



A study of the sand inventory of southeastern Tasmania

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Geological Survey Technical Report 46:

A Study of the sand inventory of southeastern Tasmania

by
T. Holmes

Cover: The sand pit face at the Watsons lease on Hope Beach, South Arm, Tasmania.

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Executive Summary

- As of 2025, Southeast (SE) Tasmania has effectively exhausted its available supply of natural coarse sharp sand suitable for concrete manufacture. This will likely result in price increases for sand use for concrete manufacture.
- Demand for sand has been generally increasing in Tasmania for as long as production records have been maintained. Sand demand in SE Tasmania has closely tracked trends observed across the state.
- The prior resource estimates in sand quarries and of natural sand deposits have not been Joint Ore Reserve Committee (JORC) compliant. Some of these resources estimates have proven unreliable.
- There are five level 2 quarries (regulated by the Tasmanian Environment Protection Authority [EPA]) in the Greater Hobart area. Two of these quarries are in the process of closing. Following these closures, the three remaining quarries (the Lazenby Sand, Flexmore Park and Llanherne Spit quarries) will not produce the coarse-grained sharp sand needed by the concrete manufacturing industry.
- Neither the Lazenby Sand nor Flexmore Park quarries produce a sand product that is suitable for structural concrete.
- The Watsons sand quarry, located in the South Arm dune system, is a Level 1 activity (regulated by council) producing fine-grained sand. This operation has sufficient resources to potentially increase its production output.
- There appears to be a stable long-term supply of fine-grained dune sand from Llanherne Spit. This quarry supplies fine-grained sand to concrete batchers, but it does not contain coarse-grained sand.
- Resource sterilisation from many sources (e.g., city growth, golf course development, heritage and cultural values) will limit local material availability for future economic development in SE Tasmania.
- Tasmania has abundant natural sand deposits. Some are unavailable for resource extraction due to a combination of protected areas and competing land uses. Concrete manufacture requires both fine and coarse-grained sand. However, most natural sand deposits in SE Tasmania are only fine-grained.
- Most potential future coarse-grained sand deposits in SE Tasmania are either marine or alluvial (Table 1). These deposits are likely to be overlain by cover, thus future exploration will likely require the digging of pits to sample potential resource at depth.

Table 1. An ideal future sand source would contain a large volume of homogeneous well graded coarse-grained sand. Future exploration needs to change from easy to spot coastal dunes at surface towards marine sands and alluvial deposits that may lie under cover.

	Quaternary coastal dunes aeolian sheets	Tertiary-Quaternary marine, estuarine or lacustrine deposits	Quaternary alluvial deposits	In-situ weathering of Triassic sandstone and Permian sedimentary units
Potential to find new undeveloped deposits	Low	High	High	High
Likelihood to contain coarse sand deposits	Low	High	High	Low
Likelihood to contain fine sand deposits	High	High	High	Low
Geological variability	Low	High	High	High
Resource uncertainty	Low	High	High	Medium
Typical deposit Volume	Large	Medium	Medium	Low
Rehabilitation burden to resource volume ratio	Low	Medium	Medium	High
Example locations	Llanherne Spit, South Arm Quarries	Goats Bluff sharp sand @ Males pit, South Arm	Clarkes Sand, Huonville	Copping tip, Sand River, Forcett, Bucklands
Comment	Limited coastal dunes are available for future sand mining	Target marine sands under cover. Difficult to find.	River corridors are typical high value land or have potential to be associated with cultural heritage restrictions.	Easy to locate, but typically fine-grained, low-volume and have high rehabilitation costs relative to their value.

- Hobart area concrete batchers are now relying more heavily on crusher dust and transporting coarse sand from Northeast Tasmania due to local shortages of coarse sand in SE Tasmania.
- The transportation of sand is currently costing approximately \$0.20-\$0.25 per tonne per km. The distance to transport sand to the Hobart CBD will increase from 35 km to over 300 km as coarse sand supplies transition from South Arm to Northeast Tasmania.
- The price of fine aggregate for concrete mixes will likely increase in the future due to the costs associated with increased transportation distances.
- The shortage of construction-grade sand is not confined to SE Tasmania; it has become a global concern.



Tasmanian Government

Mineral Resources Tasmania

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Department of State Growth

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Geological Survey Branch - Mineral Resources Tasmania

CONTENTS

1.0 INTRODUCTION	8
1.1 Scope	8
1.2 Confidentiality	8
1.3 Resource estimates	9
1.4 Structure of the report.....	9
1.5 Acknowledgments.....	9
2.0 BACKGROUND.....	9
2.1 Tasmanian Context.....	10
2.1.1 Reporting.....	10
2.2 International context	10
3.0 SAND PROPERTIES AND APPLICATIONS	12
3.1 Properties of sand for concrete	12
3.1.1 Particle Shape and Supply agreements.....	14
3.1.2 Particle Size distribution	14
3.1.3 Other Properties.....	14
4.0 OVERVIEW OF SAND MINING OPERATIONS IN SOUTHEAST TASMANIA	14
4.1 Males Sand 784P/M	14
4.2 Calverts 800P/M.....	16
4.3 Watsons 864P/M	16
4.4 Lazenby Sand 813P/M and 1635P/M.....	18
4.5 Flexmore Park 1297P/M.....	18
4.6 Llanherne Spit 8M/2007	21
4.7 Sand supply discussion.....	21
4.8 Protecting future strategic resources.....	23
5.0 REGIONAL SAND INVESTIGATION.....	23
5.1 Scope	23
5.2 Methods.....	23
6.0 SAND DEPOSITS IN SE TASMANIA.....	24
6.1 Types of sand deposits.....	24
6.2 Quaternary coastal dunes or windblown sheets.....	27
6.3 Tertiary-Quaternary marine, estuarine and lacustrine deposits.....	27
6.4 Alluvial deposits.....	28
6.5 Permian/Triassic sandstone sources.....	28

CONTENTS

7.0 CONMAT DATA AND TIGER DATABASE	28
8.0 DISCUSSION	30
8.1 Biases.....	30
8.2 Consistency of supply.....	30
8.3 Alternatives to natural sand	30
8.3.1 <i>Crusher dust</i>	30
8.3.2 <i>Manufactured sand</i>	31
8.3.3 <i>Recycled materials</i>	31
9.0 FACTORS INHIBITING THE DEVELOPMENT OF LOCAL SAND RESOURCES.....	32
10.0 COMMERCIAL EXPLORATION	32
11.0 CONCLUSIONS	32
12.0 REFERENCES	32

FIGURES

Figure 1. Reported Sand production in Tasmania since 1963.....	11
Figure 2. 2/3 of worldwide sand mining is unregulated	11
Figure 3. Particle size grading envelopes recommended by the CCAA.....	13
Figure 4. A Shell fragment in the footpath outside of Northgate Shopping Centre.....	13
Figure 5. Locations of operating sand Quarries in the Greater Hobart area.	15
Figure 6. The Goats Bluff coarse washed sand	17
Figure 7. Goats Bluff washed coarse sand.....	17
Figure 8. Males dune sand	17
Figure 9. The location of sand mining leases	18
Figure 10. Spatial extent of 800P/M	19
Figure 11. Particle size distributions from Calverts lease 800P/M.....	19
Figure 12. Particle size distributions from Watsons Sand (864P/M)	20
Figure 13. Particle size distribution from Lazenby Sand sand	20
Figure 14. High silica washed sand produced at Lazenby Sand.....	21
Figure 15. Cross section of Flexmore Park workings	21
Figure 16. Particle size distributions on sand products from Flexmore Park.....	22
Figure 17. Clay causes clumping in Raw fat sand from stockpile at Flexmore Park.....	22
Figure 18. Unsieved unwashed sharp sand from stockpile at Flexmore park.....	22
Figure 19. Particle size distributions from Lhanherne Spit	22
Figure 20. Handheld auger used for sampling sands at depths up to 1 m.....	23
Figure 21. Particle size distributions from sand sampled in this program	24
Figure 22. Sample locations from SE Tasmanian sand survey.	25
Figure 23. Particle size distributions distributions for Quaternary coastal dune sands	25
Figure 24. Particle size distributions for marine, freshwater, alluvial and glacial sediments ..	26
Figure 25. Particle size distributions for inland dry sand dunes	26
Figure 26. Particle size distributions for sawdust from a dimension stone quarry.....	29
Figure 27. Sawdust from dimension stone quarrying of Triassic sandstone	29
Figure 28. Triassic sandstones.....	29
Figure 29. Inland dunes are often unmapped	30
Figure 30. MRT WebViewer displaying “Mineral occurrences” and “Observations” layers ...	31
Figure 31. Locations of sand producers in Northern Tasmania.....	31

TABLES

Table 1. Sand Resource Characteristics	3
Table 2. Reported production figures 2018-2020	11
Table 3. Summary of top 10 destinations for Australian sand exports in 2023	12
Table 4. An example of typical mix ratios.....	12
Table 5. Geological survey reports describing sand quarries in the Greater Hobart area.....	13
Table 6. Results of clay and fine silt determination by wet selling method.....	22
Table 7. Fine aggregate.....	23

1.0 INTRODUCTION

As of 2025, SE Tasmania has effectively exhausted its available supply of natural coarse-grained sharp sand suitable for concrete manufacture. The region is now adapting to the loss of this important resource. This report documents the findings of a project investigating sand resources in SE Tasmania initiated due to industry concerns about the dwindling regional supply of sand available for concrete production in the Greater Hobart area.

The goals of the project were to:

1. Assess the state of regional sand supply;
2. Provide regional geological mapping data useful to explorers attempting to identify new sand resources;
3. Communicate information relating to the state of the sand supply shortage to industry and government; and
4. Identify the broader implications of the findings - noting that MRT's remit is strictly as a regulator of mineral resources and geological research, whereas the broader implications of this work has both supply and demand side implications.

Specific aspects of this project included:

- A regional field campaign to sample and characterise naturally occurring sand deposits in SE Tasmania.
- Laboratory analysis of newly collected sand samples and existing samples held in storage at the MRT Core Library. Analyses included Particle Size Distribution and Clay and Fine silt content, with results published publicly to assist with future exploration.
- A review of the status of operating sand mines in the SE Tasmania region and reporting on sand supply projections.
- Interviewing cement batchers and investigating the geological compositional constraints on sand resources for use in concrete manufacture.
- Communicating with industry and government bodies and providing information about the current situation of sand supply in SE Tasmania.
- Digitising CONMAT data and making it publicly available by integrating it with MRT's TIGER database and The List (Land Information System Tasmania) online.

This report summarises the results of the regional sand sampling program and provides an overview of the operational state of sand supply in SE Tasmania, including the geological and economic context of future regional supply challenges.

1.1 Scope

This technical report is produced and published by Mineral Resources Tasmania (MRT). MRT operates the State geological survey and is also the regulator of the State's mining industry. This includes performing critical functions such as:

- Collection, integration, interpretation, publication, and presentation of geoscientific information and mining statistics.
- Publication of geoscientific information to promote Tasmania's mineral resource potential.
- Administration of the *Mineral Resources Development Act 1995* (MRDA) and the issuance of legal titles for mining and exploration tenements.
- Collection of fees, rentals, and royalties.
- Regulation of mineral and petroleum exploration and mining in Tasmania, and promotion of vacant areas available for exploration.

In addition to providing precompetitive geoscientific information, MRT also offers services to the mineral exploration and mining industries, such as the state geological Core Library and laboratory services.

The intent of this report is to provide background technical geological information that can be used by commercial explorers to support private mineral exploration enterprises, and by policymakers to aid in decision-making.

1.2 Confidentiality

This study involved visiting currently operating commercial sand mines, concrete batchers, private landholders with commercial interests, and sampling resources on site. Moreover, interviews with private owners, operators and regulators were undertaken alongside investigations of production records. Commercially confidential information such as pricing has not been included and reported production volumes have been aggregated. Specific information about identifiable commercial operations have either been released with permission of the owner, or are obtainable through publicly available sources such as aerial/satellite images or permit conditions published on The List (Land Information System Tasmania) <https://www.thelist.tas.gov.au/app/content/home>.

1.3 Resource estimates

The terms "Resource Estimate" and "Reserve Estimate" are defined by the JORC code which is the Australasian professional standard for public reporting of mineral resources and ore reserves (JORC, 2005). The JORC code was first published in 1989 and has been incorporated into the listing rules of the Australian Securities Exchange (ASX) and the NSX in New Zealand, making compliance mandatory for listing public companies in Australia and New Zealand. Public reporting in accordance with the code requires the formal signoff of a Competent Person, an accredited mining professional with specific qualifications, experience and professional membership requirements.

The quarrying industry in Tasmania does not generally report resource estimations to JORC standards, as most quarries are operated by either private companies or as part of large multinational companies that do not publish resource and reserve estimates for individual quarries to the ASX/NSX. Moreover, previously published resource estimates from MRT bulletins are not JORC-compliant unless specifically stated. This is largely due to insufficient sample density and/or the application of non-standard methodologies.

The impact of non-JORC-compliant sand resource reporting in Tasmania can be seen in the rapid and significant reductions in the anticipated mine life of several mines across the state. These sudden reductions resulted from the discovery of unexpected contaminants such as excess shell matter, clays, gravels and acid sulphate soils. For example: in 2000 Clarkes Sand in Huonville had a published resource of 1.27 Mt of sand (Mills, 2000) which would have been a 48-year mine life based on peak production rates in 1999 of 26,000 tonnes per annum. However, in 2001 the mine ceased production permanently after encountering problematic clay, silt and gravel fractions (Grun, 2006).

Systematic drilling or sampling is required for a robust resource estimate (including thickness [depth], volumes and sand fraction sizes) of naturally occurring undeveloped sand deposits. Furthermore, external factors that may limit or prevent sand resource extraction must be considered. These factors include council zoning, coastal buffer zones, urban area buffer zones, conservation areas, community opposition to mining and/or the refusal of private landholders.

This report will not estimate JORC-defined terms such as "Reserve" or "Resource", as quantifying these terms may be more misleading than useful. Instead, this report will comment with more

subjective estimations on expected mine life for currently operating quarries and generalised spatial extents for natural deposits. This reflects the imprecise nature of estimating resources without robust systematic sampling and professional modelling methodologies.

1.4 Structure of the report

The body of this report is divided into four sections. The first section provides a background highlighting the macroeconomic factors driving sand demand and geological requirements for specific sand products by use type.

The second section is a review of the sand mining operations in the Greater Hobart area. This section includes discussion on the state of sand supply.

The third section presents the results of the regional sand sampling and laboratory analysis performed as part of this project. This includes the geological characterisation of naturally occurring SE Tasmanian sand deposits, Particle Size Distribution (PSD) data and clay and fine silt determination results. A description of the Construction Materials (CONMAT) dataset is also presented.

The fourth section synthesises the findings and investigates implications of the local sand supply shortage for the construction industry in SE Tasmania. Alternatives to natural sand are also discussed.

The Appendix contains the laboratory reports and raw data for PSD and clay / silt content, analysed by the MRT laboratory in Mornington and the Heidelberg Materials (formerly Hansons) lab in Moonah. This data is also available through the MRT Webviewer and on the Land Information System Tasmania (The LIST).

