



## APPENDIX C

### **Amended Mitigation Measures**

## Appendix C - Consolidated Management Measures

ARDG will be responsible for implementing the management and mitigation measures identified in the EIS. The management and mitigation measures will be implemented through a Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP). These plans will be prepared sequentially, prior to each stage of the Project by ARDG and the relevant contractor, and in consultation with relevant Government Agencies. The following table provides a consolidated list of the management and mitigation measures applicable to the Project and relevant timing for implementation.

| Aspect  | Management/Mitigation Measure  | Timing                                    |
|---------|--|---|
| General | ARDG will prepare and implement a Construction Environmental Management Plan (CEMP) for the Project, incorporating all relevant management and mitigation measures outlined in the EIS and Amendment Report.   | Prior to the commencement of construction |
|         | ARDG will prepare and implement an Operation Environmental Management Plan (OEMP) for the Project, incorporating all relevant management and mitigation measures outlined in the EIS and Amendment Report.   | Prior to the commencement of operation    |
|         | The proposed construction hours will be in accordance with the Interim Construction Noise Guidelines (DECC, 2009) which identify standard hours for construction activities in NSW: <ul style="list-style-type: none"> <li>Monday to Friday: 7.00 am to 6.00 pm</li> <li>Saturday: 8.00 am to 1.00 pm</li> <li>Sunday and Public Holidays: no work.</li> </ul>   | Construction phase                        |
|         | The proposed hours of operation for the key quarry activities include: <p><b>Blasting:</b><br/>9.00 am to 5.00 pm Monday to Friday<br/>Anticipated need for 1 to 2 blasts per fortnight</p> <p><b>Quarrying and processing:</b></p> <ul style="list-style-type: none"> <li>7.00 am to 6.00 pm Monday to Friday</li> <li>7.00 am to 3.00 pm Saturday</li> </ul> <p><b>Truck loading, product transport and maintenance:</b></p> <ul style="list-style-type: none"> <li>6.00 am to 10.00 pm Monday to Friday</li> <li>7.00 am to 3.00 pm Saturdays</li> </ul> <p><b>No operation on Sundays or Public Holidays apart from maintenance activities as required</b></p> | Operation phase                           |

| Aspect          | Management/Mitigation Measure   | Timing                     |
|-----------------|---|----------------------------|
| <b>Noise</b>    | <p>The CEMP and OEMP will include the following monitoring and management controls to manage potential noise impacts associated with construction activities and site operations:</p> <ul style="list-style-type: none"> <li>• noise objectives and targets consistent with the Project approval</li> <li>• noise management measures in place at the site</li> <li>• provision of general noise awareness training for key operational staff</li> <li>• noise monitoring processes implemented at the site to provide for ongoing noise management, including:               <ul style="list-style-type: none"> <li>○ monitoring and determination of compliance with relevant noise criteria provided in the Project approval</li> <li>○ stakeholder consultation</li> <li>○ complaint/enquiry handling process including maintenance of a 24-hour community contact line</li> <li>○ a roles and responsibilities matrix, with responsibilities being clearly defined through all levels within the operation.</li> </ul> </li> </ul> | Construction and operation |
|                 | <p>Compliance monitoring will be undertaken annually via attended monitoring at defined locations. Attended monitoring for compliance assessment will be undertaken at three locations surrounding the Project Area that are considered to be representative of the most sensitive noise receivers, with one in each NAG. The attended noise monitoring locations will be reviewed periodically to ensure monitoring is undertaken at appropriate representative locations. Any changes will be reflected in amendments to the OEMP prior to being implemented.</p> <p>Annual validation monitoring will also be undertaken to confirm the noise model predictions and accuracy of the noise model. For efficiency purposes, it is likely that compliance monitoring and validation monitoring will be undertaken concurrently.</p>   | Construction and operation |
| <b>Blasting</b> | <p>The following blast emission control measures will be implemented to minimise blasting impacts (including ground vibration, airblast overpressure and flyrock impacts) on the surrounding environment:</p> <ul style="list-style-type: none"> <li>• use of ground vibration and airblast predictive models to estimate potential impacts for critical receptors</li> <li>• use of appropriate charge mass design and avoidance of overcharging holes</li> <li>• use of an appropriate initiation sequence to minimise the possibility of hole interactions, ideally aiming for single hole initiation</li> <li>• application of appropriate quality stemming material and stemming height to facilitate explosives confinement and therefore minimise airblast overpressure emissions, stemming ejection and/or flyrock incidents</li> <li>• maintain appropriate burden specification for the front row holes to avoid face bursts and related flyrock incidents.</li> </ul>  | Operation                  |
|                 | <p>ARDG will implement a Blast Monitoring, consisting of three monitoring stations to capture ground vibration and airblast overpressure impacts from blasting at the Project site. Located to the north-west (representative of private residences in the Balickera area, HWC infrastructure and Balickera House), south-east (representative of private residences in the Ferodale area) and south of the Project (in the vicinity of R1).</p>  | Operation                  |
|                 | <p>ARDG will implement a Pre-Blast Assessment Protocol to manage blasting and to minimise the impacts on the surrounding area. The protocol would be reviewed on a regular basis to address the physical changes in the quarry.</p>   | Operation                  |

