5 December 2013

## STOCKYARD HILL WIND FARM PTY LTD

Extractive Industry Work Authority 1518, Work Plan: Proposed Quarry



1. S. 14.

REPORT

Report Number.

**Distribution:** 

137618018-007-R-Rev5

Department of State Development, Business and Innovation Origin Energy Golder Associates



## **Table of Contents**

| 1.0 | INTRO                | DUCTION                                       | 1  |
|-----|----------------------|---|----|
|     | 1.1                  | Project Overview                              | 1  |
|     | 1.2                  | Work Plan Structure                           | 2  |
| 2.0 | 2.0 SITE INFORMATION |   |    |
|     | 2.1                  | Site Locality                                 | 3  |
|     | 2.2                  | Existing Conditions                           | 3  |
|     | 2.3                  | Surrounding Land Uses                         | 3  |
|     | 2.4                  | External Access                               | 4  |
| 3.0 | THE P                | ROPOSED QUARRY                                | 5  |
|     | 3.1                  | The Need                                      | 5  |
|     | 3.2                  | Estimated Annual Outputs                      | 6  |
|     | 3.3                  | Proposed Location and Quarry Features         | 7  |
| 4.0 | SITE A               | ND ACCESS DETAILS                             | 9  |
|     | 4.1                  | Planning and Title Information                | 9  |
|     | 4.2                  | Internal access                               | 9  |
|     | 4.3                  | Site Security                                 | 9  |
| 5.0 | RESO                 | URCE INFORMATION                              | 10 |
|     | 5.1                  | Geomorphology                                 | 10 |
|     | 5.2                  | Geology                                       | 10 |
|     | 5.3                  | Subsurface conditions                         | 10 |
|     | 5.3.1                | Topsoil                                       | 11 |
|     | 5.3.2                | Inferred Residual Basaltic Soils (Overburden) | 11 |
|     | 5.3.3                | Weathered Basalt                              | 11 |
|     | 5.4                  | Reserve Estimates                             | 11 |
|     | 5.5                  | Soil and Overburden Estimates                 | 12 |
| 6.0 | INFRA                | STRUCTURE                                     | 12 |
|     | 6.1                  | Fixed Plant                                   | 12 |
|     | 6.2                  | Mobile Plant                                  | 12 |
|     | 6.3                  | Portable Site Office and Amenities            | 13 |
|     | 6.4                  | Power and Fuel Supply                         | 13 |



## STOCKYARD HILL WIND FARM EXTRACTIVE INDUSTRY WORK PLAN

|      | 6.5                            | Water supply                    | . 13 |  |  |
|------|--------------------------------|---------------------------------|------|--|--|
|      | 6.6                            | Sewerage                        | . 14 |  |  |
| 7.0  | OPERATIONS                     |                                 |      |  |  |
|      | 7.1                            | Sequence of Development         | . 14 |  |  |
|      | 7.2                            | Hours of operation              | . 14 |  |  |
|      | 7.3                            | Extractive Operations           | . 14 |  |  |
|      | 7.3.1                          | Topsoil and Overburden Handling | . 14 |  |  |
|      | 7.3.2                          | Rock Extraction                 | . 15 |  |  |
|      | 7.4                            | Working Faces                   | . 15 |  |  |
|      | 7.5                            | Final Face Treatment            | . 15 |  |  |
|      | 7.6                            | Explosives Usage                | . 16 |  |  |
|      | 7.7                            | Processing Operations           | . 16 |  |  |
| 8.0  | ENVIR                          | ONMENT                          | . 17 |  |  |
|      | 8.1                            | Air Quality - Particles         | . 17 |  |  |
|      | 8.2                            | Noise                           | . 17 |  |  |
|      | 8.3                            | Blasting                        | . 17 |  |  |
|      | 8.4                            | Groundwater                     | . 18 |  |  |
|      | 8.5                            | Stormwater                      | . 19 |  |  |
|      | 8.6                            | Flora and Fauna                 | . 19 |  |  |
|      | 8.7                            | Noxious Weeds                   | . 19 |  |  |
|      | 8.8                            | Cultural Heritage               | . 20 |  |  |
|      | 8.9                            | Visual                          | . 20 |  |  |
|      | 8.10                           | Erosion Control                 | . 20 |  |  |
|      | 8.11                           | Fire Management                 | . 20 |  |  |
|      | 8.12                           | Waste Management                | . 21 |  |  |
|      | 8.13                           | Fuels and Chemicals             | . 21 |  |  |
| 9.0  | REHAE                          | BILITATION PLAN                 | . 22 |  |  |
|      | 9.1                            | Objectives                      | . 22 |  |  |
|      | 9.2                            | Process                         | . 22 |  |  |
| 10.0 | 10.0 COMMUNITY ENGAGEMENT PLAN |                                 |      |  |  |
| 11.0 | 11.0 LIMITATIONS               |                                 |      |  |  |



## STOCKYARD HILL WIND FARM EXTRACTIVE INDUSTRY WORK PLAN

#### TABLES

| 2  |
|----|
| 6  |
| 11 |
| 13 |
| 18 |
|    |

#### FIGURES

| Photo 1: Stockyard Hill- Wangatta Road (View from existing access way looking west)               | 4 |
|---|---|
| Photo 2: Stockyard Hill-Wangatta Road (View from existing access way looking east)                | 5 |
| Photo 3: Approximate location of quarry (view looking north towards Stockyard Hill-Wangatta Road) | 8 |

#### APPENDICES

APPENDIX A Locality Plans

APPENDIX B Figures

APPENDIX C Planning Property Report and Certificate of Title

APPENDIX D Air and Noise Modelling Assessment

APPENDIX E Environmental Management Plan

APPENDIX F Effects of Blasting

APPENDIX G Flora and Fauna Assessment

**APPENDIX H** Community Engagement Plan

APPENDIX I Limitations



## 1.0 INTRODUCTION

#### **1.1 Project Overview**

Stockyard Hill Wind Farm Pty Ltd (SHWFPL), a wholly owned subsidiary of Origin Energy Limited is proposing to establish the Stockyard Hill Wind Farm (SHWF), a large scale wind energy project with the potential to generate 300-550 MW of electricity. The SHWF is a wind farm with 157 permitted turbines located approximately 35km west of Ballarat, between Beaufort and Skipton. Refer to Appendix *A: Locality Plans: Approved Turbine Layout Plan*.

The proposed wind farm will connect to the national electricity grid via the transmission line extending from the wind farm site to a proposed connection point near Lismore.

The SHWF received planning approval in 2010 for wind turbines and associated infrastructure (Planning Permit No. PL-SP/05/0548). However, at the time of the planning permit application, an on-site quarry was not anticipated as required for construction.

