REFERRAL OF A PROJECT FOR A DECISION ON THE NEED FOR ASSESSMENT UNDER THE *ENVIRONMENT EFFECTS ACT 1978*

REFERRAL FORM

The *Environment Effects Act 1978* provides that where proposed works may have a significant effect on the environment, either a proponent or a decision-maker may refer these works (or project) to the Minister for Planning for advice as to whether an Environment Effects Statement (EES) is required.

This Referral Form is designed to assist in the provision of relevant information in accordance with the *Ministerial Guidelines for assessment of environmental effects under the Environment Effects Act 1978* (Seventh Edition, 2006). Where a decision-maker is referring a project, they should complete a Referral Form to the best of their ability, recognising that further information may need to be obtained from the proponent.

It will generally be useful for a proponent to discuss the preparation of a Referral with the Impact Assessment Unit (IAU) at the Department of Environment, Land, Water and Planning (DELWP) before submitting the Referral.

If a proponent believes that effective measures to address environmental risks are available, sufficient information could be provided in the Referral to substantiate this view. In contrast, if a proponent considers that further detailed environmental studies will be needed as part of project investigations, a more general description of potential effects and possible mitigation measures in the Referral may suffice.

In completing a Referral Form, the following should occur:

- Mark relevant boxes by changing the font colour of the 'cross' to black and provide additional information and explanation where requested.
- As a minimum, a brief response should be provided for each item in the Referral Form, with a more detailed response provided where the item is of particular relevance. Cross-references to sections or pages in supporting documents should also be provided. Information need only be provided once in the Referral Form, although relevant cross-referencing should be included.
- Responses should honestly reflect the potential for adverse environmental effects. A Referral will only be accepted for processing once IAU is satisfied that it has been completed appropriately.
- Potentially significant effects should be described in sufficient detail for a reasonable conclusion to be drawn on whether the project could pose a significant risk to environmental assets. Responses should include:
    - a brief description of potential changes or risks to environmental assets resulting from the project;
    - available information on the likelihood and significance of such changes;
    - the sources and accuracy of this information, and associated uncertainties.
- Any attachments, maps and supporting reports should be provided in a secure folder with the Referral Form.
- A CD or DVD copy of all documents will be needed, especially if the size of electronic documents may cause email difficulties. **Individual documents should not exceed 2MB.**

- A completed form would normally be between 15 and 30 pages in length. Responses should not be constrained by the size of the text boxes provided. Text boxes should be extended to allow for an appropriate level of detail.
- The form should be completed in MS Word and not handwritten.

The party referring a project should submit a covering letter to the Minister for Planning together with a completed Referral Form, attaching supporting reports and other information that may be relevant. This should be sent to:

Postal address

Minister for Planning
GPO Box 2392
MELBOURNE VIC 3001

Couriers

Minister for Planning
Level 20, 1 Spring Street
MELBOURNE VIC 3001

In addition to the submission of the hardcopy to the Minister, separate submission of an electronic copy of the Referral via email to ees.referrals@delwp.vic.gov.au is encouraged. This will assist the timely processing of a referral.

PART 1 PROPONENT DETAILS, PROJECT DESCRIPTION & LOCATION

1. Information on proponent and person making Referral

Name of Proponent:	Kalbar Resources Ltd
Authorised person for proponent: **Position:** **Postal address:** **Email address:** **Phone number:** **Facsimile number:**	Rob Bishop Chairman Kalbar Resources Ltd PO Box 849 Randwick NSW 2031 Rob.Bishop@kalbarresources.com.au 0419 266 288
Person who prepared Referral: **Position:** **Organisation:** **Postal address:** **Email address:** **Phone number:** **Facsimile number:**	Carolyn Balint Senior Principal Coffey Services Australia Level 1, 436 Johnston Street, Abbotsford, Vic, 3067 carolyn.balint@coffey.com 03 9290 7000 03 9290 7499
Available industry & environmental expertise: (areas of 'in-house' expertise & consultancy firms engaged for project)	**Kalbar Resources Ltd** – Proponent • Bring extensive experience in mineral sands mining and processing. • Acquired 100% of the Gippsland Heavy Mineral Sands Project from Rio Tinto in 2013. • Bauxite exploration portfolio in the Northern Territory of Australia which includes three licences on the south of the Tiwi Islands. **Coffey Services Australia Pty Ltd** – Environmental and planning approvals, and stakeholder engagement..

2. Project – brief outline

Project title: Fingerboards Mineral Sands Project
Project location: (describe location with AMG coordinates and attach A4/A3 map(s) showing project site or investigation area, as well as its regional and local context) The Fingerboards Mineral Sands Project is a proposal to develop the Glenaladale mineral sands deposit (Glenaladale deposit) in East Gippsland. The Glenaladale deposit straddles East Gippsland Shire and Wellington Shire, however the project area is located entirely in East Gippsland Shire (see Figure 1 and Plate 1).
Short project description (few sentences)**:** The Glenaladale deposit contains an estimated 68 Mt of heavy mineral (HM) including around 12 Mt of zircon. Kalbar Resources Ltd (Kalbar) will use open-cut mining methods to extract approximately 200 Mt of ore to produce 6 Mt of heavy mineral concentrate (HMC) over 20 years from the Fingerboards Mine to be developed in the eastern part of the Glenaladale deposit. It is envisaged that, due to the size of the deposit, mining will continue in other areas of the deposit following the closure of the Fingerboards Mine.

The ore will be fed to a mining unit plant (MUP) for slurrying and pumping to the wet concentrator plant (WCP). There the slurried ore will undergo initial onsite processing to produce HMC. The HMC will be exported for further processing into commercial products such as zircon and rutile.

All overburden will be returned to the mine void, with the majority directly returned as mining progresses, avoiding stockpiling. Tailings and non-economic minerals will be placed in the mine void and in an off-mine path tailings storage facility (TSF). The land will in reinstated and rehabilitated behind the advancing open cut.

3. Project description

Aim/objectives of the project (what is its purpose / intended to achieve?):

The aim of the project is to establish a long-term mineral sands mining and processing operation to produce heavy mineral concentrate for export to exploit a niche market opportunity.

The project will be designed, constructed and operated to deliver long-term benefits to stakeholders including the East Gippsland community, local, state and federal governments, customers and suppliers.

The Fingerboards Mineral Sands Project will conduct exploration and development activities in a safe and secure manner and avoid or minimise impacts on the environment. The project aims to leave a positive legacy for East Gippsland, particularly the Glenaladale community.

Background/rationale of project (describe the context / basis for the proposal, eg. for siting):

East Gippsland is an emerging mineral sands province since the discovery of the Glenaladale and Mossiface deposits by Rio Tinto in 2004. Previous activity in Victoria had centred on the Murray Basin in western Victoria.

Kalbar intends to mine the Glenaladale deposit, one of the largest mineral sands deposits in the world. The high zircon grade within the mineral assemblage increases the financial viability of the project.

Customers in Asia are seeking reliable sources of zircon and titanium minerals. Although demand has waned over recent years, there is a forecast shortage in two to three years. Kalbar hopes to meet this forecast shortfall by developing and constructing the project counter-cyclically.

The proposed project is consistent with Victorian Government strategy and policy relating to the mineral sands industry in Victoria.

Main components of the project (nature, siting & approx. dimensions; attach A4/A3 plan(s) of site layout if available):

The project involves the mining, reinstatement and rehabilitation of the eastern part of the Glenaladale deposit through development of the Fingerboards Mineral Sand Mine. The Fingerboards Mine is predicted to have a 20-year mine life.

The ore will be processed on site to produce HMC and is likely to be exported via Port Anthony.

Mining method

The proposed mineral sands mining operation at the Fingerboards Mine will involve:

- Establishment of infrastructure (site access and haul roads, site office and workshop, power and water, WCP) and the mine and MUP.
- Removal of topsoil and overburden using conventional earthmoving equipment (e.g., excavators, bulldozers, scrapers, front-end loaders and trucks).
- Ore removal by conventional earthmoving equipment.
- Screening and slurrying ore at the MUP and then pumping to the WCP.
- Initial wet gravity processing of mined ore in the WCP to produce HMC.

- Management of tailings by either co-disposal (fines and sand tailings streams) to the mine void or off-mine path TSF.
- Transportation of HMC by pipeline and/or truck via the state road network to Port Anthony or rail directly to Port of Melbourne.
- Progressive reinstatement and rehabilitation of the mined areas and other disturbed areas.

Temporary stockpiles of soils, overburden and ore will be established adjacent to the mine path during mining. Stockpiled soils and overburden will be returned to the mine void as part of the reinstatement and rehabilitation process. Where possible, direct return of overburden to the mine void will be done, reducing the footprint of the disturbed area and the need for stockpiling.

Ore will be fed directly to the MUP. It is not anticipated that ore will need to be stockpiled outside of the mine void after start-up.

Topsoil, subsoil and overburden removal
Topsoil and subsoil will be stripped separately using conventional earthmoving machinery. Topsoil and subsoil removal rates will be determined by the mining rate, the presence and nature of the soils and the prevailing weather conditions.

Chemical and structural analysis of soils will be conducted prior to soil stripping activities so that targeted soil management and rehabilitation can be achieved. Dozers and scrapers will remove topsoil and subsoil due to their rocky nature in some areas. Other sandy soils will be removed using tractor scoops.

Conventional earthmoving machinery including dozers, scrapers and excavators will remove overburden.

Topsoil and subsoil will be stockpiled separately adjacent to the mine void. Topsoil will be stockpiled to a maximum height of 2 m. Subsoil will be stockpiled to a maximum height of 5 m. Soils from agricultural areas will be stockpiled separately to those harvested from areas with native vegetation.

All overburden will be direct returned to the mine void where possible. During start-up, overburden will be stockpiled adjacent to the mine void to a maximum height of 15 m for safety reasons.

Processing
Throughout the life of the project, the processing plant components (MUP and WCP) will operate continuously once sufficient ore has been excavated. The MUP will be located adjacent or in the mine void and will be moved regularly to keep pace with the advancing mine face. The WCP is likely to be located off the mine path near the mine offices and administration area and TCF.

The MUP will screen ore to remove oversize material, mix the screened material with water to form a slurry and pump the slurry to the WCP. The mineralised sand will be processed in the WCP at a nominal rate of 1000 t/hour up to 1,500 t/hour.

The MUP is likely to consist of dry grizzly and feeder conveyors to a screen (or trommel) unit and will be track, wheel or skid-mounted to enable relocation along the pit floor.

The two waste streams from the MUP will be >300 mm oversize from the vibrating grizzly and a 1 mm oversize stream from the screen. Oversize streams, which are expected to be approximately 2% of the ore mass, will be returned directly into the pit, although a proportion of the oversize material may be used for road construction or other purposes.

The WCP will process the ore using wet gravity processing methods which will separate light minerals (such as quartz) from heavy minerals (such as rutile and zircon), and remove mining by-products such as clay and sand.

The WCP will comprise thickeners, a spirals and/or classifiers building, flocculant units, a cyclone stacker, pump stations and a tailings handling plant, constant density tank and structure, screens and associated stockpiles and pipelines, pump stations and water storage dams

HMC will be pumped via a slurry pipeline to the truck loading facility where a stacker will place the HMC that is produced into a stockpile ready for transport.

Tailings and overburden management
The sources and sizes of tailings or waste mining by-products include material from the MUP and WCP. The tailings from the WCP will consist of a combined material of fines and sand.

Tailings will be placed on the working platform in the worked out part of the mine void. Deposition will stop at least 2 m below natural ground level.

Tailings will not be deposited in low-lying areas due to a lack of space within the mine void. Excess overburden will be stockpiled and used in other sections of the pit or, where necessary, used to supplement construction of the mining platform.

After approximately three months, the tailings will have dried sufficiently to allow earthmoving equipment to place overburden, subsoil and topsoil on top.

The off-mine path TSF will be used for the storage and co-disposal of clay fines and sand from the processing of ore in the WCP. As a contingency, if the TCF reaches capacity, the drying material will be moved to the mine void and the TCF will continue to be used.

The design, construction, monitoring and rehabilitation of the TCF will be in accordance with the Victorian management of tailings storage facilities guidelines (DPI, 2004).

Waste management
Mining will create various non-hazardous recyclable and non-recyclable wastes, as well as waste hydrocarbons.

