ENVIRONMENTAL RISK ASSESSMENT AND MITIGATION MEASURES

The following section provides recommendation for mitigation measures in response to potential impacts identified in **Section 6** of the EIS. The structure of mitigation measures is based on the DPIE's hierarchy of approaches for managing impacts identified in the *Draft Environmental Impact Assessment Guidance Series* released by DPE in June 2017, as:

- **Performance based measure** – identify performance criteria that must be complied with to achieve an appropriate environmental outcome but do not specify how the outcome is to be achieved.
- **Prescriptive measure** – require action to be taken or specify something that must not be done.
- **Management based measure** – identify one or more management objectives that must be achieved through the implementation of a management plan.

Following the implementation of appropriate mitigation measures as recommended, it is determined that the proposal will not result in any significant adverse impacts on the surrounding environment. The following table illustrates how the matters raised within the SEARs will be addressed.

This analysis comprises a qualitative assessment consistent with AS/NZS ISO 31000:2009 *Risk Management–Principles and Guidelines* (Standards Australia 2009). The level of risk was assessed by considering the potential impacts of the proposed development prior to application of any mitigation or management measures. In accordance with the SEARs, the Environmental Risk Assessment (ERA) addresses the following significant risk issues:

- The adequacy of baseline data;
- The potential cumulative impacts arising from other developments in the vicinity of the site; and
- Measures to avoid, minimise, offset the predicted impacts where necessary involving the preparation of detailed contingency plans for managing any significant risk to the environment.

Risk comprises the likelihood of an event occurring and the consequences of that event. For the proposal, the following descriptors were adopted for 'likelihood' and 'consequence'.

Likelihood		**Consequence**	
A	Almost certain	1	Widespread and/or irreversible impact
B	Likely	2	Extensive but reversible (within 2 years) impact or irreversible local impact
C	Possible	3	Local, acceptable or reversible impact
D	Unlikely	4	Local, reversible, short term (<3 months) impact
E	Rare	5	Local, reversible, short term (<1 month) impact

The risk levels for likely and potential impacts were derived using the following risk matrix.

		LIKELIHOOD				
		A	**B**	**C**	**D**	**E**
CONSEQUENCE	**1**	High	High	Medium	Low	Very low
	2	High	High	Medium	Low	Very low
	3	Medium	Medium	Medium	Low	Very low
	4	Low	Low	Low	Low	Very low
	5	Very low	Very low	Very low	Very low	Very low

The results of the environmental risk assessment for the proposed development are presented in the below table and are based upon the range of technical and specialist consultant reports appended to the EIS. The table has directly related mitigation measures responding to each impact also based upon the range of technical and specialist consultant reports appended to the EIS.

N.B. 'O' – Operational; 'C' – Construction

'Pe' – Performance based mitigation measure; 'Pr' – Prescriptive based mitigation measure 'Ma' – Management based mitigation measure

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
Design Quality	The impact of poor design on encouraging a functional, safes, accessible and inclusive environment that responds to the surrounding context of the site.	O,C	B	4	Low	- The built form successfully responds to its setting and considering the site constraints, including bushfire, flooding, and ecology. The form and scale of the built form responds to the functionality of the space, operation, and integration with the surrounding use context to present a modern, considered approach to the deliver much needed education facilities in the Catherine Field community - The design responds to the project brief which has been developed through workshops with Minarah College, and in consultation with the local community. The design seeks to balance the needs of the users efficiently and effectively. The design provides a usable and adaptable spaces which accommodate a range of users including the community, school, ELC and SSP. - The proposal facilitates a safe, supportive, challenging, and engaging learning environment. It provides an environment that fosters inquiry, questioning, and experimentation; one that recognises and caters for individual learning styles and encourages students to take responsibility for their learning and their achievements. Material selections, durability and their relationships have been considered as has the detailing and weather implications to ensure the quality of the finished form and its life cycle into the future. - The landscaping approach reflects a well-considered site-specific approach, developed in consultation with the Islamic and Aboriginal community. - Connecting with Country has been a fundamental design principle underpinning the design respond. Tocomwall has provided the following recommendations, which have been included in the design response, yarning circle, reflective materials, curves in design, creek bed design feature, multi-lingual signage, welcome wall, Aboriginal artwork, interactive native garden, Lyrebird design feature and animal architecture. - The detailed design for the proposed school will consider the principles of CPTED and include lighting of entrances, paths, and car parking areas, minimising the number of areas where people could hide, security fencing and territorial reinforcement in the form of distinct and secure fencing and signage - The design has taken on board the design principles identified and produced a building that has resolved the challenges and embraced the opportunities to achieve an elegant coherent outcome. In addition, the design considers the feedback received from the SDRP.	Pe	Low
Built Form and Urban Design	Incompatibility with site context, accessibility and sustainability outcomes.	O, C	B	3	Low	The layout and design have been carefully considered to provide a positive visual outcome and an efficient use of the site.	Pe	Low

