PEREGRINE
CORPORATION

270 THE PARADE, KENSINGTON
PEREGRINE CORPORATION HELICOPTER LANDING FACILITY
PUBLIC ENVIRONMENT REPORT

270 The Parade, Kensington Park, South Australia 5068 P.O. Box 322, Kensington Park, South Australia 5068
Tel: 08 8333 9777 Fax: 08 8333 9788 E: email@perecorp.com.au

Document Information

Prepared by: Tim Beazley	Planning Consultant	Date: 21.03.19
Reviewed by: Peter Vickery	Senior Project Manager	Date: 21.03.19
Approved by: Peter Vickery	Senior Project Manager	Date: 22.03.19

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1. Executive Summary

Peregrine Corporation is a respected and successful South Australian business. Peregrine is South Australia's largest private company by revenue and also one of the biggest investors in the South Australian economy.

Peregrine Corporation is based at 270 The Parade, Norwood. This has been the headquarters of Peregrine Corporation for more than 10 years. There is currently 249 staff members located at the head office. Peregrine Corporation has grown significantly in recent years to the extent that the existing head office is no longer suited to the needs of the business, the needs of its staff or its numerous visitors.

As a consequence, Peregrine sought to redevelop the site with a new head office. The proposed development was declared by the Minister in November 2015 to be a Major Development of State Economic Significance.

On 16 May 2017 notice of the Governor's decision to grant development authorisation under section 48 of the Development Act 1993, in respect of a proposal to establish and operate a mixed-use development at 270 The Parade, Kensington by Peregrine Corporation, was published in the South Australian Government Gazette at p 1205. A subsequent variation application was submitted in November 2017 (final plans dated 14 February 2018) and approved by the Chief Development Officer as sub-delegate of the Minister for Planning as delegate of the Governor and gazetted on 3 May 2018.

The approved and subsequently varied development consists of a multistorey mixed-use development which will serve as the national headquarters for the Peregrine Corporation. The approved building consists of office space with ground level retail/café spaces and lobby, meeting rooms, training areas, gymnasium, swimming pool, short-stay accommodation suites, car parking, storage and associated landscaping.

Peregrine Corporation now proposes to utilise the roof top as a landing area for helicopters in association with the approved use of the building as an office. The variation proposal comprises one (1) aluminium prefabricated helipad and an adjacent concrete slab to be constructed on the roof of the headquarters building. No changes to the approved development are required and all helicopter movements are to be associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken. Helicopter activity will operate on no more than 10 days per year and only during daylight hours. The concrete slab will be used as an informal / temporary landing site for helicopters in the event of emergency.

Having regard to the provisions of the Norwood, Payneham & St Peters Development Plan, and noting the overall economic significance of the proposed development, it was considered that a planning assessment process that enables consideration of the project in the context of its wider economic, social and environmental benefits was warranted.

On 27 September 2018, the Honourable Stephan Knoll the Minister for Planning, by notice in *The South Australia Government Gazette* varied the Major Development Declaration by inserting within Schedule 1 reference to a 'helicopter landing facility'. Enabling the proposed helicopter landing facility to be assessed as a Major Development pursuant to Section 45 of the Development Act 1993 (the Act).

A key requirement of the Major Development process is the preparation of a Public Environmental Report (PER). Guidelines for the preparation for the PER were prepared by the

State Planning Commission (Commission) in December 2018. The Guidelines are included in **Appendix A**.

This PER has been prepared in accordance with the Guidelines. It contains all of the information sought by the Guidelines, including full details of the proposal, together with specialist technical reports, which are appended.

The PER includes an assessment of the proposal, having regard to the issues and impacts identified by the Commission. The PER identifies that all issues have been considered, with the proposal representing a project which has effectively responded to the opportunities and constraints relevant to the subject land and locality.

A draft PER was prepared by Peregrine Corporation and lodged with the Department of Planning Transport and Infrastructure (DPTI) on 22 March 2019. The draft PER underwent an adequacy check against the assessment guidelines, during which preliminary comments were sought from the referral agencies including DPTI Transport, DPTI Planning, the EPA, ODASA and DEW State Heritage. Comments from each referral agency were summarised and collated by DPTI and presented to Peregrine Corporation on 17 May 2019.

Peregrine Corporation and its consultant team reviewed the agency comments and subsequently an amended PER was submitted to DPTI on 7 June 2019. The updated PER included a separate applicant response document (dated 7 June 2019) contained within **Appendix L**.

DPTI staff confirmed the updated PER satisfactory addressed agency comments provided by DPTI Transport, DPTI Planning, ODASA and DEW State Heritage. However, the EPA indicated further noise monitoring and acoustic modelling would be required for the EPA to adequately assess the potential for noise impact on the locality. Following a series of meetings with the EPA on 19 July 2019 and 20 August 2019, Peregrine Corporation volunteered to supply that additional information and take measurements from additional locations for the purposes of assisting them. The additional information was provided to the EPA on 1 October 2019 in a supplementary Sonus report dated 30 September 2019. The additional acoustic material is included in **Appendix M**.

DPTI confirmed the EPA reviewed the additional information and indicated its support for the PER being realised for public consultation on 30 October 2019.

2. Introduction

2.1 Background, Objectives and Need for the Proposal

2.1.1 Background

Peregrine Corporation is a respected and successful South Australian business. Peregrine Corporation is South Australia's largest private company by revenue and also one of the biggest investors in the South Australian economy. It has a proven track record in retail and the building and construction industry.

Peregrine is based at 270 The Parade, Kensington. This has been the head office of Peregrine Corporation for more than 10 years. There are currently 249 staff members located at the head office. Peregrine Corporation has grown significantly in recent years to the extent that the existing head office is no longer suited to the needs of the business, the needs of its staff or its numerous visitors.

As a consequence, Peregrine sought to redevelop the site with a new head office. The proposed development was declared by the Minister in November 2015 to be a Major Development of State Economic Significance. The Development was approved by the Chief Development Officer as sub-delegate of the Minister for Planning as delegate of the Governor and gazetted on 3 May 2018.

Peregrine corporation are now seeking approval for a helicopter landing facility to be established on the roof top of the yet to be constructed Peregrine headquarters building.

2.1.2 Objectives and Need for the Proposal

Peregrine Corporation proposes to establish a helicopter landing facility on the roof top of its yet to be constructed headquarters building.

The redevelopment of the headquarters site is primarily designed to meet Peregrine Corporation's growing demand for quality office space and to provide its staff with improved work facilities and amenity. The construction of a landmark mixed use development will assist in consolidating its long term headquarters in South Australia.

The helicopter landing facility is seen as an integral component of the overall redevelopment of the site and will greatly assist Peregrine in the conduct of its business operations. The need for quick, accessible transport is paramount to ensuring a pleasurable experience for overseas and interstate business guests. Helicopters will transport interstate and overseas guests to key Peregrine sites of state importance including the Peregrine headquarters and the Tailem Bend Motorsport Park Complex. The flow on effect of this service is expected to be beneficial to the South Australian economy.

2.2 Applicant Details

Peregrine Corporation is South Australia's largest private company by revenue and also one of the biggest investors in the South Australian economy.

As at March 2019, Peregrine currently employ approximately 4000 staff members across its business, the vast majority within South Australia.

The helicopter landing facility is required to assist Peregrine in the efficient conduct of its business operations from its (to be constructed) headquarters redevelopment and the Tailem Bend Motorsport Park Complex.

2.3 Staging and Timing

Detailed design work of the previously approved Peregrine headquarters redevelopment is currently underway and could be completed by end-2019. On this basis demolition and construction is expected to commence early to mid-2020, for completion by late-2021.

Peregrine Corporation are seeking separate Construction Staging for Building Rules Consent to allow the headquarters redevelopment to be constructed in accordance with the following stages:

- Stage 1: Demolition and Substructure
- Stage 2: Superstructure
- Stage 3: Architectural and Fitout

Should planning approval be obtained for the proposed helicopter landing facility, the aluminium prefabricated helipad, the adjacent concrete slab and any other required infrastructure will be established as soon as the building superstructure is complete, effectively at the conclusion of Stage 2 of the broader headquarters redevelopment.

2.4 Procedural Matters

2.4.1 Major Development Process

Section 46 of the Act ensures that matters affecting the environment, the community or the economy to a significant extent, are fully examined and taken into account in the assessment of this proposal.

The major development process has six steps:

- The State Planning Commission sets the level of assessment (Public Environmental Report) and provides guidelines;
- Proponent prepares a Public Environmental Report (**this stage**);
- Public and agency consultation on the Assessment Document for a period of six weeks (Public Environmental Report);
- Proponent responds to public comment on the Public Environmental Report;

- Assessment of the proposal by the Minister or delegate and releasing the Assessment Report; and

- Decision by the Governor or delegate

2.4.2 Preparation of Public Environmental Report (PER)

As required by Section 46C of the Development Act 1993, The PER must:

The PER must be prepared in accordance with guidelines determined by the Development Assessment Commission (State Planning Commission) under this Subdivision.

- *Include a statement of –*

  (a) The expected environmental, social and economic effects of the development;
  (b) The extent to which the expected effects of the development are consistent with the provisions of –
    (i) Any relevant Development Plan; and
    (ii) The Planning Strategy; and
    (iii) Any matters prescribed by the regulations;
  (c) The proponent's commitments to meet conditions (if any) that should be observed in order to avoid, mitigate or satisfactorily manage and control any potentially adverse effects of the development on the environment;
  (d) Other particulars in relation to the development required –
    (i) By the regulations; or
    (ii) By the Minister.

In respect to this proposal, the Guidelines prepared by the State Planning Commission (Commission) are included as **Appendix A.**

The proposed development does not involve a prescribed activity of environmental significance as defined by the *Environmental Protection Act 1993.*

2.4.3 Referrals

The PER will need to be referred to Norwood Payneham and St Peters Council and any other prescribed body.

2.4.4 Public Consultation

With respect to public consultation, it is noted that the minister:

(b) Must ensure that copies of the PER are available for public inspection and purchase (during normal office hours) for at least 30 business days at a place or places determined by the Minister and, by public advertisement, give notice of the availability of copies of the PER and invite interested persons to make written submissions to the Minister on the PER within the time determined by the Minister for the purposes of this paragraph.

2.4.5 Minister's Response and Decision

Following the applicant's response to the submissions, the Minister will prepare an Assessment Report.

The Governor makes the final decision under Section 48 of the Act.

3. Subject Site and Locality

3.1 Subject Site and Locality

The subject land is located wholly within the city block between The Parade, Portrush Road, High Street and Bowen Street, Kensington Park. It has a total area of approximately 6,014m^2 and is located within the Business Zone of the Norwood, Payneham and St Peters Development Plan, consolidated 19 December 2017.

The subject land is currently used for office space, warehousing and associated car parking. The subject land has served as Peregrine Corporation's head office for over a decade.

The subject land comprises 7 allotments and Certificates of Title (refer **Appendix B**):

- Certificate of Title Volume 5933 Folio 307;
- Certificate of Title Volume 5933 Folio 308;
- Certificate of Title Volume 5271 Folio 714;
- Certificate of Title Volume 5265 Folio 136;
- Certificate of Title Volume 5272 Folio 818;
- Certificate of Title Volume 5272 Folio 819; and
- Certificate of Title Volume 5134 Folio 144;

The subject land is relatively flat, contains existing buildings which will be demolished as part of the previous approval outlined above and contains no vegetation of note.

The locality is characterised by a mixture of commercial, places of worship and residential land uses, with a strong heritage context (refer **Figure 3.1**).

The subject site abuts a residential zone at its rear (south east) along Bowen Street where the dwellings are predominantly two-storey townhouse style. Two dwellings located at 6 and 8 Bowen Street are Contributory heritage items, constructed in 1875 and 1880 respectively.

To the south of the subject site is Mary MacKillop Tappeiner Court Nursing Home at 286 Portrush Road (backing onto High Street). This site caters for the elderly and is a two-storey building.

To the north west and south west of the subject site are various commercial land uses fronting onto the Parade.

The locality comprises numerous State, Local and Contributory heritage places. To the north of the subject site is the State Heritage listed Clayton Wesley Uniting church complex which comprises the church, chapel, Hope Hall & Clayton Institute.

The State Heritage Places in direct proximity to the subject site are listed below and shown in Figure 1 (below).

- Corner Portrush Road and High Street: Benson Memorial Drinking Fountain (cnr Portrush & High St);
- 258-262 The Parade: two-storey shops & upstairs dwelling (5150/35);
- 239 The Parade: former Norwood Wesleyan Methodist Church (5887/798); and
- 278 Portrush Road: Clayton Wesley Uniting (former congregational) church complex – church, chapel, Hope Hall & Clayton Institute) – City of Burnside.

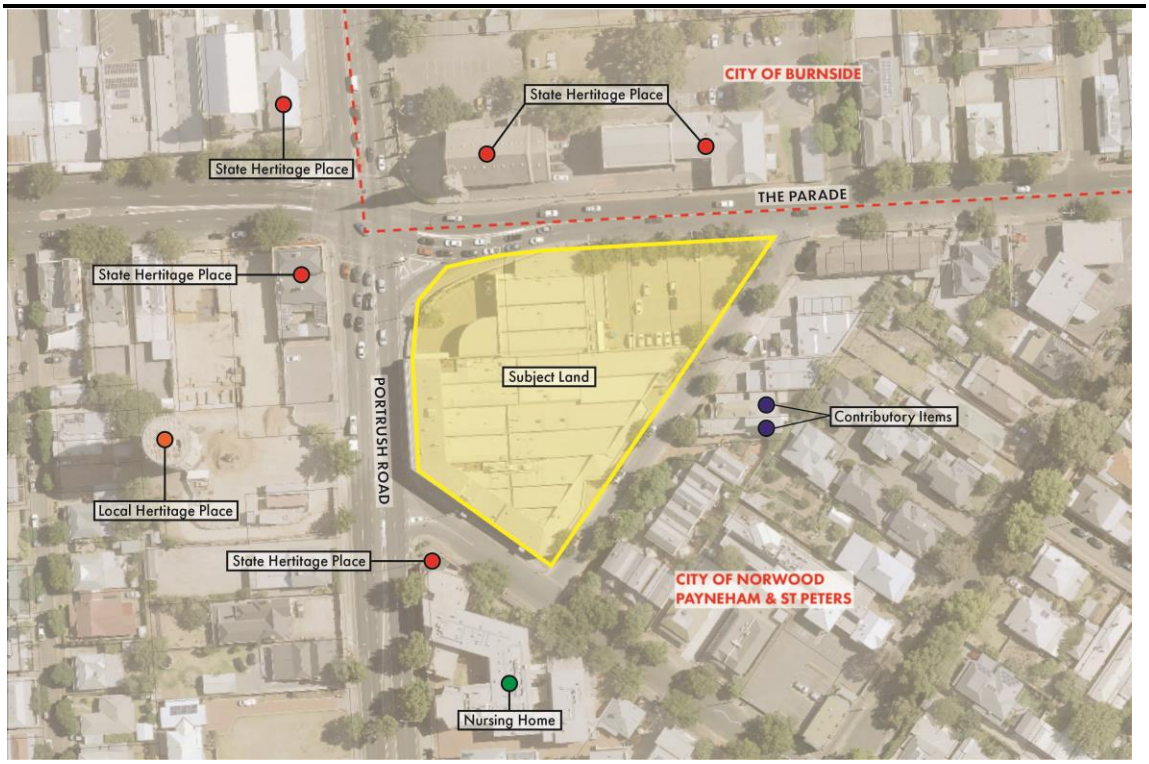


Figure 3.1: Subject land and locality (base: Property Location Browser 2019)

The Parade, east of the intersection of Portrush Road, forms the boundary between the City of Norwood, Payneham and St Peters and the City of Burnside.

3.2 Zoning

The subject land is located within the Business Zone as identified on Zone Map NPSP/10 of the Norwood, Payneham and St. Peters Development Plan (Consolidated 19 December 2017).

The subject land is also located within Kensington Policy Area 6.7 as identified on Policy Areas Map NPSP/16.

The subject land is influenced by a range of factors, these influences include:

- The Parade (east of Portrush Road) forms the boundary between the City of Norwood, Payneham and St Peters and the City of Burnside;
- The Parade (east of Portrush Road) forms the boundary between the Business Zone and the Local Business Zone;
- Bowen Street forms the boundary between the Business Zone and the Residential Historic (Conservation) Zone – Kensington 1 Policy 12.8 and also Mixed Use Historic (Conservation) Zone – Kensington Policy Area 11.3;
- High Street forms the boundary between the Business Zone and the Residential Historic (Conservation) Zone – Kensington 2 Policy Area 12.9;
- Portrush Road forms the boundary between the Business Zone and the District Centre (Norwood) Zone – The Parade East Policy Area 2.2;

- The Mixed Use B Zone is located adjacent the subject land, on the western side of Portrush Road – Portrush Road Policy Area 8.3;

- Six State Heritage Places are located less than 200 metres from the subject land; and

- Two Contributory items located on the eastern side of Bowen Street.

4. The Proposal

4.1 Overview

Peregrine Corporation wishes to utilise the roof top as a landing area for helicopters in association with the approved use of the building as an office. No changes to the approved development are required and all helicopter movements are to be associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken.

4.2 Key Features

The proposal will include one (1) prefabricated helipad of modular aluminium construction to be delivered and assembled on site. The helipad will be a polygon shape with a diameter of 19.6 metres, a safety net with a width of 1.5 metres and a depth of 1.07 metres (excluding steel transition height).

A second concrete helipad will be constructed to be available as an informal/temporary landing site for helicopters in the event of an emergency only. The concrete helipad will have a 'Prohibited Landing Marker' placed in the centre at all times (except for an emergency situation), to avoid confusion with the functional helipad.

Details of the proposed Helicopter Landing Facility are included on application plans prepared by MPH Architects and in correspondence prepared by Flight Safety. The plans and Flight Safety correspondence are included in **Appendix C and D** respectively.

4.3 Frequency of Flights and Types of Helicopters Used

The use of the roof top for helicopter landings is intended for occasional use only. Helicopter activity will operate on no more than 10 days per year and only during daylight periods. Given the limited number of operative days, the non-commercial nature of the flights and limitation to daylight hours it is our understanding that the use does not trigger a requirement for any approval or licencing from the EPA, CASA (Civil Aviation Safety Authority) or any other regulatory body. Where possible, 24 hours notice will be provided before an operational day and a register of operational days will be kept to ensure the 10 days per year are not exceeded.

No helicopters or fuel will be stored on site nor will any on-site servicing occur. The helicopters will be ordered from the airport on an as needs basis. Only three (3) types of helicopters are proposed to be used. These include;

- BELL 206 – one pilot, 4 passengers;
- EC 130 – one pilot, 6 passengers; and
- AW109/H109 – 1 or 2 pilots, 6 – 7 passengers.

Further details of the proposed helicopters are provided in the correspondence prepared by Flight Safety in **Appendix D**.

4.4 Overview of Regulatory Requirements

All flights will be conducted in Day VFR (Visual Flight Rules) in accordance with CASA and Airservices legislative requirements. There will be a trained HLSO (Helicopter Landing Site Officer) onsite for every take-off and landing. The helipad will be inspected daily and audited annually. The helipad will be designed and approved in accordance with national and international requirements and the fire suppression system will be the most advanced, in keeping with all new hospital helipads in Australia.

A fully developed site-specific Emergency Response Plan will be developed and will form part of the overall Safety Management System. A Safety Manager will be appointed to manage the entire operation, and this will be complemented by an external audit process. An example of the format of an Emergency Response Plan has been included with correspondence prepared by Flight Safety in **Appendix D**.

5. Assessment of Impacts

As required by the Development Act, an assessment of the proposal is required to address the issues identified in the Guidelines provided by the State Planning Commission (Commission).

The issues identified by the Commission are categorised in a critical, medium or standard level of assessment. For the sake of clarity, a response to the Guidelines has been prepared in the same order.

5.1 Critical Assessment (Guidelines 1 & 2)

5.1.1 Aviation Operations Guideline 1

The development proposes a Helicopter Landing Facility on the roof of the building for use not more than 10 calendar days per year and during daylight hours. Given the proximity of the subject site to residential development, educational, communal and public facilities, businesses and major arterial roads, the operation of the Helicopter Landing Facility and associated safety risks should be investigated, with a particular focus on emergency planning and response.

Evaluate the impacts of the Helicopter Landing Facility to the locality, including key risks, and identify required management techniques to mitigate and suitably address those impacts and risks, including but not limited to:

- *Clarification regarding the proposed nature, frequency and timing of use for both the Helicopter Landing Facility and adjacent concrete slab;*
- *Emergency planning and response considerations and parameters, including limitations;*
- *Proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure during take-off and landing;*
- *Proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure en-route to and from the Helicopter Landing Facility;*
- *Safety considerations associated with the provision of any guidance and landing lights on the helicopter landing facility;*
- *Design, safety and operational matters associated with any refuelling facilities;*
- *Alignment and compliance with any State and Commonwealth Aviation regulations, Codes of Practice or Standards and International Civil Aviation Organisation (ICAO) regulations for Aviation;*
- *Safety and navigation considerations given the close proximity of tall built structures including the Water Tower residential apartment building at 275 Portrush Road, Norwood; the Clayton Wesley Uniting Church at 280 Portrush Road, Norwood and the Nuova residential apartments at 254 The Parade, Norwood;*
- *Prevailing meteorological conditions at the subject land and its surrounds; and*
- *Safety and amenity considerations associated with bird strike.*

An Aviation Specialist Advice Report prepared by Mr Colin Weir of Flight Safety Group is included as **Appendix D.** The report considered the impacts of the Helicopter Landing Facility to the locality, including key risks, and provided management techniques to mitigate and suitably address those impacts.

In addition the report provides a specific response under heading to each of the 12 points outlined above. A brief extract of the response to each point is provided below.

Clarification regarding the proposed nature, frequency and timing of use for both the Helicopter Landing Facility and adjacent concrete slab

It is proposed that three different types of helicopters are to be used:

- *BELL 206 (13m 'D' value) – one pilot, 4 passengers;*
- *EC 130 (13m 'D' value) – one pilot, 6 passengers; and*
- *AW109/H109 (13m 'D' value) – one or two pilots, 6-7 passengers.*

Helicopter movements are to be solely associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken. Helicopter activity will operate on no more than 10 days per year and only during daylight hours.

The height of the seven-storey rooftop helipad design will significantly reduce noise levels.

The highest noise levels occur during the hover and take-off phases of flight, and this will occur at low level over the helipad where the maximum shielding effect is available with the extended rooftop area.

The duration of the maximum power settings is applicable to both the pre-landing, hover phase of flight (usually within 45 seconds) and the take-off phase of flight (usually accomplished within 60 seconds).

The lowest noise level is while the helicopter is at idle on the helipad.

Passengers will egress after engine shut-down and this process is normally completed with ten minutes, i.e. 3 minutes to shut-down and 7 minutes to offload.

The start-up and departure will occur in 5 – 10 minutes in accordance with the above noise control parameters.

A second concrete helipad has been designed to be available as an informal/temporary landing site for helicopters in the event of an emergency only. This helipad will meet the aircraft Weight ('t' value) & Size ('D' value) specification requirements. It is acknowledged that this is a generous contribution from a duty of care perspective.

This concrete, secondary helipad will be marked as unserviceable, unless an emergency arises.

Emergency planning and response considerations and parameters, including limitations

The structural design of the helipad will meet all requirements for an elevated helipad; design considerations will include ICAO ANNEX 14 VOL II minimum standards for effective firefighting and operational safety controls.

A fully developed Emergency Response Plan will be developed that is site specific and will form part of the overall Safety Management System. A Safety Manager will be

appointed to manage the entire operation, and this will be complemented by an external audit process.

Proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure during take-off and landing

Fortuitously the proposed Head Office site is strategically situated in an area surrounded by multiple available sites that could be used as emergency laydown areas. As all operations will be conducted during daylight hours only, all these sites become viable options for emergency use. In an emergency landing situation helicopters, unlike fixed wing, only require a small area for an emergency landing.

Proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure en-route to and from the Helicopter Landing Facility

As this is a helicopter Day VFR (Visual Flight Rules) operation only, there are multiple emergency landing sites in the area of operation.

There are multiple rotary and fixed wing flights taking place daily, throughout this area. All aircraft operations taking place in this area fall under the Adelaide Air Traffic Control area and are therefore monitored at all times.

Safety considerations associated with the provision of any guidance and landing lights on the helicopter landing facility

The elevated helipad design is in accordance with modern hospital helipads currently in use in Australia and is therefore compliant in all respects including lighting.

Although this will be for day only operations, the lighting is included to accommodate the possibility of lower visibility operations and to assist the pilot in identification and landing/take-off phases of flight. Even in daylight conditions, the lighting provides valuable visual reference assistance.

Additional identification options such as identification strobe lights or electronic landing aids are not required.

Design, safety and operational matters associated with any refuelling facilities

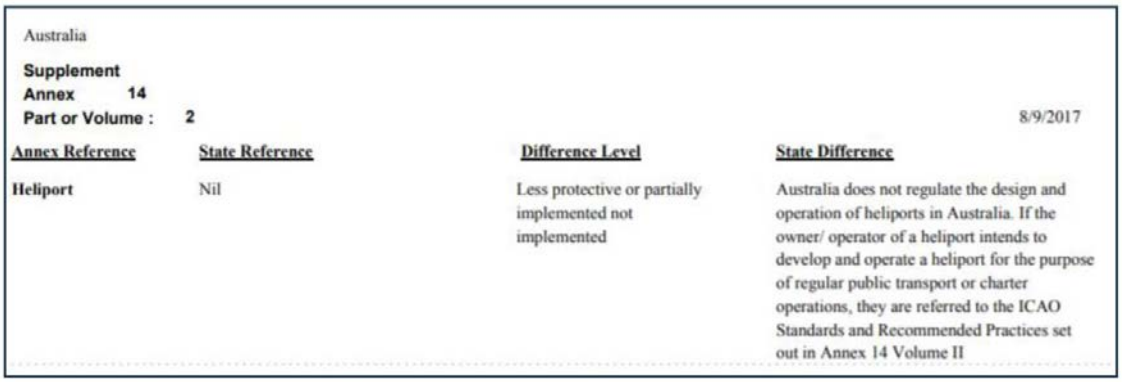
There will be no Helifuel facility available for these Helipads. All refuelling will be carried out at the departure Heliport/Helipad. No Fuel will be stored on-site.

Alignment and compliance with any State and Commonwealth Aviation regulations, Codes of Practice or Standards and International Civil Aviation Organisation (ICAO) regulations for Aviation

The CEO of the Flight Safety Group, Colin Weir, has been a participant in the CASA (Civil Aviation Safety Authority) Working Group involved with the upgrade of legislation to include offshore helidecks and onshore helipads, both surface level and elevated.

Although the Civil Aviation Safety Authority does not regulate offshore helidecks, onshore surface level and elevated helipads/heliports, the delegated responsibility is quite explicit and documented as an ICAO SARP (Standards and Recommended

Practices), through a lodged difference with ICAO, regulatory AIP reference and extracts below:



Australia

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Annex Reference	State Reference	Difference Level	State Difference
Heliport	Nil	Less protective or partially implemented not implemented	Australia does not regulate the design and operation of heliports in Australia. If the owner/ operator of a heliport intends to develop and operate a heliport for the purpose of regular public transport or charter operations, they are referred to the ICAO Standards and Recommended Practices set out in Annex 14 Volume II

Figure 5.1: Excerpt from Aviation Specialist Advice Report prepared by Flight Safety Group

In the final analysis, CASA through the SARP submission process, has delegated this regulatory requirement to the ***heliport owner/operator*** *and if they intend developing and operating the heliport/helipad for* ***regular public transport*** *or* ***charter operations*** *then they are referred to the ICAO Standards and Recommended Practices set out in* ***ANNEX 14 VOL II****.*

Although the proposed operation at 270 The Parade, Kensington, Adelaide will fall into the Private Category, it is proposed that it will be set up in accordance with ANNEX 14 VOL II, to a Commercial level ensuring that maximum safety levels have been achieved.

Safety and navigation considerations given the close proximity of tall built structures including the Water Tower residential apartment building at 275 Portrush Road, Norwood, the Clayton Wesley Uniting Church at 280 Portrush Road, Norwood and the Nuova residential apartments at 254 The Parade, Norwood

All approach and departure design profiles will meet the minimum requirements as described in the ANNEX 14 VOL II.

In addition, these profiles will be designed to provide maximum clearance from the structures mentioned. As can be seen in the Elevation Drawings (included with the report)*, the Clayton Wesley Uniting Church at 280 Portrush Road, Norwood is not an obstruction to any approach path, however the profiles will be designed to avoid any sensitive areas.*

In the final analysis all three of these identified sites are easily manageable from a Safety and Flight Navigation consideration, as the FATO approaches can be adjusted to accommodate their proximity to the helipads.

Prevailing meteorological conditions at the subject land and its surrounds

Prevailing average winds are NE/SW – the helipad FATO approaches will be aligned accordingly.

Safety and amenity considerations associated with bird strike

Bird strikes in helicopters are a rare event and controllable to a degree, due to slower forward speeds and increased visibility compared to fixed wing aircraft. High intensity, pulsating white LED lights can be fitted if required.

The Aviation Specialist Advice Report concludes that there should be no restriction to the approval for this application form an aviation regulatory or safety perspective and that there should also be no restrictions from an HLS safety, design or positioning perspective.

5.1.2 Neighbourhood Interface Guideline 2

The subject site is adjacent a Residential Historic (Conservation) Zone and a Mixed Use Historic (Conservation Zone) at its Bowen Street and High Street interface. It is also located in amongst and proximate to residential development, educational, communal and public facilities. It should therefore be demonstrated how the interface impacts of the development on these neighbouring environs will be managed.

Evaluate the impacts of the proposal on the locality, taking into account its approved bulk, scale and interface relationship to neighbouring residential development, nursing home facilities, educational, communal and other public facilities including, but not limited to:

- *An assessment of the impacts of vibration on nearby sensitive land uses;*
- *An assessment of the impacts of noise on nearby sensitive land uses against the provisions of the Environment Protection (Noise) Policy 2007;*
- *An assessment of the impacts of air pollution on nearby sensitive land uses against the provisions of the Environment Protection (Air Quality) Policy 2016;*
- *Adequacy of clearance distances from sensitive land uses in the event of a catastrophic engine failure or catastrophic landing;*
- *The impacts of rotor blade downwash and rotor wake on building cladding;*
- *Environmental impacts, particularly with regard to air quality and noise, on wildlife and domestic animals in the locality associated with helicopter approaches, landings, take offs and climbs;*
- *Amenity considerations associated with the provision of any guidance and landing lights on the helicopter landing facility;*
- *The potential for overlooking into nearby sensitive land uses from users of the Helicopter Landing Facility; and*
- *The visual impact from the addition of the Helicopter Landing Facility, adjacent concrete slab and associated structures from nearby sensitive land uses and surrounding streetscapes.*

An evaluation of the impacts of the proposal on the locality, taking into account its approved bulk, scale and interface relationship to neighbouring residential development, nursing home facilities, educational, communal and other public facilities has required specific input from a number of specialist consultants particularly given the broad range of issues raised in the 9 points listed above. Each consultant has addressed, by report, the issues relevant to their field of expertise. A summary has been provided below.

Noise and Vibration

A Helicopter Noise Assessment Report prepared by Sonus, is included as **Appendix E.** The assessment provides a response to the noise and vibration aspects of the Guidelines, considers

measures to minimise the noise associated with helicopter movements, and provides a comparison of the noise with other noise measured in the environment.

The Sonus response to specific noise and vibration issues raised in Neighbourhood Interface Guideline 2 have been summarised under heading below.

An assessment of the impacts of vibration on nearby sensitive land uses

The contact between a helicopter and a landing pad does not produce significant vibration and therefore helicopters routinely land at hospitals in the vicinity of operating theatres without any impact from the vibration.

For vibration from a helicopter to impact on sensitive land uses in the vicinity of the proposed development, the vibration would need to travel down the proposed building structure and through the ground to residences.

Ground vibration from helicopters at the development will be insignificant. It will not be at a level which could be sensed or measured at residences or other land uses in the vicinity.

An assessment of the impacts of noise on nearby sensitive land uses against the provisions of the Environmental Protection (Noise) Policy 2007

The guidelines suggest that an assessment of noise from the helicopters should be made against the provisions of the Environmental Protection (Noise) Policy 2007 (the Policy) but the Policy specifically excludes aircraft noise in Schedule 1.

Peregrine has obtained legal advice from Botten Levinson Lawyers included as **Appendix F**, confirming that the Policy does not apply and it is understood that the EPA has also obtained informal legal advice, which confirms that the Policy does not apply.

In these circumstances, it is proposed that the approach to the assessment will be to take all reasonable and practicable measures to minimise noise and conduct a comparison of the noise with existing noise measured in the environment. The provisions of the Development Plan and the requirement in the Guidelines to "moderate disturbance" support the requirement to take all reasonable and practicable measures.

Measures to Minimise Noise

The following measures are proposed to be incorporated to minimise noise from helicopter activity to nearby land uses as well as wildlife and domestic animals:

- *The proposed helipad is located near the centre of the roof of a 7 storey building. This location increases the distance to residences but also allows the edge of the building to block line of sight (and therefore reduce noise) between the closest residences and a helicopter on the helipad.*
- *The helipad will not operate outside the hours of 7:00am and 10:00pm. The helipad will be further restricted by only operating during daylight hours.*
- *The flightpaths will be designed to be the maximum practical distance from residences. That is, flightpaths to the south-east will be avoided whenever meteorological conditions allow.*
- *Preference will be given to lower noise helicopters using the site.*

- *Flights will occur on no more than 10 days per year.*
- *The helipad has been situated directly above a plant room.*

Noise into Proposed Building

The following measures will be taken to moderate the noise to occupants of the development.

- *The helipad will be located above a plantroom, which is not sensitive to noise.*
- *During the detailed design, consideration will be given to the construction of the upper ceiling below the roof to ensure that all uses are adequately protected from the noise of the helicopter operating.*
- *Helicopters will only operate during the day, on no more than 10 days per year, minimising any potential noise impact to accommodation areas within the development.*

Predicted Noise and Comparison with Existing Noise

It is proposed that three different types of helicopters are to be used:

- *BELL 206 Jet Ranger;*
- *Eurocopter EC 130; and*
- *Agusta Westland AW109/H109*

To provide an indication of the likely noise from helicopters reference is made to the noise measured from a Bell 206 Jet Ranger and a Eurocopter AS350B2 (an earlier model of the EC130). With these helicopters (or similar) operating at the helipad and the above measures implemented, the maximum noise (L_{Amax}) at the closest residences is predicted to be approximately 87 dB(A) for a short time during flights.

The impact of a noise source on other land uses, as well as wildlife and domestic animals, is often determined by reference to other noise in the environment. To provide context to the predicted helicopter noise, a comparison has been made to the maximum noise levels (L_{Amax}) recorded in Bowen Street adjacent to the closest residences. The figure below shows the maximum noise levels recorded in Bowen Street in a one week period between 27 July and 3 August 2016.

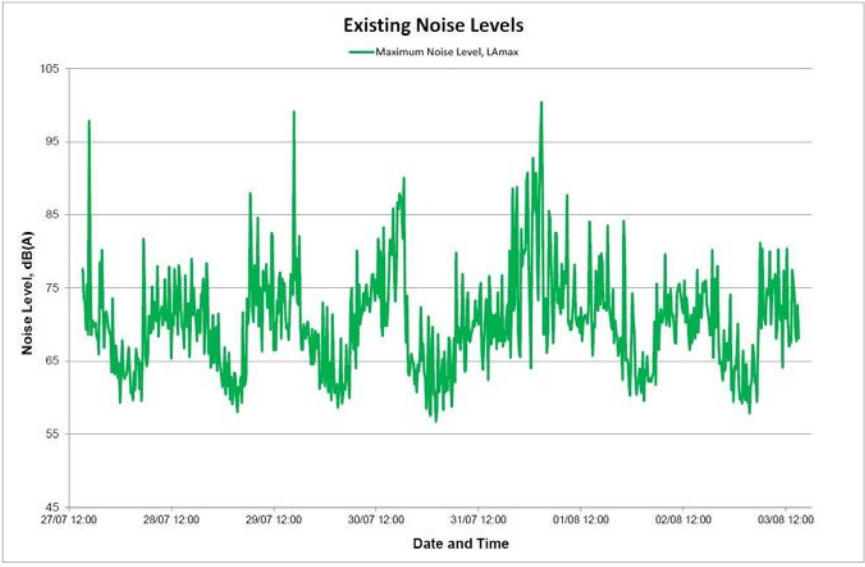

Figure 5.2: Maximum noise levels recorded in Bowen Street (27 July – 3 August 2016)

The figure shows that the predicted maximum levels are regularly exceeded in the existing noise environment.

The assessment provides recommendations for measures to reduce the noise and provides a comparison of the predicted maximum noise with the existing noise in the environment.

With the measures incorporated, the noise on 10 days per year will be less than the noise measured on several occasions in a single week.

As such, it is considered that, with the measures incorporated into the proposal, "all reasonable and practicable measures" have been taken, and the proposal is therefore consistent with the relevant noise related provisions of the Guidelines and the City of Norwood Payneham and St Peters Development Plan.

Environmental impacts, particularly with regard to air quality and noise, on wildlife and domestic animals in the locality associated with helicopter approaches, landings, take offs and climbs

The impact of helicopter noise on wildlife and domestic animals has been considered and addressed by Sonus above and in the Helicopter Noise Assessment in **Appendix E**.

Clearance Distances and Impacts of Rotor Blade Downwash

The adequacy of clearance distances from sensitive land uses in the event of a catastrophic engine failure or catastrophic landing, the impacts of rotor blade downwash and rotor wake on building cladding and the impacts of lighting have been addressed in the Aviation Specialist Advice Report prepared by Flight Safety Group included as **Appendix D**. A summary of the response to each point is provided below.

Adequacy of clearance distances from sensitive land uses in the event of a catastrophic engine failure or catastrophic landing

The helipads have a design value of 19.6 m 'D' and all three helicopter types have 'D' values of 13m. This additional operational safety margin is considered expedient for operations with these three helicopter types and allows additional safety features during the highest risk, take-off and landing phases of flight.

Fortuitously the proposed Head Office site is strategically situated in an area surrounded by multiple available sites that could be used as emergency laydown areas. As all operations will be conducted during daylight hours only, all these sites become viable options for emergency use. In an emergency landing situation helicopters, unlike fixed wing, only require a small area for an emergency landing.

The impacts of rotor blade downwash and rotor wake on building cladding

The calculation of rotor blade downwash and rotor wake on building cladding, has been calculated in accordance with industry mathematical formulae and included in the design parameters.

The following methodology is applicable:

The rotor must produce an upward force, or thrust, equal to the helicopter's weight for the helicopter to hover. Since Force = (Mass) x (acceleration), that upward thrust must come from continually accelerating a stagnant mass of air downwards through the plane of the rotor disk to a final downwash velocity.

This final velocity depends on the weight of the helicopter, the size of the rotor disk area, and the density of the air the helicopter is trying to hover in.

The energy transfer between the rotor and the air must happen at an equal rate. Equating these energy expressions results in the velocity of the downwash at the rotor disk being equal to the square root of: Weight divided by 2 x (Air density) x (Disk Area).

However, this only partially completes the calculation, as this is the speed at the rotor disk. As the column of air is forced down below the rotor, it constricts, much like molasses being poured out of a pitcher. In doing so, it reaches its maximum velocity at 1.5 — 2 rotor diameters below the disc.

Consequently, the final fully developed downwash velocity can be shown to be 2x the above calculated amount.

This calculation has been applied to all proposed helicopter types.

Amenity considerations associated with the provision of any guidance and landing lights on the helicopter landing facility

The elevated helipad design is in accordance with modern hospital helipads currently in use in Australia and is therefore compliant in all respects including lighting.

The proposed helicopter landing facility will only operate during daylight hours on no more than 10 operational days per year.

Lighting is included to accommodate the possibility of lower visibility operations and to assist the pilot in identification and landing/take-off phases of flight. Even in daylight conditions, the lighting provides valuable visual reference assistance.

Additional identification options such as identification strobe lights or electronic landing aids are not required.

The use of lighting will be limited to when the helicopter landing facility is operational and will be switched off when not in use.

Given the height of the building and the limited use of the helicopter landing facility. The proposed lighting is not expected to have any adverse impacts on the amenity of adjoining residential land uses.

Environmental Impacts & Air Quality

A Helipad Air Quality Impact Assessment prepared by Air Quality Professionals is included as **Appendix G.** The assessment evaluates the impacts of air pollution on nearby sensitive land uses against the provisions of the Environmental Protection (Air Quality) Policy 2016.

The Air Quality Professionals response to specific air quality issues raised in Neighbourhood Interface Guideline 2 have been summarised under heading below.

An assessment of the impacts of air pollution on nearby sensitive land uses against the provisions of the Environment Protection (Air Quality) Policy 2016

The Air Quality Professionals report provides a robust assessment of the nature of pollutants discharged to air from the combustion of jet fuel and incudes AERMOD modelling to determine the impact of these pollutants on nearby sensitive land uses.

Schedule 2 of the Environment Protection (Air Quality) Policy 2016 (herein referred to as the "EPP (2016)") provides a list of design groundlevel criteria (DGLC) for a wide range of pollutants against which AERMOD dispersion model results have been compared to determine the potential for significant impacts.

Helipad Air Quality Impact Assessment concluded the following:

> *Modelling results show that even with the extremely conservative assumptions implied in the estimation of pollutant emission rates, the predicted concentrations of pollutants at nearby sensitive receptors are all below the applicable DGLC published in EPP (2016).*
>
> *Conservative factors applied in the modelling methodology and the estimation of emission rates include:*
>
> - *Include 90th percentile of background air quality data;*
> - *Use the 100th percentile of model predictions;*
> - *Assume there is a continuous discharge from the helipad for all hours 7am to 10pm, for every day of the year. This is a necessary but highly conservative assumption due to the small number of helicopter trips anticipated;*
> - *Depending on pollutant and averaging period required, either:*
>   - *Assume the discharge is continuously at the maximum identified for any part of helicopter flight operations, or*
>   - *Assume the discharge rate is continuously at the average hourly rate calculated with 3 helicopters using the helipad per hour*
> - *Assume the helicopter type using the helipad is the largest of the nominated types, with the largest possible engine configuration.*
>
> *It is concluded that the proposed use of the helipad is consistent with EPP (2016) requirements for air quality.*

Overlooking and Visual Impact

An assessment of the potential for overlooking into nearby sensitive land uses and the visual impact from the addition of the Helicopter Landing Facility has been provided by MPH Architects in advice included as **Appendix H**. A summary of the response to each point is provided below.

Address the potential for overlooking into nearby sensitive land users of the Helipad Landing Facility

> *The helipads have operational use restrictions placed on them, the users of this facility will be on the deck for a limited time and this will be to access or exit the helicopter, they will not have time to be overlooking any adjacent properties. As part of the operational procedures, personnel will generally be prevented from accessing the*

helipad, except the Safety Officer during the course of their daily checks. In the event of a flight activity, the Safety Officer will ensure all passengers remain off the helipad until the aircraft has landed and the rotor stopped, after which point passengers will be allowed to either disembark or enter the aircraft as quickly as practical, once all passengers are clear of the deck the Safety Officer will reinstate the referred safety barriers / chains and no further personnel movement on the helipad will take place. There is absolutely no opportunity for passengers to congregate on the helipad itself and only the Safety Officer is allowed on the helipad.

The helipad height is aligned to the highest part of the built form (façade), to meet operational requirements, these are setback from the building façade line, similar to how level 03 is setback from the podium, to restrict the view lines and overlooking of adjacent properties especially to Bowen Street.

It should be noted that the helideck and roof areas are non-occupied space and the concerns raised by the overlooking from the helideck, albeit higher, is no greater to the foreground areas than that of the occupied floor Level 06.

Address the visual impact from the addition of the Helicopter Landing Facility, adjacent concrete slab and associated structures from nearby sensitive land uses and surrounding streetscapes

The current helipad provisions are no higher than the original plant rooms included on the DA application. We have however, reduced the bulk of the plant room and amended the helipad shape to reduce the visual impact. The reduction of the plant room forms have resulted in a void to the underside of the helipads which reduces the visual bulk of this provision to the top of the building, the operational helipad is an open mesh deck on aluminium frame with a perimeter safety netting, all of which has a degree of translucency further reducing the visual impact. The helipad's amended shape, from the square slab, to octagonal has set these back from the building perimeter which has further reduced the impact of roof top plant / helipad provisions from that indicated on the current DA.

5.2 Medium Assessment (Guidelines 3 & 4)

5.2.1 Design Quality Guideline 3

The proposal will be a high quality landmark design for the site, the local area and the wider metropolitan area.

Evaluate the design response of the development, in particular the proposed design modifications to the top of the building for the Helicopter Landing Facility. The proposal should respond to the Principles of Good Design by the Office of Design and Architecture SA.

An evaluation of the design response of the development, in particular the proposed design modifications to the top of the building for the Helicopter Landing Facility prepared by MPH Architects, is included as **Appendix H.**

In relation to the proposed design modifications MPH Architects noted the following:

The revised DA and provisions for the helipad's has a lighter visual impact to that of the original plant room and slab, the reduction of the full height louvered façade to the oversized plant rooms has reduced the visual weight and bulk to the building from at the roof line. This reduction and the revised shape of the helipads has moved the edge

of the slab / helipads from the building perimeter further reducing the visual impact from the street level.

The helipads are in most cases set far enough back to be obscured from most views of the building, they will be seen from distance, but they will be viewed set back from the facade line and appear as part of the roof top plant provisions. This can be seen from the issued perspectives and elevations. The provision of the access walkways are compliance issue and we have set these up to the areas furthest from the façade line to reduce their impact.

The new forms are more interesting to the rooftop they create a softer top to the building with a simple geometry which works better with the abstract and irregular geometry of the façade, further strengthening the atrium form with open and honest materiality expressed – we are not adding cladding etc to hide the stairs / helipads to reduce the weight and visual impact of these provisions.

5.2.2 Heritage Context Guideline 4

State Heritage Places are located on the north-west, north east and south west corners of the Parade and Portrush Road intersection, as well as the State Heritage listed Benson Memorial Drinking Fountain to the south of the subject site. The subject site is also adjacent two contributory items on Bowen Street and in close proximity to Local Heritage Places. It should therefore be demonstrated how the proposal respects and responds to the heritage context of this visually prominent intersection and the adjacent Residential Character Zone.

Evaluate the impacts of the proposal on the heritage context of the locality, particularly in relation to the proposed design modifications to the top of the building.

A Heritage Impact Assessment (HIA) prepared by DASH Architects, is included as **Appendix I** The assessment considered the heritage impacts associated with changes to the approved Peregrine Headquarters scheme arising from the proposed helicopter landing facility.

Previous findings

In relation to the previously approved Peregrine Headquarters building the HIA (dated 11.08.16, Rev A) prepared at the time came to the following conclusions:

While the proposal is of a notable scale, its design has been developed in response to the context of its surrounds, to reduce its visual bulk and scale, and limit any material impacts on the context of the surrounding State and Local Heritage places.

The proposed development on the subject site will have an acceptable impact on the context of the surrounding State Heritage places.

Local Heritage impacts are largely negligible, with only two adjacent Local Heritage places, both of which are remnant former residential buildings.

Impacts on the historic character of the adjacent Residential Historic (Conservation Zone are limited, as the immediate interface with the Subject Site accommodates only one Contributory Item.

Impact on the residential amenity and character are limited to Bowen Street, where the Development seeks the site's servicing, carparking and deliveries to be located. Once again, the design response seeks to lessen such impacts associated with a notable

development of this size through the establishment of a clear podium level, materials selections, general articulation and upper level setbacks.

A supplementary HIA (dated 22.11.16) was prepared to accommodate minor amendments to the proposal, which concluded:

> *Recent amendments … have resulted in an overall reduction in the height of the proposal by 3800mm, and a reduction to the building podium from four storeys to three. These changes have had the net effect of reducing the overall physical and visual bulk and scale of the proposal, and in turn any State and Local Heritage impacts.*
>
> *The reduction in scale (both physical and visual) has also further mitigated any potential impacts on character of the interfacing Residential Historic (Conservation) Zone across Bowen Street.*

The approved headquarters development was referred to the Heritage Branch of the Department of Environment Water and Natural Resources (DEWNR, now DEW). DEWNR's Principal Conservation Architect, Mr Peter Wells generally concurred with the analysis of impacts on State Heritage places set out in the HIA, and subject to recommendation, considered the proposed development acceptable.

Current Proposal

In relation to the built form changes of the headquarters development resulting from the proposal the HIA notes the following:

> *External physical changes from the approved scheme arising from the proposed helipad appear negligible, and generally limited to the amendment of the previous two square plant enclosures to a circular form (one noted as "Helipad", the other "Concrete Slab"). There are some minor alterations to the footprint of these rooftop elements arising from minor plant and atrium reconfiguration.*
>
> *The full height louvered screen of the approved plant enclosures has been lowered in the current proposal, with an aluminium fabricated helipad and concrete slab framed over.*
>
> *The atrium top to the eastern side of the building has been provided a revised roof structure, however does not notably change the overall form from the proposal to that of the approved scheme.*
>
> *While the RL levels between the current proposal and the approved scheme differ, I understand this is solely as a result of a confirmed datum height. The overall height of the proposal remains consistent between the two schemes (namely 34.850m).*

Heritage Impact Assessment

In relation to the Heritage Impacts, the HIA formed the following conclusions:

> *Figure 6 through Figure 15 provides a comparison between the currently approved scheme, and the proposed changes to the roof top level arising from the proposal. These comparisons show that the proposed changes are not visible from the primary setting of the Clayton Wesley Church (when viewed from The Parade), (Figure 7, Figure 10).*

The minor changes to the rooftop configuration have resulted in sections of the proposed helipad being visible from Portrush Road looking north (Figure 9) and south (Figure 13) however such changes are inconsequential to the setting of the State Heritage Place. Similarly, amendments to the top of the eastern atrium are largely not visible from any of the nearby heritage places (State or Local) and therefore have no consequential impacts to their settings.

The most notable change to the proposal is when viewed from the east (looking west down High Street, Figure 14 and Figure 15). While this vantage does enable views of the rooftop changes, such views are again inconsequential to any heritage impacts as:

- *There are no heritage places within the context of these views (namely Figure 15);*
- *These changes to the roof top level setback from the façade edge, resulting in limited, if any views of these changes from either Bowen Street, or the Contributory Items on this interfacing roadway.*

From other views some edges of the rooftop elements have encroached towards the facades, others have regressed. Further the lowering of the louvred plant screen, curving of the edged (from square plant enclosures to circular helipad / slab) and open framing of their upper portion will result in an overall reduction of their visual presence when viewed from surrounding areas.

All other aspects of the proposal built form remain consistent with the existing approval.

For these reasons I do not consider the proposed helipad application to impact on:

- *The setting or context of the nearby State Heritage places (namely the Clayton Wesley Church, former Norwood Wesleyan Methodist Church and Hall, two storey shops (258-262 The Parade) or Benson Memorial Drinking Fountain) as the proposed changes are generally not visible from the contexts of these places;*
- *The setting of the Local Heritage listed dwelling at 279 Portrush Road, as the proposal's design response to the relevant Development Plan provisions remains consistent with the approved scheme; or*
- *The historic character of the interfacing Residential (Historic) Conservation Zone, as the proposed changes will generally not be visible from Bowen Street, or the Contributory Items therein.*

5.3 Standard Assessment (Guidelines 5 – 7)

5.3.1 Traffic Assessment Guideline 5

The proposal provides for the use of the facility for 10 days per year and during daylight hours.

Evaluate the additional traffic impact of the development on the surrounding road network by undertaking updated traffic analysis.

GHD have prepared an updated traffic assessment of the proposed development which is included as **Appendix J**

In relation to the additional traffic impact of the development on the surrounding road network GHD provide the following traffic analysis:

Traffic Analysis

A review has been undertaken in conjunction with the Transport, Access & Pedestrian Impact Assessment Report (TAPIA) prepared by GHD in February 2017, looking at the potential traffic impacts associated with the proposed Helicopter Landing Facilities associated with the Peregrine Corporation Mixed Use Development located at 270 The Parade Norwood.

Traffic volumes and crash data information has been updated accordingly. No additional traffic generation, modelling or turn path analysis has been undertaken as this report was to look at the traffic impacts associated with the proposed Helicopter Landing Facilities only.

After considering the new traffic volumes and crash data for the immediate area surrounding the site, it has been ascertained that impacts of the Helicopter Landing Facilities, which will only operate ten (10) days per year and only during daytime hours, will have little to no effect.

Therefore, the impact on the existing traffic movement, traffic flows or traffic generation associated with the mixed-use development is believed to have little to no adverse effect relating to the traffic impact or road safety on the adjacent road network for the area.

Conclusion

In conclusion, taking into account the current road usage and activity adjacent the site and the impacts of the traffic and transport related activities associated with the proposed Helicopter Landing Facilities to be located on the rooftop of 270 the Parade, Kensington, the following is provided:

- *Existing traffic volumes surrounding the site have been updated, and whilst they are slightly higher (an additional 2,200 vpd) over the last 2 years, these volumes are not considered to have a direct impact on the proposed Helicopter Landing Facilities or the mixed use development in general for the site.*

- *As the Helicopter Landing Facilities will not operate more than ten (10) helicopter flights per year in which these are to be taken during daytime hours only, there is no foreseen impact on the adjacent network form a traffic / transport or road safety perspective.*

- *Therefore, existing and proposed future traffic volumes are not expected to have any substantial impact on the adjacent road network or its capacity with the operational requirements of the proposed Helicopter Landing Facilities.*

5.3.2 Economic Impact Guideline 6

The proposal should make a positive contribution to the commercial functions of the Norwood/Kensington Park area.

Evaluate the additional economic contribution of the proposal on the Norwood and Kensington precincts, taking into account the existing commercial and retail circumstances of the area.

Fyfe have prepared an updated evaluation of the economic contribution of the proposal on the Norwood and Kensington precincts which is included as **Appendix K**

The Fyfe assessment found that due to the limited and integrated use of the proposed helicopter landing facility, the proposal would likely generate no further economic contribution or impact on the Norwood and Kensington Precincts and beyond that of the previously approved Headquarters redevelopment.

The proposed helicopter landing facility is ancillary to and integrated with the approved mixed use development and consequently, is not expected in its own right to have an economic impact on the Norwood and Kensington Precincts. Rather, it will complement the overall redevelopment of the Peregrine Corporation Headquarters and the associated economic benefits arising.