| Aspect                          | Management/Mitigation Measure   | Timing                       |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
|---------------------------------|---|------------------------------|------------------------------|------------------------------|---------------|--|-----|------------------|--|-----|------------------------|--|-----|---------------------------------|----------------------------|-----|----------------------------|
|                                 | ARDG will implement a Road Closure Management Plan developed in consultation with the relevant road authorities and PSC to manage blasting impacts on public roads which, depending on the operational stage of the quarry, will be located within 0.5 km of the extraction area.   | Operation                    |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
|                                 | ARDG will implement a Residence Notification System to provide information on the dates and times of proposed blasting to the private residences in close proximity.  | Operation                    |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
|                                 | ARDG will continue to liaison with adjacent quarries to prevent concurrent blasting times to avoid cumulative blast impacts and to minimise impact on the local community.  | Operation                    |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
| <b>Air Quality</b>              | <p>The CEMP and OEMP will include the following monitoring and management controls to manage potential air quality impacts associated with construction activities and site operations:</p> <ul style="list-style-type: none"> <li>• minimising the area of disturbed land at any one time, in line with an approved Quarry Operations Plan</li> <li>• implementation of timely progressive rehabilitation</li> <li>• review of meteorological conditions prior to blasting</li> <li>• consideration of meteorological conditions in planning the loading and unloading of overburden and product materials</li> <li>• minimising fall distance during loading and unloading of materials.</li> <li>• Procedures for monitoring background PM10 levels at Beresfield and additional dust management controls in event that 1-hr average PM10 levels at Beresfield EPA monitor exceed 80 µg/m<sup>3</sup></li> </ul>   | Construction and operation   |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
|                                 | <p>The following emission management measures will be implemented:</p> <table border="1" data-bbox="331 868 1778 1275"> <thead> <tr> <th data-bbox="331 868 734 948">Activity</th> <th data-bbox="734 868 1480 948">Emission Management Measures</th> <th data-bbox="1480 868 1778 948">Assumed emission control (%)</th> </tr> </thead> <tbody> <tr> <td data-bbox="331 948 734 1027">Drilling rock</td> <td data-bbox="734 948 1480 1027">Water sprays (as required)<br/>Minimising activities when excessive visible dust is generated</td> <td data-bbox="1480 948 1778 1027">70%</td> </tr> <tr> <td data-bbox="331 1027 734 1155">Hauling on roads</td> <td data-bbox="734 1027 1480 1155">Watering of unsealed haul routes/roads<br/>Restricting vehicle speeds<br/>Clearly marked haul routes</td> <td data-bbox="1480 1027 1778 1155">50%</td> </tr> <tr> <td data-bbox="331 1155 734 1235">Crushing and screening</td> <td data-bbox="734 1155 1480 1235">Enclosures<br/>Water sprays (as required)</td> <td data-bbox="1480 1155 1778 1235">70%</td> </tr> <tr> <td data-bbox="331 1235 734 1275">Conveyors between process units</td> <td data-bbox="734 1235 1480 1275">Water sprays (as required)</td> <td data-bbox="1480 1235 1778 1275">50%</td> </tr> </tbody> </table> | Activity                     | Emission Management Measures | Assumed emission control (%) | Drilling rock | Water sprays (as required)<br>Minimising activities when excessive visible dust is generated | 70% | Hauling on roads | Watering of unsealed haul routes/roads<br>Restricting vehicle speeds<br>Clearly marked haul routes | 50% | Crushing and screening | Enclosures<br>Water sprays (as required) | 70% | Conveyors between process units | Water sprays (as required) | 50% | Construction and operation |
| Activity                        | Emission Management Measures  | Assumed emission control (%) |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
| Drilling rock                   | Water sprays (as required)<br>Minimising activities when excessive visible dust is generated  | 70%                          |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
| Hauling on roads                | Watering of unsealed haul routes/roads<br>Restricting vehicle speeds<br>Clearly marked haul routes  | 50%                          |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
| Crushing and screening          | Enclosures<br>Water sprays (as required)  | 70%                          |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |
| Conveyors between process units | Water sprays (as required)  | 50%                          |                              |                              |               |  |     |                  |  |     |                        |  |     |                                 |                            |     |                            |