In SHWFPL's efforts to manage impact on local community including roads, traffic and local material supplies, SHWFPL is proposing to source the crushed rock required from a dedicated, temporary quarry on one of the wind farm properties on Stockyard Hill-Wangatta Road, Stockyard Hill. SHWFPL carried out a feasibility and options study for a number of quarry options across the wind farm area, considering factors such as technical, amenity, environmental, community and logistics. The number of options was progressively refined and SHWFPL has now selected a site within a property off Stockyard Hill-Wangatta Road, Stockyard Hill.

Up to approximately 1.2 M tonnes of crushed rock will be required over approximately three years for the entire construction phase of the wind farm for tracks, hardstands and concrete aggregate. As the quarry is to support the wind farm construction needs, following the completion of construction, it will be rehabilitated and returned to farmland.

This Work Plan is in support of Application for Work Authority 1518 for the operation and development of temporary quarry proposed on Lot 2 PS 604 561 Stockyard Hill – Wangatta Road, Stockyard Hill (herein referred to as the 'site'). This Work Plan includes, and is supported by, the following information:

- A description of the site and surrounding areas
- The proposed Work Authority Area
- An outline of the quarry and its operation including processing of materials
- An Environmental Management Plan
- A rehabilitation plan to return the land to pasture following completion of the SHWF construction phase.
- A Community Engagement Plan
- Air Quality and Noise Modelling Assessment
- Effects of Blasting report
- Flora and Fauna Assessment

The Work Plan is submitted by SHWFPL. It is anticipated upon engagement of a qualified quarry operator by SHWFPL the Work Authority be transferred to that operator.





### 1.2 Work Plan Structure

This Work Plan has been prepared in accordance with Department of State Development, Business and Innovation (DSDBI)) (formerly Department of Primary Industries (DPI)) *Extractive Industry Work Plan Guideline*, September 2010 (herein referred to as the Guidelines). Table 1 below identifies where the information set out in Part 1 of Schedule 1 of the *Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2010 (herein known as the Regulations)* (Clauses 1-10) are addressed within this Work Plan.

| Clauses   | Relevant Section of this Work Plan   |  |
|---|--|--|
| 1. Geological information (Clause 1)  | Refer Section 5.0: Resource Information  |  |
| 2. General location plan (Clause 2)   | Refer APPENDIX A: Locality Plans   |  |
| 3. Regional plan (Clause 3)   | Refer APPENDIX A: Locality Plans   |  |
| 4. Site plans (Clause 4)  | Refer APPENDIX B : Figures   |  |
| 5. Processing methods (Clause 5)  | Refer Section: 7.0 : Operations  |  |
| <ol> <li>Stability requirements for declared quarries<br/>(Clause 6)</li> </ol> | Not applicable, as the site is not a declared quarry   |  |
| <ol> <li>Environmental management program<br/>(Clause 7)</li> </ol>             | Refer Section 8.0: Environment and APPENDIX E:<br>Environmental Management Plan                              |  |
| 8. Rehabilitation plan (Clause 8)   | Refer Section 9.0: Rehabilitation Plan   |  |
| 9. Community facilities affected (Clause 9)                                     | Community facilities will not be affected. Community facilities within 2 km of the site were not identified. |  |
| 10. Community engagement plan (Clause 10)                                       | Refer Section 10.0: Community Engagement Plan  |  |

#### Table 1: Requirements of Part 1 of Schedule 1 of the Regulations





### 2.0 SITE INFORMATION

#### 2.1 Site Locality

The site is described as Lot 2 PS 604 561 located off Stockyard Hill –Wangatta Road, Stockyard Hill approximately 10 km south of Beaufort. Access to the site is obtained from Stockyard Hill - Wangatta Road. The site is approximately 200 hectares in area and is used as farm land.

Refer to Appendix A: Locality Plans: Location Plan and Regional Plan.

As part of the SHWF development three wind turbines are proposed for the site, as well as an overhead power line for the wind farm and access tracks which connect the quarry property to other neighbouring, turbine-hosting, properties.

The Work Authority 1518 area is defined in *Appendix B: Figure 1: Site Plan*. The Work Authority area generally follows the alignment of the property boundary but does not include the wind turbine buffer areas.

## 2.2 Existing Conditions

The site is generally comprised of gently undulating farmland which is used for grazing cattle and sheep. The topography of the site falls from approximately RL 390 m at eastern boundary to RL 365 at the western boundary over a distance of approximately 1.3 km. The site drains generally toward the north west where a small dam exists at the north west corner of the property.

The site is predominantly pasture with isolated trees, windbreaks and an agricultural windmill.

An ecological assessment (refer to Section 8.6 for details) undertaken by Ecology and Heritage Partners identified degraded remnants of Plains Grassland (EVC 132\_61) and Stony Rises Woodland (EVC 203) located to in the north of the site and a single Swamp Gum is identified in the south of the site. Refer to **APPENDIX G: Figure 1: Site Plan** for locations of the identified vegetation. No significant fauna species, in particular the Stripped Legless Lizard, were identified on site.

No streams or other water courses intersect the property.

#### 2.3 Surrounding Land Uses

The site is bounded to the north by Stockyard Hill-Wangatta Road, to the east by private property and to the west and south by unmade Government road reserves. The broader area generally consists of farming, both grazing and cropping, with residences and infrastructure generally supporting these uses.

The properties immediately to the north, south, east and west are used for farming purposes. A dwelling exists approximately 260m north of the proposed quarry. Through the development of the broader wind farm, SHWFPL has purchased this property and it will be vacant during the quarry operation, or used for wind farm purposes such as managing the quarry. A vacant church which was once used as a dwelling exists approximately 1.3 km east of the proposed quarry which is also owned by SHWFPL. It will remain vacant during the quarry operations or be used for wind farm purposes such as storage.

The closest occupied residential property is approximately 1.7 km west of the proposed quarry, with the next closest residential property being approximately 2.3 km east of the quarry.

While no water courses traverse the site, Black Lake is located approximately 1.6 km southeast of the site and an unnamed water course is located approximately 1.2 km west of the site. Refer to *Appendix A: Locality Plans: Regional Plan*.





#### 2.4 External Access

Access to the site is currently off Stockyard Hill-Wangatta Road. This road is currently managed by Pyrenees Shire Council. Refer to **Photos 1** and **2**. The quarry is proposed to be accessed from both Stockyard Hill-Wangatta Road and the SHWF internal access tracks.

