

Additions to the Summary Report for the Assessment of the Southdown Magnetite Project under the Environment Protection and Biodiversity Conservation Act 1999 (the Summary Report)

Grange Resources Limited (Grange) undertook a public comment period under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Southdown Magnetite Project (the Project) from Friday 3 November to Thursday 30 November 2017. The only technical issue raised within the submissions that required additional information further to that included in the Preliminary Documentation (referred to as the Summary Report) was related to groundwater.

In response to the public submissions regarding groundwater, Grange has added further information to the Summary Report. Table 1 provides details of these additions and their location within the revised Summary Report. Information has only been added to the latest version of the Summary Report, no information was removed.

Table 1: Additions to the Summary Report

Section within Revised Summary Report	Added Information
Executive Summary	<p>The following information was added to the existing Executive Summary:</p> <p>The abstraction of up to 5 Gigalitres per year of groundwater in the Wellstead Aquifer Investigation Area is predicted to have no impact on MNES habitat. This is because groundwater abstraction by the Project will be from the lower Werillup aquifer. This aquifer is confined by clay layers, resulting in negligible drawdown in the regional water table (in the overlying Pallinup Formation). As a consequence, abstraction of water from the Werillup aquifers will not significantly affect water levels in the shallow groundwater system used by agriculture, stygofauna, native vegetation or the coastal drainage system (Rockwater 2018; refer Appendix 2 of Appendix 6.1). Further to this:</p> <ul style="list-style-type: none"> • the regional water table in this area is more than 9-10m below the surface, and as such, any vegetation present in these areas is understood to be a facultative groundwater user that would not be affected by changes in the regional water table level (Strategen, 2018 in Appendix 6.1). • the water quality of the regional aquifer is brackish to saline and as such, is unlikely to provide a preferred water supply source to any vegetation, as the species present within

	<p>the mine locality do not represent salt tolerant species (Ecologia 2007; cited in Strategen 2018 in Appendix 6.1) and are unlikely to utilise groundwater, even in areas where depth to groundwater is shallow (Ecological 2018; cited in Strategen 2018 in Appendix 6.1).</p> <p>Pit dewatering is predicted to have no impact on MNES habitat because all areas of groundwater drawdown outside of the mine footprint are either within cleared agricultural areas or have depths to groundwater greater than 10m, so that there are unlikely to be any groundwater dependent ecosystems in these areas (Rockwater 2018; refer Appendix 2 of Appendix 6.1).</p>
<p>Section 6.1.3 Occurrence of Groundwater and Groundwater Dependent Ecosystems</p>	<p>A new section (Section 6.1.3) was added to the Summary Report with the following text:</p> <p>The detailed hydrogeology of the Project locality is based on an extensive groundwater exploration drilling and testing program and groundwater modelling conducted by Grange in progressive stages since 2006. This work is summarised in Rockwater 2018 (see Appendix 2 of Appendix 6.1) and has identified three hydrogeological occurrences of groundwater in the area proximate to the Project footprint:</p> <ol style="list-style-type: none"> 1. Surface and near-surface occurrences of perched watertables, which support wetlands and shallow rooted phreatophytic vegetation. By their nature perched water tables are separate from, and are not affected by, abstraction from other aquifers. 2. The regional water table, which occurs in the Pallinup Siltstone, within which watertable depths are generally in excess of 9 m below ground surface and depth to water table in the locality of the Project average approximately 15 m (refer Appendix 6.1). The Pallinup Siltstone forms an unconfined aquifer of horizontally bedded siltstone, claystone, spongolite and minor sandstone referred to as the Pallinup Formation (Donson 1997; cited in Strategen 2018 in Appendix 6.1). This aquifer is brackish and is generally unlikely to support groundwater dependent ecosystems because of its depth to groundwater and salinity. Areas with shallower depths to groundwater such as the seasonal Springwell Lake and Mettler Lake will be monitored to ensure there are no unexpected changes in the water table at these locations. The deepest part of the Mettler Lake basin floor is estimated to be approximately 5 m and the depth to watertable below Springwell Lake is approximately 8 m. Any surface water in these lakes is derived from rainfall and perched watertables. (Ecological 2018; refer Appendix 6.2). Shallow water