| Aspect                          | Management/Mitigation Measure   |  | Timing   |
|---------------------------------|---|--|--|
|                                 | Wind erosion  | Water sprays<br>Minimising activities when excessive visible dust is generated<br>Stabilising and minimising the extent of materials stored on-site<br>Progressive rehabilitation of exposed areas | 50 to 65%  |
|                                 | The following measures will be implemented to manage diesel exhaust emissions: <ul style="list-style-type: none"> <li>servicing machinery in accordance with maintenance contracts and adopting original equipment manufacturer recommendations for maintenance</li> <li>additional maintenance where needed to ensure equipment remains fit for purpose over its whole life cycle</li> <li>defining failure modes to help minimise potential equipment failure.</li> </ul>   |  | Construction and operation   |
| <b>Greenhouse Gas Emissions</b> | The following measures will be implemented to reduce the level of future greenhouse gas emissions: <ul style="list-style-type: none"> <li>ensuring that mobile plant and equipment are maintained and operated in an efficient manner so that unnecessary fuel usage is avoided, including the shutting down of plant and equipment when not in use and ensuring they are operated in the most efficient mode</li> <li>minimising the extent of vegetation clearance and implementing revegetation and regeneration of completed areas as soon as practicable.</li> <li>raising awareness of climate change issues amongst all stakeholders.</li> </ul> The feasibility of introducing lower emission equipment will be investigated during the replacement cycle for machinery.  |  | Construction and operation   |
| <b>Surface Water</b>            | The conceptual operational Water Management System (WMS) as described in Section 6.5.1.2 of the EIS will be implemented and maintained for the life of the operations.<br><br>A detailed Soil and Water Management Plan (SWMP) will be prepared and incorporated into the CEMP/OEMP, by a suitably qualified person to facilitate implementation of best practice erosion and sediment controls during all stages of the Project. All erosion and sediment controls will be installed, managed and maintained in general accordance with the Blue Book (Landcom, 2004) to: <ul style="list-style-type: none"> <li>divert clean water around site</li> <li>prevent sediment moving off-site and sediment laden water entering any watercourse, drainage line, or drain inlet</li> <li>reduce water velocity and capture sediment on site</li> <li>minimise the amount of material transported from site to surrounding pavement surfaces.</li> </ul> During all stages of the Project, including the construction phase, erosion and sediment controls will be established in general accordance with <i>Managing Urban Stormwater – Soils and Construction Volume 1 (Landcom, 2004) and Volume 2E: Mines and quarries (the Blue Book) (Department of Environment and Climate Change, 2008)</i> .<br><br>The CEMP and OEMP will include the following monitoring and management controls to manage potential impacts to surface water associated with construction activities and site operations: |  | Construction and operation<br><br>Construction and operation<br><br>Construction and operation |