5.3.3 Employment Guideline 7

The proposal should enhance job creation and foster ongoing employment opportunities for the local area.

Evaluate the additional local and broader job creation and employment opportunities (including any multiplier effects) resulting from the proposal.

Fyfe have prepared an updated evaluation of the broader job creation and employment opportunities resulting from the proposal which is included as **Appendix K**

The updated report found that the integrated nature of the facility on the roof of the approved building, reinforces that no significant local or broader job creation will result from the construction of the helicopter landing facility itself (i.e. the landing facility will be delivered as part of the overall building works).

The proposal will however support the approved use, which forms part of a $50 million investment supporting approximately 600 jobs in the building and construction industry.

6. Economic, Environmental and Social Effects

6.1 Economic Effects

The proposed helipad use will support the operation of Peregrine's (to be constructed) head office redevelopment which was granted development authorisation by the Chief Development Officer on 3 May 2018.

The redevelopment of the site involves an investment of over $50 million in the South Australian economy and will support approximately 600 jobs in the building and construction industry in South Australia over the construction period.

The redevelopment of the site in South Australia will also support the retention of 249 jobs, and allow for the expansion of the business, with an additional 160 new jobs likely to be created at the head office over the next 10 years. A further 110 jobs are likely in relation to the proposed retail and café components.

The overall economic contribution from the development is a made up from the sum of many small parts, and the helipad is one of those parts.

Located on the roof of the new building, the helipad is an important component for Peregrine to service its business needs. The need for quick, accessible transport is paramount to ensuring a pleasurable experience for overseas and interstate business guests.

Visitations are expected to be infrequent however each visitation is crucial in securing more business and retaining head office operations in this state.

6.2 Environmental Effects

Any environmental impacts are likely to be limited to noise and air emissions associated with the occasional helicopter movements to and from the site.

As previously mentioned, an Environmental Noise Report (**Appendix E**) and a Sustainability Assessment (**Appendix G**) have been prepared which outlines the range of strategies and initiatives that are being investigated and implemented by Peregrine Corporation in order to ensure that the proposed Helicopter Landing Facility demonstrates outstanding environmental performance.

Peregrine Corporation assents to the inclusion of the measures to minimise noise and air emissions outlined within the relevant expert reports as conditions of any approval granted by the Governor.

6.3 Social Effects

The proposal is not considered to have any extraordinary social effects.

6.4 Consequences of Proposal not Proceeding

Should the proposal not proceed, the following consequences are foreshadowed:

- The efficiency of Peregrine Corporation's business operations will be impacted, particularly those involving interstate and overseas stakeholders;

- The continued growth of Peregrine Corporation and the follow-on economic and employment benefits to the State will be impacted; and

- Peregrine Corporation's advantage with interstate competitors will be impacted.

7. Consistency with the Planning Strategy and Development Plan

7.1 Planning Strategy

The proposed helicopter Landing Facility will support the efficient operation of the previously approved Peregrine Headquarters redevelopment.

Peregrine's Headquarters redevelopment is consistent with the key directions outlined in the 30-year Plan for Greater Adelaide, particularly in respect to achieving:

- Competitiveness; and
- Creating the pre-conditions for strong economic performance

Competitiveness

- *The Plan will underpin the creation of at least 282,000 new jobs during the next 30 years, which will increase Greater Adelaide's employment to 909,200 people these new jobs will be located in areas of residential growth and in areas well served by transport networks.*

Creating the preconditions for strong economic performance

The state economy is forecast to grow by $127.7 billion over the life of the Plan.

One of the Plan's vital roles is to assist in creating some of the key preconditions for maximising economic growth. These include:

- *designating and protecting lands for employment; and*
- *encouraging flexible land-use controls to respond to industry changes*

The proposal by Peregrine Corporation, which will facilitate both the growth of their own staff numbers in addition to construction jobs as part of the project, is consistent with the expectation that the Plan will underpin the creation of at least 282,000 new jobs during the 30 year period.

The proposed Helicopter Landing Facility is able to broadly satisfy the intention of the 30-Year Plan for Greater Adelaide by aiding the efficient operation of the previously approved Peregrine Headquarters redevelopment.

7.2 Development Plan

The subject land is located within the Business Zone as identified on Zone Map NPSP/10 of the Norwood, Payneham and St. Peters Development Plan (Consolidated 19 December 2017). The subject land is also located within Kensington Policy Area 6.7 as identified on Policy Areas Map NPSP/16.

The subject land is influenced by a range of factors, these influences include:

- The Parade (east of Portrush Road) forms the boundary between the City of Norwood, Payneham and St Peters and the City of Burnside;

- The Parade (east of Portrush Road) forms the boundary between the Business Zone and the Local Business Zone;
- Bowen Street forms the boundary between the Business Zone and the Residential Historic (Conservation) Zone – Kensington 1 Policy 12.8 and also Mixed Use Historic (Conservation) Zone – Kensington Policy Area 11.3;
- High Street forms the boundary between the Business Zone and the Residential Historic (Conservation) Zone – Kensington 2 Policy Area 12.9;
- Portrush Road forms the boundary between the Business Zone and the District Centre (Norwood) Zone – The Parade East Policy Area 2.2;
- The Mixed Use B Zone is located adjacent the subject land, on the western side of Portrush Road – Portrush Road Policy Area 8.3;
- Six State Heritage Places are located less than 200 metres from the subject land; and
- Two Contributory items located on the eastern side of Bowen Street.

The relevant provisions of the Business Zone are outlined as follows:

Objective 1: *Development providing a range of business and related activities, including offices, consulting rooms and retail showrooms.*

The Business Zone accommodates a range of existing business activities in premises of variable nature and quality, with opportunity for the development and consolidation of offices and consulting rooms with some retail showrooms as well as for the upgrading, expansion and consolidation of business activities. Progressive improvements should be made to the environmental and servicing aspects of business, and development in the zone should progressively upgrade existing business areas and main road frontages.

Kensington Policy Area 6.7

Kensington Policy Area occupies a key location at the corner of The Parade and Portrush Road. Development should comprise high quality offices, consulting rooms and retail showrooms.

The corner of The Parade and Portrush Road is a visually prominent site within the city and any new building should be of massing and configuration which visually reinforces the corner, whilst respecting the scale of buildings in the adjacent Historic (Conservation) Zones and maintaining the prominence of the State Heritage listed buildings on the south-western, north-eastern and north-western corners of the intersection of Portrush Road and The Parade.

The Parade and Bowen Street should provide the primary points of access for delivery, service and visitors' vehicles. The creation of new vehicle access points onto either Portrush Road or the portion of The Parade close to the Portrush Road intersection should be avoided.

1 *Development in the Business Zone should primarily be for offices, consulting rooms, retail showrooms and in identified locations, residential development above ground floor non-residential land uses.*

2 *Development should be designed, sited and constructed to:*

(a) limit to a reasonable level, noise and air pollution beyond its site; and

(b) without limiting the general application of (a) above, conform with the requirements of all the relevant Environment Protection Policies of the Environment Protection Authority.

3 *Development within the Business Zone should not include land uses which by their operation will adversely affect the amenity of the adjacent residential zones.*

4 *Development adjacent to the Kensington 1 and Kensington 2 Policy Areas of the Residential Historic (Conservation) Zone should be compatible in design and scale with the character sought for that Zone and those Policy Areas.*

Whilst from a land use perspective, the proposal is generally consistent with the expectations of the Business Zone, interface implications with the adjacent Kensington 1 and Kensington 2 Policy Areas of the Residential Historic (Conservation) Zone will require further consideration.

Table 7.1 Development Plan Considerations

1. Land Use	
Zone Objective 1 Zone PDC 1, 2, 3	The proposed Helicopter Landing Facility is ancillary to the previously approved Peregrine Headquarters redevelopment, comprising a mix of envisaged office and retail land uses. The proposal will promote the more efficient operation of Peregrine's business operations. Supporting consultant reports from Sonus, Fyfe and DASH confirm the proposed Helicopter Landing Facility will be designed, constructed and operated in such a way so as to minimise the impact on adjoining land uses.
2. Design and Built Form	
Zone PDC 9 City Wide Objectives 18, 19, 20, 22 City Wide PDC 28, 29, 30, 37, 38, 42, 45, 46, 47, 48	The proposed helicopter landing facility will be established on the roof top with minimal changes required to the built form of the previously approved headquarters building. The potential impacts on the adjoining Residential Historic (Conservation) Zone have been fully considered in the Heritage Impact Assessment (**Appendix I**). The proposed helipad and concrete platform are no higher than the previously approved plantrooms. The application proposes to reduce the plantrooms apon which the helicopter landing facility will be sited. The reduction of the plantroom forms results in a void to the underside of the helipad which reduces the visual bulk to the top of the building. The operational helipad has an open mesh deck on an aluminium frame with a perimeter safety netting, all of which has a degree of translucency further reducing visual impact. The amended form of the helipad and concrete slab from square to octagonal has set these structures back from the building perimeter which has further reduced the impact of the proposal. The helipads are in most cases set far enough back to be obscured from most views of the building, they will be seen from distance but will be viewed set back from the façade line and appear ad part of the roof top plant provisions. The simple geometry of the proposed structures will work well with the abstract and irregular geometry of the façade. The reduction in bulk of the plantrooms will soften the roof top of the building.

3. Heritage	
City Wide Objectives 111, 113 City Wide PDC 346, 347, 361	Refer Heritage Impact Assessment (**Appendix I**).
4. Interface	
Zone PDC 2, 3 City Wide Objectives 26, 27 City Wide PDC 11, 12, 80, 83, 84	Interface issues have been considered in this assessment and particularly in respect of the heritage context of the locality and the existing residential properties that adjoin the subject site to the west. Key impacts that are relevant to the proposal have been considered below: *Emissions of noise* Sonus have prepared an acoustic assessment and have reviewed the noise impacts of the helicopter landing facility. The Sonus report concluded that; *With the measures incorporated into the proposal, "all reasonable and practicable measures" haven been taken, and the proposal is therefore consistent with the relevant noise related provisions of the Guidelines and the City of Norwood Payneham and St Peters Development Plan.* *Frequency of operation* Helicopter movements are to be solely associated with the approved use of the building with no commercial flights or flights unrelated to Peregrine Corporation to be undertaken. Helicopter activity will operate on no more than 10 days per year and only during EPA defined daylight hours. *Loss of privacy / overlooking* The potential for overlooking is considered to be limited for the following reasons: • The proposed helipad is centrally located on the roof top and sited well back from the building façade line, similar to how level 3 is setback from the podium to restrict the view lines and overlooking of adjacent properties especially Bowen Street; • The helicopter landing facility will have operational use restrictions. Helicopter passengers will be on the roof top for a limited time and only to access or exit the helicopter. There will be no time for any overlooking of adjacent properties; and • It should be noted that the roof top is a non-occupied space. Access will be restricted during times when the helipad is not in operation.

	Heritage Refer Heritage Impact Assessment at **Appendix I.**
5. Orderly and Sustainable Development	
City Wide Objectives 1, 10, 12, 13 City Wide PDC 1, 8, 12	The proposed helicopter landing facility is an integral component of the overall redevelopment of the headquarters site and will greatly assist Peregrine Corporation in the efficient conduct of its business operations. The helicopter landing facility is consistent with the City Wide Objectives for an orderly and sustainable development.

8. Conclusion

This Public Environmental Report has been prepared in respect to a proposal by Peregrine Corporation to establish a Helicopter Landing Facility on the roof top of its still to be constructed headquarter building. The proposed Helicopter Landing Facility will comprise:

- One (1) prefabricated helipad of modular aluminium construction to be delivered and assembled on site. The helipad will be a polygon shape with a diameter of 19.6 metres, a safety net with a width of 1.5 metres and a depth of 1.07 metres (excluding steel transition height).

- A second concrete helipad will be constructed to be available as an informal/temporary landing site for helicopters in the event of an emergency only. The concrete helipad will have a 'Prohibited Landing Marker' placed in the centre at all times (except for an emergency situation), to avoid confusion with the functional helipad.

- Helicopter movements are to be solely associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken. Helicopter activity will operate on no more than 10 days per year and only during EPA defined daylight hours.

The Helicopter Landing Facility is an integral component of the overall redevelopment of the Headquarters site and will greatly assist Peregrine Corporation in the efficient conduct of its business operations.

The Public Environmental Report includes several technical reports which have been undertaken in order to respond to the assessment matters listed in the Guidelines. It is evident from the assessment that the proposal appropriately responds to the key issues identified.

APPENDIX A

PUBLIC ENVIRONMENTAL REPORT GUIDLINES

GUIDELINES

For the preparation of a

PUBLIC ENIVRONMENT REPORT

Peregrine Corporation Mixed Use Development 270 The Parade, Kensington

Peregrine Corporation

Endorsed 14 December 2018

State Planning Commission

Department of Planning, Transport and Infrastructure

www.sa.gov.au

State Planning Commission
South Australia

www.saplanningcommission.sa.gov.au

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1. BACKGROUND

On 26 November 2015 the Chief Executive of the Department of Planning, Transport and Infrastructure (DPTI), as delegate of the Minister for Planning, made a declaration in *The South Australian Government Gazette* that the proposed Peregrine Corporation Headquarters mixed use development, located at 270 The Parade Kensington, be assessed as a Major Development pursuant to Section 46 of the *Development Act 1993* (the Act).

On 22 September 2016, the Chief Executive as delegate for the Minister for Planning varied the declaration in *The South Australian Government Gazette* to provide greater clarity around the proposed mix of land uses including accommodation premises for business related purposes.

Following an assessment process the Peregrine Corporation Mixed Use Major Development was approved by the Governor in Executive Council on 16 May 2017.

Simultaneously, the Governor delegated his power to grant a variation to the development to the Minister for Planning pursuant to section 48(8) of the Act. On 16 February 2018 the Minister for Planning sub-delegated these powers to the Chief Development Officer DPTI, pursuant to section 48(9)(b) of the Act.

On 3 May 2018 a variation to the development was approved by the Chief Development Officer. The variation included the removal of the basement level; provision of car parking on Level 2; increase of the pool cantilever to a 2-storey structure; and minor reconfigurations to building floor plates.

By letter dated 6 July 2018 Peregrine Corporation sought to vary the development authorisation so as to permit a Helicopter Landing Facility on the roof of the building. Following consideration the Minister for Planning considered it necessary to vary the declaration to enable a proper assessment of the development. On 27 September 2018 the variation was gazetted in the South Australian Government Gazette.

By correspondence dated 15 October 2018 and 16 November 2018 Peregrine Corporation provided further details in regards to the proposal to utilise the land for the purpose of helicopter landing and take-off and the resultant amendments to building design.

The variation proposal comprises one (1) aluminium fabricated helipad and an adjacent concrete slab to be constructed on the roof of the headquarters building.

Helicopter movements are to be solely associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken. Helicopter activity will operate on no more than 10 days per year and only during daylight hours. The concrete slab will be available as an informal/temporary landing site for helicopters in the event of emergency.

The proposal also involves:

- Changes to the design and materiality of the top of the building as a result of the aluminium fabricated Helipad, concrete slab and associated structures.
- Adjustments to the level of the building and entrance design to reflect actual site levels.
- Revised design of the atrium roof.

Section 46 of the Act ensures that matters affecting the environment, the community or the economy to a significant extent, are fully examined and taken into account in the assessment of this proposal.

The major development process has six steps:

- The State Planning Commission sets the level of assessment (Environmental Impact Assessment, Public Environmental Report or Development Report) and provides guidelines (**this stage**)
- Proponent prepares an Assessment Document (in this case a Public Environmental Report)

- Public and agency consultation on the Assessment Document for a period depending on the level of assessment
- Proponent responds to public comment on an Assessment Document
- Assessment of the proposal by the Minister or delegate and releasing the Assessment Report
- Decision by the Governor or delegate

The landing facility is operationally inexorably linked to the approved headquarters use. The take-off and landing takes place on the site of the headquarters, and it will be confined to business purposes associated with the headquarters facility, and not for general public use.

In this context this document is the guidelines as set by the State Planning Commission specifically prepared for this application. The guidelines have been developed to properly define the expected additional impacts (extent, nature and significance) associated with the proposed use for helicopter landing and take-off in the manner suggested, the proposed mitigation strategies, and on balance whether such impacts are acceptable.

The State Planning Commission has determined, subject to consideration of section 63 of the *Development Regulations 2008* that the proposal will be subject to the processes of a Public Environmental Report (PER), as set out in Section 46C of the Act. The Commission's role in the assessment process is now completed. From this point the Minister will continue with the assessment under Section 46 of the Act.

2. DESCRIPTION OF VARIATION PROPOSAL

In overall terms and as currently approved the proposal comprises the construction of a mixed use building together with associated storage and car parking for the redevelopment of Peregrine's head office to meet the companies growing demand for quality office space and improved work facilities and amenities.

The application currently comprises:

a) The demolition of all existing structures on the subject site
b) Construction of a seven (7) storey mixed use building comprising:
    - Retail tenancies
    - Office tenancies
    - A restaurant, gymnasium and pool
    - Accommodation premises for business related purposes; and
    - Car parking.

The variation proposal is for the construction of one (1) aluminium fabricated helipad on the roof of the headquarters building.

The facility will be used for transporting people to and from the subject site for business purposes associated with the use of the land. No commercial flights or flights unrelated to the Peregrine Corporation to be undertaken. The proponent has advised that arrivals and departures will not occur on more than 10 days per year and during daylight hours only.

Where possible 24 hours' notice will be provided before an operational day and a register of operational days will be kept to ensure the 10 days are not exceeded. An Emergency Management Plan will be prepared which details safety management, risk management, and emergency landing procedures.

Three (3) types of helicopters are proposed to be used:

- BELL 206 – one pilot, 4 passengers;
- EC 130 – one pilot, 6 passengers; and
- AW109/H109 – one or two pilots, 6-7 passengers.

No helicopters or fuel will be stored on site nor will any on-site servicing occur.

The helipad, prefabricated and of aluminium construction, is to be delivered and assembled on site. The helipad is a polygon shape with a diameter of 19.6 metres, a safety net with a width of 1.5 metres and a depth of 1.07 metres (excluding steel transition height).

The supporting structures of the helipad and slab including associated access stairs, building stair cores, and are exposed and visible above the glass façade. The stair cores penetrate the plan roof and discharge on the roof but are not connected to the helipad and/or concrete slab. Access to the raised helipad is via an external set of stairs at the outer edge of the structure.

Adjacent to the helipad is a concrete slab of similar dimensions. No formal use is sought or envisaged for the concrete slab as part of this variation application, however the slab will be available as an informal/temporary landing site for helicopters in the event of emergency. The slab will be engineered to the appropriate standards and include basic markings including a 'prohibited landing marker'. Use of the concrete slab as an emergency landing facility will be documented and governed in an Emergency Management Plan.

In addition to the helipad and associated structures, the variation proposal also includes design adjustments as a result of further survey and engineering investigations:

- On-site survey work indicates a significant fall across the site. To address this the ground floor of the building has been split by 150mm to ensure the building can accommodate vehicle access to the rear and be set above the ground level at the front. This has resulted in a level change to the main building entry (corner of Portrush Road and The Parade) which cannot be accommodated with ramping and has resulted in the inclusion of steps. Dedicated DDA compliant ramps are proposed in close proximity.
- The variation plans include an amended 'lantern roof' to the top of atrium. The change is due to engineering advice provided on the required thickness for the structure. The soffit treatment has yet to be finalised but it is intended to be finished in a metallic light coloured material to reduce the visual impact of the roof / ceiling to the top of the atrium.

The overall building height remains at 34.85m above ground level as previously approved.

3. MAJOR DEVELOPMENT PROCESS AND ROLE OF GUIDELINES

- These Guidelines are prepared to inform the preparation of the Public Environmental Report (PER). They set out the assessment issues associated with the proposal along with their importance (scale of risk) as determined by the State Planning Commission.

- The PER must be prepared by the proponent in accordance with the Guidelines and should specifically address each guideline.

- Each guideline is intended to be outcome focused and may be accompanied by suggested assessment approaches. These suggestions are not exhaustive, and may be just one of a wide range of methods to consider and respond to a particular guideline.

- The PER should detail any expected environmental, social and economic effects of the development, and the extent to which the development is consistent with the provisions of the Councils Development Plan, the Planning Strategy and any matter prescribed by the Regulations under the Act.

- The completed PER is submitted to the Minister for public release, and is subsequently referred to Council and relevant government agencies for comment. Council and agencies have a period of 30 business days to comment.

- An opportunity for public comment will occur when the completed PER is released. Public exhibition is undertaken for 30 business days. An advertisement will be placed in the *Advertiser* and local *Messenger newspapers* inviting submissions and a public meeting / open session must be held.

- Copies of the submissions from the public, Council and other relevant agencies will be provided to the proponent.

- The proponent may then prepare a 'Response Document' within two (2) months (or unless otherwise extended) to address the matters raised during the Public exhibition period.

- The Minister then prepares an Assessment Report. The Assessment Report and the Response Document will be available for inspection and purchase at a place determined by the Minister for a period determined by the Minister.

- Availability of each of these documents will be notified by advertisements in *The Advertiser* and *local Messenger newspapers.* A copy of the PER, Response Document and the Assessment Report will be provided to the Council.

- When a proposal is subject to the PER process, the Governor makes the final decision under Section 48 of the Act.

- In deciding whether the proposal will be approved and any conditions that will apply, the Governor must have regard to:
  - Provisions of the Development Plan;
  - The Development Act and Regulations;
  - If relevant, the Building Code of Australia;
  - The 30 Year Plan for Greater Adelaide
  - The PER and the Ministers Assessment Report;
  - Where relevant, any other government policy and/or legislation.

- The Governor can at any time indicate that the development will not be granted authorisation. This may occur if the development is inappropriate or cannot be properly managed. This is commonly referred to as an ***early no***.

4. PUBLIC ENVIRONMENTAL REPORT (PER)

The PER should be presented in terms that are readily understood by the general reader. Technical details should be included in the appendices.

THE REPORT <u>MUST</u> INCLUDE THE FOLLOWING:

Information and Assessment

The provision of all information sought by the guidelines, together with consideration and assessment against each of the matters identified in Section 4 of these Guidelines.

Consistency with Policy and Legislation

The Act requires the PER to state its consistency with the relevant Development Plan and Planning Strategy, and other key policies and/or legislation as identified within these guidelines (refer to Appendix 2 for other 'useful documents').

Commitment to meet Conditions

The guidelines must state the proponent's commitments to meet conditions to avoid, mitigate, manage and/or control any potentially unreasonable impacts from the development.

THE REPORT SHOULD INCLUDE THE FOLLOWING:

Summary

A concise summary of the matters set out in Section 46C of the Act, including all aspects covered in the Guidelines set out below, in order for the reader to obtain a quick but thorough understanding of the proposal and all its effects.

Introduction

The introduction to the PER should briefly cover the following:
- Background to and objectives of the proposed development;
- Details of the proponent;
- Staging and timing of the proposal;
- Relevant legislative requirements and assessment process.

Need for the Proposal

A statement of the objectives and justification for the proposal, including:
- the specific objectives the proposal is intended to meet;
- expected local, state or national benefits and costs;
- a summary of environmental, economic and social arguments to support the proposal; including the consequences of not proceeding with the proposal.

Plans and Forms

- **Current Certificate(s) of Title**

- **Context and locality plans** should illustrate and analyse existing site conditions and the relationship of the proposal to surrounding land and buildings. The plan should be drawn to a large scale to allow presentation on a single sheet and be readily legible. The plan should indicate:
  - the neighbouring residential buildings on Bowen Street,
  - location of state heritage buildings in relation to this site
  - the Mary MacKillop Tappeiner Court Nursing Home at 286 Portrush Road (backing onto High Street)
  - existing street trees
  - any other information that would help to set the context for the locality

- **Site plan** (drawn at a scale of 1:100 or 1:200) clearly indicating the proposed building and works.

- **Elevations** (drawn at a scale of 1:100 or 1:200) are required for all sides of the building with levels and height dimensions provided in Australian Height Datum.

- **Cross sections** of the building are required and should include ground levels, floor levels, ceiling heights and maximum height in Australian Height Datum.

- Provide **floor plans** (drawn at a scale of 1:100 or 1:200) for each level of the building demonstrating what is proposed at each floor, with indicative internal layouts.

- Location and dimensions of any external **advertising displays**. If signs are to be illuminated or contain a moving display this needs to be included.

Specialist Reports and Details

- Provide a **noise assessment** prepared by an acoustic engineer to moderate external and environmental noise disturbance and amenity impacts for future occupants of the development, but also other sensitive uses within the immediate area as a result of the proposed development.

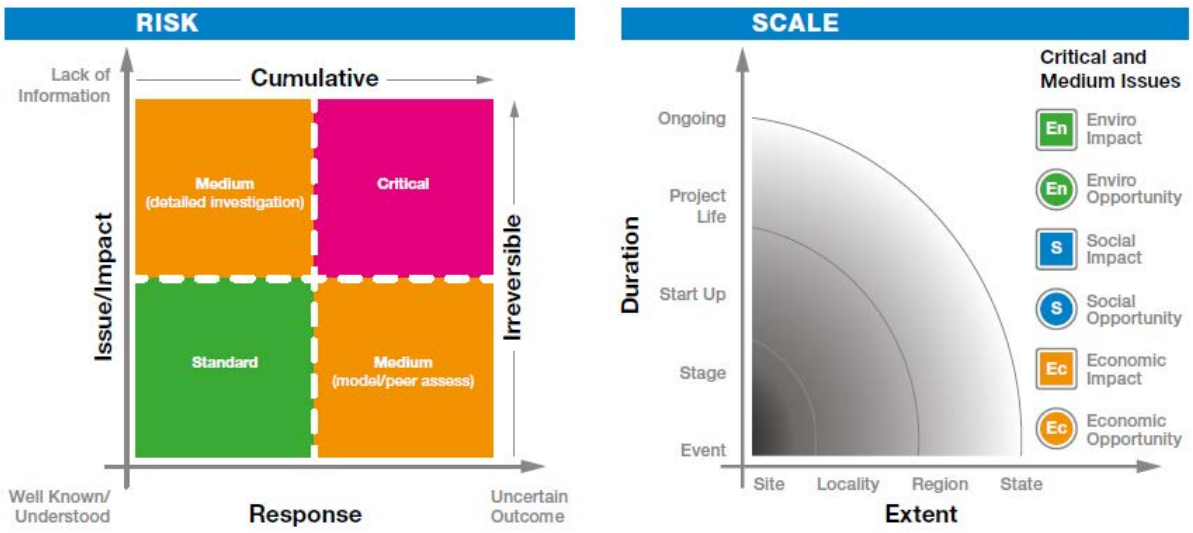
- **Flight path and aviation management matters**, including emergency management, and interplay with existing regulatory frameworks, including Civil Aviation Safety requirements.

5. ASSESSMENT

Impact assessment is an important tool that enables the consideration of projects that might otherwise struggle to be addressed properly or fairly under the 'normal' assessment system.

In setting these Guidelines, the State Planning Commission has considered the scale of issues associated with the project and determined whether they represent issues or opportunities. The potential impacts and issues have then been organised according to the level of work and type of attention required by the Applicant: either standard, medium or critical:

- Where the issue is well known and the response is well understood then the risk assessment is classed as 'standard'
- Where work is required to address the issue but the risk is likely to be manageable with additional information then the risk assessment is classed as 'medium'.
- Where information about the issue is lacking and the response is unclear, the issue is classed as 'critical'.



The issues and impacts identified by the Commission as requiring standard, medium or critical level assessment are listed below. Each guideline includes a description of the issue/impact and a description of the action needed.

CRITICAL ASSESSMENT

Aviation Operations

Guideline 1: The development proposes a Helicopter Landing Facility on the roof of the building for use not more than 10 calendar days per year and during daylight hours. Given the proximity of the subject site to residential development, educational, communal and public facilities, businesses and major arterial roads, the operation of the Helicopter Landing Facility and associated safety risks should be investigated, with a particular focus on emergency planning and response.

Evaluate the impacts of the Helicopter Landing Facility to the locality, including key risks, and identify required management techniques to mitigate and suitably address those impacts and risks, including but not limited to:

- *clarification regarding the proposed nature, frequency and timing of use for both the Helicopter Landing Facility and adjacent concrete slab;*
- *emergency planning and response considerations and parameters, including limitations;*
- *proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure during take-off and landing;*
- *proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure en-route to and from the Helicopter Landing Facility;*
- *safety considerations associated with the provision of any guidance and landing lights on the helicopter landing facility;*
- *design, safety and operational matters associated with any refuelling facilities;*
- *alignment and compliance with any State and Commonwealth Aviation regulations, Codes of Practice or Standards and International Civil Aviation Organisation (ICAO) regulations for Aviation;*
- *safety and navigation considerations given the close proximity of tall built structures including the Water Tower residential apartment building at 275 Portrush Road, Norwood; the Clayton Wesley Uniting Church at 280 Portrush Road, Norwood and the Nuova residential apartments at 254 The Parade, Norwood;*
- *prevailing meteorological conditions at the subject land and its surrounds; and*
- *safety and amenity considerations associated with bird strike.*

Neighbourhood Interface

Guideline 2: The subject site is adjacent a Residential Historic (Conservation) Zone and a Mixed Use Historic (Conservation Zone) at its Bowen Street and High Street interface. It is also located in amongst and proximate to residential development, educational, communal and public facilities. It should therefore be demonstrated how the interface impacts of the development on these neighbouring environs will be managed.

Evaluate the impacts of the proposal on the locality, taking into account its approved bulk, scale and interface relationship to neighbouring residential development, nursing home facilities, educational, communal and other public facilities including, but not limited to:

- *an assessment of the impacts of vibration on nearby sensitive land uses;*
- *an assessment of the impacts of noise on nearby sensitive land uses against the provisions of the Environment Protection (Noise) Policy 2007;*
- *an assessment of the impacts of air pollution on nearby sensitive land uses against the provisions of the Environment Protection (Air Quality) Policy 2016;*
- *adequacy of clearance distances from sensitive land uses in the event of a catastrophic engine failure or catastrophic landing;*
- *the impacts of rotor blade downwash and rotor wake on building cladding;*
- *environmental impacts, particularly with regard to air quality and noise, on wildlife and domestic animals in the locality associated with helicopter approaches, landings, take offs and climbs;*

- *amenity considerations associated with the provision of any guidance and landing lights on the helicopter landing facility;*
- *the potential for overlooking into nearby sensitive land uses from users of the Helicopter Landing Facility; and*
- *the visual impact from the addition of the Helicopter Landing Facility, adjacent concrete slab and associated structures from nearby sensitive land uses and surrounding streetscapes.*

MEDIUM ASSESSMENT

Design Quality

Guideline 3: The proposal will be a high quality landmark design for the site, the local area and the wider metropolitan area.

Evaluate the design response of the development, in particular the proposed design modifications to the top of the building for the Helicopter Landing Facility. The proposal should respond to the Principles of Good Design by the Office of Design and Architecture SA.

Heritage Context

Guideline 4: State Heritage Places are located on the north-west, north east and south west corners of the Parade and Portrush Road intersection, as well as the State Heritage listed Benson Memorial Drinking Fountain to the south of the subject site. The subject site is also adjacent two contributory items on Bowen Street and in close proximity to Local Heritage Places. It should therefore be demonstrated how the proposal respects and responds to the heritage context of this visually prominent intersection and the adjacent Residential Character Zone.

Evaluate the impacts of the proposal on the heritage context of the locality, particularly in relation to the proposed design modifications to the top of the building.

STANDARD ASSESSMENT

Traffic Impact

Guideline 5: The proposal provides for the use of the facility for 10 days per year and during daylight hours.

Evaluate the additional traffic impact of the development on the surrounding road network by undertaking updated traffic analysis.

Economic Impact

Guideline 6: The proposal should make a positive contribution to the commercial functions of the Norwood/Kensington Park area.

Evaluate the additional economic contribution of the proposal on the Norwood and Kensington precincts, taking into account the existing commercial and retail circumstances of the area.

Employment

Guideline 7: The proposal should enhance job creation and foster ongoing employment opportunities for the local area.

Evaluate the additional local and broader job creation and employment opportunities (including any multiplier effects) resulting from the proposal.

6. APPENDIX 1 – SECTION 46C OF THE *DEVELOPMENT ACT 1993*

46C—PER process—Specific provisions

(1) This section applies if a PER must be prepared for a proposed development or project.

(2) The Minister will, after consultation with the proponent—

(a) require the proponent to prepare the PER; or

(b) determine that the Minister will arrange for the preparation of the PER.

(3) The PER must be prepared in accordance with guidelines determined by the Development Assessment Commission under this Subdivision.

(4) The PER must include a statement of—

(a) the expected environmental, social and economic effects of the development or project;

(b) the extent to which the expected effects of the development or project are consistent with the provisions of—

(i) any relevant Development Plan; and

(ii) the Planning Strategy; and

(iii) any matters prescribed by the regulations;

(c) if the development or project involves, or is for the purposes of, a prescribed activity of environmental significance as defined by the Environment Protection Act 1993, the extent to which the expected effects of the development or project are consistent with—

(i) the objects of the Environment Protection Act 1993; and

(ii) the general environmental duty under that Act; and

(iii) relevant environment protection policies under that Act;

(ca) if the development or project is to be undertaken within the Murray-Darling Basin, the extent to which the expected effects of the development or project are consistent with—

(i) the objects of the River Murray Act 2003; and

(ii) the Objectives for a Healthy River Murray under that Act; and

(iii) the general duty of care under that Act;

(cb) if the development or project is to be undertaken within, or is likely to have a direct impact on, the Adelaide Dolphin Sanctuary, the extent to which the expected effects of the development or project are consistent with—

(i) the objects and objectives of the Adelaide Dolphin Sanctuary Act 2005; and

(ii) the general duty of care under that Act;

(cc) if the development or project is to be undertaken within, or is likely to have a direct impact on, a marine park, the extent to which the expected effects of the development or project are consistent with—

(i) the prohibitions and restrictions applying within the marine park under the Marine Parks Act 2007; and

(ii) the general duty of care under that Act;

(d) the proponent's commitments to meet conditions (if any) that should be observed in order to avoid, mitigate or satisfactorily manage and control any potentially adverse effects of the development or project on the environment;

(e) other particulars in relation to the development or project required—

(i) by the regulations; or

(ii) by the Minister.

(5) After the PER has been prepared, the Minister—

(a) —

(i) must, if the PER relates to a development or project that involves, or is for the purposes of, a prescribed activity of environmental significance as defined by the Environment Protection Act 1993, refer the PER to the Environment Protection Authority; and

(ia) must, if the PER relates to a development or project that is to be undertaken within the Murray-Darling Basin, refer the PER to the Minister for the River Murray; and

(ib) must, if the PER relates to a development or project that is to be undertaken within, or is likely to have a direct impact on, the Adelaide Dolphin Sanctuary, refer the PER to the Minister for the Adelaide Dolphin Sanctuary; and

(ic) must, if the PER relates to a development or project that is to be undertaken within, or is likely to have a direct impact on, a marine park, refer the PER to the Minister for Marine Parks; and

(ii) must refer the PER to the relevant council (or councils), and to any prescribed authority or body; and

(iii) may refer the PER to such other authorities or bodies as the Minister thinks fit, for comment and report within the time prescribed by the regulations; and

(b) must ensure that copies of the PER are available for public inspection and purchase (during normal office hours) for at least 30 business days at a place or places determined by the Minister and, by public advertisement, give notice of the availability of copies of the PER and invite interested persons to make written submissions to the Minister on the PER within the time determined by the Minister for the purposes of this paragraph.

(6) The Minister must appoint a suitable person to conduct a public meeting during the period that applies under subsection (5)(b) in accordance with the requirements of the regulations.

(7) The Minister must, after the expiration of the time period that applies under subsection (5)(b), give to the proponent copies of all submissions made within time under that subsection.

(8) The proponent must then prepare a written response to—

(a) matters raised by a Minister, the Environment Protection Authority, any council or any prescribed or specified authority or body, for consideration by the proponent; and

(b) all submissions referred to the proponent under subsection (7), and provide a copy of that response to the Minister within the time prescribed by the regulations.

(9) The Minister must then prepare a report (an Assessment Report) that sets out or includes—

(a) the Minister's assessment of the development or project; and

(b) the Minister's comments (if any) on—

(i) the PER; and

(ii) any submissions made under subsection (5); and

(iii) the proponent's response under subsection (8); and

(c) comments provided by the Environment Protection Authority, a council or other authority or body for inclusion in the report; and

(d) other comments or matter as the Minister thinks fit.

(10) The Minister must, by public advertisement, give notice of the place or places at which copies of the Assessment Report are available for inspection and purchase.

(11) Copies of the PER, the proponent's response under subsection (8), and the Assessment Report must be kept available for inspection and purchase at a place determined by the Minister for a period determined by the Minister.

(12) If a proposed development or project to which a PER relates will, if the development or project proceeds, be situated wholly or partly within the area of a council, the Minister must give a copy of the PER, the proponent's response under subsection (8), and the Assessment Report to the council.

7. APPENDIX 2 – USEFUL RESOURCES

Legislation

- Development Act 1993
- Development Regulations 2008
- Environment Protection Act 1993

Strategy & Policy

- Norwood Payneham and St Peters (City) Development Plan Consolidated 19 December 2017
- The 30-Year Plan for Greater Adelaide 2017 Update
- Environment Protection (Noise) Policy 2007
- Environment Protection (Air Quality) Policy 2016
- Building Code of Australia

Guidelines

- Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry (1999)

Websites

- Australian Transport Safety Bureau (www.atsb.gov.au)

APPENDIX B

CERTIFICATES OF TITLE

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1886

VOLUME 5134 FOLIO 144

Edition 4
Date Of Issue 26/07/1993
Authority CONVERTED TITLE

South Australia

I certify that the registered proprietor is the proprietor of an estate in fee simple (or such other estate or interest as is set forth) in the land within described subject to such encumbrances, liens or other interests set forth in the schedule of endorsements.

REGISTRAR-GENERAL

REGISTRAR-GENERAL SOUTH AUSTRALIA

WARNING: BEFORE DEALING WITH THIS LAND, SEARCH THE CURRENT CERTIFICATE

REGISTERED PROPRIETORS IN FEE SIMPLE

SHAHIN BROTHERS PTY. LTD. OF 8 UNDIVIDED 10TH PARTS AND SHAHIN GROUP PTY. LTD. OF 2 UNDIVIDED 10TH PARTS BOTH OF C/- 701 PORT ROAD WOODVILLE SA 5011

DESCRIPTION OF LAND

ALLOTMENT 8 FILED PLAN 103498
IN THE AREA NAMED KENSINGTON
HUNDRED OF ADELAIDE

EASEMENTS

NIL

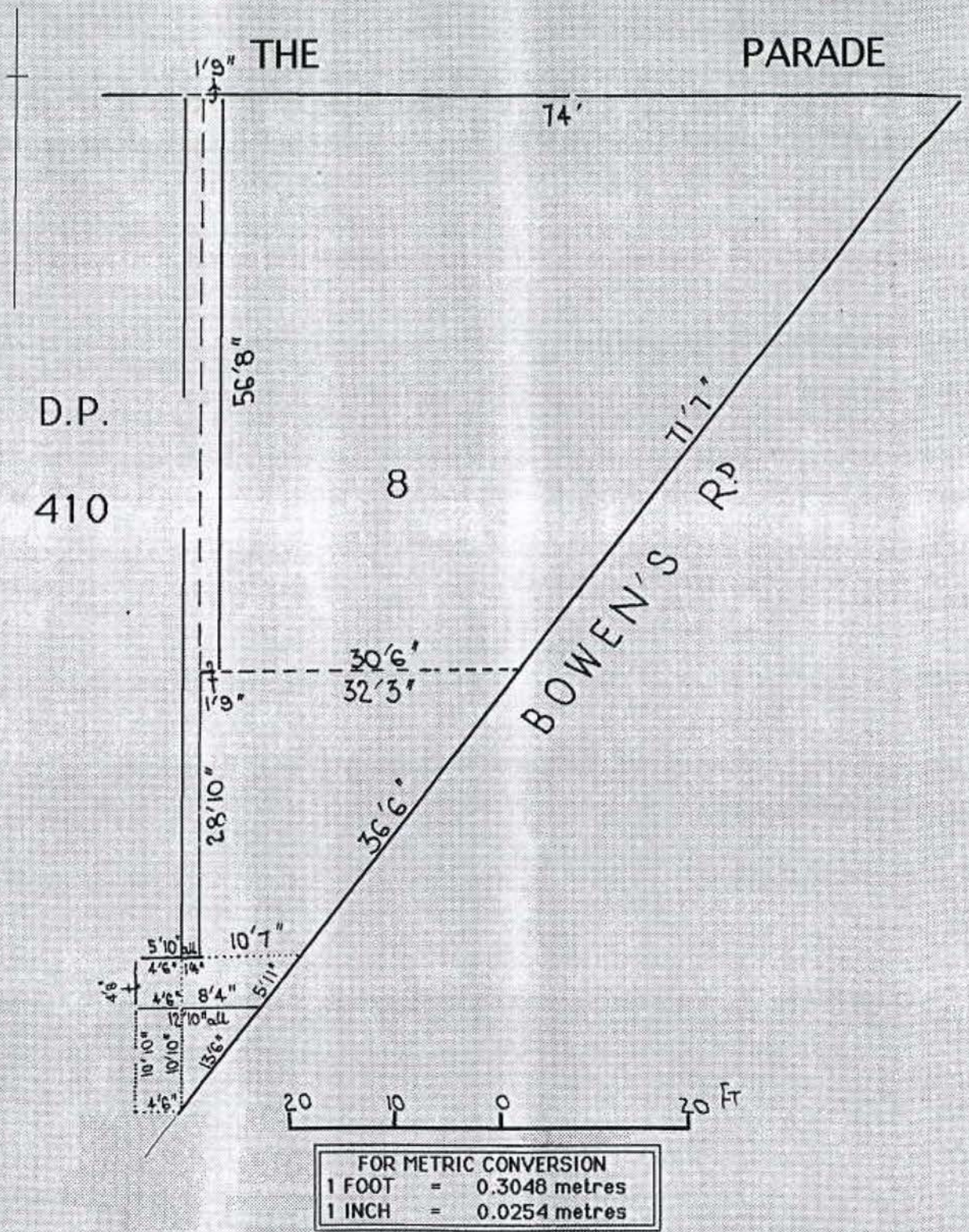
SCHEDULE OF ENDORSEMENTS

NIL

End of Text.

This plan is scanned from Certificate of Title 3217/140

LAST PLAN REF. D.P. 410



FOR METRIC CONVERSION		
1 FOOT	=	0.3048 metres
1 INCH	=	0.0254 metres

Note: Subject to all lawfully existing plans of division

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1886

VOLUME 5265 FOLIO 136

Edition 4
Date Of Issue 04/05/1995
Authority CONVERTED TITLE

South Australia

I certify that the registered proprietor is the proprietor of an estate in fee simple (or such other estate or interest as is set forth) in the land within described subject to such encumbrances, liens or other interests set forth in the schedule of endorsements.

REGISTRAR-GENERAL

REGISTRAR-GENERAL SOUTH AUSTRALIA

WARNING: BEFORE DEALING WITH THIS LAND, SEARCH THE CURRENT CERTIFICATE

REGISTERED PROPRIETORS IN FEE SIMPLE

SHAHIN BROTHERS PTY. LTD. OF 8 UNDIVIDED 10TH PARTS AND SHAHIN GROUP PTY. LTD. OF 2 UNDIVIDED 10TH PARTS BOTH OF C/- 701 PORT ROAD WOODVILLE SA 5011

DESCRIPTION OF LAND

ALLOTMENT 95 FILED PLAN 139175
IN THE AREA NAMED KENSINGTON
HUNDRED OF ADELAIDE

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

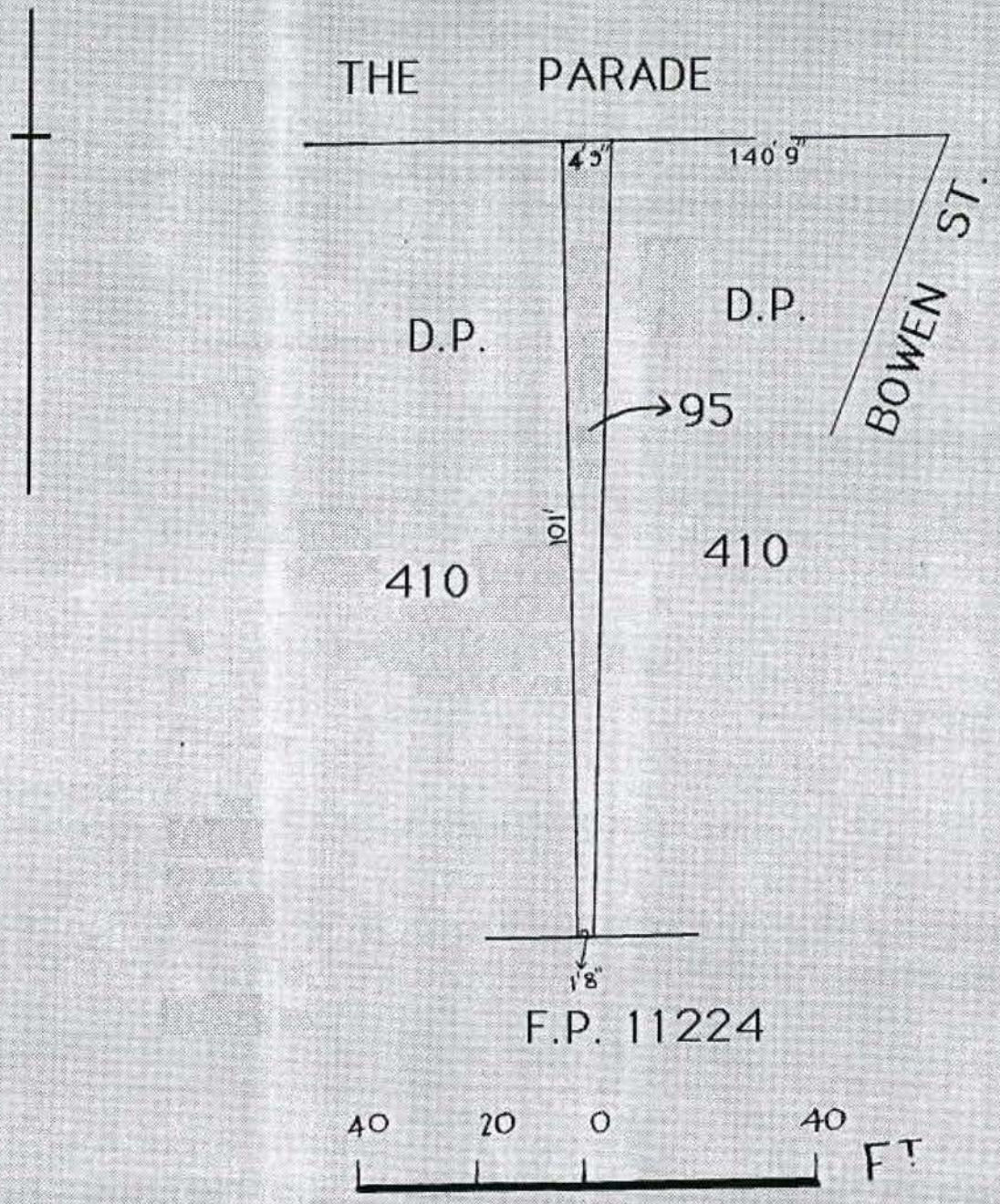
NIL

End of Text

104

This plan is scanned for Certificate of Title 864/26

LAST PLAN REF : D.P.410



DISTANCES ARE IN FEET AND INCHES FOR METRIC CONVERSION		
1 FOOT	=	0·3048 metres
1 INCH	=	0·0254 metres

Note : Subject to all lawfully existing plans of division

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1886

South Australia

VOLUME 5271 FOLIO 714

Edition 4
Date Of Issue 07/06/1995
Authority CONVERTED TITLE

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REGISTRAR-GENERAL

REGISTRAR-GENERAL SOUTH AUSTRALIA

WARNING: BEFORE DEALING WITH THIS LAND, SEARCH THE CURRENT CERTIFICATE

REGISTERED PROPRIETORS IN FEE SIMPLE

SHAHIN BROTHERS PTY. LTD. OF 8 UNDIVIDED 10TH PARTS AND SHAHIN GROUP PTY. LTD. OF 2 UNDIVIDED 10TH PARTS BOTH OF C/- 701 PORT ROAD WOODVILLE SA 5011

DESCRIPTION OF LAND

ALLOTMENT 23 DEPOSITED PLAN 410
IN THE AREA NAMED KENSINGTON
HUNDRED OF ADELAIDE

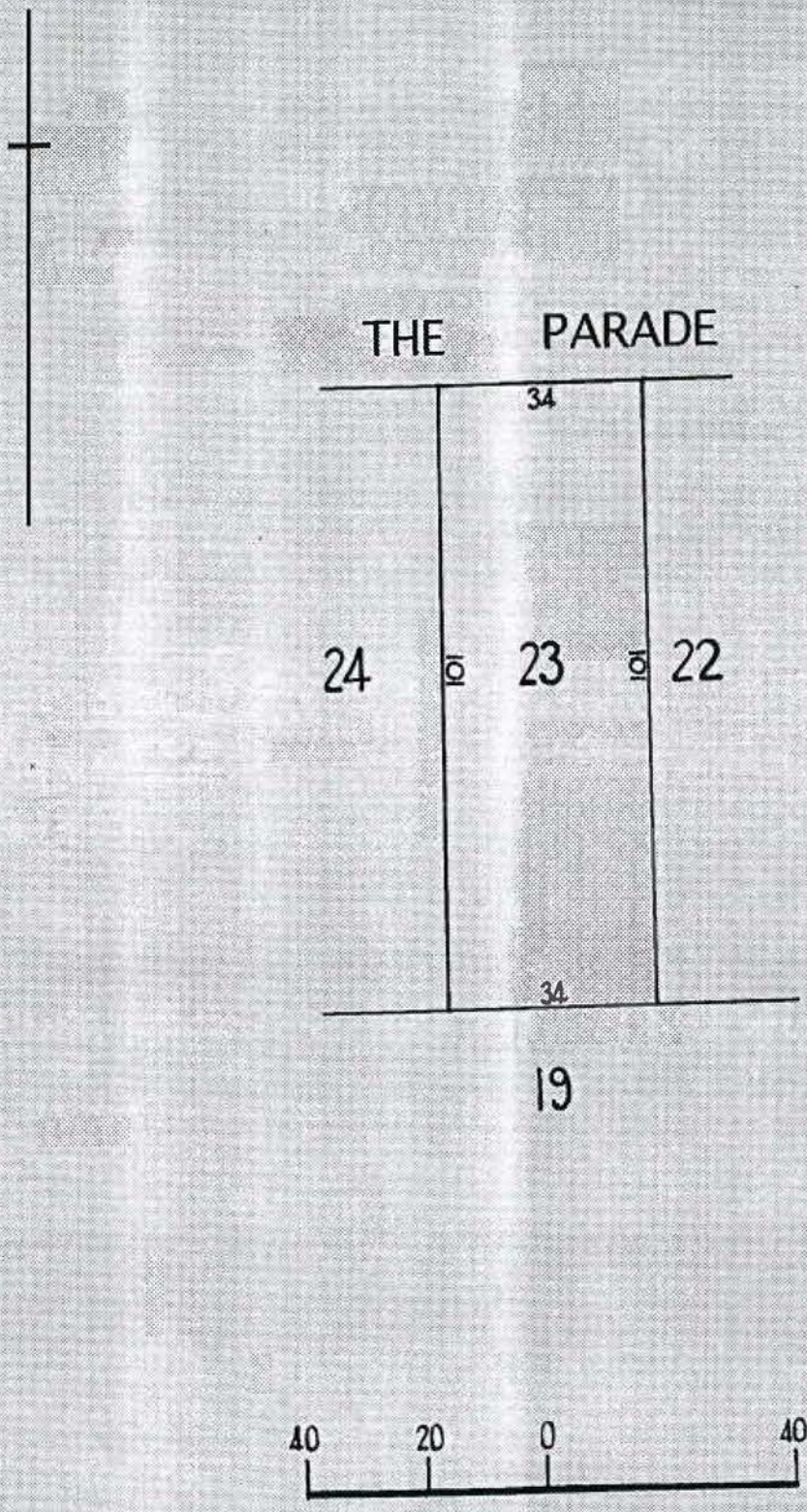
EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

NIL

End of Text



DISTANCES ARE IN FEET AND INCHES
FOR METRIC CONVERSION
1 FOOT = 0·3048 metres
1 INCH = 0·0254 metres

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1886

VOLUME 5272 FOLIO 818

Edition 4
Date Of Issue 14/06/1995
Authority CONVERTED TITLE

South Australia

I certify that the registered proprietor is the proprietor of an estate in fee simple (or such other estate or interest as is set forth) in the land within described subject to such encumbrances, liens or other interests set forth in the schedule of endorsements.

REGISTRAR-GENERAL

REGISTRAR-GENERAL SOUTH AUSTRALIA

WARNING: BEFORE DEALING WITH THIS LAND, SEARCH THE CURRENT CERTIFICATE

REGISTERED PROPRIETORS IN FEE SIMPLE

SHAHIN BROTHERS PTY. LTD. OF 8 UNDIVIDED 10TH PARTS AND SHAHIN GROUP PTY. LTD. OF 2 UNDIVIDED 10TH PARTS BOTH OF C/- 701 PORT ROAD WOODVILLE SA 5011

DESCRIPTION OF LAND

ALLOTMENT 94 FILED PLAN 139174
IN THE AREA NAMED KENSINGTON
HUNDRED OF ADELAIDE

EASEMENTS

SUBJECT TO FREE AND UNRESTRICTED RIGHTS OF WAY OVER THE LAND MARKED A

SCHEDULE OF ENDORSEMENTS

NIL

End of Text.

This plan is scanned for Certificate of Title 3211/12
See title text for easement details.