When wind farm construction commences, the internal access tracks will be constructed and it is anticipated that a level of upgrade works will take place to Stockyard Hill-Wangatta Road to facilitate wind farm construction traffic. Prior to the establishment of the wind farm tracks and Stockyard Hill-Wangatta Road upgrades, access will be solely via Stockyard Hill-Wangatta Road.

During the establishment and early operation of the quarry, access to the site will be off Stockyard Hill-Wangatta Road. As the wind farm tracks become developed, these will also be used to access the site for general access of staff as well as access and egress of tip trucks taking quarry products to their points of use.



Photo 1: Stockyard Hill- Wangatta Road (View from existing access way looking west)







Photo 2: Stockyard Hill-Wangatta Road (View from existing access way looking east)

## 3.0 THE PROPOSED QUARRY

#### 3.1 The Need

To construct SHWF, the following material requirements are expected to include:

- Crushed rock for hardstand and access tracks. Approximately 110 km of tracks is proposed for the SHWF.
- Concrete aggregate for wind turbine foundations.
- Select crushed rock for repair and remediation of local roads.
- Bulk fill may be used for raising existing surface levels such as during hardstand or access track construction.

The specific requirements are subject to finalisation through detailed design, which may alter the relative volumes and types of material required. However, it is conservatively estimated that approximately 1.2 M tonnes of processed stone will be sourced from the quarry for the construction phase of the SHWF.

The typical specifications for the types of materials commonly required in wind farm construction are shown in Table 2 below.





| Attribute                          | Bulk Fill | Tracks and hardstands | Concrete<br>Aggregate | Local<br>Roads*  |
|------------------------------------|-----------|-----------------------|-----------------------|------------------|
| Maximum Particle Size (mm)         | 150       | 53                    | 26.5                  | 26.5             |
| Proportion of fine aggregate (%)   | -         | 23                    | <5                    | Must fall within |
| Proportion of coarse aggregate (%) | -         | 90                    | -                     | grading envelope |
| Proportion of fines (%)            | -         | 12                    | <2                    | <11              |
| Plasticity Index (%)               | -         | <20                   | -                     | <6               |
| Weighted plasticity index (%)      | <1000     | <450                  | -                     | -                |
| Flakiness index (%)                | -         | -                     | <35                   | <60              |
| Wet/dry strength variation (%) /   |           |                       |                       |                  |
| minimum wet strength (kN)          | -         | -                     | <45 / 50              | -                |
| Los Angeles Value (%)              | -         | -                     | <35                   | <30              |
| Sodium Sulfate Soundness (%)       | -         | -                     | <12                   | -                |
| Unsound stone content (%)          | -         | -                     | <5                    | <7               |
| Secondary mineral content (%)      | -         | -                     | <25                   | <25              |
| Light particles:                   | -         | -                     | <3                    | -                |
| California Bearing Ratio (%)       | -         | 20                    | -                     | -                |

#### Table 2: Summary of typical specifications for fill and aggregate

\* Corresponds to VicRoads Class 2 material

The sources of different types of raw stone products are dependent on final specifications, costs and availability. However, due to the substantial volumes of material required, the haulage of this material from an external quarry for SHWF construction could introduce increased traffic and transport impacts on local roads and the community.

An on-site source for material for SHWF is proposed to reduce the traffic and transport impacts as the site contains the type and quality of rock necessary for SHWF construction.

Following construction phase of SHWF, the quarry will be rehabilitated as per the Rehabilitation Plan (Section 9.0).

#### 3.2 Estimated Annual Outputs

The production rates from the quarry have been planned to align with the indicative scheduling of SHWF construction which anticipates are substantial proportion of the total quarry output to be required within the first twelve months of construction. This is primarily due to the construction of access tracks requiring a large amount of material. After roads have been constructed, a reduced production level from the quarry would be required to support the remainder of the wind farm construction process.

The initial phase of production is estimated to produce approximately 700,000 tonnes of material in a 7-12 month period, with production reduced over approximately the remaining 2 years to cater for the completion of the construction phase of the SHWF.





### 3.3 **Proposed Location and Quarry Features**

The design of the quarry and its location has been based on the following considerations:

- Suitable material is available for extraction.
- At least one side of the quarry is at current grade level so as to allow the pit to drain and to prevent water ponding in the excavation during or after extraction.
- Post extraction, the quarry will be remediated and returned to farmland. To this end, batter slopes are to be no steeper than 5H:1V, which will be consistent with the gently undulating nature of the existing terrain (refer to *Appendix B: Figure 1*).
- Operation of the quarry does not conflict with proposed wind turbine areas or access tracks.
- Feedback from referral agencies and the property owner.
- Minimisation of the potential risk to the environment i.e. groundwater, native vegetation etc.

A concept design has been prepared for the quarry, as shown in *Appendix A: Figure 1: Site Plan* in response to these considerations. **Photo 3** below shows the approximate location of the proposed quarry.

The proposed quarry includes the following features:

- Quarry pit to cater for the volume of basalt required (approximately 1.2 M tonnes).
- Dimensions of approximately 450 m by 300 m and a depth of up to approximately 8m.
- Rock crushing and screening area which would include site office, car parking, workshop, amenities and stockpiling areas.
- A water dam for surface water management and sediment control.
- Internal quarry access tracks.
- Overburden and top soil storage areas.







Photo 3: Approximate location of quarry (view looking north towards Stockyard Hill-Wangatta Road)





## 4.0 SITE AND ACCESS DETAILS

#### 4.1 Planning and Title Information

The site is located within the Shire of Pyrenees and is zoned Farming Zone. It is not subject to any overlays.

The proposed Work Authority 1518 area is located on privately owned land (Lot 2 PS 604 561) and will be leased by SHWFPL. It is described in Certificate of Title Volume 11032 Folio 990.

There is an existing Powercor easement that runs from east to west across the north of the site. The proposed quarry activities do not intersect with this easement. A buffer of at least 20 m will be maintained for quarrying activities around the easement. Assessment of blasting activities indicate that vibration and flyrock (refer Section 8.3) are not predicted to impact on existing power poles. Safe clearance from the power lines will be maintained in accordance with the requirements of the Electricity Safety Regulations (Electric Line Clearance) Regulations 2010 and the Electricity Safety Act 1998.

Refer to Appendix C for a copy of the Planning Property Report and Certificate of Title for the site.

### 4.2 Internal access

Access tracks are proposed to connect the Stockyard Hill-Wangatta Road entrance to the site crushing and screening area (which will also host the office, car park and loading areas) as well as the internal SHWF tracks that run along the western boundary of the property. Car parking for visitors and employees will be available adjacent to the site office. Internal roads will be properly formed, drained and maintained for serviceability as needed.

