

CONMATS CONSULTING

**AMENDMENT C106 TO THE MITCHELL
PLANNING SCHEME.**

EXPERT WITNESS STATEMENT

**John Malempre
CONMATS Consulting
July 2020**

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CONMATS CONSULTING.

Name and Address.

John Malempre, Principal of CONMATS Consulting

41 Shepherd Street, Surrey Hills, Vic 3127.

Professional Qualifications.

- Diploma Mining Engineering RMIT 1973
- Fellowship Diploma of Geology RMIT 1975
- Masters of Management Macquarie University 1997
- Australian Institute of Company Directors Graduate 2004
- Department of Mines Victoria and South Australia unrestricted Managers Certificates - Opencut/Quarries.

Professional Associations.

- Institute of Quarrying Australia, Hon. Fellow and past National President (2006-2008)
- Australian Institute of Mining and Metallurgy- Past Fellow.

Professional Experience.

- I am the Principal of CONMATS Consulting which specialises in consulting work to the Construction Materials Industry in Australia.
- After graduating I joined Boral Limited (Boral) as a trainee Manager in their Victorian Quarry Business. This involved ground floor quarrying experience, supervision roles in many different quarries. This enabled me to qualify for the then Mines Department of Victoria Opencut unrestricted Managers Certificate.
- With Boral I moved to South Australia, Queensland and New South Wales progressing through a number of operations and General Management roles of quarrying and associated concrete and transport businesses.
- In 1998 I returned to Melbourne with Boral to take up the role of Regional General Manager for the Victorian / Tasmanian Construction Materials business group which included quarries, concrete, asphalt and transport divisions.
- In 2010 I was appointed to the role of National Resources General Manager for the Boral Australian Quarry business. I retired from this role late 2013.

- During my career with Boral I participated in a number of construction material investigations for international acquisitions and developments in Europe, America, South East Asia, the Middle East and New Zealand.
- I established my construction materials consulting business CONMATS Consulting in 2014.

Areas of Expertise.

- Construction materials with a particular focus on quarry operations including geological investigations, operations, marketing, capital investment proposals and business strategy.

Expertise to prepare these reports.

- As above extensive operating and management experience in all aspects of quarrying and related businesses across Australia including large metropolitan/country business units and major projects such as Hume Freeway pavement upgrades; Citylink; Eastlink; Deer Park By-Pass.
- Consulting experience for the past six years on a wide range of quarrying related projects across most states of Australia on projects related acquisitions, capital investment, geological investigation and expert witness advice.
- Between 2018/19, I was contracted by Earth Resources Regulator to provide experienced advice and services on matters related to extractive industries. This included liaison with both internal and external stakeholders on a wide range issues.

Instructions which define the Scope of reports submitted.

- I have received instructions from Best Hooper Lawyers on behalf of Conundrum Holdings Pty Ltd. In relation to their proposed North Central Quarry development.

Facts, matters and assumptions relied upon.

- I first became aware of the proposed North Central Quarry site approximately 10 years ago when working for Boral and carrying out investigations for potential quarry sites north of Melbourne. Made various enquiries related to the status of the site.
- In 2016 I was engaged by Conundrum to carry out a site assessment of the proposed North Central Quarry site and evaluated site factors relevant to the development of a quarry operation.
- During this assessment I reviewed and made enquiries related to geological investigations including site investigation drilling of the rock resource including assessment and testing of diamond drill core. I made site visits to existing Conundrum Holdings quarries located at Epping and Stawell to assess operating standards and management processes. I reviewed the Statutorily Endorsed Work Plan for the North Central Quarry referred to as Extractive Industry Work Authority No 1473 dated February 2015.
- In preparing this current witness statement (July 2020), I reviewed various relevant reports provided by Best Hooper Lawyers in relation to the proposed North Central Quarry.
- I reviewed various relevant Department of Economic Development, Jobs, Transport and Resources reports, and documents related to extractive industry supply and demand within the state of Victoria and more particular the Melbourne Region.

- I have put forward my views and assumptions based on over 40 years of my experience in the construction materials industry, with a particular focus on quarrying operations.

Documents taken in to account.

- Conundrum Holdings Pty Ltd – North Central Quarry. Statutorily Endorsed Work Plan for Extractive Industry work Authority No. 1473. Feb 2015.
- Department of Primary Industries - Melbourne Supply Area Extractive Industry Interest Areas Review. 2003/2
- Department of Economic Development, Jobs, Transport and Resources - Demand Analysis of Extractive Resources in Victoria. Ernst and Young Consulting. 2016.
- Department of Economic Development, Jobs, Transport and Resources - Extractive Resources in Victoria: Demand and Supply Study 2015-2050. PwC Consulting. 2016.
- Coffey Services Australia Pty Ltd. Report for Department of Economic Development, Jobs, Transport and Resources – Wallan/Beveridge Extractive Resources Analysis (Geology). Don Miller 2017.
- Department of Economic Development, Jobs, Transport and Resources – Helping Victoria Grow. Extractive Resources Strategy. 2018.
- Earth Resources Regulation – Extractive Industry production and value annual statistics 2018 / 2019.
- Bell Cochran & Assoc. consulting - Drilling Investigation at Wallan property Report 2006.
- BCA Consulting Proposed Wallan Basalt Quarry-WA1473 – 2019 Drilling Update Report.
- Australian Standard Codes AS1141-2009; AS1289 – 2009 Sampling and Testing of Aggregates and Crushed Rock products; AS2758.7 sampling and testing of Railway Ballast.
- Department of Transport (Vic Roads) Code of Practice 500.0 -2017 and sub codes for classification of igneous source rock, sampling and testing of aggregates and pavement materials.

Identity of persons undertaking work.

- All work to produce this witness statement document was undertaken by myself – John Lachlan Malempre

John Malempre

CONMATS consulting

July 2020

1.0 INTRODUCTION.

In evaluating a greenfield potential quarry site there are a range of complex factors that need to be considered in some detail which often takes a considerable time (a number of years) and significant expense that can run into hundreds of thousands of dollars.

The range of factors that need to be considered is quite large and often some are undefined at the start of the evaluation process but a general summary could be as follows:

- Suitability of the actual rock resource.
- Environmental setting.
- Transport access.
- Competitive position.
- Market demand.
- Ability to generate an adequate return on funds invested.

This report will discuss a number of issues relevant to each of the above factors and make comments in relation to the proposed North Central quarry, which is to be located at the 43 Kilometre post on the Old Northern Highway, south of the township of Wallan in Victoria.

The report is broadly structured under three main headings namely:

Part 1. GEOLOGICAL EVALUATION.

Part 2. SITE EVALUATION.

Part 3. DEMAND ANALYSIS.

The proposed North Central quarry would be located in an extensive basalt flow deposit (referred to as “New Basalt”). The deposit is identified in Geological Survey of Victoria documents dating from as early as 1856 and more recently in 1993, 1996, and 2003.

I am instructed that geological investigations by Conundrum on the proposed quarry site first commenced in 2004 and have been ongoing to the present time.

I have been further instructed that these investigations have resulted in a proven rock resource of about 17 Million tonnes, which at proposed production rates is equivalent to about 30 years of operation.

The land on which the proposed quarry is to be developed is generally zoned as Rural Conservation Zone with a small proportion zoned Urban Growth Zone.

Extractive Industry Work Authority No.1473 which has been “Statutorily Endorsed” was issued for the site and confirmed in a letter from the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) dated 22nd April 2015.

In that letter, the Department of Environment, Land, Water and Planning (DWELP) advised they did not object to the endorsement of the Draft Work Plan WA1473 subject to conditions, none of which are deemed to be exclusive.

As part of my assessment I carried out a site visit of the proposed North Central quarry site in September 2016.

In addition I have reviewed relevant documentation including the Statutorily Endorsed Work Plan for WA1473 dated February 2015, resource test reports (prepared by Bell Cochrane & Assoc. consulting in 2006) and diamond drill cores (also prepared by Bell Cochrane & Assoc. consulting in 2006). Current quarry operations and work practices at Conundrum Holdings – Epping and Stawell Quarries were also inspected and reviewed.

After my assessment in 2016, I made recommendations to Conundrum that in my view, additional diamond drilling (2-3Holes) should be undertaken as part of their investigations to provide further confirmation of the quality and consistency of the resource.

I am aware that an additional three diamond drill holes were drilled in 2019 and testing of core samples was carried out with results confirming those of the initial test program and the overall quality and consistency of the resource. Part 1 of this report expands on this matter.

With its good access to a growing regional market based on relatively strong residential growth, a good quality resource which can be extracted and processed at a competitive cost it is my opinion that the proposed North Central quarry will be a long term sustainable quarry operation.