1.5 Acknowledgments

The Author would like to thank the staff at MRT for their support, wisdom and encouragement, in particular Alastair Morton, Andrew McNeill and Rebecca Sproule. I would like to thank Mark Giddings from MRT and David Gardner at Heidelberg Materials for all their efforts in the laboratory, and I would also like to thank all the quarry owners and operators, cement batchers and private landholders who allowed me access to their sites and took time out of their busy schedules to be interviewed for this project.

2.0 BACKGROUND

Sand is not a rare commodity, however it is not distributed evenly and the cost of transporting sand over long distances can exceed mining costs. The physical properties of sand influence the range of potential applications in which it can be used. Sand with properties suitable for specific purposes, such as producing concrete, are

becoming increasingly depleted in locations close to areas of high demand. There are several sand mines currently operating in the Greater Hobart Area. However, the known distribution of coarse sharp sand suitable for concrete production in the Hobart area has been effectively exhausted. It should be noted that sand shortage is a globally significant problem and the situation in SE Tasmania is not uncommon.

2.1 Tasmanian Context

Tasmania contains large amounts of sand that has been deposited by natural processes. However, most of these sand resources are not available for extraction due to competing environmental, cultural and economic development factors.

Demand for sand resources in Tasmania has been steadily increasing over time (Figure 1). As economic development puts more pressure on existing sand mines, it has become increasingly important (yet difficult) to find and develop new sources of extractable sand to match demand.

SE Tasmania is currently facing a shortage of coarse sand with suitable physical properties for making concrete. This is largely due to the pending or realised exhaustion of the local supply at existing mines, coupled with a lack of new mines. Concrete batchers in SE Tasmania are now relying on a combination of crusher dust and transportation of natural sand from distant sources in the north and northeast of the state. The former results in increased production costs and the latter results in higher transportation costs.

2.1.1 Reporting

Figure 1 shows the reported sand production in Tasmania since 1963. The production data for the period between 1963 and 1993 were sourced from Department of Mines quarterly reports (Matthews and Donaldson, 1994). Post 1993 production data were obtained through production records stored on the TIGER Database.

TIGER records commenced in 1990. Between 1990-1993, aggregated production data are available in both quarterly reports and the TIGER database, however values often significantly differ. For the post 1993 data obtained from the TIGER Database, "Southern Tasmanian" operations include sand quarries that are located south of Campbell Town and east of the World Heritage areas of the Southwest National Park. Prior to 1993, the geographic classification of "Southern Tasmanian" is undetermined.

Sand production is self-reported to MRT by quarry operators. Furthermore, it does not include production from quarries that are exempt from the MRDA and its precursor legislation.

Types of quarries exempt from reporting include forestry quarries, or quarries for which material does not leave a given property (i.e. quarries supporting agriculture, or council quarries created for covering adjacent tip sites). This exemption, coupled with the administrative challenges for small private quarry operators to maintain accurate production records, means that the reported production values in Figure 1 are an underrepresentation. However, it illustrates the general trend for demand for sand in the construction sector is increasing over time.

In Tasmania, sand reporting has been classified under three primary categories for royalty purposes. These are: general sand, building sand and concrete sand (Table 2). New categories for specialty products have been recently introduced, such as heavy mineral sand (2011), and lime sand (2006). The terms "general sand", "building sand" and "concrete sand" are not defined for reporting purposes and all three categories attract the same royalty rate. Most quarries are simply reporting production under the "general sand" category making the "building" and "concrete" categories superfluous, and any conclusions drawn from those data meaningless.

2.2 International context

Sand plays a strategic role in delivering ecosystem services, maintaining biodiversity and supporting economic development. Sand is the second-most exploited natural resource in the world by mass and volume after water (UNEP, 2022), exceeding both fossil fuels and biomass (Torres, 2017). Sand is a fundamental building material for the infrastructure that supports human civilisation. It is a key ingredient in concrete, asphalt, masonry and glass. It is used extensively in foundations, for landscaping and flood control, in agriculture and in industrial processes.

Demand for sand mining has tripled in the past two decades. Worldwide usage of sand is estimated at 40-50 billion metric tons a year (Figure 2), an average of 18 kg per person per day (Peduzzi, 2014), (Beiser, 2018). In some places natural sources of sand are being depleted faster than they can be replenished by natural processes (UNEP, 2022). It is recognised globally that increased urbanisation and development pressures are further restricting potential future sand exploration and developments. This is resulting in an increasing scarcity of sand suitable for construction purposes. In 2019, the 4th United Nations Environment Assembly (UNEA-4) adopted UNEA resolution 4/19 on Mineral Resource Governance, which specifically included sand as a topic of concern.

Sand Production in Tasmania since 1963

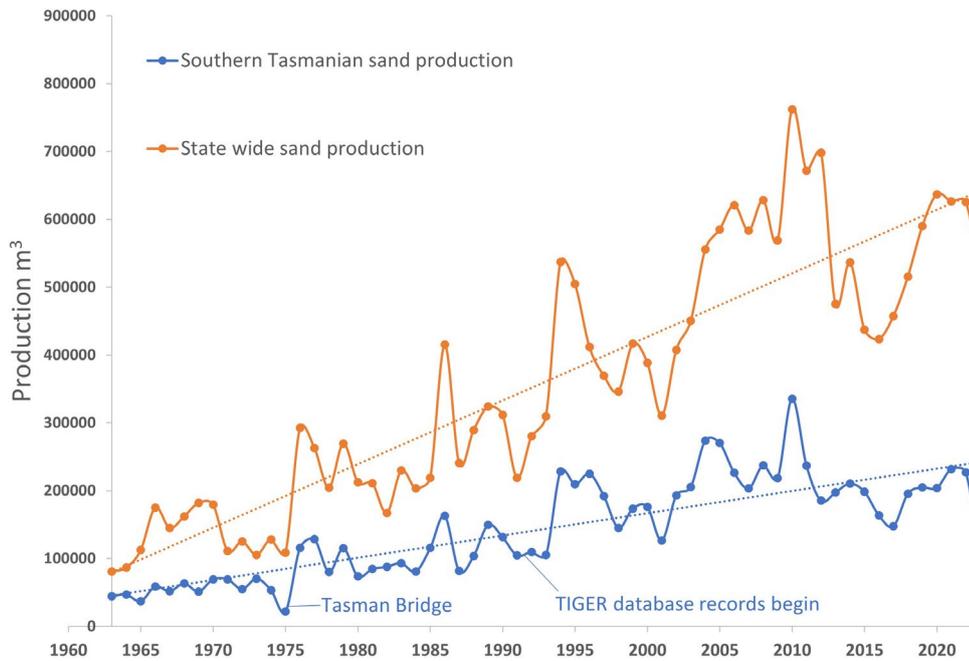


Figure 1 (Above). Reported sand production in Tasmania since 1963.

Sand			
Type	Year (FY)	Production (t)	Sales (t)
Building sand	2021-22	7,832	9,716
Concrete sand	2021-22	57,799	50,833
General sand	2021-22	455,911	442,485
	total:	521,542	503,034
Building sand	2020-21	10,641	10,641
Concrete sand	2020-21	41,069	42,133
General sand	2020-21	512,706	493,363
	total:	564,416	546,137
Building sand	2019-20	0	86,299
Concrete sand	2019-20	41,736	46,844
General sand	2019-20	436,885	478,065
	total:	478,621	611,208
Building sand	2018-19	0	11,610
Concrete sand	2018-19	27,846	25,454
General sand	2018-19	435,650	434,075
	total:	463,496	471,139
Building sand	2017-18	2,699	11,619
Concrete sand	2017-18	23,859	21,043
General sand	2017-18	473,326	482,319
	total:	499,884	514,981
2021/22 Financial Year Production Agglomerated			
General sand (Tonnes)	NE		339,787
	NW		62,928
	S		53,178
	Total		455,893
Concrete sand (Tonnes)	NE		3,674
	NW		55,504
	S		0
	Total		59,178
Building sand (Tonnes)	S		7,382
	Total		7,382

Table 2 (Left and lower left). Reported production figures. The values show that between 2018-2020 no building sand was reportedly produced statewide and no concrete sand was produced in FY21/22 in the south of the state. This is potentially due to production figures being arbitrarily reported as general sand. The terms "building sand" and "concrete sand" are not defined and attract the same royalty rates as general sand.

Figure 2 (Below). An estimated 2/3 of worldwide sand mining is unregulated (Mahadeval, 2019).

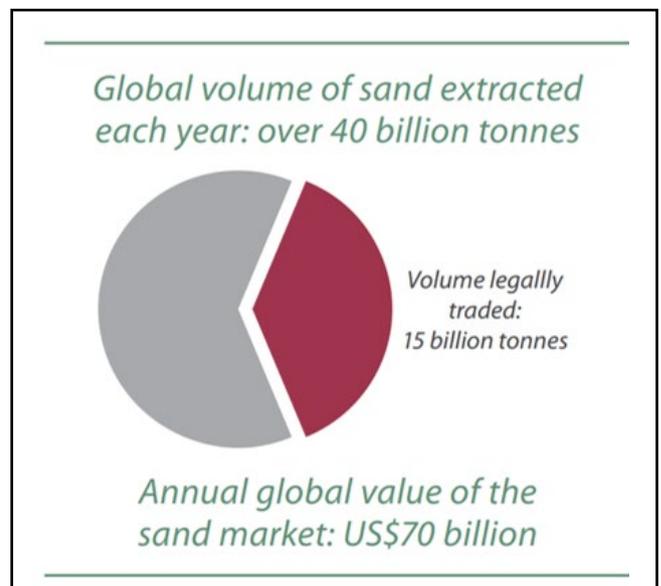


Table 3. Summary of top 10 destinations for Australian sand exports in 2023 (DFAT, 2025).

Country	Value of sand export 2023
China	\$14,599,276
Japan	\$14,052,146
Indonesia	\$7,384,898
New Zealand	\$6,647,406
Italy	\$2,555,957
Papua New Guinea	\$716,895
Solomon Islands	\$240,811
Thailand	\$229,472
Singapore	\$202,599
Cocos Keeling Islands	\$140,553
Worldwide total	\$47,463,792

Australia is a large exporter of construction sand. In 2023 Australia exported \$47.5 million worth of construction sand and gravel aggregate (DFAT, 2025). The bulk of these exports originated from Western Australia and Queensland and were primarily exported to Asian markets (Table 3).

Densely populated countries have a large demand for concrete grade sand but insufficient local land or sand resources available for quarrying. This creates a strong economic incentive to import from sand-rich and less densely populated countries such as Australia. The 829 m tall Burj Khalifa in Dubai was built using high-tensile concrete that was manufactured from imported Australian sand (McGinley, 2022), (Forbes, 2019). Although aeolian sand from deserts is highly abundant, it is typically very-fine-grained and rounded. Such sand is not suitable for structural concrete. Similarly, it is not suitable for land reclamation projects (e.g., the creation of artificial islands) as the fine particles of sand are more easily suspended in water and thus more subject to erosion.

3.0 SAND PROPERTIES AND APPLICATIONS

The physical properties of sand determine its potential economic applications, including:

- “Sharp sand” has angular grain morphologies and is often washed to remove impurities and fine particles. It is used in concrete (see section 3.1), landscaping, playgrounds and is often blended for other uses such as asphalt and industrial applications.
- “Potting sand” has a high organic content and is often mixed with coarse sand to allow for better drainage.
- “Lime sand” is used in agriculture to neutralise soil acidity, improve soil structure and add essential nutrients.

Table 4. An example of typical mix ratios of cement, sand and coarse aggregate in concrete, mortar and render. (Cement Australia, 2025).

Application	Cement	Sand	Aggregate	20 kg bags/m ³
Concrete - improve water tightness high strength	1	1.5	3	17
Concrete - Paths and driveways	1	2	3	16
Concrete - Foundations, footings	1	3	3	13
Mortar (general purpose)	1	4	-	15
Mortar (enhanced workability)	1	6 + 1 Hydrated lime	-	8
Render	1	3	-	20

- “Fat sand” has a higher clay and fine silt component. Often sold as “brickies sand” or “mortar sand”, it can be more easily moulded and hold its shape. It is valued for its colour and texture in masonry. It can form a more pliable consistency when worked and is less prone to cracking.
- “Bedding sand” creates a flat finished surface and is used in underlying foundations, pavers, pipelines and utilities and for landscaping applications.
- “Horse arena sand” and “sports field sand” contain coarser grain sizes allowing for better drainage and durability.
- “Silica sand” is high purity quartz sand ($\text{SiO}_2 > 95\%$) that is used in glass manufacture. Exceptionally high purity ($\text{SiO}_2 > 99\%$) is in high demand for the manufacture of television screens and screens in other portable electronic devices.

When seeking new sand resources, it is critical to focus on sand that possesses the specific properties required for its intended application.

3.1 Properties of sand for concrete

Concrete is made by mixing a combination of cement, sand (fine aggregate), coarse aggregate and water. The relative ratios of these components determine the compressive strength of the concrete. Specific recipes for aggregate mixes in concrete batching are engineered to suit the purpose of the concrete and account for the properties of locally available aggregate materials. Although the exact mix ratios for high-tensile concrete are often commercially sensitive, typical concrete mixes contain 25-45 % sand in the dry mass of concrete and 75-80 % sand in the dry mass of mortar and render products (Table 4).

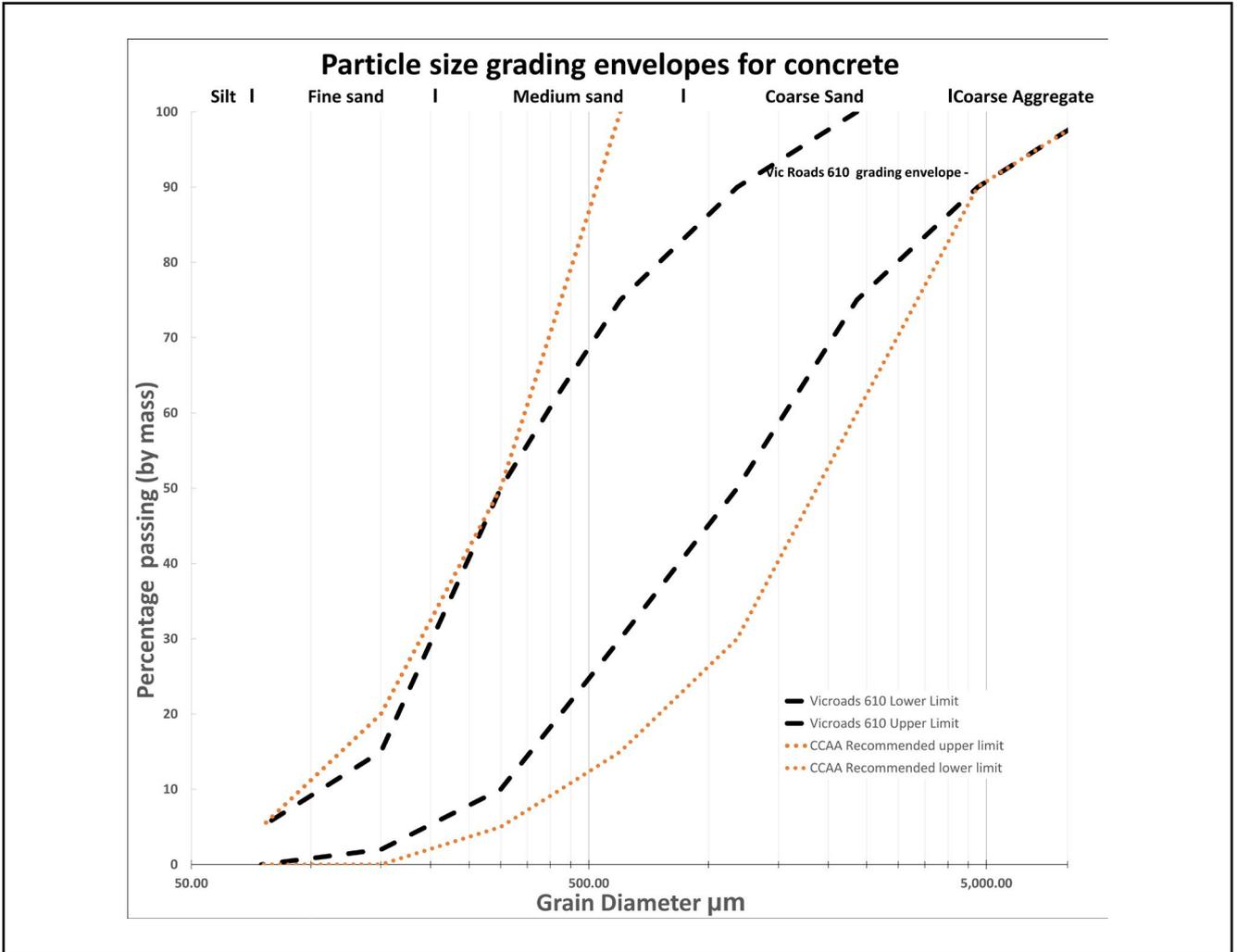


Figure 3 (Above). Particle size grading envelopes recommended by the CCAA are a bit broader than the Vic Roads 610 standard.

