Section 1

Introduction

PREAMBLE

This section introduces the Nyngan Scandium Project (the Proposal) and:

- *outlines of the scope of this Environmental Impact Statement;*
- *introduces the Applicant, EMC Metals Australia Pty Ltd;*
- *describes the Project Site;*
- *provides relevant background to the Proposal, including a review of the history of mining and exploration in the area surrounding the Project Site, an overview of the resources and reserves and an overview of the products and need for the Proposal;*
- *describes the format of this Environmental Impact Statement; and*
- *identifies the personnel involved in the Proposal design, document preparation and specialist consultant investigation.*

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1.1 SCOPE

This *Environmental Impact Statement* (EIS) has been prepared by R.W. Corkery & Co. Pty Limited on behalf of EMC Metals Australia Pty Ltd (the Applicant) to support an application for development consent for the Nyngan Scandium Project (the Proposal). Approval is sought to develop and operate an open cut scandium mine and processing plant, located approximately 20km west-southwest of Nyngan, within the Bogan Local Government Area (**Figure 1.1**). The Proposal would include construction and operation of the following.

- Two open cuts and a borrow pit with extraction of up to 80 000t per year (tpa) of high grade ore and up to 95 000tpa of low grade ore over a period of 21 years.
- A processing plant.
- A Residue Storage Facility.
- Ancillary infrastructure, including but not limited to a site access road, evaporation pond, levee bunds, water and power supply infrastructure etc.

The Proposal is classified as State Significant Development in accordance with Paragraph 5 of Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP) as it would have a capital investment value of more than $30 million. Approval is required in accordance with Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The approval authority is the Minister for Planning and Environment or their delegate. An EIS is required to be submitted to support the application. This document has been prepared in satisfaction of that requirement and in accordance with:

- the requirements of Section 79C of the EP&A Act;
- Schedule 2 of the *Environmental Planning and Assessment Regulations 2000*;
- the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning and Environment (DPE) dated 11 December 2014 and incorporating submissions from and other relevant State and local government agencies; and
- the experience of R.W. Corkery & Co. Pty Limited in the preparation of documentation for similar projects throughout NSW.

1.2 THE APPLICANT

The Applicant, EMC Metals Australia Pty Ltd, is a subsidiary of the Canadian-incorporated Scandium International Mining Corp. (SCY). SCY is a specialty metals mining group with a worldwide exploration and development focus on scandium projects and market development as well as opportunistic development of select specialty metals and rare earth elements that may accompany scandium resources. SCY's primary operational focus is on its scandium project holdings, specifically the Nyngan Scandium Project and the Honeybugle property in Australia and the Tordal scandium property in Norway.