2.0 PART 1. – GEOLOGICAL EVALUATION.

2.1 RESOURCE EVALUATION FACTORS.

When evaluating the suitability of a rock deposit (resource) for a potential quarry operation there are many factors that need to be considered. These include the size of the resource; its consistency; geological structure; ability to be quarried and processed efficiently; and its ability to produce quarry products at a competitive cost, in compliance with relevant specifications.

Generally speaking low silica rock types such as basalts and limestones have lower costs to quarry than higher silica types such as granite and hornfels. In addition rock types which are reasonably consistent and have a low degree of weathering or decomposition will have a lower waste factor and therefore be favoured as potential quarry resources.

It is also very important that the rock type is capable of being processed in to a wide range of products that meet compliance with relevant specification codes such as the applicable Australian Standards AS1141-2009 and AS1289 -2009, and Department of Transport(previously VicRoads) specifications Code of Practice 500.00 and sub sections 2017 and Department of Transport classification system Standard Section 801 for road pavement materials and aggregates.

Rock types that comply with higher levels of these specifications are valued, as they allow for the production of a wide range of quarry products, including higher value product grades.

Due to the high capital costs required to develop a quarry and the long lead time to gain approvals quarry operators will generally look for potential deposits that are large scale, often more than 10 Million tonnes in a geographical setting that can enable cost efficient extraction.

Relatively flat landforms or low undulating hills meet this requirement.

Other important factors are: the environmental setting; access to potential markets; transport routes; competitive position; and ability to generate an adequate return on funds invested.

In considering these factors relevant to the North Central Quarry proposal I note that the relatively large site (of about 120 Hectares) contains a proven resource of what can be described as “Newer” basalt and from drill hole and subsequent product testing investigations is covered with a minimal amount of overburden (generally less than 1 Metre) and displays good consistency in terms of its quality through the depth of the deposit. These investigations are discussed in detail later in this report.

It is noted that the actual approved quarry Work Plan area covers 49.7 Hectares with the remainder of the site providing extensive environmental buffers to the proposed quarry operations.

The site has good access to growth markets north of the Melbourne CBD and the proposed quarry operation is expected to be very competitive with other suppliers.

2.2 GEOLOGICAL HISTORY OF THE SITE.

As noted earlier the first reference to the geology of the proposed North Central Quarry site which is located adjacent to the Spring Hill volcanic vents was made in a Report of the Geological Surveyor of Victoria on the Geological Structure of the Colony of Victoria in 1856.

These early reports commented on the extensive flows of basalt deposited in a generally north to south direction from Kilmore to Melbourne associated with ancient volcanic activity. The most extensive of these basalt flow are referred to “New Basalt” with an estimated age ranging from about 5 Million years ago to more recent times.

In the mid 1950’s a number of detailed reports discussing the geological features of the area and the potential of the rock resources to be used for the purpose of quarrying to produce construction materials, were written in the Proceedings of the Royal Society of Victoria and other papers.

Throughout the later part of the previous century the area around Wallan including Spring Hill, Mount Fraser, and Hayes Hill have been referred to in numerous studies and reports in terms of their significance for potential extractive (quarry) industry.

From 1969 to 1977 the Geological Survey of Victoria carried out an extensive diamond drilling program to investigate the resource potential of the basalt plains north and west of Melbourne.

This work supported the first detailed report by the Geological Survey of Victoria into Extractive Industry Interest Areas for the Melbourne Supply Area, published in 1993. This report has been subsequently updated on a number of occasions , the most recent of which is the Department of Primary Industries, Melbourne Supply Area – Extractive industry Areas Review 2003/2 which I referred to.

I am instructed that investigations of the rock resource on the site adjacent to Spring Hill commenced in 2004 which included a review of geological reports, initial mapping and a program of geophysical testing. This was followed up in 2006 with initial percussion and diamond drilling program together with source rock testing supervised by Bell Cochrane and Associates Consultants

Results from these investigations show that the basalt resource on the proposed quarry site was consistent and of good quality.

After proving up the resource of good quality basalt Conundrum applied for and received a work authority number WA 1437 in August 2011 with the subsequent draft Work Plan being “Statutorily Endorsed” in April 2015 by the Department of Economic Development, Jobs, Transport and Resources.

In April 2015 the Department of Environment, Land, Water and Planning advised they did not object to the endorsement of the draft Work Plan subject to conditions, none of which were deemed exclusive.

Since 2011 the proposed North Central Quarry site often referred to as WA1473 has been referenced in a number of state government reports and documents dealing with the future planning and development requirements of the Northern Corridor and the need to ensure an ongoing sustainable source of quarry materials. These reports include the Coffey Services Australia Wallan Beveridge Extractive Resources Report 2017; the PwC Memorandum of Development of WA1473 report 2017 for DEDJTR; the Memorandum – Northern Corridor Hard Rock Analysis Report 2018 by PwC for DEDJTR and provided to the Victorian Planning Authority.

The initial drilling program of 2006 (see report Bell Cochrane & Assoc consulting – Drilling Investigation at Wallan property 2006) was followed up in 2019 by a further program (see report BCA consulting – Proposed Wallan Basalt Quarry WA 1473- 2019 Drilling Update Report) with the drilling of an additional three diamond core drill holes up to a depth of 48 metres to provide a more detailed understanding of the rock resource, and provide rock core for further detailed visual and

rock quality testing evaluations. The 2019 program was supervised by BCA Consulting and confirmed the earlier results contained in the 2006 report, and is discussed later in this report.

2.3 GEOLOGICAL ASSESSMENT.

The “Newer” basalts of Victoria are characterised by varying percentages of vesicular voids and in some cases decomposition but the proposed North Central Quarry resource has limited impacts from these characteristics, displays good consistency through the depth of the deposit, and can be classed as good quality compared to other similar deposits. Silica content of this rock type is negligible, being well less than 1%.

I am instructed that the resource is estimated to contain an assessed reserve of 10 million tonnes of fresh basalt capable of producing specification products and 7 million tonnes of material suitable for the production of a wide range of commercial products. It can be considered as a relatively large deposit and at the forecast production rates will be capable of about 30 years operation.

A range of relevant testing for basalt rock samples (both diamond drill core and percussion drill chips) was undertaken in 2006 by Bell Cochrane and Associates Consulting, Geotechnical Engineering and Geopave (VicRoads) testing services (see report Bell Cochrane & Assoc. consulting – Drilling Investigation at Wall property 2006) to assess compliance of the rock resource with relevant specification requirements.

Subsequent to this 2006 assessment program, three additional in-fill diamond drill holes were drilled in 2019 under the supervision of BCA Consulting to a depth of up to 49 metres (see report titled BCA consulting – proposed Wallan Basalt Quarry WA1473 – 2019 Drilling Update Report).

Assessment testing undertaken by Geotechnical Engineering and Geopave (VicRoads) in 2006 included Accelerated Soundness Index test and petrological testing for secondary mineral content. Samples were also assessed in terms of their Los Angeles Abrasion loss and in all cases the North Central Quarry “Newer basalt” samples have performed very well with the freshest samples being assessed to produce a range of the highest possible VicRoads specified road pavement materials and aggregates (the results of this testing are summarised in the Bell Cochrane and Associates report dated 2006).

Based on these assessments rock from this resource was confirmed as being suitable to produce a wide range of quarry products including the following:

- VicRoads specification road pavement materials Class 1 to 4 inclusive.
- VicRoads specification aggregates for concrete, asphalt and sealing works.
- Commercial grades of road pavement materials.
- General aggregate grades for use in concrete and civil works.
- Railway ballast in compliance with AS2758.7 - 2009.
- A wide range of environmental protection products such as Rip Rap, Beaching, erosion and bank stabilisation materials.
- General landscaping products including large boulder rock.

The 2019 assessment program undertaken by DoT Pavement Geotech and Materials (see BCA Consulting Proposed Wallan Basalt Quarry WA 1473 – 2019 Drilling Update Report) provided drill core for further independent testing of rock properties against applicable specifications including Department of Transport Code of Practice RC500.00 (2017) and sub sections (RC500.02 (2017) and RC500 .16 (2017)) and Australian Standards AS1141-2009 and AS1289 - 2009 (testing of aggregates and crushed rock products).

This testing program undertaken by DoT Pavement Geotech and Materials (see BCA Consulting Report proposed Wallan Quarry Basalt Quarry –WA1473 – 2019 Drilling Update Report) included verification of previous results for rock soundness including Los Angeles Value, Accelerated Soundness Index, Water Absorption and Polished Stone Value. Test results showed good consistency with results achieved from the previous testing program thereby providing high confidence in terms of the overall quality of the rock resource.