The mine site will be kept free of litter by bins positioned where food is consumed. All organic and inert waste will be securely stored in appropriate receptacles. All waste (including sewage) will be removed from site and disposed of by licensed contractors. Recyclable materials (such as aluminium cans, glass and recyclable plastics) will be sent to a licensed recycler by the licensed contractor.

Operation of the mining fleet will generate waste hydrocarbons such as oils, greases and hydraulic fluids. These waste hydrocarbons will be placed in suitable containers and removed from the mine site for disposal at either an EPA-approved hydrocarbon waste site or a recycling depot. Runoff water from mobile equipment service areas will be directed to an interceptor trap to capture hydrocarbons, prior to it being discharged to the drain and sump network. The trap will be emptied of hydrocarbons routinely by a licensed contractor.

Water supply infrastructure
During construction, freshwater may be required for the concrete batching plant, civil earthworks and ablutions. There may be several sources of water during construction including supplies trucked in from neighbouring towns.

During operations, the mine will require water for processing, dust suppression, rehabilitation and human consumption and ablutions. High security water sources are required for processing. They need to be able to supply 3 to 4 GL per year. Options for sources of water are groundwater from a bore field in the Boisdale Aquifer which is located south of the project area and surface water winter-fill from the Mitchell River.

Process water will be used to transport ore through the various stages of the ore processing system from the MUP to the WCP in what is effectively a closed water circuit. Process water does not have to be potable or of high quality. Recycled water, poor quality or even saline water can be used in the process circuit.

It is anticipated that an average of up to 50 m^3/hr of freshwater will be used at the site, predominantly for dust suppression of materials such as the topsoil and subsoil stockpiles.

Freshwater will also be used within the ablutions and administration buildings. Bottled water will be supplied on site for drinking.

A number of onsite dams will be required for water storage. These dams will be lined with clay or plastic (HDPE or polypropylene fabric).

To manage surface runoff, stockpile slope angles will be as low as practicable. Mulch materials and contour ripping will be strategically used to stabilise stockpiles and minimise erosion. All site drains will be designed and constructed using scour-resistant materials to prevent erosion.

Diversion drains will prevent clean stormwater runoff from entering the pit. This may require infilling of disused water supply channels directly adjacent to the mine site.

Freshwater for ablutions will be provided by a small water treatment plant on site. All sewage will be collected in a septic tank for removal and offsite disposal by an approved contractor. The contractor will be required to comply with local government statutory requirements.

Mine infrastructure
Site offices, main site access roads, WCP, MUP and service corridors will be located in the vicinity of the mine pit. The mining contractors' workshop, and compounds and haul roads, will be located adjacent to the active mining area.

Establishment of mine infrastructure for the project will involve the following steps:

- Upgrade of the Princes Highway intersection with the selected HMC transport road and construction of local road detours to maintain access between and within properties, as required.
- Construction of roads including site access and main haul roads.
- Transport and assemblage of the processing plant components (MUP, WCP and associated components).
- Transport and construction of site office and workshops.
- Installation of mine site power and water supply facilities.
- Diversion of electricity and telecommunication assets in the project area to enable mining.

Transport
Transport options for delivery of HMC to Port Anthony for export are currently being investigated. The two proposed road routes from the project site to Port Anthony (Figure 2) being investigated are:

- East along Bairnsdale-Dargo Road to Lindenow-Glenaladale Road, and south to the Princes Highway. West along Princes Highway to Sale, then southwest along the South Gippsland Highway to Agnes and south along Barry Road to the port.
- West along Bairnsdale-Dargo Road to Fernbank-Glenaladale Road and south to the Princes Highway to Sale, then southwest along the South Gippsland Highway to Agnes and south along Barry Road to the port.

In addition to these road routes, two extended slurry pipeline routes are being considered, one to a possible rail siding approximately 7 km from the WCP and another to a truck loading facility on the Princes Highway, approximately 12 km from the WCP.

Port facility
Port Anthony is approximately 160 km from the mine site by road. It has adequate capacity, suitable shed facilities for stockpiling HMC and can accommodate appropriate-sized vessels for exporting HMC. No project works are expected to be required at Port Anthony.

If rail is chosen as a transport option, then the Port of Melbourne will be considered as an alternative to Port Anthony.

Ancillary components of the project (e.g., upgraded access roads, new high-pressure gas pipeline; off-site resource processing):

Road upgrades
Mine access roads and haul roads will be constructed adjacent to the pit to minimise interaction with and the risk of accidents occurring between mining equipment and general site traffic. Haul roads will be constructed using overburden and local materials and will be of sufficient width to allow safe passage for haul trucks and light vehicles. The widths of haul roads will be determined after equipment fleets are finalised, but are estimated to be 20 to 30 m wide.
Road construction will vary depending on the surface and substrate.

Access roads will link processing plant components on site and provide access from the Princes Highway and Bairnsdale. Access roads will be used by mine construction and operations staff, contractors and delivery personnel, and drivers of trucks taking HMC to Port Anthony.

Accommodation
Accommodation options to house project personnel are currently being investigated. The construction workforce is unlikely to require a purpose built accommodation facility due to capacity within surrounding towns.

It is expected that the operations workforce will be accommodated in a combination of the following ways:

- In current housing within the local area (for local residents).
- In current housing in Glenaladale, Lindenow, Fernbank and, to a lesser extent, surrounding towns (for a smaller number of non-local mining personnel).
- In current housing in the larger rural cities such as Bairnsdale, Stratford, Maffra and Sale, commuting to the mine site (for some non-local personnel).

Key construction activities:
Key construction activities expected to be associated with the project are outlined below.

Mine site
Construction activities at the mine site are expected to involve:

- Transport of construction equipment and materials to site.
- Erection of a fence around the mine site to exclude unauthorised access.
- Removal and stockpiling of topsoil/subsoil for reuse in rehabilitation.
- Construction of site drainage and water management systems including perimeter drains, oil interceptors and sedimentation ponds.
- Clearing of vegetation and establishment of mine site.
- Construction/upgrade of mine site access tracks and internal roads.
- Transport and assemblage of the processing plant components (MUP, WCP and associated components including the truck loading facility).
- Construction of additional mine site infrastructure including a site office and amenities, water storages and fuel storage tanks, tailings storage facility and mining contractor workshops and warehouse facilities.
- Reinstatement and rehabilitation of temporary work sites and laydown areas.
- Installation and reconnection of powerlines and water infrastructure and facilities.

Buildings including the administration area, mining contractor workshops and stores will be constructed in proximity to the WCP and tailings storage facility. The ablutions block will include showers, toilets and change rooms. The crib rooms will include first aid facilities, and meeting and training rooms. The ablutions block and crib rooms are likely to be arranged in a cluster adjacent to the administration area and workshops.

Construction of the TSF will involve the removal of topsoil and subsoil and the use of overburden to form walls 3 m high. Local clay will be used for lining. The clay will be compacted to seal the base and prevent seepage and a decant system will be installed to harvest water for use in the process water circuit. Spoon drains will be constructed around the perimeter to divert surface runoff from around the facility. Groundwater monitoring bores will be established to monitor seepage from the TSF and any potential changes to the groundwater table.

Key operational activities:

Mining will be conducted 24 hours/day, 365 days/year. Haulage of HMC from the mine site to the port will be 24 hours/day. It is likely that there will be 2 x 12 hour shifts during normal operations. Key shutdown activities and major maintenance periods will require additional contractors and personnel. Key operational activities associated with the project include:

- Establishment of infrastructure (site access and haul roads, site office and workshop, power and water, WCP) and the working mine area.
- Removal of topsoil and overburden using conventional earthmoving equipment (e.g., excavators, bulldozers, scrapers, front-end loaders and trucks) for reuse during rehabilitation.
- Ore removal by conventional earthmoving equipment.
- Initial wet gravity processing of mined ore in a WCP to produce heavy mineral concentrate.
- Management of mining by-products by either co-disposal to the mine void or off-mine path co-disposal to a TCF.
- Transportation of HMC by truck via the state road network to Port Anthony or by rail to Port of Melbourne.
- Progressive rehabilitation of the mined areas and other disturbed areas.

Key decommissioning activities (if applicable):

Key decommissioning activities associated with the project will include:

- Resale and/or reuse of serviceable equipment and demolition and disposal of remaining plant/equipment to an appropriately licensed facility.
- Decommissioning of associated infrastructure (i.e., buildings, haul roads and other pavements, water pipeline and powerlines, fencing, fuel storage etc.) and disposal to appropriately licensed facility.
- Backfilling of mine void and reinstatement of natural contours.
- Rehabilitation of project area and return to former land use.

Is the project an element or stage in a larger project?

☒ No ☐ Yes If yes, please describe: the overall project strategy for delivery of all stages and components; the concept design for the overall project; and the intended scheduling of the design and development of project stages).

Although the Glenaladale deposit is larger, this project is for a 20-year mine life.

Is the project related to any other past, current or mooted proposals in the region?

☐ No ☒ Yes If yes, please identify related proposals.

Rio Tinto previously owned the tenements covering the Glenaladale deposits and conducted exploration and evaluation on the potential for a mineral sands mine.

4. Project alternatives

Brief description of key alternatives considered to date (eg. location, scale or design alternatives. If relevant, attach A4/A3 plans):

The proposal represents the optimum scenario for maximising the potential of the Glenaladale deposit. This information is based on exploration drilling and other studies conducted by Kalbar and previous owners of the tenements.

There are no alternative locations for the mining void as it is located on the deposit. A targeted approach to mine highly prospective areas of the Glenaladale deposit, will be adopted.

The proposed timing for the project reflects the economic viability of the development. Recent market activity and the forecast demand for, and price of, zircon and other heavy mineral products provide an opportunity for maximising economic benefits of the project.

Kalbar proposes to mine the western portions of the Glenaladale deposit, previous tenement holders concentrated their investigations on other parts of the orebody. This proposal has improved economics due to reduced strip ratios and requirement for overburden removal and treatment of clay.

Kalbar proposes to produce HMC and not do secondary processing in a mineral separation plant to produce final products. This reduces capital costs significantly and other processing by-products e.g., monazite.

Brief description of key alternatives to be further investigated (if known)**:**

Alternatives regarding project design and approach that require further investigation include:

- Mine plan and scheduling (e.g. number of pits, exclusion zones, mine and ancillary infrastructure locations).
- Mining method (e.g., dry mining, dozer trap, slurrying methods, MUP and mobility).
- Tailings management (storage facility, co-disposal, waste).
- Water source and storage (e.g., groundwater, surface water, wastewater disposal/treatment).
- Transport options (e.g., container type, slurry pipeline, road/rail, route options, ports to be used).
- Diversion of local and regional roads (i.e., roads to be diverted so underlying ore can be mined).
- Upgrade options relating to power supply.

5. Proposed exclusions

Statement of reasons for the proposed exclusion of any ancillary activities or further project stages from the scope of the project for assessment:

There are no proposed exclusions or further project stages associated with the project.

6. Project implementation

Implementing organisation (ultimately responsible for project, ie. not contractor)**:**

Kalbar Resources Ltd

PO Box 849

Randwick NSW 2031

ABN: 30 149 545 362

Implementation timeframe:

The proposed timeframe for project implementation is 2016 to 2040 allowing for feasibility studies and approvals, construction and a 20-year mine life.

Proposed staging (if applicable):
The proposed staging of the project is outlined below.

Project activity	**Timing**
Feasibility studies	2016/17
Complete government approvals process	2018
Commence construction	2018
Commissioning	2019
Expected decommissioning and closure	Post 2040

7. Description of proposed site or area of investigation

Has a preferred site for the project been selected?

☐ No ☒ Yes If no, please describe area for investigation.

If yes, please describe the preferred site in the next items (if practicable).

General description of preferred site, (including aspects such as topography/landform, soil types/degradation, drainage/ waterways, native/exotic vegetation cover, physical features, built structures, road frontages; attach ground-level photographs of site, as well as A4/A3 aerial/satellite image(s) and/or map(s) of site & surrounds, showing project footprint):

Topography/landform

The project area is located on a low-hill landform with a relief of 30 to 90 m. The central portion of the project area is dominated by a tableland which is incised in the west by the headwaters of the Perry River catchment. To the east of the project area there are sharply rising river terraces, eroded gullies and waterways that drain into the Mitchell River. Several kilometres to the north of the project area this increases to hill landforms with a relief of around 300 m (DWLWP, 2015a). The landscape within the project area has been modified due to agricultural, horticultural and forestry activities.