Table 5 (Below). Geological Survey reports describing the sand quarries currently operating in the Greater Hobart area.

Author (year)	Area described	Comment
Threader (1974)	Sandford-South Arm Peninsula	Auger drilling survey / regional resource estimates
Sloane Weldon (1990)	Greater Hobart area	Supply / Production analysis
Matthews Donaldson (1994)	Greater Hobart area	Reserve estimates
Duncan (1999)	Greater Hobart area	Pit sampling program / Resource estimates
Mills (2000)	Greater Hobart area	Reserve estimate mine operation review
Grun (2006)	Greater Hobart area	Updated sand mine operations review
Bacon, Calver, Pemberton (2013)	Statewide	Industrial mineral summaries
Kain (2018)	Penna / Flexmore Park	Reserve Estimate for 1297P/M in Penna

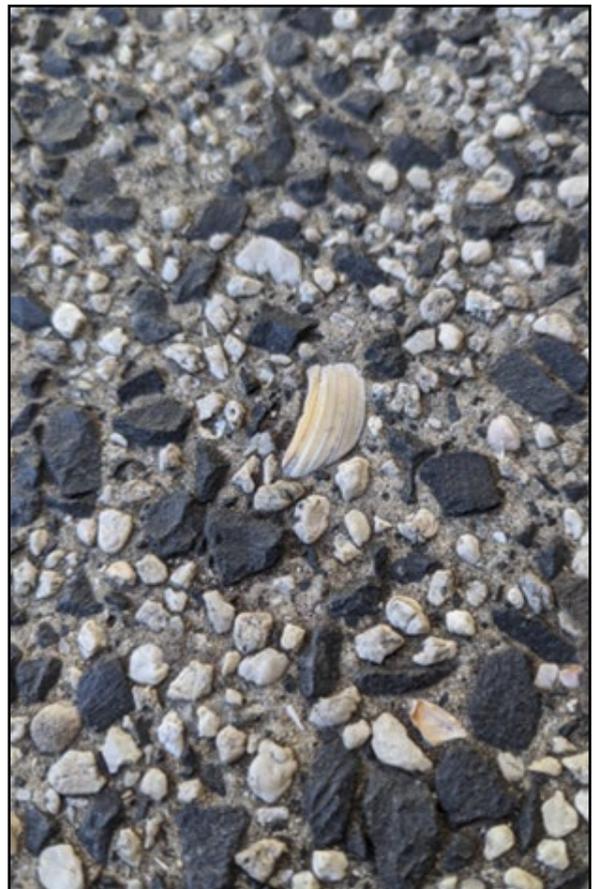


Figure 4 (Right). A shell fragment in the footpath outside of Northgate Shopping Centre is ornamental but organic impurities like this would not meet standard for structural concrete.

Concrete sand needs to be durable and resistant to chemical and mechanical breakdown across varying weather and stress conditions. Such sand should include a range of particle sizes with angular grain shapes that lock together well. AS2758.1: 2014 outlines the engineering standards for aggregates used in concrete in Australia, and AS1141: 2020 details the methods for sampling and testing aggregates.

3.1.1 Particle Shape and Supply agreements

In general, angular particles will stack and lock together more tightly than rounded particles. AS2758.1: 2014 provides detailed standards for the angularity of coarse aggregate. However, AS2758.1: 2014 does not provide specific angularity standards for fine aggregates. The current standard defers to “Supply agreements” where cement batchers engineer custom concrete blends that incorporate the properties of the locally available materials. These blends incorporate local sand and aggregate materials into a cement-aggregate-water mix that will produce a concrete end-product with compressive strength properties that conform to concrete codes such as AS3600: 2018, AS1379: 1997 and Vic Roads 610: 2017.

3.1.2 Particle Size distribution

Older versions of AS2758.1 and AS1141 for concrete aggregates were highly prescriptive regarding particle-sizing envelopes. In contrast, the current AS2758.1:2014 standard defers to Supply agreements. The CCAA publishes particle size grading envelope recommendations. The Vic Roads 610 standard also contains a particle grading envelope standard. Both particle size grading envelopes are represented in Figure 3.

Neither clay nor silt particles are desirable in concrete. Firstly, this is due to the tendency of clay to hydrate and swell, resulting in premature concrete break down. Secondly, silt particles have a very high surface-area-to-volume ratio which dramatically increases the cement content required for particle coating. AS2758.1: 2014 mandates that material passing a 75 µm sieve (0.075 mm) shall not exceed 2 % for coarse aggregate, 5 % for fine aggregate or 20 % for a manufactured fine aggregate. Supply agreements will define tighter limits for specific concrete products. Natural sand deposits which contain clay impurities normally require a wash plant to remove silt and clay fines.

3.1.3 Other Properties

Most natural sand has undergone extensive weathering and will normally conform to both durability and density requirements. Other factors may render sand unsuitable for cement, including:

1. The presence of acid sulphate soils,
2. Increased reactivity due to a non-neutral pH,
3. High-salinity, often associated with sand in contact with saline marine aquifers,
4. The presence of excessive light or heavy minerals such as ilmenite, rutile or monazite, and
5. Elevated organic components including microscopic foraminifera or larger roots and shell fragments.

4.0 OVERVIEW OF SAND MINING OPERATIONS IN SOUTHEAST TASMANIA

Operating sand mines in SE Tasmania (Figure 5) have been described by various publicly-available geological survey reports which are summarised in Table 5. Mills (2000) provides the most comprehensive description of sand mining operations near Hobart. Grun (2006) provides the most recent report. Notable changes in the Hobart area since 2006 include the permanent closure of the Clarkes sand pit in Huonville (operated by HBMI) and the opening of the Llanherne Spit (Seven Mile Beach) mine (operated by RNB Trading).

This update describes the types of sand products from each location. It does not attempt to quantify reserve estimates. However, it will provide generalised comments on potential mine life and also the ability of each mine to supply the construction industry post-2025.

4.1 Males Sand 784P/M

Mining lease 784P/M is located east of the South Arm neck, between the Calverts sand lease (800P/M) on the west end of South Arm neck, and the Watsons Cape Contrariety lease (864P/M). These three sand mining leases, along with the Calverts Lagoon Conservation Area and the South Arm Nature Recreation Area at the isthmus of South Arm neck, comprise the entire south-facing coastal dune system of South Arm. The ocean-facing side consists of Hope Beach and Calverts Beach separated by Goat Bluff (Figure 10).

The Males Sand Mine (784P/M) is operated by Males Sand and produces two products. The first is a dry screened “dune” sand. The second is a washed, coarse sharp sand, locally termed the “Goats Bluff Sharp Sand”, which is dredged from freshwater ponds and wet screened. The spatial extent of the coarser marine sand unit is undetermined as it is overlain by a finer aeolian dune sand.



Figure 5. Locations of operating sand quarries in the Greater Hobart area. (Current mining leases as at October 2025)

The Males Sand aeolian dune sand (Figure 8) is typical of SE Tasmanian coastal dunes (Figure 23) which are fine- to medium-grained, and prone to shell fragment contamination. It is a suitable concrete mix ingredient provided that the organic contamination is low. However, these aeolian dune sands do not contain a coarse sand fraction.

The Goats Bluff coarse sharp sand (Figure 7) is the only natural sand product currently mined in SE Tasmania that meets the full industry standard particle size grading envelopes (Figure 6) for fine aggregates, since the closing of Clarkes sand in Huonville in 2001. The Goats Bluff coarse sharp sand may have been an alluvial sand deposit on the former eastern shoreline of the Derwent River. This deposit was eventually incorporated into the marine environment and buried by a coastal dune system.

Males Sand (784P/M) is near the spatial limits of its permitted extraction areas under its current Environmental Protection Notice (EPN). The dry dune sand resource at Males Sand (784P/M) has been effectively exhausted. Furthermore, the potential to expand the wet dredging operation to extract more washed coarse sharp sand is unclear. At the time of writing this report, a new application had not been lodged with the EPA to expand the existing mineable area of either resource. The current wash plant lies above the likely area of expansion of the wet sand dredging operation. It is unclear if there are sufficient remaining resources to justify the investment in moving the wash plant.

Males Sand has already stopped supplying coarse sand to most cement batchers. The construction industry in SE Tasmania is in the process of adapting to the loss of this key local resource.

4.2 Calverts 800P/M

Mining lease 800P/M, located on the western side of South Arm neck (Figure 9), is operated by Hope Sand with a current permitted production capacity of 20,000 m³ per annum. This lease has supplied concrete batchers for many decades and was a major supplier to Boral. 800P/M produces a dry screened dune sand product with similar properties to most aeolian coastal dunes in SE Tasmania (Figure 23). Although the product is suitable as an ingredient in concrete, it is fine- to medium-grained and does not contain a coarse sand fraction. Furthermore, it is prone to the shell fragment contamination common in most coastal dunes.

The current EPN for 800P/M allows mining to a depth of 1 m RL above the water table. At the time of writing this report, resources above this level are close to exhaustion (Figure 10). The likelihood of mining below this level is low due to:

1. Potential environmental impacts on the water table, and
2. The lack of an abundant fresh water supply to wash sand contaminated by a saline aquifer.

4.3 Watsons 864P/M

The Watsons lease covers the Greater Cape Contrariety area (Figure 9). However, most of the lease area is over dolerite and does not contain free sand. The only area in which sand is available for extraction is confined to the western edge of the lease, inland from Calverts Beach. Currently, the lease is operated by Duggans and has been intermittently operated since 1971 as a Level 1 quarry regulated by Clarence Council.

Level 1 activities regulated by councils under the *Local Government Act* (1993) are restricted to small quarries that produce <5000 m³, or roughly ~8000 tonnes, per annum. To increase production beyond this limit, a quarry needs to apply to the EPA to become a level 2 activity regulated under the *Environmental Management and Pollution Control Act* (1994) (EMPCA).

This quarry has sufficient resources to increase production of fine-grained dune sand. This would require an application to the EPA to become a level 2 activity.

The lease has been subject to long-term community opposition, largely due to haul truck interactions with the community on the public access road and encroachment onto Calverts beach.

It is possible that the Goats Bluff coarse sharp sand extends beyond the Males Sand lease (784P/M), buried beneath other sediments. An exploration program of seven auger holes, totalling 91 m, was performed by Duncan (1999). This investigation failed to encounter any coarse-grained sharp sand, however none of the auger holes penetrated the water table. As the coarse sharp sand at Males is situated entirely below the water table, if a coarse sand unit exists at the Watsons lease it would also be below the water table and require a dredging operation in wet ponds to recover.

Further exploration drilling below the water table would need to be undertaken to map the extent of the coarse sharp sand unit. This could have potential to provide a medium-term coarse sand supply to the Hobart area construction industry.

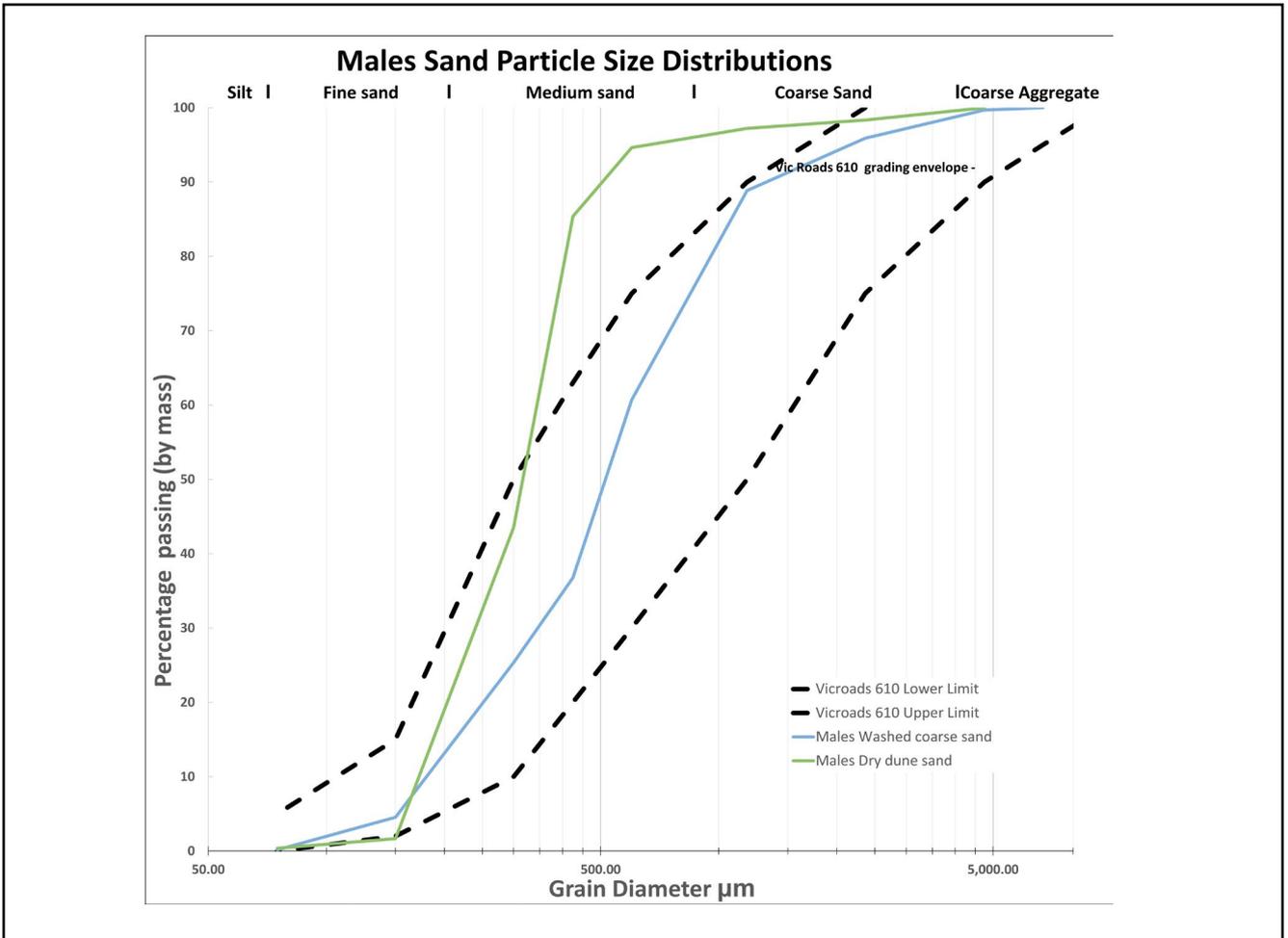


Figure 6. The Goats Bluff coarse washed sand is the only product currently produced in SE Tasmania that conforms to industry grading envelopes.