Samples of the drill cores were also thin sectioned to allow for microscopic assessment of secondary mineral contents.

In 2020 it again confirmed by letter (see letter dated 20th February from Mr. G. Newman - Team Leader Laboratory and Plant Audits, the Department of Transport - Pavement Geotech and Materials section, addressed to Mr M. Wagner Marketing/Quality Assurance Manager Conundrum Holdings Pty Ltd) that quarry products from the proposed North Central Quarry would be suitable for the production of quarry products, as referred to above. Note: VicRoads is now part of the Department of Transport, Victoria.

These programs of resource evaluation and assessment over a number of years, in my opinion, provide a high degree of confidence in terms of the quality of the rock resource and its suitability to produce a wide range of quarry products, including higher specification products used in major infrastructure and other construction projects.

The ability to produce this wide range of quarry products including the high specification aggregates and road pavement materials, which attract higher selling prices is an important factor in underpinning the financial viability of the proposed North Central Quarry operation.

The geographical landform of the site is generally a flat slightly elevated plain, with no significant watercourses or other water bodies in the proposed quarry area. These land features and its general setting make it well suited for an efficient low cost quarry operation.

I have viewed the proposed operating plans for the quarry included in the Statutorily Endorsed Work Plan for Extractive Industry Work Authority No.1473 dated February 2015, and believe it will be able to operate at a low cost of production rate, usually expressed in dollar value per tonne.

An analysis of existing quarry operations north of Melbourne (carried out by CONMATS Consulting in 2017 and as discussed later in this report, see Part 3 - Demand Analysis) has indicated a number have reserves of less than 10 years or have rock sources that are incapable of producing the full range of quarry products including high specification types i.e. they are capable of only producing commercial or non-specification products.

This means that during periods of high demand for project related specification quarry products there are shortages being experienced for these products resulting in cost impacts for the general community. For example, major projects such as the City Rail Link, North East Freeway Link or the possible upgrade of Tullamarine Airport runways can all expect to experience tight supply issues in terms of high specification quarry products leading to increased overall project costs.

The proposed North Central quarry located near Wallan with ongoing strong residential demand would become a significant source of a wide range of quarry products in the local northern region market, and would provide an additional source of high specification quarry products to a number of planned major infrastructure projects north of the Melbourne CBD.

2.4 SUMMARY – GEOLOGICAL EVALUATION.

From the above assessment, it is my belief that the proposed site for the North Central quarry has many positive advantages.

The site has a large proven resource of good quality basalt rock, has a favourable environmental setting in terms of a quarry development and is located close to major transport corridors including the Hume Freeway.

The relatively large site of about 120 Hectares will allow for a well-designed and staged quarry development with extensive bund walls, tree plantations and buffer areas, which will greatly assist in the mitigation of potential environmental impacts from blasting, noise and dust.

In addition the site will be well screened from any view points and will undergo progressive rehabilitation in line with best industry practice during the life of its operation.

Extensive investigations and source rock testing confirms the site is well placed to supply both local and more distant markets with a wide range of quarry products including high specification and commercial grades of road pavement materials and aggregates. It is expected that the site will experience good growth in demand for its products due to its location in the northern growth corridor of Melbourne.

In addition due to its ability to supply high specification products it can be expected that the site will be an important supplier to major infrastructure and commercial projects on the northern side into the City of Melbourne.

With ability to produce a wide range of quarry products including the high specification, high value products it can be expected that the proposed North Central quarry will be able to operate with a sustainable financial return on the capital invested.

With the ongoing depletion of Melbourne's hard rock quarries and the forecast strong growth in population, the proposed site of the North Central Quarry represents a "unique opportunity" in my view, to develop a highly sustainable and important source of quarry products for a large area of the northern Melbourne market.

I am unaware of any other site north of Melbourne that would have a similar range of positive factors that would allow the development of a highly sustainable hard rock quarry operation.

3.0 PART 2 – SITE EVALUATION.

3.1 QUARRY EVALUATION FACTORS.

3.1.1 SUITABILITY OF THE ROCK RESOURCE.

Under this heading consideration is given to factors such as the type of rock; the size of the resource; its consistency; geological structure; ability to be quarried and processed efficiently and at low cost in compliance with relevant specifications.

Generally speaking low silica rock types such as basalts and limestones have lower costs to quarry than higher silica types such as granite and hornfels. In addition rock types which are reasonably consistent and have a low degree of weathering or decomposition will have a lower waste and therefore be favoured as potential quarry resources.

It is also very important that the rock type is capable of being processed in to a wide range of products that meet compliance with relevant specification codes such as Australian Standards and Vic-Roads specifications for road pavement materials and aggregates. Rock types that comply with higher levels of these specifications are valued, as they allow for the production of higher value product grades.

Due to the high capital costs required to develop a quarry and the long lead time to gain approvals quarry operators will generally look for potential deposits that are large scale, often more than 10 Million tonnes in a geographical setting that enable cost efficient extraction such as relatively flat landforms or low undulating hills.

In considering these factors relative to the North Central Quarry proposal I note that the relatively large site (of about 120 Hectares) contains a proven resource of what can be described as “Newer” basalt and from drill hole investigations is covered with a minimal amount of overburden (generally less than 1 Metre) and displays good consistency in terms of its quality through the depth of the deposit. The approved quarry Work Plan area covers 49.7 Hectares.

The “Newer” basalts of Victoria are characterised by varying percentages of vesicular voids and in some cases decomposition but the North Central Quarry resource has limited impacts from these characteristics, displays good consistency through the depth of the deposit, and can be classed as high quality compared to other similar deposits. Silica content of this rock type is negligible, being well less than 1%.

I am instructed that the resource has been estimated to contain an assessed reserve of 10 million tonnes of fresh basalt capable of producing specification products and 7 million tonnes of material suitable for the production of a wide range of commercial products. I consider this to be a relatively large deposit and at the forecast production rates will be capable of about 30 years operation.

The resource has been subjected to a program of testing both in 2006 and 2019 (Bell Cochrane & Assoc. Consulting reports) to assess compliance of the rock type with relevant specification requirements.

In particular I note that in the BCA Consulting report of 2019 that the basalt rock type has been assessed by Department of Transport (formally VicRoads) Pavement Geotech and Materials in 2019 against relevant specifications for basalts which in particular refers to the Accelerated Soundness Index test and a petrological test for secondary mineral content. Samples have also been assessed in terms of their Los Angeles Abrasion loss and in all cases the North Central Quarry “Newer basalt”

samples have performed very well with the freshest samples being assessed to produce a range of the highest possible Vic-Roads specified road pavement materials and aggregates.

In summary the proposed quarry will be able to produce a wide range of products including:

- Vic-Roads specification road pavement materials Class 1 to 4 inclusive.
- Vic-Roads specification aggregates for concrete, asphalt and sealing works.
- Commercial grades of road pavement materials.
- General aggregate grades for use in concrete and civil works.
- Railway ballast in compliance with Australian Standard AS2758.7 - 2009.
- A wide range of environmental protection products such as Rip Rap, Beaching, erosion and bank stabilisation materials.
- General landscaping products including large boulder rock.

3.1.2 ENVIRONMENTAL SETTING.

When evaluating the value of a greenfield site for a potential quarry operation there are a number of environmental factors that need to be carefully considered.

These can include the aesthetic value of the site in terms of flora and fauna; the presence of water courses or other significant land features; the previous use of the land; the ability of the site to be effectively designed in terms of operational requirements to mitigate blasting, visual, noise and dust impacts through the use of extensive plantation screens and bunding; the proximity of other built structures such as roads, residential and commercial developments.

In addition it is important that site can be developed in such a way that any legislated “buffer or stand –off” areas and progressive rehabilitation activities can be incorporated in the design of the future quarry.

In reviewing the proposed North Central Quarry operating plans, including the Statutorily Endorsed Work Plan (Dated February 2015) I note that an extensive amount of investigation and thought has gone into a range of potential environmental impacts and required mitigation strategies.

The proposed quarry site has a number of advantages in terms of its development these include is relatively large size as stated above; its geographical setting and landform being a generally flat plain with limited nearby points of view; the lack of waterways or other significant land features; no known protected or endangered flora or fauna; no known aboriginal or other heritage features as concluded in the precinct structure plan review; its proximity to major transport corridors such as the Northern Highway and Hume Freeway; and only limited reasonably distant residential and other commercial developments.

The land has been extensively used for agricultural purposes including grazing over a long period of time.

I note that the North Central Quarry will be established on a staged basis with a great deal of early work to be done in establishing extensive bunding and tree plantations to protect both the short and long term operation of the quarry.