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						A simple grid structure ensures economical construction and future adaptability, enlivened by the articulated building forms and generous external shading. Group DLA were engaged to undertake a Building Code of Australia Design Compliance Review. The assessment has found that the proposed development shall accord with the relevant principles and provisions of the Building Code of Australia 2019 Amendment 1 subject to its compliance with any condition of approval and certification of the installation of the nominated fire safety systems.		
Environmental Amenity	Solar Access, Overshadowing, Accessibility and cross-ventilation	O	A	3	Medium	The proposal has been designed to minimise adverse impacts to surrounding neighbours through the consideration solar access and overshadowing. It is determined that the proposed development will have a minimal adverse impact to the neighbouring properties along the southern boundary of the site. However, the overshadowing is concentrated to non-residential uses of the land and thus will not have a detrimental impact to the amenity of the residents. Following the second State Design Review Panel, it was recommended that additional clerestory windows be added into the final design of the proposal to increase natural daylight and cross ventilation. An assessment of this suggestion was undertaken by the ESD consultant E-LAB who discovered the existing window design already exceeded the standard requirements for natural lighting and cross ventilation. Thus, the original design as depicted in the final architectural plans exceeds the standards for cross ventilation. The proposed development has also considered the importance of providing accessible and well-defined circulation areas to support the movement of pedestrians through the site. The circulation areas have been designed to be navigated by people of all abilities improving the inclusivity and functionality of the school. The circulation areas are supported by the adequate provisioning of stairwells and lifts to encourage vertical circulation.	Pe	Low
Visual Impacts	Visual impact of the development to surrounding receivers	O	B	3	Medium	The view analysis considers the proposed to be acceptable in visual impacts terms. No mitigation measures are recommended; however, it is acknowledged the proposed landscaping, privacy screens and tree planting along the setbacks will enhance the site appearance and the streetscape.	Pe	Low
Trees and Landscaping	Tree Removal	C	A	3	Medium	Encroachment within the TPZ should be compensated with a range of mitigation measures to ensure that impacts to the subject tree(s) are reduced or restricted wherever possible, these mitigation measures are listed below. **Minor encroachment (<10%):** - The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. - Detailed root investigations should not be required. - Tree protection must be installed.	Pr	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						Major encroachment (>10%): - The project arborist must demonstrate the tree(s) would remain viable. - Root investigation by non-destructive methods may be required for any trees proposed for retention. - Consideration of relevant factors, including root location and distribution, tree species, condition, site constraints, and design factors. - The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. - The project arborist will be required to supervise any work within the TPZ. - Tree protection must be installed. The planting selection will include the provision of mature trees to assist compensate the loss of trees on-site.		
Ecologically Sustainable Development	Environmental Impact of the proposal	O	B	3	Medium	The following design principles have been included to promote ecologically sustainable development and reduce the proposed developments impact on the environment: - Energy consumption on the site will be minimised through excellent design and performance - Several considerations have been made to use and discharge water responsibly to improve the development's impact on the water cycle - The architectural design of Minarah College has considered the incorporation of elements to improve indoor environmental quality - School Infrastructure has committed to net zero carbon goals by ensuring that all new assets are designed to be net zero carbon emissions	Pe	Low
Traffic and Transport	Construction and Operational traffic.	C, O	B	3	Medium	The Preliminary Traffic Management Plan and a Preliminary Construction Traffic Management Plan recommend the following measures should be undertaken to minimise the impacts of the construction activities of the development: - A construction fence and suitably classed Hoarding shall be provided along site boundaries/works area boundaries to provide safe pedestrian access. The fencing/hoardings should be maintained for the duration of the construction program associated with the stage of works being undertaken. - Traffic control would be required to manage and regulate traffic movements into and out of the site during construction, with pedestrian priority provided during peak hour periods and to maintain access to public transport facilities. - Disruption to road users should be kept to a minimum by scheduling intensive delivery activities outside of road network peak hours.	Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						- Supervised traffic control will be required where two-way flow is restricted over any length of the roadway, depending on the number of truck movements required and would be managed outside of peak hour vehicle and pedestrian activity. - In addition, to reduce the stress on the signalised intersection during operation of the school at Camden Valley Way and Catherine Fields Road, it is proposed that right turns out of the school will be banned and a channelised right-turn bay from Catherine Fields Road into the school will be introduced.		
Biodiversity	Impacts to biodiversity	C	C	D	Low	Narla is satisfied that the proposed development has been appropriately located within areas of lower ecological impact and where possible the development has been positioned to minimise impacts on biodiversity values.	N/A	N/A