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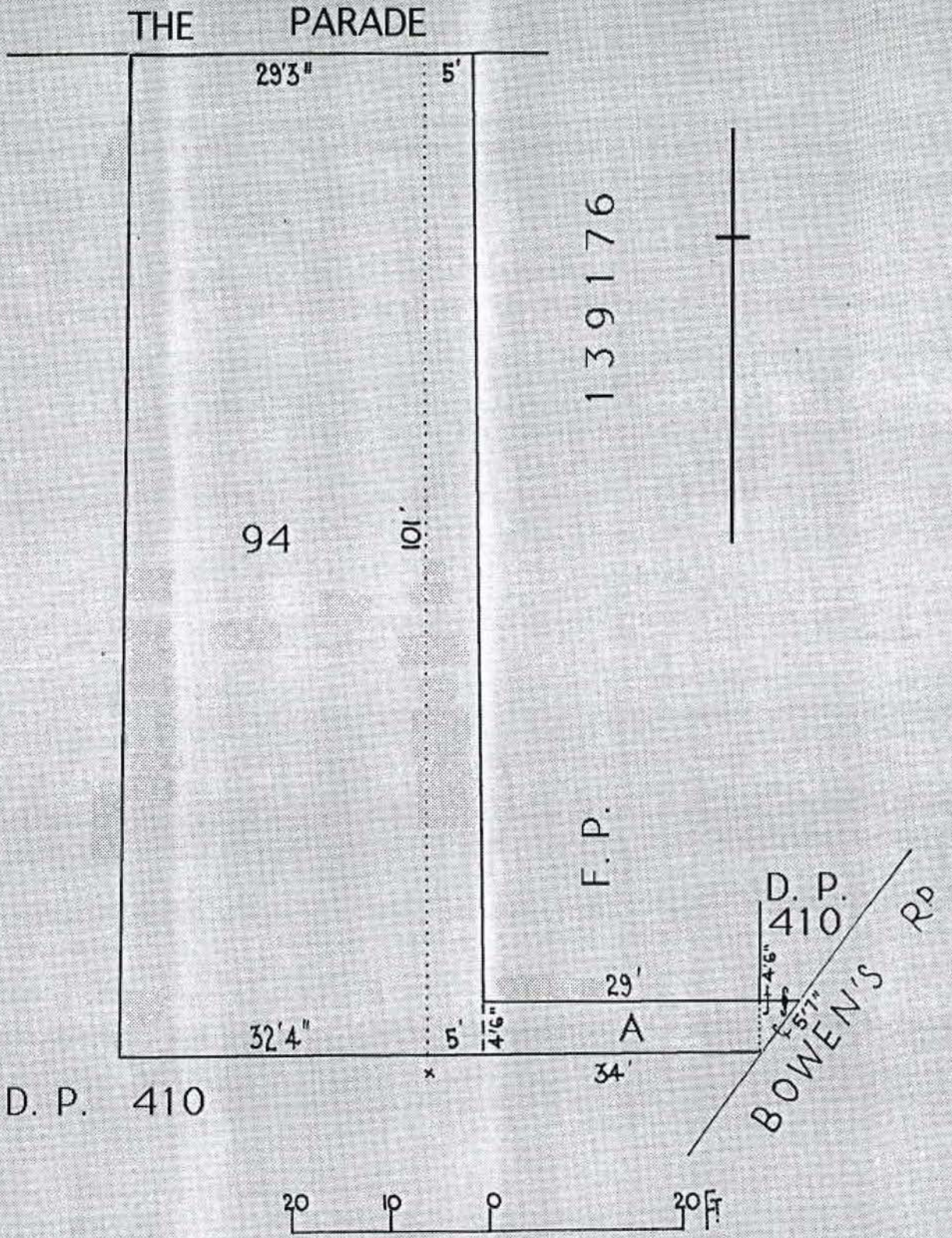


DISTANCES ARE IN FEET AND INCHES FOR METRIC CONVERSION		
1 FOOT	=	0·3048 metres
1 INCH	=	0·0254 metres

Note : Subject to all lawfully existing plans of division

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1886

VOLUME 5272 FOLIO 819

Edition 4
Date Of Issue 14/06/1995
Authority CONVERTED TITLE

South Australia

I certify that the registered proprietor is the proprietor of an estate in fee simple (or such other estate or interest as is set forth) in the land within described subject to such encumbrances, liens or other interests set forth in the schedule of endorsements.

REGISTRAR-GENERAL

REGISTRAR-GENERAL SOUTH AUSTRALIA

WARNING: BEFORE DEALING WITH THIS LAND, SEARCH THE CURRENT CERTIFICATE

REGISTERED PROPRIETORS IN FEE SIMPLE FOR LESS THAN ENTIRETY

SHAHIN BROTHERS PTY. LTD. OF 4 UNDIVIDED 10TH PARTS AND SHAHIN GROUP PTY. LTD. OF 1 UNDIVIDED 10TH PART BOTH OF C/- 701 PORT ROAD WOODVILLE SA 5011

DESCRIPTION OF LAND

ALLOTMENT 96 FILED PLAN 139176
IN THE AREA NAMED KENSINGTON
HUNDRED OF ADELAIDE

EASEMENTS

TOGETHER WITH A FREE AND UNRESTRICTED RIGHT OF WAY OVER THE LAND MARKED A

SCHEDULE OF ENDORSEMENTS

NIL

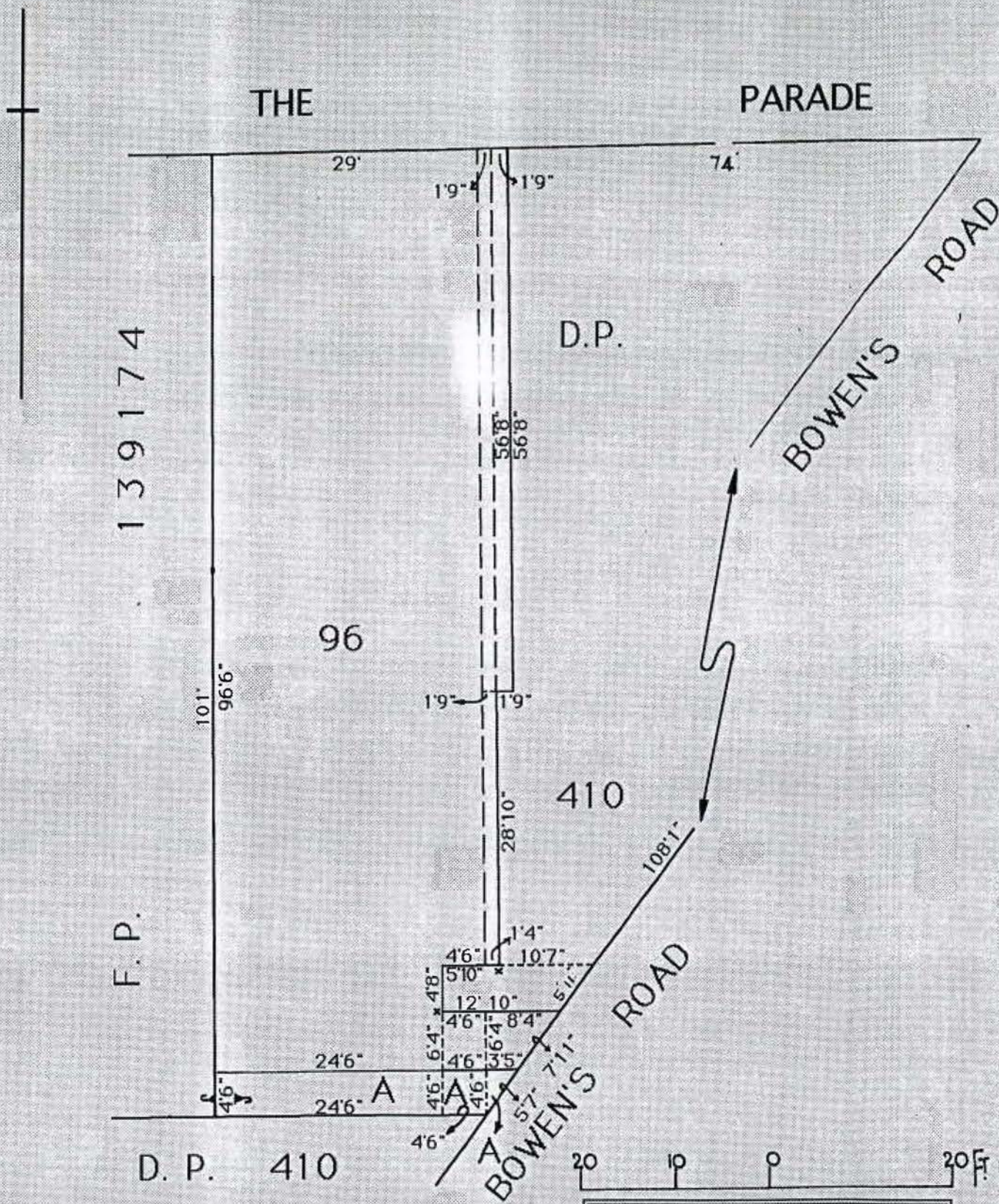
End of Text

104

This plan is scanned for Certificate of Title 2491/84

See title text for easement details.

LAST PLAN REF :D.P.410



DISTANCES ARE IN FEET AND INCHES
FOR METRIC CONVERSION

1 FOOT = 0·3048 metres

1 INCH = 0·0254 metres

Note : Subject to all lawfully existing plans of division

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5933 FOLIO 307 *

COST : $25.00 (GST exempt)	PARENT TITLE : CT 5271/948
REGION : EMAIL	AUTHORITY : RTD 9544126
AGENT : SHENP BOX NO : 000	DATE OF ISSUE : 05/01/2005
SEARCHED ON : 12/02/2013 AT : 08:59:27	EDITION : 2

REGISTERED PROPRIETORS IN FEE SIMPLE

SHAHIN BROTHERS PTY. LTD. OF 8 UNDIVIDED 10TH PARTS AND SHAHIN GROUP PTY. LTD. OF 2 UNDIVIDED 10TH PARTS BOTH OF C/- 701 PORT ROAD WOODVILLE SA 5011

DESCRIPTION OF LAND

ALLOTMENT 12 DEPOSITED PLAN 61746
IN THE AREA NAMED KENSINGTON
HUNDRED OF ADELAIDE

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

10110198 MORTGAGE TO ST.GEORGE BANK LTD.

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

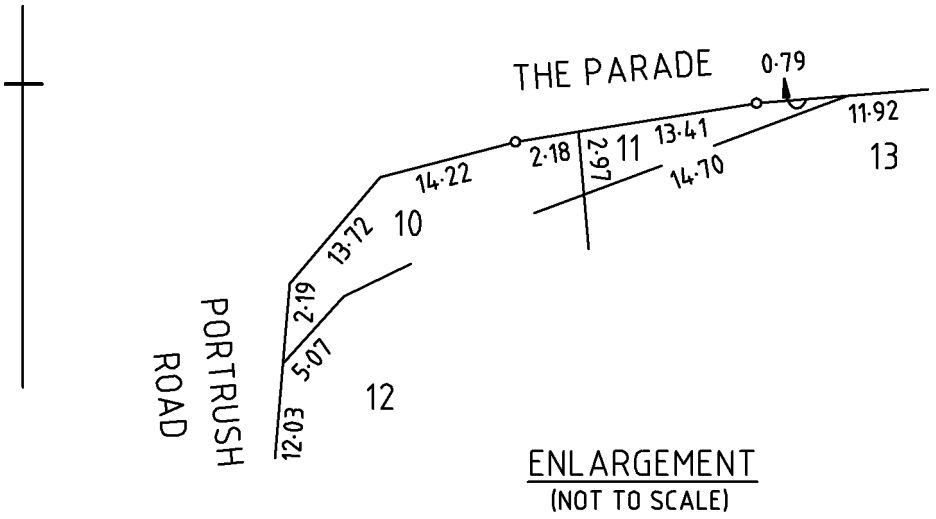
PLAN FOR LEASE PURPOSES GP 654/94

END OF TEXT.

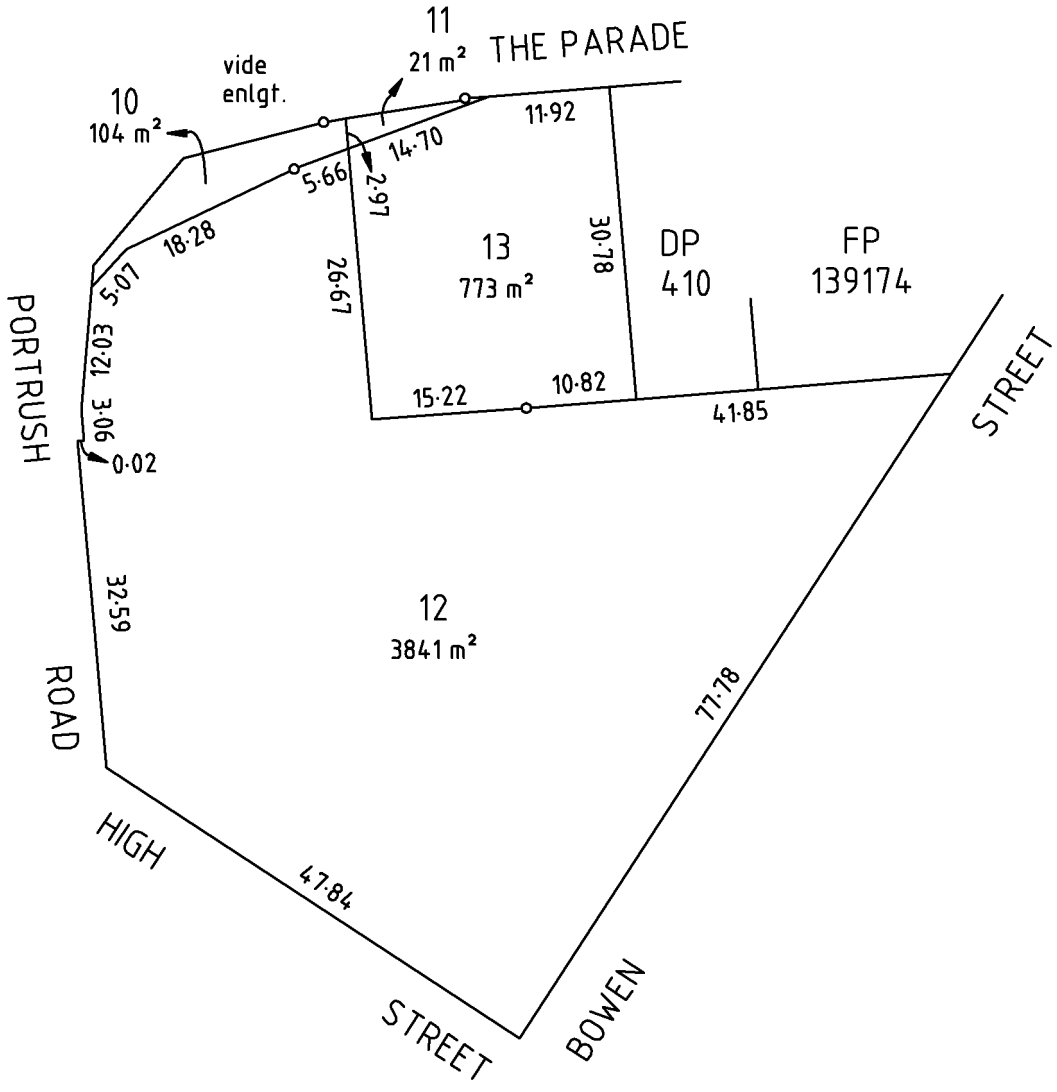
LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5933 FOLIO 307

SEARCH DATE : 12/02/2013 TIME: 08:59:27



ENLARGEMENT
(NOT TO SCALE)



0 7·5 15 22·5 30 Metres

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5933 FOLIO 308 *

COST : $25.00 (GST exempt)	PARENT TITLE : CT 5186/227
REGION : EMAIL	AUTHORITY : RTD 9544126
AGENT : SHENP BOX NO : 000	DATE OF ISSUE : 05/01/2005
SEARCHED ON : 12/02/2013 AT : 09:00:32	EDITION : 2

REGISTERED PROPRIETORS IN FEE SIMPLE

SHAHIN BROTHERS PTY. LTD. OF 8 UNDIVIDED 10TH PARTS AND SHAHIN GROUP PTY. LTD. OF 2 UNDIVIDED 10TH PARTS BOTH OF C/- 701 PORT ROAD WOODVILLE SA 5011

DESCRIPTION OF LAND

ALLOTMENT 13 DEPOSITED PLAN 61746
IN THE AREA NAMED KENSINGTON
HUNDRED OF ADELAIDE

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

10110198 MORTGAGE TO ST.GEORGE BANK LTD.

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

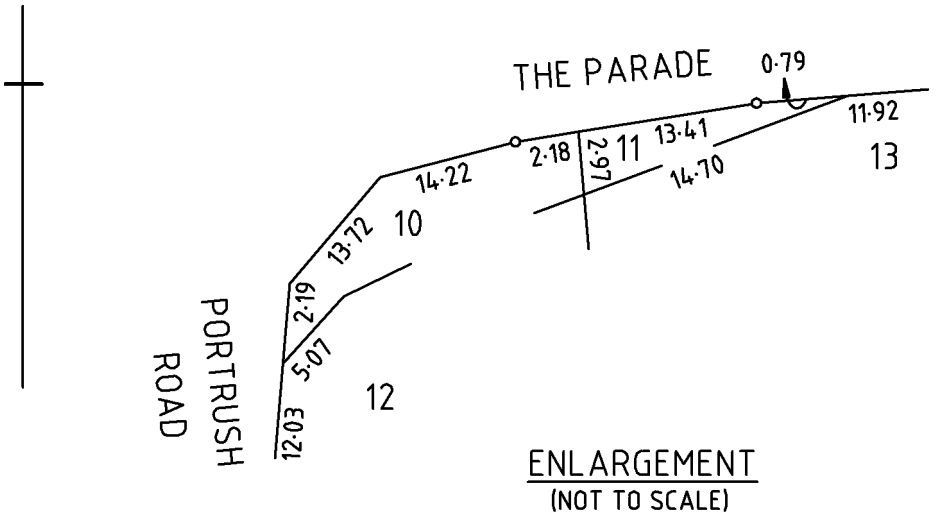
PLAN FOR LEASE PURPOSES GP 654/94

END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5933 FOLIO 308

SEARCH DATE : 12/02/2013 TIME: 09:00:32



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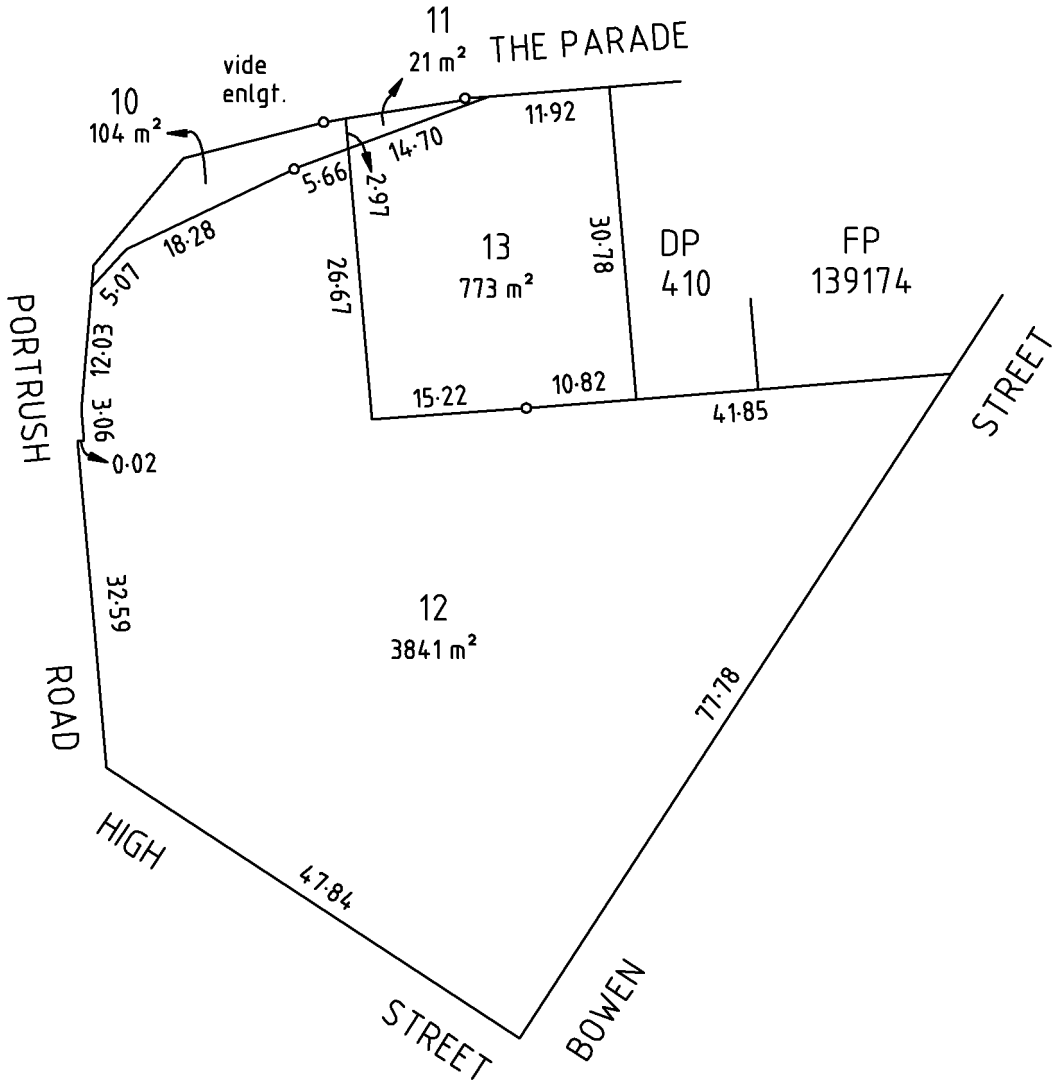
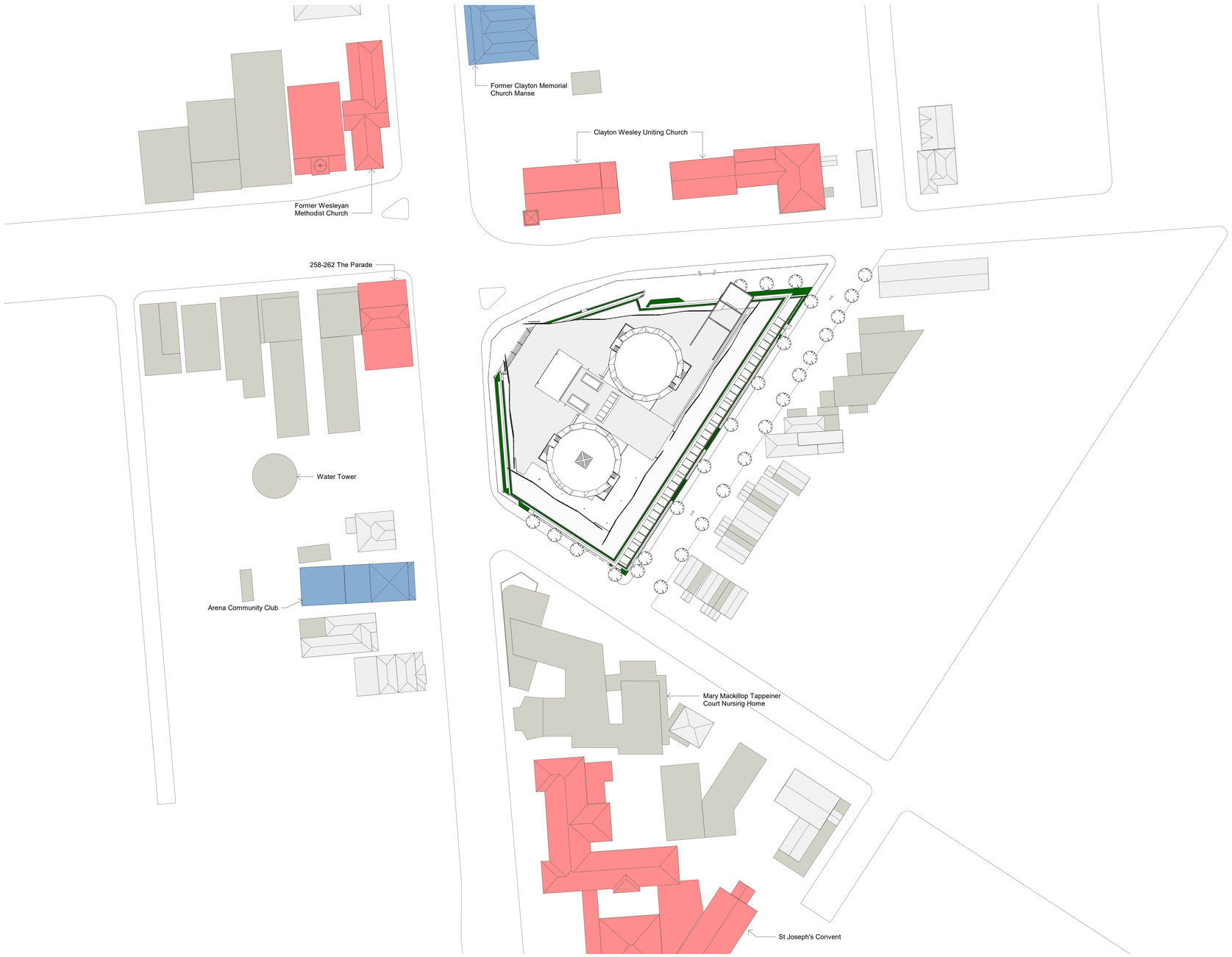
(NOT TO SCALE)



0 7·5 15 22·5 30 Metres

APPENDIX C

APPLICATION PLANS PREPARED BY MPH



1 Location Plan
DD_4_00 1 : 500

DD Sheet List			
Sheet Number	Sheet Name	Current Revision	Current Revision Date
Site Plan			
DD_0_00	Title Sheet	1	05/12/18
Site Plan			
DD_1_00	Site Plan	1	05/12/18
Concrete Profile Plan			
DD_1_10	Concrete Profile Plan - Grnd		
DD_1_11	Concrete Profile Plan - L01		
DD_1_12	Concrete Profile Plan - L02		
DD_1_13	Concrete Profile Plan - L03		
DD_1_14	Concrete Profile Plan - L04		
DD_1_15	Concrete Profile Plan - L05		
DD_1_16	Concrete Profile Plan - L06		
DD_1_17	Concrete Profile Plan - Plant		
DD_1_18	Concrete Profile Plan - Plant Roof		
General Arrangement Plan			
DD_1_50	GA Floor Plan - Grnd	2	25/02/19
DD_1_51	GA Floor Plan - L01	1	05/12/18
DD_1_52	GA Floor Plan - L02	1	05/12/18
DD_1_53	GA Floor Plan - L03	1	05/12/18
DD_1_54	GA Floor Plan - L04	1	05/12/18
DD_1_55	GA Floor Plan - L05	1	05/12/18
DD_1_56	GA Floor Plan - L06	1	05/12/18
DD_1_57	GA Floor Plan - Plant	1	05/12/18
DD_1_58	GA Floor Plan - Plant Roof	1	05/12/18
DD_1_59	GA Floor Plan - Helipad	1	05/12/18
FF&E Plan			
DD_2_50	FF&E Plan - Grnd		
DD_2_51	FF&E Plan - L01		
DD_2_52	FF&E Plan - L02		
DD_2_53	FF&E Plan - L03		
DD_2_54	FF&E Plan - L04		
DD_2_55	FF&E Plan - L05		
DD_2_56	FF&E Plan - L06		
Reflected Ceiling Plan			
DD_3_00	RCP - Grnd	1	05/12/18
DD_3_01	RCP - L01	1	05/12/18
DD_3_02	RCP - L02	1	05/12/18
DD_3_03	RCP - L03	1	05/12/18
DD_3_04	RCP - L04	1	05/12/18
DD_3_05	RCP - L05	1	05/12/18
DD_3_06	RCP - L06	1	05/12/18
DD_3_07	RCP - L07 - Plant	1	05/12/18
External Elevations			
DD_4_00	Elevation	1	05/12/18
DD_4_01	Elevation	1	05/12/18
DD_4_02	Elevation	1	05/12/18
DD_4_03	Elevation	1	05/12/18
DD_4_04	Elevation	1	05/12/18
Building Section			
DD_4_50	Sections	1	05/12/18
DD_4_51	Sections	1	05/12/18
DD_4_52	Sections	1	05/12/18
DD_4_53	Sections	1	05/12/18
DD_4_54	Sections	1	05/12/18
DD_4_55	Sections	1	05/12/18
DD_4_56	Sections	1	05/12/18
DD_4_57	Sections	1	05/12/18
Plan Details			
DD_5_00	Plan Details		
DD_5_01	Plan Details		
DD_5_02	Plan Details		
DD_5_03	Plan Details		
Stair Core			
DD_5_20	Stair Core - Plans & Sections	1	05/12/18
DD_5_21	Atrium Stair - Plans	1	05/12/18
DD_5_22	Atrium Stair - Plans	1	05/12/18
DD_5_23	Atrium Stair - Sections	1	05/12/18
DD_5_24	Stair Details		
Section Details			
DD_5_50	Section Details		
DD_5_51	Section Details		
DD_5_52	Stair Details		
DD_5_53	Section Details		
Amenities Details			
DD_7_00	Amenities Plans & Elevations	1	05/12/18
DD_7_01	Amenities Plans & Elevations		
DD_7_02	EOT Plan & Elevations		
Joinery Details			
DD_8_00	Joinery		
DD_8_01	Joinery		
DD_8_02	Joinery		
DD_8_03	Joinery		
Systems Furniture			
DD_9_00	Systems Furniture		
DD_9_01	Systems Furniture		
Door Schedule			
DD_11_00	Door Schedule		

Total: 72

no	amendment/issue	date	by
1	95% DD Issue	05/12/18	

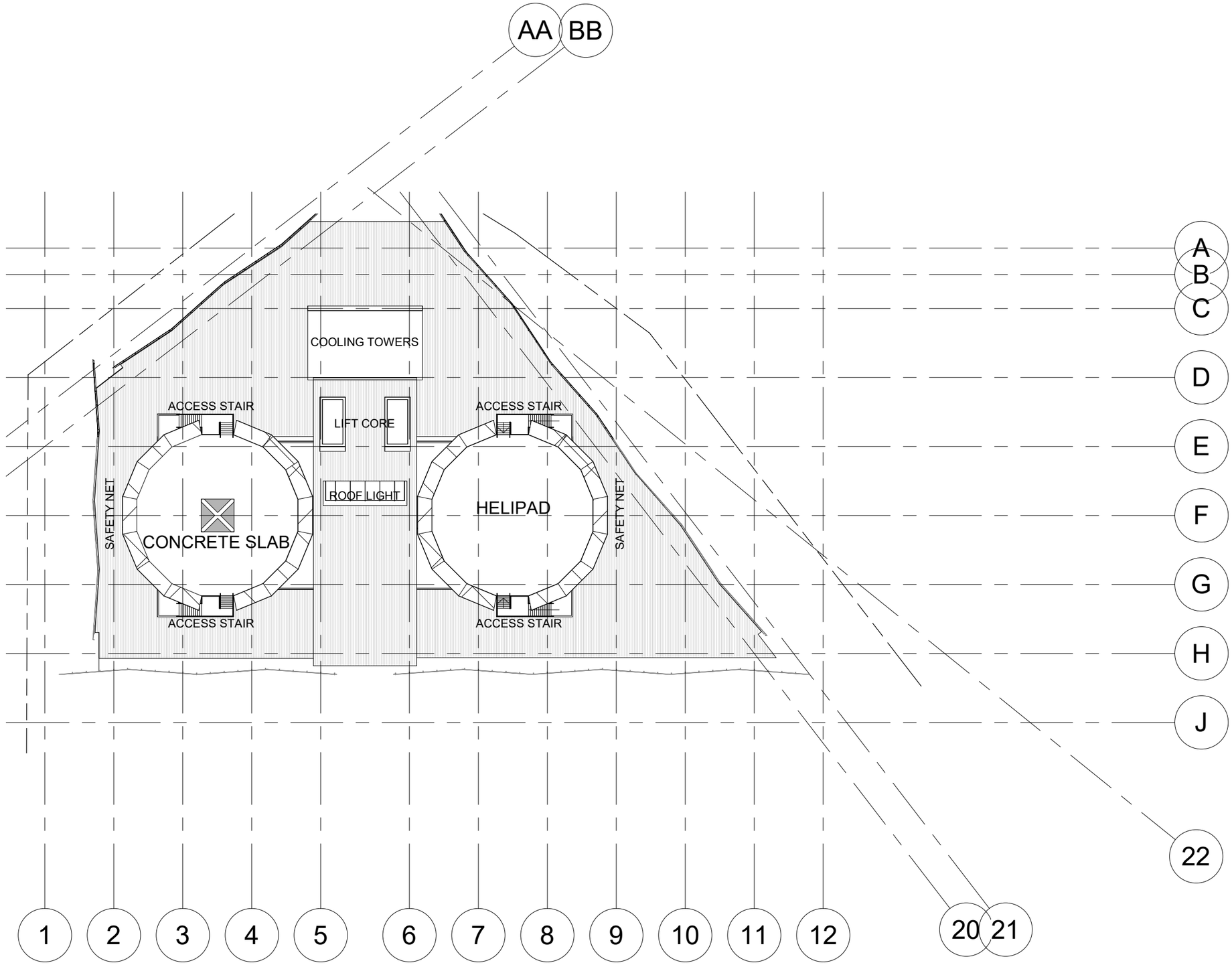
scale
2.0 m 10.0 m 5.0 m 25.0 m
north
NORTH

Whilst every effort has been made to capture all relevant details on these plans, it is acknowledged that these plans are for planning purposes only and may not contain complete information pertaining to the development. All relevant and necessary details will be documented in the detailed design and plans submitted for Building Rules Consent.

Preliminary

mph
ABN 16 759 676 449
5 Vardon Avenue Adelaide South Australia 5000
Telephone 08 8418 1600
www.mpharchitects.com.au

project Peregrine Head Office Development
title Title Sheet
scale 1 : 500 @A0 drawn Designer
date 24/01/19 checked Checker
project 1465 drawing DD_0_00 (1)



0 5 25m

mph

5 Vardon Avenue Adelaide South Australia 5000 | Telephone 08 8418
ABN 16 759 676 449

www.mpharchitects.com.au

Peregrine Head Office Development
Roof Plan

1465 22/11/18 scale 1 : 500 @ A3 SK08 (15)

mph

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ABN 16 759 676 449

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ARTIST IMPRESSION

Peregrine Head Office Development
3D Overview

1465 22/11/18 scale @ A3 SK21 (15)

mph

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ABN 16 759 676 449

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ARTIST IMPRESSION

Peregrine Head Office Development
Parade looking West

1465 22/11/18 scale @ A3 SK24 (15)

mph

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ABN 16 759 676 449

www.mpharchitects.com.au

ARTIST IMPRESSION

Peregrine Head Office Development
South East view from The Parade

1465 06/11/18 scale @ A3 SK25 (14)

mph

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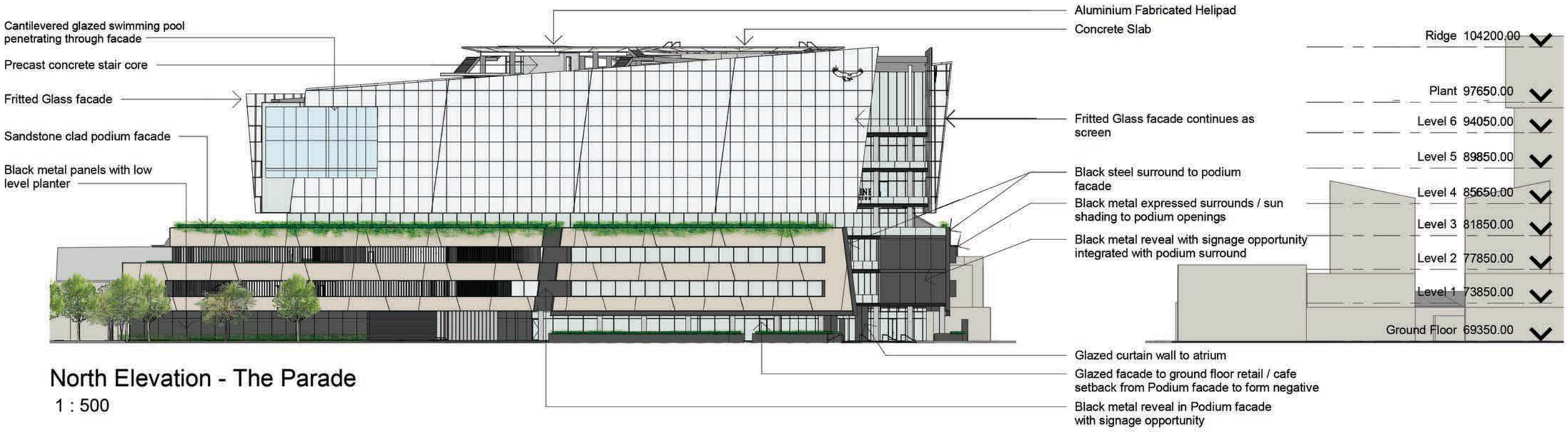
ABN 16 759 676 449

www.mpharchitects.com.au

ARTIST IMPRESSION

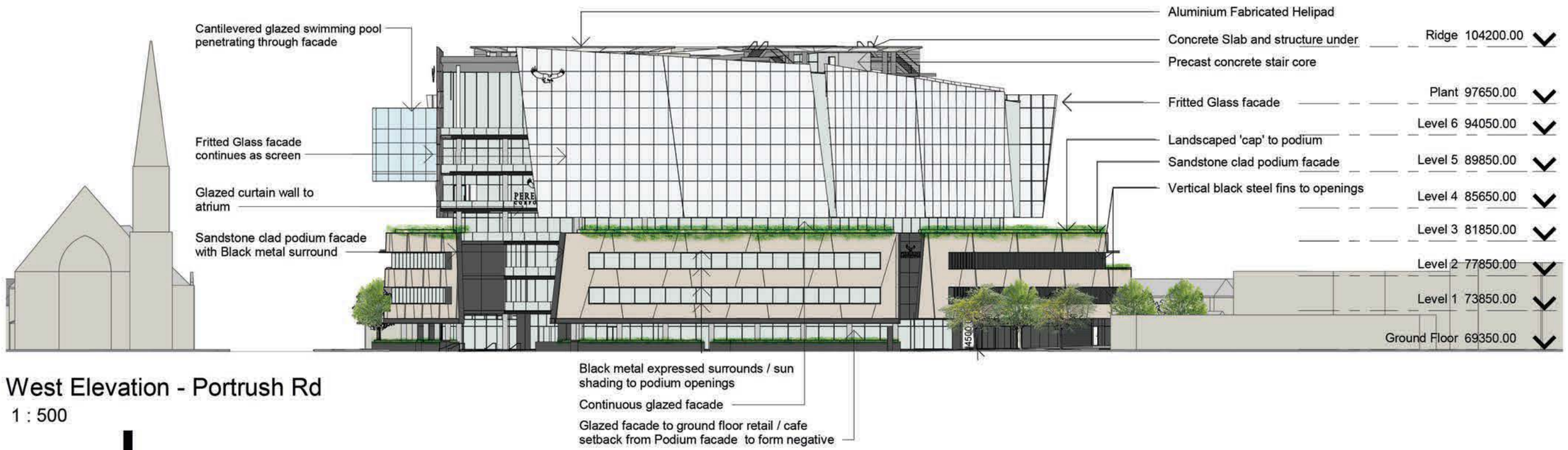
Peregrine Head Office Development
Portrush looking North

1465 22/11/18 scale @ A3 SK27 (14)



North Elevation - The Parade

1 : 500



West Elevation - Portrush Rd

1 : 500

mph

5 Vardon Avenue Adelaide South Australia 5000 | Telephone 08 8418
ABN 16 759 676 449

www.mpharchitects.com.au

Peregrine Head Office Development
Elevations

1465 22/11/18 scale 1 : 500 @ A3 SK36 (15)

mph

5 Vardon Avenue Adelaide South Australia 5000 | Telephone 08 8418
ABN 16 759 676 449

www.mpharchitects.com.au

ARTIST IMPRESSION

Peregrine Head Office Development
Parade looking East

1465 22/11/18 scale @ A3 SK47 (13)

mph

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ABN 16 759 676 449

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ARTIST IMPRESSION

Peregrine Head Office Development
Portrush looking South

1465 22/11/18 scale @ A3 SK48 (12)

mph

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ABN 16 759 676 449

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ARTIST IMPRESSION

Peregrine Head Office Development
High St looking West

1465 22/11/18 scale @ A3 SK49 (13)

mph

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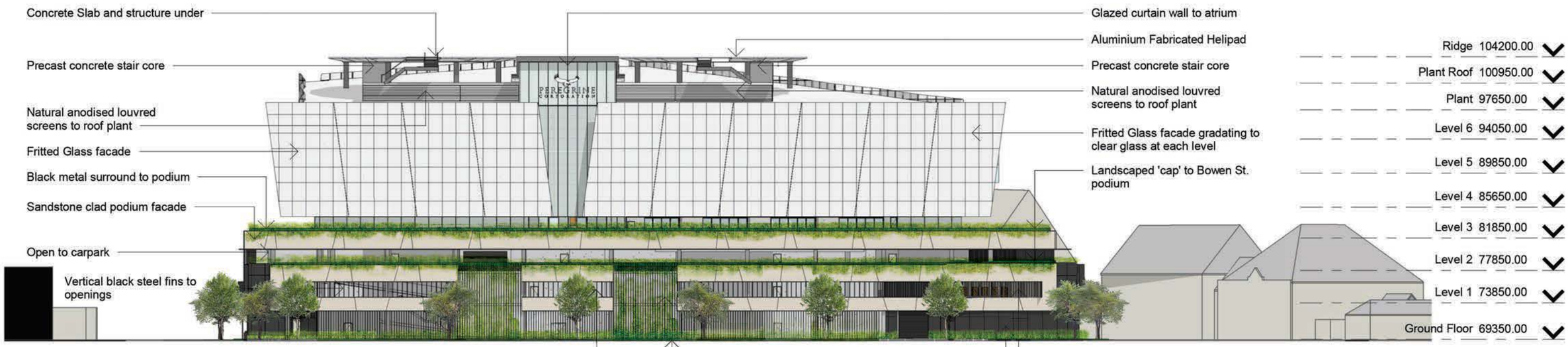
ABN 16 759 676 449

www.mpharchitects.com.au

ARTIST IMPRESSION

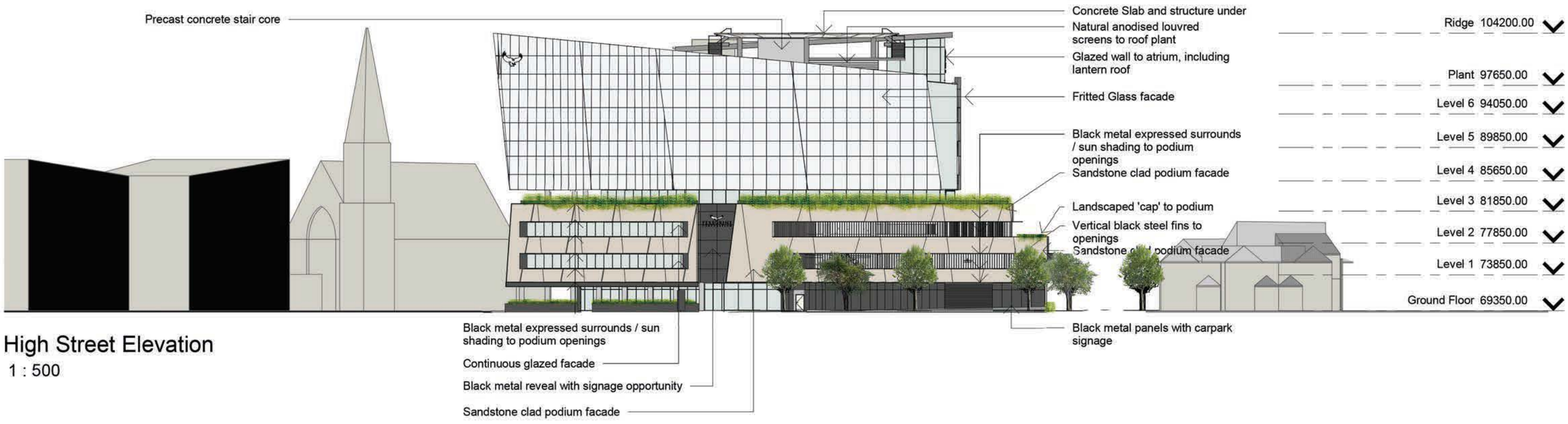
Peregrine Head Office Development
High St looking West

1465 05/12/17 scale @ A3 SK49 (11)



Bowen St Elevation

1 : 500



High Street Elevation

1 : 500

mph

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ABN 16 759 676 449

www.mpharchitects.com.au

Peregrine Head Office Development
Elevations

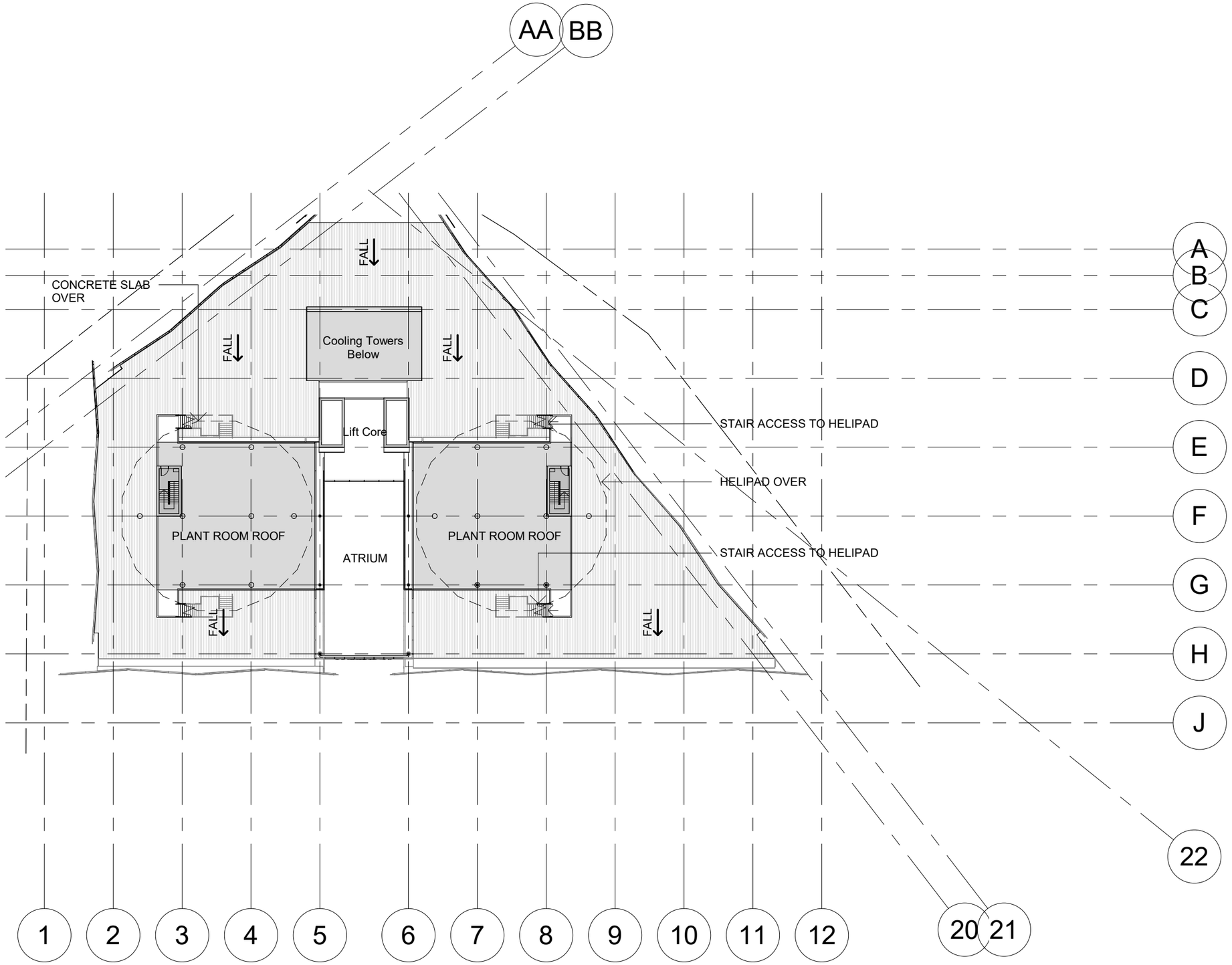
1465 22/11/18 scale 1 : 500 @ A3 SK54 (11)

5 Vardon Avenue Adelaide South Australia 5000 | Telephone 08 8418
ABN 16 759 676 449

www.mpharchitects.com.au

Peregrine Head Office Development
Plant Room

1465 22/11/18 scale 1 : 500 @ A3 SK69 (2)

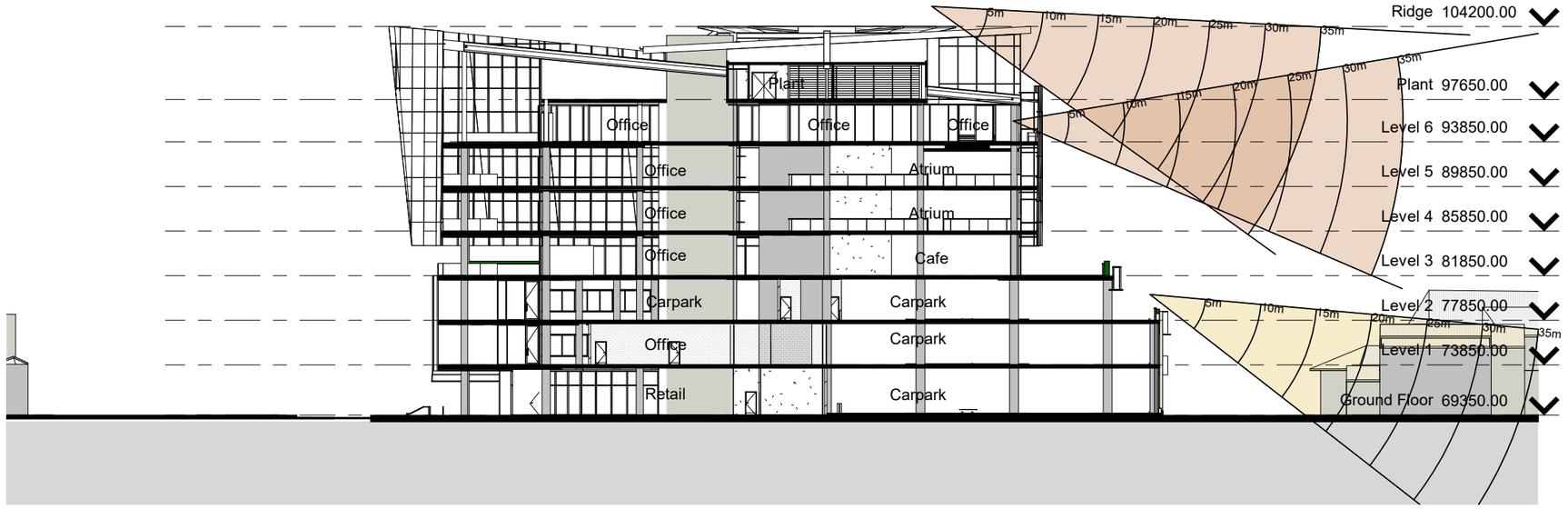


5 Vardon Avenue Adelaide South Australia 5000 | Telephone 08 8418
ABN 16 759 676 449

www.mpharchitects.com.au

Peregrine Head Office Development
Plant Roof

1465 22/11/18 scale 1 : 500 @ A3 SK70 (2)



Section A

1 : 500

Section B

1 : 500

5 Vardon Avenue Adelaide South Australia 5000 | Telephone 08 8418
ABN 16 759 676 449

www.mpharchitects.com.au

Peregrine Head Office Development
Sections

1465 03/06/19 scale 1 : 500 @ A3 SK35 13

APPENDIX D

AVIATION SPECIALIST ADVICE REPORT PREPARED BY FLIGHT SAFETY

PUBLIC ENVIRONMENT REPORT
AVIATION EXTRACT

AVIATION SPECIALIST ADVICE REPORT

PREPARED BY COLIN WEIR

MAY 2019

Flight Safety Group Reference: FS_PC Infrastructure_Peregrine CBD HO HLS_25052019

FLIGHT SAFETY PTY LTD

22 EASTERN RIDGE, HIDDEN VALLEY, WALLAN, VIC 3756, AUSTRALIA

T: +61 7 5448 2788 | office@flightsafety.com.au | www.flightsafety.com.au

ABN: 42 129 204 032

TABLE OF CONTENTS

1. INTRODUCTION

i. My name is Colin Weir I am the CEO of the Flight Safety Group of Companies with branches in Australia, South Africa and New Zealand. My address and registered office is at 22 Eastern Ridge, Hidden Valley, Wallan VIC 3756. My qualifications, experience and company profile are detailed in Appendix 1 and 2 of this report.

ii. I am a licenced and qualified Commercial/ATPL pilot with 54 years' experience, I have conducted over 2000 external aviation safety audits in the global arena, the majority of these have been rotary wing operations. We currently have contracts with multiple organisations, primarily with rotary wing operations e.g. NSW Ambulance Health Emergency and Aeromedical Services, NSW Ambulance – Aeromedical Operations, Australian Federal Police etc. We also conduct offshore helideck and onshore helipad inspections and we design onshore surface level and elevated helipads. This brief overview supported by the detailed Appendix documents 1 & 2, provides the justification for my ability to provide this report.

iii. I have been requested by Peregrine Corporation/PC Infrastructure Pty Ltd to prepare a report in response to the following:

2. PREAMBLE

PUBLIC ENIVRONMENT REPORT - AVIATION EXTRACT

Specialist Report and Details – Relevant Plan

Flight path and aviation management matters, including emergency management, and interplay with existing regulatory frameworks, including Civil Aviation Safety requirements.

Critical Assessment

3. GUIDELINE 1: AVIATION OPERATIONS

The development proposes a Helicopter Landing Facility on the roof of the building for use not more than 10 calendar days per year and during daylight hours. Given the proximity of the subject site to residential development, educational, communal and public facilities, businesses and major arterial roads, the operation of the Helicopter Landing Facility and associated safety risks should be investigated, with a focus on emergency planning and response.

TOPIC:

Evaluate the impacts of the Helicopter Landing Facility to the locality, including key risks, and identify required management techniques to mitigate and suitably address those impacts and risks, including but not limited to the following.

4. RESPONSES

a. Clarification regarding the proposed nature, frequency and timing of use for both the Helicopter Landing Facility and adjacent concrete slab;

It is proposed that three different types of helicopters are to be used:

- BELL 206 (13m 'D' value) – one pilot, 4 passengers;
- EC 130 (13m 'D' value) – one pilot, 6 passengers; and
- AW109/H109 (13m 'D' value) – one or two pilots, 6-7 passengers.

As described: Helicopter movements are to be solely associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken. Helicopter activity will operate on no more than 10 days per year and only during daylight hours.

