate Transportation Facilities</b>			
<b>MPA</b>	<b>Site</b>	<b>Mineral Operator</b>	<b>Facility</b>
DCC	Appledore Wharf	Evans Transport	Wharf
DCC	Bidna Wharf	Hanson Marine	Wharf
DCC	Exeter St Davids	Hanson	Rail siding
PCC	Pomphlett Jetty, Plymouth	Aggregate Industries	Wharf
DCC	Teignmouth Dock	Hanson	Wharf
DCC	Yelland Wharf	Notts Contractors	Wharf

DCC Devon County Council  
 DNPA Dartmoor National Park Authority  
 PCC Plymouth City Council  
 TC Torbay Council

**Table 14: Aggregate Sites and Transportation Facilities in Devon**