The location of the initial plant at R.L. 302 and quarry extraction areas are positioned in the far south-west corner of the site with large areas of rural land to the south and north, and adjacent to

land owned by the Yarra Valley Water Authority which is not planned to have any short to medium term development located on it.

At the end of Phase 1 of the development, the crushing plant will be relocated to RL290 (basically below ground level) to further mitigate any potential impact on surrounding land owners.

The staged development of the site includes the use of a small mobile plant to open the extraction activity of the quarry with a larger permanent plant to be established below ground level once the quarry pit has been developed to accommodate this permanent plant.

In addition, I have visited the site and independently reviewed other quarry operating plans for the site such as drilling and blasting, loading and hauling, crushing and screening, sales and despatch. It is my view, based on my wide experience, that they represent industry best practice in terms of managing any potential environmental impacts.

I note that significant thought and planning has gone into ensuring that Victorian EPA recommended 500 Metre buffer zone from operational activity is maintained through the life of the operation.

The operating plans including the Rehabilitation and Environmental Management Plans for the site, clearly articulate the extraction limits and the need for progressive rehabilitation of the site, the method, and timing of rehabilitation activities to ensure the long term operation and final form of the site meet best practice standards and contribute to the widest possible range of options in terms of end value uses of the site.

It is my strong view that the proposed North Central Quarry site has a large number of factors that contribute to it being able to be developed in a way that minimises long term environmental impacts and that the proposed development and operating plans for the quarry will contribute to achieving this goal. In addition the end of life value of the site will not be compromised unnecessarily.

3.1.3 TRANSPORT ACCESS TO MARKET.

A key issue in evaluating the value of any potential greenfield quarry site is its proximity and accessibility to major road transport corridors and its ability to cost effectively supply the largest possible market area.

This is particularly important in terms of quarry operations which need to maximise the most efficient types of truck transport to both minimise cost and potential environmental impacts.

Invariably this will lead to transport operators wanting to use larger allowable truck sizes for the application to minimise costs, the number of loads to move a required amount of material and the potential environmental and safety impacts.

I note the location of the proposed North Central Quarry site has a distinct advantage in terms of its direct access onto the Northern Highway and then Hume Freeway to distribute materials to a large area both in terms of local (less than 20 kilometres) and more distant markets. This includes northern and eastern suburbs and the central business district of Melbourne.

The design and development of the quarry includes the construction of a weighbridge, heavy duty internal sealed access road to an upgraded and signal controlled intersection onto the Northern Highway. Site lines at this intersection are good in both directions with the design taking into account Vic – Roads requirements, which they have approved.

Due to the generally flat nature of the quarry site and the adjacent road corridor and the design of the internal access road, operation of heavy trucks can be expected to be efficient with a high degree of safety.

In addition due to the site characteristics, quarry design and operation plans environmental impacts will be minimised due to the flat gradient of the access road, its sealed design and planned bund walls and tree plantations to provide screening.

I also note that existing housing and other development along the Northern Highway in proximity to the quarry site is generally sparse.

3.1.4 COMPETITIVE POSITION.

When evaluating the potential viability of a new quarry site it is important assess the competitive position of the site in terms of potential markets and competitors.

As with all businesses, potential for demand growth is also an important factor.

When assessing the potential market for a new quarry operation, consideration needs to be given to the local market which could be defined as that which exists within 20 kilometres of the quarry site, and the extended market which takes into account more distant demand associated with the need for specific products based on quality and availability constraints. For example large infrastructure projects requiring high specification road pavement products or high performance concrete aggregates used in major commercial developments.

This type of demand will usually exist in more developed areas such as the suburbs and the city district of Melbourne.

In assessing the market potential for the proposed North Central Quarry it becomes obvious that the location is in area that is moving from essentially rural residential to more heavily developed suburban residential as the growth of greater Melbourne generally expands in a northward direction.

Key areas of planned development exist close to the proposed site with Wallan to the north and Beveridge, Donnybrook and Whittlesea to the south, well within the 20 kilometre zone of the proposed quarry. In addition a major rail infrastructure project has been proposed for a site adjacent to Beveridge, and the Northern Ring Road corridor is in close proximity.

Due to the consistent and generally high quality of the North Central Quarry basalt rock resource and its ability to produce a wide range of specification and commercial products it is well placed to supply this growing local demand.

In addition the proposed quarry will be capable of producing a range of high specification products for the more distant demand associated with major infrastructure or commercial projects closer to the city of Melbourne. North Central Quarry with its high quality source rock located close to major road corridors including the Hume Freeway will be one of the relatively few sites that can supply the highest specification products required by major projects and authorities such as the Department of Transport (VicRoads).

In assessing the competitive setting of the proposed quarry it is also necessary to consider other quarry competitors and a range of factors such as their location, production capability in terms of

annual output and product range and longer term factors such as the size of their reserves and potential life of the operation.

Part 3 of this report provides details of potential competitor quarries operating in the region generally north of Melbourne to the town of Seymour which is approximately 90 kilometres north of the city.

From this it is my view that a number of existing quarry operations north of Melbourne have reserves that are less than 10 years and or have rock resources that are incapable of producing the full range of quarry products including high specification types i.e. they are capable of only producing commercial or non-specification products.

This means that during periods of a high demand for project related specification quarry products there are shortages being experienced for these products resulting in cost impacts for the general community. For example, major projects such as the City Rail Link, East West Freeway Link or the possible upgrade of Tullamarine Airport runways can all expect to experience tight supply issues in terms of high specification quarry products.

3.1.5 ABILITY TO GENERATE AN ADEQUATE RETURN ON FUNDS INVESTED.

In general industry expectations for a return on capital funds invested in a quarrying operation would be approximately 15% over the life of the operation.

Typically due to the long lead times to establish a quarry operation and the wide range of factors impacting on their development it is often necessary for quarry companies to secure and develop rock resources well in advance of the actual full demand need.

It should be noted that many of Melbourne's existing quarries which are generally located within 30 kilometres of the city centre were developed over 40 years ago and in some instances over 50 years ago.

The need to develop quarries in advance of demand results in lower return on funds invested in the early years of operation (often up to 10 years) until demand matures. This is certainly the case with local demand i.e. within 20 kilometres of the proposed quarry site.

As discussed above, it is my belief that the proposed North Central Quarry site south of Wallan has many factors that will help contribute to it generating good returns over a relatively short time frame. In particular the ongoing strong growth in residential development to the north of Melbourne and its focus around established areas such as Wallan and Beveridge, Donnybrook and Whittlesea will be an important driver of demand.

In addition the quarry has an identified rock resource capable of producing a wide range of quarry products for both higher specification and commercial grades making it suitable to supply more distant major infrastructure and commercial projects.

It is my belief that this proposed North Central Quarry will be able to generate a sustainable return on capital invested over the life of the quarry. In addition the quarry will contribute substantial economic value into the community through local employment, procurement of a wide range of services and supplies and additional capital investment during the life of the operation.

3.2 SUMMARY - SITE EVALUATION.

From the above evaluation it is my view that the proposed site for the North Central Quarry has many positive advantages.

The site has a large resource of high quality basalt rock, has a favourable environmental setting in terms of a quarry development and is located close to major transport corridors including the Hume Freeway.

The relatively large site of about 120 Hectares will allow for a well-designed and staged quarry development with extensive bund walls, tree plantations and buffer areas, which will greatly assist in the mitigation of potential environmental impacts from blasting, noise and dust.

In addition the site will be well screened from any view points and will undergo progressive rehabilitation in line with best industry practice during the life of its operation.

The site is well placed to supply both local and more distant markets with a wide range of quarry products including high specification and commercial grades of road pavement materials and aggregates. It is expected that the site will experience good growth in demand for its products due to its location in the northern growth corridor of Melbourne.

In addition due to its ability to supply high specification products it can be expected that the site will be an important supplier to major infrastructure and commercial projects on the northern side into the City of Melbourne.

With the ongoing depletion of Melbourne's quarries and the forecast strong growth in population, the proposed site of the North Central Quarry represents a "unique opportunity" in my view, to develop a highly sustainable and important source of quarry products for a large area of the Melbourne market.

I am unaware of any other site north of Melbourne that would have a similar range of positive factors that would allow the development of a highly sustainable hard rock quarry operation.

4.0 PART 3 – DEMAND ANALYSIS.

4.1 EXECUTIVE SUMMARY.

This part of the report assesses demand and supply for hard rock quarry products in the northern region of the Greater Melbourne market. The region extends from Kilmore in the north to the northern areas of the Melbourne Central Business District (CBD).