	<p>tables also occur in the deeply incised Wilyun Creek and Eyre River close to the coast (refer Appendix 6.1).</p> <p>3. Groundwater occurs within the Werillup Formation, which extends from depths of 30 m or more below the ground surface down to bedrock. The Werillup Formation comprises dark clay, carbonaceous material, siltstone, and sand beds. It underlies the Pallinup Siltstone and extends to depths in the range 30 to 140 m (refer Appendix 2 of Appendix 6.1). Water levels in the Werillup Formation are several metres below those in the overlying Pallinup Siltstone, which indicates a general downward movement of water between these two formations. Groundwater within the Werillup Formation occurs within two aquifers, which are confined by carbonaceous clay layers with negligible transfer of water across these layers. As a consequence, abstraction of water from these aquifers is not expected to significantly affect water pressures or levels in the shallower groundwater systems.</p> <p>The location of the Werillup Aquifers is presented in Figure 2 of Appendix 6.1. The conceptual hydrogeological configuration is presented diagrammatically in Figure 3 of Appendix 6.1.</p> <p>Salinity of groundwater at or below the regional watertable varies from fresh at the coast to extremely saline inland with levels as high as 15 000-20 000 mg/L inland of Denmark and Albany (WRC 2001; cited in Strategen 2018 in Appendix 6.1). Donson (1997) (cited in Strategen 2018 in Appendix 6.1) notes that groundwater salinity generally increases with depth and to the north and east as rainfall decreases. Rockwater (2018) (Appendix 2 of Appendix 6.1) notes the salinity of the Pallinup Formation varies widely from 300 to 7,000 mg/L, with no pattern in the salinity distribution clearly evident. The water quality of the regional aquifer is brackish to saline and as such, is unlikely to provide a preferred water supply source to any vegetation, as the species present within the mine locality do not represent salt tolerant species (Ecologia 2007) and are unlikely to utilise groundwater, even in areas where depth to groundwater is shallow (Ecological 2018).</p>
<p>Section 6.2 Flora and Vegetation Impact Assessment and Proposed Management</p>	<p>Section 6.2 of the Summary Report was amended to include the following text:</p> <p>An analysis conducted by Strategen (2018) (Refer Appendix 6.1) has concluded that vegetation within the Wellstead Aquifer Investigation Area would not be impacted by the abstraction of groundwater</p>

	<p>within this area. This is because groundwater abstraction by the Project will be from the lower Werillup aquifer. This aquifer is confined by clay layers, resulting in negligible drawdown in the regional water table (in the overlying Pallinup Formation). As a consequence, abstraction of water from the Werillup aquifers will not significantly affect water levels in the shallow groundwater system used by agriculture, stygofauna, native vegetation or the coastal drainage system (Rockwater 2018; refer Appendix 2 of Appendix 6.1). Further to this:</p> <ul style="list-style-type: none"> • the regional water table in this area is more than 9-10m below the surface, and as such, any vegetation present in these areas is understood to be a facultative groundwater user that would not be affected by changes in the regional water table level. • the water quality of the regional aquifer is brackish to saline and as such, is unlikely to provide a preferred water supply source to any vegetation, as the species present within the mine locality do not represent salt tolerant species (Ecologia 2007) and are unlikely to utilise groundwater, even in areas where depth to groundwater is shallow (Ecological 2018). <p>Pit dewatering is predicted to have no impact on habitat that support MNES because all areas of groundwater drawdown outside of the mine footprint are either within cleared agricultural areas or have depths to groundwater greater than 10m, so that there are unlikely to be any groundwater dependent ecosystems in these areas (Rockwater 2018; refer Appendix 2 of Appendix 6.1).</p>
<p>Section 7.2.2 Fauna Impact Assessment; Dewatering and Groundwater Abstraction Potential Impacts</p>	<p>The following text was added to Section 7.2.2:</p> <p>The investigation conducted on groundwater drawdown and potential impacts in relation to MNES (Strategen 2018, Appendix 6.1) concluded that neither dewatering at the mine nor groundwater extraction at the Wellstead Aquifer Investigation Area will result in any impacts on Carnaby's Black-Cockatoo or Western Ringtail Possum. However, as a precautionary measure, the adaptive Groundwater Monitoring and Management Plan (refer Appendix 6.2) will be implemented to address any issues of uncertainty regarding potential impacts of groundwater abstraction and dewatering on MNES habitat.</p> <p>The abstraction of up to 5 Gigalitres per year of groundwater in the Wellstead Aquifer Investigation Area is predicted to have no impact on MNES. This is because groundwater abstraction by the</p>