Figure 7. The Goats Bluff washed coarse sand is the only sand product mined in SE Tasmania that meets specifications for fine aggregate grade envelope for concrete production.



Figure 8. Males dune sand. Note the fine grain size and presence of shell fragments which is a common contaminant in coastal dune sand.

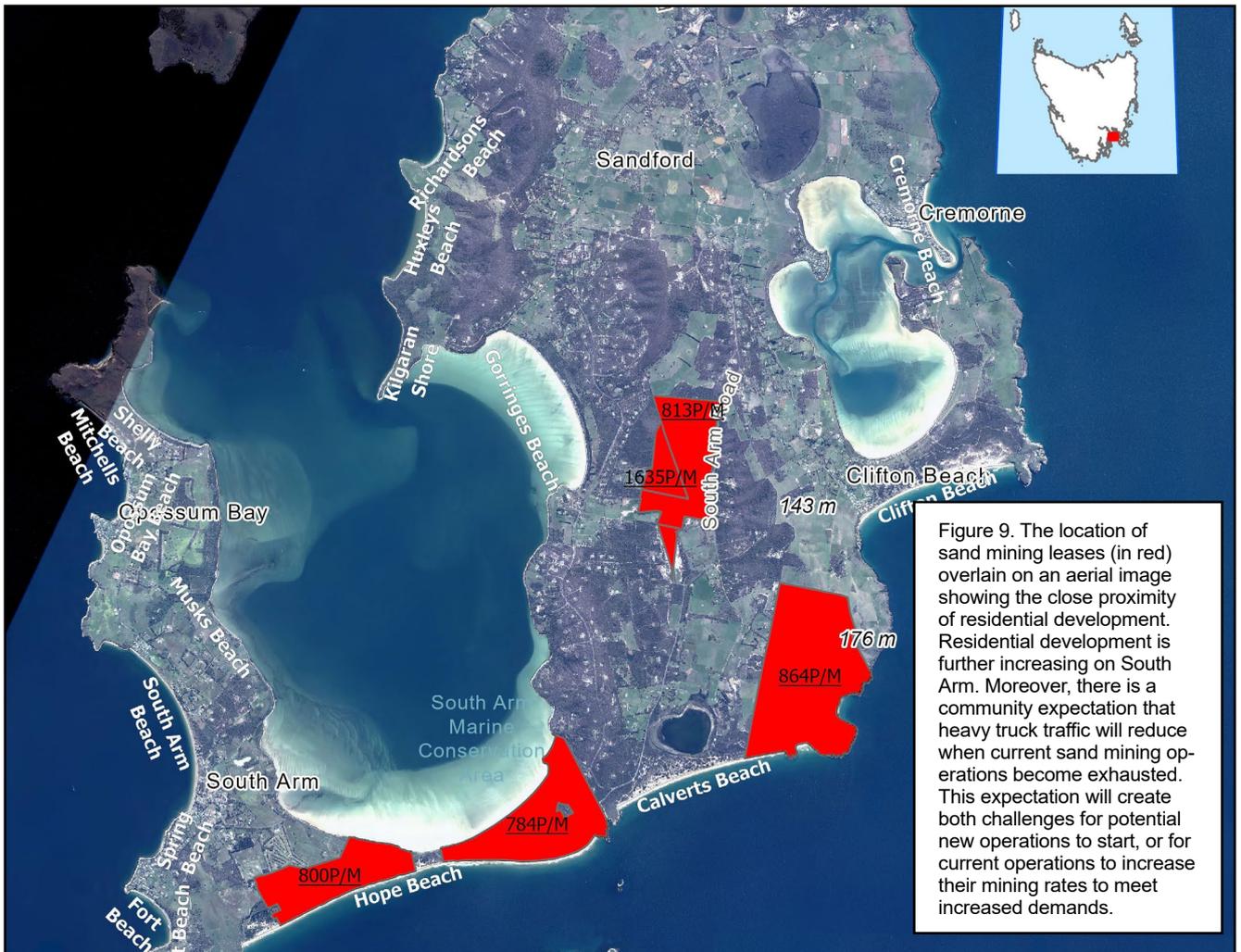


Figure 9. The location of sand mining leases (in red) overlain on an aerial image showing the close proximity of residential development. Residential development is further increasing on South Arm. Moreover, there is a community expectation that heavy truck traffic will reduce when current sand mining operations become exhausted. This expectation will create both challenges for potential new operations to start, or for current operations to increase their mining rates to meet increased demands.

4.4 Lazenby Sand 813P/M and 1635P/M

Lazenby Sand is located in Sandford, inland from Gorringes Beach and west of Clifton Beach (Figure 9). It is currently permitted to extract 20,000 m³ of material per annum and has recently applied to increase production to 45,000 m³ per annum. This inland lease contains a fine-grained, quartz-rich aeolian sand dune under a layer of organic-rich soil and overlying a network of intermittent, narrow basalt dykes and sills.

The primary product at Lazenby Sand is potting soil, which is extracted from the organic-rich topsoil layer. Lazenby Sand also produces a white, washed sharp sand (Figure 14) from the Tertiary aeolian dune, as well as a crushed basalt product. However, the washed white sharp sand from Lazenby (Figures 14 and 15) is too fine-grained to be used in concrete manufacture. It also contains a very high quartz content and was used for glass manufacture in Moonah, Tasmania during the 1960s. The high-silica washed sharp sand product from Lazenbys is now useful for bedding sand, joint filling sand, sports field preparation and industrial applications such as tile grout and laying glass bricks (Lazenby Sand, 2025). Production of crushed basalt aggregate is a relatively recent product at Lazenby Sand.

Lazenby Sand currently has an active application to increase extraction and processing capacity. Notably, this application includes a proposal to receive used concrete which is to be recycled into a crushed concrete product (EPA, 2023). However, aggregates created from recycled concrete are not typically used to manufacture new concrete and cannot be used for high-tensile-strength structural concrete. This material is more likely to supply general purpose gravel and road base needs.

4.5 Flexmore Park 1297P/M

Mining lease 1297 P/M “Flexmore Park” is operated by Allsands. It is located west of Penna Beach at the mouth of the Coal River in the Derwent Estuary (Figure 5). The mine is currently permitted to produce 20,000 m³ per annum. The resource is composed of a sharp sand layer overlying a clay-rich fat sand (Figure 15) with a hardpan clay base. The deposit is stratified with coarser layers on top of finer layers, suggesting an initially low energy depositional environment, that transitioned to a higher energy environment over time. The deposit has been variably classified. Mills (2000) described 1297P/M as an alluvial deposit. Duncan (1999) classified the resource as a marine/estuarine or lacustrine deposit, and Forsyth (2024) recorded it as Qhwd (Aeolian dune and sheet sand) on the 1:25,000 series geological map produced by MRT.



Figure 10. Spatial extent of 800P/M (in transparent red) overlain over an aerial image. This state aerial image taken during the 2022-23 season shows the mined-out extent (in a heavy red line) indicating that the resource is nearly exhausted.

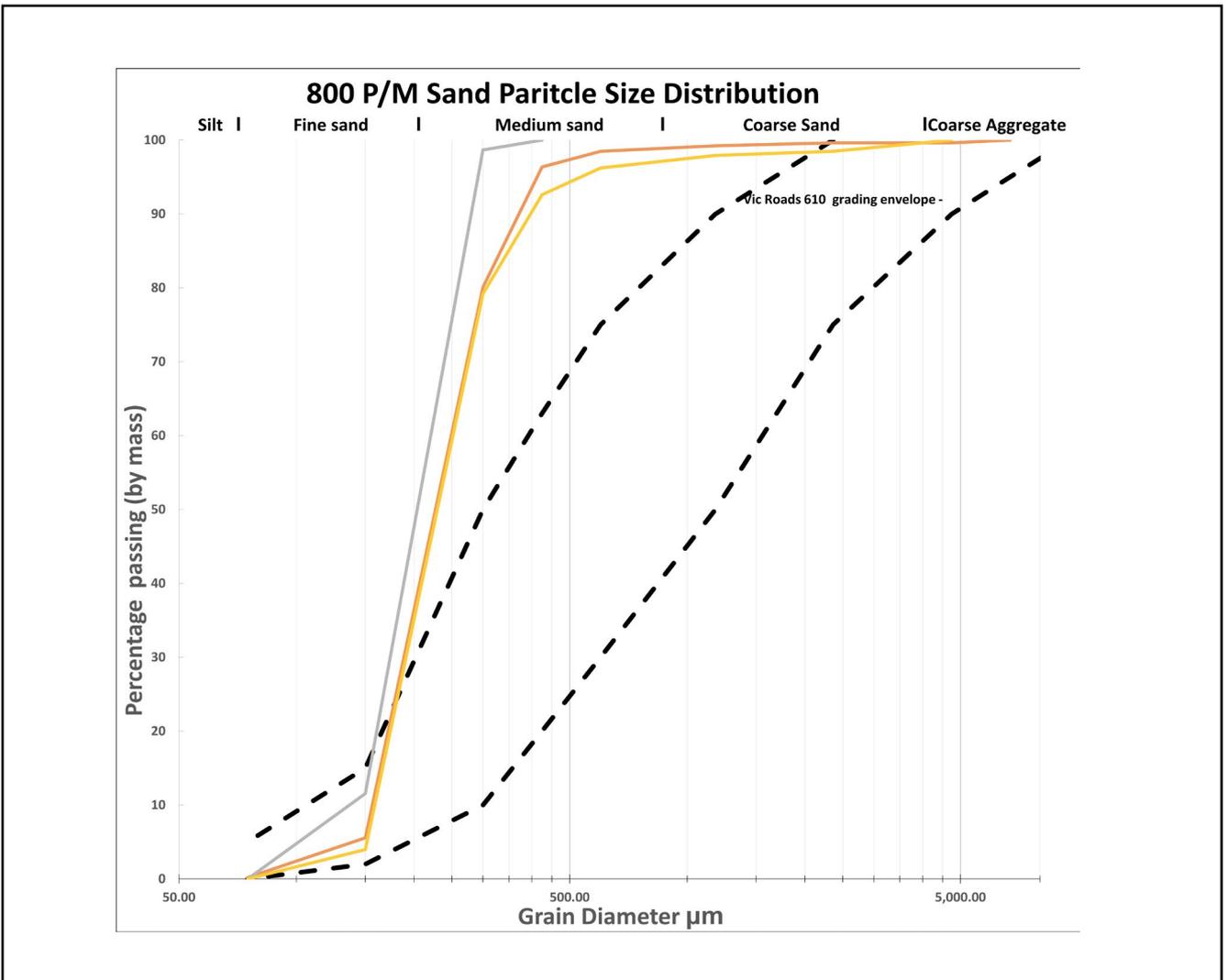


Figure 11. Particle size distributions from Calverts lease 800P/M with the Vic Road 610 grading envelope showing a fine- to medium-grained sand distribution.

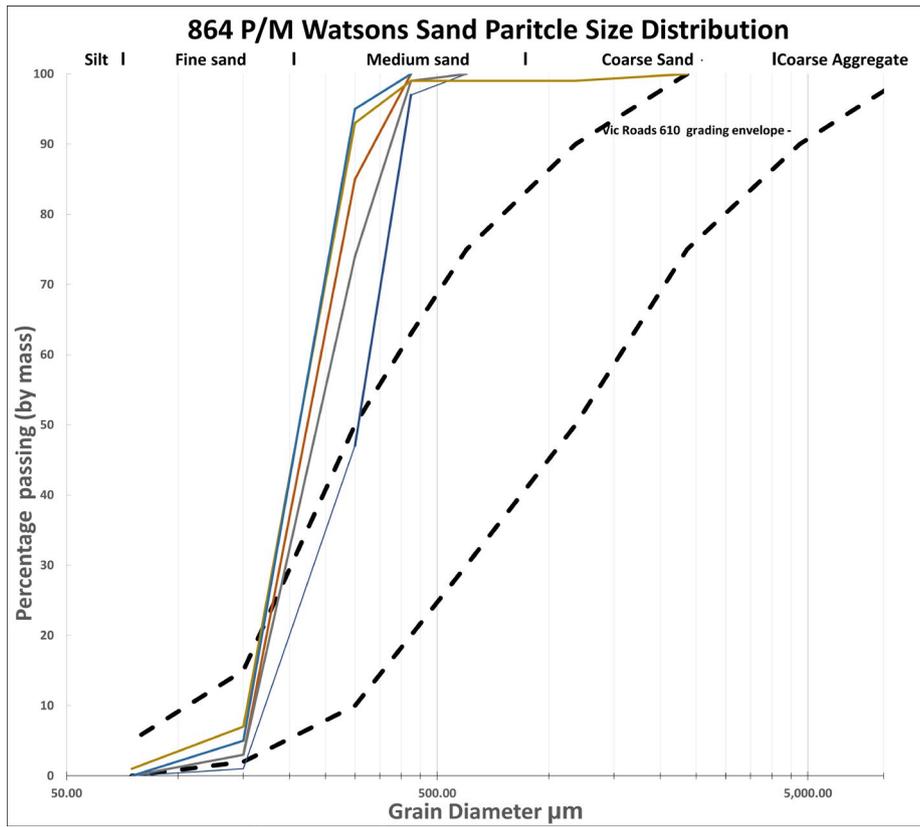


Figure 12. Particle size distributions from Watsons Sand (864P/M) with the Vic Road 610 grading envelope showing the same fine- to medium-grained particle size distribution as most coastal dune systems in SE Tasmania.