Geology and soil types

The project area is located within the eastern lowlands region of the Gippsland Lakes Basin. Geologically the Gippsland Lakes Basin is highly complex in its structure and sedimentary deposition. The oldest exposed rocks are Cambrian submarine basic volcanics, associated sediments and intrusive rocks (Aldrick et al., 1984). The Gippsland Lakes Basin is broadly divided into two regions; the hill and mountains on consolidated rocks and the relatively flat terrain at low elevations (referred to as uplands and lowlands). The project area is located within the eastern lowlands subregion, which consists of fans, terraces and floodplains. The Haunted Hills Gravels outcrop extensively across the project area. Overlying soils are sodic and affected by gully and tunnel erosion in areas of steeper gradient. Underlying the Haunted Hill Formations are the fine sands of the Coongulmerang Formation which host the Glenaladale deposit.

Drainage/waterways

The project area is located on a tableland to the east of the lower floodplains of the Mitchell River. A number of small, ephemeral tributary streams drain the central and eastern half of the project area to the Mitchell River which passes to the east of the project area while the far southwestern part of the project area drains south to the Perry River. The Perry River flows south to join the Avon River at Lake King.

Native/exotic vegetation cover

The project is located within a transitional zone between the East Gippsland Lowlands and Gippsland Plain bioregions, and a short distance from the Highlands Southern Fall and East Gippsland Uplands bioregions (DEPI, 2015b). The dominant ecological vegetation classes (EVCs) that are likely to occur within and surrounding the project area comprise Lowland Herb-rich Forest, Lowland Forest, Plains Grassy Forest, Plains Grassy Woodland, Valley Grassy Forest, Dry Valley Forest, Damp Sands Herb-rich Woodland and Riparian Shrubland. One nationally-listed vegetation community, the Gippsland Red Gum (*Eucalyptus tereticornis subsp. mediana*) Grassy

Woodland and associated native grassland, has the potential to occur within the project area. This community is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Invasive plants and animals are a persistent and widespread threat to East Gippsland's natural environment and agricultural industries (RMCG, undated). An indication of the extent of the invasive plant species in the region are the records of over 120 exotic species in East Gippsland, which vary in their threat, distribution and degree of impact (RMCG, undated).

Physical features
No notable physical features are located within or adjacent to the project area other than those mentioned in the previous sections.

Built structures
Two residential dwellings are located within the project area. There are nine residential properties within a 1 km radius of the project area. This number of neighbouring properties was derived from a review of aerial imagery. This will be confirmed during the approval process. There is also a range of agricultural infrastructure (e.g. water tanks, sheds, access roads, fences and channels) located within the project area. Other built structures within the project area include a communication tower, powerlines and underground telecommunications cables

Road frontages
The following main road frontages are within or in proximity to the project area (see Figure 1):

- Fernbank-Glenaladale Road (local road) and Bairnsdale-Dargo Road (declared road) traverse the eastern part of the project area.

Other minor road frontages within or in proximity to the project area including local roads, farm access tracks and plantation access tracks will be described in detail during the approval process.

Site area (if known): The Glenaladale deposit covers an area of approximately 6,500 ha and the project area is approximately 1,400 ha.

Route length (for linear infrastructure): Existing roads are proposed for transport of HMC to Port Anthony. The option to extend the slurry pipelines from the mine site to a rail siding or the Princes Highway range from 7 to 12 km.

Current land use and development:

The key land uses within the project area include grazing (sheep and cattle), hobby farms, plantations, disused gravel quarry, and rural residential properties. In the vicinity of the project area land uses include dairy, irrigated horticulture, state forest, recreational and commercial uses in small rural towns.

Description of local setting (eg. adjoining land uses, road access, infrastructure, proximity to residences & urban centres):

Agriculture and forestry are the region's major industries. Irrigated horticulture, grazing (both sheep and cattle) and dairy and hobby farming are the dominant land uses in the area.

The project area is accessed from the Princes Highway via the Lindenow–Glenaladale Road and Bairnsdale-Dargo Road through Lindenow South and Walpa or the Fernbank–Glenaladale Road through Fernbank

Bairnsdale is the main service centre of East Gippsland and is located approximately 20 km east of the project area. Other settlements and towns within a 10 km radius of the project area include Stockdale, Iguana Creek, Fernbank, Walpa, Lindenow, Lindenow South, Woodglen and Wuk Wuk.

Planning context (eg. strategic planning, zoning & overlays, management plans):
The project area is covered by the East Gippsland Planning Scheme (see Figure 3). The predominant zoning is Farming Zone (FZ1). The Bairnsdale–Dargo Road, which passes through the project area is zoned Road Zone Category 1 (RDZ1). The state forest to the northwest of the project area, reserves to the west and Perry River frontage are zoned Public Conservation and Resource Zone (PCRZ).

Land within the project area is subject to the following overlays (see Figure 4):

- Erosion Management Overlay (EMO) applies to much of the east and northeast of the project area Vegetation Protection Overlay (VPO) applies to parts of some of the road reserves within the project area.
- Environmental Significance Overlay (ESO51) applies to patches of vegetation within road reserves in and adjacent to the project area.
- Wildfire Management Overlay (WMO) applies to the softwood plantations located in and adjacent to the eastern part of the project area.
- Environmental Significance Overlay (ESO38) applies to the Mitchell River frontage east of the project area.

Local government area(s):
The project area is located entirely within the East Gippsland Shire. The transport routes straddle three local government areas, East Gippsland Shire, Wellington Shire and South Gippsland Shire. No project works are expected to be required at Port Anthony within the South Gippsland Shire.

8. Existing environment

Overview of key environmental assets/sensitivities in project area and vicinity
(cf. general description of project site/study area under section 7)**:**

Soils and landforms
Most soil variation in the Gippsland Lakes basin is caused by differences in factors such as drainage patterns, source rocks, climatic conditions which range from sub-alpine to maritime, and stream regimes (Aldrick et al., 1984). In depressions poor drainage has limited soil development through lack of leaching, bioturbation, oxidation and drying fractures (Aldrick et al., 1984).

Soils in the eastern lowlands region range from red texture contrast soils, kurosols and chromosols to brown and red friable earths, dermosols, kandosols and ferrosols (DEPI, 2015c). Much of the soils in the modern floodplains of the eastern lowlands are high quality agricultural soils ideally suited to irrigated use (Aldrick et al., 1984). Within the project area soils are characterised by pale sands and duplex soils (brown kurosols and sodosols) with low compaction and high leaching (DEPI, 2015c). During a site visit by Coffey in June 2015 soils in the western portion of the project area were observed to be shallow or absent of topsoil, nutrient poor, rocky and with dispersive subsoil. Soils in the eastern lowlands are prone to gully, wind, rill and tunnel erosion and are moderately well drained (DEPI, 2015c). Evidence of sheet, rill and tunnel erosion was also noted during a site visit in June 2015.

Groundwater
The project area is located at the northern margin of the Central Gippsland groundwater basin where basement rock rises to form the foothills of the Great Dividing Range approximately 5 km to the north. Shallow groundwater is inferred to be generally limited to the quaternary alluvial aquifers which exist along most of the major surface drainage features. While these aquifers are not regionally extensive, they represent a high value resource for many irrigators. Productive groundwater in the project area primarily occurs in the Balook Formation (upper Mid Tertiary Aquifer) which is estimated to be present at depths of between 50 and 150 m below ground surface. The Boisdale Formation, the potential source of water for the project is found to the south of project area and is not used for irrigated horticulture along the Mitchell River.

The project area is within close proximity to two groundwater management units; the Wy Yung water supply protection area (WSPA) and the Stratford groundwater management area (GMA). Aquifers associated with the Wy Yung WSPA to the northeast of the project area are an example of high value shallow alluvial groundwater resources. A permissible consumptive volume currently applies to the Wy Yung WSPA, capping the volume of groundwater extraction from this management unit (i.e. all aquifers from the ground surface to 25 m below surface). Groundwater is present in shallow alluvial deposits associated with the Mitchell River valley and has provided relatively stable groundwater levels since records began in 1969. The Stratford GMA is located to the south of the project area and was established to manage deep (>350 m below ground level) groundwater resources, primarily used by industry. The Sale WSPA forms part of the Stratford

GMA, and is in place to manage groundwater primarily used by irrigators at depths of between 100 and 200 m below ground surface.

Surface water

The project area is located within the catchments of both the Mitchell River and Avon River.

The eastern part of project area is situated in the Mitchell River catchment, which drains an area of 664 km$^{2.}$ The Mitchell River passes to the northeast of the project area, with a number of small, ephemeral tributary streams draining the eastern half of the project area. The Mitchell River has an estimated average annual stream flow of 884,500 ML (DSE, 2011). The upper catchment is predominantly undisturbed, forested, public land including sections of the Alpine National Park and Mitchell River National Park. The Mitchell River system is the largest river system in Victoria that does not have a large on-stream dam, which has assisted to maintain its high environmental value. In the lower reaches of the catchment, the river transitions to floodplains where deposited sediment has created fertile agricultural land. The floodplains have been extensively cleared for agriculture and are highly modified from their natural state. The Mitchell River catchment falls under the management of the East Gippsland CMA and is listed as a Heritage River under the *Heritage Rivers Act 1992*. Flooding occurs across the low-lying plains with approximately 60 km^2 of land prone to flooding, with major floods persisting between 3 and 40 days (DEDJTR, 2015). The Mitchell River discharges into Jones Bay and Lake King which form part of the Gippsland Lakes.

The southwestern portion of the project area lies within the Perry River catchment which is a tributary of the Avon River. The Avon River catchment drains an area of approximately 2,000 km^2 and extends from the foothills of the Great Dividing Range to Lake Wellington, which forms part of the Gippsland Lakes system. The Avon River catchment supports a wide range of agricultural and irrigation land uses on the lower floodplains. Flooding is a common occurrence with major flood events occurring in 2007, 2011 and 2012. The Avon River is managed by the West Gippsland CMA.

The Gippsland Lakes consist of a series of coastal lagoons along the Gippsland coast separated from the sea by a barrier system of sand dunes. Whilst located around 25 km south of the project area, they represent significant, high value surface water features in the area, and receive both groundwater and surface water discharge from systems emanating from or passing through the project area.

Biodiversity

The project is located within a transitional zone between the East Gippsland Lowlands and Gippsland Plain bioregions, and a short distance from the Highlands Southern Fall and East Gippsland Uplands bioregions (DEPI, 2015b). The regional landscape is rich in biodiversity due to the transition from a coastal to sub-alpine environment.

To the west of the project area, the East Gippsland Lowlands bioregion transitions to the Gippsland Plain bioregion. This bioregion consists of flat low lying coastal and alluvial plains with a gently undulating terrain dominated by barrier dunes and floodplains and swampy flats generally below 200 m above sea level. The bioregion retains native vegetation in a highly fragmented pattern, reflecting a variety of land-use histories in the region.

The dominant EVCs that are likely to occur within and surrounding the project area comprise Lowland Herb-rich Forest, Lowland Forest, Plains Grassy Forest, Plains Grassy Woodland, Valley Grassy Forest, Dry Valley Forest, Damp Sands Herb-rich Woodland and Riparian Shrubland, as scattered patches (see Figure 5)

A review of the EPBC Act protected matters search tool, *Flora Fauna Guarantee Act 1988* (FFG Act), and the Advisory List of Rare or Threatened Plants in Victoria identified nine rare or threatened flora species with the potential to occur within or surrounding the project area (DEPI, 2014). A further 10 species are listed on the Advisory List of Rare or Threatened Plants in Victoria as either rare or poorly known.

Rare or threatened flora that have the potential to occur within the project area include:

- Two nationally listed species, the dwarf kerrawang (*Commersonia prostrate*) and swamp everlasting (*Xerochrysum palustre*), have been recorded locally. Both of these species occur in swampy, sometimes ephemeral wetlands and shallow freshwater marshes. Another four nationally-listed species or their habitat may occur within the study area.
- Two state listed species, yellow-wood (Acronychia oblongifolia) and prostrate cone-bush (Isopogon prostrates) have been recorded locally. The former is a small to medium sized tree. The latter is a rare heath shrub that occurs in dry open Eucalyptus woodlands.
- A further flora 10 species are listed on the Advisory List of Rare or Threatened Plants in Victoria as either rare or poorly known and have historically been recorded in the region.

A review of the EPBC Act protected matters search tool, FFG Act, and the Advisory List of Rare or Threatened Fauna in Victoria (DSE, 2013) identified 42 rare or threatened terrestrial fauna species with the potential to occur in the region.