The report establishes that a significant demand and supply imbalance currently exists in the northern region and concludes there is a strong case to support the establishment of a new “greenfields” quarry (the North Central Quarry) at a site located just south of the town of Wallan.

This new quarry would have the potential to supply a wide range of hard rock quarry products including high specification products to the northern region residential growth areas which include the council areas of Hume and Whittlesea, and also project work closer to the Melbourne CBD.

As part of the demand and supply analysis carried out for this report a review and comments have been made on information contained in a study report completed by PwC consultants for the Victorian - Department of Economic Development, Jobs, Transport and Resources (DEDJTR).

In my previous career with Boral and my subsequent consulting business I have gained considerable experience in undertaking quarry supply and demand analysis studies.

The PwC study titled “Extractive Resources in Victoria: Demand and Supply Study, 2015 to 2050” and published in May 2016, analyses the supply and demand for extractive materials including hard rock; sand and gravel; limestone; clay and shale, across the state of Victoria and represents the most comprehensive data currently available on the subject.

The PwC study is quite difficult to interpret in terms of understanding the specific demand and supply issues for hard rock quarry products in the northern region of the Greater Melbourne market as it often discusses demand and supply for all extractive materials i.e. hard rock, sand and gravel, limestone, clay and clay shale.

In summary it does identify a significant shortfall in supply of hard rock quarry products particularly in the high residential growth areas of Hume and Whittlesea over the period 2015 to 2050 (page 56) and the need to source additional material from a range of new quarry developments. The report states (page 31) that by 2050 about 34% of the demand for extractive materials across Victoria, including hard rock quarry products will need to be supplied from new sites.

The shortfall in supply of hard rock quarry products within the northern region has been identified by separate analysis carried out as part of this report by reference to the PwC study, the study done by Coffey Services Australia, Wallan/Beveridge Extractive Resources Analysis (Geology)- Don Miller 2017, my own knowledge and experience of the northern market which has led to my conclusions in this report.

The report indicates demand growth in this region is expected to continue at a level of about 2% per annum (Tables 5 and 6 page 20) over the period supported by Greater Melbourne's ongoing strong residential growth and significant demand from projects committed to by the State Government particularly in the short term (2018 to 2025).

At the present time the estimated shortfall in hard rock quarry products (mainly concrete and asphalt aggregates) in the northern region of about 1 Million tonnes per annum, is being made up by transporting these products in from quarries located at some distance from the region at a significant cost penalty.

In terms of new quarry sites that will be able to meet future demand for hard rock quarry products across the Greater Melbourne market very few are currently identified or known.

The proposed North Central Quarry to be located near Wallan has been clearly identified as one site that is available but at this time approval to commence development has been delayed by planning approval issues.

The site contains a significant resource (approximately 17 Million tonnes) of good quality basalt suitable to produce a full range of hard rock quarry products including high specification products. In addition the site has good access to major road infrastructure including the Hume Freeway, has large land buffer areas with no nearby residential developments or sensitive receptors.

In summary, the environmental setting is well suited for the proposed use as a quarry site, and the proposed quarry Work Plan allows for best practice in terms of a staged development with progressive rehabilitation.

The proposed North Central Quarry will be a significant supplier of hard rock quarry products to the northern region for a period of about 30 years at the annual planned production rate, but by itself is unlikely to be able to address the full demand and supply imbalance that exists in the region.

4.2 KEY OBJECTIVES OF THIS REVIEW.

The key objectives of this review are:

- To review and comment on the DEDJTR (PwC) - "Extractive Industries in Victoria, Demand and Supply Study 2015-2050" report, published in 2016 with a particular focus on its relevance and implications for the supply of hard rock quarry products into the northern region of the Greater Melbourne market and the development of the proposed Conundrum North Central Quarry near Wallan.
- To assess and discuss current and future demand levels for hard rock quarry products in the northern region of the Greater Melbourne metropolitan market and

the potential for the proposed new Conundrum North Central Quarry to be established near Wallan to supply this market.

- To review current suppliers of hard rock quarry products into this market region in terms of their annual production capacity and forecast reserves life.

4.3 PROPOSED NORTH CENTRAL QUARRY.

The proposed North Central Quarry site is located just off the Old Northern Highway south of the town of Wallan approximately 43Kms due north of the Melbourne CBD. The quarry site is situated in the southern end of the Shire of Mitchell.

Conundrum have a long term property lease over an area of approximately 120 Hectares and have developed a proposed Quarry Work Plan covering about 50 Hectares of the total site.

The rock resource across the site is a good quality “New Age” basalt capable of producing a full range of VicRoads specification quarry products in addition to a wide range of other products such as rail ballast, rip rap and other commercial grade quarry materials.

The basalt has negligible levels of silica present in its rock matrix and is covered by a minimal amount of overburden, generally less than 1 metre. It is regarded as consistent and of high strength.

Reserves across the site have been assessed to be about 17 Million tonnes or sufficient for 30 years of operation at the planned average production rate.

The environmental setting for the site is well suited for the proposed quarry operation with good buffer areas surrounding the planned working area of the quarry and no nearby housing or sensitive receptors.

Previous surveys across the site have not found any protected species of flora or fauna, heritage structures or items. In addition no aboriginal relics have been identified on the site. The site has a history of being used for rural activities such as cropping and grazing, there are a minimal number of mature trees across the site.

The crushing and screening plant will be located behind treed bunds initially before being relocated into the quarry hole therefore minimising impacts of sight, noise or dust.

The proposed quarry Statutorily Endorsed Work Plan for WA No.1473 (dated February 2015) for the site includes a staged development with progressive rehabilitation over the life of the site to leave a final landform of open parkland around a landscaped lake.

The proposed site is well located to access the northern region market high growth residential areas and the Greater Melbourne market as far south as the CBD.

With its expected low cost of production, due to characteristics related to this type of basalt deposit and its good access to the Hume freeway and other arterial roads the site can be expected to supply hard rock quarry materials across a wide area of the northern region of Greater Melbourne in a very cost competitive manner.

At this time no other known or proposed quarry site in the northern region has the advantages present at the North Central Quarry site.

4.4 REVIEW OF DEDJTR (PwC) - EXTRACTIVE RESOURCES IN VIC, DEMAND AND SUPPLY STUDY, 2015 -2050.

This detailed demand and supply study was commissioned by the DEDJTR and published in May 2016. It attempts to analyse demand and supply of extractive materials (namely Hard Rock, Sand and Gravel, Limestone, and Clay /Shale) across the state of Victoria for the period 2015 – 2050.

In terms of this review the “PwC” study report has been used as a source of information relating to the demand and supply of hard rock quarry products into the Greater Melbourne market with a particular focus on the northern region of this market which would be the primary market for the proposed North Central Quarry.

Some key findings of this study are:

Demand for hard rock products within the Greater Melbourne market is expected to increase from 25 Million tonnes in 2015, to 30 Million tonnes in 2025 and then to 51 Million tonnes in 2050 or an increase of about 109% over the study period (Table 2 Page 19).

By 2050 about 44% of demand in the Victorian market for all extractive materials including hard rock will be supplied from currently operating sites with the remaining 56% assumed to be supplied from new sites (page 28).

It is expected that the ratio of supply for hard rock to the Greater Melbourne market will remain the dominant extractive product (about 60% of the total products) and this market is by far the largest in the state (based on annual sales statistics collected by Earth Resources Regulation).

In making the above statements the DEDJTR study report comments that there are many complex competing land uses that impact on existing quarries and potential future extractive sites particularly in urban and regional fringe areas.

It further comments on land planning decisions which fail to protect future extractive resources or prohibit their establishment in areas close to market demand. It goes on further to state that there is an opportunity that land planning legislation and decisions particularly on the fringes of the Greater Melbourne area and regional cities should take into account the need to secure existing and future sources of extractive materials.

Across the whole Victorian market extractive products can generally be transported up to 100Kms from source point (quarry) to use point with heavy truck transport by far the most dominant method of transport. Rail transport of extractive materials is less than 2%. Within the Greater Melbourne market hard rock materials would generally be transported less than 50Kms due to the current number of well-established quarries located within the market.

In recent years substitute recycled hard rock products (made from demolition concrete and surface boulder rock) have entered the Greater Melbourne market due to the trend towards recycling and sustainability but these products are mainly limited to lower grade road base products due to their variability. It is estimated that currently about 5.5M tonnes per annum of these products are consumed in the market and this figure is expected to remain fairly stable depending on availability of demolition concrete, boulder rock and to a lesser extent brick sources.