A Traffic Management Plan will be prepared for the quarry that considers traffic on public roads for the haulage of quarry products from the quarry to their proposed points of use. This would include traffic generated through the establishment of the quarry and movements of the operating staff.

Refer to Appendix B: Figure 1: Site Plan for approximate location of internal roads.

## 4.3 Site Security

The site will be securely fenced and gate access will be locked when not in use.





### 5.0 **RESOURCE INFORMATION**

A geotechnical investigation was undertaken by Golder Associates to assess the availability of suitable quality material at the site for the construction phase of the SHWF.

The assessment undertaken by Golder Associates included drilling of 3 boreholes to a depth of approximately 10m intended to penetrate the deepest part of the proposed quarry footprint. Refer to *Appendix B: Figure 1: Site Plan* for location of geotechnical boreholes.

Laboratory testing was undertaken on:

- Selected soil samples to assess the suitability of overburden materials as bulk fill
- Selected intact rock core samples to assess the strength of the weathered basalt rock
- Cores obtained from the site, combined and crushed to an aggregate material

Based on the information gathered during the laboratory testing, crushed highly or less weathered basalt is likely to meet the criteria for use of material in access track pavement and hardstand construction and concrete aggregate necessary for the SHWF construction. Selective excavation would be required to obtain medium to high strength basalt for use as Vicroads Class 2 crushed rock for use in upgrades of public roads.

The findings from the geotechnical investigation are described in Section 5.2 below.

#### 5.1 Geomorphology

The site is located in Stockyard Hill which is a volcanic eruption point, from which lava is estimated to have erupted 100,000 to 500,000 years ago. Lava from Stockyard Hill flowed up 20km towards the west and south east creating a stony rise topography comprising an undulating landscape of mounds and ridges with little or no soil covered and minimal surface drainage. The lava has cooled to form a basalt rock which is now exposed on the stony rises.

#### 5.2 Geology

The site is underlain by Quaternary Newer Volcanics basalt derived from the Stockyard Hill lava flow. The basalt is fine grained, high strength, jointed igneous rock, formed from cooled lava. A mantle of residual clay soil is likely to be present over the rock.

#### 5.3 Subsurface conditions

A description of the main subsurface units encountered in the boreholes, the material characteristics and its suitability for use as part of the construction phase of SHWF are described below. Table 3 summarises the depth range of these units.



| Unit | Description                  | Depth Range (m)                        |                                       |                                       |  |
|------|------------------------------|--|---------------------------------------|---------------------------------------|--|
| Onit |                              | GA12-BH07                              | GA12-BH08                             | GA12-BH09                             |  |
| 1    | Topsoil                      | 0.0 - 0.1                              | 0.0 – 0.05                            | 0.0 - 0.1                             |  |
| 2    | Residual basaltic clay       | 0.1 – 1.2                              | 0.05 – 1.3                            | 0.1 – 1.2                             |  |
| 3a   | EW and EW/HW basalt          | 2.15 – 2.85                            | -                                     | -                                     |  |
| 3b   | HW and HW/MW basalt          | 2.85 – 7.7                             | 1.3 - 5.4<br>6.5 - 7.4<br>7.9 - 10.25 | 1.2 – 2.5<br>5.75 – 8.0               |  |
| 3c   | MW and less weathered basalt | 1.2 – 2.15<br>7.7 – 10.35 <sup>#</sup> | 5.4 – 6.5<br>7.4 – 7.9 <sup>#</sup>   | 2.5 – 5.75<br>8.0 – 10.4 <sup>#</sup> |  |

#### Table 3: Depth Range of Subsurface Units Encountered.

<sup>#</sup>borehole terminated in this unit

EW= Extremely Weathered, HW= Highly Weathered, MW= Moderately Weathered

#### 5.3.1 Topsoil

A thin layer of top soil with a thickness of between 0.05 to 0.1 m was encountered within the boreholes drilled at the site. The top soil typically comprises low liquid limit clayey and sandy silt, with a high proportion of organic root matter.

#### 5.3.2 Inferred Residual Basaltic Soils (Overburden)

The top soil material was underlain by inferred residual basaltic soils in all boreholes. These soils typically comprised of silty clay, clayey silt, gravelly clay, sandy clay, and gravelly sandy clay. These soils are of medium to high plasticity and have a consistency ranging between stiff and hard. The inferred residual basaltic soils extended to depths of between 1.2 to 1.3 m in the boreholes drilled at the site.

Laboratory testing indicated that the residual basaltic soils will be suitable for non-structural fill applications.

#### 5.3.3 Weathered Basalt

The residual basaltic soils were underlain by variably weathered basalt in the boreholes drilled at the site. The weathering of basalt ranges from extremely weathered to slightly weathered with the majority of basalt encountered assessed as being highly or moderately weathered. The average defect spacing of typically 0.1 to 3 m was identified in the boreholes drilled on site.

The highly weathered basalt is generally of medium to high strength and the moderately or less weathered basalt is generally of high to very high strength. The inferred rock strength on site based on UCS testing is between 29.3 to 82.9 MPa,

Point load strength index tests were undertaken and the results ranged from 2.5 to 7.6 MPa. Bulk densities taken prior to UCS testing indicated an in situ rock density of between 2.27 t/m<sup>3</sup> and 2.67 t/m<sup>3</sup> on site.

#### 5.4 **Reserve Estimates**

The quarry design allows for approximately 1.2 M tonnes of basalt to be extracted to supply the construction phase of the SHWF. The design of the quarry has taken into account the characteristics of basalt as described above. Conservative assumptions regarding the amount of overburden and proportion of unsuitable material to be extracted have been incorporated into the quarry design.





## 5.5 Soil and Overburden Estimates

Top soil and overburden depths encountered at the site were between 1.3 and 1.4 m. A conservative estimate of 1.5 m was used in calculating the estimated amount of top soil and overburden to be removed, which equates to approximately 460 000 tonnes This material will be stored separately and use later during rehabilitation.

Refer Appendix B: Figures: Figure 2 for location of overburden and top soils storage.

### 6.0 INFRASTRUCTURE

The following section details the infrastructure that is proposed to be utilised to develop and operate the quarry, based on the concept designs. The staffing levels at the site will generally vary according to the level of activity but will typically involve a core team of 5 people (including administration) growing to 10 people when required.

### 6.1 Fixed Plant

No fixed plant is proposed as part of this Work Plan to minimise the extent of disturbance on the land associated with the use of for footings associated with fixed plant. This assists in returning the site to pasture following the construction phase of the SHWF.