A full list of species is provided in the flora and fauna desktop study within the Glenaladale Mineral Sands Project Baseline Report (Coffey, 2015, Attachment 2).

An aquatic habitats study for the project was undertaken in 2016 (Attachment 1). Based on field surveys to assess the aquatic habitats within the vicinity of the project by Aquatica Environmental (Attachment 1) and Ecology and Heritage Partners, waterways and water bodies in the study area consist of either modified and impacted creeks and gullies or constructed farm dams. Overall these waterways and water bodies were considered to be in poor to moderate condition with limited aquatic habitat and connectivity to downstream receiving waterways and therefore limited aquatic fauna passage.

The desktop component of this survey identified 15 aquatic fauna species as either occurring, potentially occurring or potentially having habitat within 10 km of the study area including 11 native and two exotic fish species, one species of reptile (a freshwater turtle) and one species of mammal (Platypus). Of these results, the following species are listed under Commonwealth and/or Victorian legislation:

- Australian grayling (*Prototroctes maraena*): Listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and on the Victorian Advisory List and *Flora and Fauna Guarantee Act 1988* (FFG Act) List.
- Flinders pygmy perch (*Nannoperca sp. 1 or N. australis 'flindersi'*): Listed as Vulnerable on the Victorian Advisory List.

A full list of aquatic species is provided in the Aquatic Habitat Assessment Report (Ecology and Heritage Partners, 2016, Attachment 1).

Cultural Heritage

Indigenous cultural heritage

The Indigenous inhabitants of the East Gippsland region are known as the Gunaikurnai people. Pre-European settlement, the Gunaikurnai comprised five tribal groups; the Krowathunkooloong, Bratualong, Tatungalong, Brabralong, Brayakaulung peoples (GTLMOB, 2015). For thousands of years, the East Gippsland region sustained the Gunaikurnai people, providing fertile soils, freshwater systems and coastal environments that offered food sources, hunting and gathering sites and shelter. Influenced by seasonal weather and food supplies, these groups moved between defined coastal areas and the foothills of the Great Dividing Range (GTLMOB, 2015). Traditionally Gunaikurnai territory occupied most of present-day Gippsland, between Wilson's Promontory and far East Gippsland, including the coastal and inland areas and much of the southern slopes of the Victorian Alps (GTLMOB, 2015). Aboriginal artefacts present in the region provide evidence of this occupation. The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is the Registered Aboriginal Party for the Gippsland area (DJR, 2010).

A review of Victorian Department of Premier and Cabinet cultural heritage sensitivity mapping indicates that there are areas of cultural heritage sensitivity within and adjacent to the project area, particularly near watercourses including rivers and creeks (DPC, 2015). Approximately 80

registered places (predominately scar trees and artefact scatters) were identified on the Victorian Aboriginal Heritage Register as being present in the wider East Gippsland region; however only 4 of these sites are located within or adjacent to the project area. Of these, one registered heritage place (a scar tree) is located within the project area and two scar trees are to the north of the project area (see Figure 6).

Initial desktop investigations undertaken by AECOM in 2012 as part of the preliminary constraints, opportunities and process assessment report (AECOM, 2012) established that an area to the

south of the project area (as per the project footprint at the time of the desktop study) had been recorded as a sand dune feature which is believed to be Pleistocene in age. Pleistocene sand dunes are associated with significant sites and old burial areas and are therefore typically classified as highly sensitive landforms.

Non-Indigenous cultural heritage
Many of the townships surrounding the project area still contain historical buildings and relics that provide a record of European settlement of the area, including the unregistered former Fernbank School (established 1908). The Fingerboards is the area at the intersection of the Bairnsdale–Dargo Road and Glenaladale–Fernbank Road and is known to have local significance due to its association with past grazing.

A search of the Victorian Heritage Database indicates that there are a number of listed heritage places near to but not within the project area. These include Wuk Wuk Bridge and the Glenaladale Weir (both are listed on the National Trust register). The Old Weir on Mitchell River (also known as Glenaladale Weir) is located near the junction of the Mitchell River and Stony Creek. Construction commenced in 1891 however the weir was damaged by floods in 1893 and was never repaired. Sections of the weir wall are still present today (EGCMA, 2015). The Wuk Wuk Bridge was constructed in 1937 and forms the overpass of the Mitchell River for the Lindenow–Glenaladale Road. The bridge is historically, scientifically and aesthetically of State significance. It is a representative example of novel Victorian bridge engineering of the mid to late 1930s (HCV, 2015). Although most of the timber foundations have been replaced, one of the original pylons is still present. Figure 6 shows the location of these two sites.

Landscape and visual
The topography of the area can be classified as flat to gently undulating with sharply rising river terraces, eroded gullies and surface water forms scattered throughout the landscape. It is a rural landscape with irrigated horticulture, grazing (both sheep and cattle) and hobby farming the dominant land uses. Key features in the landscape surrounding the project area include the Mitchell River National Park, significant wetlands and reserves, and state forest.

The project area is sparsely populated. The undulating topography and roadside and paddock boundary vegetation present in the area act as natural screening, concealing or partially concealing residences and roadsides from certain viewpoints. Given the rural location of the project, the night landscape is primarily dark with scattered residences producing little external light. To the east of the project area, the towns of Walpa, Lindenow and Bairnsdale emit a low light spill.

There are several significant landscape overlays in proximity to the project area that relate to the Gippsland Lakes. East Gippsland is a valued scenic resource in Victoria, and is considered a major tourism destination due in part to its landscape significance.

Potential viewpoints from the road network to the mine site and associated infrastructure could be from Lindenow–Glenaladale Road, Bairnsdale–Dargo Road and local roads running north of the project area in the foothills.

Air quality
The project area and surrounding landscape is lightly populated with two residences within the project area and nine residences within 1 km of the project area boundary. Land use within and surrounding the project area predominantly consists of agriculture, forestry and conservation (DTPLI, 2007). Key sources of ambient air emissions within the project area include:

- Controlled burning.
- Bushfires.
- Dust storms.
- Domestic wood heating.
- Motor vehicles.
- Heavy vehicle transportation associated with the timber and milling industry.
- Agricultural activities such as crop dusting and ploughing of paddocks.

These activities generate a range of air emissions including particulate matter, volatile organic compounds (VOCs), nitrogen oxides (NO_x) and sulfur oxides (SO_x).

Port Anthony is an existing operational port located adjacent to the Barry Beach Marine Terminal. Key sources of air emissions from the port and terminal include transport, handling and storage of cargo (generating particulate matter), heavy machinery used to load and unload ships (generating VOCs, NO_x and SO_x).

Ambient air quality is monitored across Victoria by the Victorian Environment Protection Authority (EPA Victoria) using objectives and goals set in the State Environment Protection Policy (Ambient Air Quality) (SEPP AAQ). The nearest monitoring station to the project area is the Traralgon monitoring station located 85 km southwest of the project area. Emissions monitored at this station include nitrogen dioxide, ozone, sulfur dioxide and particles as PM_{10}.

In 2013, the ozone (four-hour) and particulate matter (as PM_{10}) objectives were exceeded at Traralgon. Exceedances were still within the SEPP AAQ goal of no more than one exceedance for ozone and no more than five days per year for PM_{10}. The highest reading of PM_{10} was 104.8 µg/m^3 (the SEPP AAQ maximum ambient concentration is 50 µg/m^3) (EPA Victoria, 2014b). These exceedances were a result of planned burning, bushfires and local dust.

Dispersion of air pollutants is climate dependent. Warmer temperatures lead to greater dispersion of pollutants released into the atmosphere and rainfall assists in removing particles and water soluble VOCs. According to data collected at the Bureau of Metrology's Mount Moornapa meteorological station (the nearest station to the project area), prevailing winds are predominantly in a westerly direction (BoM, 2012). The mean maximum temperature recorded at Mount Moornapa in 2014 ranged from 25.5°C (in January) to 12.1°C (in July) and mean annual rainfall was 838.6 mm (BoM, 2012). Rainfall is spread fairly evenly throughout the year.

Air quality of the existing environment and potential impacts of air emissions generated by the project will be investigated during the project impact assessment.

Noise

There is no available noise data for the project area and immediate surrounds. Land within and surrounding the project area is zoned predominantly for agriculture, forestry and conservation (DTPLI, 2007). The noise environment is reflective of this and background noise levels are generally low. As identified during a site visit by Coffey in June 2015, background noise levels are characterised by natural noise sources with occasional vehicle and agricultural machinery noise (associated with activities such as crop dusting, ploughing).

Weather conditions can have an effect on noise propagation. Climate in the lowlands of East Gippsland is temperate. Data collected at the Mount Moornapa meteorological station (the nearest station to the project area) showed that prevailing winds are predominantly in a westerly direction (BoM, 2012). The mean maximum temperature recorded at Mount Moornapa ranged from 25.5°C (in January) to 12.1°C (in July) and mean minimum ranged from 5.3°C (July) to 13.5°C (February). The mean temperature at 9:00 a.m. ranged from 7.0°C (July) to 16.8°C (January).

There are a number of small towns and residences located along the proposed transport routes from the project area to Port Anthony. The majority of the two proposed transport routes are along the Princes and South Gippsland highways, which are classified as arterial highways (VicRoads, 2015). These highways and all roads included in the proposed transport routes, with the

exception of Fernbank–Glenaladale Road, are approved under the VicRoads B Double Network and are already used as major transport routes (VicRoads, 2015).

Port Anthony is located at Corner Inlet in South Gippsland, approximately 133 km southwest of the project area adjacent to the Barry Beach Marine Terminal. The Barry Beach Marine Terminal is the main supply depot for ExxonMobil's Bass Strait oil and gas operations (ExxonMobil, 2015). Port Anthony is an operational port and caters for handling dry-bulk cargo with a focus on bulk commodities such as brown coal, dairy products and timber (Port Anthony, 2013).

Barry Beach Marine Terminal is located adjacent to Port Anthony and operates 24 hours a day servicing 23 offshore oil and gas platforms and installations (ExxonMobil, 2015). Approximately 70,000 tonnes for cargo are shipped from the terminal each year (ExxonMobil, 2015). The main source of noise emissions from the Barry Beach Marine Terminal and Port Anthony are the loading, unloading and movement of cargo and the transport of goods and workforce to and from the site.

9. Land availability and control

Is the proposal on, or partly on, Crown land?

☒ No ☐ Yes If yes, please provide details.

Three state forests are located adjacent to the project area. An approximately 250 ha patch of forest to the west of the project area and two smaller patches (approximately 30 ha each) to the northwest of the project area.

Current land tenure (provide plan, if practicable):

Land tenure within the project area is shown in Figure 7.

The land within the project area is freehold land used for agriculture and plantation forestry.

Intended land tenure (tenure over or access to project land):

Kalbar is still considering options and alternatives for land tenure for the project. Kalbar may purchase or obtain a long-term lease over land required for development within the project area. All landowners whose properties will be impacted by the project will be compensated in accordance with relevant legislation and guidelines.

Other interests in affected land (eg. easements, native title claims):

The Gunaikurnai people have been recognised as holding native title over much of Gippsland.Their native title applies to Crown land from West Gippsland close to Warragul, east to the Snowy River and north to the Great Dividing Range. The area also extends 200 m offshore. The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is the Registered Aboriginal Party for the Gippsland area (DJR, 2015).

Other interests in the project area will be determined during the preparation of the impact assessment.

10. Required approvals

State and Commonwealth approvals required for project components (if known):

The project is expected to require State and Commonwealth approvals under the following legislation.

- *Mineral Resources (Sustainable Development) Act 1990*: the project will require approvals such as:
    - Mining licence.
    - Approved mining work plan.
    - Restricted Crown land consent.
    - Work authority to commence mining.

In order to obtain a work authority, the following requirements need to have been met:

- Minister's assessment of an EES or an approved planning permit.
- Written consent (or compensation agreements) from private landowners.
- Rehabilitation bond.
- An approved cultural heritage management plan (CHMP).
- An approved work plan.
- Public liability insurance.
- *Environment Protection and Biodiversity Conservation Act 1999*: the project is likely to be determined a controlled action and require environmental assessment and approval under Commonwealth guidelines or an accredited Victorian process.