| Aspect | Management/Mitigation Measure  | Timing                     |
|--------|--|----------------------------|
|        | <ul style="list-style-type: none"> <li>• To minimise ground disturbance, construction and operational activities including vehicle and machinery movements, stockpiling, temporary vehicle parking and material laydown will be restricted to designated work areas. The disturbance boundary is to be clearly delineated with construction fencing or barrier tape.</li> <li>• All fuels, chemicals and liquids will be stored in an impervious bunded area, a minimum of 50 m away from drainage lines or waterways and all refuelling of plant and equipment is to be undertaken within this area.</li> <li>• Emergency spill kits will be kept on site at all times. All workers will be made aware of the location of the spill kits and trained in their use.</li> <li>• Any concrete washout undertaken on site will be in a bunded area that is not on waterfront land and at least 10 m from drains.</li> <li>• Where possible, topsoil will be stripped and handled only when it is moist (not wet or dry) to avoid decline of soil structure.</li> <li>• Topsoil stockpiles will be stabilised with vegetation (seeded) if they are to be inactive for long periods.</li> <li>• Stockpiles of erodible material that have the potential to cause environmental harm if displaced will be located away from concentrated surface flow and excessive up-slope stormwater surface flows.</li> <li>• Wherever reasonable and practicable, 'clean' surface waters will be diverted away from sediment control devices and any untreated, sediment-laden waters.</li> <li>• All runoff from the works will pass through sediment controls which will be located as close to the source of the sediment as practicable.</li> <li>• Sediment control devices will be de-silted and made fully operational as soon as reasonable and practicable after a sediment-producing event. Sediment traps will be maintained to ensure that no more than 30% of their design capacity is lost to accumulated sediment.</li> <li>• Sediment removed from any trapping device will be disposed of in locations where further erosion and consequent pollution to downslope lands and waterways will not occur.</li> <li>• Temporary soil and water management structures will be removed only after the Project Area is stabilised appropriately.</li> </ul> |                            |
|        | <p>ARDG will obtain an Environment Protection Licence (EPL) for carrying out a premises-based activity listed in Schedule 1 of the <i>Protection of the Environment Operations Act 1997</i> (i.e., extractive activities greater than 30,000 tonnes/year and crushing, grinding separating works). ARDG will include a request for at least one licensed discharge point in the EPL application to allow controlled discharges of surplus water from the quarry WMS.</p>   | Construction and operation |
|        | <p>ARDG will implement a surface water quality monitoring program including a continuation of monitoring in the three receiving waters reference sites in Nine Mile Creek plus an additional downstream site in a tributary of Caswells Creek, adjacent to Italia Road. Monitoring of water quality would also be undertaken within Sediment Basin 1, Sediment Basin 2, Main Pit Sump and the quarry licensed discharge point.</p> <p>Stored water volumes and discharge flow rates and volumes would also be monitored across the WMS and an automatic weather station installed to provide continuous recording of rainfall depth.</p>   | Construction and operation |

| Aspect              | Management/Mitigation Measure  | Timing   |
|---------------------|--|--|
|                     | <p>Routine stream stability monitoring will be undertaken as recommended in the baseline stream stability assessment that will be completed prior to construction.</p> <p>An inspection and water quality testing program for potable water stored in tanks on site will also be implemented to ensure amenities water quality meets the relevant Australian Drinking Water Guidelines.</p>  |  |
| <b>Groundwater</b>  | <p>The CEMP and OEMP will include a groundwater monitoring program to:</p> <ul style="list-style-type: none"> <li>• inform estimates of groundwater inflow into the pit (noting that a significant percentage is likely to evaporate on pit walls and in sumps and is not directly measurable)</li> <li>• assess potential impacts to groundwater levels and quality on other groundwater users in the vicinity</li> <li>• identify groundwater issues such as higher than predicted drawdowns that may impact receptors as early as possible</li> <li>• provide data which can be used to calibrate the analytical model and update the groundwater inflow predictions</li> <li>• measure groundwater level recovery post-closure and provide data which can be used to predict the length of time a WAL may be required after the Project is completed.</li> </ul> <p>ARDG will install a monitoring bore approximately 1 km from the Project Area, to the north-west, to confirm drawdown predictions in the GWIA and inform ARDG of any higher than predicted impacts on drawdown which may affect private bores before the pit depth reaches a point at which it may impact those bores. The precise location of this bore will be identified in the OEMP and will be installed, and monitoring commissioned prior to the development quarrying below the water table. Other than this additional bore, all other aspects of the monitoring program will be implemented prior to commencement of extraction. The groundwater monitoring program will include regular monitoring of water levels and water quality. Given access to some bores may be difficult in very wet weather data, loggers will be installed in at least two monitoring bores outside of the final quarry footprint, to provide a continuous record. Estimates of groundwater inflows will be obtained through an interpretation of rainfall, evaporation, bore data and pumping data from the pit.</p> | <p>Construction and operation</p> <p>Operation</p> |
|                     | <p>Prior to the pit floor in the Main Pit (not including the sump) progressing below 28m AHD, a GDE monitoring and management plan (GDEMMP) will be developed and implemented. The GDEMMP will be designed to identify the magnitude of drawdown impacts to the north of the Project Footprint as quarry operations in North Pit and Main pit progress below the interpolated water table. The Plan will be informed by updated drawdown predictions and an improved understanding (or conservative assumptions) around groundwater dependency and ecological value of vegetation communities identified as being probable GDEs. Triggers for management actions will be developed where groundwater and vegetation monitoring indicates groundwater drawdown is having, or likely to have, an impact on vegetation that is outside that which would be expected through natural variability.</p>  | <p>Operation – prior to mining below 28m AHD</p>   |
| <b>Biodiversity</b> | <p>The CEMP and OEMP will include the following management measures to mitigate the residual impacts (direct, indirect and prescribed) associated with the Project:</p> <ul style="list-style-type: none"> <li>• Workforce Education and Training – to create awareness of the key ecological issues, understand policies being implemented to protect biodiversity and responsibilities relating to weed management.</li> <li>• Vegetation Protection Zones for retained vegetation – appropriate temporary fencing and clear and visible signage.</li> </ul>   | <p>Construction and operation</p>                  |