Noise and Vibration	Impacts of construction and operational activities to surrounding receivers	C, O	B	3	Medium	Day Design make the following recommendation to minimise the noise and vibration impact of the proposed works. Noise can be effectively managed through engineering and practical control measures such as: - Increasing distance between mechanical plant and sensitive receivers. - The construction of acoustical enclosers around items of mobile plant that may be used for extended periods of time, such as generators. - Choosing low noise options where practical and possible and reducing cumulative noise impacts through the simultaneous use of mechanical plant. - Noise levels may also be reduced through the implementation of Noise Management Controls such as including periods of respite, appropriate work practices, fostering positive community relations and the appropriate management of noise complaints. - Day Design also recommend that noise monitoring and vibration be undertaken throughout the construction period with the outcomes submitted to the relevant authority for review.	Ma	Low
Ground and Water Conditions	Impacts of disturbance of Soil profiles	C	C	3	Medium	- All earthworks shall be carried out in accordance with AS3798 (2007), the Council earthworks specification and will correspond with the site-specific recommendations for site preparation. - Soils and weathered rock should be readily excavated to a maximum depth of 2.0 m using conventional earthmoving equipment. Low strength rock may require a ‘toothed’ bucket or ripping tyne (or similar). - All excavation work should be completed with reference to the most recent version of Code of Practice ‘Excavation Work’ by Safe Work Australia. - Batter slopes of 1V:2H should be adopted for temporary slopes (unsupported for less than 1 month) and 1V:3H for longer term unsupported slopes, subject to inspection and approval by a qualified and experienced geotechnical engineer on site. Excavation in soil / weathered rock, exceeding 1.0 m depth must be	Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						temporarily and permanently battered back / supported / retained to maintain slope stability - Retaining structures should consider additional surcharge loading from live loads, new structures, construction equipment, compacted backfill compaction and static water pressures unless drainage such as subsoil drains, weepholes or horizontal drains is provided behind retaining walls. - The re-use of site soils is not considered suitable for fill replacement unless the material is mixed with lime / gypsum and tested by an experienced geotechnical engineer. - In order to minimise shrink-swell movement due to soil moisture changes, Martens Engineering Consultants recommend undertaking lime / gypsum stabilisation of the top 0.5 m of residual soil within the footprint of buildings and structures. - Appropriate surface and sub-surface drainage should be provided to divert overland flows and limit ponding of water near footings and foundations. - Appropriate soil erosion control methods in accordance with Landcom (2004) will be implemented - All footings should be founded on at least the stiff to very stiff residual clay or engineered fill or bedrock. - Footings should be founded on consistent material to limit the potential of long term differential settlement. - Pile foundations such as bored cast in situ piles may be adopted where greater structural loads are required to be supported. - The design parameters assume the base of excavation of exposed shallow footing and base of bored piles / piers are free of loose / soft soils or debris and reasonably dry prior to placement of concrete and approved following inspection by an experienced and qualified geotechnical engineer		
Wastewater	Impact to the sites effluent land capability	C	B	3	Medium	Prior to the construction of a site sewage management system, an approval under section 68A of the Local Government Act (1993) will be required where final design specifications for the effluent treatment and reuse systems shall be submitted for approval to Council. Prior to occupation of the school a section 68 approval to operate the system must be obtained.	Ma	Low
Flooding Risk	Risk of flooding on the subject site	C, O	C	3	Medium	- Structures below the site flood planning level are to be constructed using flood compatible materials in accordance with Council requirements. - An updated TUFLOW hydraulic model with detailed earthworks and should be simulated at detailed design stage.	Ma	Very Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
Hazards and Risks	The impact of the presence of hazardous materials on the subject site.	C	B	3	Medium	EI Australia makes the following recommendations to mitigate the risk posed by dealing with hazardous materials: **Asbestos:** Asbestos materials should be removed prior to the commencement of any demolition works that may cause their disturbance. The removal of these materials is to be done in accordance with the NSW Work Health and Safety Act and Regulations 2017 and the following SafeWork NSW approved codes of practice: - SafeWork NSW (2019) How to Manage and Control Asbestos in the Workplace; and - SafeWork NSW (2019) How to safely Remove Asbestos Where asbestos is to be removed, the licensed asbestos removal contractor should prepare and asbestos removal control plan prior to undertaking any removal works which should include the minimum requirements for asbestos removal presented in the HMS. **Lead Paint:** Site structures containing lead paint should be managed in accordance with the procedures detailed in: - Australian Standard AS 4361.2-2017 Guide to Lead Paint Management, Part 2: Lead Paint in Residential, Public and Commercial Buildings; - NOHSC (1994a) National Standard for the Control of Inorganic Lead at Work; and - NOHSC (1994b) National Code of Practice for the Control and Safe Use of Inorganic Lead at Work. The HMS also makes important recommendations that should be implemented as a minimum when working with lead paint. A notification of lead work form must be submitted to SafeWork NSW at least seven days before lead work begins. **Synthetic Mineral Fibres** The following guidance documents should be consulted for guidance regarding the removal and disposal of SMF: - National Standard for the Safe Use of Synthetic Mineral Fibres - National Code of Practice for the Safe Use of Synthetic Mineral Fibres; and - Code of Practice for the Safe Use of Synthetic Mineral Fibres - Polychlorinated Biphenyl Capacitators All metal-cased capacitors should be assumed as contained PCBs. EI Australia has made important recommendations that must be implemented when removing/handling PCB containing capacitors, this is detailed in the HMS.	Ma	Very Low