Noise Pollution Controls

There are significant mitigating factors integral with helicopter operations to this helipad, they are:

- The height of the seven-storey rooftop helipad design will significantly reduce noise levels.
- The highest noise levels occur during the hover and take-off phases of flight, and this will occur at low level over the helipad where the maximum shielding effect is available with the extended rooftop area.
- The duration of the maximum power settings is applicable to both the pre-landing, hover phase of flight (usually accomplished within 45 seconds) and the take-off phase of flight (usually accomplished within 60 seconds).
- The lowest noise level is while the helicopter is at idle on the helipad.
- Passengers will egress after engine shut-down and this process is normally completed within ten minutes, i.e. 3 minutes to shut-down and 7 minutes to offload.
- The start-up and departure will occur in 5 – 10 minutes in accordance with the above noise control parameters.

The following Enhanced Safety Management processes will be implemented:

Although there is no aviation legislative requirement to run this operation as a fully-fledged commercial aviation exercise, i.e. under a Civil Aviation Safety Authority, Air Operator's Certificate (AOC) – this being an authorisation granted by CASA under the section 27 of the Civil Aviation Act, to conduct commercial activities prescribed by regulation 206 of the Civil Aviation Regulations 1988 (CAR), it has been deemed prudent to structure this operation to a commercial level, to afford the maximum possible levels of safety as a corporate due diligence initiative and to ensure the safety of the general public.

The following is relevant:

- The Operators of these three helicopter types will be audited on an annual basis, during this process the aircraft concerned will be inspected and the experience levels of the proposed pilots examined and approved if they comply.
- The main Aluminium helipad has been designed to fully comply as a Certified ANNEX 14 VOL II helipad, in keeping with global standards.
- There will be a trained HLSO (Helicopter Landing Site Officer) onsite for every take-off and landing. The helipad will be inspected daily and audited annually.

- The HLSO's (Helipad Landing Safety Officers) will be VHF Airband radio trained, to ensure compliance with current VHF Airband radio operator's regulatory requirements.
- The helipad will be designed and approved in accordance with national and international requirements and the fire suppression system is the most advanced, in keeping with all new hospital helipads in Australia.
- A second concrete helipad has been designed to be available as an informal/temporary landing site for helicopters in the event of an emergency only. This helipad will meet the aircraft Weight ('t' value) & Size ('D' value) specification requirements. It is acknowledged that this is a generous contribution from a duty of care perspective.
- This concrete, secondary helipad will be marked as unserviceable, unless an emergency arises.
- The helipad will also be equipped with basic Crash Box and fire-fighting requirements.

b. Emergency planning – response considerations and parameters, including limitations;

The structural design of the helipad will meet all requirements for an elevated helipad; design considerations will include ICAO ANNEX 14 VOL II minimum standards for effective firefighting and operational safety controls.

- Markings as per ANNEX 14 VOL II.
- Rescue & Fire fighting forms part of the HLSO training as per ICAO Annex 14 VOL II Heliport Services-Chapter 6.1.
- Please refer to Section 3 a). above: **'The following Enhanced Safety Management processes will be implemented'**.

GENERAL DETAILS OF THE EMERGENCY MANAGEMENT PLAN

A fully developed Emergency Response Plan will be developed that is site specific and will form part of the overall Safety Management System. A Safety Manager will be appointed to manage the entire operation, and this will be complemented by an external audit process.

The extract below shows the format for the detailed Emergency Response Plan.

FLIGHT SAFETY

Emergency Response Plan
VERSION 1 Next Amendment – 30th June 2013

Revision Date – 25th November 2012

EMERGENCY RESPONSE PLAN

XXX

FOR ALL EMPLOYEES, CONTRACTORS AND VISITORS

EMERGENCY CONTROL TEAM	TELEPHONE	MOBILE
Emergency Controller	(0X) XXXX XXXX	
Deputy Emergency Controller	(0X) XXXX XXXX	XXXX XXXX
Chief Pilot	(0X) XXXX XXXX	XXXX XXXX

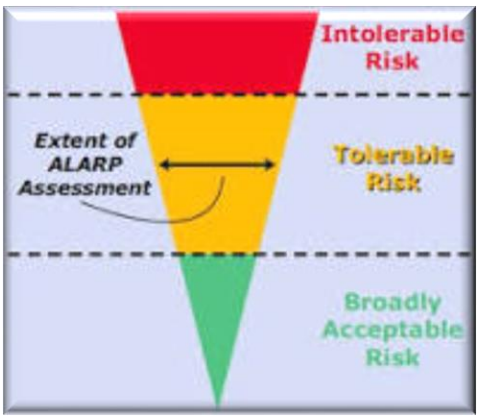
EXTERNAL EMERGENCY SERVICES

XXXXXX OFFICE NUMBER.....	XXXX XXXX
XXX FAX.....	XXXX XXXX
Search and Rescue.....	XXXX XXXX
Police.....	XXXX XXXX
Fire & Chemical Spill Crews.....	XXXX XXXX
Ambulance.....	XXXX XXXX
Poisons Information.....	XXXX XXXX
Airport: SECURITY CENTRE.....	XXXX XXXX
ATSB (Chief Pilot to Notify):.....	XXXX XXXX
24 hour Emergency Chemicals Information.....	XXXX XXXX

EMERGENCY CONTACTS

SAFETY CASE

Before operations commence a formal Risk Assessment/Safety Case will be carried out, encompassing the entire operation to ensure that any limitations or gaps will be identified and mitigated in accordance with ALARP (As Low As Reasonably Practicable) principles, as depicted below.



c. Proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure during take-off and landing;

The helipads have a design value of 19.6 m 'D' and all three helicopter types have 'D' values of 13m. This additional operational safety margin is considered expedient for operations with these three helicopter types and allows additional safety features during the highest risk, take-off and landing phases of flight.

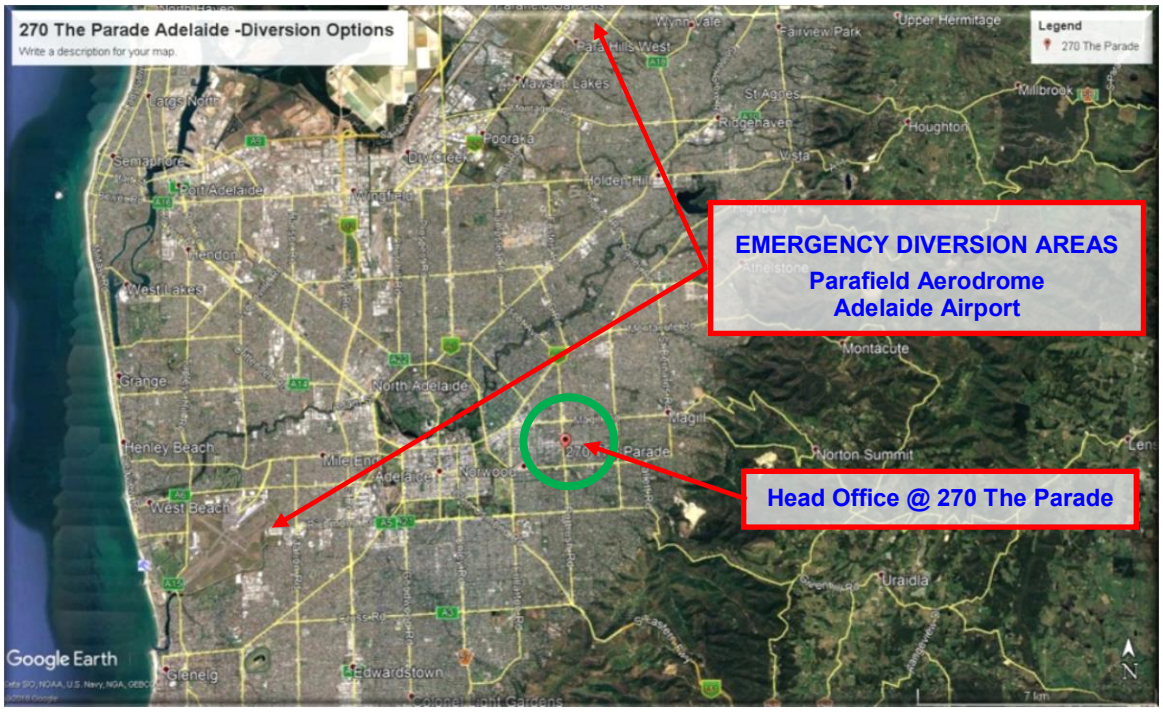
The Adelaide, Google Maps extracted below, identifies the Head Office site at 270 The Parade, Adelaide and identifies the available open areas that could be used as Emergency Laydown areas.

Fortuitously the proposed Head Office site is strategically situated in an area surrounded by multiple available sites. As all operations will be conducted during daylight hours only, all these sites become viable options for emergency use. In an emergency landing situation, helicopters, unlike fixed wing, only require a small area for an emergency landing.

d. Proximity, accessibility and availability of an alternative landing facility in the event of a catastrophic engine failure en-route to and from the Helicopter Landing Facility;

The Google map extract below indicates the two main Airports that could be used in a controlled emergency situation, however as this is a helicopter Day VFR (Visual Flight Rules) operation only, there are multiple emergency landing sites in the area of operation.

There are multiple rotary and fixed wing flights taking place daily, throughout this area. All aircraft operations taking place in this area fall under the Adelaide Air Traffic Control area and are therefore monitored at all times.



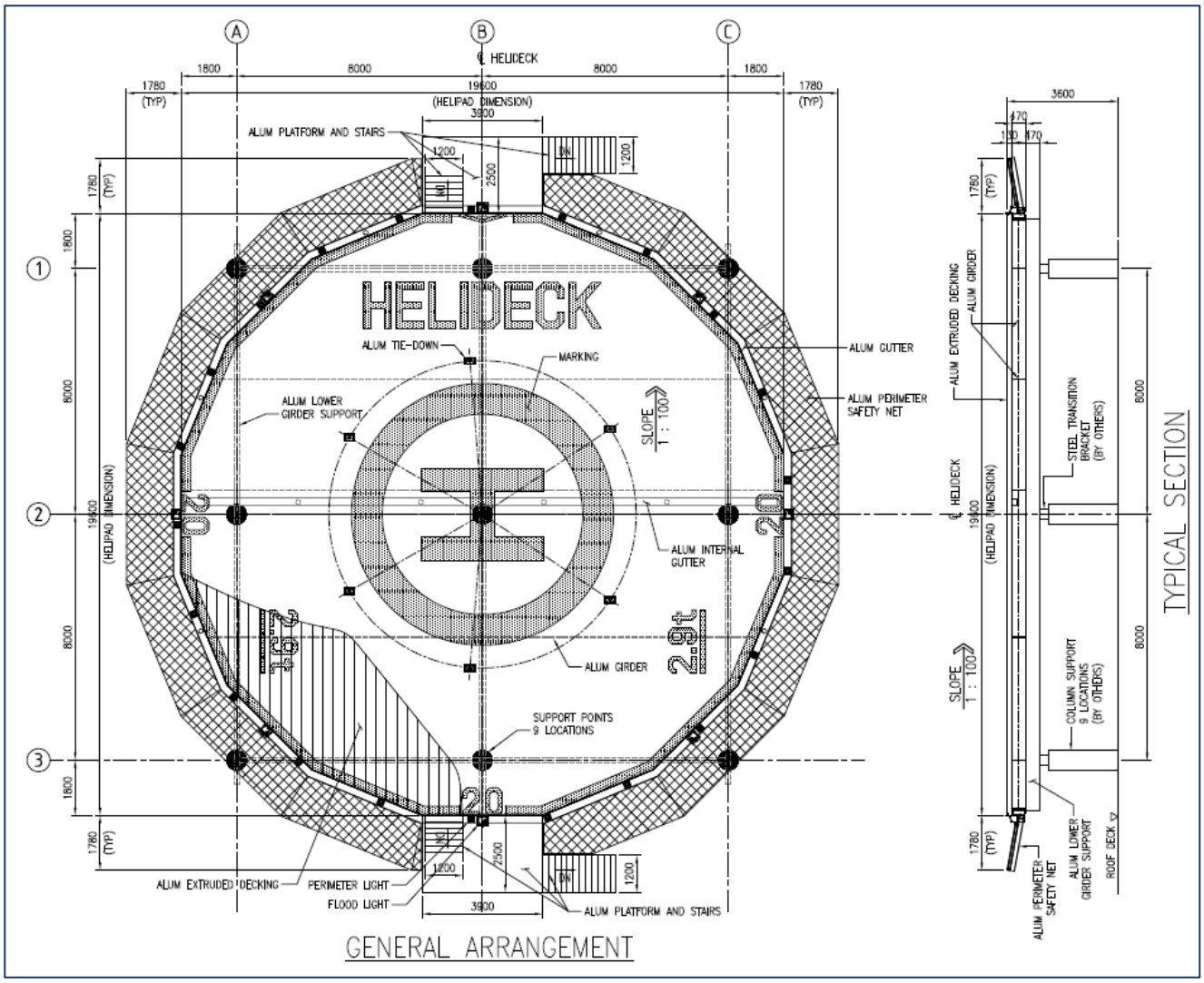
e. Safety considerations associated with the provision of any guidance and landing lights on the helicopter landing facility;

The elevated helipad design is in accordance with modern hospital helipads currently in use in Australia and is therefore compliant in all respects including lighting.

Although this will be for day only operations, the lighting is included to accommodate the possibility of lower visibility operations and to assist the pilot in identification and landing/take-off phases of flight. Even in daylight conditions, the lighting provides valuable visual reference assistance.

Additional identification options such as identification strobe lights or electronic landing aids are not required.

The lighting and general design features are included in the preliminary Drawing as below.



f. Design, safety and operational matters associated with any refuelling facilities;

There will be no Helifuel facility available for these Helipads. All refuelling will be carried out at the departure Heliport/Helipad. No fuel will be stored on-site.

g. Alignment and compliance with any State and Commonwealth Aviation regulations, Codes of Practice or Standards and International Civil Aviation Organisation (ICAO) regulations for Aviation;

The CEO of the Flight Safety Group, Colin Weir, has been a participant in the CASA (Civil Aviation Safety Authority) Working Group involved with the upgrade of legislation to include offshore helidecks and onshore helipads, both surface level and elevated.

CASA Regulations and Legislative Control

The following overview provides an understanding of the current regulations.

Although the Civil Aviation Safety Authority does not regulate offshore helidecks, onshore surface level and elevated helipads/heliports, the delegated responsibility is quite explicit and documented as an ICAO SARP (Standards and Recommended Practices), through a lodged difference with ICAO, regulatory AIP reference and extracts below:

Note: Heliport in this context (ANNEX 14 VOL II) is synonymous with helipad or HLS.

Australia

Supplement
Annex 14
Part or Volume : 2

8/9/2017

Annex Reference	State Reference	Difference Level	State Difference
Heliport	Nil	Less protective or partially implemented not implemented	Australia does not regulate the design and operation of heliports in Australia. If the owner/ operator of a heliport intends to develop and operate a heliport for the purpose of regular public transport or charter operations, they are referred to the ICAO Standards and Recommended Practices set out in Annex 14 Volume II

Current References - Search for AIRSERVICES AIP H136/17, ANNEX 14 VL II Heliports/Helipads and relevant extract below:

http://www.airservicesaustralia.com/aip/current/sup/h136generatedsupplements/Annex_14_Vol_2.pdf

In the final analysis, CASA through the SARP submission process, has delegated this regulatory requirement to the **heliport owner/operator** and if they intend developing and operating the heliport/helipad for **regular public transport** or **charter operations** then they are referred to the ICAO Standards and Recommended Practices set out in **ANNEX 14 VOL II**.

Although the proposed operation at 270 The Parade, Kensington, Adelaide will fall into the Private Category, it is proposed that it will be set up in accordance with ANNEX 14 VOL II, to a Commercial level ensuring that maximum safety levels have been achieved.

This will be in accordance with ANNEX 14 VOL II and specifies the required horizontal and vertical obstruction clearance parameters as defined in the Drawing below:

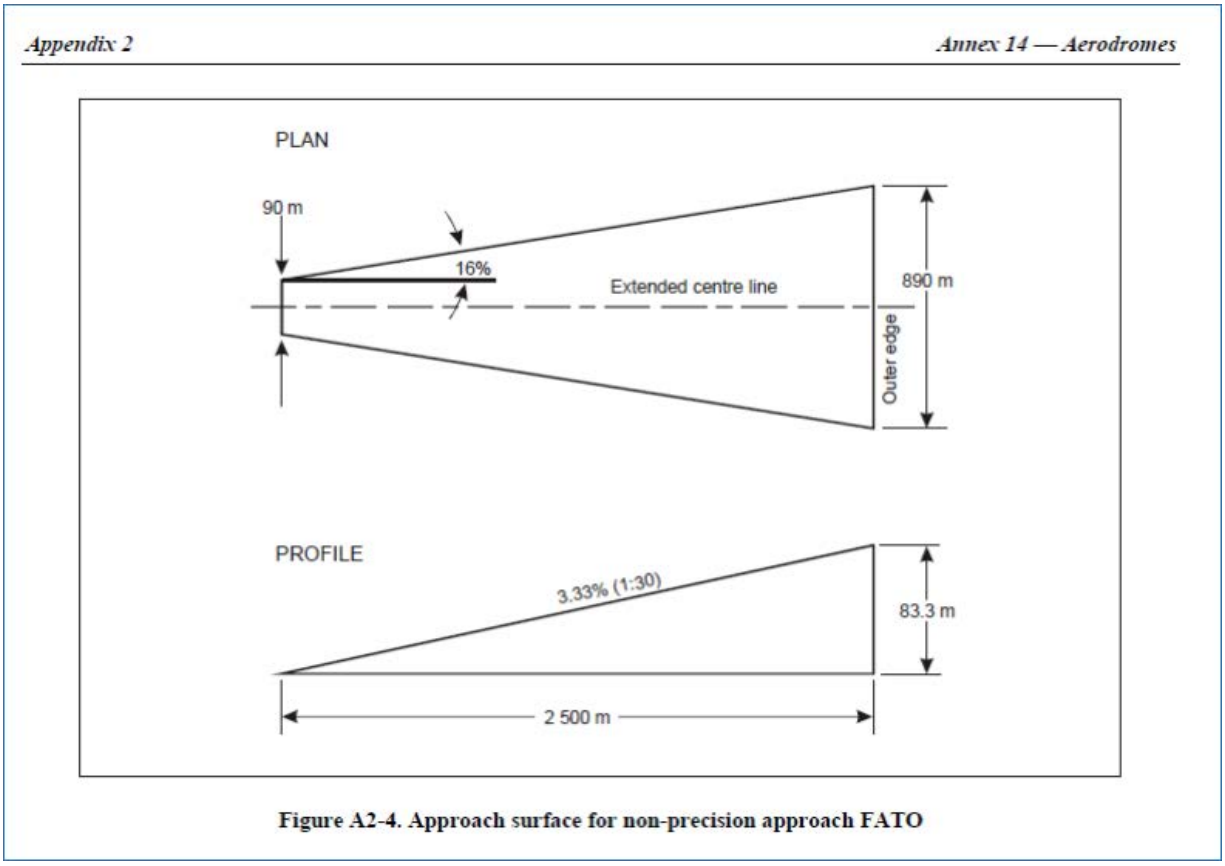
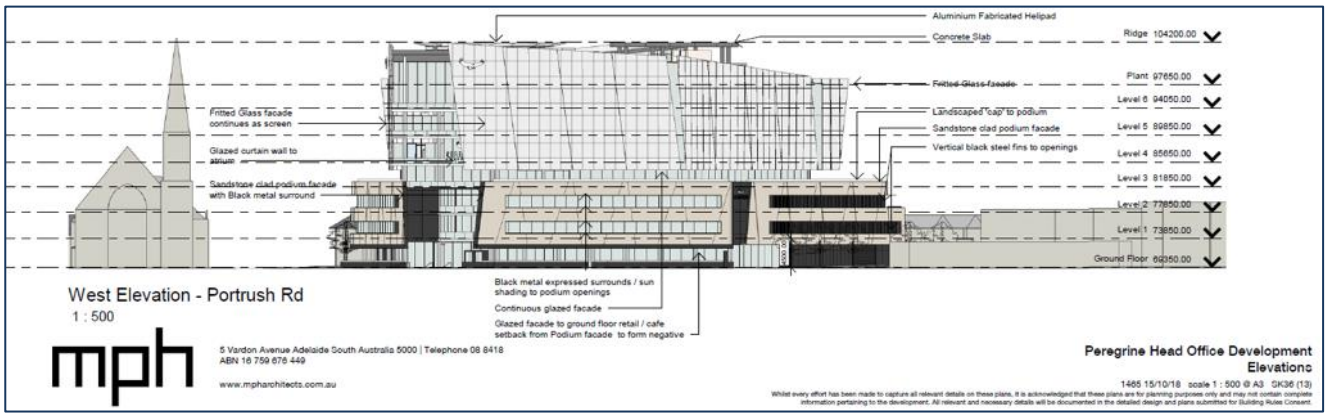


Figure A2-4. Approach surface for non-precision approach FATO

h. Safety and navigation considerations given the close proximity of tall built structures including the Water Tower residential apartment building at 275 Portrush Road, Norwood; the Clayton Wesley Uniting Church at 280 Portrush Road, Norwood and the Nuova residential apartments at 254 The Parade, Norwood;

All approach and departure design profiles will meet the minimum requirements as described in the ANNEX 14 VOL II extract Figure A2-4 as above.

In addition, these profiles will be designed to provide maximum clearance from the structures mentioned. As can be seen in the Elevation Drawings below, the Clayton Wesley Uniting Church at 280 Portrush Road, Norwood is not an obstruction to any approach path, however the profiles will be designed to avoid any sensitive areas.



Water Tower residential apartment building at 275 Portrush Road, Norwood

In the final analysis all three of these identified sites are easily manageable from a Safety and Flight Navigation consideration, as the FATO approaches can be adjusted to accommodate their proximity to the helipads.

The following Adelaide Control Zone – Visual Terminal Chart confirms that operations to the proposed Helipad at 270 The Parade, will all be conducted within Adelaide CTR (Controlled Airspace).

i. Prevailing meteorological conditions at the subject land and its surrounds;

The following historic Wind Rose provides an accurate long-term forecast of the prevailing wind over Adelaide. Prevailing average winds are NE/SW – the helipad FATO approaches will be aligned accordingly. An initial design layout follows this Diagram below.

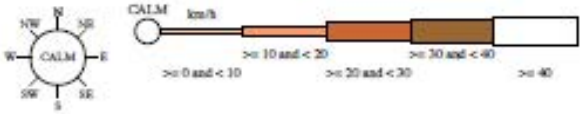
Rose of Wind direction versus Wind speed in km/h (16 Feb 1955 to 05 Apr 2016)

Custom times selected, refer to attached note for details

ADELAIDE AIRPORT

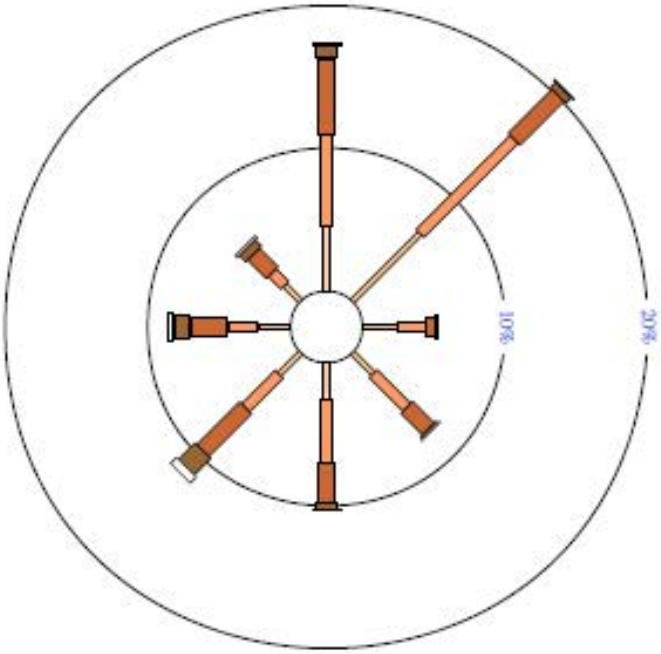
Site No: 023034 • Opened Feb 1955 • Still Open • Latitude: -34.9524° • Longitude: 138.5204° • Elevation 2m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am
22458 Total Observations

Calm 13%



Wind directions are divided into eight compass directions. The circles around the image represent the various percentages of occurrence of the winds. For example, if the branch to the west just reaches the 10% ring it means a frequency of 10% blowing from that direction. The scale factor can be ignored when interpreting these wind roses.

An observed wind speed which falls precisely on the boundary between two divisions will be included in the lower range (e.g. 10km/h is included in the 1-10 km/h range)

Calm has no direction. An asterisk (*) indicate that calm is less than 1%.

Only quality controlled data have been used.

TCZ9178533 Page 1

Initial FATO Design Layout

As can be seen from the Diagram above, all the potential obstacles are avoided.

j. Safety and amenity considerations associated with bird strike.

Bird strikes in helicopters are a rare event and controllable to a degree, due to slower forward speeds and increased visibility compared to fixed wing aircraft. High intensity, pulsating white LED lights can be fitted if required.

The extract from the ATSB statistical data, reference ATSB-AR-2016-063 below confirms the low incidence within the Adelaide area. Helicopter operations falls into the Low Capacity in Table 36 below.

ATSB – AR-2016-063

Appendix D – Additional birdstrike data

Table 32: Number of birdstrikes at major aerodromes by location, aggregated for all operation types, 2006 to 2015

Airport	Aerodrome proximity	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Adelaide	Aerodrome confines	54	49	45	72	51	72	55	40	57	69	564
	5 to 15 km	7	1	0	3	0	2	2	0	2	2	19
	>15 km	1	0	0	0	0	0	0	0	0	0	1
	Unknown	0	0	0	0	0	0	0	0	0	1	1

ATSB – AR-2016-063

Table 36: Number of damaging (serious and minor) birdstrikes at aerodromes, departing and on approach (including those further than 15 kilometres from an aerodrome) by operation type, 2006 to 2015

Airport	Operation Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Adelaide	High capacity air transport	1	1	1	4	1	1	2	0	1	0
	Low capacity air transport	1	0	0	2	0	1	0	0	0	0

5. GUIDELINE 2: NEIGHBOURHOOD INTERFACE

6. RESPONSES

a. Adequacy of clearance distances from sensitive land uses in the event of a catastrophic engine failure or catastrophic landing;

Covered in GUIDELINE 1, AVIATION OPERATIONS - RESPONSES, Paragraph c above.

b. The impacts of rotor blade downwash and rotor wake on building cladding;

The calculation of rotor blade downwash and rotor wake on building cladding has been calculated in accordance with industry mathematical formulae and included in the design parameters.

The following methodology is applicable:

The rotor must produce an upward force, or thrust, equal to the helicopter's weight for the helicopter to hover. Since Force = (Mass) x (acceleration), that upward thrust must come from continually accelerating a stagnant mass of air downwards through the plane of the rotor disk to a final downwash velocity.

This final velocity depends on the weight of the helicopter, the size of the rotor disk area, and the density of the air the helicopter is trying to hover in.

The energy transfer between the rotor and the air must happen at an equal rate. Equating these energy expressions results in the velocity of the downwash at the rotor disk being equal to the square root of: Weight divided by 2 x (Air density) x (Disk Area).

However, this only partially completes the calculation, as this is the speed at the rotor disk. As the column of air is forced down below the rotor, it constricts, much like molasses being poured out of a pitcher. In doing so, it reaches its maximum velocity at 1.5 — 2 rotor diameters below the disc.

Consequently, the final fully developed downwash velocity can be shown to be 2x the above calculated amount.

This calculation has been applied to all proposed helicopter types.

7. CONCLUSION

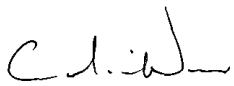
It is my considered opinion that:

- There should be no restriction to the approval for this application from an aviation regulatory or safety perspective.
- There should be no restriction to the approval for this application from an HLS safety, design or positioning perspective.
- There are no provisional opinions that have not been researched.
- There are no areas within the scope provided that fall outside of my expertise.
- The report as provided is complete and accurate.

8. SIGNED DECLARATION

I have carried out the necessary research and made all the enquiries that I believe are desirable and appropriate, and that no matters of significance which I regard as relevant, have to my knowledge been ommitted from this report.

Signed:



Colin Weir

CEO I Flight Safety Group

9. APPENDIX 1: FLIGHT SAFETY GROUP OVERVIEW AND CAPABILITY

FLIGHT SAFETY GROUP OVERVIEW AND CAPABILITY

Flight Safety Pty Ltd, Flight Safety Helideck Certification Pty Ltd and Aeronautical Enterprises Pty Ltd are part of the Flight Safety group of companies and has over 20 year's global experience, providing specialised external Aviation Audits of service providers and AOC holders, Consultancy Services, including, Aerodrome Inspections, Aviation Risk Management/Risk Assessing, Accident/Incident Investigations, Helideck/Helipad/Heliport Design, Inspection, and CAP 437 Certification and Friction Testing.

Audit Methodology

Flight Safety has carried out over 2000 detailed Audits for the full spectrum of air, maintenance, and ground operations including security. These Audits have been carried out on both rotary and fixed wing operations within various sectors of the aviation industry including; international/national/regional airlines, training operations, geophysical survey sectors, emergency medical services, and marine pilot transfer operations.

Flight Safety is Lloyd's Registered ISO 9001:2015 Certified and applies typical ISO 9001:2015 auditing techniques, such as opening meetings, auditing only with auditee key personnel present, closing meetings with mutual agreement on Non-Compliances/Findings based on objective evidence. Checklists are used as an aide-mémoire during the audit. This methodical process is recorded in a comprehensive final report that includes digital photographic records of all relevant aspects of the audit.

All Flight Safety personnel hold professional aviation qualifications and are ISO 9001:2015 Lead Auditor trained with extensive aviation backgrounds.

Risk Assessment and Risk Management

Using qualitative and quantitative risk assessment techniques developed specifically for all types of aviation activities, Flight Safety integrates risk management into quality management control structures.

Flight Safety also offers specialised training in:

- Accident Incident Investigation and Analysis (AIIA) Training Course
- Quality/Safety Management Training; including the implementation of formal I.C.A.O. Safety Management Systems for national and international clients. This includes pro-active Accident Prevention Programs as described in I.C.A.O. Docs 9376 & 9422.
- Helideck Inspection Awareness Training (HIAT)
- Helicopter Landing Site Officer (HLSO) Training
- Helicopter Landing Officer (HLO) - Recurrency Training (on-board or onshore)
- Offshore Meteorological Weather Interpretation Training

General and comprehensive aviation consultancy and technical advice is also provided.

Current operational bases include; the Sunshine Coast Queensland, Melbourne Victoria, Perth Western Australia and Pretoria and Cape Town in South Africa.

Flight Safety is positioned to offer advice and certification to both International and UK CAP 437 standards for helideck and land-based facilities. The company owns the only accredited Friction Tester in Australia, we have two units with backup spares.

The Flight Safety Group CEO is a member of our Australian Civil Aviation Safety Authority CASA - Part 139 (Airports, Helidecks, and Heliports) working group, involved in the amendment and upgrade process of regulations and criteria for Helidecks, Heliports (surface level and elevated hospital) in Australia.

Note: Heliport in this context (ANNEX 14 VOL II) is synonymous with helipad or HLS.

Flight Safety has trained CASA delegates in Offshore and Onshore landing sites for both design and procedural control.

Flight Safety Group clients have included; Origin Energy Australia and New Zealand, QGC – A BG Group, Shell/Arrow, Vermilion Oil & Gas Australia, BP, Statoil, In Salah Gas Joint Venture, and Australian State and Federal Government Agencies (Health, Defence, Police, Retrieval Services and Counter Disaster Unit, Main Roads, Transport and National Parks), Bristow, Maersk, Ensco, Atwood Oceanics, Transocean, Modec Drilling, DOF Subsea Asia Pacific, ENI, Murphy, Pipe and Civil, Diamond Offshore General Company, Virgin Australia and many more.

www.flightsafety.com.au

www.flightsafetyhelideckcertification.com.au

10. APPENDIX 2: COLIN WEIR CURRICULUM VITAE

CURRICULUM VITAE: COLIN WEIR

Name:	Colin William Weir
Telephone:	+61(0)7 5448 2788 | Mobile: +61(0)439 031 654
Email:	Colin.weir@flightsafety.com.au
Date of Birth:	05/06/1944
Passport:	Australian Passport Number: E4078479
Office Address:	P.O. Box 5016, Sunshine Coast MC, QLD Australia 4560
Home Address:	22 Eastern Ridge, Hidden Valley, Wallan VIC 3756
Marital Status:	Married
Children:	Three daughters – 26, 24 and 20 years of age

CURRENT POSITION

Present – 1st February 2004

Owner and principal of an aviation consultancy group of companies that specialise in aviation management processes, Expert Witness, Tribunal and Council Hearings, AOC applications and restructuring, external audits, helideck/helipad design, inspections.

The Flight Safety group of companies also provide aviation training and external audit/accident investigation services under Flight Safety Pty Ltd, Flight Safety Helideck Certification Pty Ltd, Flight Safety New Zealand, Aeronautical Enterprises Pty Ltd, Flight Safety Africa Pty Ltd & Helideck Certification-Africa Pty Ltd.

Flight Safety has many longstanding contracts and vendor agreements with National and International organisations including; various Australian State and Federal Government Agencies, Health, Defence, Police, Transport, Retrieval Services, Counter Disaster Units, and multiple Oil & Gas organisations.

Company Restructuring and Applications, AOC Audits, Inspections, Accident/Incident Investigations, Training

Company restructuring and AOC applications: 55

Audits: over 2,500 - rotary, fixed wing and airline operations

Number of Accidents/Incidents Investigated: 30

Friction Tests: over 100

Helideck Inspector Awareness Training course: Number trained – 250 (Global)

Helicopter Landing Site Officer Training: Number trained – 120 (Global), including all the Australian Civil Aviation Safety helideck/helipad/heliport personnel.

Personal Helipad, Heliport, and Helideck Experience

Number of Certified Helipads (hospital & surface level) designed in accordance with ANNEX 14 Vol II and monitored through to final certification in the last 3-5 years: 18

Number of Prepared Helipads designed in accordance with ANNEX 14 Vol II and monitored through to final approval in the last 3-5 years: 25

Number of Helidecks (including luxury yachts) Inspected by Flight Safety: over 200, 30 helideck inspections completed in the last 12 months.

Number of Helideck Design/Redesign Projects: 65. Contracted in by Chevron for the entire design, build & commissioning phases for the Wheatstone Rig project.

Country Involvement

Global

Clients

Australian State and Federal Government Agencies (Health, Defence, Police, Retrieval Services and Counter Disaster Unit, Main Roads and Transport), AGR, Alliance Engineering, Allseas, APA Group, Apache, Arrow, Atwood Oceanics, BHP Billiton, Bibby, Bluewater, Bristow, Chevron, CIRWAME, Dampier Port Authority, Diamond Offshore, ENI, Ensco, Esso China, Exxon Mobil, Frigstad Offshore, Fugro TSM, GC Rieber, GCCC, Heerema, Maersk, McDermott Australia Pty Ltd, McDermott International, MSQ, Newfield, Noble Drilling, OMV, Ophir Energy, Opus Offshore, Origin, Origin NZ, Pacific Drilling, Pacific Drilling Korea, Petroleum GeoServices, Prosafe, PSMC, PTTEP, QLD Health Hospitals, PSBA, REM Maritime, Roc Oil, Santos, Santos Bangladesh, Santos Indonesia, Santos Offshore, Santos Vietnam, Sapura Acergy, Sapura Kencana, Seabird, Seadrill / HSE, Seadrill / Sevan Drilling, SNLPP, Stena Drilling, Swire, Technip, Teekay, Transfield Services, Transocean, TS Marine, Van Oord, Vermilion, Virgin Australia, Volstad Management AS, WEL, Wilhelmsen Ships Service

PREVIOUS POSITIONS

1st February 2004 – 1st October 2002

Appointed as the designated senior adviser/external lead auditor for the Melbourne based BHP Billiton mining group responsible for Australasia, PNG, Indonesia, India, Middle East, and Africa.

1st October 2002 – 1st August 2002

Employed in the management section of Ansett Airlines (Australia) specialised regulatory compliance, quality management systems implementation and flight safety auditing unit.

1st August 2002 – 1st July 2001

Contract work - external auditing and quality management systems, operating under the business name, Flight Safety; the forerunner to Flight Safety Pty Ltd.

1st July 2001 – 1996

CEO and owner of two aviation companies providing consultancy and external auditing services.

1996 – 1987

Corporate Pilot for the Anglo Alpha group of companies operating a fleet of multi-engine turbine aircraft.

1987 – 1980

CEO/Chief Pilot and owner of an Air Operating Company providing turbine charter services.

1980 – 1972

Various flying jobs in Australia and South Africa/Africa.

EDUCATION

- Primary School: Waterkloof House Preparatory School, Pretoria (until Year 5).
- High School Christian Brothers College, Pretoria (Matriculated with university entrance in 1962, Maths and Science).

- South African Air Force/Police Air Wing Pilot qualified - commissioned in 1968. 16 years' service, 9 years' fighter line - qualified fighter line, safety officer and safety systems investigator.
- Trained as an aviation Intelligence Officer, involved in airborne and ground clandestine operations.
- Commercial Aviation Licensed ATPL military/commercially in South Africa/commercially in Swaziland and Botswana. Corporate pilot Australia - 7800 total hours.
- Current Australian Commercial Pilot's Licence: ARN: 123174 first issued 10th September 1975
- Auditing: Registered QSA International (IATCA) QMS, ISO 9001:2015 (JASANZ) – Quality Management Lead Auditor and Risk Assessor.
- Lecturing: Extensive experience in structuring and presenting course material on accident investigation, helideck/helipad training, quality management systems, safety management systems, integrated aviation management systems.
- HUET TBOSIET EBS trained and current.
- Current ASIC (Aviation Security Identity Card) & MSIC (Marine Security Identity Card).
- Risk Assessment and Accident/Incident Investigation trained and current.

BUSINESS/MANAGEMENT

- Owner and CEO/Chief Pilot of an Aircraft Operating Company as described - managed personnel, financial and operational functions of the company during this period (12 Pilots/16 Aircraft).
- Involved in the Licence application, start-up airline process, AOC setup and subsequent approval of African Star Airways, the second National Carrier Airline in South Africa, appointed as the Director of Regulatory Compliance and served on the Board as a Director/Shareholder, responsible for Quality Assurance, selection of Flight Deck and Cabin Crew, setting up and presenting training programs, structuring costing and liaising with international organisations associated with the airline.
- Involved in multiple aviation organisational restructuring projects and management review processes.
- Shareholder, Managing Director, CEO and Chief Pilot of CISJetlink (Pty) Ltd – company formed to cater for the African Star Airways regional flying services.
- Successfully completed a Business Management course on the 18th July 2001 at the SARINA RUSSO Institute of Technology, Business Management Centre, Maroochydore, Sunshine Coast, Queensland.
- Nationally Certified trainer in Testing & Assessing. Cert IV, Train the Trainer.

AUDITING & RELATED ACTIVITIES

- Completed over 2,500 external audits over the last eighteen years in Australasia, Malaysia, Indonesia, UK, USA, Canada, Europe, Malta, Middle East, China, India, and Africa. These audits involved rotary and fixed wing operations in charter, airline/regional airline, helicopter offshore operations, including helideck inspections, marine pilot transfer, geophysical survey, airport/refuelling facilities, emergency medical service - the full spectrum of air operations, including maintenance.
- Aviation expertise and experience encompasses all facets of Air Operations; including extensive experience in the Australian, Malaysian, Indonesian, Chinese, Vietnamese, New Zealand, and African AOC/Air Services Licencing and similar international, environments.
- Involved in post-accident/incident – AOC Management/Safety Management System investigation and analysis on behalf of the client base listed. Numerous of these have been completed, including accidents in Africa, high profile accidents in Australia (RFDS, Master Foods), India (MI 172 ONGC - offshore fatal accident), Africa (NAC Bell 407 fatal accident), Super Puma fatal roll-over accident in Jakarta, Garuda

Indonesia with the accident at Yogyakarta Airport; including audits of Solo and Yogyakarta Airports, also accidents with Merpati and the Bell 412 accident at Manado.

- Invited by the ADF to participate as a civilian component in the Nias - Indonesia and Fiji - Black Hawk helicopter post-accident external audit processes.
- Processed licence applications for approximately 40 Companies in South Africa including African Star Airways and South African Airways Historic Flight. Involved in Air Service Licensing Council/CAA violation hearings and was a member of the Emergency Medical Services regulatory review committee.
- Produced the approved manual formats (these included Part 121, 135, 145, 142, 138, 139 etc.) for the new SACAA regulations (New Zealand model) and subsequently wrote 150 sets of manuals for South African/African Aviation Companies and Airlines; These were JAR-OPS - European Aviation Safety Agency (EASA) format manuals, also completed multiple manuals within the Australian regulatory environment.
- Conducts the aviation technical adviser selection for Petronas. Malaysia.
- Contracted in to Indonesian AOC's conducting air crew selection programs.
- Flight Safety Helideck Certification Pty Ltd (FSHC) is a unique organisation that has evolved out of two highly specialised audit disciplines, merged to provide the most effective offshore helideck inspection process available.
- Flight Safety Helideck Certification Pty Ltd offers advice and certification to both International and UK CAP 437 standards for helideck and land-based facilities, including specialist shipping requirements such as luxury yachts.

QUALITY/SAFETY MANAGEMENT SYSTEMS

- Actively involved in consultancy and research into the implementation of new regulatory requirements regarding Quality Management Systems throughout Australia and internationally. This includes the establishment of organisational/management structures and relevant documentary requirements e.g. Flight Operations Manuals, AOC applications and ISO 9001:2015 aviation certification processes.
- Structuring and presentation of course material; development of I.C.A.O. compliant quality/safety management systems - electronic database control programs.
- Presented a paper on 'ISO 9001:2000' – Integrated Safety Management Systems' at the Australian International Aerospace Congress held in Brisbane from the 29th July 2003 – 1st August 2003. Copy attached and available on the Flight Safety Website www.flightsafety.com.au - Paper number AIAC 2003–060.
- Presented at the Aeromedical Conference, 25th Scientific Meeting in Melbourne on the 29th August 2013.
- Presented at the Rotortech Convention at the Sunshine Coast, Australia on the 24th – 26th May 2018
- Presented at IBCAS (Indonesia Business & Charter Aviation Summit) in Jakarta on the 29th – 30th August 2018

REGULATIONS AND TECHNICAL STANDARDS

- Long term involvement in national/international Civil Aviation Regulations, JAR-OPS, ICAO and American FAA Regulations, due to Flight Operations Manual compilation, Course structuring/presentation and flight safety auditing for Aircraft Operating Companies.
- A current member of the CASA (Civil Aviation Safety Committee), Part 139 Working Group, involved in the implementation of offshore helideck and onshore helipad regulatory revision processes.

INTERESTS, ACHIEVEMENTS, AND SPORTING ACTIVITIES

- Sporting Activities: Flying, cycling, motorcycle riding and running.
- Aerial Photography.

- Computers/Web page creation: Owned and managed a secondary business building and selling computers, including upgrade/software and network set-up.
- Parachuting/Skydiving: 20 jumps.

REFERENCES

Company Name	Contact Name & Position	Contact Details
Australian Federal Police	**Andy Sims** Coordinator Contracts and Logistics International Deployment Group	Tel: +61 (0)2 6133 3522 Ext 153522 Fax +61(0) 2 61333649 www.afp.gov.au
Australian Civil Aviation Safety Authority	**Darren Angelo** **Part 139 Standards Lead**	Mobile: +61 (0)428 818 743 darren.angelo@casa.gov.au
Origin Energy	**Sean MacGregor** Previous Manager Aviation Safety Origin Energy	Mobile: +61 (0)459 847 204 s_c_macgregor@hotmail.com
Shell / QGC – A BG Group	**Richard Eva** Aviation Manager	Tel: +61 (0)7 3024 7350 Richard.Eva@shell.com

APPENDIX E

HELICOPTER NOISE ASSESSMENT REPORT PREPARED BY SONUS

Peregrine Head Office Development

Helicopter Noise

March 2019

S4658C8

sonus.

Document Title	:	Peregrine Head Office Development – Addendum for Helicopter Noise
Document No	:	S4658C8
Date	:	March 2019
Prepared by	:	Sonus Pty Ltd 17 Ruthven Avenue Adelaide 5000 SA www.sonus.com.au 08 8231 2100
Author	:	Chris Turnbull (MAAS) }
Reviewer	:	Jason Turner (MAAS) }

TABLE OF CONTENTS

1 INTRODUCTION

A mixed use development is proposed to be located at the corner of Portrush Road and The Parade, Kensington Park in the location shown in Appendix A. The development will include office and meeting spaces, cafe / retail, training spaces, a digital hub, a restaurant, a gymnasium and spa, accommodation, covered car parking, a loading area and a waste collection area. A noise assessment was prepared by Sonus in August 2016 (the August Assessment) to address the Development Assessment Commission (DAC) "Guidelines for the Preparation of a Development Report" (the original DAC Guidelines).

The August Assessment specifically considered:

- environmental noise at the closest residences, located southeast of the site across Bowen Street from main noise sources and activities associated with the development (mechanical plant, vehicle movements and car park activity, loading area activity, waste collection and background music in the restaurant); and,
- external noise ingress to the accommodation part of the development on Level 6 from traffic on the surrounding roads.

Since preparing the August Assessment, the proposal has been varied to incorporate one aluminium fabricated helipad and an adjacent concrete slab to be constructed on the roof of the head office building. Helicopter movements are to be solely associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken. Helicopter activity will operate on no more than 10 days per year and only during daylight hours. The concrete slab will be available as an informal/temporary landing site for helicopters in the event of emergency.

In response, the State Planning Commission has issued *Guidelines for the Preparation of a Public Environment Report* (the Guidelines) specifically for the changes associated with the helicopter landing.

This assessment provides a response to the noise and vibration aspects of the Guidelines, considers measures to minimise the noise associated with the helicopter movements, and provides a comparison of the noise with other noise measured in the environment.

2 DEVELOPMENT PLAN

The proposed site is located within the Kensington Policy Area of the Business Zone of the City of Norwood Payneham and St Peters Development Plan, whilst the closest residences are within the Kensington 1 Policy Area of the Residential Historic (Conservation) Zone of the same Development Plan. The Development Plan has been reviewed and particular regard has been given to the following specific acoustic provisions:

City Wide Provisions

Objective 26 *Development located and designed to minimise adverse impact and conflict between land uses.*

Objective 27 *Protect community health and amenity from the adverse impacts of development and support the continued operation of all desired land uses.*

Objective 31 *A compatible arrangement between land uses and the transport system which will:*
(a) ensure minimal noise and air pollution;
…

PDC 80 *Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:*
…
(b) noise;

PDC 81 *Residential development adjacent to a non-residential land use or zone or within a non-residential zone should be located, designed and sited in a manner which*
(a) protects residents from any adverse effects of non-residential activities; and
(b) minimises negative impact on existing and potential future land uses considered appropriate in the locality.

PDC 84 *Non-residential development on land abutting a residential zone or within a residential zone should be designed to minimise noise impacts and achieve adequate levels of compatibility between existing and proposed uses.*

PDC 86 *Development that emits noise (other than music noise) should include noise attenuation measures that achieve the relevant Environment Protection (Noise) Policy criteria when assessed at the nearest existing noise sensitive premises.*

PDC 87 *Development with the potential to emit significant noise (e.g. industry) should incorporate noise attenuation measures that prevent noise from causing unreasonable interference with the amenity of noise sensitive premises.*

3 THE GUIDELINES

The Guidelines include the following with respect to noise:

> Provide a **noise assessment** prepared by an acoustic engineer to moderate external and environmental noise disturbance and amenity impacts for future occupants of the development, but also other sensitive uses within the immediate area as a result of the proposed development.
>
> **Guideline 2:** The subject site is adjacent a Residential Historic (Conservation) Zone and a Mixed Use Historic (Conservation Zone) at its Bowen Street and High Street interface. It is also located in amongst and proximate to residential development, educational, communal and public facilities. It should therefore be demonstrated how the interface impacts of the development on these neighbouring environs will be managed.
>
> *Evaluate the impacts of the proposal on the locality, taking into account its approved bulk, scale and interface relationship to neighbouring residential development, nursing home facilities, educational, communal and other public facilities including, but not limited to:*
>
> - *an assessment of the impacts of vibration on nearby sensitive land uses;*
> - *an assessment of the impacts of noise on nearby sensitive land uses against the provisions of the Environment Protection (Noise) Policy 2007;*
> - *environmental impacts, particularly with regard to air quality and noise, on wildlife and domestic animals in the locality associated with helicopter approaches, landings, take offs and climbs;*

The Guidelines suggest that an assessment of noise from the helicopters should be made against the provisions of the *Environment Protection (Noise) Policy 2007* (the Policy) but the Policy specifically excludes aircraft noise in Schedule 1. It is understood that Peregrine has obtained legal advice to confirm that the Policy does not apply and that the EPA has also obtained informal legal advice, which also confirms that the Policy does not apply.

In these circumstances, it is proposed that the approach to the assessment will be to take all reasonable and practicable measures to minimise noise and to conduct a comparison of the noise with existing noise measured in the environment. The provisions of the Development Plan detailed above and the requirement in the Guidelines to “moderate disturbance” support the requirement to take all reasonable and practicable measures.

4 MEASURES TO MINIMISE NOISE

The following measures are proposed to be incorporated to minimise noise from helicopter activity to nearby land uses as well as wildlife and domestic animals:

- The proposed helipad is located near the centre of the roof of a 7 storey building. This location increases the distance to residences but also allows the edge of the building to block line of sight (and therefore reduce noise) between the closest residences and a helicopter on the helipad.

- The helipad will not operate outside of the hours of 7:00am and 10:00pm. The helipad will be further restricted by only operating during daylight hours.

- The flightpaths will be designed to be the maximum practical distance from residences. That is, flightpaths to the south-east will be avoided whenever meteorological conditions allow.

- Preference will be given to lower noise helicopters using the site.

- Flights will occur on no more than 10 days per year.

- The helipad has been situated directly above a plant room.

5 VIBRATION

The Guidelines require an assessment of the impacts of vibration on nearby sensitive land uses.

The contact between a helicopter and a landing pad does not produce significant vibration and therefore helicopters routinely land at hospitals in the vicinity of operating theatres without any impact from the vibration.

For vibration from a helicopter to impact on sensitive land uses in the vicinity of the proposed development, the vibration would need to travel down the proposed building structure and through the ground to residences.

Ground vibration from helicopters at the development will be insignificant. It will not be at a level which could be sensed or measured at residences or other land uses in the vicinity.

6 NOISE INTO PROPOSED BUILDING

The Guidelines require that environmental noise disturbance and amenity impacts be moderated for future occupants of the development. The following measures will be taken to moderate the noise to occupants of the development.

- The helipad will be located above a plantroom, which is not sensitive to noise.
- During the detailed design, consideration will be given to the construction of the upper floor ceiling below the roof to ensure that all uses are adequately protected from the noise of the helicopter operating.
- Helicopters will only operate during the day, on no more than 10 days per year, minimising any potential noise impact to accommodation areas within the development.

7 PREDICTED NOISE AND COMPARISON WITH EXISTING NOISE

It is proposed that three different types of helicopters are to be used:

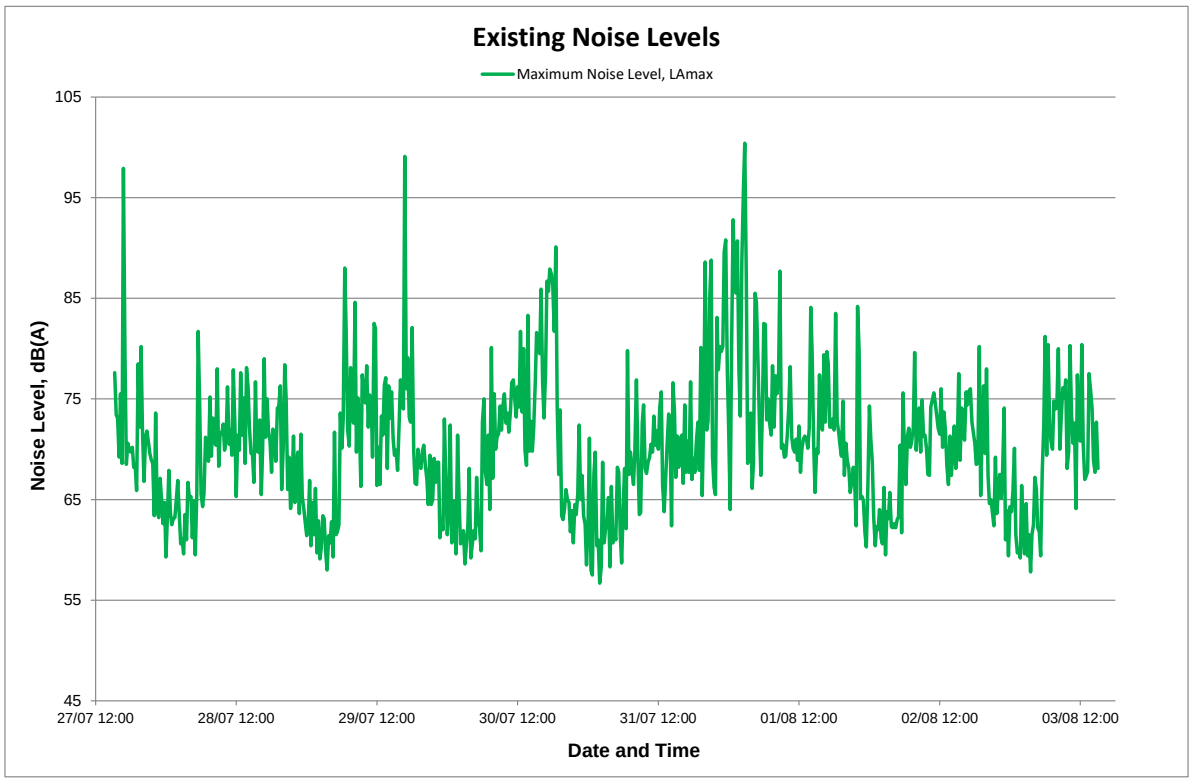
- BELL 206 Jet Ranger;
- Eurocopter EC 130; and
- Agusta Westland AW109/H109.