	<p>Project will be from the lower Werillup aquifer. This aquifer is confined by clay layers, resulting in negligible drawdown in the regional water table (in the overlying Pallinup Formation). As a consequence, abstraction of water from the Werillup aquifers will not significantly affect water levels in the shallow groundwater system used by agriculture, stygofauna, native vegetation or the coastal drainage system (Rockwater 2018). Further to this:</p> <ul style="list-style-type: none"> • the regional water table in this area is more than 9-10m below the surface, and as such, any vegetation present in these areas is understood to be a facultative groundwater user that would not be affected by changes in the regional water table level (Strategen 2018 in Appendix 6.1). • the water quality of the regional aquifer is brackish to saline and as such, is unlikely to provide a preferred water supply source to any vegetation, as the species present within the mine locality do not represent salt tolerant species (Ecologia 2007) and are unlikely to utilise groundwater, even in areas where depth to groundwater is shallow (Ecological 2018). <p>Pit dewatering at the mine is predicted to have no impact on MNES because all areas of groundwater drawdown outside of the mine footprint are either within cleared agricultural areas or have depths to groundwater greater than 10m, so that there are unlikely to be any groundwater dependent ecosystems in these areas (Rockwater 2018).</p>
<p>Section 7.3 Proposed Management for Fauna MNES</p>	<p>The following bullet points were added to the list of proposed management measures to reduce potential impact of the project on those fauna species listed as MNES:</p> <ul style="list-style-type: none"> • Implement the adaptive Groundwater Monitoring and Management Plan (Eco Logical Australia 2018; refer Appendix 6.2) to verify whether abstraction from the Werrilup aquifer will result in negligible changes to shallow groundwater levels. If unexpected changes in groundwater levels occur, the vegetation response will be investigated, and contingency actions implemented if necessary. • Conduct fauna surveys during design of the proposed borefield to ensure the only potential impact to fauna MNES is that which is currently being assessed. That is, the clearing of no more than 6 ha of native vegetation that may be foraging habitat to Carnaby's Black-Cockatoos.

Appendix 2 of Appendix 6.1	<p>Appendix 2 of Appendix 6.1 of the Summary Report has been updated to include more detailed information on the hydrogeology of the Project area.</p> <p>Appendix 2 of Appendix 6.1 has also been amended to include the following three documents as appendices:</p> <ul style="list-style-type: none"> • Rockwater (2016). Southdown Magnetite Project, Wellstead Area Groundwater Exploration Programme, Bore Completion and Test Pumping Report. May 2016. • Rockwater (2017). Southdown Magnetite Project, Numerical Modelling of Groundwater Supply from the Wellstead Sub-basin. October 2017. • Golder Associates (2006). Report on Estimates of Groundwater Inflow and Drawdown around the Proposed Open Pit, Southdown Iron Ore Project. July 2006.
Appendix 6.2	The Summary Report has added Appendix 6.2 which includes a Groundwater Monitoring and Management Plan.