In addition to the above, consultation with relevant authorities and the outcomes of specialist studies may determine that other permits and approvals are required for the project such as:

- A licence to take and use water and a works on waterway permit as required under the *Water Act 1989*.
- Planning permit(s) and / or planning scheme amendments may be required for project activities that are not related to mining or minerals processing under the *Planning and Environment Act* 1987 such as road diversions or upgrades.
- Indigenous Land Use Agreement or Negotiation by Consent in accordance with the *Native Title Act* 1993.
- An approved CHMP and consent to disturb Aboriginal heritage sites under the *Aboriginal Heritage Act* 2006.
- Approval to disturb known historic sites in accordance with the *Heritage Act 1995*.
- Radiation management and operation licence in accordance with the *Radiation Act 2005* and *Radiation Regulations 2007*.
- Dangerous Goods Licence under the *Dangerous Goods Act* 1985.
- Licence to discharge and a works approval and licence for onsite bulk storage of diesel fuel under the *Environment Protection Act 1970*.
- Permit to take protected species listed under the *Flora and Fauna Guarantee Act 1988*, unless an EES is required, and an approved native vegetation offset management plan.
- Licences or registration under the Regulations to Operate a Major Hazardous Facility under the *Occupational Health and Safety Act 2004*.
- Road closure, diversion and / or opening permits under the *Road Management Act 2004*.
- Permit to control wildlife under the *Wildlife Act 1975*.

Have any applications for approval been lodged?

☒ No ☐ Yes If yes, please provide details.

Approval agency consultation (agencies with whom the proposal has been discussed):
Approval agencies consulted about the project to date include:

- Department of Environment, Land, Water and Planning (DELWP).
- Department of Economic Development, Jobs, Transport and Resources (DEDJTR).

Other agencies consulted:
Other agencies consulted to date include:

- East Gippsland Shire Council.
- Wellington Shire Council.
- Aboriginal Victoria (AV).
- Gunaikurnai Land and Waters Aboriginal Corporation.
- Southern Rural Water.
- East Gippsland Water.

PART 2 POTENTIAL ENVIRONMENTAL EFFECTS

11. Potentially significant environmental effects

Overview of potentially significant environmental effects (identify key potential effects and comment on their significance and likelihood, as well as key uncertainties):

Flora and fauna

A flora and fauna desktop study was conducted (Coffey, 2015, see Attachment 2) to provide a preliminary assessment of flora and fauna impacts associated with development of the project. The study was based on data sourced from publicly available resources such as Victorian and Australian databases and search tools.

The desktop study identified 8 flora species and 25 fauna species of state significance that may potentially occur within the project area. A search of the EPBC protected matters report identified 6 EPBC Act listed flora species and 18 fauna species with potential to occur in the project area. The majority of the identified species were considered unlikely to occur based on the availability and condition of habitat in the project area.

Surveys to assess the extent and quality of terrestrial vegetation and aquatic habitats were completed during July 2016 to supplement desktop information (Attachment 1 and 2). Further flora and fauna surveys are planned for October 2016.

The surveys recorded approximately 400 scattered trees and 148.7 ha of native vegetation within the project area, including the following seven distinct vegetation communities:

- Valley Grassy Forest (Ecological Vegetation Class [EVC] 47) (vulnerable) – 65.2 ha.
- Plains Grassy Forest (EVC 151) (endangered) – 54.2 ha.
- Lowland Herb-rich Forest (EVC 877) (depleted) – 13.4 ha.
- Plains Grassy Woodland (EVC 55) (endangered) – 11.8 ha.
- Lowland Forest (EVC 16) (least concern) – 2.8 ha.
- Aquatic Herbland (EVC 653) (endangered) – 1.1 ha.
- Plains Grassy Wetland (EVC 125) (endangered) – 0.2 ha.

As Plains Grassy Woodland (EVC 55) is associated with the EPBC-listed Gippsland Red Gum (*Eucalyptus tereticornis* subsp. mediana) Grassy Woodland and Associated Native Grassland ecological community and the FFG listed Forest Red Gum Grassy Woodland, there is potential for impacts to these communities. Further surveys will be conducted in October 2016 to determine the presence and extent of these communities.

Potential impacts on flora and fauna resulting from development of the project include direct or indirect impacts. These issues can be grouped into habitat loss from vegetation clearance, habitat degradation and reduced abundance or diversity of flora and fauna populations. It is estimated that the maximum area of native vegetation to be cleared for the development of the project is 242.7 ha.

The Victorian Government 'Permitted clearing of native vegetation – biodiversity assessment guidelines' outline how impacts to Victoria's biodiversity will be assessed and managed. DELWP has developed various biodiversity information tools to assist with the determination of risk associated with permitted clearing and identifying the contribution that native vegetation makes to Victoria's biodiversity.

The Native Vegetation Location Risk Map indicates that the project is located within Location 'A', which depending on the extent of clearing, will be assessed by either the low or moderate risk pathway. Due to the proposed area of disturbance, the project is likely to be assessed under the moderate risk-based pathway.

Field surveys are planned to assess the presence or absence of threatened species with the potential to occur in the project area and these will inform the project impact assessment.

Kalbar is committed to conserving biodiversity where practicable, having regard to the location of the mineral sands deposit and mining method. Kalbar will endeavour to minimise potential effects on flora and fauna by targeting areas of previous disturbance (e.g. agricultural land) for development of mine and ancillary infrastructure, and progressively rehabilitating disturbed land to its former land use.

Surface water and drainage

Potential impacts on surface water systems resulting from development of the project include alteration/degradation of water quality due to sedimentation, runoff and accidental spills, and altered flow regimes due to changes in landscape topography and drainage. Additionally, once the ore is mined, the void will be filled by tailings, deposited as a slurry. The tailings will be dried prior to overburden, subsoil and topsoil being replaced.

Although most of the associated water with tailings will be recovered and reused, some seepage to the shallow groundwater system is expected, which may discharge to nearby waterways, potentially impacting water quality of the receiving environment.

Where process water demand is met in part or in full by surface water there is the potential for altered flow regimes, the nature and extent of which would be dependent on the manner in which surface water was abstracted and/or stored. The development of the project is likely to impact three waterways or gullies within the project area. The impacts on these ephemeral waterways is yet to be determined and will be investigated during the impact assessment process.

Groundwater

An estimated 3 to 4 GL/year of make-up water may be required for ore processing. This water may be sourced from groundwater, with the most feasible systems currently identified for development being either the Boisdale Formation or the LaTrobe Group, at locations distant from the project area (~8 to 15 km south). As the groundwater entitlement would need to be obtained via water trading, the overall sustainability of the resource is not considered to be affected. However, it is expected that a bore or multiple bores would be established in new locations, and groundwater extraction would need to consider the potential impacts to existing users and groundwater dependent ecosystems from both groundwater quantity and quality perspectives.

Mining activities and associated supporting operations may also impact groundwater resources in the following ways:

- Altered groundwater regime, including recharge and discharge mechanisms and flow direction as a result of the removal of overburden and mineral resource, as well as rehabilitation of deposited tailings.
- Altered groundwater quality from leaks and spills from surface processes (i.e. contamination from chemical spills) and tailings seepage.

Radioactivity

Mineral sands deposits in the East Gippsland region contain naturally occurring radioactive materials (NORMs). Potential impacts regarding radioactivity from development of the project are associated with the excavation and transport of NORMs. There are several environmental, health and safety considerations, which will require further assessment during preparation of the impact assessment.

Air quality

Potential impacts on air quality resulting from the development of the project are associated with dust and greenhouse gas emissions. Dust from mining (e.g. overburden stripping and stockpiling) and road transport to and from the mine pit will need to be assessed for health and amenity impact. Dispersion modelling may be required to assess potential impacts on residents and other sensitive receptor points located in proximity to the development. Greenhouse gas emissions generated by the project will need to be calculated although the total is likely to be more than 200,000 tonnes of CO_2 equivalent per annum.

Traffic and transport
Potential impacts on traffic and transport resulting from the project are largely associated with the overall increase in traffic along local roads and the Princes Highway. The associated safety and amenity impacts on local residents of the region, as well as impact on road infrastructure will be assessed. The proposed mode and route of transport of product to and from the project area is yet to be determined, however the potential impacts of the development on traffic and transport will be assessed.

Indigenous cultural heritage
The Gunaikurnai people have a strong spiritual, physical, social and cultural connection to their land. Scar trees and artefact scatters have been identified in the region and within proximity to the project area, mainly adjacent to and along watercourses including the Mitchell River and its tributaries. The rich archaeological history of the area suggests that there may be unregistered sites in the study area. Further investigations will be required to understand the cultural heritage significance of the study area and the impacts on cultural heritage that could arise from development of the project.

12. Native vegetation, flora and fauna

Native vegetation

Is any native vegetation likely to be cleared or otherwise affected by the project?

☒ NYD ☒ No ☒ Yes If yes, answer the following questions and attach details.

What investigation of native vegetation in the project area has been done? (briefly describe)

A flora and fauna desktop study was conducted (Coffey, 2015, see Attachment 2) to provide a preliminary assessment of flora and fauna impacts likely from development of the project. The study was based on data sourced from publicly available resources such as Victorian and Australian databases and search tools. In addition, a site visit was completed in June 2015 by Coffey by a qualified ecologist to assess the biodiversity values of the region. This review comprised the main areas of mineralisation (i.e., the project area) with an additional 5 km buffer.

There has yet to be A detailed assessment of the vegetation communities, and the flora and fauna present in the study area, the presence and extent of these communities is planned for October 2016. The type, location and extent of communities will be confirmed following this survey.

What is the maximum area of native vegetation that may need to be cleared?

☒ NYD Estimated area 148.7 (hectares)

How much of this clearing would be authorised under a Forest Management Plan or Fire Protection Plan?

☒ N/A …… approx. percent (if applicable)

Which Ecological Vegetation Classes may be affected? (if not authorised as above)

☒ NYD ☒ Preliminary/detailed assessment completed. If assessed, please list.

Ecology and Heritage Partners Pty Ltd completed surveys of vegetation in June 2016 of accessible land within the project area. The surveys were undertaken on public land (i.e. road reserves) and in properties where landowners had granted permission to access. The survey area totalled approximately 1,109 hectares and accounted for 75% of the adopted study area.

Prior to completing these surveys, it was considered that the survey area supported 177.9 hectares of native vegetation based on EVC modelling as reported in the Glenaladale Mineral Sands Project Baseline Report (Coffey, 2015, see Attachment 2).

The surveys recorded approximately 400 scattered trees and 148.7 ha of native vegetation within the survey area, including the following seven distinct vegetation communities:

- Valley Grassy Forest (Ecological Vegetation Class [EVC] 47) (vulnerable) – 65.2 ha.
- Plains Grassy Forest (EVC 151) (endangered) – 54.2 ha.
- Lowland Herb-rich Forest (EVC 877) (depleted) – 13.4 ha.
- Plains Grassy Woodland (EVC 55) (endangered) – 11.8 ha.
- Lowland Forest (EVC 16) (least concern) – 2.8 ha.
- Aquatic Herbland (EVC 653) (endangered) – 1.1 ha.
- Plains Grassy Wetland (EVC 125) (endangered) – 0.2 ha.

While the vast majority of the project area has been historically cleared of native vegetation, remnant vegetation occurs in scattered fragments. Potential impacts to vegetation communities of conservation significance may occur due to vegetation clearance and earthworks. Five of the seven EVCs with the potential to occur in the project area are listed as either vulnerable or endangered.

As Plains Grassy Woodland is associated with the EPBC-listed Gippsland Red Gum (*Eucalyptus tereticornis* subsp. *mediana*) Grassy Woodland and Associated Native Grassland ecological

community and the FFG listed Forest Red Gum Grassy Woodland, there is potential for impacts to these communities.

Due to seasonal constraints at the time of vegetation assessment, it was not possible to definitively determine whether these vegetation patches meet the condition thresholds that define the nationally significant ecological community. However, further surveys during spring (when the majority of native flora are in flower) will enable clear determination to be made.

Kalbar will endeavour to minimise potential effects on native vegetation by targeting areas of previous disturbance (e.g. agricultural land) for development on mine and ancillary infrastructure, and progressively rehabilitating disturbed land.

Have potential vegetation offsets been identified as yet?

☒ NYD ☐ Yes If yes, please briefly describe.

NYD = not yet determined

Flora and fauna

What investigations of flora and fauna in the project area have been done?
(provide overview here and attach details of method and results of any surveys for the project & describe their accuracy)

A flora and fauna desktop study was conducted (Coffey, 2015, see Attachment 2) to provide a preliminary assessment of flora and fauna impacts likely to be encountered during the project. The study was based on data sourced from publicly available resources such as Victorian and Australian databases and search tools. In addition, a site visit was completed in June 2015 by Coffey by a qualified ecologist to assess the biodiversity values of the region.