#### 6.2 Mobile Plant

There is a wide variety of types and sizes of equipment which could be utilised in this quarry. While the contractor engaged by SHWFPL will be responsible for determining final types and number of equipment to be utilised at the quarry, equipment that would support the establishment, operations and rehabilitation phases includes:

*Excavator* – This excavates and loads the blasted material and maintains the batter slopes at the edge of the pit. It would also be used for building and maintaining ditching and pond construction for water runoff control.

Dump truck - The dump truck(s) would typically be used within the quarry for removal of overburden and product and stockpiling of same.

*Trucks* – road legal tipper trucks. These trucks would haul material from the quarry to stockpiles as well as hauling from stockpiles to construction sites as material is required. The number required will depend on construction schedule and haul distances.

*Water truck* – Water trucks should be utilised to keep haul roads in good condition and control dust generation. Water will be required within the pit and its infrastructure areand to water down the roads when material is being hauled from and to the various sites. At least one and possibly two water tanks holding between 10,000 L and 20,000 L will be required.

*Grader* – Haul roads around the quarry will require some grading and maintenance; at least weekly depending on the quality of construction of the pit roads, the amount of usage and the weather conditions. The roads that are used for hauling to and from the sites will require maintenance grading at least weekly during heavy usage. There should be a limited requirement for addition of road base during grading.

*Dozer or scraper* – for initial topsoil and overburden removal and stripping. Scrapers are likely to be used over larger areas, however a dozer will be required for ripping, building windrows and developing access roads to and from the pits.





*Drill rig* – for use during the drilling and blasting operations.

*Mobile Crusher and Screener* – The number of crushing and screening plant will depend on the rate of production. For example in the first 6-7 months there may be two crushing and screening plants to cater for the high rate of production and this may drop back to 1 crushing and screening plant for the remaining life of the quarry. (A larger excavator fleet combination may be required to better match the production rates).

*Front End Loader* – feeding the crusher, stockpiling excess crushed product, and loading road trucks to take material to construction sites.

There will also be additional minor equipment such as maintenance vehicles and light vehicles for the people on site.

### 6.3 **Portable Site Office and Amenities**

A portable site office, workshop, weighbridge and amenities will be installed and utilised for the duration of the quarry operations. These will be located within the crushing and screening area as identified in the concept plans.

#### 6.4 **Power and Fuel Supply**

It's proposed that off-grid crushing and screening equipment will be used for the quarry operations. A generator will be used for powering the site office and amenities. There may be future opportunities to connect plant and offices to mains power supplies as part of wind farm construction, however, this will need to be determined at a later stage. The quarry can be operated and managed using site generators.

Diesel fuel to support electricity generation, mobile plant and crushing and screening equipment will be stored in a bunded, above ground storage tank. Oils, lubricants and diesel fuel will be stored appropriately in a suitable area according to the requirements of the Dangerous Goods (Storage and Handling) Regulations 2000.

#### 6.5 Water supply

Table 4 below identifies the water needs and anticipated water supply for the operation of the quarry.

#### Table 4: Need and Water Supply

| Need   | Anticipated Source   |  |
|--|--|--|
| Dust suppression - watering of roads, wetting down loads stockpiles, plant and equipment etc | Water dam.   |  |
| Site office and amenities  | Rainwater will be collected and stored in rainwater tanks for amenities. |  |
| General washing of vehicles and equipment  | Water tanks/rainwater tanks  |  |
| Fire fighting  | Water dam  |  |

Water will be carted to site if necessary to supplement the water to be collected in the water dam and rainwater tanks. Sufficient water will be stored on site or imported to meet the quarry needs as described in Table 4.







#### 6.6 Sewerage

Sewerage from the site will be treated by septic tanks installed and operated in accordance with the *Code of Practice Onsite Wastewater Management, EPA Publication number 891.3* February 2013.

#### 7.0 **OPERATIONS**

It is proposed to operate the quarry using conventional hard rock quarrying techniques. The progress of the extraction will be dependent on project demands.

This section describes how the quarry is intended to be operated. Potential environmental impacts and associated control measures to be established for the quarry are described in Section 8.0 and the EMP (Refer to **APPENDIX E: Environmental Management Plan**).

#### 7.1 Sequence of Development

- Construction of the internal haul roads with imported material.
- Construction of the water dam and associated drains.
- Removal top soil from the Crushing and Screening Area and initial extraction area.
- Initial extraction will commence in the west of the proposed excavation Proposed Crushing and Screening Area hardstand to be constructed.
- Initial crushing and screening will be conducted with mobile crushers and screens.
- Extraction will continue towards the east and with benches of approximately 2-3m.
- Crushing and screening of rock will continue to meet the required rates of production.
- Following the construction phase of the SHWF the quarry will be rehabilitated and returned to pasture.

#### 7.2 Hours of operation

The extraction, processing operations and transportation of materials from the quarry will be carried out between the hours of operation:

- 7.00 am to 6.00 pm Monday to Friday
- 7.00 am to 1.00 pm Saturday

Works outside these hours will only be essential for maintenance or by agreement with the Responsible Planning Authority (Pyrenees Shire Council).

#### 7.3 Extractive Operations

#### 7.3.1 Topsoil and Overburden Handling

The top ~0.1 -0.5m of top soil will be stripped and stockpiled for later use in the rehabilitation.

The quarry operation is expected to produce a moderate quantity of weathered overburden rock and small quantity of soil. The overburden will predominantly be placed in the overburden stockpile. Reject from the crusher operation will be included in the overburden stockpile, or be placed directly against any final





excavated rock slope of the quarry. The development of the pit includes locations and areas on *Figure* 1 for the stripped topsoil and overburden mound. The overburden will be stockpiled in windrows and will form a bund adjacent to the northern, southern and eastern edge of the quarry pit.

Typically topsoil and overburden will be progressively stripped to expose the rock as extraction occurs. The stripping is likely to involve an excavator loading dump trucks but also may include bulldozers, scrapers and or front end loaders. Topsoils stockpiles will be limited in approximately 2 m to assist in maintaining soil viability. Top soil mounds will be grassed with pasture grasses to prevent erosion.

#### Refer to Appendix B: Figure 2: Proposed Quarry Layout.

#### 7.3.2 Rock Extraction

Once the top soil and overburden has been removed and stockpiled, the basalt will be drilled and blasted.

Typical extraction of the fresh basalt material will be via conventional drilling and blasting techniques. Equipment such as a tracked hydraulic percussion drill rig and non-electric blast initiation may be used. The frequency of blasting has not been determined at this stage.

The blasted material will then be excavated and hauled to the stockpiles prior to crushing and screening using an excavator and dump trucks. The material will be separated into a crusher feed stockpile and bulk fill stockpile based on the quality of the material as it is excavated. It is typical to encounter zones with higher weathering and pockets of completely degraded material within a shallow rock mass, but the excavator operator should be able to identify poor quality material during digging and direct trucks loaded with the low quality rock to the bulk fill stockpile, separating it from the crusher feed.