| Aspect  | Management/Mitigation Measure   | Timing               |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
|---|---|----------------------|-------------|----------------------|---|-----------|----|---|-----------|------|---|-----------|----|---|-----------|-----|--|---------|------|---|---------|------|---|---------|------|--------------|
|   | <ul style="list-style-type: none"> <li>Ecologist pre-clearance survey and supervision of work – pre-clearing relocation survey for fauna, staged clearing work, management of fauna during clearing, ecologist supervision of all hollow tree felling and nest box installation.</li> <li>Erosion and Sediment Control – minimising disturbance, erosion and sediment control structures, surface water management structures and stabilisation of disturbed areas.’</li> <li>Weed Management – survey and treatment of invasive weeds, ongoing inspections and treatment, cleaning of machinery prior to entering the site.</li> <li>Fencing, access control and fauna exclusion – security fencing will assist with limiting fauna access to operational areas.</li> </ul>  |                      |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
|   | <p>ARDG will develop a biodiversity offset strategy during the assessment process in consultation with FCNSW, BCD, DPHI and DCCEEW. The biodiversity offset strategy will be based on the credits required to be retired to offset the impacts of the Project and the offset options available under the BC Act and BC Regulation including:</p> <ul style="list-style-type: none"> <li>Land based offsets through the establishment of new Stewardship Sites (and subsequent retirement of credits). ARDG would retire the required number and class of credits determined in accordance with the BDAR and the offset rules in the BC Regulation.</li> <li>Securing (purchasing) credits through the open credit market, and/or</li> <li>Paying into to the Biodiversity Conservation Fund (BCF).</li> </ul> <table border="1" data-bbox="331 762 1778 1216"> <thead> <tr> <th data-bbox="331 762 1355 842">PCT/Species credit</th> <th data-bbox="1355 762 1585 842">Credit type</th> <th data-bbox="1585 762 1778 842">No. credits required</th> </tr> </thead> <tbody> <tr> <td data-bbox="331 842 1355 885">PCT 762 Cabbage Gum open forest or woodland on flats of the North Coast</td> <td data-bbox="1355 842 1585 885">Ecosystem</td> <td data-bbox="1585 842 1778 885">13</td> </tr> <tr> <td data-bbox="331 885 1355 928">PCT 1590 Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest</td> <td data-bbox="1355 885 1585 928">Ecosystem</td> <td data-bbox="1585 885 1778 928">1092</td> </tr> <tr> <td data-bbox="331 928 1355 1008">PCT 1618 Smooth-barked Apple – White Stringybark – Red Mahogany – <i>Melaleuca sieberi</i> shrubby open forest on lowlands of the lower North Coast</td> <td data-bbox="1355 928 1585 1008">Ecosystem</td> <td data-bbox="1585 928 1778 1008">34</td> </tr> <tr> <td data-bbox="331 1008 1355 1088">PCT 1619 Smooth-barked Apple – Red Bloodwood – Brown Stringybark – Hairpin Banksia heathy open forest of coastal lowlands</td> <td data-bbox="1355 1008 1585 1088">Ecosystem</td> <td data-bbox="1585 1008 1778 1088">763</td> </tr> <tr> <td data-bbox="331 1088 1355 1131">squirrel glider (<i>Petaurus norfolcensis</i>)</td> <td data-bbox="1355 1088 1585 1131">Species</td> <td data-bbox="1585 1088 1778 1131">2519</td> </tr> <tr> <td data-bbox="331 1131 1355 1174">brush-tailed phascogale (<i>Phascogale tapoatafa</i>)</td> <td data-bbox="1355 1131 1585 1174">Species</td> <td data-bbox="1585 1131 1778 1174">2519</td> </tr> <tr> <td data-bbox="331 1174 1355 1216">koala (<i>Phascolarctos cinereus</i>)</td> <td data-bbox="1355 1174 1585 1216">Species</td> <td data-bbox="1585 1174 1778 1216">2519</td> </tr> </tbody> </table> | PCT/Species credit   | Credit type | No. credits required | PCT 762 Cabbage Gum open forest or woodland on flats of the North Coast | Ecosystem | 13 | PCT 1590 Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest | Ecosystem | 1092 | PCT 1618 Smooth-barked Apple – White Stringybark – Red Mahogany – <i>Melaleuca sieberi</i> shrubby open forest on lowlands of the lower North Coast | Ecosystem | 34 | PCT 1619 Smooth-barked Apple – Red Bloodwood – Brown Stringybark – Hairpin Banksia heathy open forest of coastal lowlands | Ecosystem | 763 | squirrel glider ( <i>Petaurus norfolcensis</i> ) | Species | 2519 | brush-tailed phascogale ( <i>Phascogale tapoatafa</i> ) | Species | 2519 | koala ( <i>Phascolarctos cinereus</i> ) | Species | 2519 | Construction |
| PCT/Species credit  | Credit type   | No. credits required |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
| PCT 762 Cabbage Gum open forest or woodland on flats of the North Coast   | Ecosystem   | 13                   |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
| PCT 1590 Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest   | Ecosystem   | 1092                 |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
| PCT 1618 Smooth-barked Apple – White Stringybark – Red Mahogany – <i>Melaleuca sieberi</i> shrubby open forest on lowlands of the lower North Coast | Ecosystem   | 34                   |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
| PCT 1619 Smooth-barked Apple – Red Bloodwood – Brown Stringybark – Hairpin Banksia heathy open forest of coastal lowlands                           | Ecosystem   | 763                  |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
| squirrel glider ( <i>Petaurus norfolcensis</i> )  | Species   | 2519                 |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
| brush-tailed phascogale ( <i>Phascogale tapoatafa</i> )   | Species   | 2519                 |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |
| koala ( <i>Phascolarctos cinereus</i> )   | Species   | 2519                 |             |                      |   |           |    |   |           |      |   |           |    |   |           |     |  |         |      |   |         |      |   |         |      |              |