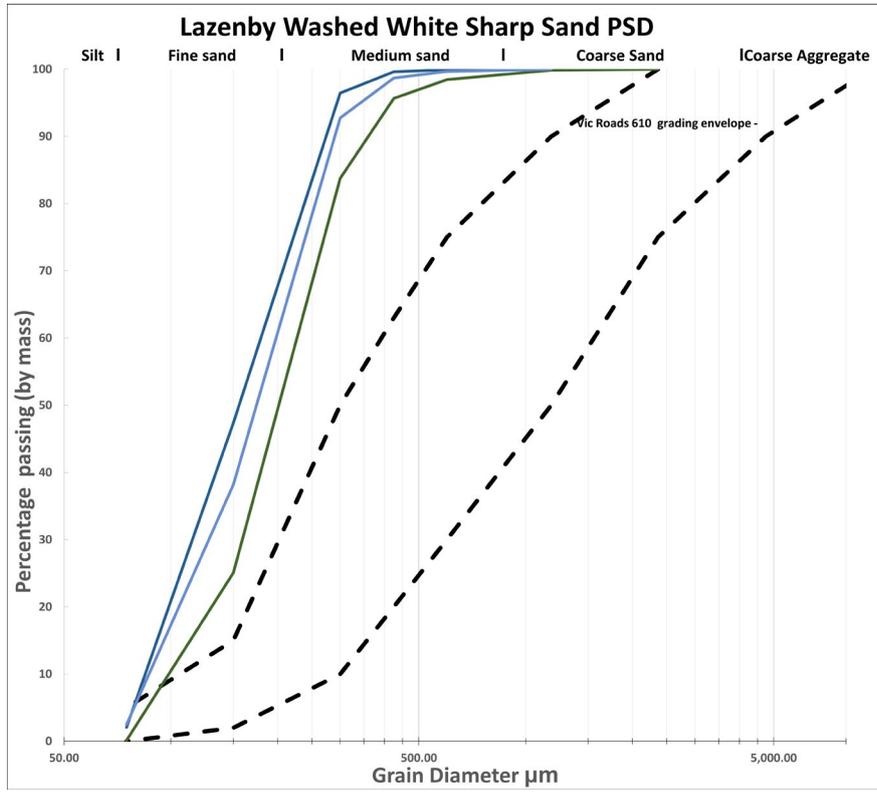


Figure 13. Particle size distribution from Lazenby Sand washed white sharp sand with the Vic Roads 610 grading envelope indicating that the product is too fine-grained for concrete manufacture.

Although 1279/P/M may have a very large in-ground sand resource, the owners of 1297P/M are currently focusing on agricultural activities. Their main purpose for extractive sand mining is to remove topographical highs to aid the installation of pivot irrigators and other agricultural activities on the site.

The primary products at Flexmore Park include a dry sieved sharp sand product (Figure 18) and a fat sand (clay-rich) product (Figure 17), that is blended into a brickies sand, or mortar sand. Both products are used for bedding sand and for landscaping applications. Although the sharp sand product has been supplied to a cement batcher on a trial basis, a “washing” operation to remove clay contamination is not present at Flexmore Park.

Based on particle size distribution results obtained using the dry sieve method AS1141.1 (Figure 19), there appears to be limited difference between the sharp sand product and the clay rich fat sand product. However, fat sands do not reliably pass a dry sieve due to clumping. When tested for clay by the wet tube settling method AS1141.33: 2015 (Table 6), the fat sand has approximately twice the clay content of the sharp sand. Furthermore, the analysed sample of sharp sand is out of specification for concrete manufacture due to excessive clay.

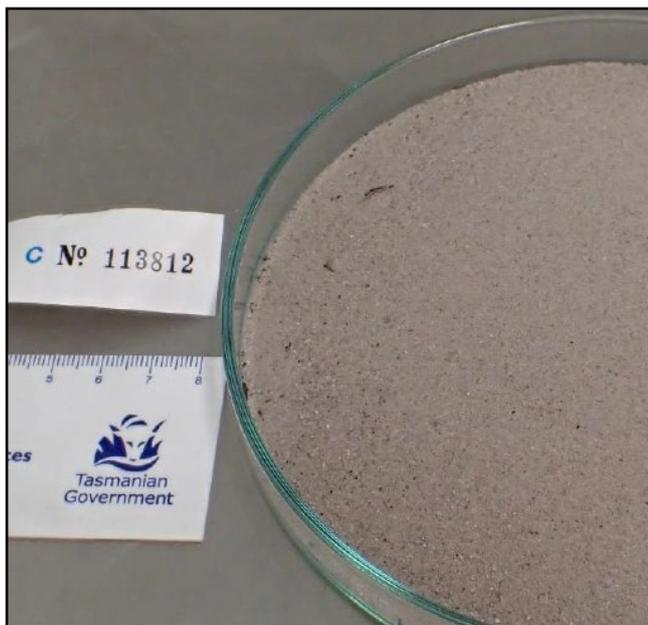


Figure 14. High-silica washed white sharp sand produced at Lazenby Sand is well suited for glass manufacture, but is more commonly used as bedding sand, in sports fields and for industrial applications. The larger, clumpy impurities seen in this image are bracken fern root fragments.

4.6 Llanherne Spit 8M/2007

Located on the Llanherne Spit, behind Seven Mile Beach (Figure 5) and operated by RNB Trading, 8M/2007 is a large and relatively homogeneous coastal dune/littoral spit system (Figure 19). The mine is currently permitted to produce 95,000 m³ per annum. This production capacity is greater than all the five other operating sand mines in the Hobart area combined, and this lease has potentially the largest reserve in the Greater Hobart area. Although no JORC-compliant resource statement is available, the operators of 8M/2007 are working the mine on a 100-year mine plan. Actual mine life will depend on future extraction rates.

4.7 Sand supply discussion

There are currently five Level 2 quarries operating in the Greater Hobart area. Two of these operations are in the process of closure due to resource exhaustion. This includes the loss of the only local source of coarse sand suitable for concrete production. The three remaining Level 2 quarries and the Level 1 operation have multiple decades of reserves based on current production levels. However, only the Llanherne Spit quarry can currently supply large quantities of natural fine sand to cement batchers. All other quarries can supply the bedding sand market. Noting resource uncertainties as outlined in Section 1.3, there appears to be sufficient supply of fat sand, brickies sand and potting soil for the next few decades.

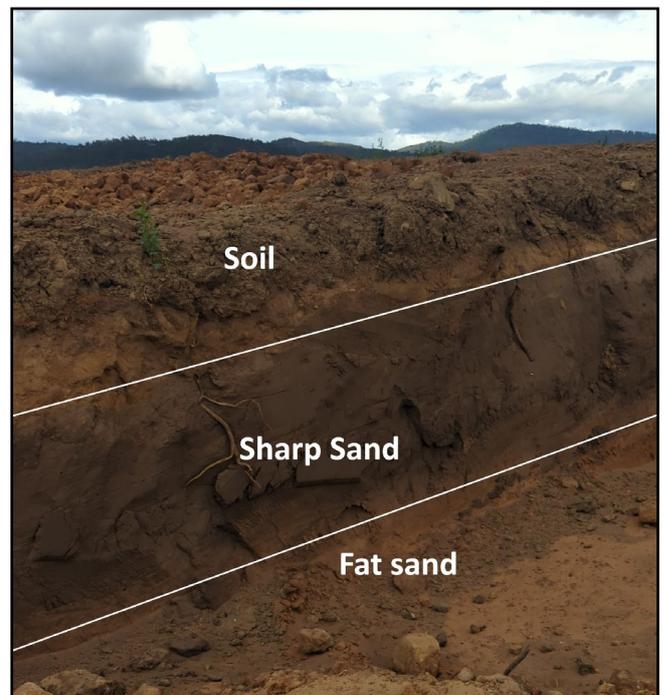


Figure 15. Cross section of Flexmore Park workings exposing the upper sharp sand layer on top of the fat sand layer yet to be excavated.

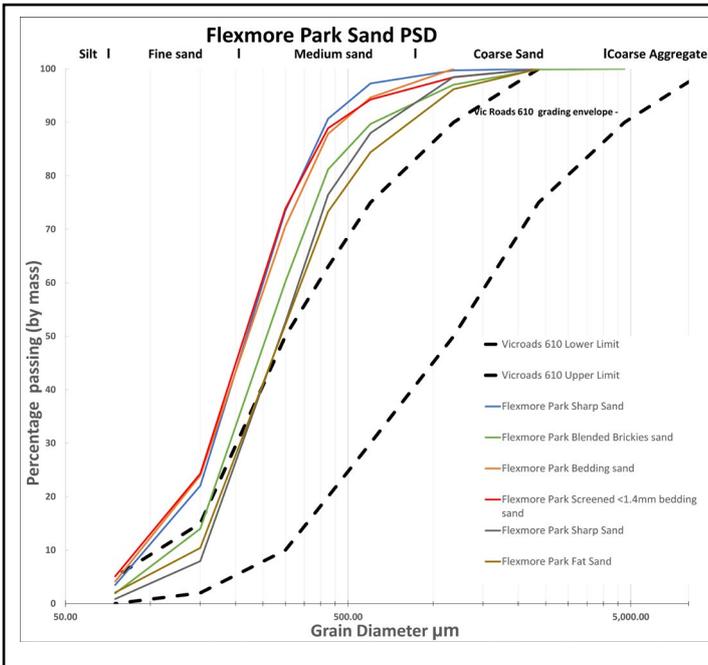


Figure 16. Particle size distributions on sand products from Flexmore Park.



Figure 17. Clay causes clumping in raw fat sand from stockpile at Flexmore Park.



Figure 18. Unsieved unwashed sharp sand from a stockpile at Flexmore Park. Note the fine-grained appearance and minor clumping due to clay impurities.

Table 6. Results of clay and fine silt determination by wet settling method AS1141.33, shows nearly twice the clay content in the fat sand product as the sharp sand product

Registration #	Sample description	Ratio by Volume of Clay Fine silt to sand (%) by AS1141.33
C113807	Flexmore Park: sharp sand stockpile	15 %
C113808	Flexmore Park: fat sand Stockpile	27 % * Estimated / Separation of sediments unclear

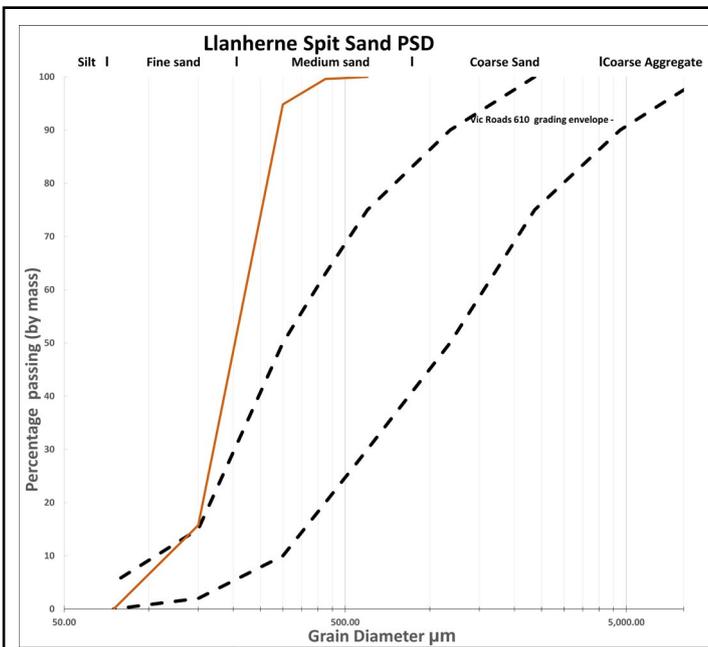


Figure 19. Particle size distributions from Llanherne Spit with the Vic Road 610 grading envelope showing that the sand is well-sorted with > 90 % being between 100 μm and 300 μm .

Lazenby Sand is in the process of applying for an increase to their permitted production limit but this operation does not produce sand suitable for concrete production. Both Flexmore Park and Watsons leases have in-ground sand resources available to expand production capacity, however leaseholders at these locations have not submitted applications to increase capacity. Furthermore, neither location has demonstrated significant volumes of coarse sand. Installation of a wash plant to remove clay contamination at Flexmore Park could potentially produce a fine-grained sand product suitable for concrete production.

The Llanherne Spit operation currently has the dominant share of the construction sand market. Unless other new sand sources are located in SE Tasmania, this location will have a near monopoly on fine sand supply to the concrete manufacturing market in SE Tasmania.

4.8 Protecting future strategic resources

No source of coarse sand has been identified in SE Tasmania that merits recommendation for protection as a strategic resource. Although the Llanherne Spit sand quarry contains many decades of sand resources, it is not an infinite supply. Moreover, many more decades of fine-grained sand resources on Llanherne Spit have recently been sterilised by golf course developments. It is important for the long-term economic development of Tasmania to conserve the few remaining areas of strategic fine-grained sand resources existing on public land.

5.0 REGIONAL SAND INVESTIGATION

The purpose of the regional sand investigation was to provide more spatial data specific to sand resources available to explorers and to better characterise natural sand deposits in SE Tasmania. One hundred and fifty sand samples were collected in the field and obtained from storage at the MRT core library in Mornington, and analysed for particle size distribution by dry sieve method AS1141.1: 2020, and for clay and fine silt by the wet tube settling method AS1141.33: 2015.

5.1 Scope

This project was initiated due to concerns regarding the dwindling supply of sand for the manufacture of concrete in the Hobart area. As there is no perceived shortage of Jurassic dolerite for coarse aggregate supply, this study ignores coarse aggregate supply and focuses only on fine aggregates. The regional sampling area was confined to SE Tasmania (Figure 22) and includes samples from both working quarries and undeveloped sand deposits.

5.2 Methods

1-2 kg sand samples were gathered using a handheld auger (Figure 20) which was capable of sampling depths up to 1 m. Most samples were obtained from depths between 50-80 cm below the surface. Samples were collected into calico bags and dried out in an oven at a relatively low temperature (< 50 °C) over several days before being submitted to laboratories for testing.

Two laboratories were used for particle size distribution analysis by dry sieve method AS1141.1: 2020: the MRT laboratory in Mornington and the NATA accredited laboratory at Heidelberg Materials (formerly Hansons) in Moonah.

The dry sieve method involved drying samples, running the bulk samples through a splitter to reduce sample volume and then passing the sand through a series of sieves detailed in Table 5.

Wet tube settling determinations of clay and fine silt content by AS1141.33 were performed at the MRT laboratory in Mornington.

Carbon sulphur testing, as a proxy for organic contamination, and X-Ray Diffraction (XRD) analysis for mineralogy, were trialled, but abandoned, due to capacity constraints.

Table 7. Fine aggregate is classified as < 5 mm but a standard set of sieves is used to determine PSD.

AS1141.1 Sieve sizes	
13.2 mm	600 µm
9.5 mm	425 µm
6.7 mm	300 µm
4.75 mm	150 µm
2.36 mm	75 µm
1.18 mm	



Figure 20. Handheld auger used for sampling sand at depths up to 1 m.