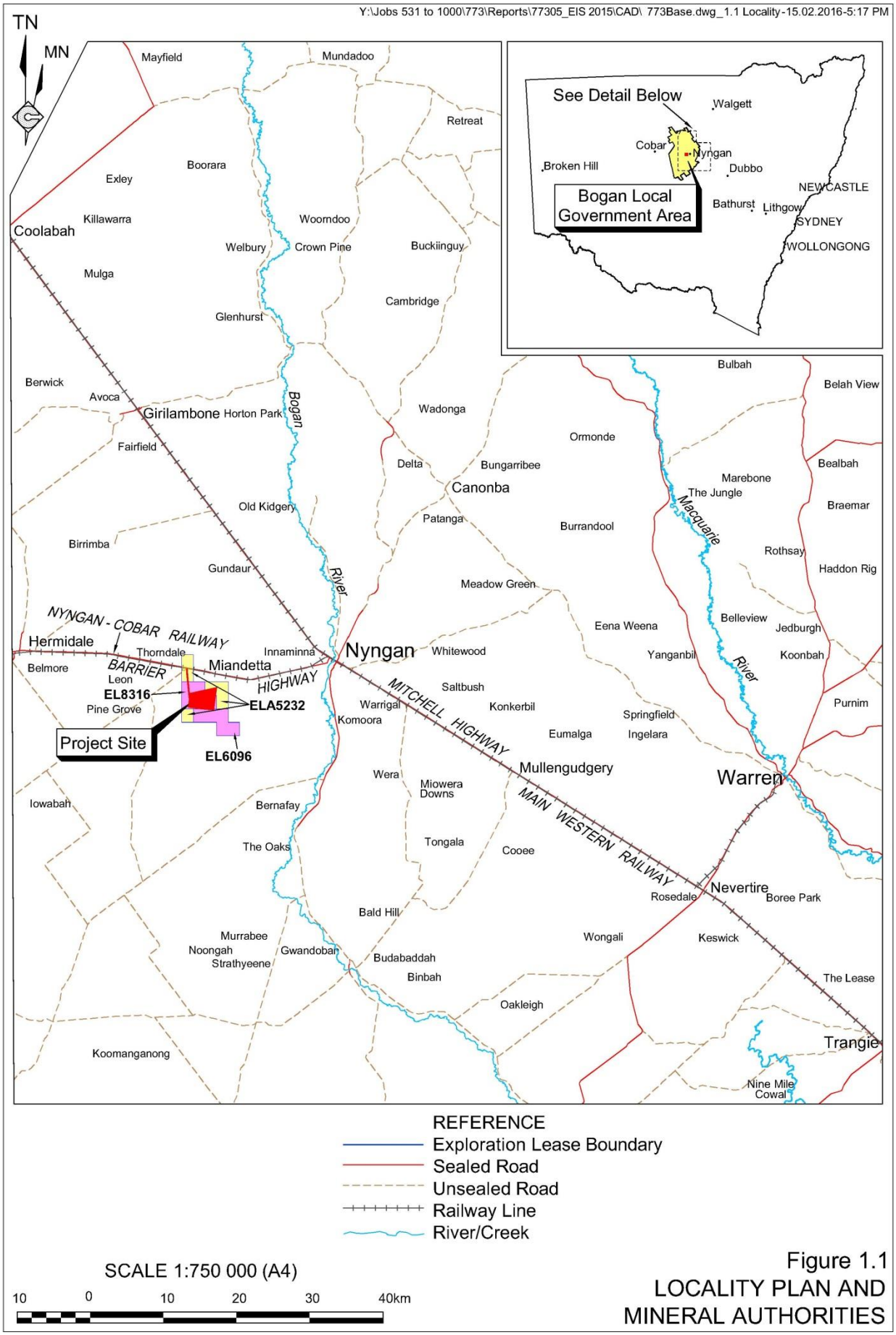

Figure 1.1
LOCALITY PLAN AND MINERAL AUTHORITIES

SCY was formed in 2006 under the name Golden Predator Mines Inc. and changed its name to EMC Metals Corp. in March 2009 as part of a reorganisation and spin-out of its precious metals portfolio. In November 2014 the Company announced a decision to change its name to Scandium International Mining Corp. to better reflect the company's strategic focus on its scandium assets.

The Proposal is 100% owned and operated by the Applicant.

SCY has a board of seven directors, namely:

- Mr William B Harris, BA, MBA (Chairman);
- Mr George F Putnam, MBA (Finance) (President, CEO and Director);
- Mr Willem P C Duyvesteyn, MSc, Suma cum Laude (Chief Technology Officer, Director);
- Mr Warren K Davis (Director);
- Mr Barry Davies (Director);
- Mr James R Rothwell (Director); and
- Mr Andrew C Greig (Director).

The Company's senior management also include:

- Mr John D Thompson, (B.E.Mining and Petroleum, FAusIMM), (Vice President of Project Development).
- Mr Edward H Dickinson, CPA (CFO).

1.3 PROJECT SITE

The Project Site comprises an area of approximately 910ha of freehold land, as well as small sections of Crown Road Reserve. The Project Site incorporates all areas of Proposal-related activities. **Table 1.1** and **Figure 1.2** present land titles within the Project Site.