| Aspect                        | Management/Mitigation Measure   | Timing                     |
|-------------------------------|---|----------------------------|
| <b>Aboriginal Archaeology</b> | <p>The CEMP and OEMP will include the following management measures:</p> <ul style="list-style-type: none"> <li>• ARDG will ensure that all parties involved in the Project (through induction processes) are aware that it is an offence under Section 86 of the <i>National Parks and Wildlife Act 1974</i> (NPW Act) to harm or desecrate an Aboriginal object (unless otherwise approved under the NPW Act or a development consent for SSD issued under the EP&amp;A Act.</li> <li>• in the unlikely event that an Aboriginal object is exposed during works, all works in the vicinity of the object should cease and advice should be sought from an archaeologist and the RAPs in regard to management of the object(s).</li> </ul>   | Construction and operation |
| <b>Historic Heritage</b>      | <p>The CEMP and OEMP will include the following management measures:</p> <ul style="list-style-type: none"> <li>• An unexpected finds protocol will be established and followed in the event that any unexpected historical archaeological deposits, artefacts, or structures of potential heritage significance are identified.</li> <li>• All Project team members and construction contractors will undergo a heritage-specific induction to support the use of the unexpected finds protocol prior to undertaking any activities within the Project Area.</li> <li>• In the unlikely event that unexpected finds are encountered during the Project, all work in the area will cease and a suitably qualified archaeologist will be contacted to determine an appropriate course of action. Depending on the extent and/or significance of the finds encountered, consultation with Heritage NSW may also be required prior to the re-commencement of works.</li> </ul>   | Construction and operation |
| <b>Traffic</b>                | <p>ARDG will implement the following traffic management and mitigation measures:</p> <ul style="list-style-type: none"> <li>• No quarry product will be transported from the site until the Italia Road-Pacific Highway intersection works (the subject of a separate development application process by Boral) are completed to the satisfaction of Port Stephens Council/TfNSW. To prevent conflicts on the road network, heavy vehicles would only be permitted to turn left out of Italia Road onto the Pacific Highway. An acceleration lane is to be provided onto the Pacific Highway (as part of a separate development application process), essentially removing the left-turn movement in favour of a downstream merge movement.</li> <li>• No heavy vehicles would be permitted to travel west on Italia Road past the quarry access point (toward Seaham) either to or from the quarry site.</li> <li>• A new site access point would be constructed directly opposite the existing Boral Seaham Quarry on Italia Road. A Channelised Right Turn (CHR) treatment is to be provided on Italia Road at the site access, to enable safe right turns into the Project Area.</li> </ul> | Operation                  |
| <b>Geotechnical Stability</b> | <p>ARDG will incorporate the following measures:</p> <ul style="list-style-type: none"> <li>• When quarrying commences, regular site inspections will be undertaken to observe for signs of adverse geotechnical conditions. Furthermore, where site conditions are observed to deviate from those outlined in the Geotechnical Stability Review, additional intrusive investigation and/or defect mapping would be undertaken. This may include core sampling of key stratigraphic units, and laboratory testing to confirm the geomechanical properties and strength parameters of the material.</li> </ul>   | Construction and operation |