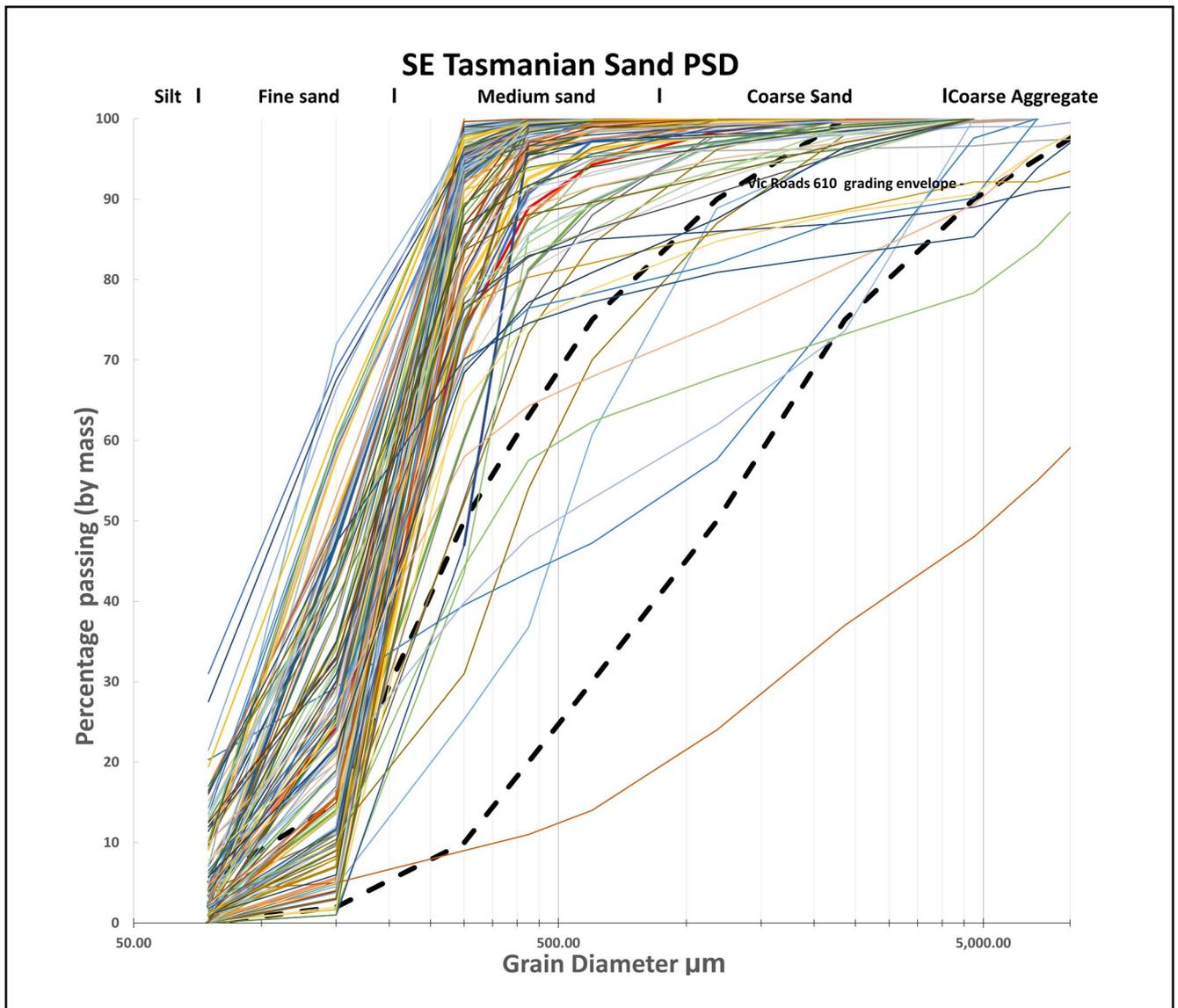


Figure 21. Particle size distributions from all sand sampled in this program with the VicRoad 610 grading envelope. Most sand sampled as part of this survey was too fine-grained to completely satisfy particle grading envelopes required for concrete mix.

Particle Size Distributions (PSD) by dry sieve method AS1141.1: 2020, and clay and fine silt settling method AS1141.33: 2015, were obtained for 145 samples of fine aggregate from around SE Tasmania. Detailed results for individual sample locations are listed in the appendix and are available digitally on the TIGER database and the LIST, within the samples and observations layer. As per the standard, it is noted that there was no consistent relationship between the wet settling test results and the mass passing the 75 µm dry sieve. However, the magnitude of the results for the wet settling method were equal to, or greater than, the result passing the 75 µm sieve, in compliance with the AS 1141.33: 2015 predictions. This effect is likely caused by some of the fine clay particles adhering to larger sand particles in the dry sieve process and failing to pass through the 75 µm sieve. However, a higher proportion of clay reports to the fine fraction in the wet settling method when liberated by water.

Aggregated results for different types of sand deposits are included in the geological characterisations (Figures 23, 24, 25 and 26) that follow.

6.0 SAND DEPOSITS IN SE TASMANIA

6.1 Types of sand deposits

This section describes the geological context of sand deposits in SE Tasmania and discusses their future exploration potential. Four major types have been characterised by Threader (1974), Leaman (1976), Sloane & Weldon (1990) Matthews & Donaldson (1994) and Duncan (1999):

1. Quaternary coastal dunes and aeolian sheets located near coastal areas.
2. Tertiary-Quaternary marine, estuarine or lacustrine deposits located in near-shore areas.
3. Quaternary alluvial deposits.
4. In-situ weathering of Triassic sandstone and Permian sedimentary horizons.

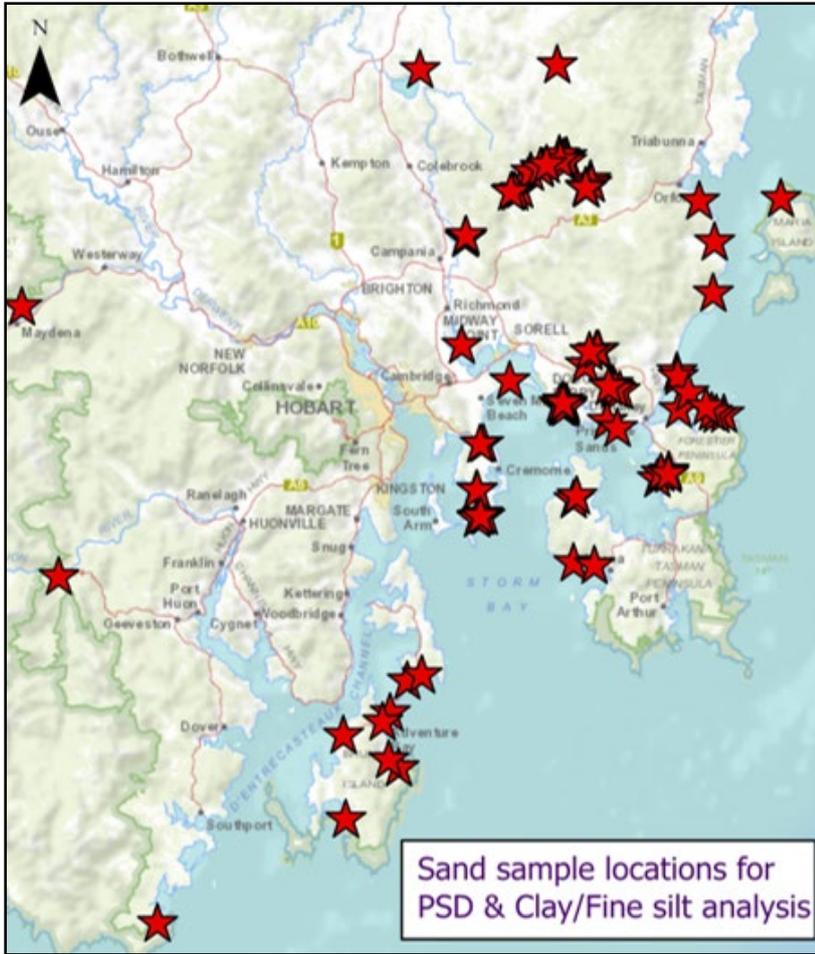
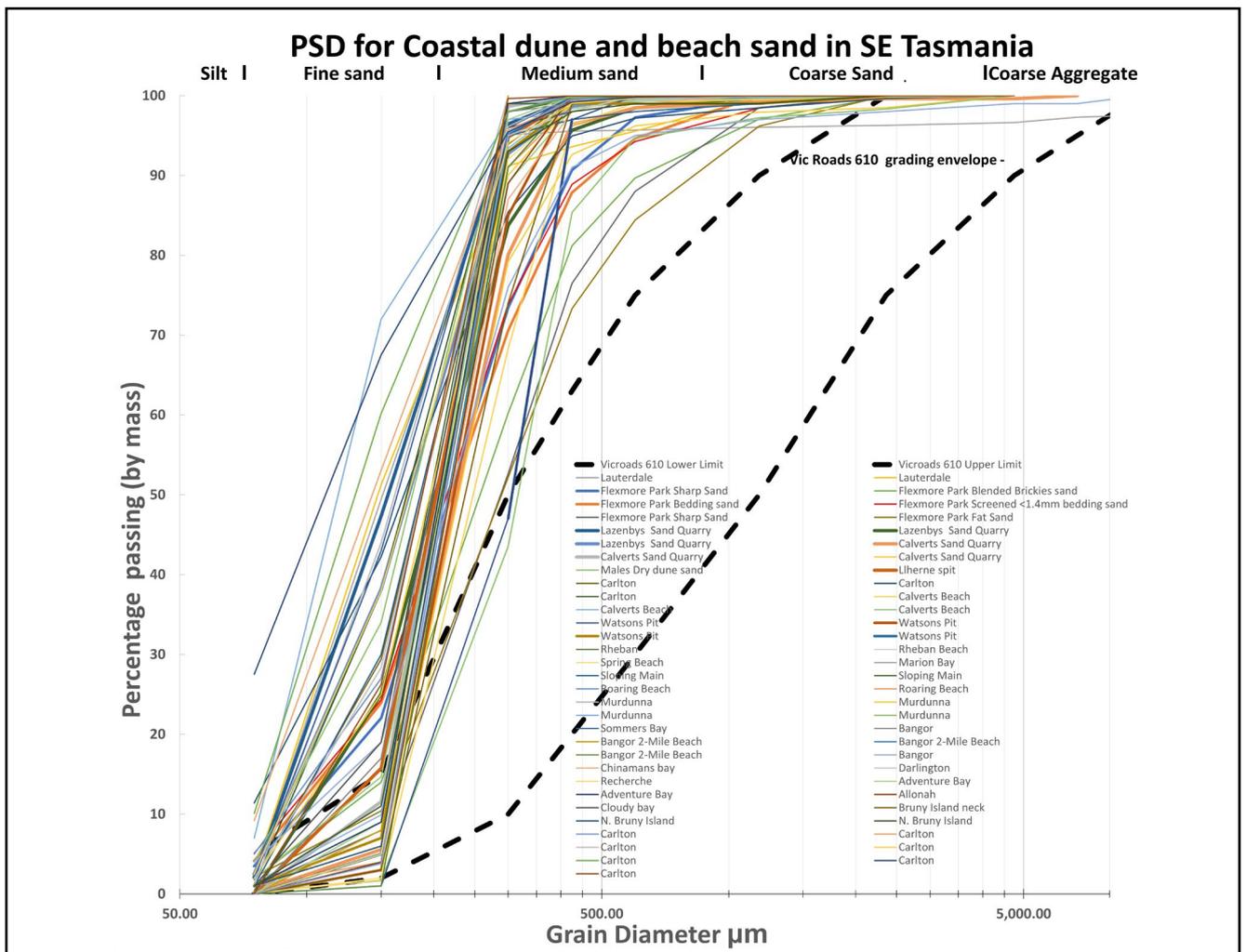


Figure 22 (Left). Sample locations from SE Tasmanian sand survey.

Figure 23 (Below). Particle size distribution plots for Quaternary coastal dune sands around SE Tasmania with the Vic Roads 610 grading envelope show a very wide distribution of relatively homogeneous fine-grained sand in coastal dunes.



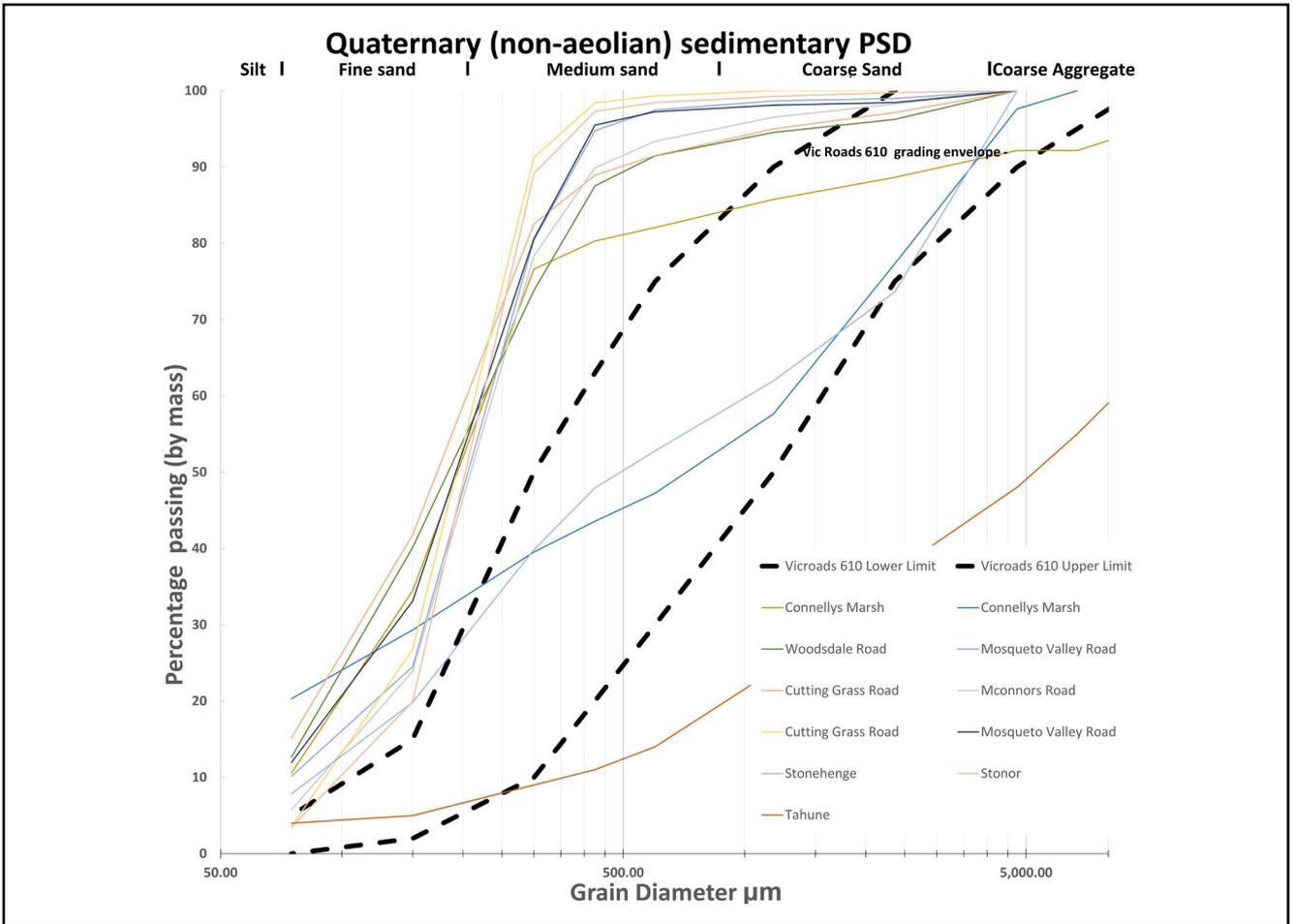


Figure 24. Particle size distribution plots for marine, freshwater, alluvial and glacial sediments around SE Tasmania with the Vic Roads 610 grading envelope. This shows that marine, freshwater, alluvial and glacial sediments are geologically complex, difficult to sample by hand from the surface and contain significant sources of clay contamination.