To provide an indication of the likely noise from the helicopters reference is made to the noise measured from a Bell 206 Jet Ranger and a Eurocopter AS350B2 (an earlier model of the EC130). With these helicopters

(or similar) operating at the helipad and the above measures implemented, the maximum noise (L_{Amax}) at the closest residences is predicted to be approximately 87 dB(A) for a short period of time during flights. The predicted maximum levels are summarised in the table below:

Helicopter type	Predicted Maximum Noise Level (L_{Amax})
Eurocopter AS350B2	87 dB(A)
Bell 206 Jetranger	87 dB(A)

The impact of a noise source on other land uses, as well as wildlife and domestic animals, is often determined by reference to other noise in the environment. To provide context to the predicted helicopter noise, a comparison has been made to the maximum noise levels (L_{Amax}) recorded in Bowen Street adjacent to the closest residences. The figure below shows the maximum noise levels recorded in Bowen Street in a one week period between 27 July and 3 August 2016.



The figure shows that the predicted maximum levels are regularly exceeded in the existing noise environment.

8 CONCLUSION

An assessment has been made of the noise associated with occasional helicopter flights at the Peregrine head office on the corner of Portrush Road and the Parade.

The assessment provides recommendations for measures to reduce the noise and provides a comparison of the predicted maximum noise with the existing noise in the environment.

With the measures incorporated, the noise on 10 days per year will be less than the noise measured on several occasions in a single week.

As such, it is considered that, with the measures incorporated into the proposal, “all reasonable and practicable measures” have been taken, and the proposal is therefore consistent with the relevant noise related provisions of the Guidelines and the City of Norwood Payneham and St Peters Development Plan.

APPENDIX A: LOCATION OF SITE

APPENDIX F

LEGAL OPINION EPA NOISE POLICY PREPARED BY BOTTEN LEVINSON LAWYERS

Our ref: TLC/216308

7 March 2019

Mr Tony Kuhlmann
Peregrine Corporation
270 The Parade
KENSINGTON SA 5068

By email: T.Kuhlmann@peregrine.com.au

Dear Tony

270 The Parade, Norwood

You have asked for advice about whether a helicopter is an "aircraft" for the purposes of the *Environment Protection (Noise) Policy 2007* **(the Policy)**. In particular, you want to know whether noise from a helicopter is excluded from the operation of the Policy by operation of clause 6(a) and Schedule 1, item 3 of the Policy.

I understand that Peregrine proposes to redevelop its business headquarters at 270 The Parade, Norwood. In association with the operation of the redeveloped business headquarters, Peregrine wishes to conduct ordinary motorised helicopter arrivals or departures from the building on not more than 10 days per year.

For the reasons that follow, in our opinion a helicopter is plainly an "aircraft" for the purposes of Schedule 1, item 3 of the Policy. Noise from the use of a helicopter is therefore excluded from the operation of the Policy.

Environment Protection Policies

The Policy is an environment protection policy made under section 27 of the *Environment Protection Act 1993*. Section 27(4)(a) provides that a policy can be of general application or limited application.

Clause 6(a) of the Policy relevantly provides that the Policy does not apply to a noise of a class set out in Schedule 1. Item 3 of Schedule 1 lists "aircraft or railway noise" as noise excluded from the Policy.

The term "aircraft" is not defined in the Policy or the Act. There is no policy, contextual or other reason why the word "aircraft" where used in the Policy, should be afforded anything other than its ordinary meaning. The Macquarie Dictionary (Seventh Edition) defines "aircraft" as follows:

> ***aircraft*** *... any machine supported for flight in the air by buoyancy (such as balloons and other lighter-than-air craft) or by dynamic action of air on its surfaces (such as aeroplanes, helicopters, gliders and other heavier-than-air craft).* (my underlining).

The ordinary meaning of the word "aircraft" therefore expressly includes a "helicopter". A "helicopter" is relevantly defined as follows[1]:

> ***helicopter*** *(n) 1. any of a class of heavier-than-air craft which are lifted and sustained in the air by helicoid surfaces or propellers turning on vertical axes by virtue of power supplied by an engine.*

[1] Op cit.

Level 1 Darling Building
28 Franklin Street, Adelaide
GPO Box 1042, Adelaide SA 5001
t. 08 8212 9777
f. 08 8212 8099
e. info@bllawyers.com.au
www.bllawyers.com.au

It follows that where used in the Policy, helicopter noise is aircraft noise, which is excluded from the Policy by Schedule 1, item 3.

Schedule 1, item 7(b) - Helicopter Landing Facilities

For completeness we also note that Schedule 1, item 7(b) of the Policy lists, amongst other things, noise from "helicopter landing facilities" *"…as described in clause 8 of Schedule 1 of the Act…"* as noise excluded from the Policy.

Clause 8(3) of Schedule 1 of the Act relevantly prescribes the following as an activity of environmental significance for the purposes of the Act, with certain exclusions (my underlining):

> ***(3) Helicopter Landing Facilities***
>
> *the conduct of facilities designed for the arrival and departure of helicopters, but excluding—*
>
> *(a) facilities at an aerodrome licensed under Part 6; or*
> *(b) facilities at which helicopter arrivals or departures take place on not more than 10 days per year; or*
> *(c) facilities that are situated more than 1 kilometre from residential premises not associated with the facilities; or*
> *(d) facilities at the site of an activity authorised under the Mining Act 1971, the Petroleum Act 2000, the Petroleum (Submerged Lands) Act 1982 or the Roxby Downs (Indenture Ratification) Act 1982.*

Although it is unnecessary to determine for the purposes of this advice, it is not clear whether (regardless of frequency) the proposal involves "the **conduct of facilities designed for** the arrival and departure of helicopters" (my emphasis).

However, in any event as the proposal involves arrivals or departures on not more than 10 days per year it cannot be a helicopter landing facility "…as described in clause 8 of Schedule 1 of the Act", for the purposes of the Policy.

The rationale behind this exclusion is likely to be that any helicopter landing facilities that require a licence under the EP Act are excluded from the operation of the Noise Policy as they will be the subject of a separate assessment. It does not however follow that use of a helicopter on not more than 10 days per year will be subject to the Policy. There is a clear intention that noise from an aircraft in ordinary operation is not to be subject to the Policy.

While the proposed helicopter use is not excluded from the operation of the Policy on account of being a helicopter landing facility, it remains excluded on the basis that it is noise from an aircraft.

Yours faithfully

Tom Crompton
Senior Associate
BOTTEN LEVINSON
Email: tlc@bllawyers.com.au
jrb:p216308_032.docx

APPENDIX G

HELIPAD AIR QUALITY IMPACT ASSESSMENT PREPARED BY AIR QUALITY PROFESSIONALS

air quality professionals pty ltd

ABN 92 160 694 011

Report

Peregrine Head Office Development
Helipad Air Quality Impact Assessment

Report prepared for:
PC Infrastructure Pty Ltd

21 March 2019







Table of Contents

Appendices

Appendix 1: Extracts from NPI (2003)

Appendix 2: Comparison of model results at ground level and at 6m above ground

Appendix 3: Model inputs

Appendix 4: Model output file

1 Introduction

Peregrine Corporation is based at 270 The Parade, Norwood. This has been the headquarters of Peregrine Corporation for more than 10 years. Peregrine is working on a proposal to construct a new headquarters on the same site that will better suit the needs of the business, its staff and visitors.

The proposed development consists of a multistorey mixed-use development which will serve as the national headquarters for the Peregrine Corporation. The building consists of office space with ground level retail/café spaces and lobby, meeting rooms, training areas, gymnasium, swimming pool, short-stay accommodation suites, car parking, storage and associated landscaping.

Peregrine Corporation wishes to utilise the roof top as a landing area for helicopters in association with the use of the building as an office. All helicopter movements are to be associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken.

Air Quality Professionals (AirQP) has been engaged by Peregrine Corporation to prepare an air quality assessment for the proposed helipad, focussing on the following scope defined by the State Planning Commission for the proposal:

- An assessment of the impacts of air pollution on nearby sensitive land uses against the provisions of the Environment Protection (Air Quality) Policy 2016.
- Environmental impacts, particularly with regard to air quality and noise, on wildlife and domestic animals in the locality associated with helicopter approaches, landings, take offs and climbs.

This report addresses potential air quality impacts from the combustion of fuel in the helicopter engines.

2 Location and Setting

The site is located in metropolitan Adelaide, 3.8 km east of the central business district. The location in the regional context is shown in Figure 1, and a closer view is shown in Figure 2. Road names and property numbers are identified on Figure 3.

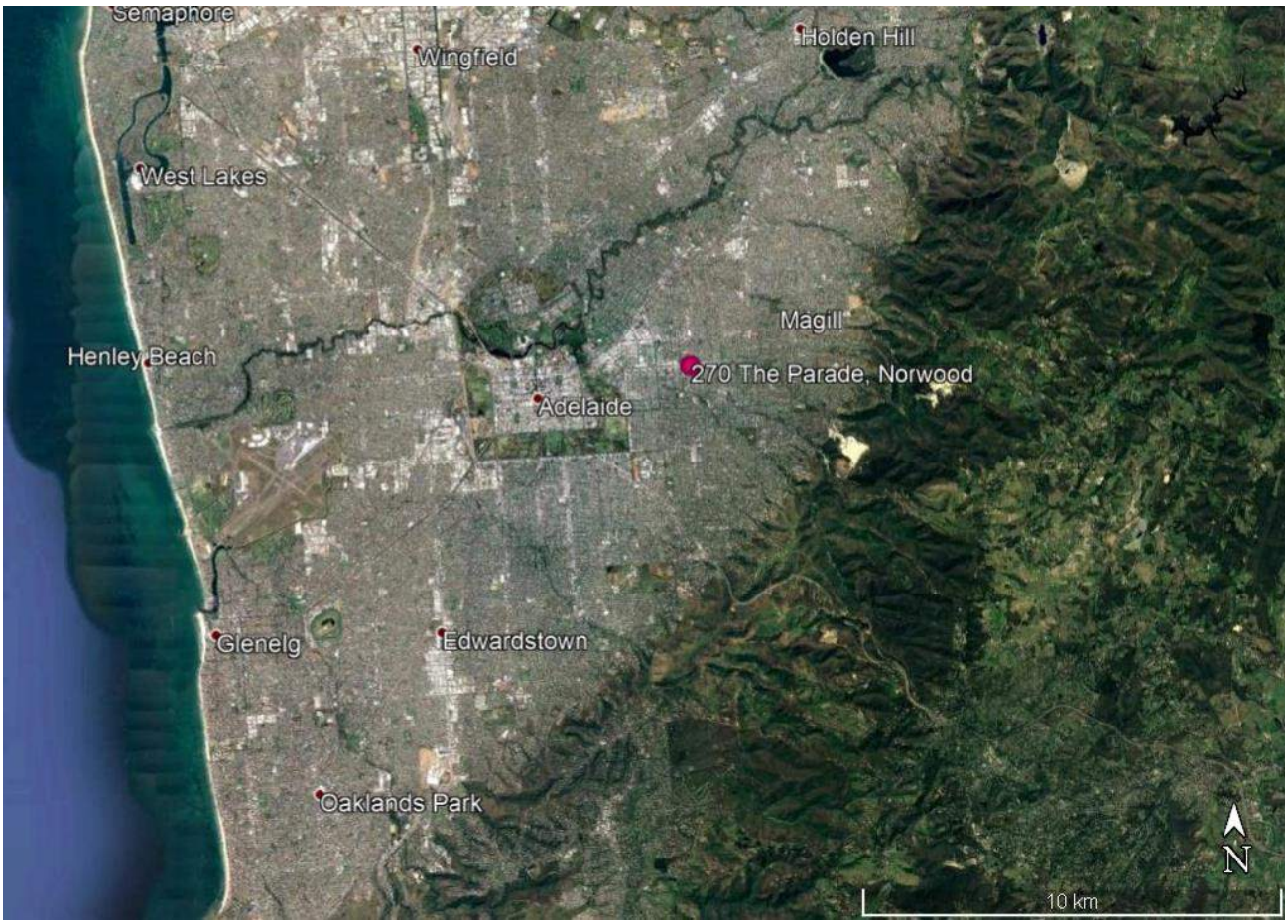


Figure 1: Location of Peregrine Corporation Headquarters, 270 The Parade Norwood. Image from Google Earth.

Figure 2: Location of Peregrine Corporation Headquarters, 270 The Parade Norwood (marked with green symbol); local context. Image from Nearmaps.com, flown 27 January 2019.

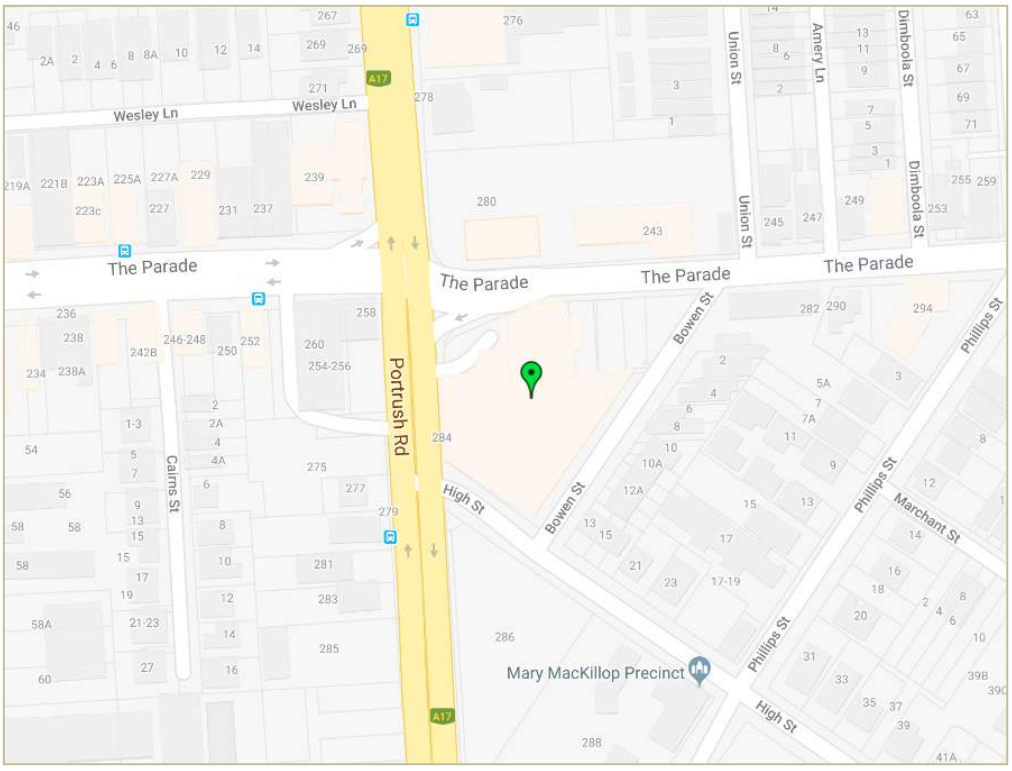


Figure 3: Location of Peregrine Corporation Headquarters, 270 The Parade Norwood (marked with green symbol); local roads and property numbers. Map source: Nearmap.com

The site is bordered by The Parade to the north and Portrush Road to the west, and is adjacent to a number of properties with sensitive land uses.

The locality is characterised by a mixture of commercial, places of worship and residential land uses. The subject site abuts a residential zone at its rear (southeast) along Bowen Street where the dwellings are predominantly two-storey townhouse style.

To the south of the subject site is Mary MacKillop Tappeiner Court Nursing Home at 286 Portrush Road (backing onto High Street). This site caters for the elderly and is a two-storey building.

To the northwest and southwest of the subject site are various commercial land uses fronting onto the Parade.

3 Description of Development

3.1 Building Design

Artist impressions of the building design are shown on the front cover of this report, and in Figure 4. Building elevations are shown in Figure 5; the ridge and helipad height is 34.85m above local ground level.

The building and helipad location, overlaid on the road and property map (from Figure 3), is shown in Figure 6.

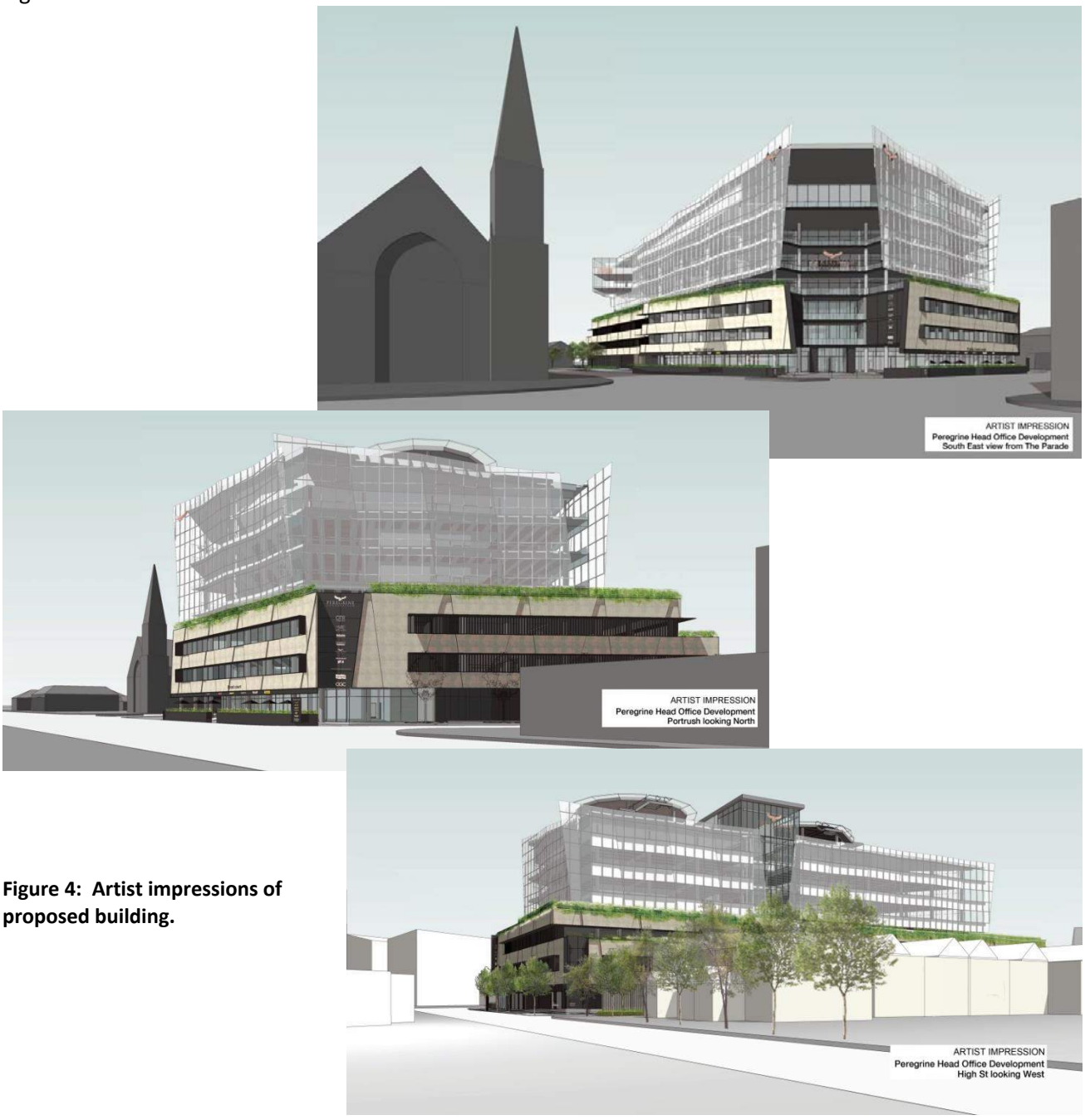


Figure 4: Artist impressions of proposed building.

Figure 5: Building elevation.

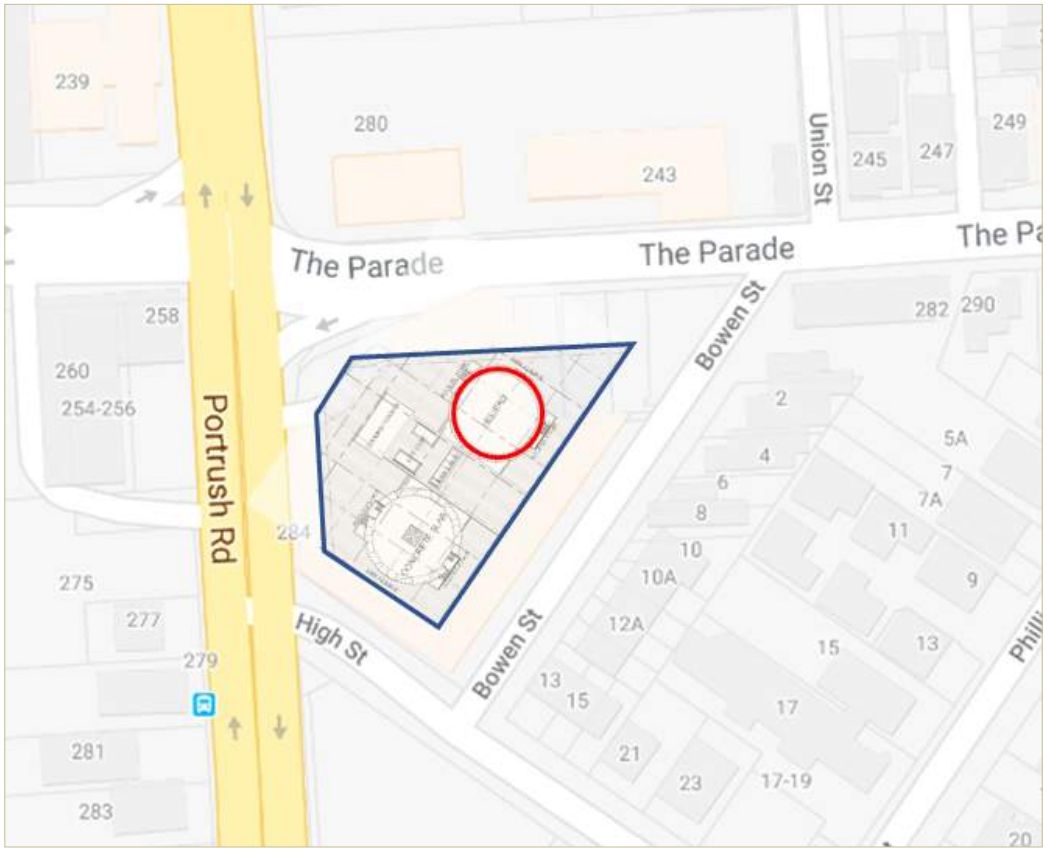


Figure 6: Helipad (red outline) siting on property. Proposed building footprint shown in blue outline.

3.2 Helipad Use

It is proposed that three different types of helicopters are to be used:

- BELL 206 – one pilot, 4 passengers;
- EC 130 – one pilot, 6 passengers; and
- AW109 – one or two pilots, 6-7 passengers.

Bell 206B

EC 130

AW109

Helicopter movements will be solely associated with the use of the building, with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken.

There will be no Helifuel facility available for the helipad. All refuelling will be carried out at the departure heliport/helipad. No fuel will be stored on-site.

Peregrine Corporation advised that the highest number of helicopter trips using the helipad in one day is eight trips, and the highest anticipated number of helicopter movements in one hour is three trips. Only one helicopter will be at the site at any time.

Operational hours for the helipad will be as per the EPA Noise Policy daylight hours defined as 7am – 10pm.

The aviation consultant engaged by Peregrine Corporation has estimated the following helicopter activity durations for the purposes of noise assessment; these activity durations are also relevant to the assessment of potential air emissions:

- The duration of the maximum power settings is applicable to both the pre-landing, hover phase of flight (usually accomplished within 45 seconds) and the take-off phase of flight (usually accomplished within 60 seconds).
- Passengers will egress after engine shut-down and this process is normally completed within ten minutes, i.e. 3 minutes to shut-down and 7 minutes to offload.
- The start-up and departure will occur in 5 – 10 minutes.

Engine specifications for the three helicopter types are provided in Table 1. The AW109 with Turbomeca Arrius 2K1 engine option has the highest engine power rating, and will be assumed to be the only helicopter type using the helipad for the purpose of the air emissions assessment.

Table 1: Helicopter engine specifications

Helicopter type	Engine type	Engine maximum rating	Reference
Bell 206B-L4	1 × Allison 250-C30P turboshaft, 420 shp	420 shp, derated to 317 shp (310 kW) due to drivetrain limitations	https://en.wikipedia.org/wiki/Bell_206#Specifications_(206B-L4)
EC 130	1 × Turbomeca Arriel 2B1 turboshaft,	632 kW (847 shp)	https://en.wikipedia.org/wiki/Eurocopter_EC130#Specifications_(EC130_B4)
AW109	2 × Pratt & Whitney PW206C engines, or 2 × Turbomeca Arrius 2K1 engines	PW206C: 477kW per engine (561 shp) Arrius 2K1: 500kW per engine (670 shp)	https://www.aerospace-technology.com/projects/aw109-helicopter/

4 Emission Information

4.1 Nature of Pollutants

Helicopter engines are powered using jet fuel, a complex mixture of hydrocarbons similar to kerosene. The pollutants discharged to air from combustion of jet fuel include (NPI, 2003)[1]:

1. Nitrogen oxides (NO_x),
2. Carbon monoxide (CO),
3. Sulphur dioxide (SO_2), and
4. Unburned hydrocarbons (HC).

The unburned hydrocarbons comprise particulate (total suspended particulate, or TSP), and volatile organic compounds (VOCs).

Emissions data in NPI (2003) is referred to throughout this section, and the relevant pages of the NPI document are provided in Appendix 1 for ease of reference.

Oxides of Nitrogen

NO_X is an expression of the total amount of both nitric oxide (NO) and nitrogen dioxide (NO_2) in a gas, with the mass of NO_x calculated by assuming that all of the NO has been oxidised to NO_2. NO_X is generated during combustion processes.

In emissions from hydrocarbon fuel-combustion processes, the NO_X emission is predominately made up of NO. NO then slowly converted to NO_2 in the environment through complex atmospheric reactions. Only the concentration of the NO_2 fraction of NO_X is regulated in ambient air.

As a general rule of thumb, NO_2 composition in the discharge from combustion processes will typically be about 5-10%.

In this assessment however, it was assumed that NO_2 comprised 100% of the NO_x discharged. This is discussed further in Section 6.5.

[1] National Pollutant Inventory (NPI) (2003). *Emissions Estimation Technique Manual for Aggregated Emissions from Aircraft*. Published by Environment Australia, 25 March 2003 – Version 2.2. http://www.npi.gov.au/system/files/resources/7c29f57e-fb3e-a0d4-e5f3-8e3b559d0f75/files/aircraft.pdf

Carbon Monoxide

Carbon monoxide (CO) is present in small amounts in all discharges from fuel burning equipment due to inefficient or incomplete fuel combustion.

CO emissions from hydrocarbon fuel-burning in the presence of sufficient oxygen almost always have very minor potential to cause adverse effects because of the high combustion efficiency of the fuel burning equipment and the relatively high air impact criteria for CO compared to other combustion gases such as SO_2 or NO_2. However, CO emissions have been considered in this air impact assessment as CO is identified in NPI (2003) as an aircraft engine pollutant.

Sulphur Dioxide

Sulphur dioxide (SO_2) emissions from the combustion of jet fuel are directly related to sulphur content. Jet fuel specifications require total sulphur content to be less than 0.30 wt%[2] (3000 ppm), although jet fuel typically contains an average sulphur content of 400-800 ppm[3]. Fuel consumption rates for the helicopter-types proposed to use the helipad are not known, so SO_2 emission rates were based on data in NPI (2003). The model conclusions were not sensitive to this assumption.

Particulate

The particulate matter discharged in the engine emissions will be comprised of a variety of size fractions but mostly less than 10 microns in size. Two fine particulate categories are relevant for potential health impacts:

- Particulate less than 10 µm in diameter (known as PM_{10}).
- Particulate less than 2.5 µm in diameter (known as $PM_{2.5}$). $PM_{2.5}$ is a subset of PM_{10}.

Emission data provided in NPI (2003) for particulate emissions from aircraft engines refers only to total suspended particulate ("TSP") and not the PM_{10} and $PM_{2.5}$ fractions. However, Table 5 in NPI (2003) lists a weight fraction in TSP of 0.976% for PM_{10} in gas turbine engines. Therefore, it is assumed that all of the particulate matter in the discharge will be in the PM_{10} fraction.

Data on the fraction likely to be in the $PM_{2.5}$ subset is not available. However, the National Pollutant Inventory guide to air emissions from diesel-fired generation from stationary sources (NPI, 2008; Table 43)[4] indicates that essentially all of the PM_{10} emissions from that emission type are within the $PM_{2.5}$ range. Therefore, it is assumed for this air quality assessment that 100% of the particulate matter emissions from the helicopter engines are in the $PM_{2.5}$ range.

[2] https://www.digitalrefining.com/literature/1000948,Sulfur_in_jet_fuel_by_ASTM_D4294.html#.XIcAwfZuJZU

[3] http://partner.mit.edu/projects/environmental-cost-benefit-analysis-ultra-low-sulfur-jet-fuels

[4] National Pollutant Inventory (NPI) (2008). *Emissions Estimation Technique Manual for Combustion Engines*. Published by Environment Australia, June 2008 – Version 3.0.

Hydrocarbons

Unburned hydrocarbons in aircraft engine exhaust have the typical composition shown in Table 2. The data in this table is taken from Table 4 of NPI (2003). In NPI (2003), data is given for three categories of aircraft use – commercial, general, and military. The "general" category is relevant to flight operations such as helicopter journeys using the proposed helipad.

Table 2: Weight fraction of VOC species in exhaust emissions from general-activity aircraft engines (from NPI (2003) Table 4).

VOC species	Weight fraction in hydrocarbon discharge
Acetaldehyde	0.0432
Acetone	0.0293
Benzene	0.0179
1,3-Butadiene	0.0157
Ethylbenzene	0.0015
Formaldehyde	0.1414
Polycyclic aromatic compounds[1]	0.0095
Phenol	0.0022
Styrene	0.0037
Toluene	0.0049
Xylenes[2]	0.0044

Notes:
1. Sum of Napthelene and Methyl Napthelenes
2. Sum of M & P Xylenes and O-Xylenes

4.2 Emission Rate Data Sources

Pollutant emission rates for jet engines used in modern commercial fixed wind aircraft are readily available on the internet via the International Civil Aviation Organization (ICAO) Aircraft Engine Emissions Databank[5]. However, this databank only contains emission data for turbofan engines used in jet aircraft (as opposed to propeller aircraft and helicopters). Turbofan data is also published in Appendix D of NPI (2003). Appendix F of NPI (2003) contains some data for turboprop engines (used in propeller aircraft).

AirQP was unable to source emissions data for the specific engine types that may use the helipad, as listed in Table 1, or for any other specific turboshaft helicopter engines. However, the turboshaft engine design is similar in concept to the turboprop engine (see https://www.aircraftsystemstech.com/p/gas-turbine-engines-types-and.html for description aircraft gas turbine engine types). Therefore, it is assumed for the purpose of this air quality assessment that pollutant emission rates from the turboshaft engines in helicopters using the proposed helipad will be equivalent to that from a similar-sized turboprop engine.

[5] https://www.easa.europa.eu/easa-and-you/environment/icao-aircraft-engine-emissions-databank#group-easa-downloads

The closest-sized turboprop engine listed in Appendix F of NPI (2003) is a Pratt & Whitney PT6A-41 engine, which has a shaft horsepower rating of 850 shp (as compared to the largest anticipated engine configuration using the helipad of 2x670 shp engines). The emissions from two PT6A-41 engines will be assumed for the air quality assessment, multiplied by a factor of (670/850) = 79% to correct for the lower horsepower rating.

4.3 Emission Rate Estimates

From Appendix F of NPI (2003), the emission rates for a PT6A-41 engine are listed in Table 3. Only the pollutants HC, CO and NO_x are listed in Appendix F of NPI (2003).

Table 3: Emission factors for PT6A-41 Pratt & Whitney turboprop engine, from Appendix F of NPI (2003).

Pollutant	Emission factor (kg/h) during various flight operations			
	Take off	Climb Out	Approach/Land	Idle
Hydrocarbons	0.405	0.436	6.769	2.812
CO	1.181	1.395	4.310	7.679
NOx	1.850	1.620	0.576	0.131

Emission rates for SO_2 and TSP must be inferred from the "regional aircraft" section of Table 3 of NPI (2003) (attached in Appendix 1). This was done using the following approach:

1. Calculate the SO_2 emission factor as a ratio compared with HC, CO, and NO_x emission factor.
2. Repeat for TSP emission factor.
3. Take the maximum emission factor ratio for SO_2 and TSP and apply this to the emission rates in report Table 3 above.

This yielded the SO_2 and TSP emission rates shown in Table 4.

Table 4: Emission factors for PT6A-41 Pratt & Whitney turboprop engine for SO_2 and TSP, derived from Table 3 of NPI (2003) and from report Table 3 above.

Pollutant	Maximum emission factor (kg/h) during various flight operations			
	Take off	Climb Out	Approach/Land	Idle
SO_2	0.019	0.064	0.114	0.007
TSP (also PM_{10} and $PM_{2.5}$)	1.30	1.71	3.59	0.25

For the dispersion modelling, the maximum emission rate for each pollutant in Tables 3 and 4 will be used for the initial assessment, even though this greatly overstates the actual emission rates averaged over an hour. These emission rates are converted to the equivalent emission rate for the largest helicopter proposed to use the helipad and are summarised in Table 5, along with an estimated worst-case 1-hour average emission rate (3 helicopters per hour).

For the 1-hour average emission rates, the following assumptions were made:

- Take-off and landing have the same maximum emission rate shown in Table 3 for "Approach/Land".
- Take-off and landing duration is a combined 3-minutes per flight.
- Idle duration (engine shutdown, start up or waiting) is 7 minutes per flight.

Table 5: Short-term (duration a few minutes per hour) maximum emission rates, and 1-hour average emission rates. Emissions based on helicopter type AW109 with 2x '2K1" engines.

Pollutant	Maximum short term emission rate in g/s	Maximum 1-hour average emission rate in g/s
Hydrocarbons	2.97	0.876
CO	3.37	1.460
NO_x	0.81	0.142
SO_2	0.05	0.009
TSP	1.58	0.275

Emission rates for VOC species were calculated by multiplying the worst case HC emission rate in Table 5 by the weight fractions in Table 2. The resulting emission rates for each VOC species are shown in Table 6.

Table 6 also lists the design ground level criteria (DGLC) for each VOC species, and the ratio of the DLGC divided by the emission rate. The DGLC information was sourced from the South Australia Environment Protection (Air Quality) Policy 2016 (EPP 2016), Schedule 2. This ratio provides an indication of which species are of most interest for environmental compliance, with the smallest ratio indicating the species requiring the most dilution to reach the DGLC threshold.

As shown in Table 6, formaldehyde has the smallest DGLC:ER ratio, and will be used in this report as the indicator for VOC compliance – if the assessment of formaldehyde dispersion complies with environmental regulations, all other VOC species will also comply.

Table 6: Mass emission rate of VOC species in exhaust emissions and corresponding DGLCs.

VOC species	Weight fraction in HC discharge	Emission rate, g/s for maximum short-term and 1-hour average, (in order)	3-min average DGLC from EPP (2016), mg/m³		DGLC:max ER ratio (lowest number = highest significance)	
			Toxicity basis	Odour basis (if specified)	Toxicity basis	Odour basis (if specified)
Acetaldehyde	0.0432	0.13 0.038	6.44	0.083	79	1.0
Acetone	0.0293	0.087 0.026	44		799	
Benzene	0.0179	0.053 0.016	0.058		1.7	
1,3-Butadiene	0.0157	0.047 0.014	0.08		2.7	
Ethylbenzene	0.0015	0.0045 0.0013	15.8		5602	
Formaldehyde	**0.1414**	**0.42** 0.12	**0.044**		0.165	
Polycyclic aromatic compounds[1,3]	0.0095	0.028 0.0083	0.5		28	
Phenol	0.0022	0.0065 0.0019	0.14	0.039	34	9
Styrene	0.0037	0.011 0.0032	7.6	0.23	1092	33
Toluene	0.0049	0.015 0.0043	13.4	0.71	1454	77
Xylenes[2]	0.0044	0.013 0.0039	12.4	0.38	1499	46

Notes:
1. Sum of Naphthalene and Methyl Naphthalenes
2. Sum of M & P Xylenes and O-Xylenes
3. No data for Naphthalene and Methyl Naphthalenes available in EPP (2016). Data taken from https://www.osha.gov/chemicaldata/chemResult.html?recNo=736

5 Meteorology

The nearest meteorological data station operated by Bureau of Meteorology (BoM) is in the Adelaide suburb of Kent Town, 1.8km due west of the Peregrine site. As there are no significant terrain features between the two sites, the monitoring station is suitably representative of wind conditions at the Peregrine site.

Hourly records of wind speed and direction from January 2008 until December 2018 were obtained from BoM. Wind speeds and directions at the Kent Town site for 2008-2018 are shown in Figure 7.

It is understood that EPA SA prefers use of meteorological data for the 2009 year in regulatory assessments. Therefore, the 2009 year was used in this air quality assessment. A windrose for the 2009 year is shown in Figure 8 for comparison with the longer term windrose. The 2009 year displays a higher proportion of winds from the west and northwest than the long term average, but this is unlikely to affect dispersion model results in this case.

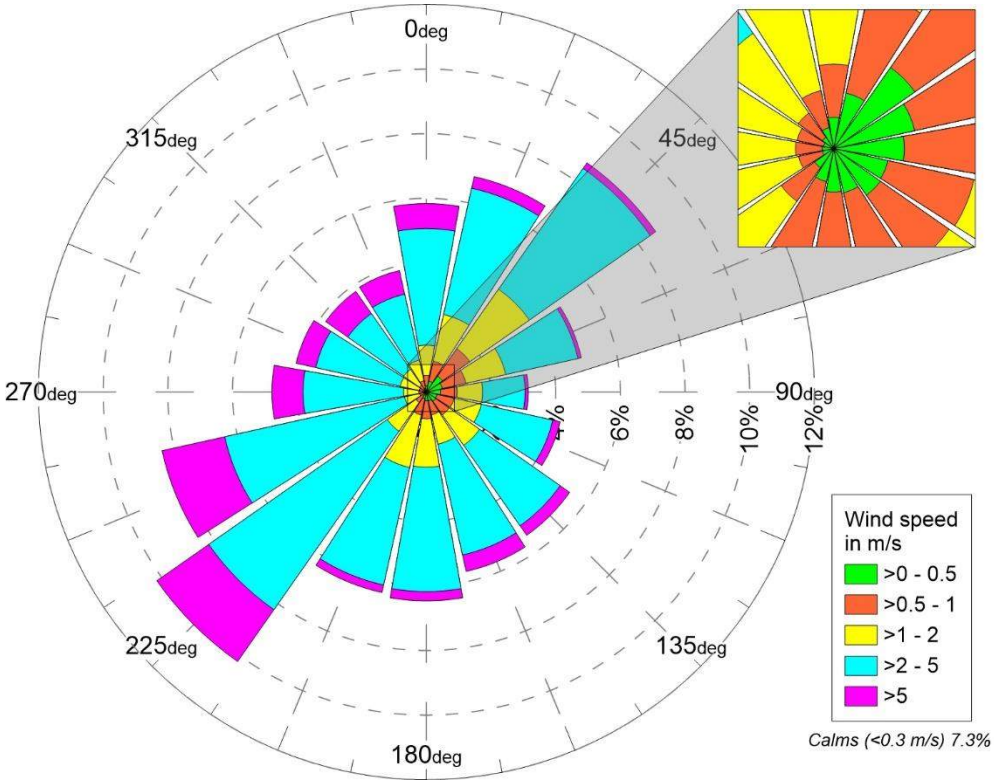


Figure 7: Windrose for January 2008 – December 2018 for Adelaide (Kent Town). Hourly average wind speed and direction, data supplied by Bureau of Meteorology.

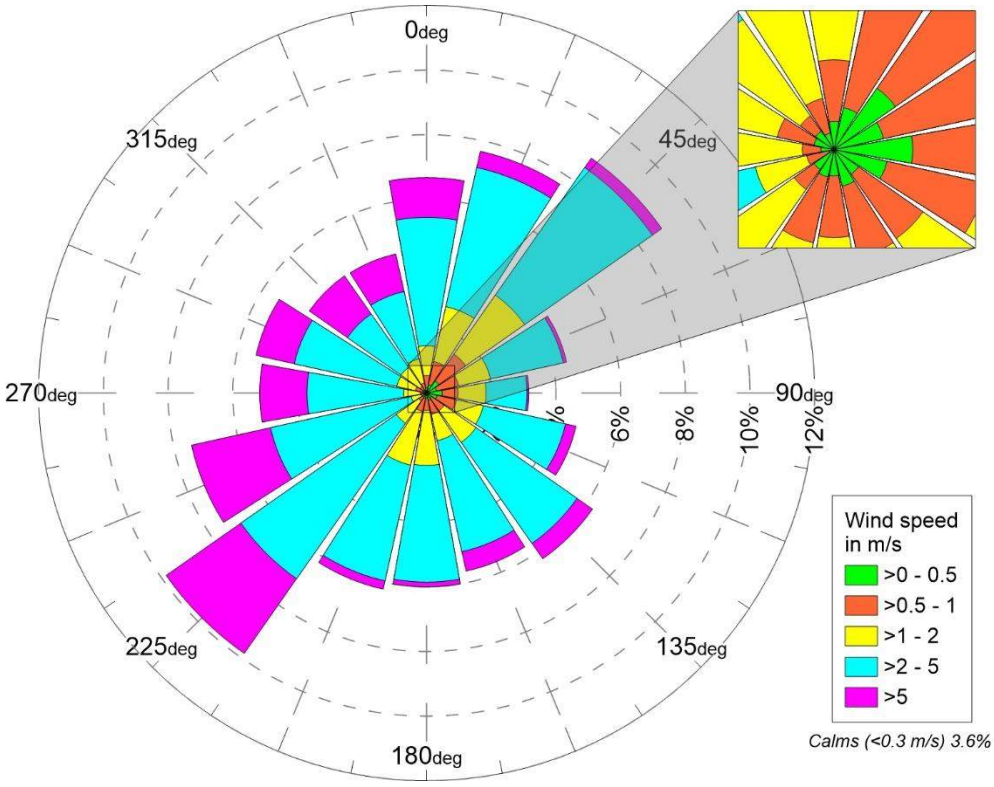


Figure 8: Windrose for January 2009 – December 2009 for Adelaide (Kent Town). Hourly average wind speed and direction, data supplied by Bureau of Meteorology.

6 Dispersion Model Setup

6.1 Model Selection

The dispersion model AERMOD was used for this air quality assessment. Whilst the simpler AUSPLUME model is still accepted for regulatory assessments in South Australia, AUSPLUME is outdated in most States in Australia, and default model recommended by EPA Victoria for regulatory air quality assessments is AERMOD. To complete a scientifically-robust air quality assessment, the AERMOD model was therefore used for this air quality assessment.

6.2 AERMET and AERMOD Setup

Meteorology for the AERMOD model was prepared using the accompanying software AERMET and following standard procedures (EPA Victoria, 2014)[6]. The methodology for the construction of the meteorological dataset for the AERMOD model is summarised in Table 7. The modelling was conducted for the calendar year 2009 as described in Section 5.

Table 7: AERMET methodology

Parameter	Settings/Description
Input data and sources	• Wind speed, direction, temperature, relative humidity from Kent Town BoM site. • Cloud, atmospheric pressure from Adelaide Airport BoM site. • Upper air soundings from Adelaide Airport, downloaded from https://ruc.noaa.gov/raobs/
Model used	AERMET version 16216, with data input via AERMET View software v9.5.0 produced by Lakes Environmental and licenced to Air Quality Professionals.
AERMET Settings	• Regulatory default mode including selection of "U* adjustment" option. This is in accordance with latest USEPA guidelines. • Landuse – 12 sectors processed using AERSURFACE utility, with land use within a radius of 6km of the site defined using NLCD92 Land Cover Classes interpreted from aerial photography (source – maps.au.nearmap.com licence) using "Land Use Creator" module in AERMET View. Average moisture, with settings varying by season and month.

[6] EPA Victoria (2014), *Guidelines for Input Meteorological Data for AERMOD*. Publication number 1550 Revision 3, September 2014

For the AERMOD model, the following modelling parameters were used:

- Model options
  - Included "LowWind3" option which sets minimum surface friction velocity (U*) to 0.3 m/s. This option was used to approximate the air movement caused by the helicopter blades which will disturb surface air layers in atmospheric conditions where the surface friction velocity is very small (and therefore could otherwise result in unrealistically high downwind pollutant concentrations).
- Terrain processing
  - Terrain adjustments included using default methods provided in AERMOD, with data sourced from SRTM1 Global web database supplied with the AERMOD View software licence.
- Source representation
  - Emission modelled as a volume source, of width 60m (cross-section width of building) on top of a 35m high building. This nominally represents the initial mixing of emissions created by the turning of the helicopter blades. Release height of volume source was 37m above ground – 35m height of helipad plus 2m height of exhaust nozzle.
- Building downwash
  - Not included, as source was modelled as a volume source
- Discharge conditions and emission rates
  - Constant emission rates, 15 hours per day (7am to 10pm) for all days of the year, as listed in Table 5.
- Receptor grid
  - 1km × 1km uniform grid centred on Peregrine site, @ 10m receptor spacing.
  - Modelled initially both with receptors at ground-level, and a flagpole height of 6m above ground (representing general air quality outside a 2nd-floor window). A comparison of ground-level versus 6m above ground model results was carried out, results for a nominal 1 g/s emission rate are shown in Appendix 2 for both a 3-minute and 24-hour averaging time. The differences between the two results plots are minor, with slightly higher predicted concentration at the 6m height above ground.
  - Therefore, all further modelling was conducted at a uniform receptor flagpole height across the grid of 6m above ground. Specific flagpole heights at discrete receptors were also specified, as shown in Figure 9.
- Averaging period
  - 1-hour average period in model, corrected by post-processing to 3-minute average where required using the normal convention of multiplying the 1-hour average concentration by a factor of 1.82.
- Output ranking
  - Maximum (100th percentile).

Figure 9: Discrete receptors (yellow square symbols) and nominated flagpole heights (FH). FH expressed as metres above ground.

6.3 Design Groundlevel Concentrations

EPA SA has published the Environment Protection (Air Quality) Policy 2016 (herein referred to as the "EPP (2016)"). In Schedule 2 of the EPP (2016), a list of design groundlevel criteria (DGLC) for a wide range of pollutants is provided, which dispersion model results are to be compared against for assessment of the potential for significant impacts. Specifically, the EPP (2016) states that:

> **Part 4—Matters relating to Part 6 of Act**
>
> **18—Matters relating to Part 6 of Act**
>
> (1) In determining any matters under Part 6 of the Act in relation to an activity (including a related development), the Authority must take into account the following matters (to the extent to which they are relevant):
>
> (a) ***ground level concentrations***—whether the activity has resulted, or may result, in the concentration of a pollutant specified in column 1 of the table in Schedule 2 clause 2 exceeding the maximum concentrations specified in column 4 or 5 for that pollutant over the averaging time specified in column 3 for that pollutant (based on evaluations at ground level using a prescribed testing, assessment, monitoring or modelling methodology for the pollutant and activity);

The DGLC defined in the EPP (2016) for the pollutants modelled in this report are listed in Table 8. The EPP (2016) specifies that these DGLC are to be compared against the maximum concentrations determined using a suitable dispersion model. The percentile of model results to be considered as the "maximum" is not specified either in the EPP (2016) nor in the companion Ambient Air Quality Assessment guide (AAQA Guide, 2016)[7], however it is understood that EPA SA usual requires the 100th percentile of model results to be utilised.

Good modelling practice normally regards the 99.9th percentile of model results as representative of the "maximum" for a 1-hour average. This is the case required in Victoria and New South Wales, and New Zealand for example. However, the 100th percentile has been adopted in this assessment, noting this is a conservative approach.

Some of the pollutants listed in Table 8 also have annual-average DGLC listed in EPP (2016). These are not considered in this report, as the frequency and duration of helipad use is negligible on an annual basis.

Table 8: Design groundlevel criteria (DGLC) and corresponding averaging periods specified in EPP (2016)

Pollutant	DGLC (µg/m^3)	Specified averaging period for DGLC
Nitrogen dioxide (NO_2)	250	1 hour
Sulphur dioxide (SO_2)	570	1 hour
Carbon monoxide (CO)	31,240	1 hour
PM_{10}	50	24 hours
$PM_{2.5}$	25	24 hours
Formaldehyde	44	3 minutes

[7] EPA South Australia, 2016. *Ambient Air Quality Assessment*, published August 2016.

6.4 Background Air Quality Data

The AAQA Guide requires that air quality assessments include background information in the model simulation:

"It is expected that existing ambient background concentrations of pollutants are also included into the assessment process, so that total concentrations of specific pollutants are less than their respective GLC. Where applicable, these background concentrations can be based on data from the nearest EPA monitoring station, modelled background levels, baseline monitoring performed for the project or advice from the EPA given on a case-by-case basis."

The AAQA Guide does not prescribe methods for applying background concentrations, in terms of which percentile of monitored data to apply. It is highly conservative to take a worst case background concentration and add a worst case model prediction; therefore some compromise is usually adopted.

CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$ concentrations in ambient air are monitored by EPA SA at several stations around Adelaide. The closest station to the Peregrine site is at Kensington Gardens, however this site is representative of a typical suburban area rather than a commercial area with major roads. A more representative monitoring station for the Peregrine site is the Adelaide CBD monitoring station at the EPA offices at the corner of Wakefield Street and Victoria Square.

The Adelaide CBD monitoring station measures the pollutants CO, NO_2, PM_{10} and $PM_{2.5}$. SO_2 is no longer routinely monitored in Adelaide due to consistent very low readings historically. SO_2 is still measured at the Northeast Adelaide and Northwest Adelaide monitoring stations. The Northwest Adelaide station is not considered representative of the Peregrine site because of the proximity of heavy industry to the Northwest Adelaide station. SO_2 background ambient air quality data was therefore taken from the Northeast Adelaide monitoring station in Northfield.

Background ambient air quality data for formaldehyde is not available. Formaldehyde does not persist for long in the environment. When it is present in air, most of it degrades to molecular hydrogen and carbon monoxide[8]. In a previous air quality assessment involving formaldehyde conducted by AirQP in Victoria, EPA Victoria advised AirQP to apply a constant 1-hour average background concentration of 1 µg/m^3 in a commercial/industrial part of Melbourne; that value has also been applied in this assessment.

8 https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/chemicals+and+contaminants/formaldehyde

Ambient air quality data for January 2015 to December 2018 from the Adelaide CBD and Northeast Adelaide monitoring stations was downloaded from the EPA SA website. The data was analysed and key percentile statistics are summarised in Table 9.

The 90th percentile of background data shown in the table was applied in the modelling assessment. Selection of the 90th percentile is considered to be a reasonable compromise between (i) not underestimating potential concurrent background concentrations, and (ii) not overstating the risk of worst case model results coinciding with worst case background air quality.

Table 9: Summary of EPA SA Ambient Air Quality Monitoring Data at Adelaide CBD and Northeast Adelaide

	Pollutant concentration at each percentile, all data records Jan 2014 – Dec 2018 (µg/m³)				
	Adelaide CBD Monitoring Station				Northeast Adelaide Monitoring Station
Percentile	PM_{10}, 24-hour average	$PM_{2.5}$, 24-hour average	NO2, 1-hour average	CO, 1-hour average	SO_2, 1-hour average
50th	16	6	24	18	0
70th	19	8	36	25	0
80th	21	9	43	31	0
90th	24	10	55	41	0
95th	27	11	66	52	3
98th	31	13	81	68	3
99th	35	13	94	81	5

6.5 NO_X and NO_2 Oxidation Calculations

As introduced in Section 4.1, only a portion of the NO_x emissions from fuel combustion are in the form of NO_2. To calculate ambient concentrations of NO_2 downwind that could occur as a result of these discharges, it is necessary to estimate the oxidation of NO into NO_2 in the atmosphere after discharge from the engine.

For the calculation of NO_2 dynamics, an assessment of NO-to-NO_2 conversion is required to compare the model results to the regulatory assessment criteria. This is done after the dispersion modelling, by extracting predicted total NO_x concentrations for each hour of the model from identified discrete receptors and processing the oxidation calculations in a spreadsheet.

A number of methods are available to estimate NO-NO_2 oxidation rates. These methods vary in complexity and conservatism. The simplest and most conservative method requires the assumption that 100% of the NO_x emitted is immediately converted to NO_2. This is a highly conservative method, however if cumulative NO_2 concentrations calculated using this method, after addition of background air quality, do not exceed the DGLC, then a more refined assessment is not necessary. In this case, this simple method was sufficient for assessment of NOx emissions.

7 Dispersion Model Results

7.1 Model Results

The AERMOD model was run with a nominal pollutant emission rate of 1 g/s. The results can then be scaled in proportion with actual emission rate of each pollutant to calculate the maximum downwind concentrations of each pollutant. Model input settings are displayed in Appendix 3. A model output file for the run with the six discrete receptors is supplied in Appendix 4.

Maximum model predictions at each of the discrete flagpole-height receptors shown in Figure 9 were extracted from the model and multiplied by the relevant emission rates for each pollutant. The 90th percentile background concentrations for each pollutant (Table 9) were then added to calculate the cumulative predicted concentration for each pollutant. These results are listed in Table 10, Table 11, and Table 12, with each table corresponding to DGLCs with different averaging periods.

The cumulative (including background) model results for each pollutant in Tables 10-12 are shown in Figures 10-15.

Table 10: Dispersion model results for pollutants with 1-hour average DGLC.

		1-hr average model predicted concentration for continuous maximum short term emission rate, 100th percentile			Cumulative predicted concentration including background		
Receptor number	Height above ground (m)	CO	NO_2*	SO_2	CO	NO_2*	SO_2
1	12	398	96	6	439	151	6
2	6	297	71	4	338	126	4
3	6	497	120	7	538	175	7
4	6	526	127	8	567	182	8
5	8	479	116	7	520	171	7
6	0	463	111	7	504	166	7
				DGLC	**31240**	**250**	**570**

* Assumes all NO_x discharged as NO_2 or converted immediately to NO_2 in the atmosphere.

Table 11: Dispersion model results for pollutants with 24-hour average DGLC.

		24-hr average model predicted concentration for continuous (7am to 10pm) hourly-average emission rate, 100th percentile		Cumulative predicted concentration including background	
Receptor number	Height above ground (m)	PM_{10}*	$PM_{2.5}$*	PM_{10}*	$PM_{2.5}$*
1	12	4	4	28	14
2	6	3	3	27	13
3	6	5	5	29	15
4	6	6	6	30	16
5	8	5	5	29	15
6	0	5	5	29	15
			DGLC	**50**	**24**

* Assumes 100% of all TSP is PM_{10} and $PM_{2.5}$.