Because several different construction products are required, there will need to be corresponding stockpiles for the crushed and screened material. The optimum size of each stockpile will depend on the peak usage of each material in the construction schedule, but it is generally easy to allow the individual stockpiles to vary in size as construction progresses as long as there is sufficient total area set aside. As a minimum, typically a week's supply of each product would be stockpiled.

The final extraction limit will be surveyed and marked out with survey posts.

#### 7.4 Working Faces

Working faces in the overburden will be developed with an excavator in approximately 0 to 1.5 metre high faces. Bulldozers may also be used to prepare the overburden benches. The excavated batter slope in the soft material will be approximately 1V to 1H.

Working faces for the basalt will be a maximum of 3m high with an anticipated minimum batter angle of 70°. It is expected that a minimum berm width of 5m will be maintained between benches. At the deepest part of the quarry pit, i.e. eastern end, the total depth of extraction will be approximately 8m below the existing topography with 3 benches of 2-3 m at this end. The slope of the working faces in competent rock (i.e. blasted faces) will be between 15° from vertical and vertical (90°). Working faces may be split to allow selective quarrying to meet particular project requirements.

#### 7.5 Final Face Treatment

To ensure faces are stabilised during quarrying, sufficient progressive backfilling will be undertaken once terminal positions are reached. The typical final face treatments for the excavation faces of the quarry are illustrated in *Appendix B: Figure 3: Sections*.

Final faces will be rehabilitated once sufficient distance to the working faces has been established (typically 50 m). Final faces may be developed with bulldozers pushing and tracking overburden directly to



rehabilitation areas or with an excavator and trucks placing material, then spread and tracked by a bulldozer or scraper.

## 7.6 Explosives Usage

Bulk explosives will be supplied from an external contractor. The quantity of bulk explosive required for any one shot is predetermined and only the immediately required explosives are delivered to site. No explosives or detonators will be stored at the quarry.

As described in Section 8.3 blasting will comply with DSDBI guidelines for airblast (<115 dBL for 95% of blasting in a twelve month period with all blasts <120 dBL) and ground vibration (<5mm/sec for 95% of blasting in a twelve month period with all blasts <10mm/sec)

Appropriate exclusion zones will be maintained for plant and equipment and personnel. The Traffic Management Plan to be prepared will ensure public roads within the exclusion zone will be guarded and closed during the blasting period. (Refer *Appendix F: Effects of Blasting*)

## 7.7 Processing Operations

The primary means of transporting materials from the pit to the processing plant will be by off road dump truck. A front end loader or excavator will be used to load the dump trucks. The crusher and screens will be located to the northwest of the quarry. For safety, it has not been located within the quarry to allow sufficient room to manage stockpiling and minimise equipment interaction.

Once material is in the crushing and screening plant, transport is via conveyors and chutes until product discharges onto the ground. Products can then be loaded by front end loader into trucks to sized aggregate stockpiles away from the plant area.

Finished product is stored in the stockpile area. Product from the stockpile area is loaded directly into delivery trucks with a front end loader. A weighbridge will be provided on site to ensure compliance with statutory vehicle loading requirements and to assess weights of material removed from site.





#### 8.0 ENVIRONMENT

Consistent with the DSDBI WP Guidelines assessment of potential environmental impacts has been considered in the development of this Work Plan.

Principally due to the location of the quarry, no significant adverse impacts associated with the operation of the quarry were identified.

The proposed quarry operations will be carried out in accordance with an Environmental Management Plan (EMP) prepared by Golder Associates. The assessment of potential environmental impacts has been undertaken in a risk assessment as part of the development of the EMP. The assessment of potential impacts described in this Section of the Work Plan is based on the intended operation of the quarry (i.e. the control measures described in the EMP have been taken into account in the assessment).

#### 8.1 Air Quality - Particles

The potential particle impacts from the proposed quarry on the nearest residence were assessed using the EPA approved dispersion model AUSPLUME by Golder Associates. The methodology for the assessment was consistent with that described in the EPA Publication *'Protocol for Environment Management Mining and Extractive Industries*' Refer to **Appendix D: Air and Noise Modelling Assessment**.

The predicted ground level concentrations of PM<sub>10</sub>, PM<sub>2.5</sub> and respirable crystalline silica at the closest residence is predicted to be less than half the criteria in EPA Publication '*Protocol for Environment Management Mining and Extractive Industries*'. Background pollutant concentrations were incorporated in the model and are considered conservative. The major contribution to the predicted ground level concentrations at the nearest sensitive receptor is the background concentration.

An air quality monitoring program will be established and is described in the EMP. Refer to *Appendix E: Environmental Management Plan* for further information.

#### 8.2 Noise

The potential noise impacts from the proposed quarry, on the nearest residence were modelled using CadnaA by Golder Associates and assessed in accordance with EPA Victoria Guidelines set out in 'Noise from Industry in Regional Victoria' (NIRV). Refer to *Appendix D: Air and Noise Modelling Assessment* for further information.

Noise levels at the nearest residence were predicted to meet the recommended noise limits as determined using NIRV. Noise management measures will be carried in accordance with the EMP. Refer to **Appendix** *E: Environmental Management Plan* for further information.

#### 8.3 Blasting

The potential impacts on blasting from the proposed quarry to nearest residence and existing infrastructure such as water bores and power lines was modelled by Terrock Consulting Engineers. Refer to *Appendix F: Effects of Blasting.* 

The assessment considered the impacts of ground vibration, airblast and flyrock and concludes the peak ground vibration and airblasts from blasting operations within the quarry will comply with the following DSDBI limits at any sensitive site, such as a house or school:

- Ground Vibration ≤ 5 mm/s for 95% of blasts in a 12 month period
  - $\leq$  10 mm/s for all blasts





■ Airblast ≤ 115 dBL for 95% of blasts in a 12 month period

 $\leq$  120 dBL for all blasts.

Flyrock can be limited as to not pose a risk to personnel and infrastructure.

The predicted levels at any sensitive receptor are at or below the threshold of human perception. The maximum ground vibration for any blast at the closest house (~1.7 km away) is predicted to be 0.2 mm/s, and the maximum airblast less than 105 dBL. Other houses are located within sufficient separation distance that there will be no difficulty in complying with the amenity limit criteria. Depending on the timing of construction and quarrying, blasting will have an insignificant effect on the turbines of the wind farm and the aquifers and any bores will not be affected by the blasting.