Table 1.1
Project Site

Lot	DP	Lot	DP
1[1]	752879	20[1]	752879
6	752879	7300[1]	1156652
7	752879	Unnamed Crown road reserves	
Note 1: Part Lot only			

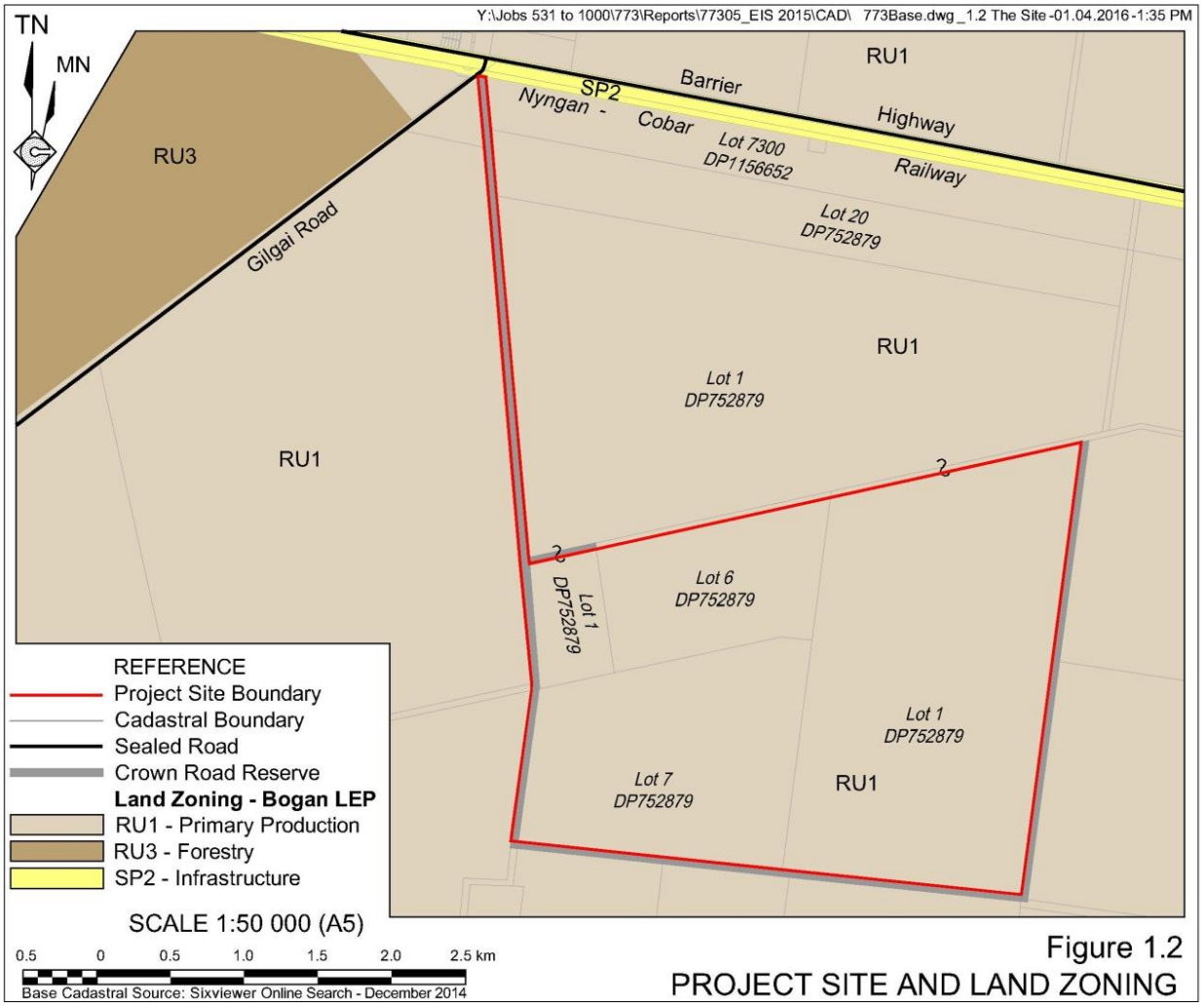

Figure 1.2
PROJECT SITE AND LAND ZONING

1.4 EXISTING MINERAL AUTHORITIES, IDENTIFIED RESOURCE AND PRODUCTS

1.4.1 Existing Mineral Authorities

The existing mineral authorities held by the Applicant or related companies are presented in **Figure 1.1** and **Table 1.2**. The Proposal is contained within Exploration Licences (EL) 8316 and 6096 and Exploration Licence Application (ELA) 5232.

Table 1.2
Existing Mineral Authorities

Mineral Authority	Company	Date Issued	Expiry Date
EL 6096	EMC Metals Australia Pty Limited	09 July 2003	08 July 2018
EL 8316		21 October 2002	20 October 2016
ELA 5232		-	-
Source: Department of Industry Division of Resources and Energy			

1.4.2 Resources

In 2010, the Applicant prepared an independent Canadian National Instrument 43-101 (NI 43-101)-compliant technical report outlining a measured and indicated resource for the Nyngan Scandium Deposit. The NI 43-101-compliant resource estimation is approximately 12 million tonnes of scandium-rich laterite, grading an average 261ppm scandium, with a 100ppm cut-off. **Table 1.3** summarises the current resource estimate prepared to comply with NI 43-101 and JORC requirements.

Table 1.3
Resource Estimate

Resource Category	Cut-off Sc (ppm)	Total Tonnes (Mt)	Grade Sc (ppm)	Stripping Ratio
Measured	100	2.7	274	0.81:1
Indicated	100	9.3	258	1.40:1
Total	**100**	**12.0**	**261**	**1.10:1**
Source: Larpro (2015) – After Table 1.2				

It is noted that the current measured and indicated resource would permit operation at the proposed rate of 75 000tpa for over 180 years. As a result, the Proposal at this stage, would not extract all of the identified resource. Rather, as the global market for scandium expands, modifications would be sought to the development consent, should it be granted, to permit extraction of ore material at a greater rate from a larger area. In designing the Proposal an allowance has been made to permit potential expansion of the Proposal.