Table 12: Dispersion model results for pollutants with 3-minute average DGLC.

		3-minute average model predicted concentration for continuous (7am to 10pm) hourly-average emission rate, 100th percentile	Cumulative predicted concentration including background
Receptor number	Height above ground (m)	Formaldehyde*	Formaldehyde*
1	12	27	28
2	6	20	21
3	6	33	34
4	6	35	36
5	8	32	33
6	0	31	32
		DGLC	**44**

* Indicator for compliance of all VOC species.

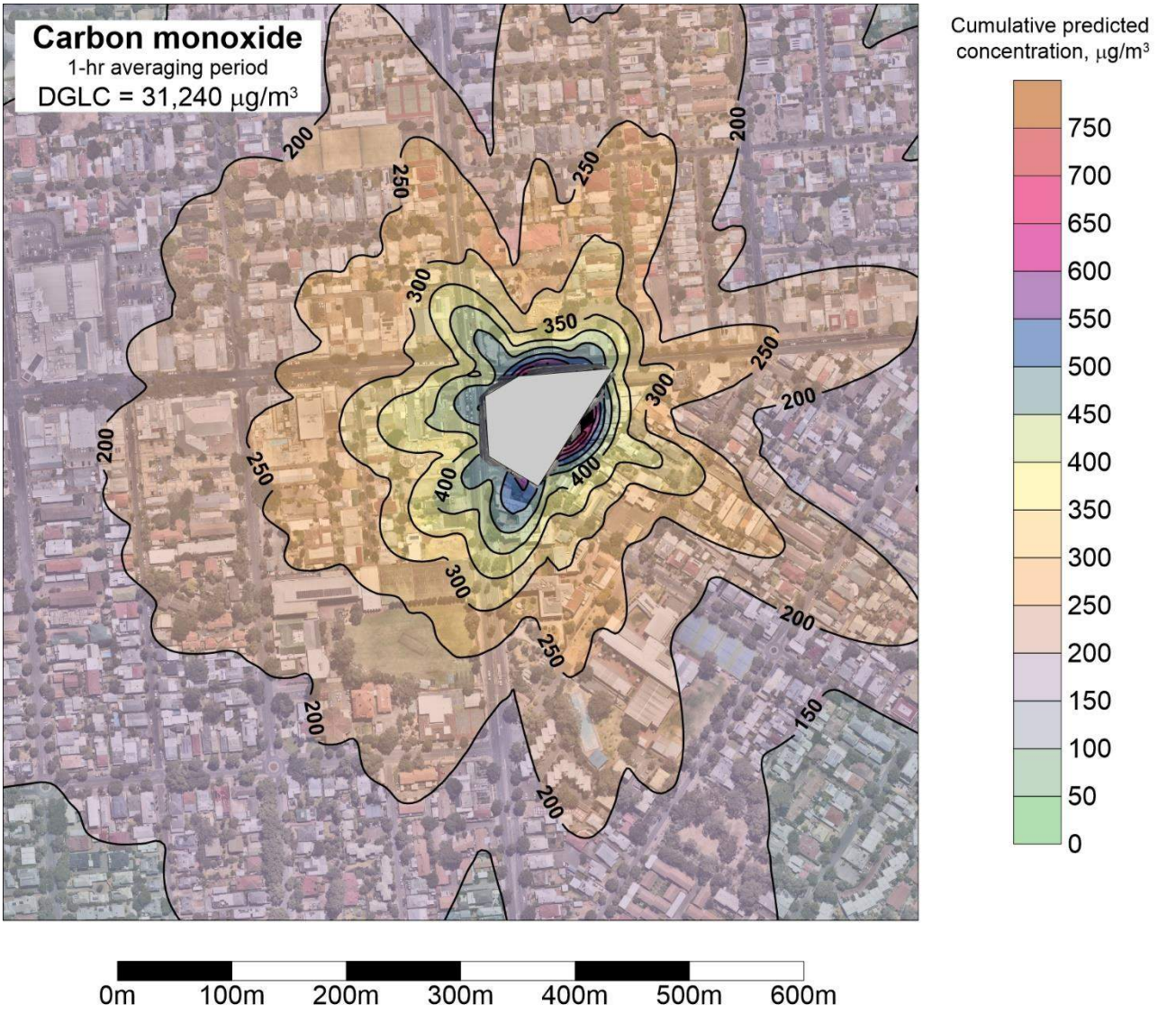


Figure 10: Dispersion model results for carbon monoxide: maximum short term emission rate sustained continuously 7am to 10pm, 1-hour averaging period, 100th percentile of model predictions, concentrations at 6m above ground level, background air quality included. Grey polygon shows Peregrine site footprint.

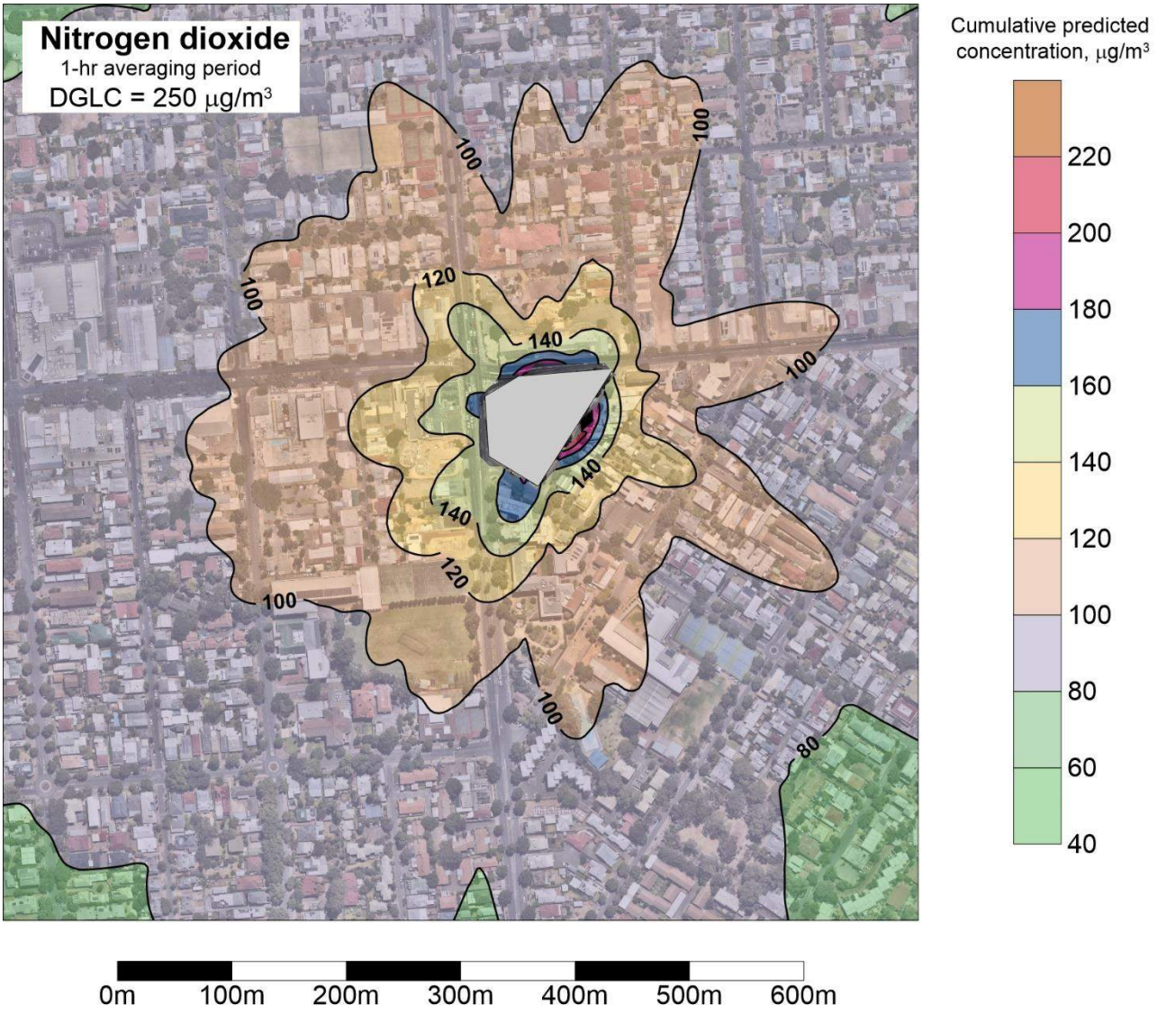


Figure 11: Dispersion model results for nitrogen dioxide: maximum short term emission rate sustained continuously 7am to 10pm and all NO_x discharged as NO_2, 1-hour averaging period, 100th percentile of model predictions, concentrations at 6m above ground level, background air quality included. Grey polygon shows Peregrine site footprint.

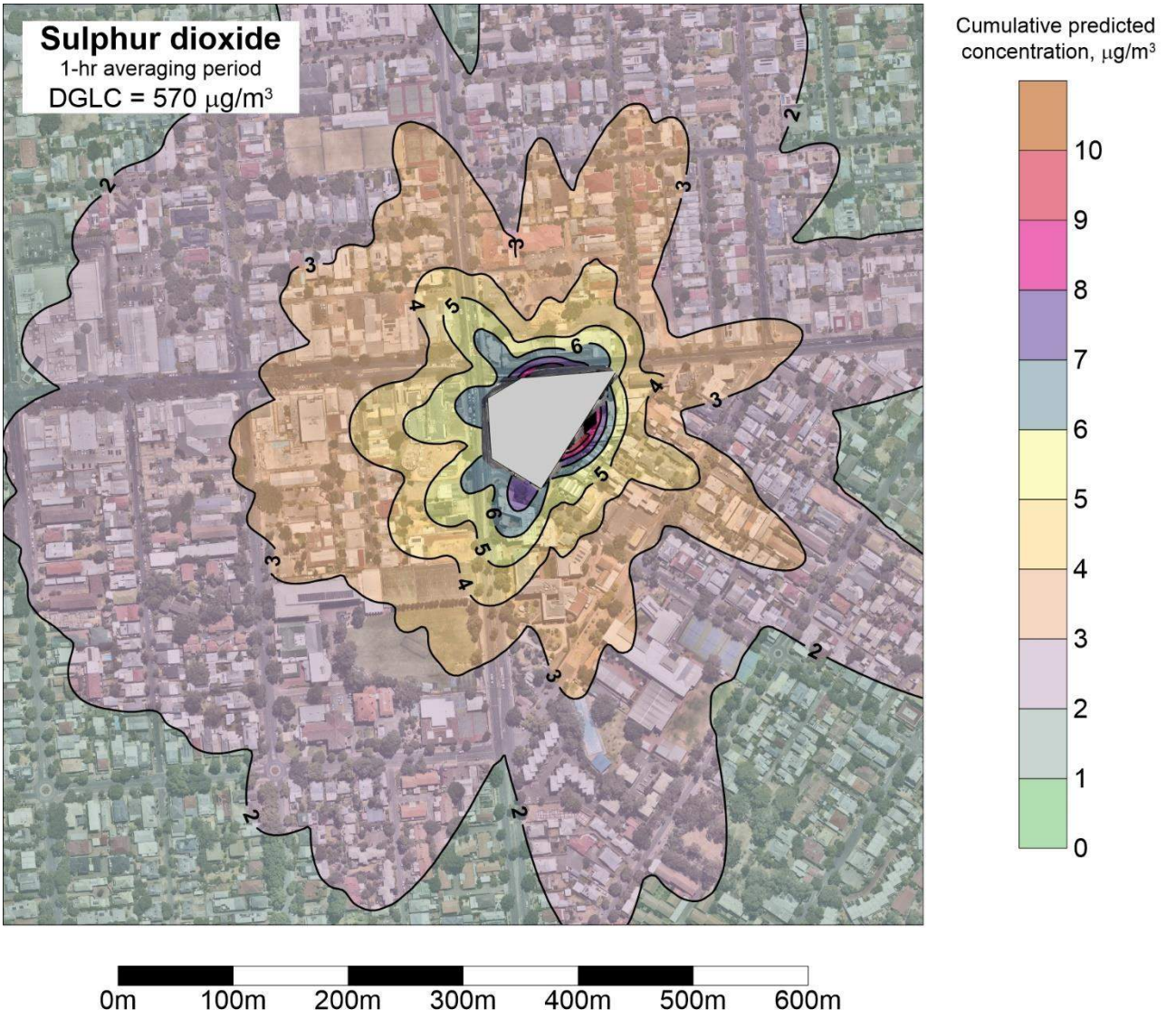


Figure 12: Dispersion model results for sulphur dioxide: maximum short term emission rate sustained continuously 7am to 10pm, 1-hour averaging period, 100th percentile of model predictions, concentrations at 6m above ground level, background air quality included. Grey polygon shows Peregrine site footprint.

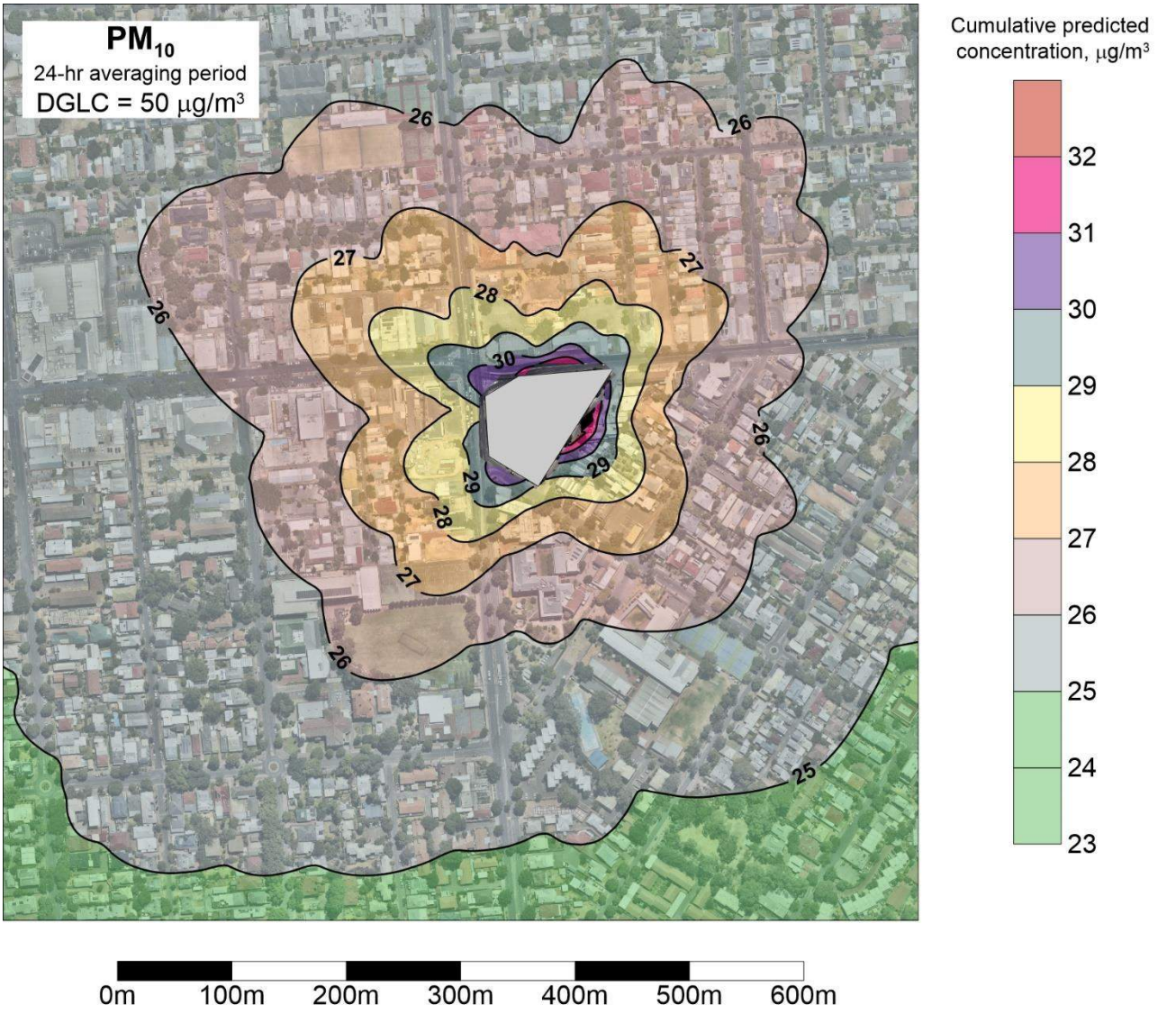


Figure 13: Dispersion model results for PM_{10}: maximum 1-hour average emission rate sustained continuously 7am to 10pm, model results extracted as 24-hour averaging period, 100th percentile of model predictions, concentrations at 6m above ground level, background air quality included. Grey polygon shows Peregrine site footprint.

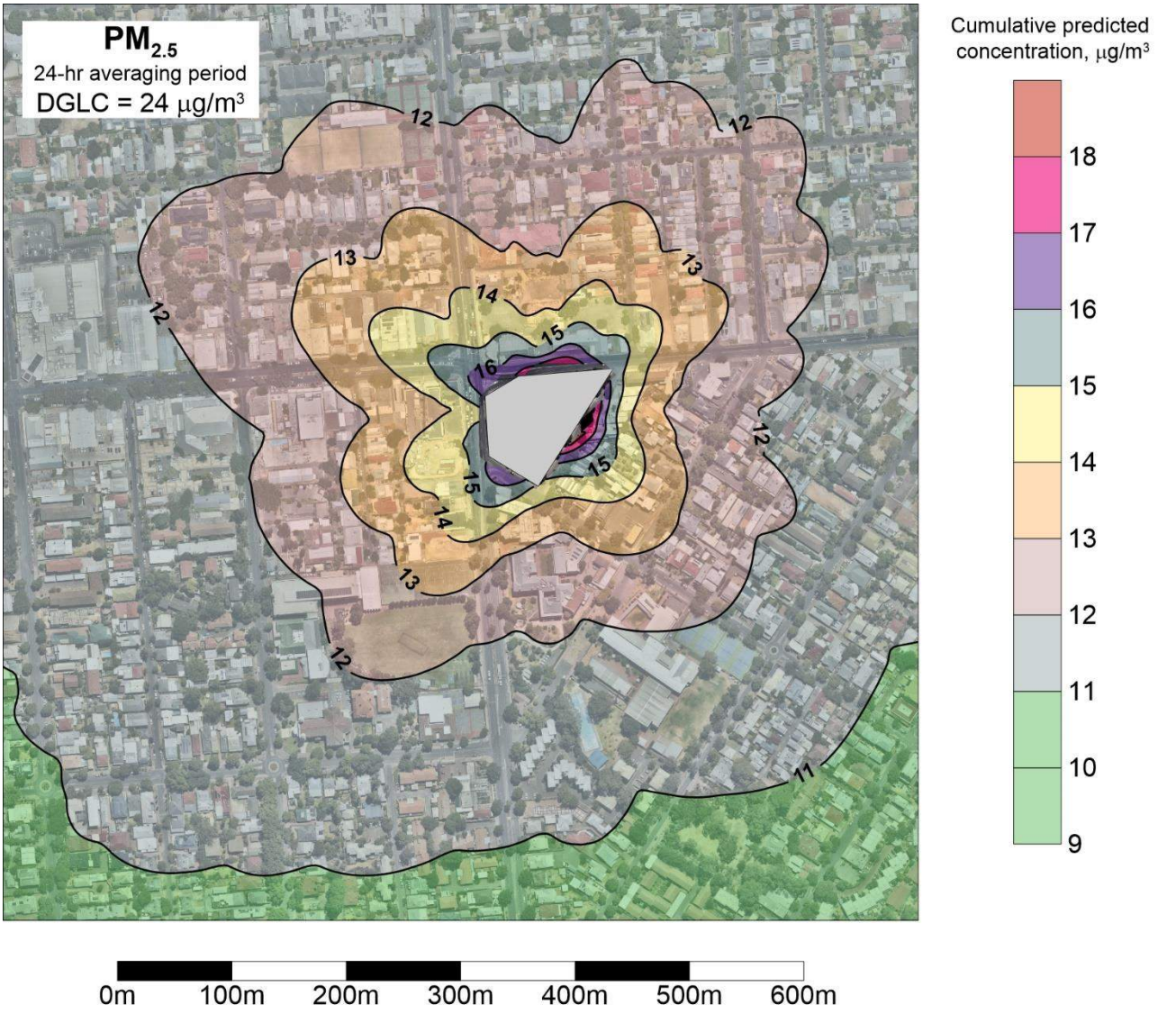


Figure 14: Dispersion model results for $PM_{2.5}$: maximum 1-hour average emission rate sustained continuously 7am to 10pm, model results extracted as 24-hour averaging period, 100th percentile of model predictions, concentrations at 6m above ground level, background air quality included. Grey polygon shows Peregrine site footprint.

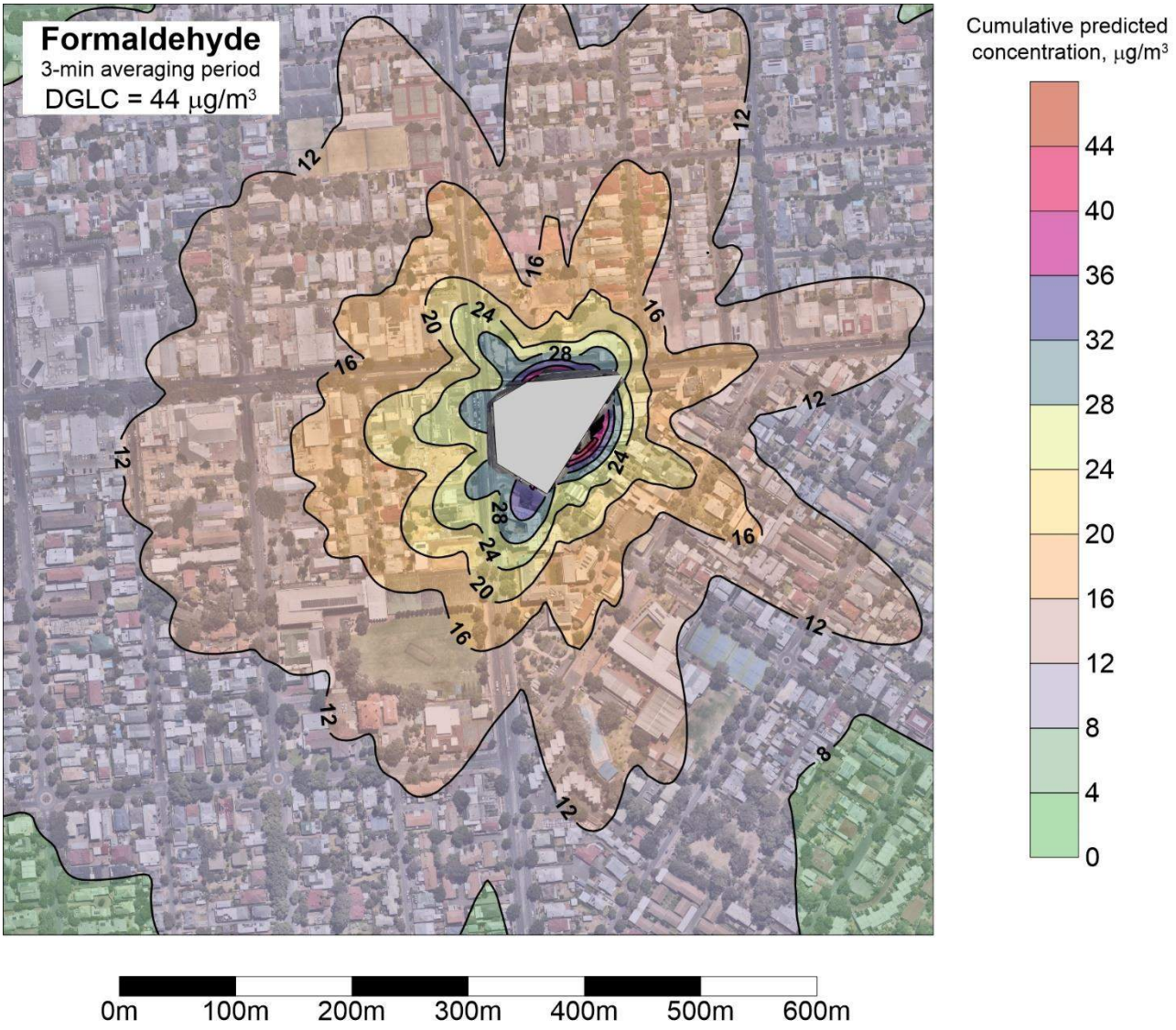


Figure 15: Dispersion model results for formaldehyde: maximum 1-hour average emission rate sustained continuously 7am to 10pm, model results processed as 3-minute averaging period, 100th percentile of model predictions, concentrations at 6m above ground level, background air quality included. Grey polygon shows Peregrine site footprint.

7.2 Discussion of Model Results for Each Pollutant

Oxides of Nitrogen

Predicted 1-hour average concentrations of NO_2 at nearest sensitive receptors are below the DGLC even with the highly conservative assumption that all NO_x is discharged from the helicopter engine exhausts as NO_2. Other conservative assumptions in the calculation of predicted NO_2 concentrations are:

- Include 90th percentile of background air quality data.
- Use the 100th percentile of model predictions.
- Assume there is a continuous discharge from the helipad for all hours 7am to 10pm, for every day of the year.
- Assume the discharge rate is continuously at the maximum identified for any part of helicopter flight operations.
- Assume the helicopter type using the helipad is the largest of the nominated types, with the largest possible engine configuration.

Sulphur Dioxide and Carbon Monoxide

Predicted 1-hour average concentrations of SO_2 and CO at nearest sensitive receptors are well below the respective DGLC. The conservative assumptions listed above for NO_2 are also applicable to the SO_2 and CO modelling results.

PM_{10} and $PM_{2.5}$

Predicted 24-hour average concentrations of PM_{10} and $PM_{2.5}$ at nearest sensitive receptors are below the respective DGLC. Conservative assumptions in the calculation of the predicted particulate concentrations are:

- Include 90th percentile of background air quality data.
- Assume there is a continuous discharge from the helipad for all hours 7am to 10pm, for every day of the year. This is a highly conservative assumption due to the small number of helicopter trips anticipated.
- Assume the discharge rate is continuously at the average hourly rate calculated with 3 helicopters using the helipad per hour.
- Assume the helicopter type using the helipad is the largest of the nominated types, with the largest possible engine configuration.

Formaldehyde

Predicted 3-minute average concentrations of formaldehyde would exceed the DGLC if the pollutant discharge rate was assumed to be continuously at the maximum identified for any part of helicopter flight operations. However, given how conservative this assumption is for the proposed activity, along with the other conservative factors about helicopter type and engine size, it is more appropriate to compare the DGLC with model predictions calculated with the maximum hourly-average emission rate. Under this

scenario, the predicted 3-minute average concentrations of formaldehyde at nearest sensitive receptors are below the DGLC.

The conservative assumptions listed above for PM_{10} and $PM_{2.5}$ are also applicable to the formaldehyde assessment.

Formaldehyde has been adopted as the indicator for compliance of all other VOCs likely to occur in the engine exhaust.

8 Conclusion

The modelling results show that even with the extremely conservative assumptions implied in the estimation of pollutant emission rates, the predicted concentrations of pollutants at nearby sensitive receptors are all below the applicable DGLC published in EPP (2016).

Conservative factors applied in the modelling methodology and the estimation of emission rates include:

- Include 90th percentile of background air quality data.
- Use the 100th percentile of model predictions.
- Assume there is a continuous discharge from the helipad for all hours 7am to 10pm, for every day of the year. This is a necessary but highly conservative assumption due to the small number of helicopter trips anticipated.
- Depending on pollutant and averaging period required, either:
    - Assume the discharge rate is continuously at the maximum identified for any part of helicopter flight operations, or
    - Assume the discharge rate is continuously at the average hourly rate calculated with 3 helicopters using the helipad per hour.
- Assume the helicopter type using the helipad is the largest of the nominated types, with the largest possible engine configuration.

It is concluded that the proposed use of the helipad is consistent with the EPP (2016) requirements for air quality.

Appendix 1

Extracts from NPI (2003)

Table 3: Aircraft Default Emission Factors Per LTO by Mode

	Emission Factor (kg LTO^{-1})				
	CO	HC	NO_x	SO_2	TSP
International					
Approach	0.989	0.210	5.40	0.552	0.194
Taxi / Idle	16.9	3.16	3.43	0.790	0.769
Takeoff	0.238	0.106	18.8	0.398	0.0651
Climbout	0.260	0.101	16.7	0.490	0.104
Domestic					
Approach	0.626	0.0387	1.27	0.157	0.0953
Taxi / Idle	7.66	0.891	0.973	0.250	0.116
Takeoff	0.0835	0.0134	2.14	0.106	0.0428
Climbout	0.107	0.0187	2.24	0.134	0.0465
Regional					
Approach	0.961	0.135	0.369	0.00227	0.0716
Taxi / Idle	6.36	3.80	0.317	0.00596	0.211
Takeoff	0.0790	0.0104	0.487	0.00049	0.0335
Climbout	0.254	0.0149	0.570	0.00218	0.0585
General Aviation: Piston					
Approach	2.89	0.0431	0.00391	0.00049	0.330
Taxi / Idle	1.29	0.0767	0.00107	0.00026	0.880
Takeoff	0.261	0.00269	0.00056	4.83E-05	0.0165
Climbout	2.97	0.0352	0.0123	0.00060	0.275

Table 4: VOC Speciation for Exhaust Emissions from Aircraft[1]

NPI Substance	Weight Fraction[a]		
	Commercial	General	Military
Profile[2]	**1098**	**1099**	**1097**
Acetaldehyde	0.0465	0.0432	0.0483
Acetone	0.0245	0.0293	0.0241
Benzene	0.0194	0.0179	0.0202
1,3-Butadiene	0.018	0.0157	0.0189
Ethylbenzene	0.0017	0.0015	0.0018
Formaldehyde	0.1501	0.1414	0.1548
Polycyclic aromatic compounds[3]	0.0106	0.0095	0.0112
Phenol	0.0024	0.0022	0.0026
Styrene	0.0039	0.0037	0.0041
Toluene	0.0052	0.0049	0.0055
Xylenes[4]	0.0048	0.0044	0.0050

Notes:
1. From Reference 9 (USEPA 2000) – Speciate 3.1 database
2. Profile number from the Speciate 3.1 database
3. Sum of Napthelene and Methyl Napthelenes from Speciate 3.1 database
4. Sum of M & P Xylenes and O-Xylenes from Speciate 3.1 database

From Appendix F of NPI (2003):

Table 16: Non-Jet Engine Emission Factors from the FAA Database

FAA ID Number	Engine Maker[1]	Engine Identification	HC Emission Factor (kg/h)				CO Emission Factor (kg/h)				NO_x Emission Factor (kg/h)			
			T/O	C/O	App	Idle	T/O	C/O	App	Idle	T/O	C/O	App	Idle
220	GE	CT7-5	0.364	0.338	0.216	0.243	0.909	0.914	0.859	1.912	5.02	4.47	1.118	0.119
182	GE	T58-GE-5	0.000	0.317	5.866	0.317	0.000	2.250	2.250	10.233	0.00	2.90	2.901	0.091
148	P&W	PT6A-27	0.000	0.000	2.619	0.214	0.193	0.218	2.273	3.341	1.50	1.27	0.817	0.127
149	P&W	PT6A-41	0.405	0.436	6.769	2.812	1.181	1.395	4.310	7.679	1.85	1.62	0.576	0.131
253	P&W	R-985-AN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000
157	RR	TYNE	1.302	1.191	3.007	1.217	0.538	0.596	5.117	18.505	12.30	11.44	4.084	0.216
225	RR	DART RDA10	0.000	0.000	1.685	0.000	1.687	1.836	6.590	7.840	3.30	2.39	0.625	0.303
226	RR	DART RDA7	0.641	0.622	4.448	0.001	2.051	1.978	9.758	17.011	3.59	2.54	0.264	0.130
469	TEX LYC	T53-L-11D	0.000	0.089	4.084	0.089	0.000	0.924	0.924	1.907	0.00	2.27	2.268	0.091

N otes:
1. The engine makers are; GE – General Electric, RR Rolls Royce, P&W – Pratt & Whitney, TEX LYC - Textron Lycoming

Appendix 2

Comparison of model results at ground level and at 6m above ground.

3-minute averaging period, receptor heights at ground level

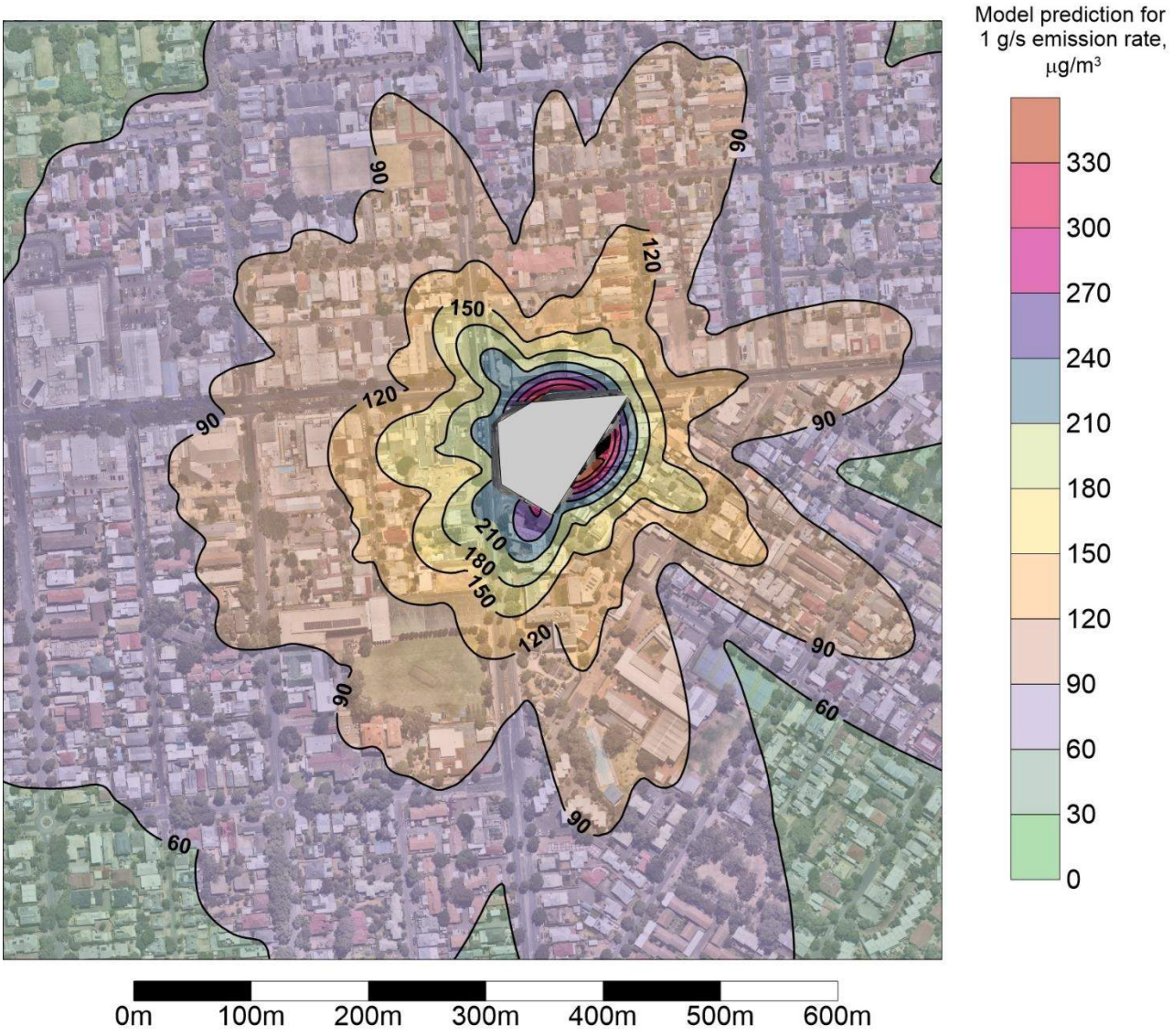


Figure A2-1: Dispersion model result for hypothetical worst case: 1 g/s emission rate, 3-minute averaging period, 100th percentile of model predictions, ground-level concentrations. Grey polygon shows Peregrine site footprint.

3-minute averaging period, receptor heights 6m above ground

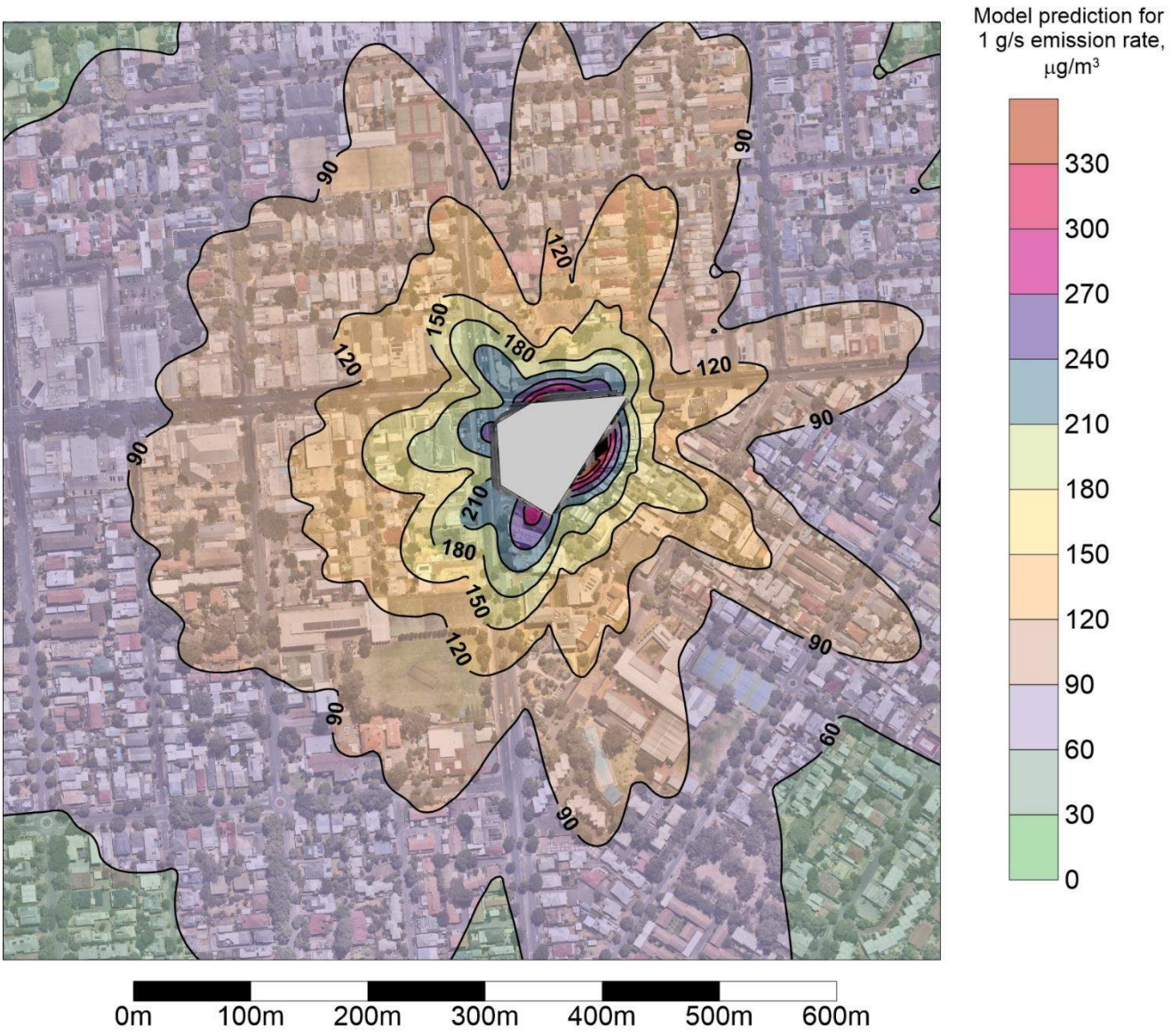


Figure A2-2: Dispersion model result for hypothetical worst case: 1 g/s emission rate, 3-minute averaging period, 100th percentile of model predictions, receptor heights 6m above ground level. Grey polygon shows Peregrine site footprint.

24-hour averaging period, receptor heights at ground level

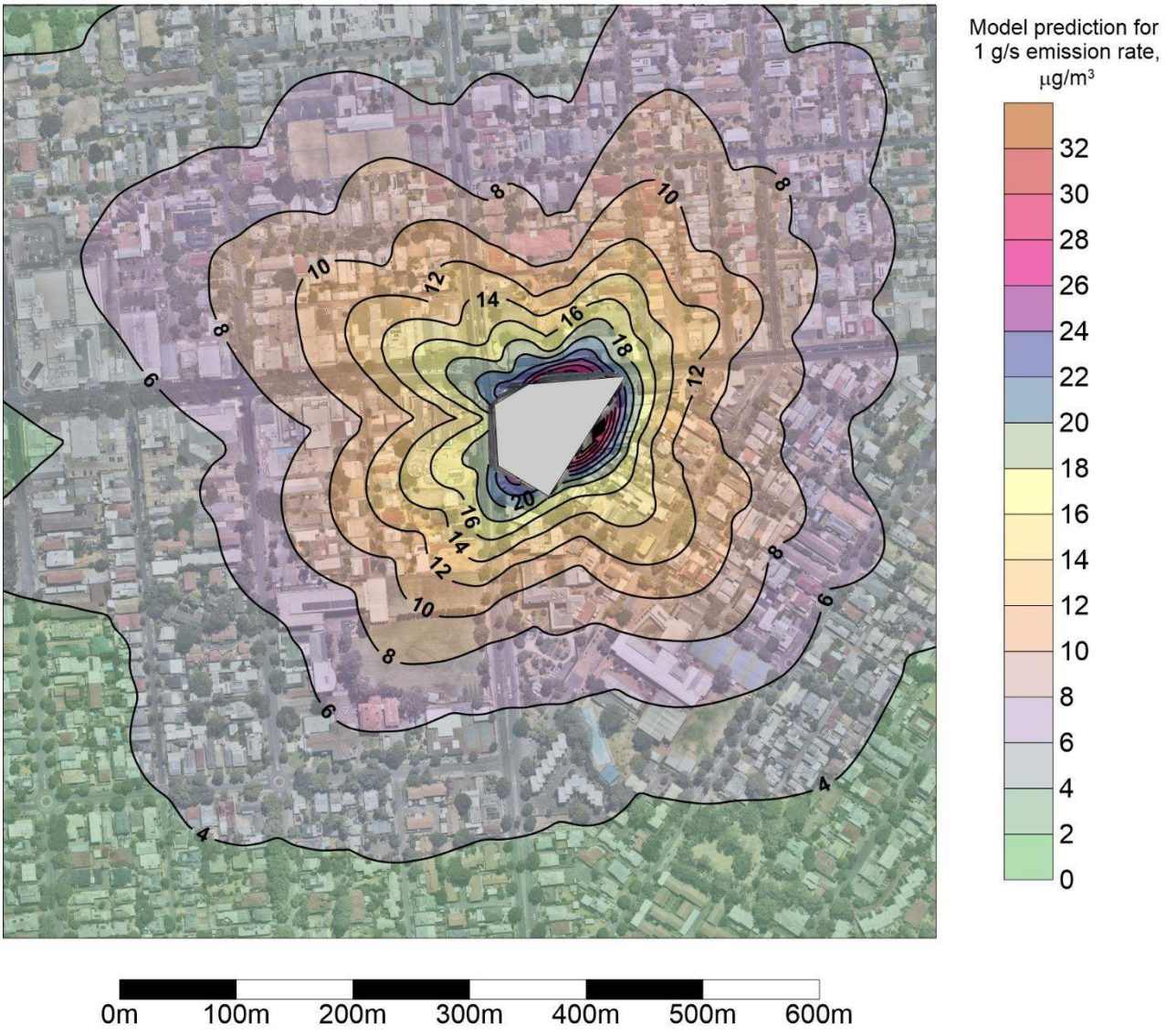


Figure A2-3: Dispersion model result for hypothetical worst case: 1 g/s emission rate, 24-hour averaging period, 100th percentile of model predictions, ground-level concentrations. Grey polygon shows Peregrine site footprint.

24-hour averaging period, receptor heights 6m above ground

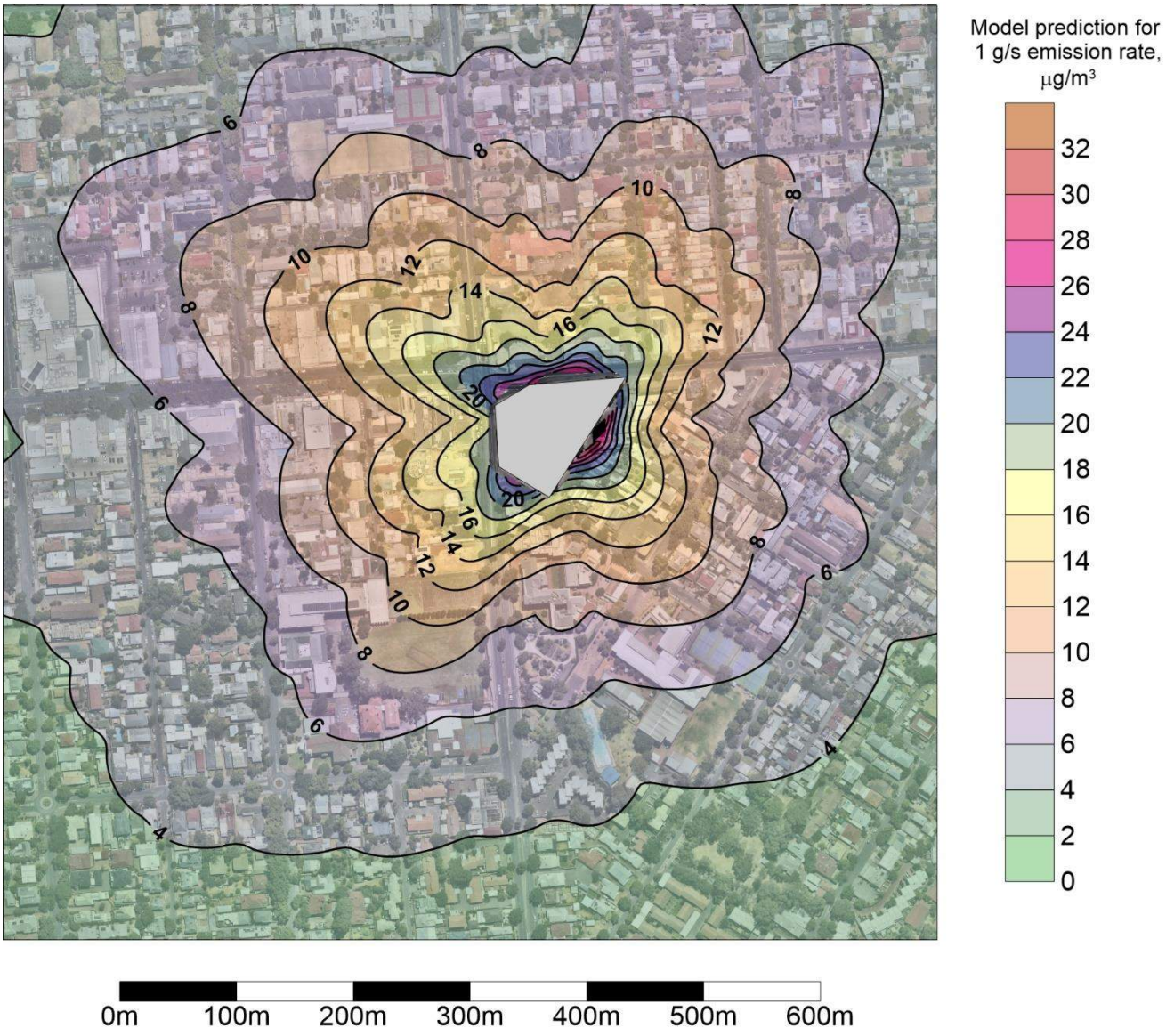


Figure A2-4: Dispersion model result for hypothetical worst case: 1 g/s emission rate, 24-hour averaging period, 100th percentile of model predictions, receptor heights 6m above ground level. Grey polygon shows Peregrine site footprint.