A headline finding of the PwC study is that across Victoria there are resources of all extractive materials available in 2050 from existing and planned approved sites of 11 Billion tonnes (page 28) with very large quantities being supplied from South Gippsland (33% of the Greater Melbourne market needs over the study period). Further analysis of the study shows that of the stated 11 Billion tonnes of resources 9 Billion tonnes are sand and gravel (mainly from south Gippsland) and 1 Billion tonnes is new basalt (mainly from the western region of Melbourne).

These findings are very much questioned by members of the industry and have led to significant confusion over the real state of future reserves across the Victorian market. It should be noted that at the present time only insignificant amounts of hard rock material is sourced in South Gippsland (mainly for local needs) and future possible reserves are very limited.

It is highly unlikely that supply of hard rock quarry products could be sourced from South Gippsland into the Greater Melbourne market due to excessive transport costs even if they were available.

From my experience the PwC study seems to understate the importance of hard rock quarry products being supplied into the Greater Melbourne market (approximately 55% of total Victorian demand) from existing large scale hard rock quarries, with generally close proximity, supplying this market.

Some of these are Boral at Deer Park, Montrose and Lysterfield; Hanson at Wollert and Lysterfield; Holcim at Pakenham, Oakland's Junction and Werribee South; and Barro at Wyndamvale. In addition the report does not comment on a number of important sources of supply into this market that will be exhausted well before 2050.

The PwC study does make comment and attempts to quantify shortages of hard rock materials within council regions of the Greater Melbourne market such as Central Melbourne, Hume and Whittlesea (page 56) and the relevance of these shortages are discussed in the following sections of this report.

The PwC study fails to identify and quantify the impact of current and short term major infrastructure projects in the Greater Melbourne market on the demand for hard rock quarry products, particularly related to the higher specification products required for these projects which are generally those under most supply pressure. These projects are going to have a major impact on demand in the period from 2020 to 2025 and shortages can be expected which are likely to impact on project time deliverables and cost.

Some of these include the Melbourne Metro Rail Link, the Western Distributor, the Mernda Rail Extension, the Beveridge Interstate Rail Freight Terminal, the M80 Link to the Eastern Freeway and the Kilmore/Wallan By – Pass, Melbourne Airport new runway.

4.5 NORTHERN REGION DEMAND ANALYSIS.

Of particular relevance to the proposed North Central Quarry is the current and future demand for hard rock quarry products in what can be defined as the northern region of the Greater Melbourne market which generally extends from Kilmore (approximately 55Kms north of, to the Melbourne CBD).

This region takes in the southern areas of the Shire of Mitchell, eastern areas of the Shire of Macedon Ranges, Councils of Hume, Whittlesea, Darebin, Moreland and the northern areas of the City of Melbourne.

Demand for hard rock quarry products in this area is heavily influenced by strong residential housing growth, associated infrastructure and commercial development, urban renewal and infill, and major project work (freeways, railways, airports).

A previous study carried out by the DEDJTR (Ernst Young Consulting, May 2016) estimates that on average 8.6 tonnes of quarry products are required annually for each person residing in the Greater Melbourne market area of which hard rock demand could represent about 60% or about 5.2 tonnes per person (estimated from Earth Resources Regulation annual extractive production statistics).

On the basis of assuming the population of Greater Melbourne is currently about 5 Million people and applying a demand figure for hard rock quarry products of 5.2 tonnes per annum then total demand is estimated at 26 Million tonnes per annum. This figure has close alignment with the annual demand for hard rock stated in the PwC study report of about 25M tonnes per annum in 2015. (Fig 42 page 75 of the report.)

Across the period of 2015 to 2050 the PwC study forecasts part of the demand for hard rock materials in the northern region based on some council areas, and estimates for others are summarised in the following table to build up an overall market demand for hard rock materials in the region that could potentially be supplied from the proposed Conundrum North Central quarry.

The estimated demand in the northern region of the Greater Melbourne market has been calculated at about 8.5 Million tonnes per annum or approximately one third of the total

market. This seems reasonable in terms of the number of strong growth areas in the northern region market.

From the ABS Census Statistics 2016, areas such as Doreen, South Morang, Mickleham and Mernda are all stated to have population growth rates of more than 20% per annum over the period of 2006 to 2016.

TABLE 1 - HARD ROCK QUARRY PRODUCTS DEMAND, NORTHERN REGION.

(Million Tonnes per Annum.)

SHIRE/COUNCIL	2015	2025	2050	COMMENTS
MITCHELL.	1.2	1.3	3.0	RES. GROWTH
MACEDON RANGES.	0.8	1.2	1.6	EST. RES GROWTH.
HUME.	1.6	0.9	1.4	RES.GROWTH
WHITTLESEA.	2.9	2.4	4.0	RES.GROWTH
DAREBIN.	1.0	1.3	1.5	EST. RENEWAL
MORELAND.	1.0	1.3	1.5	EST. RENEWAL
MELBOURNE CITY. (NORTH)	1.0	1.2	1.4	EST. GROWTH RENEWAL
TOTALS	8.5	8.3	14.4	

I have prepared Table 1 above to summarise estimated demand figures in 2025 for the growth councils of Hume and Whittlesea are understated as I believe these areas will continue to have significant residential growth.

From the PwC study report total demand for hard rock materials in the Greater Melbourne market is stated as 25 Million tonnes in 2015 rising to 30 Million tonnes in 2025 then to 51 Million tonnes in 2050 i.e. an increase over 100% across the study period (Table 2 page 19).

It is expected that hard rock material demand for major projects such as the Melbourne Metro Rail Link, Western Distributor, Mernda Rail Extension, M80 Eastern Link, Kilmore/Wallan By-Pass, Beveridge Rail Freight Terminal, and Melbourne Airport Upgrades will all have the potential to create significant hard rock quarry demand for quarries operating in the northern region of Greater Melbourne including the proposed North Central quarry.

At this time it is not possible to accurately estimate the hard rock material demand for these projects or timing of demand but based on current advice it is expected to be significant in the period 2020 to 2025.

It is noted that in past periods of high project work, demand for hard rock quarry products across Victoria has risen to about 35m tonnes (2007/2008 Eastlink and other projects) and 38M tonnes in 2012 (Deer park By-pass, Peninsula Link and others) from a base of about 30M tonnes.(DEDJTR study Figure 7). This increase was largely driven by projects in the Greater Melbourne market.

A factor to also consider is that major projects such as these generally require large quantities of high specification aggregates and road base materials which generally come under most demand pressure during periods of high demand, and are more supply constrained than lower quality products.

It is a reasonable assumption that base line demand for hard rock products in the 2015 to 2025 period could be increased by 30 - 40% due to major project work.

As a guideline to demand VicRoads estimates that a four lane arterial road requires 22K tonnes of hard rock material for each kilometre of construction with 60% of this requirement being for higher specification road base materials. (VicRoads submission to DEDJTR Demand and Supply Study May 2016)

Clearly major road projects have a very big impact on the demand for hard rock quarry projects particularly high specification products and the intensity of use over shorter time periods has increased significantly as projects increase in size and construction companies push for greater efficiency in the build schedule.

4.6 NORTHERN REGION HARD ROCK QUARRY PRODUCTS SUPPLY ANALYSIS.

A review was carried out as part of this supply and demand analysis of hard rock quarries currently in operation in the northern region of Greater Melbourne including their estimated annual production quantity, reserves life and rock type.

For completeness this review also provides details of Recycled quarry product producers.

At the present time the northern region of Greater Melbourne is generally served by a number of well-established quarries with largest of these being the Hanson Kilmore and Wollert quarries and the Holcim Oaklands quarry which all have relatively long term reserves (in excess of 25 years).

This said there are several significant operations that have less than 10 years of reserve which include the Boral Wollert quarry, the Barro Donnybrook quarry, the Hi Quality Bulla quarry and the Conundrum Epping quarry. Based on my knowledge these quarries will exhaust their reserves in about 2028.

From the attachment (see Attachment 1 prepared by me), current hard rock quarry production capacity in the northern region is estimated to about 6.5 Million tonnes per annum with recycled materials adding approximately a further 1.0 Million tonnes per annum of substitute materials pre-dominantly used in residential estate development. Therefore current hard rock (and substitute capacity) is about 7.5 Million tonnes.

With reference to Table 1 - Hard Rock Quarry Products Demand, Northern Region this implies that a considerable amount of hard rock demand in the northern region (about 1.0M tonnes per annum) is currently being transported by road into the region from more distant

sources. I expect this will largely be aggregate products used in pre-mix concrete and asphalt production by the major companies who dominate supply of these products in the region.

These aggregate products will be coming from quarries located west of Melbourne such as Boral Deer Park and Barro Wyndamvale, and eastern quarries such as Boral Montrose and Hanson Lysterfield at some cost penalty due to longer cartage distances. The impact of these costs is discussed further later in this report.