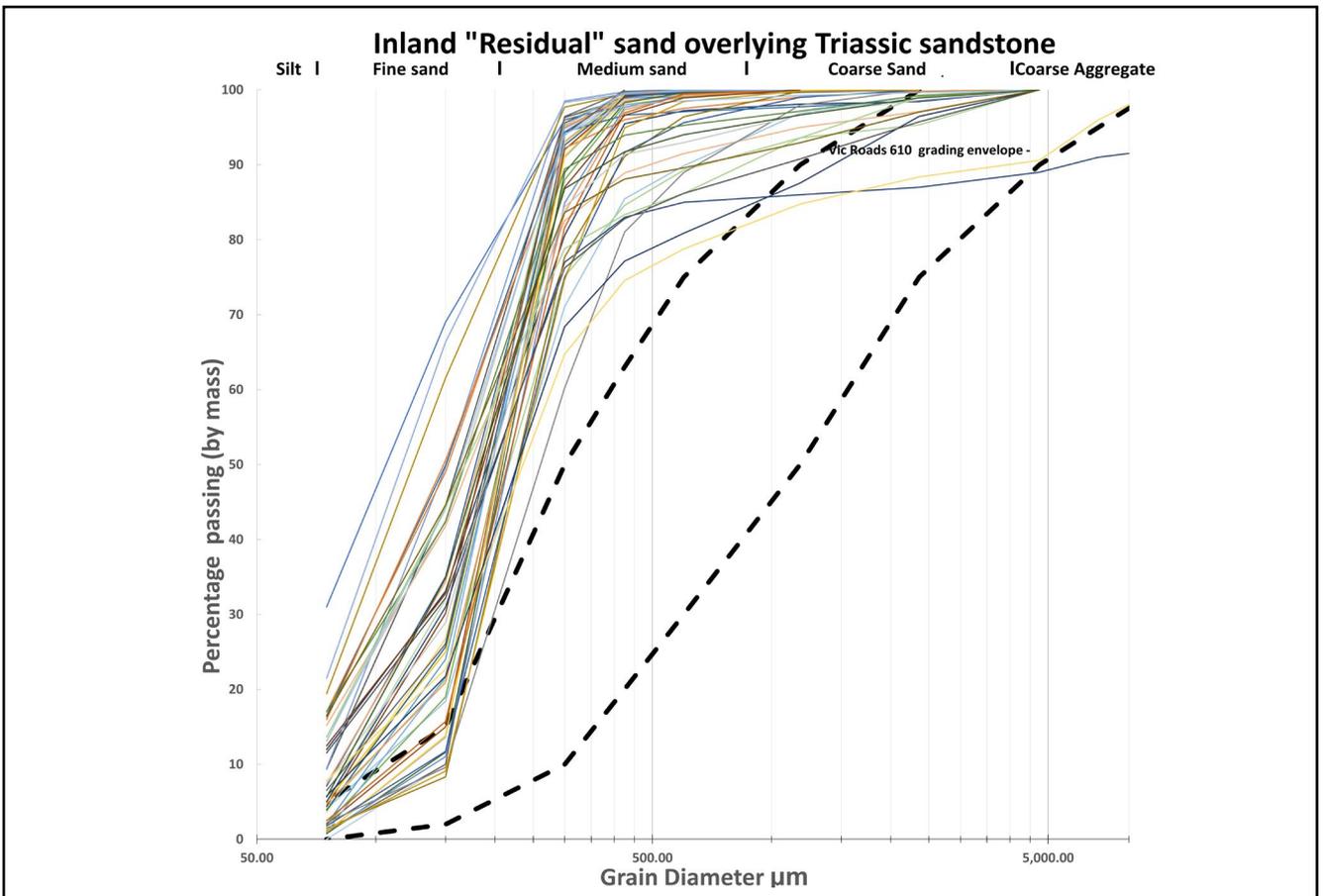


Figure 25. Particle size distribution plots for inland dry sand dunes overlying decayed Triassic sandstone with the Vic Roads 610 grading envelope. This shows a predominance of fine- to medium-grained particles.

Most free sand in SE Tasmania is originally derived from the weathering of Triassic sandstone and Permian sedimentary units (Matthews and Donaldson, 1994), (Leaman, 1976). These sands tend to be predominantly very fine- to medium-grained. Weathered sand grains are eventually transported to marine coastal environments forming Quaternary coastal dune and beach deposits. The dominant igneous lithology in Southern Tasmania is Jurassic dolerite. Due to the mafic composition of Jurassic dolerite, it does not contain significant volumes of quartz and instead weathers to clays without leaving a sand residuum. In contrast, Northern Tasmania contains abundant felsic and coarse-grained granite. The granites contain resistate quartz which readily weathers to a coarse sand.

6.2 Quaternary coastal dunes or windblown sheets

Quaternary coastal dunes are the most common form of sand deposit in Southern Tasmania and provide the bulk of the current sand supply in the Greater Hobart area. Males dry sand, Calverts, Llanherne Spit and the Watsons sand quarries are all examples of sand extraction currently operating within Quaternary coastal aeolian dune deposits. Lazenby Sand contains a covered aeolian Quaternary or Tertiary-aged quartz-rich dune. The sand deposit at Flexmore Park is mapped at 1:25,000 scale as a Quaternary aeolian sheet, however, this view is not uniformly supported by all researchers.

Particle size gradients from coastal dune deposits across SE Tasmania are relatively homogeneous and are typically sub 300 μm (Figure 26). This uniform grain-size distribution is likely the result of both a fine-grained Permian-Triassic sedimentary origin in addition to marine and aeolian sorting Leaman (1976) and Threader (1974).

There are also numerous inland aeolian sand sheets in SE Tasmania. These are typically located on the lee side of topographic highs, based on prevailing winds. However, these deposits are typically thin and volumetrically much smaller than coastal sand deposits. These sand sheets may potentially act as traps for coastal sand blown long distances inland, or alternatively may be locally-derived, in-situ weathering products from Triassic sandstones. Regardless of origin, all inland dunes in SE Tasmania tend to be well-sorted and fine-grained (Figures 24 and 25).

There are extensive land use competition challenges associated with coastal sand dunes for sand mining. These can include natural and cultural values and competition from other types of land development, including urban sprawl.

Demand for real estate has sterilised the large coastal dune systems at Clifton Beach, Lauderdale, Carlton (including Carlton Beach) and Primrose Sands. The South Arm Peninsula has been heavily mined for sand for decades and is experiencing a growing residential population (Figure 9), thus the potential in the South Arm – Sandford – Clifton Beach area is extremely limited. Golf courses and recreational reserves occupy more land in the Llanherne Spit area than the Llanherne Spit sand mine. The Llanherne Spit mine will be the main source of fine concrete sand for the Greater Hobart area for the foreseeable future.

There are only a limited number of large coastal dunes available for resource extraction near Hobart, and all the obvious candidates for sand extraction are currently under a mining lease. As coastal sand dune resources are easy exploration targets, it is unlikely that additional new coastal dunes with extraction potential will be identified in SE Tasmania. New coarse-grained sand resources in SE Tasmania are more likely to be another style of sand deposit discovered under shallow cover.

6.3 Tertiary-Quaternary marine, estuarine and lacustrine deposits

Low energy marine, lacustrine and estuarine deposits are typified by high silt and clay contents. Several, mostly unsuccessful, attempts were made to sample sand at geographic regions mapped Qh (Sand, gravel and mud of alluvial, lacustrine and littoral origin) at the 1:250,000 scale in coastal areas near the Primrose Sands – Dunalley – Marion Bay districts, including the Tasman Peninsula north of Eaglehawk Neck. These areas typically have hard-packed clay at surface and show few surficial signs of free sand. Similarly, many of these areas are under cultivation, or have active pastures. However, these areas may host economic sand resources at depth. This potential may be worth exploring in future, when an increased price of sand justifies the additional costs of exploration under cover.

The most likely future targets for coarse sand are buried horizons of coarse marine sand. A good analogy would be the “Goats Bluff” coarse sharp sand, which lies buried under a coastal aeolian dune at the Males lease on South Arm. The “Goats Bluff” coarse sharp sand is recognised as an ideal concrete ingredient and the goal of exploration would be to find more buried marine sands with similar properties.

6.4 Alluvial deposits

River sand is the most desirable source for concrete making sand in many parts of the world. High energy fluvial processes create well-sorted and naturally washed deposits of coarse sand, which may be consolidated. Alluvial sand exploration is typically more complicated, as the deposits are often under cover and may contain complex sedimentary structures. However, alluvial corridors do have good potential to concentrate coarse sands into economic deposits.

Determining the structure and consistency of an alluvial sand deposit during the exploration phase can be challenging. Internal variability is difficult to map from borehole analysis alone, and uncertainty around economic viability can dissuade investment decisions. Clay, silt and oversize gravel components will all complicate extraction. Therefore, a wash plant and settling ponds would be required as part of any extractive operation, which would increase the cost of production. As alluvial deposits can exist under cover, good potential exists to discover new deposits through targeted exploration.

Land use competition is another factor that affects the discovery and availability of alluvial sand. For example: the Huon Valley contains known deposits of sand, but factors such as low-capacity road networks, high-value agricultural land and residential developments, coupled with complex exploration and the relatively low returns of sand mining, impact sand resource potential. Rivers closer to Hobart, such as the Jordan and Coal rivers, also contain significant alluvial sand deposits, but land use constraints again preclude extractive activities.

SE Tasmania faces numerous challenges in developing potential alluvial resources. Firstly, Tasmanian rivers are relatively short compared to major mainland rivers. For example: the Derwent River is only 215 km long (Australian Bureau of Statistics, 2008) and sediment from the upper reaches is trapped by Lake King Edward and Lake St. Clair. Secondly, the Derwent traverses source rocks of Jurassic dolerite and sedimentary facies with only very limited felsic igneous components as a source of coarse-grained quartz.

The shorter-than-anticipated life of the Clarkes sand pit in Huonville highlights both the strong potential for high-quality coarse sand deposits in alluvial environments, and how the geologic complexity of alluvial systems can complicate extraction. Attempts to sample sand along the Huon River corridor as a part of this study were largely unsuccessful due to the hardpan clay topsoil deposited by successive river floods.

6.5 Permian/Triassic sandstone sources

Weathered Triassic sandstone decomposes into graded layers of clean quartz-rich, fine-grained sand at surface, to clay-rich fat sand and weathered sandstone regolith at depth. These inland sheet sands are typically covered by a distinctive understory of mature bracken fern that makes exploration relatively straightforward. They are typically laterally extensive, but extraction is usually vertically limited due to rapidly increasing clay content and lithified sand at depth. Examples of this type of deposit have been recorded around Forcett, Woodvine, Copping (Figure 29), Brown Mountain Road, Sand River and in a general arc through the Buckland-Levendale area. Small-scale extractive activities have historically occurred in the Buckland area. However, the small grain-sizes (Figure 25), small resource volumes, and the high environmental reclamation burden renders this style of resource unattractive.

Dimension stone quarries produce a sawdust by-product from cutting fresh Triassic sandstone into building blocks, which can create large volumes of waste sand that have potential for secondary applications. However, most Tasmanian Triassic sandstones are already fine-grained and the rock cutting process tends to further reduce the grain-size. Thus, the resultant product is too fine for use as a concrete mix ingredient (Figures 26, 27 and 28).

7.0 CONMAT DATA AND TIGER DATABASE

The Mineral Occurrences Database is a component of the Tasmanian Information on Geoscience and Exploration Resources (TIGER) system administered by MRT. It is publicly available on the LIST: www.thelist.tas.gov.au, and through the dedicated MRT webviewer at https://www.mrt.tas.gov.au/mrt_maps/app/list/map. The Mineral Occurrences layer includes data on operating and abandoned mines, prospects, mapped occurrences and mineral fields or mineralised areas. The Mineral Occurrences Database was formed in 2003 by merging two earlier databases: MIRLOCH for minerals and CONMAT for construction materials.

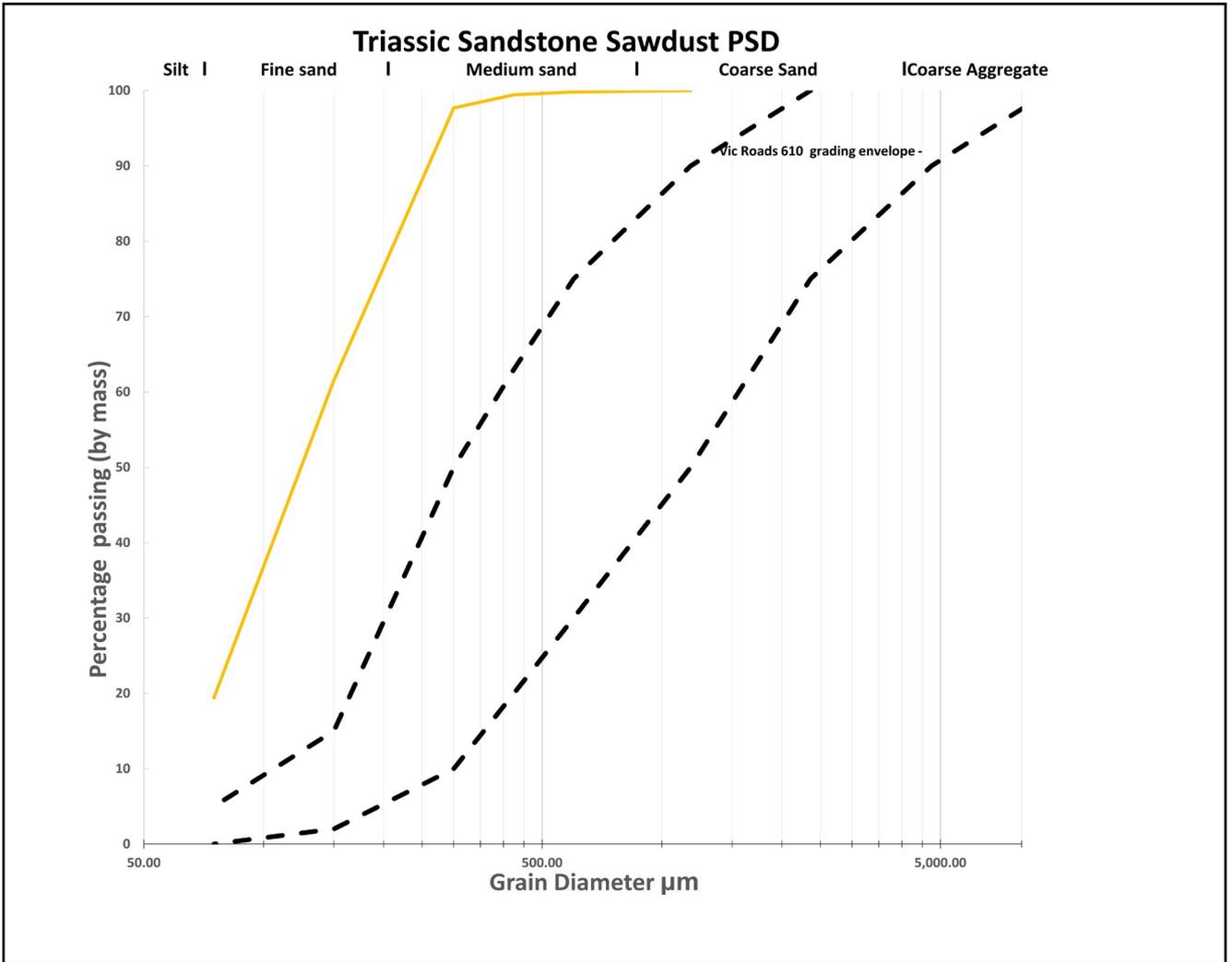


Figure 26. Particle size distribution plot for sawdust from a Triassic sandstone dimension stone quarry with the Vic Roads 610 grading envelope, indicating that the product is too fine-grained for concrete manufacture.