| Aspect          | Management/Mitigation Measure   | Timing                     |
|-----------------|---|----------------------------|
|                 | <ul style="list-style-type: none"> <li>Ongoing groundwater monitoring of the Project Area will be undertaken. Where site conditions are observed to deviate from those outlined in the Geotechnical Stability Review, a full suite of stability analyses with the benefit of additional data obtained from the intrusive hydrological studies would be undertaken.</li> </ul>   |                            |
| <b>Waste</b>    | <p>The following measures will be implemented to ensure that wastes are appropriately managed for the life of the Project:</p> <ul style="list-style-type: none"> <li>Waste streams will be classified and managed in accordance with the principles of the waste management hierarchy and EPA guidelines.</li> <li>All wastes will be stored in appropriate containers/receptacles that are lidded where practical, within designated waste storage areas.</li> <li>All wastes will be collected for reuse/recycling/disposal by appropriately licensed waste contractors.</li> <li>Site inductions for employees and contractors will include waste management information.</li> <li>Appropriate signage will be provided at all waste storage areas to clearly identify waste segregation and recycling procedures.</li> </ul>   | Construction and operation |
| <b>Bushfire</b> | <p>A Bushfire Emergency Management Plan will be developed for the Project and incorporated into the CEMP and OEMP, in accordance with PBP 2019 and in consultation with the RFS (including the local Fire Control Centre and local brigades), DPPI, FCNSW and NPWS. The plan will identify all relevant bushfire risks and mitigation measures associated with the construction and operation of the Project, including:</p> <ul style="list-style-type: none"> <li>detailed measures to prevent or mitigate fires igniting, outlining: <ul style="list-style-type: none"> <li>APZ locations and management requirements</li> <li>access locations, passing bays (if required) and any alternate emergency access</li> <li>water supply and any other bush fire suppression systems</li> </ul> </li> <li>work that should not be carried out during total fire bans</li> <li>availability of fire-suppression equipment</li> <li>storage and maintenance of fuels and other flammable materials</li> <li>notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate</li> <li>appropriate bush fire emergency management and relevant evacuation plan developed with consideration of the emergency response applicable to the surrounding State Forest.</li> </ul> | Construction and operation |