Smaller volumes from nearby country quarries would also be entering the northern region but at a considerable transport disadvantage compared to other quarries located in the Greater Melbourne market.

This supply imbalance is expected to continue to increase particularly in the short term (next 5 years) due to ongoing growth in residential demand and a significant increase in project work across the Greater Melbourne market including northern areas.

In the longer term it is expected demand in the northern region will continue to increase at an average rate of about 2.1% per annum in line with DEDJTR study forecast (page 19).

During the next 10 years existing quarry operations of Boral at Wollert and Conundrum Holdings at Epping will exhaust their reserves adding up to 1.0 Million tonnes per annum to the current imbalance figure assuming no new production capacity for hard rock quarry products comes on line in the northern region.

At the present time there are very few potential new hard rock quarry sites in the northern region. In addition it is considered that upgrade options to fixed plant capacity of existing quarries in the region are limited.

In terms of potential new quarry sites those currently known are:

4.6.1 Conundrum Holdings – North Central.

As previously discussed this leasehold site controlled by the Kerr family is the subject of a current application for an extractive industry. Full details of the site are provided on page 6 of this review.

This site is a “greenfield site” located to the north of the northern region market area and has the advantages of being located adjacent to good transport corridors, a good environmental setting, and proven reserve of high quality basalt that could sustain a quarry operation for about 30 years operating at 500 Thousand tonnes per annum.

The site would be capable of supplying general demand throughout the northern region including project work in the near northern CBD areas.

4.6.2 Barro Group – Donnybrook

The Barro Group currently operate a siltstone quarry and recycled quarry products business on land they control at Donnybrook 30Kms due north of the Melbourne CBD.

There is potential to extend quarry operations on this site into an adjacent basalt resource.

Unfortunately the site is rapidly being surrounded by residential housing, increased local traffic and has a number of impediments including high voltage power lines and a major gas pipe line limiting the workable areas of the potential reserve.

The quality of the basalt resource on the site is thought to be only average and it may not be suitable for producing high specifications products.

Little is known about the status of approval for this extension of operations.

4.6.3 Holcim - Donnybrook.

This site is located adjacent to the Barro quarry site in Donnybrook and has the same impediments (power lines and gas pipe line) and residential encroachment to its potential development. In addition road access to this site may be restricted due to other land holders.

Based on my experience, the basalt reserve is thought to be only of average quality.

It is unknown whether Holcim intend to seek approval for quarry operations on this “greenfield” site.

4.6.4 Adams Group - Beveridge.

The Adams Group control significant land holdings in the Beveridge area just north of Donnybrook, some of which may contain a suitable resource of basalt to develop a quarry operation.

This land is in the general area of the potential Melbourne interstate rail freight terminal and other residential / commercial developments.

The quality of any potential basalt resource is unknown but again is thought to be only average.

The development of the potential rail freight terminal, associated rail access and roads, and commercial premises such as warehouses and factories would obviously impact on any potential quarry development.

At this time it is unknown if the Adams Group have any intention of pursuing a quarry development on their land, it is thought to be unlikely with their preference to support the interstate rail freight terminal development and associated infrastructure.

In summary there are very limited options to develop new quarry operations in the northern region of the Greater Melbourne market. The Conundrum site at Wallan is clearly the best prospect for the reasons given above, with rapidly encroaching residential development in the Donnybrook and adjacent areas being a serious impediment to other options.

4.7 OPTIONS TO UPGRADE EXISTING PRODUCTION CAPACITY IN THE NORTHERN REGION.

It may be possible for a number of the current major operators of quarries in the northern region to upgrade existing production of hard rock materials in the northern region to meet the current demand/supply imbalance and future increased demand.

The most likely of these sites are discussed below:

4.7.1 Hanson - Kilmore Quarry.

This quarry located in the far north of the region is approximately 65Kms from the CBD is capable of producing about 1.2 Million tonnes of hard rock materials per annum.

Historically this quarry has been a major supplier of high specification aggregates to Hanson's internal concrete and asphalt (sold some years ago) businesses located in the Greater Melbourne market. Most of this material was transported by rail into metropolitan depots for further distribution by road transport.

Reserves at the site were increased some years ago with the acquisition of the adjacent Galli Quarry and are thought to be sufficient for about 30 years production.

Due to its location disadvantage to the market, despite rail transport, it is unlikely that Hanson would consider a significant upgrade of this location. The site is disadvantaged in terms of its ability to sell road base and other by- products into the northern region market due to its location near Kilmore.

4.7.2 Hanson – Wollert Quarry.

This quarry is one of the largest in the northern region producing about 1.6 Million tonnes of hard rock materials per annum from a reserve of new basalt. Reserves are thought to be in excess of 20 years at current production capacity.

A full range of quarry materials are produced from the site including aggregates and road bases however due to the "average quality" of the basalt reserve not all high specification products can be produced.

During the past the quarry fixed plant has had a number of incremental upgrades to increase capacity but is thought to be at its limit in terms of further significant upgrades.

In recent periods of high demand Hanson has supplemented fixed plant capacity by bringing in mobile crushing capacity. This equipment can supply increased volumes of product but at additional incremental cost increase of about 30% over the fixed plant production cost.

Many quarries adopt the strategy of employing mobile crushing capacity to avoid the high capital cost of increasing fixed plant production, associated downtime(loss of production) to undertake a significant upgrade, and potential planning and approval delays and problems.

4.7.3 Holcim – Oakland’s Quarry.

This quarry is currently the largest operating in the northern region and is based on a reserve of hornfels and granite located approximately 25Kms from the CBD. Reserves are long term (In excess of 25 years).

The quarry is capable of producing about 2.0 Million tonnes per annum of hard rock materials including high specification aggregates and road bases.

It has good access to major transport routes and covers a large area of land, and is relatively free of encroachment from residential activity.

As for the Hanson Wollert quarry, Holcim have employed mobile crushing capacity to supplement fixed plant production during periods of high demand.

This quarry is relatively high cost to operate due to significant overburden depths and the high silica content of the two rock types quarried on the site.

The fixed plant has had a number of incremental upgrades in past years (crushers and screens) and it has potential for a significant upgrade in future capacity to supply periods of high project demand.

It is not known if there are any current plans to increase production capacity of this site.

4.7.4 Barro - Donnybrook Quarry.

This quarry process both siltstone and basalt boulder rock to produce a range of lower specification commercial quarry products. It is not capable of producing higher specification road bases or aggregates.

The plant consists of what could be described as lightweight semi transportable or mobile modules of limited capacity. It is thought it is capable of producing about 600 Thousand tonnes per annum.

Due to its environmental setting, and nature of the resource I do not believe it likely to be upgraded significantly in the foreseeable future.

4.7.5 Other Northern Region Quarries.

Other quarries operated in the northern region such as Boral – Wollert, Conundrum – Epping and Hi - Quality at Bulla have limited reserves (Less than 10 years) making it unlikely that these sites would be considered for significant production capacity upgrades.

In addition these quarries lack the production scale of those listed above and in some cases have higher levels of encroachment from residential activity making it more unlikely that capacity upgrades would be considered.

Overall with the possible exception of the Holcim - Oakland's quarry it seems unlikely that there will be any significant upgrades in hard rock quarry production in the northern region in the short term.

4.8 TRANSPORT COST IMPACTS.

The PwC study attempts to quantify the cost of transport of all extractive materials supplied to the Victorian market in 2015 and then goes on to develop transport costs for a number of increased cartage distances to show the impact of demand/supply imbalances across the study period of 2015 to 2050.

The study states (page 87) that after consultation with industry sources extractive materials average 35% of total project costs for typical residential or commercial construction projects when considering only material costs. Clearly this figure will vary significantly depending on the type of project e.g. a residential road verses the actual residence, due to variations in extractive materials use intensity.

In the PwC study report, it has been estimated that an extra \$2 Billion would be incurred across the 2015 to 2050 period for every additional 25Kms that all extractive materials need to be transported from their supply source (page 87). The study then estimates increased transport costs for a range of more distant supply sources.

It should be noted that the PwC study states these increased transport costs are "direct" costs and do not include other "indirect cost" impacts such as environmental (noise, emissions, loss of amenity) social impacts such as traffic congestion and road safety, or additional infrastructure costs such as road upgrades or increased maintenance.

This report has focused on demand and supply of hard rock quarry products into the Greater Melbourne market with a particular focus on the northern region of the market and the potential role the proposed Wallan quarry would play in meeting this demand.