The mineralised resource may extend beyond the limit of the current defined resource, and therefore beyond the dimensions of the proposed mining area. During the life of the Proposal, the Applicant proposes to undertake additional exploration drilling to define additional mineralisation. Future expansions of mineral resource, and subsequent expansions of mining and processing capacity that may be contemplated, will be addressed by amendments to this Proposal where possible, or otherwise proposed through subsequent applications where those are required.

1.4.3 Products and Need for the Proposal

An independent technical report, prepared by Larpro Pty Ltd in 2015, on behalf of the Applicant, provided a *Preliminary Economic Assessment* in support of the Proposal. The *Preliminary Economic Assessment* illustrated existing and potential markets for scandium. Scandium is almost always sold and consumed as a complex oxide also known as scandia. It is similar to but is not considered to be a rare earth element and is commonly found in subsoil in low concentrations. Two principal and potentially high volume markets for scandia are described below and illustrated in **Plate 1.1** and **Plate 1.2**.

Aluminium-scandium Alloys

Aluminium-scandium alloys are one of the superior performing variants of existing aluminium alloy types. The addition of scandia to aluminium promotes grain refinement, while retaining desirable superplasticity and improving the response to precipitation hardening techniques. These effects substantially increase the strength of certain aluminium alloys, while also improving corrosion resistance and weldability.

Aluminium alloys are used in a variety of applications today, most prominently in the transportation sector, principally aircraft and speciality car and train parts (**Plate 1.1**). Aluminium alloys are also used for high voltage wiring and in structural applications in the building and construction industries. The use of scandium in an aluminium alloy has the potential to produce lighter manufactured parts, and the preservation of desirable aluminium alloy properties has the potential to reduce the manufacturing costs to make those parts, and to assemble those parts.