Figure 27. (Left) Sawdust from dimension stone quarrying of Triassic sandstone has potential for use as a fine aggregate.

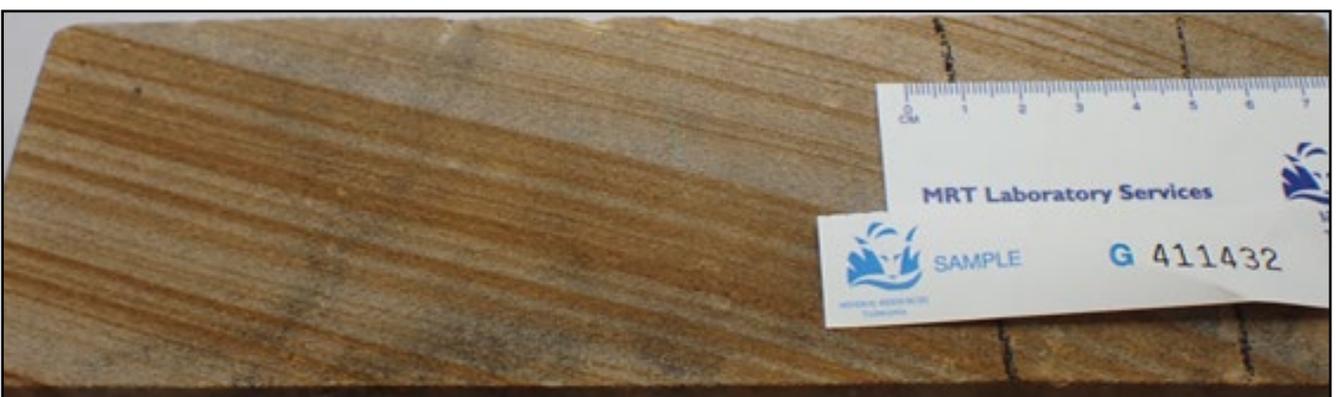


Figure 28. (Below) Triassic sandstones are typically well-sorted and often fine-grained.



Figure 29. Inland dunes, such as this example from near the Copping Tip, are often unmapped. In this case, the area is mapped on the 1:250,000 scale geological map as Triassic sandstone.

The Construction Minerals Register (CONMAT) was originally developed in FORTRAN in the early 1980s. Although the databases were merged in 2003, much of the paper legacy data was not digitised. As part of this project, previously undigitised CONMAT data has recently been uploaded to TIGER. This data includes quarry descriptions and particle size distribution (PSD) records data from SE Tasmania, the Midlands and King and Flinders islands. This data is now available online and is searchable through the Mineral Occurrences layer and the Observations layer in TIGER and on the LIST.

8.0 DISCUSSION

8.1 Biases

Due to resource constraints, survey sites were selected opportunistically and not on a spatially systematic basis. Furthermore, there is systematic bias toward publicly accessible sites, or private sites with access consent. Samples were collected with hand tools, thus there is also a sample bias towards deposit styles with accessible free sand at surface, or at depths of under one metre. This favours over-representation of coastal and inland aeolian dunes at surface and

leads to an underrepresentation of alluvial and low energy marine, freshwater sedimentary facies and graded deposits under cover. To counter this bias, analyses were also undertaken on archived sand samples previously collected by pit sampling projects on private property. These archived samples were retrieved from storage at the MRT Core Library in Mornington.

Bias towards surficial aeolian sand deposits also mirrors the types of sand deposits that are currently in production in SE Tasmania. All six of the currently operating sand quarries in the Greater Hobart area are mining coastal or inland systems that are visible at, or near, surface. With very little, to no overburden, these types of deposits are very easy to access, cheap to extract and contain large volumes of relatively homogeneous, well-sorted, fine- to medium-grained sand, with relatively little geological complexity.

8.2 Consistency of supply

Concrete mix supply agreements are engineered based on test samples of raw supply material obtained directly from source quarries. A large and homogeneous (low geological variability) sand source is preferable to a small and inhomogeneous (high geological variability) source. If a sand quarry has very low geological variability with large volumes of homogeneous sand, then the cement batcher can more reliably produce consistent concrete. However, if a sand quarry has high geological variability with irregularly distributed quantities of clay, organic impurities, particle size distribution variability or other properties which cause the properties of the sand supply to vary, this can result in inconsistent production and non-compliant concrete.

8.3 Alternatives to natural sand

8.3.1 Crusher dust

Crusher dust is now heavily used for concrete manufacture in SE Tasmania due to the current lack of coarse sand resources. This is a good use of a waste material. However, accurate classification and characterisation of material is required prior to its inclusion in a concrete aggregate mix.

Major issues with crusher dust are the presence of excess fines and the potential inclusion of clays and other contaminants, including sulphides. Moreover, crushing rock, specifically for the purpose of creating crusher dust to replace natural sand, is expensive.

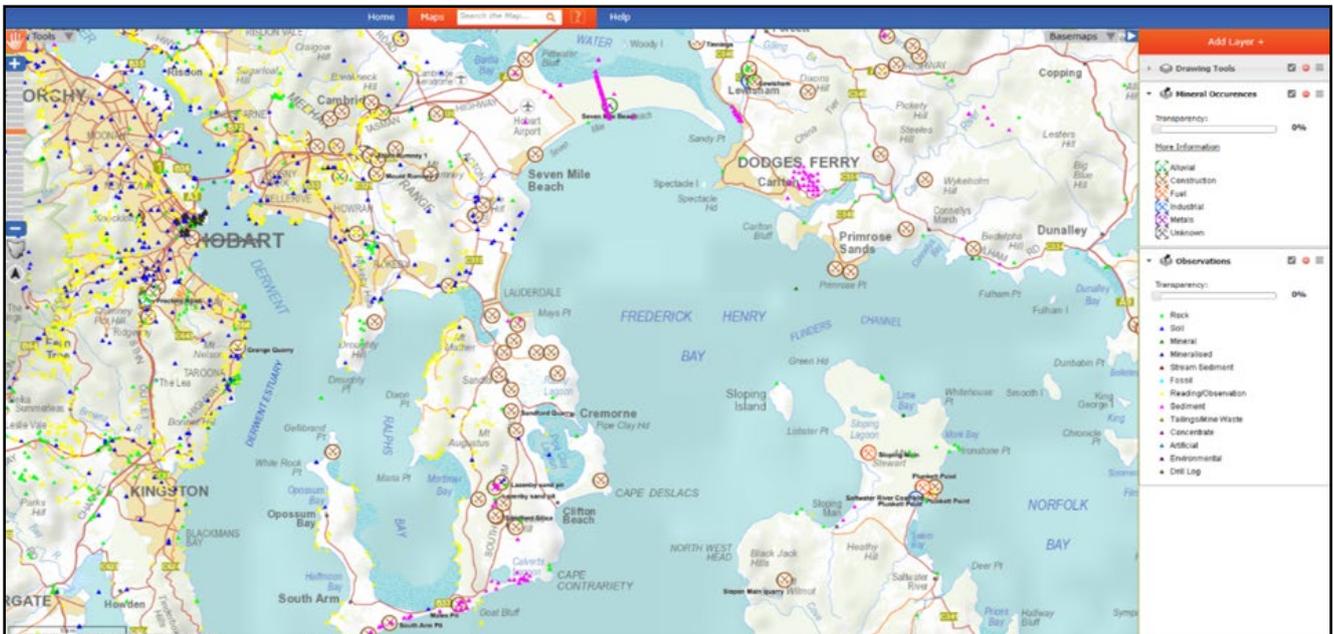


Figure 30. MRT WebViewer displaying “Mineral Occurrences” and “Observations” layers. CONMAT data can be interrogated through these layers.

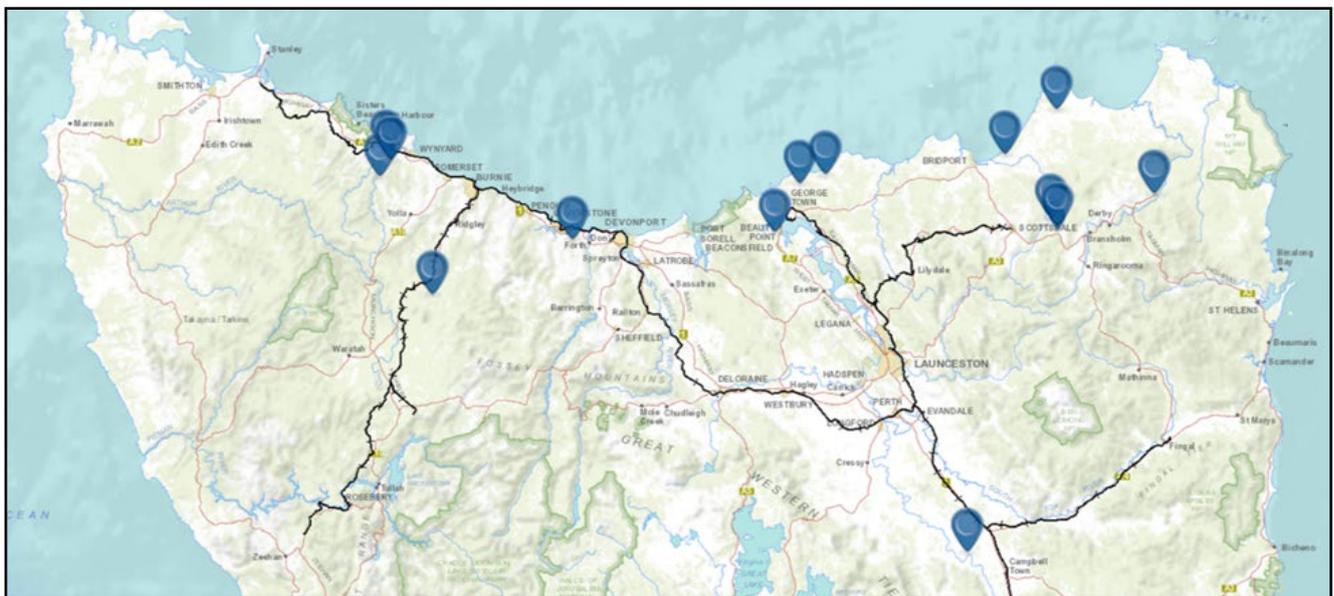


Figure 31. Locations of sand producers in Northern Tasmania relative to major road and rail infrastructure.

8.3.2 Manufactured sand

The difference between crusher dust and manufactured sand (M-Sand) is in the design and set-up of the crushing system. M-sand systems are tooled to crush rock into sand with specific dimensional properties of shape and size for the desired sand product. Normal crusher dust is a byproduct of crushing rock into coarse aggregate with the “dust” classified and stored in an under-sized returns pile. This dust may contain “spear” or other undesirably-shaped fragments as well as an excess of fines.

Dedicated M-Sand systems are expensive to purchase and operate. However, these systems may prove economic when natural sand prices

rise. The use of crushing systems tailored to producing engineered sand phased into dolerite and basalt quarries in SE Tasmania may increase in future.

8.3.3 Recycled materials

The use of recycled materials such as recycled glass, slag waste from industrial processes, or recycled crushed concrete, can replace natural sands for some uses. However, structural concrete requires a mechanical integrity that recycled glass cannot provide. Similarly, it is difficult to maintain quality control on recycled concrete. For this reason, natural sand or sand manufactured from fresh rock, are still preferred for high-tensile-strength structural concrete.

9.0 FACTORS INHIBITING THE DEVELOPMENT OF LOCAL SAND RESOURCES

Geological scarcity is only one contributing factor to the shortage of sand resources available to the construction industry. Resource sterilisation, through zoning and competing land use activities, has further reduced the available area for resource extraction.

It is inevitable that new quarries will be located further from major developed centres, which will also incur higher transportation costs.

10.0 COMMERCIAL EXPLORATION

An ideal new source of sand for resource development in SE Tasmania would be a large volume of homogeneous, well-graded, coarse sand located close to Hobart and accessible by roads suitable for heavy haulage vehicles. However, as large coastal dunes are unavailable for a variety of factors (e.g., land use competition, development, natural and cultural values), smaller and more geologically complex sources of sand, likely in alluvial environments, are recommended as the next exploration targets. Inland residual deposits are typically fine-grained, shallow in depth and often smaller in volume. These smaller volumes will negatively impact the ratio of resource value to rehabilitation cost.

11.0 CONCLUSIONS

- There is a sufficient supply of fine sand available in the Hobart area for the next few decades.
- There is currently no quarry producing coarse sand at the volumes required by the concrete manufacturing industry in the Greater Hobart area and SE Tasmania.
- There does not appear to be an easy, short-term replacement for the loss of local coarse sand supply for the construction industry in SE Tasmania.
- There is scope to discover new sources through targeted exploration. However, the combination of a natural geological scarcity of coarse sand in SE Tasmania and limitations on the available land for resource extraction, will challenge the discovery of new deposits.
- Exploration in alluvial and marine deposits under cover has potential to identify new coarse sand resources in SE Tasmania. Supply from such deposits is not available in the short term.

- Alluvial and marine sand deposits are typically smaller in volume, more geologically complex, and have shorter mine life in comparison to the currently-operating mines associated with large coastal dune systems.
- Crushing sand (M-Sand) will likely become more common.
- The increased distances involved in transporting sand from quarries in the north of the state, to infrastructure projects in the south, will result in higher costs for infrastructure projects in the south of the state.

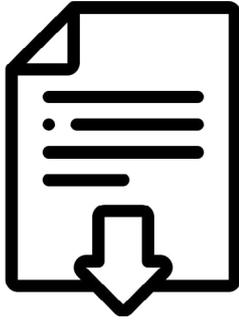
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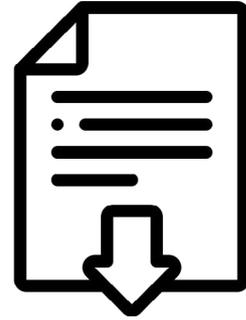
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APPENDIX

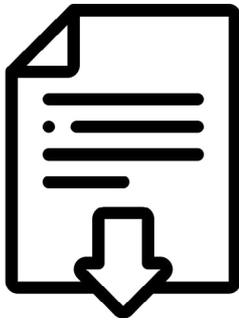
Laboratory test results



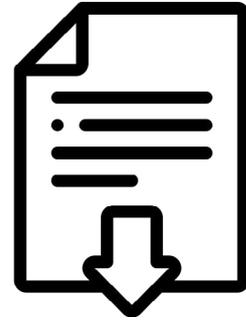
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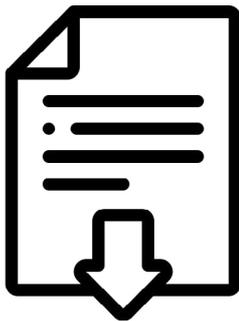
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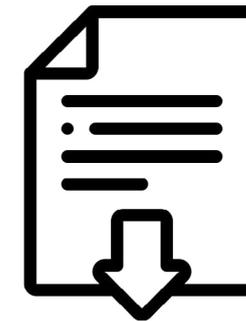
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