| Aspect                | Management/Mitigation Measure   | Timing                     |
|-----------------------|---|----------------------------|
| <b>Visual</b>         | <p>ARDG will implement the following mitigation and management measures:</p> <ul style="list-style-type: none"> <li>• To the greatest extent practicable, the Project Area will be quarried in a manner that enables mobile equipment to remain shielded behind the active face as the ridge is lowered.</li> <li>• Vegetated buffers will be retained around the Disturbance Area and along road frontages.</li> <li>• Lighting will be directed downwards and away from residential areas and public roads in accordance with relevant Australian Standards (AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting).</li> <li>• The Project Area will be maintained in a clean and tidy condition at all times.</li> </ul>   | Construction and operation |
| <b>Social</b>         | <p>ARDG will implement the following strategies:</p> <ul style="list-style-type: none"> <li>• Community Engagement Strategy comprising project-specific stakeholder analysis, mechanisms or methods to be utilised, periodic action plans, targets, and responsibilities for implementation. The strategy would also outline the development of a monitoring and evaluation framework throughout the life of the Project, which will complement the ongoing engagement through the established Community Consultative Committee (CCC).</li> <li>• Employment, Training and Procurement Strategy, including initiatives to proactively enable the maximisation of local employment and sourcing for the Project’s construction and operational needs and could include investigation of options for prioritising the employment of local workers, supplier and servicing opportunities for local businesses and jobs, supplier, and servicing opportunities that target partnerships with local and enhancement strategies.</li> <li>• Social Impact Management Plan (SIMP) will be developed in collaboration with key stakeholders. ARDG will be responsible for the development, implementation and monitoring of the SIMP throughout the life of the Project.</li> </ul> | Prior to construction      |
| <b>Economic</b>       | <p>ARDG will implement the following economic management measures:</p> <ul style="list-style-type: none"> <li>• Employment of regional residents preferentially where they have the required skills and experience and can demonstrate a cultural fit with the organisation.</li> <li>• Participating, as appropriate, in business group meetings, events or programs in the regional community.</li> <li>• Locally sourcing non-labour inputs to production where local producers can be cost and quality competitive.</li> <li>• Provision of community grants through various initiatives and programs within the local community, including the education, arts, sporting and culture sectors.</li> </ul>   | Construction and operation |
| <b>Rehabilitation</b> | <p>The OEMP will include the development of a rehabilitation management plan and will include the following key management measures to be implemented throughout the quarry establishment and operational stages:</p> <ul style="list-style-type: none"> <li>• Topsoil management – Topsoil material for rehabilitation will be sourced from soil stored on-site that has been stockpiled as part of the initial site preparation processes, although it is noted that the soil resource across the Disturbance Area is limited, and importation of additional material may be required at the time of rehabilitation. Where practicable, mulched vegetation will also be included to promote on-site growth medium availability. Prior to use for rehabilitation purposes, topsoil material will be analysed at a NATA registered laboratory to determine the application requirements for any soil ameliorants, if necessary.</li> </ul>  | Operation                  |

| Aspect | Management/Mitigation Measure  | Timing  |
|--------|--|---|
|        | <ul style="list-style-type: none"> <li>• Habitat enhancement – The salvage of hollow bearing trees, hollow logs, and fallen timber will be undertaken, where practical, during the vegetation clearing process. These resources will be stockpiled adjacent to the Disturbance Area along with topsoil stockpiles, with both being spread across flatter areas of the shaped landform once complete. The relocation of these habitat resources into post-quarrying rehabilitation areas is aimed at increasing habitat complexity, in order to make these areas more habitable for native species. With the approval of FCNSW, hollow logs, felled hollow bearing trees, and fallen timber material may also be emplaced within adjoining areas of the State Forest for habitat enhancement purposes where it is considered that the habitat benefits of the features unlikely to be retained for on-site rehabilitation purposes following extended stockpiling periods.</li> <li>• Weed and pest management – Weed and pest species may be inadvertently introduced to the Project Area through vehicle movements or could invade naturally into disturbed areas following the removal of native vegetation. Weed and pest management strategies will be detailed in the BRMP to ensure populations are appropriately controlled throughout the Project life.</li> <li>• Revegetation – A major issue to be considered in the revegetation of the upper quarry benches and surrounding ancillary areas is the shallow rock underlying the entire site. Topsoil and substrate depth and/or the ability of plant root systems to penetrate the subsoil is crucial to ensure plant survival, to allow access to water and support for root systems, especially for canopy species. If the roots of planted vegetation cannot reach sufficient depth, they may be susceptible to toppling as they age. Revegetation of quarry benches will therefore focus on the establishment of vegetation species suited to shallow rooting depth, providing a vegetated transition between the final void water storages and the surrounding forest. Other areas of the site with shallow soil material (e.g., outcrop areas or shallow rock) may also be subject to similar revegetation constraints and will have similar revegetation treatment to benches. Areas of the voids expected to be flooded within 10 years of closure will not be actively revegetated however natural regrowth in these areas (other than weeds) will not be discouraged as the presence of sucker material within the pit lakes can enhance long term biodiversity values.</li> </ul> |   |
|        | <p>A Detailed Quarry Closure Plan will be developed 3 years prior to planned cessation of quarrying activities. The Detailed Quarry Closure Plan will be based on a final land use focused on promoting the surrounding forest landscape by re-establishing pockets of woodland species across the benches consistent with endemic vegetation types with retained access opportunities to the voids/lakes for safety purposes and future uses consistent with management objectives for the State Forest. Alternative land uses will be investigated as part of the development of the Detailed Quarry Closure Plan and will include consultation with FCNSW, Hunter Water, Port Stephens Council and DPE.</p>   | <p>Operation – 3 years prior to planned closure</p> |