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Contamination and Remediation	Risk of site contamination	C	D	3	Low	Based on the Preliminary Site Investigation and the Detailed Site Investigation the site is considered environmentally suitable for the proposed site subject to the following: - The assessment of soils in the footprints of existing site features should be undertaken after complete demolition and/ or removal by a licensed contractor. - The small stockpile of ash located on site must be removed. - Sampling and testing will be required to determine the contamination status of soils in the footprints of site features and in the vicinity. - In the event of contamination the site can be made suitable by detailed assessment followed by remediation and validation. - A hazardous material survey should be carried out for the presence of asbestos and possibly lead paints, prior to the demolition of existing building features on the site. - Additional sampling should be undertaken at the location of the elevated zinc levels to determine the extent of Zinc contamination. This should be carried out in conjunction with the assessment of the footprints of the existing features after their complete demolition and removal. - A remedial action plan for the remediation of asbestos Zn impacted soils, plus any other contamination identified through the detailed, additional sampling and testing should be prepared. - The dame water should be assessed prior to de-watering to determine the contamination status of the water and recommend the de-watering method. On completion of de-watering a contamination assessment should be carried out.	Ma	Low
Waste Management	Impact of waste to the environment	O	C	4	Low	The school will implement systems for monitoring, measurement and reporting of operational waste management performance. Annual performance and contract reviews will be conducted with facilities management, waste contractor and cleaning manager to assess progress towards annual waste diversion targets and other KPIs, identify operational issues, and address any shortcomings. Waste audits will also be conducted annually to benchmark performance. The school's facilities management team will have responsibility for reviewing the WMP annually, ensuring that its objectives are met, and making adjustments where required to ensure continued accuracy and relevance to operational conditions. If the above systems are implemented throughout the construction and operational phases, waste will be minimised as far as reasonably possible.	Ma	Very Low
Aboriginal and Historical Heritage	Impacts of the development on any soil profiles with the potential to contain Aboriginal archaeological deposits and objects.	C	D	3	Medium	Tocomwall suggest the following recommendations to mitigate the potential impacts the proposal will have to the subject site. - Further investigation should be undertaken in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010, Guide to investigating, assessing and reporting on Aboriginal cultural	Ma	Very Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						heritage in NSW 2011, and the Aboriginal cultural heritage consultation requirements for proponents 2010. - A test sampling program should be implemented in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010, to determine the presence of Aboriginal objects, characterise the site, and determine if there is a need to apply for an Aboriginal Heritage Impact Permit Implementation of these recommendations will significantly decrease the likelihood of significant impact to the Aboriginal and cultural heritage of the site.		
Social Impact	Potential positive and negative social impacts of the development.	C, O	B	3	Medium	Negative short-term impacts that may be generated are likely to arise with the construction and fit out of the school buildings over the staged construction of the College, should the application be approved. Any potentially negative impacts associated with construction can be mitigated through conditions of development consent. School contact details are to be made available on the Minarah College website to provide a platform for neighbours or members of the wider community to raise any issues or concerns about the operation of the school with the College Executive. The potential positive social impacts generated by the proposed school will only be realised if the development is approved.	Ma	Very Low
Infrastructure Requirements and Utilities	Impact to the development process.	C	B	3	Medium	**Hydraulic Services** - A Section 73 and Notice of Requirements will be a requirement of the SSFA checklist - As part of Stage 1 works a new authority water meter and potable cold-water pump-set able to accommodate design flows for future stages will be provided. - Currently there is no natural gas infrastructure available for the site. JHA have proposed on-site LPG gas storage. LPG (Liquid Petroleum Gas) is stored in vessels in liquid form. Utilising Educational Facilities Standards & Guidelines (ESFG) requirements as a guide only, the on-site storage tank shall be no less than 7.5kL and not be accessible by students **Electrical and Telecommunication Infrastructure** - A maximum electrical demand has been completed for the new proposed works on the site. The total expected maximum demand is 2360 A/phase. - To facilitate the proposed staging of the College, two substations; each being a rating of 1000kVA are to be installed during: • Stage 1 early works to the south • Future Stage works to the north.	Ma	Low