Appendix 3

Model Inputs

Control Pathway

Dispersion Options

Titles

Peregrine Helipad
35m volume source and all receptors at 6m above GL

Dispersion Options

☐ Regulatory Default ☑ Non-Default Options

☑ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:

☐ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☑

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Urban
Population:
Name (Optional):
Roughness Length:

Output Type

☑ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

TSP

Averaging Time Options

Hours ☑ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 12 ☑ 24

☐ Month ☐ Period ☐ Annual

Exponential Decay

☐ Yes ☑ No

Terrain Height Options

☐ Flat ☑ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☑ Yes ☐ No

Default Height = 6.00 m

Control Pathway

Optional Files

Re-Start File	Init File	Multi-Year Analyses	Event Input File	Error Listing File
☐	☐	☐	☐	■

Detailed Error Listing File

Filename: Run_9.err

Source Pathway - Source Inputs

Volume Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Length of Side [m]	Building Height [m]	Initial Lateral Dim. [m]	Initial Vertical Dim. [m]
VOLUME	VOL1	284577.00	6133145.00	75.75	37.00	1.00000	60.00	35.00	13.95	16.28

Source Pathway

Building Downwash Information

Option not in use

Emission Rate Units for Output

For Concentration

Unit Factor:	1E6
Emission Unit Label:	GRAMS/SEC
Concentration Unit Label:	MICROGRAMS/M**3

Variable Emissions

Hourly Emission Rate Variation

Scenario: Scenario 2

Source ID:	VOL1					
1 to 6	0.00	0.00	0.00	0.00	0.00	0.00
7 to 12	0.00	1.00	1.00	1.00	1.00	1.00
13 to 18	1.00	1.00	1.00	1.00	1.00	1.00
19 to 24	1.00	1.00	1.00	1.00	0.00	0.00

Receptor Pathway

Receptor Networks

Note: Terrain Elavations and Flagpole Heights for Network Grids are in Page RE2 - 1 (If applicable)
Generated Discrete Receptors for Multi-Tier (Risk) Grid and Receptor Locations for Fenceline Grid are in Page RE3 - 1 (If applicable)

Discrete Receptors

Discrete Cartesian Receptors

Record Number	X-Coordinate [m]	Y-Coordinate [m]	Group Name (Optional)	Terrain Elevations	Flagpole Heights [m (Optional)
1	284481.71	6133143.84		74.00	12.00
2	284424.49	6133117.68		72.95	6.00
3	284596.71	6133104.60		77.74	6.00
4	284619.06	6133137.30		77.09	6.00
5	284538.40	6133074.08		76.61	8.00
6	284572.19	6133193.98		75.80	

Plant Boundary Receptors

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: Norwood_2009_adjU.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: Norwood_2009_adjU.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 75.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2009			
Upper Air		2009			
On-Site		2009			

Data Period

Data Period to Process

Start Date: 1/01/2009 Start Hour: 1 End Date: 31/12/2009 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Receptor Pathway

Receptor Networks

Note: Terrain Elavations and Flagpole Heights for Network Grids are in Page RE2 - 1 (If applicable)
Generated Discrete Receptors for Multi-Tier (Risk) Grid and Receptor Locations for Fenceline Grid are in Page RE3 - 1 (If applicable)

Uniform Cartesian Grid

Receptor Network ID	Grid Origin X Coordinate [m]	Grid Origin Y Coordinate [m]	No. of X-Axis Receptors	No. of Y-Axis Receptors	Spacing for X-Axis [m]	Spacing fo Y-Axis [m]
UCART1	284035.88	6132646.09	101	101	10.00	10.00

Discrete Receptors

Plant Boundary Receptors

Output Pathway

Tabular Printed Outputs

Short Term Averaging Period	RECTABLE Highest Values Table										MAXTABLE Maximum Values Table	DAYTABLE Daily Values Table
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th		
1	☑	☐	☐	☐	☐	☐	☐	☐	☑	☐		No
24	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐		No

Contour Plot Files (PLOTFILE)

Path for PLOTFILES: RUN_8.AD

Averaging Period	Source Group ID	High Value	File Name
1	ALL	1st	01H1GALL.PLT
24	ALL	1st	24H1GALL.PLT
1	ALL	9th	01H9GALL.PLT

Output Pathway

Tabular Printed Outputs

Short Term Averaging Period	RECTABLE Highest Values Table										MAXTABLE Maximum Values Table	DAYTABLE Daily Values Table
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th		
1	■	☐	☐	☐	☐	☐	☐	☐	☐	☐		No
24	■	☐	☐	☐	☐	☐	☐	☐	☐	☐		No

Post-Processing Files (POSTFILE)

Path for POSTFILES: RUN_9.AD

Averaging Period	Source Group ID	File Format	File Unit (Optional)	File Name
1	ALL	PLOT (Formatted)		RUN_9.POS

Contour Plot Files (PLOTFILE)

Path for PLOTFILES: RUN_9.AD

Averaging Period	Source Group ID	High Value	File Name

Appendix 4

Model output file

```
**
**************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 9.6.5
** Lakes Environmental Software Inc.
** Date: 19/03/2019
** File: D:\Lakes\AERMOD View\Peregrine Helipad\Run_9\Run_9.ADI
**
**************************************
**
**
**************************************
** AERMOD Control Pathway
**************************************
**
**
CO STARTING
   TITLEONE Peregrine Helipad
   TITLETWO 35m volume source and all receptors at 6m above GL
   MODELOPT CONC ALPHA
   AVERTIME 1 24
   URBANOPT 2000
   POLLUTID TSP
   FLAGPOLE 6.00
   RUNORNOT RUN
   LOW_WIND 0.3000 0.2800 1.0000
   ERRORFIL Run_9.err
CO FINISHED
**
**************************************
** AERMOD Source Pathway
**************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
   LOCATION VOL1         VOLUME     284577.000  6133145.000       75.750
** Source Parameters **
   SRCPARAM VOL1               1.0    37.000    13.953    16.279
   URBANSRC ALL

** Variable Emissions Type: "By Hour-of-Day (HROFDY)"
** Variable Emission Scenario: "Scenario 2"
   EMISFACT VOL1         HROFDY 0.0 0.0 0.0 0.0 0.0 0.0
   EMISFACT VOL1         HROFDY 0.0 1.0 1.0 1.0 1.0 1.0
   EMISFACT VOL1         HROFDY 1.0 1.0 1.0 1.0 1.0 1.0
   EMISFACT VOL1         HROFDY 1.0 1.0 1.0 1.0 0.0 0.0
   SRCGROUP ALL
SO FINISHED
**
**************************************
** AERMOD Receptor Pathway
**************************************
**
**
RE STARTING
   INCLUDED Run_9.rou
RE FINISHED
**
**************************************
** AERMOD Meteorology Pathway
**************************************
**
**
ME STARTING
   SURFFILE Norwood_2009_adjU.SFC
   PROFFILE Norwood_2009_adjU.PFL
   SURFDATA 0 2009
   UAIRDATA 94672 2009
   SITEDATA 98765 2009
```

```
   PROFBASE 75.0 METERS
ME FINISHED
**
**************************************
** AERMOD Output Pathway
**************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 1ST
   RECTABLE 24 1ST
   POSTFILE 1 ALL PLOT RUN_9.AD\RUN_9.POS
** Auto-Generated Plotfiles
   SUMMFILE Run_9.sum
OU FINISHED


  *** Message Summary For AERMOD Model Setup ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            5 Warning Message(s)
 A Total of            0 Informational Message(s)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 CO W320      23       URBOPT: Input Parameter May Be Out-of-Range for Parameter       URB-POP
 CO W111      27     LOW_WIND: User-specified minimum Sigma-V on LOW_WIND Keyword       0.3000
 CO W112      27     LOW_WIND: User-specified minimum WindSpeed on LOW_WIND Keywd       0.2800
 CO W113      27     LOW_WIND: User-specified maximum FRAN on the LOW_WIND Keywrd       1.0000
 ME W187      74       MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET

 *********************************
 *** SETUP Finishes Successfully ***
 *********************************
```

```
 *** MODELOPTs:    NonDFAULT  CONC  ELEV  FLGPOL  ALPHA  URBAN  LOW_WIND  ADJ_U*

                                            ***     MODEL SETUP OPTIONS SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for     1 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =      2000.0 ;  Urban Roughness Length =  1.000 m

 **Model Allows User-Specified Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Full Conversion Assumed for NO2.
        6. Urban Roughness Length of 1.0 Meter Used.

 **Other Options Specified:
        ADJ_U*   - Use ADJ_U* option for SBL in AERMET
        CCVR_Sub - Meteorological data includes CCVR substitutions
        TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Accepts FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  TSP

 **Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR

 **This Run Includes:      1 Source(s);       1 Source Group(s); and       6 Receptor(s)

               with:      0 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:      1 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with      0 line(s)


 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  18081

 **Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs External File(s) of Concurrent Values for Postprocessing (POSTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =    75.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =
0.0
                  Emission Units = GRAMS/SEC                            ;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3
```

 **Approximate Storage Requirements of Model =   3.5 MB of RAM.

 **Input Runstream File:
aermod.inp
 **Output Print File:
aermod.out

 **Detailed Error/Message File:
Run_9.err
 **File for Summary of Results:
Run_9.sum

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
VOL1	0	0.10000E+01	284577.0	6133145.0	75.8	37.00	13.95	16.28	YES	HROFDY

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
ALL	VOL1 ,

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs
	2000.	VOL1 ,

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR

SOURCE ID = VOL1 ; SOURCE TYPE = VOLUME :

1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.10000E+01
19	.10000E+01	20	.10000E+01	21	.10000E+01	22	.10000E+01	23	.00000E+00	24	.00000E+00

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZHILL, ZFLAG)
(METERS)

(284481.7, 6133143.8, 74.0, 74.0, 12.0); (284424.5, 6133117.7, 73.0, 73.0, 6.0);
(284596.7, 6133104.6, 77.7, 77.7, 6.0); (284619.1, 6133137.3, 77.1, 77.1, 6.0);
(284538.4, 6133074.1, 76.6, 76.6, 8.0); (284572.2, 6133194.0, 75.8, 75.8, 6.0);

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: Norwood_2009_adjU.SFC Met Version: 18081
Profile file: Norwood_2009_adjU.PFL
Surface format:
FREE
Profile format:
FREE
Surface station no.: 0 Upper air station no.: 94672
Name: UNKNOWN Name: UNKNOWN
Year: 2009 Year: 2009

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
09	01	01	1	01	-64.0	0.826	-9.000	-9.000	-999.	1802.	787.6	0.81	1.14	1.00	4.20	231.	10.0	290.8	10.0
09	01	01	1	02	-64.0	0.763	-9.000	-9.000	-999.	1611.	641.2	0.81	1.14	1.00	3.90	221.	10.0	290.6	10.0
09	01	01	1	03	-64.0	0.867	-9.000	-9.000	-999.	1932.	911.8	0.81	1.14	1.00	4.40	224.	10.0	290.6	10.0
09	01	01	1	04	-64.0	0.826	-9.000	-9.000	-999.	1808.	787.5	0.81	1.14	1.00	4.20	224.	10.0	290.6	10.0
09	01	01	1	05	-64.0	0.763	-9.000	-9.000	-999.	1611.	641.2	0.81	1.14	1.00	3.90	215.	10.0	290.6	10.0
09	01	01	1	06	-64.0	0.826	-9.000	-9.000	-999.	1797.	788.3	0.81	1.14	1.00	4.20	225.	10.0	290.8	10.0
09	01	01	1	07	8.7	0.671	-9.000	-9.000	-999.	1351.	-3123.0	0.81	1.14	0.40	4.20	216.	10.0	290.4	10.0
09	01	01	1	08	74.9	0.721	-9.000	-9.000	-999.	1465.	-447.7	0.81	1.14	0.24	4.40	219.	10.0	291.2	10.0
09	01	01	1	09	120.1	0.731	-9.000	-9.000	-999.	1499.	-291.6	0.81	1.14	0.19	4.40	222.	10.0	292.2	10.0
09	01	01	1	10	139.6	0.824	-9.000	-9.000	-999.	1791.	-360.1	0.81	1.14	0.18	5.00	222.	10.0	292.4	10.0
09	01	01	1	11	170.6	0.919	-9.000	-9.000	-999.	2108.	-408.8	0.81	1.14	0.17	5.60	223.	10.0	292.9	10.0
09	01	01	1	12	282.4	1.129	-9.000	-9.000	-999.	2864.	-457.9	0.81	1.14	0.17	6.90	232.	10.0	294.2	10.0
09	01	01	1	13	296.3	1.131	-9.000	-9.000	-999.	2884.	-438.1	0.81	1.14	0.17	6.90	238.	10.0	294.5	10.0
09	01	01	1	14	293.5	1.161	-9.000	-9.000	-999.	2998.	-479.4	0.93	1.14	0.17	6.70	240.	10.0	294.8	10.0
09	01	01	1	15	273.4	1.098	-9.000	-9.000	-999.	2778.	-434.7	0.81	1.14	0.17	6.70	233.	10.0	295.1	10.0
09	01	01	1	16	235.3	1.216	-9.000	-9.000	-999.	3201.	-686.9	0.81	1.14	0.17	7.50	233.	10.0	294.5	10.0
09	01	01	1	17	182.3	0.937	-9.000	-9.000	-999.	2303.	-405.9	0.68	1.14	0.18	6.10	203.	10.0	294.2	10.0
09	01	01	1	18	116.2	0.784	-9.000	-9.000	-999.	1721.	-372.6	0.47	1.14	0.20	5.80	171.	10.0	292.5	10.0
09	01	01	1	19	42.1	0.770	-9.000	-9.000	-999.	1626.	-976.1	0.47	1.14	0.28	5.80	168.	10.0	290.6	10.0
09	01	01	1	20	-47.1	0.663	-9.000	-9.000	-999.	1314.	559.2	0.47	1.14	0.52	4.70	163.	10.0	288.8	10.0
09	01	01	1	21	-49.1	0.499	-9.000	-9.000	-999.	877.	274.4	0.47	1.14	1.00	3.60	171.	10.0	287.8	10.0
09	01	01	1	22	-37.9	0.384	-9.000	-9.000	-999.	585.	162.5	0.47	1.14	1.00	2.80	175.	10.0	287.4	10.0
09	01	01	1	23	-36.4	0.370	-9.000	-9.000	-999.	540.	150.3	0.68	1.14	1.00	2.20	183.	10.0	287.4	10.0
09	01	01	1	24	-22.7	0.231	-9.000	-9.000	-999.	278.	58.5	0.68	1.14	1.00	1.40	202.	10.0	287.6	10.0

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
09	01	01	01	10.0	1	231.	4.20	290.8	99.0	-99.00	-99.00

F indicates top of profile (=1) or below (=0)

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TSP IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
284481.71	6133143.84	118.22401	(09052417)	284424.49	6133117.68	88.03446	(09052417)
284596.71	6133104.60	147.34164	(09041209)	284619.06	6133137.30	155.94616	(09062616)
284538.40	6133074.08	142.26943	(09030708)	284572.19	6133193.98	137.28614	(09041209)

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TSP IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
284481.71	6133143.84	15.73724c	(09070524)	284424.49	6133117.68	12.23314	(09052424)
284596.71	6133104.60	22.61006c	(09051724)	284619.06	6133137.30	25.51736c	(09041124)
284538.40	6133074.08	21.01841c	(09062624)	284572.19	6133193.98	21.31139c	(09041124)

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF TSP IN MICROGRAMS/M**3 **

GROUP	ID	AVERAGE CONC	DATE (YYMMDDHH)	NETWORK TYPE	GRID-ID	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF
ALL	HIGH 1ST HIGH VALUE IS	155.94616	ON 09062616:	AT	(	284619.06, 6133137.30, 77.09, 77.09, 6.00)	DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF TSP IN MICROGRAMS/M**3 **

GROUP	ID	AVERAGE CONC	DATE (YYMMDDHH)	NETWORK RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	25.51736c	ON 09041124:	AT (284619.06, 6133137.30, 77.09, 77.09, 6.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** MODELOPTs: NonDFAULT CONC ELEV FLGPOL ALPHA URBAN LOW_WIND ADJ_U*

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of   0 Fatal Error Message(s)
A Total of   24 Warning Message(s)
A Total of   656 Informational Message(s)

A Total of   8760 Hours Were Processed

A Total of   318 Calm Hours Identified

A Total of   32 Missing Hours Identified (0.37 Percent)

   ******** FATAL ERROR MESSAGES ********
             *** NONE ***

   ********   WARNING MESSAGES   ********
CO W320   23   URBOPT: Input Parameter May Be Out-of-Range for Parameter   URB-POP
CO W111   27   LOW_WIND: User-specified minimum Sigma-V on LOW_WIND Keyword   0.3000
CO W112   27   LOW_WIND: User-specified minimum WindSpeed on LOW_WIND Keywd   0.2800
CO W113   27   LOW_WIND: User-specified maximum FRAN on the LOW_WIND Keywrd   1.0000
ME W187   74   MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
MX W441   4138   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062210
MX W441   4139   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062211
MX W441   4140   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062212
MX W441   4141   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062213
MX W441   4142   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062214
MX W441   4143   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062215
MX W441   4144   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062216
MX W441   4145   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09062217
MX W441   6728   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100808
MX W441   6729   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100809
MX W441   6730   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100810
MX W441   6731   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100811
MX W441   6732   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100812
MX W441   6733   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100813
MX W441   6734   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100814
MX W441   6735   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100815
MX W441   6736   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100816
MX W441   6737   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100817
MX W441   6738   METQA: Vert Pot Temp Grad abv ZI set to min .005, KURDAT=   09100818

   ****
   *** AERMOD Finishes Successfully ***
   ****

APPENDIX H

DESIGN STATEMENT PREPARED BY MHP

MPH Architects ABN 16 759 676 449
5 Vardon Avenue Adelaide South Australia 5000 Australia
Telephone 08 8418 1600 Facsimile 08 8227 1271

Memorandum

To:	Tim Beazley
CC:	
From:	Brendan Le Var
Subject:	Response to DA Assessment Guidelines 2 & 3
Date:	04 March 2019

Refer to the following Architectural statements in response to Assessment Guidelines 2 & 3 to be incorporated into the formal submission of the Public Environmental Report for the Peregrine Office Development:

Critical Assessment

Guideline 2 – Neighbourhood Interface

_Address the potential for overlooking into nearby sensitive land uses from users of the Helipad Landing Facility.

The helipads have operational use restrictions placed on them, the users of this facility will be on the deck for limited time and this will be to access or exit the helicopter, they will not have time to be overlooking any adjacent properties as part of the operational procedures personnel will generally be prevented from accessing the helipad, except the Safety Officer during the course of their daily checks. In the event of a flight activity, the Safety Officer will ensure all passengers remain off the helipad until the aircraft has landed and the rotor stopped, after which point passengers will be allowed to either disembark or enter the aircraft as quickly as practical, once all passengers are clear of the deck the Safety Officer will reinstate the referred safety barriers / chains and no further personnel movement on the helipad will take place. There is absolutely no opportunity for passengers to congregate on the helipad itself and only the Safety Officer is allowed on the helipad.

The helipad height is aligned to the highest part of the built form (façade), to meet operational requirements, these are setback from building façade line, similar to how level 03 is setback from the podium, to restrict the view lines and overlooking of adjacent properties especially to Bowen Street.

It should be noted that the helideck and roof areas are non-occupied space and the concerns raised by the overlooking from the helideck, albeit higher, is no greater to the foreground areas than that of the occupied floor Level 06,

_Address the visual impact from the addition of the Helicopter Landing Facility, adjacent concrete slab and associated structures from nearby sensitive land uses and surrounding streetscapes.

MPH Comments: The current helipad provisions are no higher than the original plant rooms included on the DA application. We have however, reduced the bulk of the plant room and amended the helipad shape to reduce the visual impact. The reduction of the plant room forms have resulted in a void to the underside of the helipads which reduces the visual bulk of this provision to the top of the building, the operational helipad is an open mesh deck on aluminium frame with a perimeter safety netting, all of which has a degree of translucency further reducing the visual impact. The helipad's amended shape, from the square slab, to octagonal has set these back from the building perimeter which has further reduced the impact of roof top plant / helipad provisions from that indicated on the current DA.

MPH Architects ABN 16 759 676 449
5 Vardon Avenue Adelaide South Australia 5000 Australia
Telephone 08 8418 1600 Facsimile 08 8227 1271

Medium Assessment

Guideline 3 – Design Quality

_Evaluate the design response of the development, in particular the proposed design modifications to the top of the building for the Helicopter Landing Facility. The proposal should respond to the Principles of Good Design by the Office of Design and Architecture SA.

The revised DA and provisions for the helipad's has a lighter visual impact to that of the original plant room and slab, the reduction of the full height louvered façade to the oversized plant rooms has reduced the visual weight and bulk to the building form at the roof line. This reduction and the revised shape of the helipads has moved the edge of the slab / helipads from the building perimeter further reducing the visual impact from the street level.

The helipads are in most cases set far enough back to be obscured from most views of the building, they will be seen from distance but they will be viewed set back form the façade line and appear as part of the roof top plant provisions. This can be seen from the issued perspectives and elevations. The provision of the access walkways are a compliance issue and we have set these up to the areas furthest from the façade line to reduce their impact.

The new forms are more interesting to the rooftop they create a softer top to the building with a simple geometry which works better with the abstract and irregular geometry of the façade, further strengthening the atrium form with open and honest materiality expressed – we are not adding cladding etc to hide the stairs / helipads to reduce the weight and visual impact of these provisions.

APPENDIX I

HERITAGE IMPACT ASSESSMENT PREPARED BY DASH

DASH (Danvers Schulz Holland) Architects was founded in 1964 and has since established itself as one of South Australia's leading practices in the provision of specialist heritage services.

DASH Architects has been at the forefront of the development of a sustainable paradigm for the conservation of cultural heritage within Australia. This approach is based on contemporary values and traditions, and recognises the importance of both tangible and intangible cultural significance within our community.

Peregrine Head Office Redevelopment

270 The Parade, Kensington Park

Heritage Impact Assessment

Supplement – Helipad Proposal

DA163272 Issue A

07.06.19

1.0 Introduction

This Supplementary report has been prepared by Jason Schulz, Director of DASH Architects.

In August 2016 I was engaged by Shahin Brothers Pty and Shahin Group Pty Ltd to undertake a Heritage Impact Assessment (HIA) of the proposed redevelopment at 270 The Parade, Kensington Park. This engagement extended to the provision of heritage advice to the design team, MPH Architects, during the development of the proposal, as well as the preparation of a Heritage Impact Assessment to accompany the application.

The proposed development on the site was granted Development Authorisation by the Governor under Section 48 of the Development Act 1993 and notice of the decision was published in the South Australian Government Gazette on 16 May 2017. A subsequent variation application was submitted in November 2017 and approved by the Chief Development Officer as sub-delegate of the Minister for Planning as delegate of the Governor and gazetted on 3 May 2018.

This Supplementary Heritage Impact Assessment (HIA) has been prepared in response to a Major Development Assessment for the provision of a helipad facility on top of the previously approved proposal. In addition to this, other minor changes include:

- minor reconfigurations of roof top services / lift over-runs (to the top of the building) and minor revisions to atrium;
- Adjustments to the level of the building and entrance design to reflect actual site levels

On this basis, the scope of this supplementary statement will be limited to the assessment of heritage impacts associated with changes to the approved scheme arising from the proposed helipad.

dasharchitects

1 Waymouth Place
Adelaide SA 5000
t 8231 8344
adelaide@dasharchitects.com.au
www.dasharchitects.com.au
ABN 82 059 685 059

This HIA is based on the following documentation prepared by MPH Architects:

- 1465 SK08(15) Roof Plan (22.11.18)
- 1465 SK21(16) 3D Overview (22.11.18)
- 1465 SK24(16) parade looking west (22.11.18)
- 1465 SK25(14) South east view from The Parade (22.11.18)
- 1465 SK27(14) Portrush looking North (22.11.18)
- 1465 SK36(15) Elevations (22.11.18)
- 1465 SK47(13) Parade Looking East (22.11.18)
- 1465 SK48(12) Portrush looking South (22.11.18)
- 1465 SK49(13) High St Looking West (22.11.18)
- 1465 SK5411) Elevations (22.11.18)
- 1465 SK69(2) Plant Room (22.11.18)
- 1465 SK70(2) Plant Roof (22.11.18)

Disclaimer: This HIA has been based on the information scheduled above. Any changes to these scheduled items may result in differing heritage impacts to those considered and assessed in the below report. It is recommended that the above issue dates and revision numbers be confirmed to those lodged for Development Plan Consent when considering the findings are recommendations of this report.

2.0 Subject Site / Locality

The 2016 Heritage Impact Statement noted:

> *The proposed development is located at 270 The Parade, Kensington (The Subject Site). This site occupies the south-east corner of the busy Portrush Road / The Parade intersection.*
>
> *While the site is located within the City of Norwood Payneham and St Peters, its northern (The Parade) boundary interface with the City of Burnside.*
>
> *The site is located within a Business Zone, Kensington Policy Area 6.7. The site's eastern (Bowen Street) and southern (High Street) sides interface with a Residential Historic (Conservation) Zone (RH(C)Z).*
>
> *There are no heritage places on the Subject Site, however there are several State and Local Heritage places within the immediate locality, as illustrated in Image 1 below. Image 1 also identifies the adjoining RH(C)Z, and associated Contributory Items.*

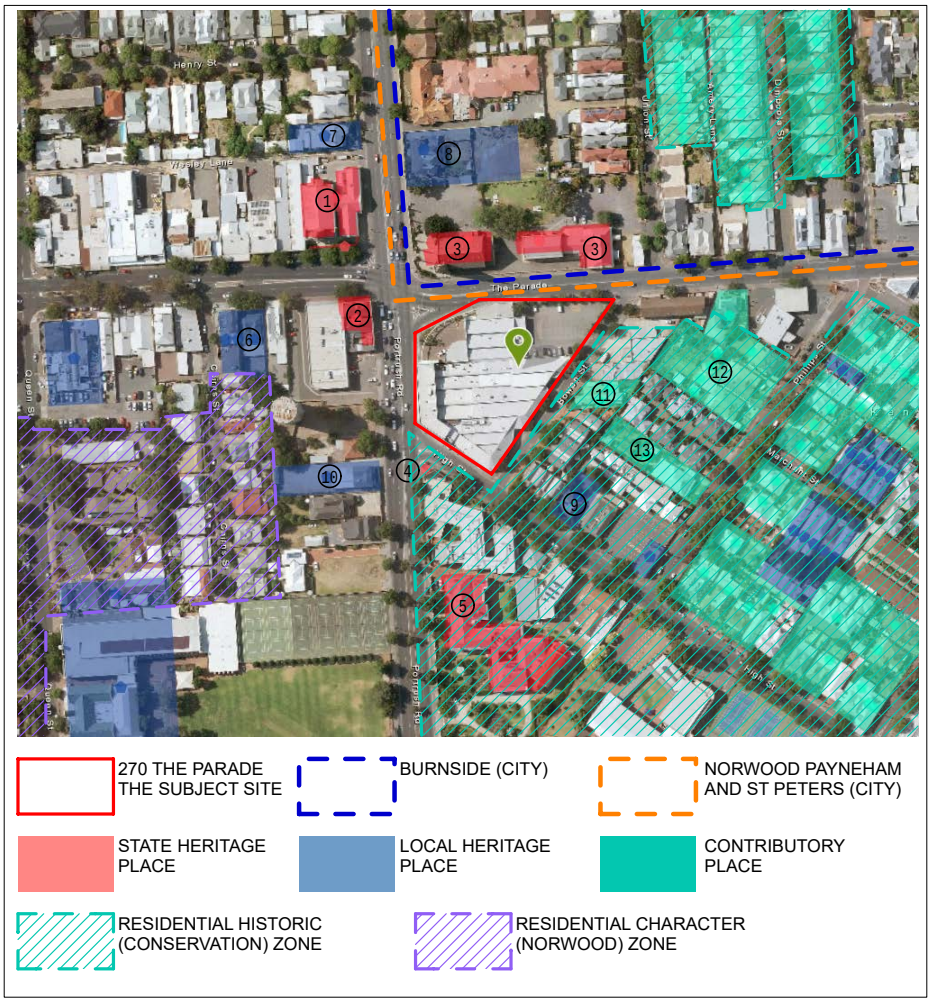


Figure 1: Locality plan, showing nearby heritage places (State heritage in red, Local heritage in blue): Source: Base image sourced www.location.sa.gov.au

State Heritage places identified in the above image include:

1. *239 The Parade, Norwood: Former Norwood Wesleyan Methodist Church, Hall and Front Fence (shrcode 10950);*
2. *258 – 262 The Parade, Norwood: Two Storey Shops and Upstairs Dwellings (shrcode 12689);*
3. *278 Portrush Road, Beulah Park: Clayton Wesley Uniting (former Congregational) Church Complex (including 1882 Church, 1856 Chapel, 1875 Hope Hall and 1910 Clayton Institute (shrcode 13171);*
4. *Corner of Portrush Road and High Street: Benson Memorial Drinking Fountain, Kensington (shrcode 10609);*
5. *268 Portrush Road, Kensington: St Joseph's Convent including the 1876 chapel, the 1908 main building and additions to it (shrcode 14150)*

Local Heritage places identified in the above image include:

6. *250 The Parade, Norwood: Victorian Bluestone and Red Brick*

Dwelling (Norwood, Payneham and St Peters);

7. *271 Portrush Road, Norwood: Late Victorian Masonry Dwelling (Norwood, Payneham and St Peters);*
8. *278 Portrush Road, Beulah Park: House – former Clayton Memorial Church Manse (Burnside);*
9. *21 High Street, Kensington: Mid Victorian Bluestone Villa (Norwood, Payneham and St Peters);*
10. *279 Portrush Road, Norwood: High Victorian Bluestone Dwelling 'Arena Community Club' (Norwood, Payneham and St Peters)*

Contributory places identified in the above image include:

11. *8 Bowen Street, Kensington: Dwelling;*
12. *3 Phillips Street, Kensington: Dwelling;*
13. *15 Philips Street, Kensington: Dwelling.*

3.0 Previous Findings

The HIA prepared for the DAC lodgement (dated 11.08.16, Rev A) came to the following conclusions:

> *While the proposal is of a notable scale, its design has been developed in response to the context of its surrounds, to reduce its visual bulk and scale, and limit any material impacts on the context of surrounding State and Local Heritage places.*
>
> *Of the surrounding State Heritage places, the Clayton Wesley Church it most likely to be materially impacted by the proposed development, due to its proximity to the site, and current visual dominance. The proposed development will also have limited impact on the primary setting and view corridors of the Church, namely looking eastward from the western end of The Parade, where the dog-leg in The Parade across Portrush Road has the affect of setting the proposed development back from this important view corridor.*
>
> *While the immediate context of the Church will be affected, such impacts needs to be considered in the context of:*
>
> - *recent nearby development application for buildings of a similarly notable scale;*
> - *the quality of the design proposal, and noted design measures that lessen such impacts; and*
> - *the natural and ongoing evolution the to setting of historic buildings, as has been the case to date with the ever expanding nature of Portrush Road and The Parade.*
>
> *For these reasons, and the design measures noted above, I consider the proposed development on the Subject Site to have an acceptable impact on the context of the surrounding State Heritage places.*
>
> *Local Heritage impacts are largely negligible, with only two adjacent*

Local Heritage places, both of which are remnant former residential buildings. The Development Plan seeks proposals adjacent such places to demonstrate design consideration of their relationship with the heritage place. This provision applies to both State and Local Heritage places, however for reasons noted in my assessment, I consider the State Heritage response to take precedent. In responding to the State Heritage contextual issues, however, the design also demonstrates design consideration to the identified Local Heritage places through the selection of materials, mitigation of bulk and scale, and design references.

Impacts on the historic character of the adjacent Residential Historic (Conservation) Zone are limited, as the immediate interface with the Subject Site accommodates only one Contributory Item.

Impact on residential amenity and character are limited to Bowen Street, where the Development seeks the site's servicing, carparking and deliveries to be located. Once again, the design response seeks to lessen such impacts associated with a notable development of this size through the establishment of a clear podium level, materials selections, general articulation and upper level setbacks.

A Supplementary HIA (dated 22.11.16) was prepared to accommodate minor amendments to the proposal, which concluded:

Recent amendments to the proposed development at 270 The Parade Kensington Park have resulted in an overall reduction in the height of the proposal by 3800mm, and a reduction to the building podium from four storeys the three. These changes have had the net effect of reducing the overall physical and visual bulk and scale of the proposal, and in turn any State and Local Heritage impacts.

The reduction in scale (both physical and visual) has also further mitigated any potential impacts on character of the interfacing Residential Historic (Conservation) Zone across Bowen Street.

The additional materials and finishes information is also consistent with the original DAC application and Heritage Impact Assessment.

4.0 DEWNR Referral Advice

The approved application was referred to the Heritage Branch of the Department of Environment Water and Natural Resources (DEWNR, now DEW) due to the site's proximity to nearby State Heritage places.

Referral advice provided by DEWNR's Principal Conservation Architect, Mr Peter Wells, dated 24 October 2016 advised:

> *I concur generally with the analysis of impacts on State heritage places set out in the Heritage Impact Assessment, and (subject to the recommendation set out below) consider the proposed development acceptable in relation to the above State heritage places for the following reasons identified in the Heritage Impact Assessment.*
>
> - *As the Subject Site contains no State Heritage places, potential State Heritage impacts are limited to those associated with the context of the nearby State Heritage places.*
> - *It is acknowledged that the proposed development will be a notable visual element within the streetscape. Its impacts on the context of surrounding State Heritage places is, however, primarily limited to those on the adjacent Clayton Wesley Church, that's visual dominance in the existing locality was recognised in the heritage assessment that formed the basis of its original State Heritage nomination.*
> - *The context and setting of the other surrounding State Heritage places is primarily to their immediate street frontage, and their interrelationship with each other (which the proposed development does not affect).*
> - *The proposed development will also have limited impact on the primary setting and view corridors of the Clayton Wesley Church, namely looking eastward from the western end of The Parade, where the dog-leg in The Parade across Portrush Road has the effect of setting the proposed development back from this important view corridor.*
> - *The design response to this context (is) through the establishment of a strong podium base (of a more monolithic, fine grained character), and visually 'lighter' upper levels.*
> - *The use of a 'flowing veil' upper façade skin visually softens the upper storeys, and creates a contrasting backdrop to the strong geometric forms of the Clayton Wesley Church spire when viewed from the north.*
> - *This overall articulation, and careful use of materials, significantly mitigates the overall visual bulk and scale of the proposal in the context of its immediate surrounds.*
> - *(The) approach to the material selection on the project greatly contributes to its integration into the existing streetscape, particularly with regards to the identified State Heritage*

places, and the mitigation of the proposal's overall visual bulk and scale.

- *It is within the immediate environs of the Clayton Wesley Church where the visual impacts of the proposed development will be most notable. These impacts have, however, been substantially mitigated through the design measures noted above.*
- *The Benson memorial drinking fountain's primary setting and context is, as noted, to the intersection of High Street and Portrush Road. Its spatial relationship to the adjacent Sisters of St Joseph is also an important aspect to the significance of this item. The proposed development will have negligible, if any, material impact on this context and setting.*

5.0 Current Proposal

External physical changes from the approved scheme arising from the proposed helipad and atrium amendments appear negligible, and generally limited to:

- the amendment of the previous two square plant enclosures to a circular form (one noted as "Helipad", the other "Concrete Slab"); and
- minor alterations to the footprint of rooftop elements arising from minor plant and atrium reconfiguration.

The full height louvred screen of the approved plant enclosures has been lowered in the current proposal, with an aluminium fabricated helipad and concrete slab framed over.

There have been minor changes to the cooling tower locations, however this plant sits below the roof line and is generally not visible from the surrounding areas.

The building's lift overruns have also changed in configuration, however these are located centrally and setback well away for the façade edges.

The atrium top to the eastern side of the building has been provided a revised roof structure, however does not notably change the overall form from the proposal to that of the approved scheme.

While the RL levels between the current proposal and the approved scheme differ, I understand this is solely as a result of a confirmed datum height. The overall height of the proposal remains consistent between the two schemes (namely 34.850m).

Figure 2: **Approved** Bowen Street Elevation, showing louvred plant to rooftop

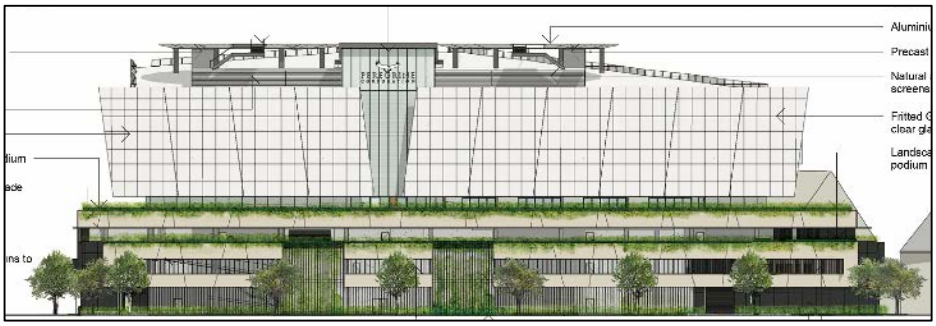


Figure 3: **Proposed** Bowen Street Elevation, showing lowered lourves with framed helipad and concrete slab to rooftop.

Figure 4: **Approved** Portrush Road Elevation, showing lowered lourves plant enclosures to rooftop.

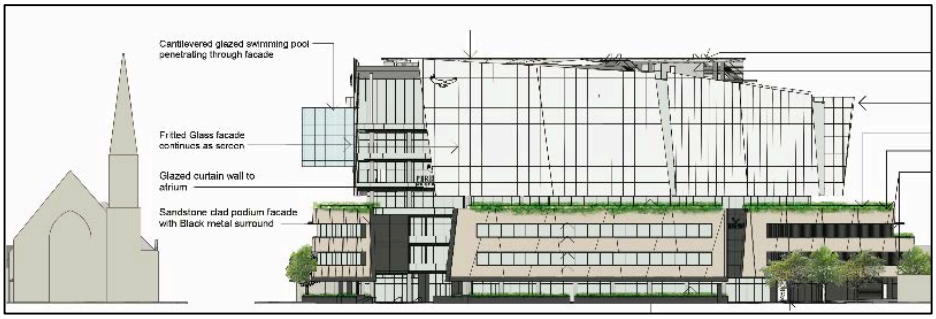


Figure 5: **Proposed** Portrush Road Elevation, showing helipad and concrete slab to rooftop.

6.0 Heritage Impact Assessment

Figure 6 through Figure 15 provides a comparison between the currently approved scheme, and the proposed changes to the roof top level arising from the proposal. These comparisons show that the proposed changes are not visible from the primary setting of the Clayton Wesley Church (when viewed from The Parade), (Figure 7, Figure 10).

The minor changes to the rooftop configuration have resulted in sections of the proposed helipad being visible from Portrush Road looking north (Figure 9) and south (Figure 13) however such changes are inconsequential to the setting of the State Heritage Place. Similarly, amendments to the top of the eastern atrium are largely not visible from any of the nearby heritage places (State or Local) and therefore have no consequential impacts to their settings.

Figure 6: Streetscape render of **approved scheme**, south east view from The Parade. Approved rooftop plant not visible.

Figure 7: Streetscape render of **proposed scheme**, south east view from The Parade. Proposed rooftop plant not visible.

Figure 8: Streetscape render of **approved scheme**, Portrush Road looking north. Approved rooftop plant only partially visible behind façade screen.

Figure 9: Streetscape render of **proposed scheme**, Portrush Road looking north. Proposed rooftop plant partially visible above façade screen.

Figure 10: Streetscape render of **approved scheme**, viewed from The Parade looking east. Approved rooftop plant not visible.

Figure 11: Streetscape render of **proposed scheme**, viewed from The Parade looking east. Proposed rooftop plant not visible.

Figure 12: Streetscape render of **approved scheme**, viewed from Portrush Road looking South. Approved rooftop only partially visible behind and slightly over façade screen.

Figure 13: Streetscape render of **proposed scheme**, viewed from Portrush Road looking South. Proposed rooftop only partially visible behind and slightly over façade screen.

Figure 14: Streetscape render of **approved scheme**, viewed from High Street looking west. Limited Roof top plant visible above façade screen.

Figure 15: Streetscape render of **proposed scheme**, viewed from High Street looking west. Proposed rooftop partially visible behind and slightly over façade screen.

As noted in Section 4.0 above, the overall height of the current proposal remains consistent with the approved development. While minor changes to the rooftop configuration have resulted in differing glimpses of the affected infrastructure, such changes are, in reality, inconsequential.

The most notable change to the proposal is when viewed from the east (looking west down High Street, Figure 14 and Figure 15). While this vantage does enable views of the rooftop changes, such views are again inconsequential to any heritage impacts as:

- There are no heritage places within the context of these views (namely Figure 15);
- The changes to the roof top level remain setback from the façade edge, resulting in limited, if any views of these changes from either Bowen Street, or the Contributory Items on this interfacing roadway.

From other views, some edges of the rooftop elements have encroached towards to the facades, other have regressed. Further the lowering of the louvred plant screen, curving of the edged (from square plant enclosures to circular helipad / slab) and open framing of their upper portion will result in an overall reduction of their visual presence when viewed from surrounding areas.

All other aspects of the proposal built form remain consistent with the existing approval.

For these reasons I do not consider the proposed helipad application to impact on:

- the setting or context of the nearby State Heritage places (namely the Clayton Wesley Church, Former Norwood Wesleyan Methodist Church and Hall, two storey shops (258-262 The Parade) or Benson Memorial Drinking Fountain) as the proposed changes are generally not visible from the contexts of these places;
- the setting of the Local Heritage listed dwelling at 279 Portrush Road, as the proposal's design response to the relevant Development Plan provisions remains consistent with the approved scheme; or
- the historic character of the interfacing Residential (Historic) Conservation Zone, as the proposed changes will generally not be visible from Bowen Street, or the Contributory Items therein.

APPENDIX J

TRAFFIC ASSESSMENT PREPARED BY GHD

Peregrine Corporation Pty Ltd

Peregrine Corporation Mixed Use Development
Helicopter Landing Facilities
Updated Traffic Impact Assessment

March 2019

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Figure index

1. Introduction

GHD Pty Ltd (GHD) has been engaged by Peregrine Corporation Pty Ltd (Peregrine) to provide further traffic advice in response to the approved and subsequently varied development application for the proposed Helicopter Landing Facilities to be located on the rooftop of 270 The Parade, Kensington, South Australia as part of the Mixed Use Development application.

1.1 Purpose of this report

This assessment is specific to the Public Environmental Report (PER) as follows:

Section 46(6) Standard Assessment – Guideline No.5 – Traffic Impact: Evaluate the additional traffic impact of the development on the surrounding road network by undertaking updated traffic analysis.

This report is in addition to and compliments the *Transport, Access & Pedestrian Impact Assessment Report (TAPIA)* prepared for Peregrine Corporation by GHD in February 2017.

1.2 Scope and limitations

This report: has been prepared by GHD for Peregrine Corporation Pty Ltd and may only be used and relied on by Peregrine Corporation Pty Ltd for the purpose agreed between GHD and the Peregrine Corporation Pty Ltd as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Peregrine Corporation Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section(s) 3 to 7 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 Assumptions

This report solely looks at the potential impacts associated with the Helicopter Landing Facilities associated with the Mixed use Development.

Where possible traffic volume and crash data has been updated.

No additional traffic generation, modelling or turn path analysis has been undertaken as part of this report.

2. Background

The proposed development was declared by the Minister in November 2015 to be a Major Development of State Economic Significance. On 16 May 2017 notice of the Governor's decision to grant development authorisation under section 48 of the Development Act 1993, in respect of a proposal to establish and operate a mixed use development at 270 The Parade, Kensington by Peregrine Corporation, was published in the South Australian Government Gazette.

A subsequent variation application was submitted in November 2017 (final plans dated 14 February 2018) and approved by the Governor and gazetted on 26 April 2018.

The approved and subsequently varied development consists of a multistory mixed-use development which will serve as the national headquarters for the Peregrine Corporation. The approved mixed-use development building compromises of the following:

- Office Space, Lobby, Digital Hub and Meeting Rooms – 7,050 m^2
- Ground Level Lobby, Café and Retail – 1,430 m^2
- Training Area – 520 m^2
- Restaurant / Members Lounge – 470 m^2
- Gymnasium, Spa and Pool – 605 m^2
- Short-Stay Accommodation – 815 m^2
- Covered Car Parking – 7,625 m^2 (198 Car Parking Spaces, including 12 Secure Parking Spaces and 7 Car Storage Spaces)
- Loading Area – 100 m^2 (3 Spaces)
- Waste Collection Area – 180 ^{hu}

3. Existing Conditions

3.1 Road Network

The Peregrine Corporation Mixed Use Development at 270 The Parade, Kensington is located at the signalised intersection of Portrush Road and The Parade.

The site is bounded by Portrush Road and The Parade (West), which both come under the care, control and management of the Department of Planning Transport and Infrastructure (DPTI), with The Parade (East) Bowen and High Streets under the care, control and management of the City of Norwood, Payneham, St Peters (NPSP) Council, as shown below in **Figure 1**.

Figure 1 Site location – 270 The Parade, Kensington

The roads bounding the site are described further below:

3.2 Portrush Road

Portrush Road functions as an Arterial Road and comes under the care, control and management of the Department of Planning, Transport and Infrastructure (DPTI) as follows:

- Dual southbound traffic lanes of (3.3 m) & (3.0 m) and northbound traffic lanes (3.3 m) and (3.0 m), with a posted speed limit of 60 km/h;
- Segregated right turn lanes (3.0 m) at The Parade intersection;
- Segregated right turn lane (3.0 m) within a raised median at the High Street intersection;

- Bicycle Lanes (1.2 m) on Portrush Road with associated full time parking restrictions; and
- Annual Average Daily Traffic (AADT) of 37,200 vehicles per day (vpd).

3.3 The Parade (West)

The Parade (West) also functions as an Arterial Road and comes under the care, control and management of DPTI and is configured as follows:

- Dual eastbound traffic lanes of (3.0 m) & (3.0 m) and a left turn slip lane for northbound vehicle movements of (4.6 m);
- Dual westbound traffic lanes (3.0 m) and (3.0 m), governed by the speed limit of 50 km/h;
- A raised median of 0.5 m at the Portrush Road intersection that expands to 3.3 m west of Cairns Street;
- Annual Average Daily Traffic (AADT) of 16,500 vehicles per day (vpd); and
- Paved footpath on both corner quadrants exists between the full depth of kerb to boundary.

3.4 The Parade (East)

The Parade (East) functions as a Secondary Arterial Road which comes under the care, control and management of the City of Norwood Payneham and St Peters (NPSP) and is configured as follows;

- Dual eastbound traffic lanes of (3.0 m) & (3.6 m) and a left turn slip lane for southbound vehicle movements of (4.6 m);
- Dual westbound traffic lanes (3.1 m) and (3.0 m), governed by the speed limit of 60 km/h;
- A raised median of 0.5 m at the Portrush Road intersection;
- Annual Average Daily Traffic (AADT) of 12,500 vehicles per day (vpd);
- Paved footpath on both corner quadrants exists between the full depth of kerb to boundary.

3.5 High Street

High Street is a local road and comes under the care, control and management of the city of Norwood, Payneham and St Peters (NPSP) and is configured as follows;

- Single traffic lanes (4.8 m) & (4.8 m) in each direction, governed by the urban speed limit of 50 km/h;
- Annual Average Daily Traffic (AADT) of 500 vehicles per day (vpd); and
- Paved footpath exists on both corner quadrants the full width of kerb to boundary.

3.6 Bowen Street

Bowen Street is also a local road under the care, control and management of Norwood, Payneham St Peters Council (NPSP) and is configured as follows;

- A single traffic lane (5.8 m) in the north-eastbound direction, governed by the urban speed limit of 50 km/h;
- Annual Average Daily Traffic (AADT) of 2,500 vehicles per day (vpd); and
- Paved footpath exists on both corner quadrants between the kerb and boundary.

4. Crash History

4.1 Portrush Road / The Parade – Signalised Intersection

Road crash data for the last complete five (5) year period from 2013 through to the end of 2017 has been obtained from DPTI (Locations SA Map Viewer) at the signalised intersection of Portrush Road and The Parade, Kensington.

Assessment was also done for the lengths of road, which immediately bound the existing site; in conjunction with data from the signalised intersection which includes north and south of the intersection along Portrush Road and east and west of the intersection along The Parade.

Forty-two (42) crashes were recorded at the intersection of Portrush Road / The Parade during the five (5) year period between 2013 and 2017.

The majority of the crashes were Property Damage Only (PDO), with “Rear End” collisions recording twenty (20) and the second highest crash type being “Right Turn” with a total of eleven (11), ten (10) of the total crashes were recorded at night, as seen below in **Table 1**.

Table 1 Crash history at signals of Portrush Road / The Parade and surrounds

Location	PDO	Injury	Fatality	Rear End	Hit Fixed Object	Side Swipe	Right Angle	Head On	Hit Pedestrian	Rollover	Right Turn	Hit Parked Vehicle	Hit Animal	Hit Object on Road	Left Road	Other	Unknown	Bicycle	Pedestrian	Night-time
Signalised Intersection	35	7	0	20	1	5	4	0	0	0	11	0	0	0	0	1	0	2	0	10
Portrush Road (North)	4	2	1	3	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0
Portrush Road (South)	6	1	0	4	0	3	1	0	0	0	0	0	0	0	0	0	0	1	0	1
The Parade (East)	3	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
The Parade (West)	6	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	0	1	0	2
Total	**52**	**11**	**1**	**28**	**2**	**11**	**5**	**0**	**1**	**0**	**11**	**3**	**0**	**0**	**0**	**1**	**0**	**5**	**1**	**13**

4.2 Portrush Road / High Street – Unsignalised Intersection

Assessment of crash records has revealed that there has been four (4) crashes associated with this intersection; however, it is noted that these crashes may have been caused by the conflict created with the right turn lane into High Street, which is shared the same right turn lane into The Parade.

One (1) of the crashes during day time conditions was within the right turn lane directly opposite High Street, classified as a “Rear End” that resulted in an injury crash. The three (3) remaining crashes occurred during daytime conditions and were Property Damage Only (PDO).

However, two (2) of the crashes were “Side Swipe” crashes both occurring within the right turn lane into High Street.

There is no crash data available for the intersection of The Parade (East) and Bowen Street, or Bowen Street and High Street.

However, one (1) crash was recorded only 15.0 m from the intersection of Bowen Street on The Parade, which was a “Rear End” crash resulting in Property Damage Only (PDO).

Overall, within the immediate facility of the Peregrine Corporation Mixed Use Development at No.270 The Parade, Kensington, there has been one hundred and thirty two (132) recorded crashes during the five (5) year period between 2013 and 2017.

For the number of vehicle movements and total traffic volume in the area, nearly 70,000 vehicles per day, which is an increase of 2,200 vpd since 2017, the crash numbers are generally low (132 crashes or 0.18%) less than 0.2% in which no conclusions can be drawn from the crash data available other than this is minimal.

5. Proposed Helicopter Landing Facilities

Peregrine Corporation propose to utilise the rooftop as a landing area for helicopters in association with the approved use of the building as an office. No changes to the approved development are required and all helicopter movements are to be associated with the approved use of the building with no commercial flights or flights unrelated to the Peregrine Corporation to be undertaken.

The use of the rooftop for helicopter landings is intended for occasional use only. Helicopter activity will operate on no more than ten (10) days per year and only during daylight periods. Given the limited number of operative days, the non-commercial nature of the flights and limitation to daylight hours it is our understanding that the use does not trigger a requirement for any approval or licensing from the EPA, CASA (Civil Aviation Safety Authority) or any other regulatory body.

Where possible, 24 hours’ notice will be provided before an operational day and a register of operational days will be kept to ensure the ten (10) days per year are not exceeded. No helicopters or fuel will be stored on site, nor will any on-site servicing occur.

The helicopters will be ordered from the airport on an as needs basis. Only three (3) types of helicopters are proposed to be used which include:

- BELL 206 – one (1) pilot and four (4) passengers;
- EC 130 – one (1) pilot and six (6) passengers; and
- AW109/H109 – one (1) or two (2) pilots and six (6) to seven (7) passengers.

All flights will be conducted in Day VFR (Visual Flight Rules) in accordance with CASA (Civil Aviation Safety Authority) and Airservices legislative requirements. There will be a trained HLSO (Helicopter Landing Site Officer) onsite for every take-off and landing.

The helipad will be inspected daily and audited annually. The helipad will be designed and approved in accordance with national and international requirements and the fire suppression system is the most advanced, in keeping with all new hospital helipads in Australia.

A fully developed site-specific Emergency Response Plan will be developed and will form part of the overall Safety Management System. A Safety Manager will be appointed to manage the entire operation, and this will be complemented by an external audit process.

6. Traffic Analysis

A review has been undertaken in conjunction with the *Transport, Access & Pedestrian Impact Assessment Report (TAPIA)* prepared by GHD in February 2017, looking at the potential traffic impacts associated with the proposed Helicopter Landing Facilities associated with the Peregrine Corporation Mixed Use Development located at 270 The Parade, Kensington.

Traffic volumes and crash data information has been updated accordingly. No additional traffic generation, modelling or turn path analysis has been undertaken as this report was to look at the traffic impacts associated with the proposed Helicopter Landing Facilities only.

After considering the new traffic volumes and crash data for the immediate area surrounding the site, it has been ascertained that impacts of the Helicopter Landing Facilities, which will only operate ten (10) days per year and only during daytime hours, will have little to no effect.

Therefore, the impact on the existing traffic movement, traffic flows or traffic generation associated with the mixed-use development is believed to have little to no adverse effect relating to the traffic impact or road safety on the adjacent road network for the area.

7. Conclusion

In conclusion, taking into account the current road usage and activity adjacent the site and the impacts of the traffic and transport related activities associated with the proposed Helicopter Landing Facilities to be located on the rooftop of 270 The Parade, Kensington, the following is provided:

- Existing traffic volumes surrounding the site have been updated, and whilst they are slightly higher (an additional 2,200 vpd) over the last 2 years, these volumes are not considered to have a direct impact on the proposed Helicopter Landing Facilities or the mixed use development in general for the site.
- As the Helicopter Landing Facilities will not operate more than ten (10) helicopter flights per year in which these are to be taken during daytime hours only, there is no foreseen impact on the adjacent network from a traffic / transport or road safety perspective.
- Therefore, existing and proposed future traffic volumes are not expected to have any substantial impact on the adjacent road network or its capacity with the operational requirements of the proposed Helicopter Landing Facilities.

GHD

Level 4, 211 Victoria Square
Adelaide SA 5000
T: 61 8 8111 6600 F: 61 8 8111 6699 E: adlmail@ghd.com

3319130 Peregrine Corporation Mixed Use Development Helicopter Landing Facilities - Updated Traffic Impact

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	N.Phillips	C.Spencer	C.Spencer*	C.Spencer	C.Spencer*	28/02/2019

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APPENDIX K

EVALUATION OF ECONOMIC & EMPLOYMENT IMPACTS PREPARED BY FYFE

65147-2-002

12 March 2019

FYFE

ENVIRONMENT
DEVELOPMENT
RESOURCES

Level 1, 124 South Terrace
Adelaide SA 5000

GPO Box 2450
Adelaide SA 5001
Telephone 61 8 8201 9600
Facsimile 61 8 8201 9650
www.fyfe.com.au

FYFE PTY LTD
ABN 57 008 116 130

Mr Peter Vickery
PC Infrastructure

Dear Peter

RESPONSE TO ASSESSMENT GUIDELINES 6 AND 7

We write in response to your request to prepare an evaluation of the economic and employment impacts arising from the proposed helicopter landing facilities for the Peregrine Corporation at 270 The Parade, Kensington.

In particular, in accordance with the endorsed guidelines for the preparation of a Public Environment Report (PER), an evaluation of the proposed landing facilities against the below guidelines is required:

- *Guideline 6 – Economic Impact*
  - *Evaluate the additional economic contribution of the proposal on the Norwood and Kensington Precincts, taking into account the existing commercial and retail circumstances of the area.*
- *Guideline 7 – Employment*
  - *Evaluate the additional local and broader job creation and employment opportunities (including any multiplier effects) resulting from the proposal.*

Background

Development approval was issued for a mixed use development at 270 The Parade, Kensington on 16 May 2017. The proposal incorporated a redevelopment of the Peregrine Corporation headquarters to provide additional office space to accommodate for growth and provide additional commercial facilities including retail and a restaurant.

Variations have been made since this initial approval, generally including a reduction in the number of storeys, redesignation of floor area usage and associated changes to the façade. The approved mixed use development includes a total of seven floor levels, which feature the following:

- Ground floor: retail, cafes, reception area, waste storage and parking;
- Level 1: car parking, office and training;
- Level 2: car parking and office;
- Level 3 – 5: Office, meeting rooms and outdoor areas

- Level 6: Restaurant, members lounge, temporary visitor accommodation, gym, spa, swimming pool and outdoor area.

The Development Report prepared in relation to the approved development identified that the project involved an investment of over $50 million in the South Australian economy and will support approximately 600 jobs in the building and construction industry over the construction period.

We understand that a helicopter landing facility is now proposed for the roof of the building. 10 helicopter movements are anticipated per year. We further understand that the landing facility and helicopter service are solely for the purposes of the approved use and will not be made available to the general public. It will be for the exclusive use of the Peregrine Corporation, its executives and guests.

In our opinion, the helipad is clearly associated with the approved head office, noting it is a service specifically relating to the approved use, not a service which is independently available to the broader community.

Evaluation

An evaluation is required to consider the economic and employment impacts of the proposed development on the Norwood and Kensington areas.

In our opinion, due to the limited and integrated use of the proposed landing facility, it will generate no further economic contribution or impact on the Norwood and Kensington Precincts, as compared to the approved development.

The integrated nature of the facility on the roof of the approved building reinforces that no significant local or broader job creation will result from the construction of the helicopter landing facility itself (ie the landing facility will be delivered as part of the overall building works).

Put simply, the proposal supports the approved use, which forms part of a $50 million investment supporting approximately 600 jobs in the building and construction industry.

Conclusion

The proposed helicopter landing facility is ancillary to and integrated with the proposed mixed use development and consequently, is not expected in its own right to have an economic or employment impact on the Norwood and Kensington Precincts. Rather, it will complement the overall redevelopment of the Peregrine Corporation Headquarters and the associated economic and employment benefits arising.

Yours sincerely

Michael Osborn
National Planning Manager

APPENDIX L

ADEQUACY CHECK FEEDBACK APPLICANT RESPONSE

PEREGRINE
CORPORATION

7 June 2019

By email & post

Ms Sally Smith
General Manager Planning and Development
Department of Planning Transport and Infrastructure
77 Grenfell Street
Adelaide SA 5001

Dear Sally

Peregrine Corporation Helicopter Landing Facility – 270 The Parade Kensington Gardens – Final Public Environment Report

We refer to electronic correspondence dated 17 May 2019, which included comments from DPTI Transport, DPTI Planning, The EPA, ODASA and DEW State Heritage.

Further to this correspondence, the applicant and consultant team have reviewed the comments received and have amended the proposal and/or prepared additional material. These are appended to the Public Environment Report (PER) which has also been amended to reflect the proposed changes before formal referral and consultation occur.

We address your comments in respect to each guideline in turn.

Guideline 1 – Aviation Operations

Agency Comment

DPTI Transport Policy – *The PER provides for a register of operational days and yearly audit process. The process to be adopted for the regular auditing should be clarified, including whether this will be available online for the community and adjacent neighbours to access. A complaints procedure should be developed in accordance with the Fly Neighbourly Guide by the Helicopter Association International (HAI) as a reference see 7.4.2 of the guide.*

Applicant Response

A register of operational days will be kept by the applicant and will be made available if requested. The helicopter audit processes are confidential and are the property of Flight Safety and the client (PCI), the helideck audits are managed in similar fashion. The Helicopter Association International (HAI) "Fly Neighbourly Guide" has no aviation legal standing or relevance to this application.

270 The Parade, Kensington Park, South Australia 5068 P.O. Box 322, Kensington Park, South Australia 5068
Tel: 08 8333 9777 Fax: 08 8333 9788 E: email@perecorp.com.au

Agency Comment

DPTI Transport Policy – *The PER should refer to whether or not the proposed helicopter land facility will be consistent with CASA Guidelines in particular: Civil Aviation Advisory Publication (CAAP) 92-9 – Guidelines for the establishment and operation of onshore Helicopter Landing sites.*

Applicant Response

The PER states that while the proposed operation of the helicopter landing facility falls into the Private Category, the design considerations for the proposal include ICAO Annex 14 Volume 2. Flight Safety Group confirm CAAP 92-2 is not relevant to this application. The document is for guidance only and is now obsolete.