The transport of hard rock quarry products in the Greater Melbourne market is a significant cost factor estimated to be about 26 – 30% per tonne of the total delivered cost per tonne or currently about \$150M per annum. (Estimated from Earth Resources Regulation Extractive Production Annual statistics)

As stated previously in this report (page 27) there is a current supply imbalance for hard rock quarry products in the northern region of about 1 Million tonnes per annum a large proportion being aggregates for use in pre-mix concrete or asphalt.

This imbalance is currently estimated to be costing the "end user" of construction material products in the northern region an estimated \$3.5 Million per annum in direct costs alone assuming an additional average transport distance of 20Kms from the supply source. There are also a range of other indirect costs such as environmental emissions, road maintenance, amenity and safety.

Assuming the proposed North Central Quarry operated at a production level of about 500 Thousand tonnes per annum it could reduce this cost impost by about \$1.6M per annum. Again this is based on direct costs only for the current general demand in the northern region and does not allow for addition volume impacts from major project work that will occur in the next 5-10 years.

If further demand/supply imbalance increases in the region due to major project work, this will result in even more distant supply sources being required, adding to cost impacts particularly for higher specification products.

4.9 SUMMARY – DEMAND ANALYSIS.

Generally speaking the Greater Melbourne market for construction materials has benefited from the supply of hard rock quarry products from a range of well-located, cost competitive quarries that were originally located outside residential development areas of the market.

Many of these quarries located on significant reserves of hard rock were established up to 50 years ago and are now facing pressures of residential encroachment and diminished reserves. A number of these quarries will exhaust their reserves within the next 10 years and certainly by 2050 others will have ceased operation as stated in the PwC study report.

The PwC study report stated that demand for hard rock quarry products across Victoria is expected to grow from about 32 Million tonnes per annum in 2015 to 63.8M tonnes in 2050 or about 100%. This represents an average of about 3% per annum which is in excess of the population growth rate.

The Greater Melbourne market will account for almost 80% of this demand for hard rock quarries or about 51M tonnes in 2050 compared to the current figure of about 27m tonnes per annum. This is well above existing and known planned future supply capacity.

At the current time there are very limited known hard rock replacement sites and these are facing significant delays and cost impacts in terms of the approval process.

This review has focused on hard rock quarry product demand and supply issues in the Greater Melbourne market with a specific focus on the northern region of the market i.e. from the northern CBD through to the town of Kilmore taking in a number of rapidly growing council areas such as Hume, Whittlesea and the southern areas of the Shire of Mitchell.

It is likely that supply shortages, certainly for higher specification materials will occur across the Greater Melbourne market in the period 2020 to 2025 as major project demand ramps up strongly.

New infrastructure projects are being announced regularly such as the recent western arterial road upgrade program announced in 2017 and the very large North East Link (2018). In addition it is expected work on the new Melbourne Airport runway will commence in this

period. A large intermodal rail container terminal is also planned to be developed in the Beveridge area as part of the inland rail project.

Therefore it is expected that forecast demand for hard rock quarry products in the 2018 to 2025 period is likely to be significantly more than stated in the PwC study i.e. 30 – 50% greater.

The PwC study report has stated that from industry experience an average increase in costs of 10% could be expected for extractive materials from supply constraints which could result in an average of 3.5% increase in project costs across the state i.e. \$35 Million in a new \$1Billion road project.

This increase could be under stated for high specification hard rock quarry products. It is likely that supply shortages, certainly for higher specification materials will occur across the Greater Melbourne market in the period 2020 to 2025 as major project demand ramps up strongly.

The proposed North Central quarry to be located just south of Wallan in the northern region is a significant well located reserve of good quality basalt which would be available for about 30 years at the planned production rate.

Approval of this quarry operation would be important in helping to address the current demand/supply imbalance in the region, but by itself would not address the full imbalance now or in the future.

Across the Melbourne Region or near to it, there will be a need for several new sources of hard rock quarry products to be approved over the short to medium term to meet the forecast growth in demand if shortages of supply are to be avoided.

5.0 CONCLUSIONS.

From this evaluation it is my belief that the proposed North Central Quarry site south of the township of Wallan has many positive advantages.

The Greater Melbourne market will account for about 80% of Victoria's demand for hard rock quarry materials or about 51 Million tonnes in 2050 compared to the current figure of about 27 Million tonnes per annum. This forecast demand is well above existing and known planned future capacity.

At the current time there are very limited known hard rock replacement sites and these are facing significant delays and cost impacts in terms of the approval process.

This evaluation has focused on hard rock quarry product demand and supply issues in the Greater Melbourne market with a specific focus on the northern region of the market i.e. from the northern CBD through to the town of Kilmore taking in a number of rapidly growing council areas such as Hume, Whittlesea and the southern areas of the shire of Mitchell.

The North Central Quarry site has a proven large resource of good quality basalt, has a favourable environmental setting in terms of quarry development and is located close to major transport routes including the Hume Freeway.

The relatively large site of about 120 Hectares will allow for a well – designed and staged quarry development with extensive bund walls, tree plantations and buffer areas, which will greatly assist in the mitigation of potential environmental impacts from blasting, noise and dust.

The site will be well screened from any view points and will undergo progressive rehabilitation in line with best industry practice during the life of the quarry operation.

Extensive investigations and source rock testing confirms the site is well placed to supply both local and more distant markets with a wide range of quarry products including high specification and commercial grades of road pavement materials and aggregates. It is expected the site will experience good growth in demand for its products due to its location in the northern residential growth corridor of Melbourne.

Its ability to produce high specification products will mean the site can be an important supplier to major infrastructure and commercial projects on the northern side into the City of Melbourne.

With its ability to supply this wide range of quarry products including higher value products it can be expected that the proposed North Central Quarry will be able to operate with a sustainable financial return on the capital invested.

With the ongoing depletion of Melbourne's hard rock quarries and the forecast strong growth in population, the proposed North Central Quarry represents a "unique opportunity" in my view, to develop a highly sustainable and important source of quarry products for a large area of the northern Melbourne market.

The development of this quarry operation would be important in helping to address the current demand/supply imbalance in the northern area, but by itself would not address the full imbalance now or in the future.

Across the Melbourne Region it will be necessary for a number of new resources of hard rock quarry products to be approved over the short to medium term to meet forecast growth in demand if shortages of supply and consequent adverse cost impacts to the community are to be avoided.

The proposed North Central Quarry site located south of the township of Wallan in the northern area of Melbourne is a significant well located reserve of good quality basalt which would be available for about 30 years at the planned production rate.

I am unaware of any other resource site north of Melbourne that would have a similar range of positive factors for the development of a highly sustainable quarry operation as the site proposed for the North Central Quarry.

John Malempre
CONMATS Consulting
July 2020

ATTACHMENT 1 - NORTHERN REGION OF MELBOURNE QUARRY OPERATIONS.

LOCATION	WORK AUTH NUMBER	OPERATOR	ROCK TYPE	PRODUCTION (PER ANNUM*)	LIFE (EST. YEARS)	DISTANCE (KILOMETRES)	PRODUCTS	COMMENTS
Kilmore	WA384400	Hanson	Basalt	1,200	20+	6520	All	Rail to Melbourne
Donnybrook	WA492	Barro	Siltstone	350	10	3017	Commercial	Low grade
Oaklands	WA176	Holcim	Granite & Hornfels	2,000	25+	2520	All	Two rock types quarried
Wollert	WA393	Hanson	Basalt	1,600	25+	2718	Commercial	Can be variable
Wollert	WA102	Boral	Hornfels	450	7	2323	All	Residential encroachment, high percentage low grade
Bulla	WA1123	Hi-Quality	Basalt	150	3	2525	Commercial	Highly variable, Close to finished
Woodend	WA463	Fulton Hogan	Basalt	300	10	5038	All	Possible extension +10 years, environmental issues
Epping	WA445	Conundrum	Basalt	400	8	2126	Commercial	Can be variable
RECYCLERS/EXCAVATION STONE PRODUCERS.								
Donnybrook		Barro	Recycle/Exc	250	N/A	3017	Commercial	Recycled concrete/Exc rock, variable, uncertain availability
Wollert		Boral	Recycle/Exc	70	N/A	2323	Commercial	Recycled concrete/variable, uncertain availability
Epping		Alex Fraser	Recycle/Exc	450	N/A	2126	Commercial	Recycled concrete/Exc rock, variable, uncertain availability
Epping		Aurora	Recycle/Exc	300	N/A	2126	Commercial	Recycled concrete/Exc rock, variable, uncertain availability
Notes:	*Production estimate only in thousands of tonnes per annum. Includes dust and scalps (approx. 50% of total) Commercial refers to limited ability to produce Vic-Roads specification products. Does not include clay or fine sand operations.							