Surveys to assess the extent and quality of terrestrial vegetation and aquatic habitats (Attachment 1) were completed during July 2016 to supplement desktop information. Further flora and fauna surveys are planned for October 2016.

Have any threatened or migratory species or listed communities been recorded from the local area?

☐ NYD ☐ No ☒ Yes If yes, please:

- List species/communities recorded in recent surveys and/or past observations.
- Indicate which of these have been recorded from the project site or nearby.

Threatened flora

Based on desktop searches of databases and knowledge of this region, six EPBC listed species have potential to occur within the study area. Two nationally listed species, the dwarf kerrawang (*Commersonia prostrate*) and swamp everlasting (*Xerochrysum palustre*), have been recorded locally. Both of these species occur in swampy, sometimes ephemeral, wetlands and shallow freshwater marshes. Due to their habitat requirements the project is not predicted to impact upon these species, as there is no suitable habitat in the project area. Another four nationally-listed species – aniseed boronia (*Boronia galbraithiae*), clover glycine (*Glycine latrobeana*), gaping leek-orchid (*Prasophyllum correctum*) and Austral toadflax (*Thesium austral*) – or their habitat may occur within the study area, as predicted by the EPBC Protected Matters Search Tool.

Two state listed species, yellow-wood (*Acronychia oblongifolia*) and prostrate cone-bush (*Isopogon prostrates*) have been recorded locally. The former is a small to medium sized tree listed species the purple diuris (*Diuris punctatum* var. *punctatum*) may also occur in the project based on its habitat requirements of native grasslands, grassy woodlands, heathy woodlands.

A further 10 species are listed on the Advisory List of Rare or Threatened Plants in Victoria as either rare or poorly known (Attachment 2)

Flora surveys during July 2016 recorded the veined spear-grass (*Austrostipa rudis* subsp. *australis*) at two locations. Further surveys during October 2016 will be completed to assess the presence of threatened flora.

Threatened fauna

Rare or threatened fauna species listed under either the EPBC Act, FFG Act, or on the Advisory List of Rare or Threatened Fauna in Victoria, with the potential to occur in the study area based on suitable habitat, are presented in Attachment 2.

In terms of invertebrate species, the golden sun moth (*Synemon planar*) is listed as potentially occurring or having habitat that may occur within the study area. However, the closest records of the species are more than 100 km away and it is considered unlikely that they occur in the study area and therefore no impacts to the species are predicted to occur as a result of the project.

Four amphibian and two reptile species either threatened or rare could occur in the study area. Two nationally-listed amphibian species, the giant burrowing frog (*Heleioporus australiacus*) and the growling grass frog (*Litoria raniformis*), have been recorded locally. The giant burrowing frog was recorded east of the Mitchell River in 2003 and the growling grass frog at Lindenow South and Brigalong in 1977 and 1978, with other records of the species in the region. Other nationally-listed amphibian and reptile species listed as potentially occurring by the EPBC Protected Matters Search Tool are considered to be unlikely to occur in the study area based on their distribution and habitat requirements. The southern toadlet (*Pseudophryne semimarmorata*), listed as vulnerable on the Advisory List of Rare or Threatened Fauna, has been recorded at various locations locally particularly around Stockdale, at Glenaladale and Moilun Creek, most recently in 2010.

In terms of habitat for birds and mammals, the project area is characterised by predominantly disturbed agricultural environments with varying levels of disturbance. Native and non-native habitats include small remnant native stands of trees, semi-cleared bushland, isolated mature trees, cleared grassland, regenerating areas and constructed habitat. Much of the remaining remnant native vegetation within the study area (not covered by the other values defined for the study area) is along roadsides. These strips of vegetation often contain large mature trees with hollows that support a variety of fauna. For example, there are records of the greater glider along roadways around Stockdale including Beverleys Road.

Many mature scattered remnant trees that are not part of a remnant patch of vegetation occur within cleared areas of the project area. There are likely to be several hundred scattered trees, which contribute to the area's biodiversity values. Many of these trees will be impacted by mining activities. These trees not only represent some of the oldest in the landscape, but also provide habitat and connectivity for a wide range of ground dwelling and arboreal fauna.

A total of 26 rare or threatened bird species have either been recorded locally or have potential habitat in the study area. Four species are listed under the EPBC Act and FFG Act. The swift parrot was recorded at Moilun Creek and Nile Creek in 1977 as well as other more recent records being made in the broader region. The regent honeyeater (*Anthochaera phrygia*) and the Australian painted snipe (*Rostratula australis*) have also been recorded locally; the latter at Lindenow and the former at Lindenow and Stockdale. The Australasian bittern (*Botaurus poiciloptilus*) has not been recorded locally with the closest record of the species in Bairnsdale (but is recorded as potentially occurring based on the EPBC Protected Matters search). Nine additional species listed as threatened on the FFG Act have been recorded locally including the little egret (*Egretta garzetta nigripes*), masked owl (*Tyto novaehollandiae novaehollandiae*), grey goshawk (*Accipiter novaehollandiae novaehollandiae*), hooded robin (*Melanodryas cucullata cucullata*), diamond firetail (*Stagonopleura guttata*), blue-billed duck (*Oxyura australis*), powerful owl (*Ninox strenua*), chestnut-rumped heathwren (*Calamanthus pyrrhopygius*) and speckled warbler (*Chthonicola sagittatus*). A further 13 bird species have been recorded locally and are listed on the Advisory List of Rare or Threatened Fauna in Victoria (see Attachment 2).

In terms of mammals, eight listed species have either been recorded locally or have potential habitat present. Of these, six are listed under the EPBC Act. The long-nosed potoroo (*Potorous tridactylus tridactylus*), broad-toothed rat (*Mastacomys fuscus mordicus*) and southern brown bandicoot (*Isoodon obesulus obesulus*) were each recorded at Iguana Creek adjacent to Friday Creek Road more than 15 years ago. The spot-tailed quoll (*Dasyurus Maculatus maculates*) has been recorded in the Mitchell River National Park and in early 2012, a male was found dead on the road at the Providence Ponds Reserve between Bairnsdale and Stratford. The New Holland

mouse has also been recorded in this reserve. All the aforementioned mammals are considered to be unlikely to occur in the project area based on visual assessment of the remaining habitat. The greater glider (*Petauroides volans*) has been recorded at various locations around Stockdale including Beverleys Road between 1962 and 1998. The remaining species, including the brush-tailed rock-wallaby and grey-headed flying fox were listed as having the potential to occur within the study area, but no records have been made locally.

Two nationally-listed fish species, Australian grayling (*Prototroctes maraen*) and eastern dwarf galaxias (*Galaxiella pusilla*), may occur in the study area. Australian grayling has been recorded locally. The species was recorded in the Moilun Creek in 1905 and in the Avon River at Stratford most recently in 2010. The eastern dwarf galaxias has been recorded in the Perry River at the Providence Ponds Flora and Fauna Reserve, approximately 7 km from the project area, but has the potential to occur in the vicinity of the project area. The Flinders pygmy perch (*Nannoperca australis 'flindersi'*), listed as vulnerable on the Advisory List of Threatened Fauna (DSE, 2013), has the potential to occur or potential habitat within or downstream of the project (see Attachment 1 and 2).

Migratory fauna

Eleven migratory species (excluding marine species) have the potential to occur within the project area based on their distribution and habitat. Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations.

Listed migratory species are those listed in the:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).
- China-Australia Migratory Bird Agreement (CAMBA).
- Japan-Australia Migratory Bird Agreement (JAMBA).
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

In addition, native species can be listed in an international agreement approved by the Minister of Environment.

A review of the EPBC Protected Matters Search Tool indicates that six terrestrial migratory species or their habitat may occur within the vicinity of the project area. These include:

- White-bellied sea-eagle (*Haliaeetus leucogaster*).
- White-throated needletail (*Hirundapus caudacutus*) (recorded in the study area).
- Rainbow bee-eater (*Merops ornatus*).
- Black-faced monarch (*Monarcha melanopsis*).
- Satin flycatcher (*Myiagra cyanoleuca*).
- Rufous fantail (*Rhipidura rufifrons*).

In addition, the EPBC Protected Matters Search Tool indicates that six migratory species dependent on wetland habitats may occur within the study area. These include:

- Great egret (*Ardea alba*).
- Cattle egret (*Ardea ibis*).
- Latham's snipe (*Gallinago hardwickii*).
- Eastern osprey (*Pandion cristatus*).
- Australian painted snipe (*Rostratula australis*) (also listed as Endangered under the EPBC Act and critically endangered under the FFG Act).

For the majority of these species, suitable habitat is lacking within the project area, as many of these species specific habitat requirements, such as large waterbodies or wetlands, are absent.

If known, what threatening processes affecting these species or communities may be exacerbated by the project? (eg. loss or fragmentation of habitats) Please describe briefly.

Potential threatening processes that may affect flora and fauna communities include:

- Habitat loss from vegetation clearance and earthworks and subsequent smothering of vegetation by eroded material, altered hydrology and altered land uses.
- Habitat degradation associated with the establishment of invasive species or the introduction of pathogens, edge effects, deposition of eroded sediments, or from contamination caused by accidental spills of hazardous materials.

- Reduced abundance and/or diversity of flora and fauna populations as a consequence of:

  - Increased disturbance (through project-related noise and lighting) disrupting the behaviour of fauna and potentially reducing reproductive success.
  - Some isolated changes to available habitat (including food sources, shelter and nesting or roosting sites) due to habitat loss and degradation (described above).
  - Potential injury, death or displacement of fauna from vegetation clearing and earthworks, collision with vehicles.

Are any threatened or migratory species, other species of conservation significance or listed communities potentially affected by the project?

☐ NYD ☐ No ☒ Yes If yes, please:

- List these species/communities:
- Indicate which species or communities could be subject to a major or extensive impact (including the loss of a genetically important population of a species listed or nominated for listing) Comment on likelihood of effects and associated uncertainties, if practicable.

While the project area is not known to rare or threatened flora species, they could occur within the project area based on their habitat requirements including open sclerophyll forest, woodlands and grasslands (see Attachment 2). Therefore vegetation clearance could result in the loss on individual plants. These are not expected to be of a scale to cause a significant impact to any of these species on a regional, state or national level. Further targeted field surveys will be conducted to determine the presence or absence of these species to further determine any potential impacts from project activities.

Based on the project location and description, it is unlikely the project will have a significant impact on rare or threatened reptiles and amphibians. While there may be some localised losses of farm dams and ephemeral creeks these are not likely to contain large or significant populations of these species. Targeted surveys focussing on amphibian surveys are proposed to further define the presence of any of these species and if required inform mitigation strategies.

In the regional context, impacts on rare or threatened birds and mammals are not expected to be significant with affects largely causing behaviour shifts in home ranges and potentially nesting sites. There may be isolated instances of deaths of individuals of some fauna species, but a more accurate baseline assessment is required to determine the extent of population abundance of rare or threatened species before any impacts can be predicted with confidence.

Is mitigation of potential effects on indigenous flora and fauna proposed?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

Baseline and targeted flora and fauna investigations will be conducted to determine the presence of any indigenous or threatened flora and fauna within the project area, and the likelihood of potential impacts from project activities. The assessment will identify the potential impacts to threatened species and will be used to derive avoidance, mitigation and management measures.

In addition, establishment of mining and ancillary infrastructure will target areas of previous disturbance (due to agricultural practices). Temporary worksites, laydown areas and the mine void will be progressively rehabilitated.

Other information/comments? (eg. accuracy of information)

Initial desktop assessments have been based on historical records, many of which are more than three decades old. Field surveys to assess vegetation and fauna habitat were completed during July 2016. Further surveys to assess the presence or absence of threatened species will be completed during October 2016. These surveys and subsequent assessments will enable a more accurate assessment of project impacts and will inform the project environment effects statement.

13. Water environments

Will the project require significant volumes of fresh water (eg. > 1 Gl/yr)?

☐ NYD ☐ No ☒ Yes If yes, indicate approximate volume and likely source.

The project will require significant volumes of water for activities such as ore processing, dust suppression, washdown, as well as for onsite drinking water and ablutions. Initial water requirements for construction and start-up are likely to be between 2 to 3 GL.