Aluminium alloys are manufactured either as wrought alloys or castable alloys, and turned into products through different processes based on this distinction and other characteristics designed into the alloys themselves. Aluminium alloys are currently being applied to fresh new manufacturing techniques such as additive layer manufacturing, more commonly referred to as '3D Printing'. The development of additive layer manufacturing with aluminium promises to provide significant benefits to manufacturing capability, as this technique can manufacture

highly engineered parts that are impossible to form by traditional methods. Scandium additions bring unique and valuable benefits to each of these alloy manufacturing segments, which in turn are likely to add value for manufacturers and end users of aluminium-scandium alloys.

Solid Oxide Fuel Cells

Solid Oxide Fuel Cells (SOFC) are electrical generation devices that convert a hydrocarbon gas into electricity and usable heat, without combustion or moving parts. The use of scandia-stabilised zirconia in electrolytes within certain fuel cells acts as a heat stabiliser and enables reactions at lower temperatures. This substantially extends the commercial life of the units (up to ten times), replaces higher cost materials for containment and increases electrical output over competing materials.

SOFCs are recognised as highly efficient, they can be adapted for various fuel types, and they produce fewer emissions than those produced through combustion of the same fuels. **Plate 1.2** shows Solid Oxide Fuel Cells incorporating scandium manufactured by Bloom Energy and installed in a commercial setting.

Other commercial applications for scandium include:

- doping of ceramics for increased hardness;
- applications in electrical devices that include laser parts and computer switches;
- mercury vapour high intensity lighting; and
- TV/digital displays.

In its elemental form, scandium metal is principally purchased and used for scientific and laboratory work.

Available sources of scandium are limited and historically located in Russia and China. The current traded scandium market is limited by low and relatively expensive supply. The Applicant estimates that annual global scandium trade in 2015 was approximately 15t. The Applicant has forecast growth over the next five years to more than 100t per year based on latent demand from manufacturing and technological markets. This could potentially expand further should applications be developed as result of a reliable supply. The Nyngan Scandium Project would be the first mine globally to be developed with a principal focus on scandium production.

1.5 FORMAT OF THE DOCUMENT

This EIS includes five sections of text, a reference section, glossary and a set of appendices. The information presented in this document covers all aspects of the planning, development, operation, rehabilitation and environmental monitoring of the Proposal at a level of detail reflecting the environmental risk posed by each issue. The issues and their relevant importance to the assessment of the Nyngan Scandium Project have been identified through consultation with government agencies, surrounding residents and the local community, and specialist consultant assessments.

The format of the EIS is as follows.

- **Section 1:** introduces the Proposal, the Applicant, the Project Site and the mineral authorities held for the Proposal. Background information in relation the estimated resources within the Project Site are provided. The section concludes with information on the structure of the document and management of investigations.
- **Section 2:** describes the Applicant's objectives and proposed mining, processing and residue management activities, product despatch, hours of operation, infrastructure and services, water and waste management and rehabilitation activities. The section also describes the feasible alternatives considered by the Applicant during the design of the Proposal.
- **Section 3:** provides a description of the process used to identify and prioritise the key issues for assessment with reference to the Secretary's requirements, stakeholder consultation and specialist consultant assessments.
- **Section 4:** presents the environmental setting of the Project Site, including information on topography, meteorology, land ownership and land use. The section also presents a description of a range of environmental features of the local environment that may or would be influenced by the Proposal, i.e. the key environmental issues. The operational safeguards and controls, and where appropriate, the management procedures that have been incorporated into the Proposal design to protect the local environment, are also presented. This section also analyses the potential impact the Proposal would have on the physical, biological and social environment once the proposed safeguards and procedures are adopted.
- **Section 5:** provides a conclusion to the document including an assessment of the unmitigated and residual or mitigated risks, as well as a justification of the Proposal in terms of biophysical, economic and social considerations and ecologically sustainable development and records the consequences of not proceeding with the Proposal.
- **References:** lists the various source documents referred to for information and data used during the preparation of the EIS.
- **Glossary:** presents a list of the acronyms, symbols and units and technical terms used throughout the EIS.
- **Appendices:** present the following additional information.
    1. A copy of the Applicant's Political Donations Disclosure Statement.
    2. A copy of the SEARs for the Proposal, including the requirements provided by the various government agencies consulted.