Appropriate exclusion zones will be maintained for plant and equipment and personnel. The Traffic Management Plan to be prepared will consider the need to guard and close public roads within the exclusion zone during the blasting period.

Management procedures and a monitoring program for vibration and blasting are described in the EMP. Refer to *Appendix E: Environmental Management Plan* for further information.

#### 8.4 Groundwater

The water table at the site is contained within the basalt of the Newer Volcanics aquifer. Groundwater is inferred to flow west to south-westerly.

Three groundwater monitoring wells were drilled and installed at the site. Refer to *Appendix A: Figure 1: Site Plan* for locations of BH01, BH02 and BH03. Table 5 shows the groundwater depth and elevation for each bore hole.

| Well ID | Date       | Groundwater Depth (m bgl) | Groundwater Elevation (m AHD)* |
|---------|------------|---------------------------|--------------------------------|
| BH01    | 10/07/2013 | 14.920                    | 351                            |
| BH02    | 04/07/2013 | 25.087                    | 357                            |
| BH03    | 04/07/2013 | 23.360                    | 362                            |

#### Table 5: Groundwater Depth and Elevation

\*Groundwater elevation has been based on the location of the well on the topographic map.

Based on the three bores sampled, the estimated depth to groundwater is between 14 - 25 m below ground level. The quarry excavation is therefore not intended to intersect with groundwater as the deepest part of the quarry will be approximately 8m below ground level.

Based on information provided in the Victorian Groundwater Management System database on a well screened across the basalt within 5 km of the site, the seasonal variation in groundwater elevation is considered to be approximately 1 m. The information provided for this well indicates that groundwater levels in the basalt have been declining since monitoring began in 1993.

Due to the depth of groundwater, the potential environmental risks and hazards to groundwater associated with the construction and temporary operation of the quarry are considered to be low. Mitigation measures for protection of groundwater are described outlined in the EMP.

A groundwater monitoring program will be established and is described in the EMP. Refer to **Appendix E**: **Environmental Management Plan** for more information.





#### 8.5 Stormwater

The design of the quarry has a 1% grade on the quarry floor which will allow natural drainage. Surface run off from the quarry pit will be directed to the outlet and will drain naturally (via gravity) into the water dam.

The water dam is intended to capture sediment laden stormwater runoff and allow settlement of sediment. Collected water will be used on site for dust suppression. The water dam will be designed to capture rainfall from within the quarry at up to a 1 in 100 year storm event. Overflows from the dam will flow across existing pasture to the north west. Flows from the dam are not expected to impact on surface waters due to the separation of the site from water courses. Detailed design of the water dam will be completed prior to the operation of the quarry.

The crushing and screening operation will be a dry operation, with water only used to wash down the equipment for repair and maintenance. Stormwater from the crushing and screening plant area will be directed to a dedicated pond for sediment control. This pond will then drain to the surrounding paddock.

Stormwater management procedures are described in the EMP. Refer to *Appendix E: Environmental Management Plan* for further information.

#### 8.6 Flora and Fauna

An ecological assessment consisting of flora and targeted Striped Legless Lizard surveys was conducted by Ecology and Heritage Partners. The purpose of the survey was to identify the extent of native vegetation present on site and to determine the presence of significant flora and fauna species and/or ecological communities.

The flora assessment identified degraded remnants of Plains Grassland (EVC 132\_61) and Stony Rises Woodland (EVC 203) located to the north of the site and a single scatted Swamp Gum is identified south of the site. The remainder of the site was classified as Degraded Treeless Vegetation – Minor Treeless Vegetation (mTV) which does not meet the threshold for a remnant vegetation patch.

The fauna assessment particularly focused on the Striped Legless Lizard surveys for the site. The assessment concluded that the likely occurrence of the Striped Legless Lizard within the site is considered to be low as the site is isolated from high quality grassland habitat

Refer to Appendix G: Flora and Fauna Assessment for further details of the ecological assessment.

The site has been altered as a result of land clearing for agriculture. All areas that qualify as remnant native vegetation patches and scattered indigenous trees will be protected and avoided throughout the operation of the quarry. Management procedures for potential flora and fauna impacts are described within the EMP. Refer to *Appendix E: Environmental Management Plan for further information*.

#### 8.7 Noxious Weeds

The ecological assessment conducted by Ecology and Heritage Partners has identified localised areas of noxious weeds, in particular Variegated Thistle and Spear Thistle.

Management procedures for weeds and noxious weeds have been described within the EMP to prevent further weed spread to adjacent areas containing remnant vegetation. Refer to *Appendix E: Environmental Management Plan*.





#### 8.8 Cultural Heritage

An assessment undertaken by Tardis (5 August 2013) confirms the development of the proposed quarry does not trigger the need for a Cultural Heritage Management Plan (CHMP) for the following reasons:

- There are no registered places within the activity area.
- There are no areas of Aboriginal cultural heritage scientific sensitivity.
- It is unlikely that Aboriginal cultural heritage is present.

Whilst not a mandatory requirement, SHWFPL has decided to voluntarily develop a CHMP for the site.

#### 8.9 Visual

Due to the temporary nature of the quarry and the plan to rehabilitate the quarry to pasture following wind farm construction, no measures to mitigate visual impact will be employed during the quarry operation phase.

## 8.10 Erosion Control

Land clearance to enable quarrying may result in soil erosion impacts. The EMP describes the mitigation measures that would be implemented to reduce potential erosion impacts at the site. These measures primarily relate to:

- Minimising land disturbance and the removal of vegetation
- Diverting stormwater runoff form the crushing and screening plant area to a dedicated pond which will drain naturally to the surrounding paddock.
- Arranging work schedules so that disturbed land does not remain unstabilised for long periods.
- Temporary erosion controls, such as sand bags and/or silt fencing may be used during periods of excessive wet weather to mitigate erosion impacts.

Refer to Appendix E: Environmental Management Plan for further information.

#### 8.11 Fire Management

The measures summarised below will be implemented to reduce the environmental risks that may be associated with fire related incidents at the site:

- Plant areas and access roads will be cleared of vegetation.
- Plant and vehicles will carry suitable fire extinguishers.
- No blasting will be undertaken on days of Total Fire Ban.
- Activities such as welding, cutting or grinding will not be undertaken on days of Total Fire Ban. Where undertaken at other times they will be undertaken in accordance with CFA requirements.
- Mobile water facilities (e.g. water truck) will be supported by portable pump and hose to be used for fire protection. Water for fire fighting operations will be obtained from the onsite water dam.





• Fuel and other flammable chemicals will be stored in accordance with the requirements of the Australian Standard AS1940: *The Storage and Handling of Flammable and Combustible Liquids.* 

Refer to Appendix E: Environmental Management Plan for further information.