During the project impact assessment a number of water source options will be investigated including surface water and groundwater. The project will recycle and reuse water where practicable (such as flood runoff and supernatant water from tailings dams and the mine pit) and optimise operations to maximise water use efficiency.

The annual make-up water requirement is expected to be approximately 3 to 4 GL.

The source of water and volume requirements for the project will be confirmed during the impact assessment stage of the project. Potential water sources include groundwater and winter-fill from the Mitchell River. A project water balance will be derived that outlines predicted water use and discharge volumes, as well as reticulation and recycling of water where appropriate. Water supply options will be discussed with relevant agencies such as DELWP, EPA, DEJTR and Southern Rural Water.

Will the project discharge waste water or runoff to water environments?

☐ NYD ☐ No ☒ Yes If yes, specify types of discharges and which environments.

Wastewater discharge requirements and the potential for surface water runoff to water environments will be determined during the project impact assessment. It is likely that some wastewater will be discharged to the environment but measures will be in place to reduce impacts of discharges reporting to surface water or groundwater resources.

Flood events and surface drainage will need to be managed to ensure erosion and sediment impacts are minimised, particularly on the Mitchell River.

Are any waterways, wetlands, estuaries or marine environments likely to be affected?

☐ NYD ☐ No ☒ Yes If yes, specify which water environments, answer the following questions and attach any relevant details.

The most significant water feature in the region is the Mitchell River. The river is used as a water source for the horticulture industry and for dryland grazing agricultural enterprises.

Several surface waterbodies in the project area are ephemeral and therefore the potential for impacts on water quality will depend on whether waterbodies and drainage lines contain water over the timescale of project activities.

Potential impacts to waterways and wetlands will be assessed during the project impact assessment. There are no estuaries or marine environments in the vicinity of the project area and therefore these will not be impacted upon.

Are any of these water environments likely to support threatened or migratory species?

☐ NYD ☒ No ☐ Yes If yes, specify which water environments.

Based on the desktop review and the aquatic habitat recorded in the project area (Attachment 1), it is considered a low likelihood that rare or threatened aquatic biota or communities occur in the Fingerboards Mineral Sands Project study area.

Are any potentially affected wetlands listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'?

☐ NYD ☒ No ☐ Yes If yes, please specify.

Could the project affect streamflows?

☐ NYD ☐ No ☒ Yes If yes, briefly describe implications for streamflows.

The project could potentially affect stream flow regimes in the project area as the project will result in some alteration of landform topography during mining and rehabilitation. Surface water management measures will be in place to maintain existing surface flow regimes and minimise runoff from project disturbed areas.

The potential for impacts to stream flows will be assessed during the project impact assessment.

Could regional groundwater resources be affected by the project?

☐ NYD ☐ No ☒ Yes If yes, describe in what way.

The option of using groundwater will be considered and assessed during the project impact assessment. The Boisdale Aquifer to the south of the project area is considered to be able to provide groundwater resources for the project. Impacts to groundwater will be assessed during the project impact assessment.

Could environmental values (beneficial uses) of water environments be affected?

☐ NYD ☐ No ☒ Yes If yes, identify waterways/water bodies and beneficial uses (as recognised by State Environment Protection Policies)

Beneficial uses will need to be protected from project impacts (such as reduction of water available for agricultural and irrigation, or degradation of aquatic ecosystems).

Impacts to beneficial uses will be assessed during the project impact assessment.

Could aquatic, estuarine or marine ecosystems be affected by the project?

☐ NYD ☐ No ☒ Yes If yes, describe in what way.

There are no estuarine or marine ecosystems in the vicinity of the project. Aquatic ecosystems associated with groundwater and surface water, such as the ephemeral gullies and the Mitchell River will require protection.

Impacts to aquatic ecosystems will be assessed during the project impact assessment. Management measures to minimise impacts on aquatic ecosystems will be implemented throughout the project.

Is there a potential for extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems over the long-term?

☐ No ☒ Yes If yes, please describe. Comment on likelihood of effects and associated uncertainties, if practicable.

There are no estuarine or marine ecosystems in the vicinity of the project. There is the potential that aquatic ecosystems could be impacted in the long term by project activities. This includes discharges to surface water (particularly to tributaries of the Mitchell River) and groundwater, or alteration of flow regimes due to changes to surface drainage and groundwater drawdown. Such impacts to biodiversity could be long term depending on the magnitude and the severity of the impact to the aquatic environment.

Long-term impacts to aquatic ecosystems will be assessed during the project impact assessment.

Is mitigation of potential effects on water environments proposed?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

Measures to reduce impacts to water environments will be assessed and proposed during the project impact assessment. Measures to be adopted will be based on the hierarchy of:

- Avoidance or 'designing out' impacts during design of the project concept.
- Mitigation and management of impacts.
- Monitoring the performance of management measures.

As mining activities will be in proximity to surface water features, measures will need to be implemented during the life of the project to reduce, manage and monitor impacts to water environments. Management and mitigation of water impacts are likely to revolve around:

- Optimising project concept to reduce water use and discharge.
- Implementing surface water flow control to minimise erosion and runoff.
- Implementing controls to prevent chemical or sediment contamination of water sources.
- Monitoring the effectiveness of water management controls and improving them where necessary.

Other information/comments? (eg. accuracy of information)

14. Landscape and soils

Landscape

Has a preliminary landscape assessment been prepared?

☒ No ☐ Yes If yes, please attach.

Is the project to be located either within or near an area that is:

- **Subject to a Landscape Significance Overlay or Environmental Significance Overlay?**
  ☐ NYD ☒ No ☐ Yes If yes, provide plan showing footprint relative to overlay.

- **Identified as of regional or State significance in a reputable study of landscape values?**
  ☒ NYD ☐ No ☐ Yes If yes, please specify.

- **Within or adjoining land reserved under the *National Parks Act 1975*?**
  ☐ NYD ☒ No ☐ Yes If yes, please specify.

The project area is not within or adjoined to a national park. The Mitchell River National Park is located approximately 4 km north east of the project area (see Figure1).

- **Within or adjoining other public land used for conservation or recreational purposes?**
  ☐ NYD ☐ No ☒ Yes If yes, please specify.

A State Forest (approximately 250 ha) is located to the west of the project area and dissected by Limpyers Road primarily to the south of Long Marsh Gully and bounded by Boundary No. 34 Track. Two smaller State Forests (approximately 30 ha each) are located adjacent to Beverleys Road to the northwest of the project area. A large State Forest is located to the north of the project area. This forms a large, continuous area of native vegetation to the Great Dividing Range and includes area protected by various national parks.

Is any clearing vegetation or alteration of landforms likely to affect landscape values?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

The project will involve vegetation clearance and landform alteration. Disturbed areas will be rehabilitated progressively during mining with some of these changes to the landscape being temporary. The aim of rehabilitation and closure works will be to resemble the landscape prior to mining.

Potential impacts to landscape values will be assessed as a part of the impact assessment. This will involve consultation with stakeholders to understand the landscape values to be protected.

Is there a potential for effects on landscape values of regional or State importance?

☒ NYD ☐ No ☐ Yes Please briefly explain response.

Landscape values will be assessed during the impact assessment for the Environment Effects Statement.

Is mitigation of potential landscape effects proposed?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

Appropriate mitigation measures for protection of landscape values will be developed as a part of the impact assessment and are likely to include measures relating to the colours of buildings and appropriate siting of stockpiles.

Other information/comments? (eg. accuracy of information)

Note: A preliminary landscape assessment is a specific requirement for a referral of a wind energy facility. This should provide a description of:

- The landscape character of the site and surrounding areas including landform, vegetation types and coverage, water features, any other notable features and current land use;
- The location of nearby dwellings, townships, recreation areas, major roads, above-ground utilities, tourist routes and walking tracks;
- Views to the site and to the proposed location of wind turbines from key vantage points (including views showing existing nearby dwellings and views from major roads, walking tracks and tourist routes) sufficient to give a sense of the overall site in its setting.

Soils

Is there a potential for effects on land stability, acid sulphate soils or highly erodible soils?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

There is clear evidence of past or current mass movement of soil within the project area. Soils in the eastern lowlands are prone to gully, wind, rill and tunnel erosion and are moderately well drained (DEPI, 2015c). Evidence of sheet, rill and tunnel erosion was observed throughout the project area.

An East Gippsland Soil Erosion Management Plan has been developed for the region to assess the risk of erosion and identify and set management actions for freehold land (DPI, 2009). The risk assessment shows that the project area is located within an area that has been identified as high risk for sheet and rill erosion.

Given the soil type and proneness to erosion, management of surface water flows and erosion will need to be planned and implemented prior to construction activities. Some soils in the region are highly productive and support intensive agricultural activities. This should be considered when planning land clearance and rehabilitation activities. While there is a low likelihood of soil contamination being present within the project area, consideration to further investigations should be given during preliminary excavation activities for mine infrastructure and the mine pit(s).

Are there geotechnical hazards that may either affect the project or be affected by it?

☐ NYD ☐ No ☒ Yes If yes, please briefly describe.

The undulating landforms of the project area present unique challenges for managing mining and rehabilitation of the area. Some of these challenges include presence of waterways, eroding topography, steep gullies, rocky outcrops, little or no topsoil in areas, stony topsoil and dispersive subsoil. As a result project activities that have the potential to impact geology, landforms and soil include:

- Clearing of vegetation and topsoil.
- Overburden removal and stockpiling.
- Overburden removal and emplacement directly as backfill.
- Stockpiling of topsoil and subsoils.
- Deposition of co-disposed tailings.
- Rehabilitation of cleared areas.

These activities have the potential to result in the degradation of soil structure and fertility, changes in soil chemistry and changes to landform. The impact of which will depend on how the activities are conducted and managed. These may either reduce, maintain or improve the:

- Capability of land to support agriculture.
- Capability of land to support existing ecosystems.
- Potential for erosion.
- Ability to rehabilitate successfully.

• .Ability to achieve closure criteria.
Other information/comments? (eg. accuracy of information)

15. Social environments

Is the project likely to generate significant volumes of road traffic, during construction or operation?

☐ NYD ☐ No ☒ Yes If yes, provide estimate of traffic volume(s) if practicable.

Roads within and surrounding the project area are used by passenger vehicles, farming machinery and heavy vehicles. The project is expected to generate increased traffic volumes within the project area and surrounding road network, particularly during construction. This is likely to be associated with the transportation of materials and equipment to the project area and construction personnel.

During operations, the project proposes transport of HMC to Port Anthony, which is located approximately 160 km southwest of the project area on Barry Road, Agnes. Twenty B-double trucks are proposed to make the return journey to the port each day, via the Princes Highway to Sale and then along the South Gippsland Highway.

Increases in traffic volumes and associated impacts will be determined as a part of the project impact assessment. This will involve identifying management measures to minimise potential impacts.

Is there a potential for significant effects on the amenity of residents, due to emissions of dust or odours or changes in visual, noise or traffic conditions?

☐ NYD ☐ No ☒ Yes If yes, briefly describe the nature of the changes in amenity conditions and the possible areas affected.

The project is located in a region with high natural and rural landscape attributes which are valued by local residences and tourists alike. These landscapes play an important role in shaping the region's character and identity, and modifications to these landscapes could influence the amenity of the region. The project area is located in a highly modified landscape that forms part of the region's rural setting.

A change to the landscape during the construction and operation of the project and its associated effects has the potential to affect the landscape values and visual amenity of the area enjoyed by local residences and passing motorists. The changes will affect the amenity of local residents, they may detract from visitors experience but could also attract visitors curious to inspect the mine site. During construction key issues are expected to relate to the generation of dust, night lighting, traffic, vegetation removal, and the visibility of built infrastructure, construction machinery and stockpiles. During operations, key issues are expected to relate to the visibility of mine infrastructure and stockpiles, land disturbance associated with mining activities, night lighting and traffic. With rehabilitation of the mined areas to occur progressively during mining, some of these changes to the landscape will be temporary, with the aim of rehabilitation and closure works to resemble the landscape prior to mining.

The project will generate noise emissions during construction and operations. The main noise sources associated with construction and operation of the project are expected to include:

- Traffic to and from the mine site.
- HMC transport.
- Mobile plant and equipment.
- Mobile plant and equipment servicing and repair.
- MUP and WCP.
- Concrete batch plant (if installed for construction).

It is anticipated that noise associated with the operation of the mine will occur 24 hours per day, 7 days per week. Construction noise will be short term compared with operations noise and is likely to be greater at times. The extent to which noise will be an issue at any location will depend on several factors including:

- Existing noise environment.