3. An itemised and tabulated summary of the SEARs, including the requirements provided by the various government agencies consulted. This appendix also includes reference to the section(s) within the EIS or *Specialist Consultant Studies Compendium* where each is addressed.
4. A risk screening and Preliminary Hazard Analysis completed by RWC in accordance with the requirements of *State Environmental Planning Policy (SEPP) 33*.
5. An itemised and tabulated summary of the proposed environmental management and monitoring measures. This appendix also includes reference to the section(s) within the EIS where each measure is addressed.

A *Specialist Consultant Studies Compendium* has been placed on exhibition with the EIS. The contents of these reports are summarised into the appropriate section(s) of the EIS.

1.6 MANAGEMENT OF INVESTIGATIONS

The preparation of this document has involved a study team managed by Mr Mitchell Bland (B.Sc (Hons), MEcon Geol, LLB (Hons)), Principal Environmental Consultant with R.W. Corkery & Co Pty Limited. Mr Nicholas Warren (B.Sc., M.Bus (Marketing), M.Env.Sc.), Environmental Consultant and Ms Lauren Clear (B.Sc., M.Env.), Graduate Environmental Consultant, both with the same Company, assisted with preparation of the document.

Several professional staff within EMC Metals Australia Pty Ltd or its professional advisors assisted with the preparation of this document including, but not limited to the following:

- Mr John Thompson (B.E.Mining, FAusIMM) – Vice President – Project Development – SCY.
- Mr George Putnam (MBA (Finance)) – CEO and President.
- Dr Nigel Ricketts (B.A.Sc (Metallurgy), PhD (Chemical Engineering)) – Technical Director, Altrius Engineering Services.
- Dr Geoff Duckworth (B.Eng. (Chem)), B.Eng.Sci., PhD) – Senior Consultant – Process, Lycopodium Minerals Pty Ltd.
- Mr Tim Rowles (B.Sc. (Hons), M.Sc.) – Regional Manager (Queensland), Knight Piésold Pty Ltd.

Strong emphasis has been placed upon a multi-disciplinary team approach to the design of the Proposal, the description of the existing environment, identification of key issues, development of appropriate safeguards and assessment of impacts. The following specialist consultancies were commissioned by the Applicant to prepare nominated specialist consultant studies for the Proposal.

- Air Quality and Greenhouse Gas – ENVIRON Australia.
  – Mr Scott Fishwick (B.Sc).

- Biodiversity – EnviroKey.
  - Mr Steve Sass (B.App.Sci (Env.Sci) (Hons) (C.Env.P).
- Surface Water – Knight Piésold.
  - Mr Tim Rowles (B.Sc (Hons), M.Sc, RPEQ).
- Groundwater – Ground Doctor.
  - Mr James Morrow (B.Eng.Env (Hons)).
- Noise – Spectrum Acoustics.
  - Dr Neil Pennington (PhD, B.Sc (Physics), B.Math (Hons)).
- Traffic – Constructive Solutions.
  - Mr Neil Fitzgerald (B.Eng (Civil), MBA).
- Heritage – Artefact Heritage Services.
  - Dr Sandra Wallis (BA (Hons), PhD, MAACAI).
  - Mr Grant Warner (B.Bus (Hons), BA).
- Soils – Strategic Environmental and Engineering Consultants.
  - Mr Mark Passfield (B.Sc (Hons) Eng. Geology & Geotechnics, CPESC).