SEARS	Potential Impact	Stage of Project	Likelihood	Consequence	Risk Level	Approach	Mitigation Measure (Pe/Pr/Ma)	Residual Impact
						- Both substations are proposed to be located within the development site abutting the lot boundary facing Catherine Fields Road. JHA has already submitted an application to Endeavour Energy for the Stage 1 early works substation and have attached the received Endeavour Energy Supply Offer for reference. JHA has Accredited Level 3 ASP designers that will be carrying out the design works in co-ordination with Endeavour Energy for this project. - To provide suitable electrical supply connections to the new development, it is proposed the existing Endeavour Energy high voltage overhead network located along the western side of Catherine Fields Road will be utilised to connect the new Endeavour Energy padmount substations proposed along the Catherine Fields Road frontage. This arrangement is subject to suitable spare capacity in the existing High Voltage feeders and Endeavour Energy design acceptance. - An application to NBN is being made to install a lead-in cable to provide telecommunications services to the campus. A separate application for a Telstra fibre connection to the site is being made to allow contingency with two carriers to reduce the chance both connections are lost at one given time.		
Bushfire Risk	The impact of bushfire risk to the proposed development	O	C	3	Medium	**Bushfire Emergency Management Plan** A Bushfire Emergency Management Plan is intended to provide suitable emergency and evacuation arrangements for occupants of SFPP developments. It is recommended that a Bushfire Emergency/ Evacuation Management Plan is to be prepared and updated in accordance with the NSW Rural Fire Service Guidelines for the Preparation of Emergency/ Evacuation Plan. **Asset Protection Zones** It is recommended that all grounds not built upon within the subject site are maintained as Inner Protection Area's, as detailed in the NSW Rural Fire Service's document 'standards for Asset Protection Zones' and Appendix 4 of Planning for Bush Fire Protection 2019. **Construction** That all proposed buildings, excluding the Staff & Admin, Primary Hall, Kindergarten, Year 1 and Year 2 buildings, shall comply with section 5 (BAL 12.5) Australian Standard AS3959-2018 "Construction of buildings in bush fire-prone areas" and section 7.5 of "Planning for Bush Fire Protection" 2019. **Services** All new internal hydrants, electricity services and gas services are to comply with the requirements of Planning for Bushfire Protection 2019. **Access** The access roads are to be constructed in accordance with the Pre-DA advice given by RFS. The proposed service trail to the rear of the subject site is to comply with the	Ma & Pr	Very Low

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						relevant requirements for a Category 1 Fire Trail as described in the NSW RFS publication ‘NSW RFS Fire Trail Standards’ and ‘NSW Rural Fire Service Fire Trail Design Construction and Maintenance Manual’ and the proposed internal roads shall comply with the Access requirements as detailed in Table 6.8b of PBP,		