- Proximity of residences and habitat to noise generating activities.
- Variable factors such as weather and wind direction.
- Occurrence of adverse conditions that may enhance noise propagation.
- Duration of project-generated noise.
- Timing of project-generated noise.
- Tonal qualities of repetitive project-generated noise.
- Effectiveness of noise mitigation and management procedures carried out by Kalbar.

Noise monitoring and noise modelling are required in the project area to determine background noise levels and set a baseline level to use for monitoring noise during construction and operation activities.

Traffic conditions will change with increased road traffic (heavy and light vehicle movements). Potential impacts include:

- The increased traffic volumes associated with the construction and operation phases of the project and safety on local and regional roads, intersections and level crossings.
- Changes to private property or township access associated with road closures, temporary diversions or detours, during the life of the project.

Accelerated deterioration of road surfaces necessitating increased maintenance of the road network, as well as road or intersection upgrades.

Is there a potential for exposure of a human community to health or safety hazards, due to emissions to air or water or noise or chemical hazards or associated transport?

☒ NYD ☒ No ☒ Yes If yes, briefly describe the hazards and possible implications.

The potential impacts to human health will be assessed during the impact assessment for the preparation of the environment effects statement. The assessment will include the exposure to naturally occurring radioactive material, dust and noise.

Is there a potential for displacement of residences or severance of residential access to community resources due to the proposed development?

☒ NYD ☒ No ☒ Yes If yes, briefly describe potential effects.

Two residences are located in the project area and may need to be relocated. The potential impact on residences including displacement or severance of residential access will be assessed during the impact assessment for the preparation of the environment effects statement.

Are non-residential land use activities likely to be displaced as a result of the project?

☒ NYD ☒ No ☒ Yes If yes, briefly describe the likely effects.

The temporary use of agricultural land for the project will influence the availability of agricultural land within the East Gippsland Shire in the short to medium term. The temporary diversion and relocation of local and regional roads will result in the displacement of existing land uses for transport and traffic in the short to medium term.

Do any expected changes in non-residential land use activities have a potential to cause adverse effects on local residents/communities, social groups or industries?

☒ NYD ☒ No ☒ Yes If yes, briefly describe the potential effects.

The use of agricultural land for mining has the potential to interrupt farming practices for local farming families. The reduction in area for grazing and other agricultural activities will impact upon farm productivity and profitability, sustainable grazing practices and stocking rates, and regional agricultural economics.

Is mitigation of potential social effects proposed?

☒ NYD ☒ No ☒ Yes If yes, please briefly describe.

Kalbar will work with the directly affected landholders to determine the potential impact of the

change in land use and how to mitigate against potential social and economic impacts.

The management and mitigation of social impacts will be determined during the approvals process and through the stakeholder engagement program for the project.

All directly impacted landowners will be compensated in accordance with the *Mineral Resources (Sustainable Development) Act 1990*.

Other information/comments? (eg. accuracy of information)

Cultural heritage

Have relevant Indigenous organisations been consulted on the occurrence of Aboriginal cultural heritage within the project area?

☐ No If no, list any organisations that it is proposed to consult.
☒ Yes If yes, list the organisations so far consulted.

Kalbar have had several meetings with the Gunaikurnai Land and Waters Aboriginal Corporation. These meetings have been in relation to exploration activities and tenement management.

What investigations of cultural heritage in the project area have been done?
(attach details of method and results of any surveys for the project & describe their accuracy)

No field investigations of the project area have been conducted to date.

Is any Aboriginal cultural heritage known from the project area?

☐ NYD ☐ No ☒ Yes If yes, briefly describe:

– Any sites listed on the AAV Site Register
– Sites or areas of sensitivity recorded in recent surveys from the project site or nearby
– Sites or areas of sensitivity identified by representatives of Indigenous organisations

A high level desktop review has been conducted into Aboriginal cultural heritage within the project area and surrounds. The Victorian Department of Premier and Cabinet cultural heritage sensitivity mapping indicates that there are areas of cultural heritage sensitivity within and adjacent to the project area, particularly near watercourses (DPC, 2015). Four registered places were identified on the Aboriginal Heritage Register as being located within or adjacent to the project area. Of these, one registered heritage place (a scar tree) is located within the project area and two scar trees are on the boundary of the project area.

Initial desktop investigations undertaken in 2012 (AECOM, 2012) also identified an area to the south of the project area as a sand dune feature which is believed to be Pleistocene in age. Pleistocene sand dunes are associated with significant sites and old burial areas and are therefore typically classified as highly sensitive landforms.

Are there any cultural heritage places listed on the Heritage Register or the Archaeological Inventory under the *Heritage Act 1995* within the project area?

☒ NYD ☐ No ☐ Yes If yes, please list.

A preliminary search of the Victorian Heritage Database indicated that there are a number of listed heritage places (including a bridge and weir) adjacent to but not within the project area.

Is mitigation of potential cultural heritage effects proposed?

☒ NYD ☐ No ☐ Yes If yes, please briefly describe.

Other information/comments? (eg. accuracy of information)

16. Energy, wastes & greenhouse gas emissions

What are the main sources of energy that the project facility would consume/generate?

- [x] Electricity network. If possible, estimate power requirement/output …….
- [ ] Natural gas network. If possible, estimate gas requirement/output ……...
- [ ] Generated on-site. If possible, estimate power capacity/output …….
- [ ] Other. Please describe.

Please add any relevant additional information.

Power for the project is likely to be sourced from the Victorian electricity grid. The project is expected to require approximately 2500 kWh to 3,000 kWh. Power for the early stages of construction is likely to come from diesel generators.

What are the main forms of waste that would be generated by the project facility?

- [x] Wastewater. Describe briefly.
- [ ] Solid chemical wastes. Describe briefly.
- [x] Excavated material. Describe briefly.
- [x] Other. Describe briefly.

Please provide relevant further information, including proposed management of wastes.

The project will result in some wastewater particularly from dewatering, processing and tailings deposited in the mine void.

Some excavated material, including large rock, may be used for the formation of haul roads and laydown areas. Overburden will be returned to the mining void for final placement during rehabilitation.

The volumes and types of waste to be generated by the project, including construction waste will be assessed during the project impact assessment.

What level of greenhouse gas emissions is expected to result directly from operation of the project facility?

- [ ] Less than 50,000 tonnes of CO_2 equivalent per annum
- [ ] Between 50,000 and 100,000 tonnes of CO_2 equivalent per annum
- [ ] Between 100,000 and 200,000 tonnes of CO_2 equivalent per annum
- [x] More than 200,000 tonnes of CO_2 equivalent per annum

Please add any relevant additional information, including any identified mitigation options.

The expected level of greenhouse gas emissions is unknown at this stage and will be assessed during preparation of the impact assessment. Emissions could potentially be more than 200,000 tonnes of CO_2 equivalent per annum, mainly from diesel consumed by mobile plant and equipment.

17. Other environmental issues

Are there any other environmental issues arising from the proposed project?

- [ ] No
- [x] Yes If yes, briefly describe.

With increased activity on site during mining including hot work, there is potential for increased bushfire risk to surrounding agricultural areas. A permit system will be implemented on site to mitigate against the potential risk of fire starting and spreading from the site. This will include restrictions during high fire danger days and total fire bans.

Unsuccessful rehabilitation and the inability to achieve closure of the mine are potential environmental issues for the project. Rehabilitation for the project will be progressive throughout the mine life. The extraction and return of soils in a manner that considers the physical and chemical properties of the soils will be a key factor in successful rehabilitation. Once mining has

ceased and rehabilitation has been completed, the land should be capable of returning to agricultural production with similar farming systems and productivity to current land use. The return of pre-mining landforms and land uses are key closure criteria for the project.

18. Environmental management

What measures are currently proposed to avoid, minimise or manage the main potential adverse environmental effects? (if not already described above)

☒ Siting: Please describe briefly

The active mining area is determined by the location of the deposit, which is located on previously disturbed agricultural land. The location of infrastructure associated with the mine including the processing plant, TSF and office facilities will be sited to avoid sensitive environmental values.

☒ Design: Please describe briefly

A number of alternatives are under consideration to minimise the potential environmental and social impacts of the project. These include the potential water source for processing and dust suppression, the transport route to the port, the port selected for the export of HMC, tailings treatment and disposal, and the mine plan and infrastructure layout.

☒ Environmental management: Please describe briefly.

An environmental management framework will be prepared as part of the approvals process. An environmental management plan will be prepared for the project and will include a construction environmental management plan and an operations management plan. This will include all commitments and management measures proposed to mitigate the impacts identified during the approvals process.

☐ Other: Please describe briefly

Add any relevant additional information.

19. Other activities

Are there any other activities in the vicinity of the proposed project that have a potential for cumulative effects?

☐ NYD ☒ No ☐ Yes If yes, briefly describe.

20. Investigation program

Study program

Have any environmental studies not referred to above been conducted for the project?

☒ No ☐ Yes If yes, please list here and attach if relevant.

Has a program for future environmental studies been developed?

☐ No ☒ Yes If yes, briefly describe.

A preliminary environmental studies program has been developed to inform the project's impact assessment based on the potential environmental and social impacts associated with the project. The studies will include desktop assessments supported by field investigations where appropriate. It is expected that the following studies will be conducted as part of this program:

- Terrestrial and aquatic flora and fauna.
- Surface water and groundwater.

- Aboriginal and non-Indigenous cultural heritage.
- Traffic and transport.
- Socio-economic.
- Land use and planning.
- Visual and landscape.
- Radiation.
- Air quality and greenhouse gas.
- Noise.
- Geology, soils and landform.
- Rehabilitation.

Consultation program

Has a consultation program conducted to date for the project?

☐ No ☒ Yes If yes, outline the consultation activities and the stakeholder groups or organisations consulted.

Kalbar has conducted formal and informal engagement to date including the following:

- Community meetings (17 November 2014, Mossiface Hall; 10 December 2014, Glenaladale Hall; 11 April 2015, Glenaladale Hall; 25 July 2016, Glenaladale Hall).
- Email updates to landowners and community meeting attendees in December 2014, January 2015, March 2015 and June 2015.
- Personal discussions through telephone calls, emails and visits to landholder's properties to arrange exploration drilling and land access.
- Meetings with the Gunaikurnai Land and Waters Aboriginal Corporation to discuss exploration activities and tenement management.
- Introductory meetings, calls or emails with local MPs, councillors, local government representatives and community groups including Rotary and Lions Club.
- Presentation at the East Gippsland Shire Council mining day in March 2014.
- Letterbox drops of project information to areas adjacent to initial exploration drilling program in June 2014.
- Media release about the community meetings, exploration drilling program, Lindenow Water Security Grant, granting of Retention Licence and establishment of Bairnsdale office.
- Information bulletin on project status in September 2016.
- Interviews with ABC Radio Gippsland, Weekly Times, Bairnsdale Advertiser and Stock and Land about the community meetings and exploration drilling program in 2014, 2015 and 2016.
- Fingerboards Mineral Sands Project stand at East Gippsland Field Days 2016.
- Fact sheets, website, project email address, 1800 number for enquiries about Fingerboards Mineral Sands Project.
- Meetings with local businesses including major irrigators.

Government agencies and stakeholder groups consulted to date include:

- Department of Economic Development, Jobs, Transport and Resources (DEDJTR).
- Aboriginal Victoria (AV).

- DELWP.
- East Gippsland Shire Council.
- Wellington Shire Council.
- Gunaikurnai Land and Waters Aboriginal Corporation.
- Southern Rural Water.
- Minerals Council of Australia.
- East Gippsland Water.

Has a program for future consultation been developed?

☐ NYD ☐ No ☒ Yes If yes, briefly describe.

Kalbar has developed a Preliminary Stakeholder Engagement Plan which provides the strategic framework that underpins the communication and engagement requirements for the project and outlines the specific actions to be taken throughout the development of the project.
The plan outlines the methods and materials to be used during the engagement process and will remain a working document that will continue to be updated as the project progresses. Once dates and activities are confirmed, a formal schedule of activities with accountabilities will be developed and incorporated into the plan to facilitate the appropriate dissemination of information and provide stakeholders with the opportunity to communicate concerns.

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Authorised person for proponent:

I, Robert Bishop (full name),

Chairman (position), confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature _____

Date 31 October 2016

Person who prepared this referral:

I, _____ (full name),

Senior Principal (position), confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature _____

Date 31 October 2016