#### 8.12 Waste Management

Waste minimisation and management during operation of the site will follow the waste hierarchy as follows:

- waste avoidance and/or reduction (most preferred)
- reuse
- recycling
- disposal (least preferred).

Waste management will include:

- appropriate storage of waste at the site and disposal in accordance with statutory requirements
- onsite treatment of sewerage via a septic tank
- use of bins and skips that are designed to hold the intended waste stream securely to prevent land and water contamination and does not attract vermin
- waste will not be buried or burned on site
- waste streams will be segregated at the source.

Refer to Appendix E: Environmental Management Plan for further information.

#### 8.13 Fuels and Chemicals

Fuels and chemicals will be stored and handled at the site to ensure that stormwater, soils and groundwater do not become contaminated. This will include establishing a dedicated bunded fuel / chemical store away from stormwater drains and drainage features prior to commencing site operations, and storage and use in accordance with the Material Safety Data Sheet. Other fuel and chemical management measures include:

- Appropriate spill kits will be available at the site, and spills will be cleaned up immediately.
- Onsite refuelling of plant and equipment will be undertaken on impervious areas, away from drainage points, water course and stormwater drains, and will be undertaken in a temporary bunded area (e.g. over a drip tray, or within sediment sock bund).
- Limited volumes of fuels, greases, oils and chemicals will be stored onsite.

The EMP (Refer to **Appendix E: Environmental Management Plan)** provides further detail on the mitigation measures that would be implemented to reduce potential risks that may be associated with use of fuels and chemicals at the site.





#### 9.0 REHABILITATION PLAN

#### 9.1 **Objectives**

The final rehabilitated landform has been designed having regard to the following principles:

- A final profile that would generally blend into the surrounding landscape and suitable for return to pasture
- Naturally draining to prevent the collection of water within the former extraction area

#### Refer to Appendix B: Figure 4: Rehabilitation Plan.

At the end of the quarry operations, the site will be returned to pasture. As the quarry is only intended to operate for approximately 3 years, other alternative end uses for the land have not been considered and progressive rehabilitation would not be practical.

Rehabilitation will commence following completion of extraction of material necessary for SHWF construction activities. The return of the site to pasture will result in a landform that is generally consistent with the surrounding landscape and one that has a minimal visual impact.

#### 9.2 Process

To rehabilitate the pit it is proposed to batter back the excavated rock slopes to a batter no steeper than 5H in 1V. The battering of the rock slopes will comprise the placement of weathered rock or crusher reject rock fill wedges against the excavated rock slopes, and then covering the weathered rock wedges with a layer of topsoil. The weathered rock will be sourced from temporary stockpiles within the excavated pit, the crusher and the overburden stockpile set back from the perimeter of the pit.

The volume of weathered rock required to batter back the rock slopes is less than the expected volume of overburden from the pit. It is expected that up to twice the volume of weathered rock will be available compared to the volume required for the battering back of the rock slopes.

The top surface of the weathered rock wedges against the rock faces will be covered with a layer of topsoil, as indicated in *Appendix B: Figure 4: Rehabilitation Plan*. The topsoil will be sourced from the topsoil stockpile area which is formed during the initial surface stripping operation of the quarry pit.

The quarry pit floor will be excavated with a slope of 1 in 100 towards the north west to direct stormwater runoff out of the former pit area. The runoff from the reshaped perimeter rock slope and the former quarry pitfloor will be directed to intersect with the natural drainage of the site. The water dam will be filled using the material previously excavated as part of its construction. The floor will be covered with a layer of topsoil also sourced from the topsoil stockpile area which is formed during the initial surface stripping operation of the quarry pit.

The surface area of the reshaped quarry will be approximately the same surface area of the ground surface prior to topsoil stripping. The volume of stockpiled topsoil should therefore be enough to cover the surface of reshaped quarry. Similarly the topsoil stripped footprint area of the overburden stockpile is similar to the surface area of the final shape of the overburden stockpile, so the topsoil volume should balance.

Topsoil areas will be seeded with pasture grass.

Approximately half of the overburden stockpile is expected to remain outside the quarry pit. The final overburden stockpile will be reshaped to create outside batters no steeper than 5 H in 1 V, and the top of the stockpile will be shaped to a grade of approximately1 in 100 to shed stormwater runoff. In general stormwater runoff will be directed to the east and south sides of the stockpile.





The area of the water dam, all hardstand, and areas of plant will be ripped following removal of the equipment and imported materials, and seeded with pasture grass. Access roads will remain for use as part of the wind farm. Fences erected around native vegetation as described within the EMP will be removed following completion of rehabilitation works.

An inspection and maintenance program will be established for 12 months following completion of quarry rehabilitation to monitor the condition of the site including grass uptake, erosion etc. SHWFPL will continue to maintain a presence in the area as part of the ongoing operation of the wind farm.

#### **10.0 COMMUNITY ENGAGEMENT PLAN**

SHWFPL has undertaken extensive stakeholder engagement for the broader SHWF project. A community engagement plan has been prepared in accordance with the requirements of the Mineral Resources (Sustainable Development) MRSD Act 1990. Refer to *Appendix H: Community Engagement Plan.* 

#### **11.0 LIMITATIONS**

Your attention is drawn to the document - "Limitations" (LEG04, RL1), which is included in *Appendix I: Limitations* of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by Golder, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing. We would be pleased to answer any questions the reader may have regarding these 'Limitations'.





## **Report Signature Page**

#### **GOLDER ASSOCIATES PTY LTD**

Shantini Gill Environmental Planner

SG/BD/sg

A.B.N. 64 006 107 857

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

j:\env\2013\137618018 - origin work plan for shwf\correspondence out\137618018-007 work plan\rev5\137618018-007-r-rev5.docx



Zome Jone

Bruce Dawson Principal Environmental Consultant





**Locality Plans** 





# **APPENDIX B**

**Figures** 







**Planning Property Report and Certificate of Title** 





## **APPENDIX D**

Air and Noise Modelling Assessment





# **APPENDIX E**

## **Environmental Management Plan**











# **APPENDIX G**

**Flora and Fauna Assessment** 





# APPENDIX H

**Community Engagement Plan** 







Limitations



As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa 
 Asia
 + 86 21 6258 5522

 Australasia
 + 61 3 8862 3500

 Europe
 + 356 21 42 30 20

+ 27 11 254 4800

North America + 1 800 275 3281 South America + 56 2 2616 2000

solutions@golder.com www.golder.com

**Golder Associates Pty Ltd Building 7, Botanicca Corporate Park** 570 – 588 Swan Street **Richmond, Victoria 3121** Australia T: +61 3 8862 3500