Agency Comment

DPTI Transport Policy – *The PER references a number of locations that are identified as emergency laydown areas:*

- *Saint Ignatius College playfield field (west of Portrush Road) – also identified as an 'ideally located' Emergency Diversion Area;*
- *Croquet club at 259 Portrush Road, Norwood;*
- *Loreto College playing field, Kensington Road;*
- *Marryatville High School Oval, Kensington Road;*
- *Marryatville Primary School, Shipsters Road;*
- *Kensington Park Oval, Olympic Lane;*
- *Haslam Oval, Magill Little Athletics Centre, Cnr The Parade & Gurrs Road; and*
- *Pembroke School playing field, Walsall St*

The risks and safety implications of utilising these areas for emergency landings should be further clarified in the PER, on the basis that these locations are available and viable for this purpose. It is acknowledged that their 'availability' would be sporadic depending on their use for educational and community purposes (and that discussions have been held with their operators/owners as to their current use). None of these locations should be used for 'pre-planned' landings.

Applicant Response

A helicopter "emergency laydown area" can be any area that can contain the size, or "D" value of the helicopter i.e. 15-20 metres. However this is not relevant to the assessment of the proposal, as only the helipad design and surrounding environmental considerations should be taken into account. All other operational factors are already covered under the existing CASA (Civil Aviation Safety Authority) regulations.

An information letter will be sent out to all owners / operators of sites identified in the PER as potential emergency laydown areas.

No landings will be pre-planned at the identified "Emergency laydown areas".

Agency Comment

DPTI Transport Policy – *See above – further detail is required on physical obstructions, adjacent structures, use times and ranking of these emergency / forced landing locations.*

Applicant Response

Helicopter operational procedures are the responsibility of the Helicopter Operator and Airservices, through the Adelaide Airport Control Authority. Multiple helicopter flights are undertaken on a daily basis over the Adelaide CBD area.

Agency Comment

DPTI Transport Policy – *The PER does not refer to whether the proposed helicopter landing facility will be consistent with, or applied any, of the following Guidelines / Standards / Procedures / Advisory notes:*

- *Australian Standard AS 2363:1999 Acoustics – Measurement of noise from helicopter operations;*
- *Civil Aviation Advisory Publication (CAAP) 92-9 – Guidelines for the establishment and operation of onshore Helicopter Landing Sites;*
- *Noise abatement procedures and noise – Helicopter Association International (HAI);*
- *National Airports Safeguarding Framework – Guideline H; and*
- *Planning requirements for heliports and helicopter landings sites Practice Note 75 (Victoria).*

To demonstrate compliance with State and Commonwealth Aviation regulations, Codes of Practice or Standards and International Civil Aviation Organisation (ICAO) regulations a helicopter flight path survey should be provided by a suitably qualified aviation professional to provide greater detail than a desktop review and further evidence of potential impacts.

Applicant Response

The only applicable Standard for helipad design requirements in Australia is ICAO ANNEX 14 VOL II. The helipad design applicable in the instance is in full compliance with the legislation. The proposed helicopter landing facility has been designed to meet Commercial Operational Standards and has also been designed to meet future legislative changes.

Agency Comment

DPTI Transport Policy – *Pages 12, 13 & 14 incorrectly identifies the Nuova apartments at 254 Portrush Road, when they are located at 254 The Parade (north of the water tower).*

Applicant Response

This error has been corrected in the updated Aviation Specialist Advice Report prepared by Flight Safety Group included in Appendix D.

Agency Comment

DPTI Transport Policy – *Would be assisted by further details regarding procedures to take advantage of meteorological conditions to minimise noise see HAI Fly Neighbourly Guide section 4.8.*

Applicant Response

The HAI Fly Neighbourly Guide Section 4.8 is not relevant to this assessment.

Agency Comment

DPTI Transport Policy – *The assessment provided regarding risk of bird strike is very brief and does not consider the local context. The National Airports Safeguarding Framework – Guideline H provides additional guidance in this regard in terms of land uses which have the potential to be high risk wild life attractants. This section of the PER should be updated to review whether any of these land uses referenced in #72 of Guideline H are in proximity to the proposed helicopter land facility and if so how potential bird strike might be managed.*

Applicant Response

The National Airports Safeguarding Framework – Guideline H is titled "Protecting Strategically Important Helicopter Landing Sites" which are defined as "a site declared by state or territory to be of critical need to the provision of identified services". None of the high-risk land uses mentioned in Clause 72 of that document are present in close proximity to the subject land.

Flight Safety Group has confirmed this document is not relevant to the assessment.

Guideline 2 – Neighbourhood Interface

Agency Comment

EPA - *The acoustic assessment has been reviewed however the following additional information is required to fully undertake an appropriate assessment of noise:*

- *The nature of the potential noise pollution and the sensitivity of the receiving environment, including the current state of technical knowledge about helicopter noise, the operation of helicopter landing facilities (see below) and the likelihood of the proposed measures to minimise helicopter noise impacts working in practice.*
- *clarification that the noise from helicopters approaching, leaving, landing and taking off from the proposed helicopter landing facility complies with the general environmental duty of the Environment Protection Act 1993. This may involve considering:*
- *any component of the ambient noise or extraneous noise that has a noise level similar to or greater than the noise from helicopters accessing the proposed helicopter landing facility*
- *any component of the ambient noise or extraneous noise that has a similar noise character or similar regularity and duration to the noise from helicopters accessing the proposed helicopter landing facility*
- *the times of occurrence of the noise from helicopters accessing the proposed helicopter landing facility*
- *the kind of activities undertaken at the proposed helicopter landing facility and the other land uses existing in the vicinity of the noise affected premises*
- *the number of people adversely affected by the noise from helicopters accessing the proposed helicopter landing facility and whether there is any special need for quiet at the noise-affected premises.*

In responding to the above, the proponent needs to predict through modelling the noise levels at potential noise- affected premises along each of the possible landing and take-off flight paths (up to cruising height) for each type of helicopter proposed to be used when operating under worst case conditions. Such information should be presented in map format showing noise contours at ground level and the worst-case frequency and duration that such noise would occur on any one day when the helicopter landing facility may be in use.

Continuous baseline noise monitoring should be conducted for a minimum 7 days at the following locations:

- *at ground level near the corner of Dimboola Street and Glyde Street, Beulah Park, and*
- *indoors, on the second storey, at St Ignatius School at Queen Street, Norwood and the Tappeiner Court aged care nursing home at 286 Portrush Road, Norwood.*

This analysis will enable a proper comparison between existing noise levels in these locations against the predicted noise levels associated with helicopter movements associated with the proposed helicopter landing facility.

Explanatory comments:
Helicopter noise should not be compared to traffic noise. Noise from elevated sources propagate noise over a much wider area than ground level noise sources and protection against its intensity or character is not typically a feature of noise sensitive receivers due to its unusual nature. Helicopter noise may affect a wider level of noise sensitive receivers at ground level because such noise cannot be controlled by ground-level barriers. Ground level noise sources will typically have the greatest impact on the nearest sensitive noise receiver. Ground level noise can be prevented from affecting a wide area due to the effect of buildings (and features such as fences) acting as barriers to noise travelling over a longer distance. For example, a car may affect one, or a few properties at a time as it drives along a road but a helicopter may affect many properties at the same time.

Applicant Response

The request is beyond the scope of the Guideline. It introduces requirements which were not part of the Guideline and ignores the acoustic report prepared in response to the Guideline.

The request relies on the Environment Protection (Noise) Policy 2007 (the Policy). The Guideline required an assessment against the Policy but aircraft noise is specifically excluded from the Policy and therefore it cannot be used as an assessment tool. Dot points 3, 4, 5, 6 and 7 of the request are taken directly from the Policy and are therefore these requests are also not applicable. Further, the text below these dot points provides guidance regarding the desired response to the requests from the Policy and are therefore also not applicable.

The request is not in proportion to the limited activity proposed. It requires noise contour mapping, showing worst case frequency and duration for each potential aircraft. This analysis is more onerous than the analysis conducted for many airports in South Australia where commercial flights are conducted every day of the year. The request requires noise logging at one outdoor public location and two indoor locations on private property. Notwithstanding the difficulty in accessing indoor areas on private property, this equates to 21 days of additional noise monitoring, which equivalent to more than 2 additional years of operation of the helicopter landing facility.

The request is contradictory. It requires extensive noise logging at 3 locations in the vicinity of major roads to enable "a proper comparison between existing noise levels in these locations against the predicted noise levels associated with helicopter movements". In the explanatory comments, the request then states that helicopter noise should not be compared with traffic noise.

The request is issued in the absence of any formal policy or guideline for helicopter noise in South Australia. When policies and guidelines are drafted, there is an extensive consultation process that must occur. This process enables the EPA to provide a reasonable, consistent and proportional approach. It would ensure that the proposed limited days of operation is properly taken into account.

Notwithstanding the above, the Sonus report provided a comparison of the highest noise from helicopters at residences against noise logging located at an equivalent location to the closest residence. It showed that the highest noise, which occurs on up to 10 days per year is regularly already exceeded in the existing acoustic environment. The report detailed all reasonable and practicable measures which would be taken to minimise noise. The most significant of these measures is the limitation of the operation to no more than 10 days per year.

To provide an indication of the likely noise from the Helicopters Sonus have used noise modelling from two of the 3 helicopters that are proposed to be used as part of this application. Details are provided on pages 8 and 9 of the Sonus Helicopter Noise Assessment.

Agency Comment

DPTI Transport Policy - *Confirmation that the total number of trips (which includes take offs and/or landings for each trip event) that might occur during each day of the 10 days (i.e. how many take off and landings may occur on any given day?) and clarification of the length of start-up and shut down noise timeframe and total number of minutes/hours for the full calendar year. These timeframes should also take account of take-off and landing procedures (i.e. engine warm-up, passenger departure or boarding etc.) for which a noise impact may result. These details should naturally form part of the noise assessment referenced above.*

Note - the PER does not make any reference to the potential to develop a Fly Neighbourly Agreement which seeks to address potential amenity impacts with sensitive land uses. Refer to Fly Neighbourly Guide – Helicopter Association International.

Applicant Response

The HAI Fly Neighbourly Guide is not relevant to this assessment and has no legislative standing.

Peregrine Corporation cannot commit to how many landings / take-offs may occur on each of those (maximum) 10 days of use per year, there are limited numbers of the type of helicopters referenced for used in the PER. Use of these helicopters is subject to availability and operational procedures of the 3rd party Helicopter Operators.

A useful description of the nature of the Helicopter Landing Facility including best estimated time frames for landing and take of procedures is outlined in Section 4a of the Aviation Specialist Advice Report prepared by Flight Safety included in Appendix D.

Agency Comment

EPA - *The pollutants assessed included NO2, CO, SO2, hydrocarbons (and a subset of volatile organics to determine the highest risk) and particles. It is the EPA's understanding that helicopters often use Avgas. However, it is not clear whether the jet fuel that would be used is Avgas. If Avgas is the fuel that would be used then, a lead (Pb) assessment will need to be included in the modelling as Avgas is leaded fuel.*

Applicant Response

The three helicopters models under consideration are equipped with gas turbine engines and use lead free JET A1 fuel. AVGAS is only used in piston engine aircraft.

Agency Comment

DPTI Planning - *The PER discusses rotor blade downwash and rotor wake being calculated in accordance to "industry mathematical formulae" however these standards and the impact on building cladding has not been discussed in detail. The detail behind this calculation and assessment is required to understand the potential impacts.*

Applicant Response

Downdraft calculations can only provide an indication - design and engineering processes then ensure structural integrity.

Peregrine Corporation are currently modelling the rotor downwash for the proposed helicopters and the impact on the building's cladding as part of the detailed design process for the previously approved headquarters redevelopment. This modelling is expected to be completed in June and the results will be incorporated with the building's structure and façade design. Both the downwash modelling and the structure/façade design are being completed by Mott MacDonald.

Agency Comment

EPA - *The draft PER acknowledges that helicopter blades will cause air movement. However it is not clear whether the 'Low Wind' option with the volume source is effective in providing a reasonable approximation of the operation of a helicopter on a helipad at 35 metres off the ground and the likely dispersion to provide accurate estimates at ground level. Further explanation is required in the PER about how this aspect of the air quality model works and why the model presented is a scientifically defensible best estimate of approximation of ground level impact.*

Applicant Response

The "LowWind" options with AERMOD are traditionally used to place limits on minimum values of meander and horizontal turbulence computed by the model during very low wind speeds and stable atmospheric conditions. These limits are needed to offset the model's tendency to overpredict downwind concentrations under such wind conditions.

In this case, it was considered appropriate to use the "LowWind" options as plume meander and atmospheric turbulence in low wind speeds and stable atmospheric conditions will be greatly enhanced, both horizontally and vertically, due to the action of the helicopter blades. In fact, I consider it likely that even with the "LowWind" options, we have underestimated the extent of atmospheric mixing caused by helicopter blades (and therefore overpredicted downwind concentrations).

Rather than implying that the "LowWind" options are specifically applicable in a case where helicopter blades are turning, I would instead say that use of the "LowWind" options eliminates some hypothetical meteorological conditions that could predict high downwind concentrations of pollutants but that simply could not occur in this scenario.

Agency Comment

ODASA - *Updated section drawings (sections A and B from V1 drawing set) and potential for overlooking to Bowen Street properties.*

Applicant Response

Updated sections showing the proposed helipad and view lines have been prepared by MPH Architects and are included in Appendix C of the PER.

Agency Comment

ODASA - *The provided Artist impression (SK49(13) indicates that the helipad is most visible from High Street. Additional information - including a comparison of the approved scheme and variation (updated section drawings A and B from V1 drawing set, and visualisations from High Street) - is requested to consider the proposed amendments on other sensitive land uses.*

Applicant Response

The Artist impression of the High Street perspective from the previously approved scheme (SK49(11) has been included for comparison in the PER with the proposed High Street Artist impression (SK49(13) (see Appendix C). A description of the proposed changes has been provided by MPH Architects in their design statement included as Appendix H.

Agency Comment

ODASA - *The Heritage Impact Assessment includes Figures 1-12 that compare the approved scheme with the proposed scheme through elevations and visualisations. An additional description and side by side comparison of the proposed architectural visualisation presented on SK49 'High St looking West' to the approved scheme would assist in the review.*

Applicant Response

An additional comparison of the proposed architectural visualisation presented on SK49 'High St looking west' to the approved scheme has been included in the updated HIS prepared by DASH Architects (see Appendix I).

Guideline 3 – Design Quality

Agency Comment

ODASA - *Refer comments above. Provide further clarification regarding the changes to the roof profile of the atrium including any amendments to plans that were previously authorised. See High Street looking West visualisations for reference – plans dated 5/12/17 in comparison to 22/11/18.*

Applicant Response

MPH Architects have confirmed there are no changes to the roof profile of the atrium proposed as part of this application. Apparent differences shown on the application plans dated 22/11/18 with the previously approved scheme dated 5/12/17 such as a thicker atrium roof cap are the product of more accurate plans being provided as a result of progress made in the detailed design process.

Guideline 4 – Heritage Context

Agency Comment

DEW State Heritage - *Complete list and reference to nearby heritage places. For example, on p.11 of the Heritage Impact Statement (HIS) (p.212 of the PER document), the concluding remarks refer to SH/13171 Clayton Wesley Uniting Church complex and SH/10609 Benson Memorial Drinking Fountain, but not to other State Heritage Places in proximity to the proposed development. The HIS should be updated to include references to the other State Heritage Places identified on p.11 of the PER, namely SH/10950 Former Norwood Wesleyan Methodist Church, Hall and Front Fence and SH/12689 Two Storey Shops and Upstairs Dwellings.*

The summary statement on p.29 of the PER should also be updated accordingly.

Applicant Response

The PER and HIS prepared by DASH Architects have been updated to include a complete list of nearby heritage places.

Agency Comment

DEW State Heritage - *The summary of proposed external amendments to the building as identified on p.3 of the SPC Guidelines (PER p.43) include the entrance design and the atrium roof. These are further described on p.5 of the Guidelines (PER p.45). While it is considered that the entrance design changes do not merit coverage in the HIS, it is recommended that the HIS should include commentary on the atrium roof amendments, given that the description for the sake of completeness) that the HIS should include commentary on the atrium roof amendments, given that the description for Guideline 4 states "…particularly in relation to the proposed design modifications to the top of the building."*

Applicant Response

The HIS prepared by DASH Architects has been amended to include commentary on the minor changes to the atrium roof referred to page 3 and 5 of the SPC Guidelines.

We trust that this cover letter along with the revised PER and appendices address the comments received from DPTI Transport, DPTI Planning, The EPA, ODASA and DEW State Heritage.

Please do not hesitate to contact the undersigned should you require any further information.

Kind regards

Tim Beazley MPIA
Consultant Town Planner
Peregrine Corporation

APPENDIX M

SUPPLEMENTARY SONUS REPORT DATED 30 SEPTEMBER 2019

PEREGRINE
CORPORATION

1 October 2019

By email & post

Ms Sally Smith
Executive Director, Planning & Land Use Services
Department of Planning, Transport and Infrastructure
77 Grenfell Street
Adelaide SA 5000

RE: Peregrine Corporation Mixed Use Development
Helipad Landing Facility – Public Environment Report – Noise Impacts

Dear Sally,

We refer to Peregrine Corporation's application for the addition of a helipad to the approved development at 270 The Parade, Kensington Park 5068. The limited proposed use of the helipad means that it is not a prescribed activity of environmental significance and as such does not require Peregrine Corporation obtain approval / licensing from the EPA.

In response to our application dated 15 October 2018, we received *Guidelines for the Preparation of Public Environment Report* dated 14 December 2018. Guideline 2 requested an assessment of the impacts of noise on nearby sensitive land uses against the provisions of the *Environmental Protection (Noise) Policy 2007* despite that:

1. noise from helicopters is specifically excluded from the provisions of the *Environmental Protection (Noise) Policy 2007*;

2. the limited use sought does not require an environmental license and thus would not normally have been expected to be subject to a specific form of assessment.

Accordingly, the submitted Public Environment Report (PER) revision V2 dated 7 June 2019 included a report prepared by Sonus, a highly respected acoustic consulting firm. In the absence of any formal policy or guidelines for helicopter noise in South Australia, Sonus provided in their report a comparison of the noise from helicopters at residences against noise logging located at an equivalent location to the closest residence. We consider this to be an appropriate means of assessment.

Since that date, further discussions have been held with the EPA on information to assist them in assessing the application. We volunteered to supply that additional information and take measurements from additional locations for the purposes of assisting them. That additional information is attached here in the supplementary Sonus report ref S4658C13 dated 30 September 2019.

270 The Parade, Kensington Park, South Australia 5068 P.O. Box 322, Kensington Park, South Australia 5068
Tel: 08 8333 9777 Fax: 08 8333 9788 E: email@perecorp.com.au

In summary:

1. The Sonus report shows that existing background noise levels are high even in backstreets in the vicinity of the helipad.

2. In accordance with the General Environmental Duty of the *Environmental Protection Act 1993* the approach has been to take all *reasonable and practicable* measures to minimise noise. These were detailed extensively in the PER and are summarised in the table below, for your convenience.

3. The helipad is necessary to support a major event at The Bend Motorsport Park, which is an event of significant economic significance to South Australia.

#	Mitigation Measure	Details
1.	Location of Helipad	Locating the helipad above a plant room near the centre of the roof of the 7-storey building to maximise the separation from the nearest residence as well as using the building to block the line of sight and hence reduce noise
2.	Flight Paths	Utilising flight paths which maximise the practical distance from residences whenever meteorological conditions allow.
3.	Limited Days of Operation	Limiting operation to a maximum of 10 days per year.
4.	Limited Hours of Operation	Limiting operation to daylight hours (7am – 10pm).
5.	Choice of helicopters	Giving preference to lower noise helicopter models – three models have been proposed in our submission, of these the single-engine Bell 206 Jetranger and Eurocopter EC130 will be the likely models to be used with the larger AW109 only included for an instance where meteorological conditions require the use of a twin-engine model

We trust that this additional information addresses the request. Should you have any further queries please do not hesitate to contact the undersigned.

Kind regards,

Peter Vickery
Senior Project Manager
Peregrine Corporation

sonus.

Peregrine Corporation
270 The Parade
KENSINGTON SA 5068

S4658C13

Attention: **Peter Vickery** **30 September 2019**

Dear Peter,

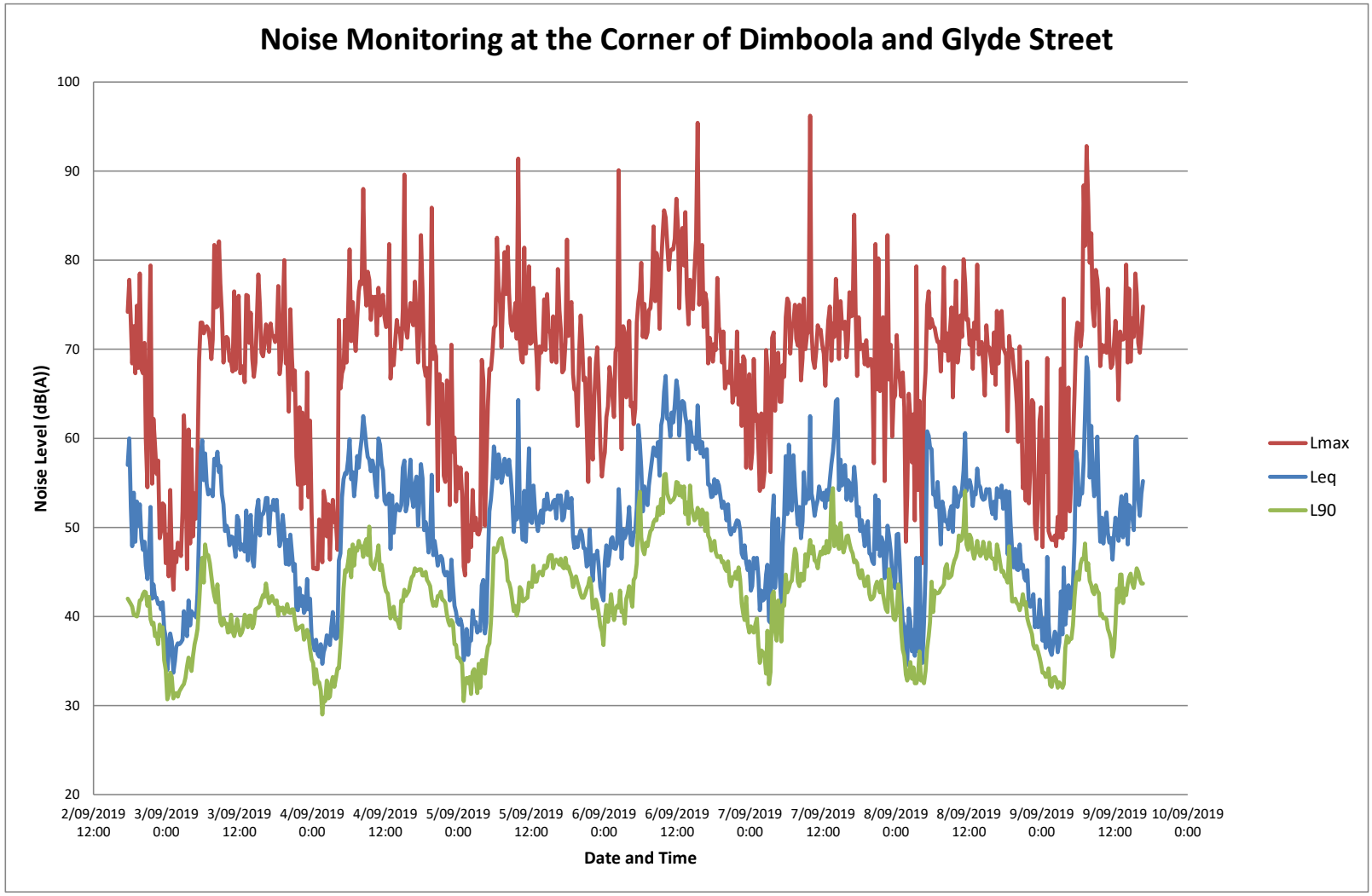
PEREGRINE HEAD OFFICE DEVELOPMENT
HELICOPTER NOISE

Further to the email correspondence dated 13 September, 2019, the following consolidated information is provided to assist the EPA with the assessment of the Peregrine Helipad:

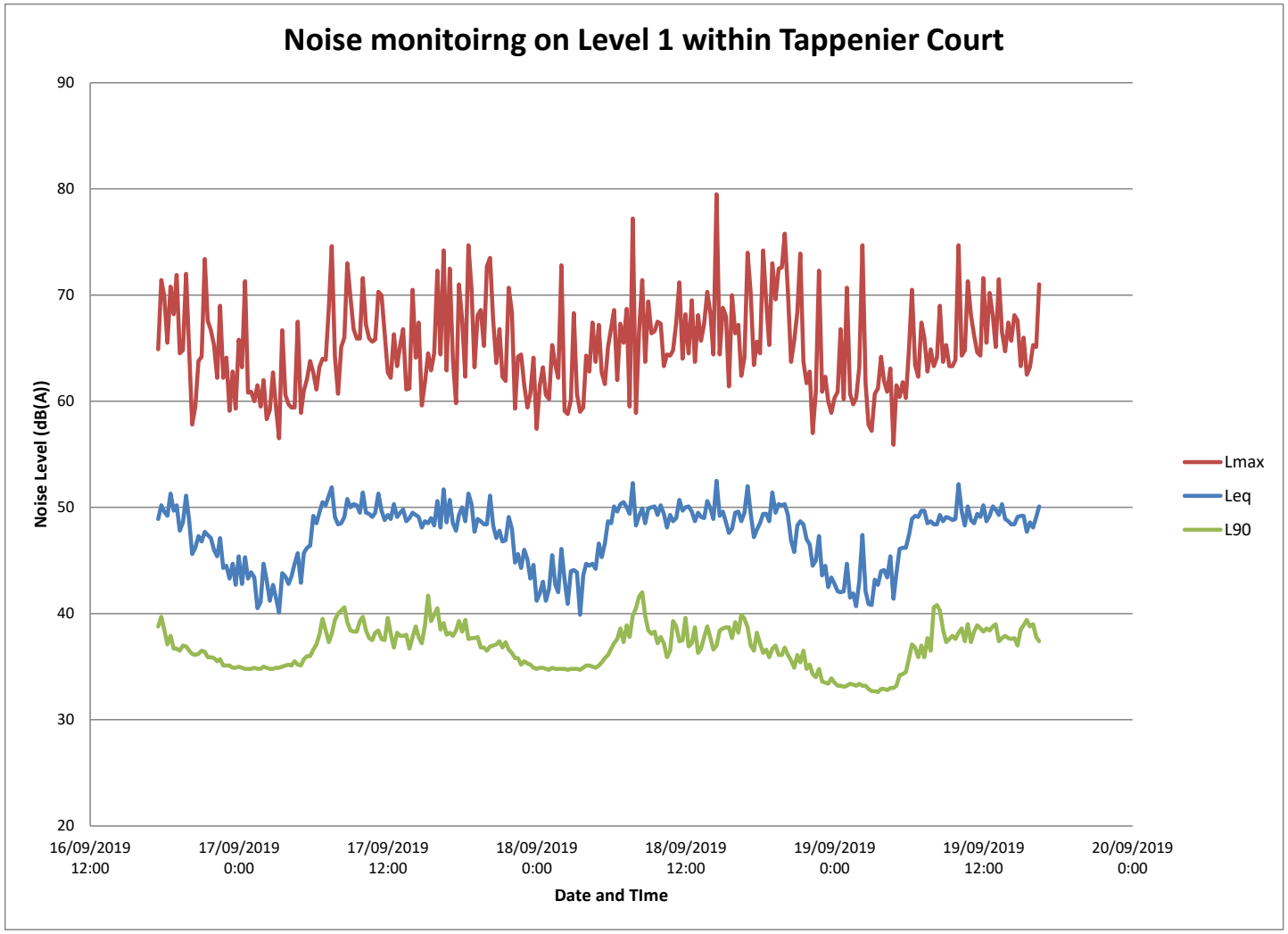
1. Outdoor noise logging at ground level near the corner of Dimboola Street and Glyde Street, Beulah Park.
2. Indoor noise logging on Level 1 within the Tappeiner Court Nursing Home.
3. Arrival and departure paths and profiles for helicopter operation below normal cruising height.
4. Contours of maximum noise from landing and take-off of each proposed helicopter.
5. Locations of the noise logging
6. An assessment of the typical noise intrusion into houses via walls (including windows) in comparison to roofs.
7. The noise report for the Tappeiner Court Nursing Home from 2017;

sonus.

1. Outdoor noise logging at ground level near the corner of Dimboola Street and Glyde Street, Beulah Park.



2. Indoor noise logging on Level 1 within the Tappeiner Court Nursing Home.



3. Arrival and departure paths and profiles for helicopter operation below normal cruising height.

Modelled Helicopter Flight Path

Modelled Helicopter Flight Profile

Table 1: Approach Profile

Horizontal Distance from Helipad (ft)	Altitude Above Helipad (ft)
7650	1000
2850	500
0	15
0	0
60 Second Flight Idle	
180 Second Ground Idle	

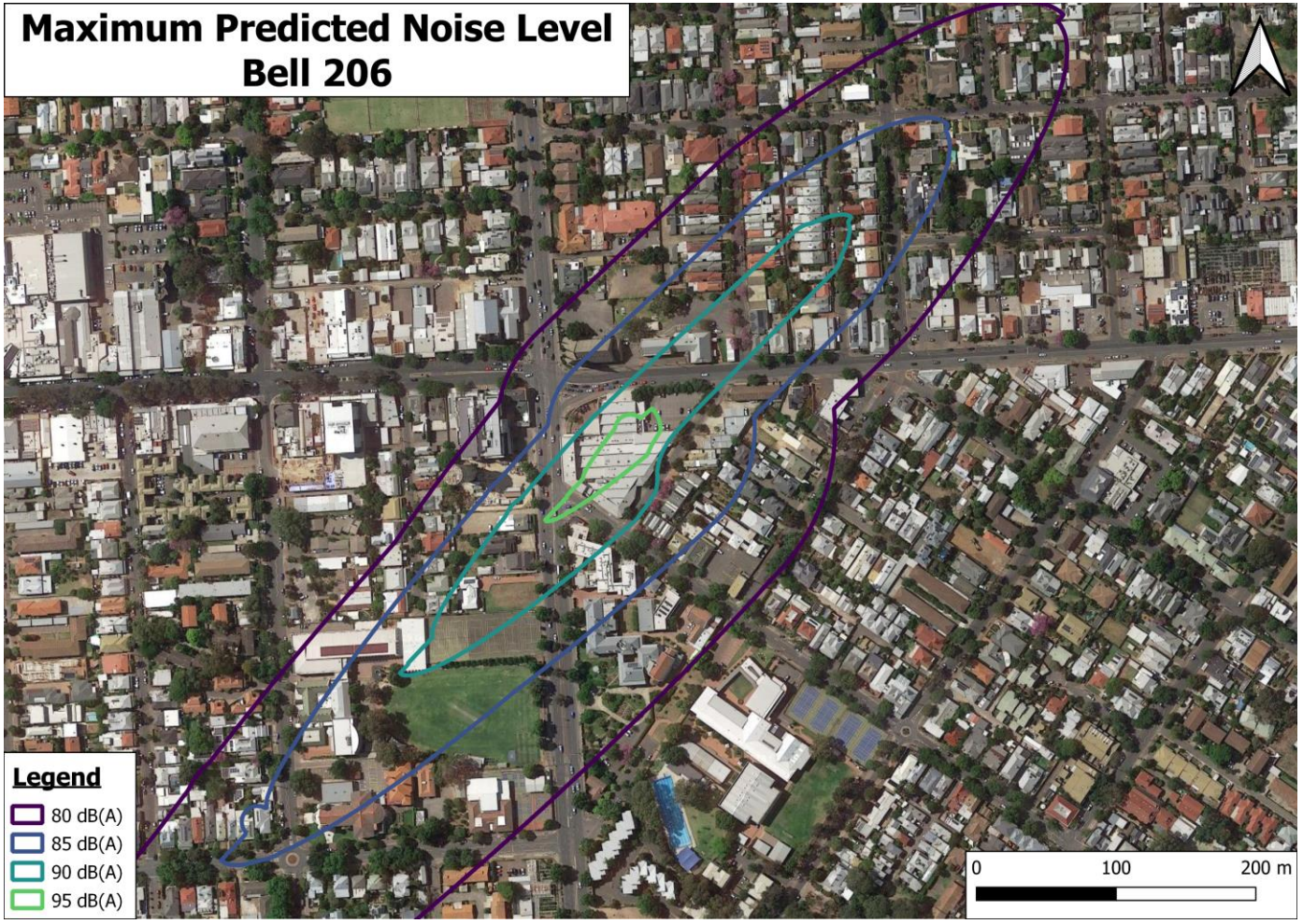
Table 2: Departure Profile

Horizontal Distance from Helipad (ft)	Altitude Above Helipad (ft)
180 Second Ground Idle	
60 Second Flight Idle	
0	0
0	15
100	15
600	30
4100	1000

sonus.

4. Contours of maximum noise from landing and take-off of each proposed helicopter.

Maximum noise level predictions conducted using the US Federal Aviation Administration's Aviation Environmental Design Tool, version 2d.



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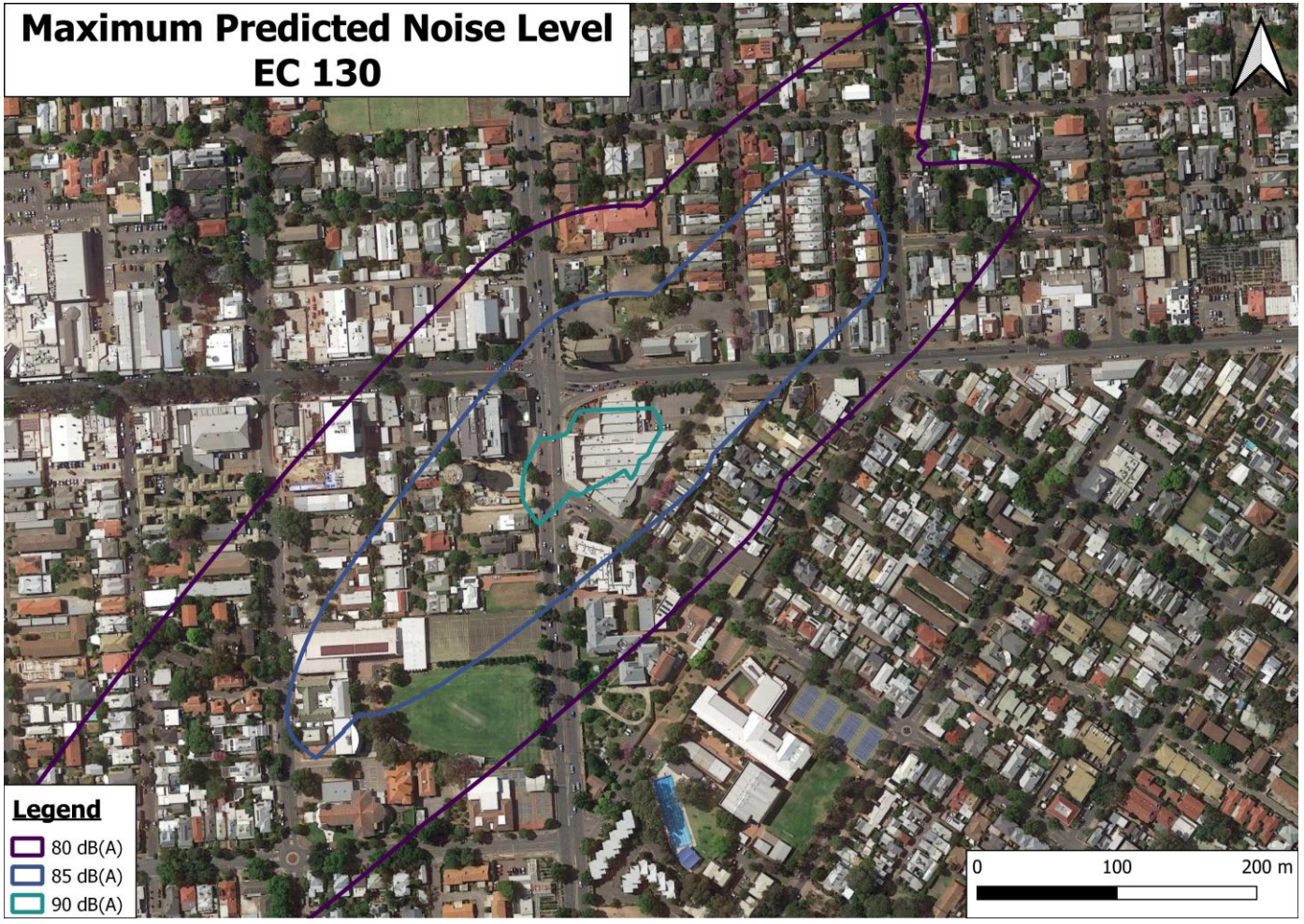
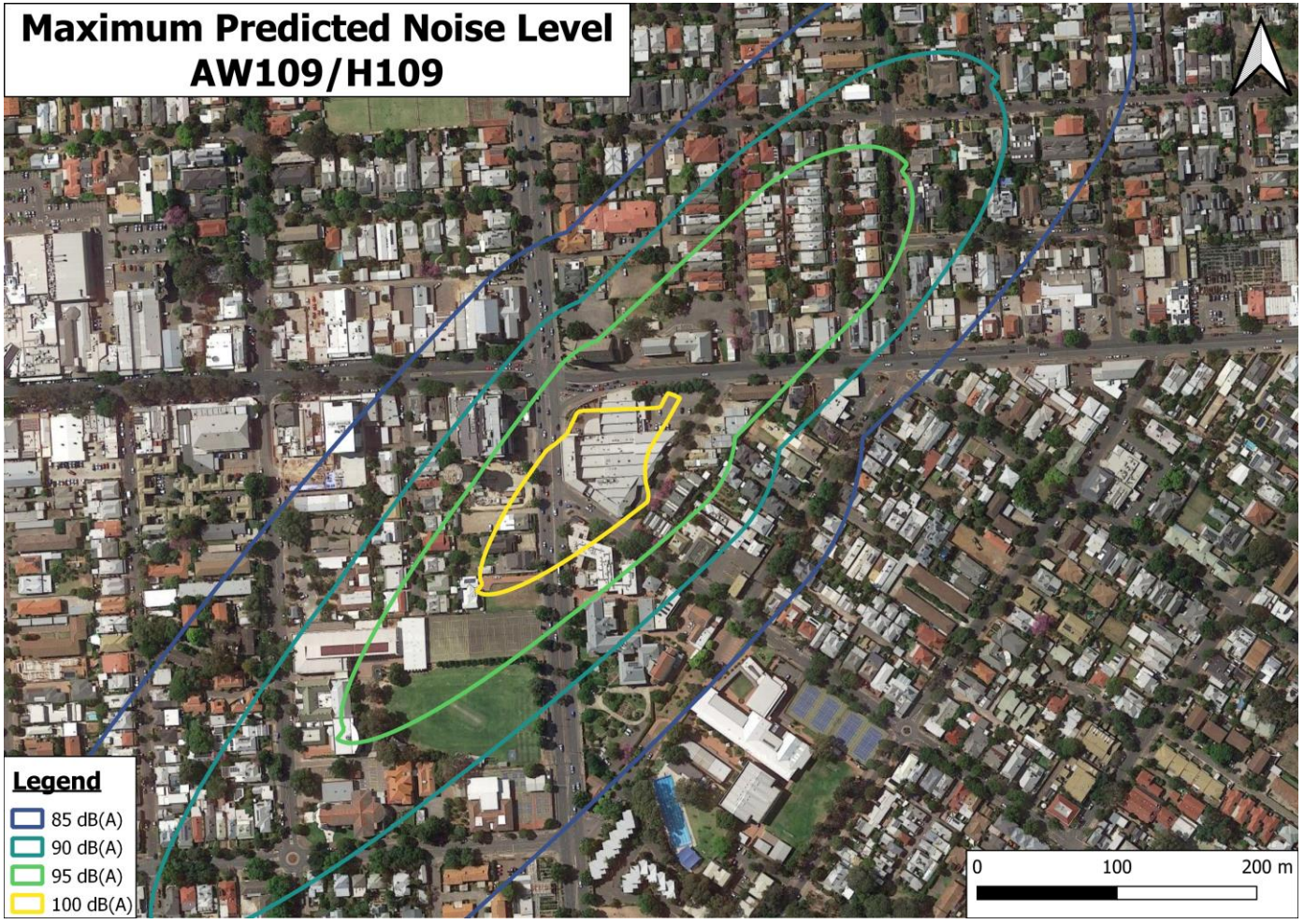
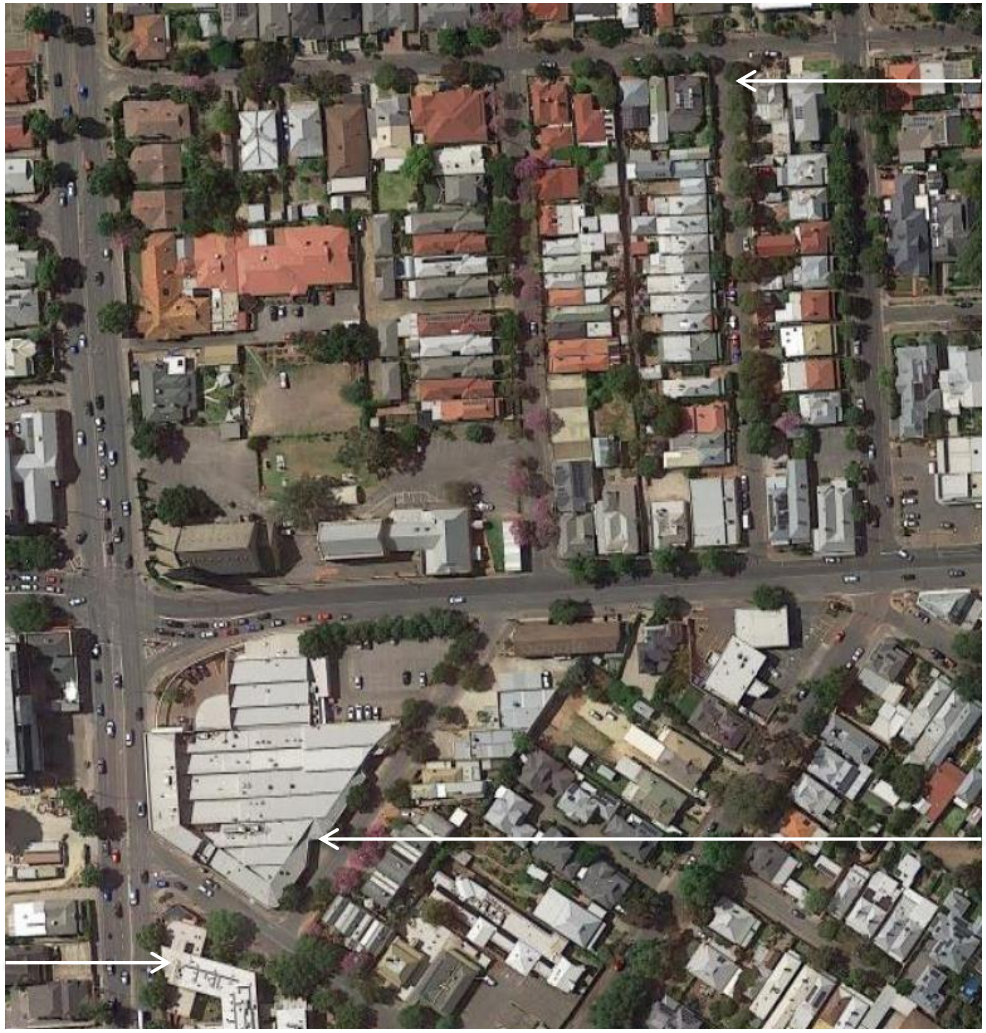

Maximum Predicted Noise Level
EC 130
Legend
80 dB(A)
85 dB(A)
90 dB(A)
0
100
200 m

sonus.


Maximum Predicted Noise Level
AW109/H109
Legend
85 dB(A)
90 dB(A)
95 dB(A)
100 dB(A)
0
100
200 m

sonus.

5. Locations of the noise logging



Location noise of logging conducted near the corner of Dimboola Street and Glyde Street between 2 and 9 September, 2019

Approximate location of noise logging conducted in Bowen Street between 27 July and 3 August, 2016 (also see photo below)

Approximate location of noise logging conducted on Level 1 within Tappeiner Court between 16 and 19 September, 2019

sonus.


Approximate location noise logging conducted in Bowen Street between 27 July and 3 August, 2016

6. An assessment of the typical noise intrusion into houses via walls (including windows) in comparison to roofs.

To provide an indication of the typical noise intrusion into houses via different building elements, reference is made to the *Minister's Specification SA 78B "Construction requirements for the control of external sound"* (**SA78B**).

SA78B provides the sound attenuation performance of a range of different building elements as *Weighted Sound Reduction Index* ($\mathbf{R_w}$) values and R_w values with spectrum adaptation placing greater emphasis on low frequency performance ($\mathbf{R_w + C_{tr}}$). The $R_w + C_{tr}$ values are typically most relevant for noise intrusion.

The $R_w + C_{tr}$ values for typical building elements are provided in Table 3 below:

Table 3: Sound Attenuation Performance of Different Building Elements

Building Elements	$R_w + C_{tr}$ Value
Glazing comprising 3mm thick monolithic or laminated glass with sliding or double hung type opening	22
Roof/ceiling construction comprising: • roof tiles or metal sheet roofing; • 165mm thick glass or mineral wool insulation with a minimum density of 7kg/m^3; • one layer of 10mm plasterboard.	35
External wall construction comprising: • Single leaf of 110 mm clay brick masonry; • row of 70 mm × 35 mm timber studs at 600 mm centres, spaced 20 mm from the masonry wall; • 50 mm thick glass or mineral wool insulation with a density of 11 kg/m^3 positioned between studs; • one layer of 13 mm plasterboard fixed to outside face of studs and outside face of masonry.	50

The actual noise intrusion will depend on the $R_w + C_{tr}$ values and the size of the different building elements.

A comparison of the noise intrusion has been made based on different sized windows and rooms in Table 4 below. The values have been normalised based on the performance of the window to enable a comparison to easily be made between the building elements.

It is noted that there will be some variation in the performance depending on the frequency spectrum of the external noise.

Table 4: Noise Intrusion Normalised to the Performance of the Window

Scenario	Building Element	Area of as a percentage of the floor area of the room	Noise intrusion normalised to the performance of the window	Increase in internal noise level above the contribution from the window
1	Glazing	10%	-	-
	Roof/ceiling	100%	3 dB(A) less than window	1.8 dB(A)
	External wall	200%	15 dB(A) less than window	0.1 dB(A)
2	Glazing	20%	-	-
	Roof/ceiling	100%	6 dB(A) less than window	1.0 dB(A)
	External wall	200%	18 dB(A) less than window	0.1 dB(A)
3	Glazing	40%	-	-
	Roof/ceiling	100%	9 dB(A) less than window	0.5 dB(A)
	External wall	200%	21 dB(A) less than window	0 dB(A)
4	Glazing	60%	-	-
	Roof/ceiling	100%	11 dB(A) less than window	0.3 dB(A)
	External wall	200%	23 dB(A) less than window	0 dB(A)

Based on the above, the noise via the glazing (even with windows closed) will be the dominant noise path with standard building materials, with the contribution of noise via the glazing increasing as the relative area increases.

Where the window has an area above 20% of the floor area, the contribution of noise from roof/ceiling will not result in any meaningful increase to the internal noise level.

7. The noise report for the Tappeiner Court Nursing Home dated 12 September 2017 is provided in Appendix A.

If you have any questions or require clarification, please call me.

Yours faithfully
Sonus Pty Ltd

Chris Turnbull
Principal

+61 417 845 720
ct@sonus.com.au

APPENDIX A: Noise report for the Tappeiner Court Nursing Home

Resonate
acoustics

Tappeiner Court Nursing Home
Traffic Noise Intrusion Assessment

Report Date: Tuesday, 12 September 2017
Reference: A17671RP1, Revision 0

Resonate acoustics

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Document Information

Project	Tappeiner Court Nursing Home	
Client	Sisters of St Joseph	
Report title	Traffic Noise Assessment	
Project Number	A17671	
Author	Sam Fotheringham Acoustic Engineer p+61 8 8155 5888 m+61 411 164 105 sam.fotheringham@resonateacoustics.com	
Reviewed by	Darren Jurevicius	

Revision Table

Report revision	Date	Comments
0	12 September 2017	Initial Issue

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Day	Between 7 am and 10 pm as defined in the Noise EPP
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of loudness.
dB(A)	Units of the A-weighted sound level.
L_{90}	Noise level exceeded for 90 % of the measurement time. The L_{90} level is commonly referred to as the background noise level.
Night	Between 10.00 p.m. on one day and 7.00 a.m. on the following day as defined in the Noise EPP
Noise source	Premises or a place at which an activity is undertaken, or a machine or device is operated, resulting in the emission of noise
R_W	Weighted Sound Reduction Index—A laboratory measured value of the acoustic separation provided by a single building element (such as a partition). The higher the R_W the better the noise isolation provided by a building element.
$R_W + C_{tr}$	A measure of the sound insulation performance of a building element with a C_{tr} spectrum adaptation term placing greater emphasis on the low frequency performance.
Reverberation Time (RT)	Of a room, for a sound of a given frequency or frequency band, the time that would be required for the reverberantly decaying sound pressure level in the room to decrease by 60 decibels.

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Table of Contents

1 Introduction

This report outlines a traffic noise intrusion assessment for the existing Tappeiner Court Nursing Home, Kensington. It is understood that the existing nursing home is to be redeveloped into self-contained units within the existing building and that traffic noise and vibration intrusion into these new units is of concern. This report details an assessment of the traffic noise and vibration from Portrush Road to the existing nursing home.

2 Development

2.1 Location

The existing Tappeiner Court Nursing Home is located between High Street and Portrush Road. The location of the existing buildings and the major traffic noise source are presented in Figure 1.

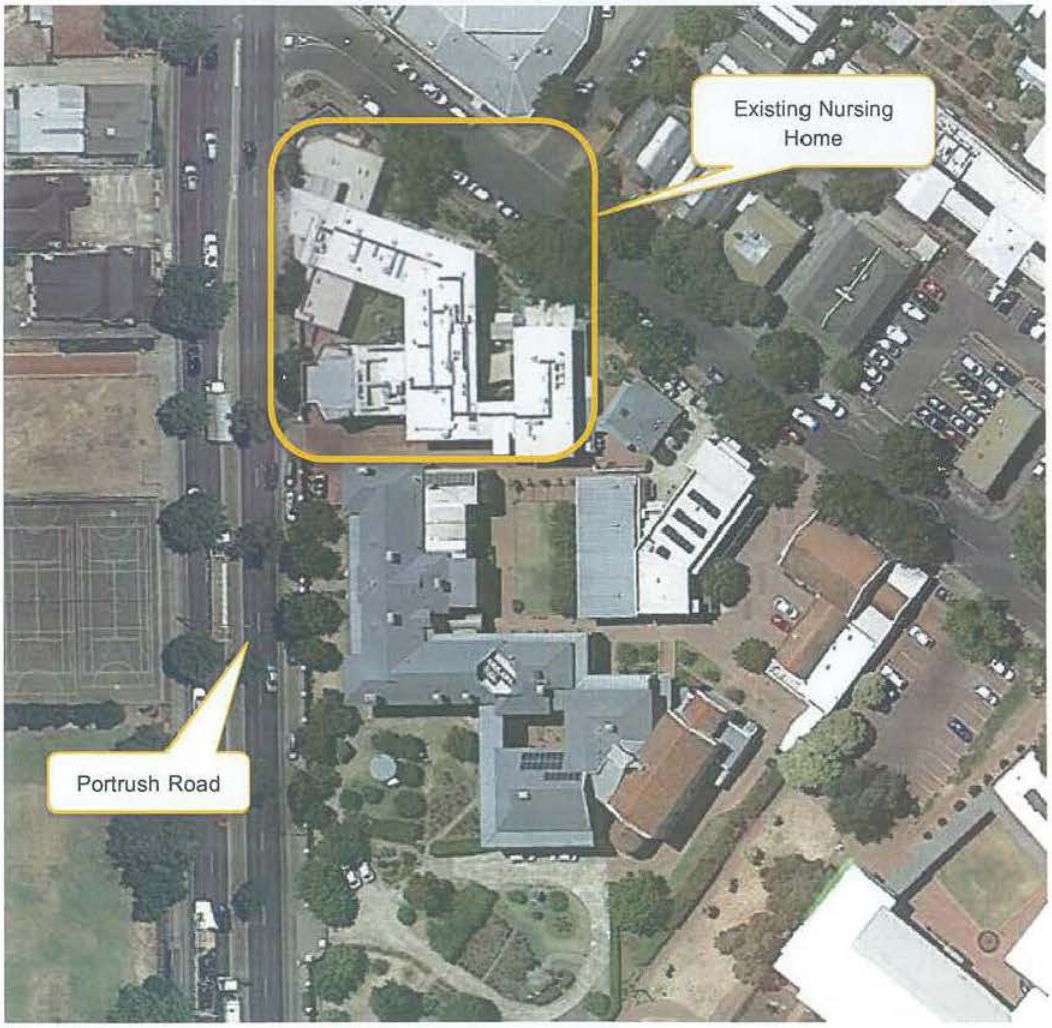


Figure 1 Site Layout

2.2 Existing construction

The existing building is constructed with a brick facade. In this instance, windows and external doors (where relevant) are the acoustic weak point in the facade construction. Inspection of the existing windows revealed them to be 3 mm single glazed sliding windows with brush seals.

3 Criteria

3.1 External noise levels

The World Health Organisation (WHO) has developed guidelines[1] for community noise which provide recommendations with regard to noise annoyance during the daytime and evening for outdoor areas. The recommendations of the guidelines are provided below:

> "To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq}."

A summary of the WHO criteria for outdoor areas is:

- A noise level of L_{eq} 55 dB(A) averaged over a 16 hour period—the majority of people will not be *seriously* annoyed
- A noise level of L_{eq} 50 dB(A) averaged over a 16 hour period—the majority of people will not be *moderately* annoyed.

3.2 Internal noise levels

In addition to external noise levels, we have considered appropriate internal noise levels within the units. Internal noise level criteria are based on the requirements of Australian/New Zealand Standard (AS/NZS) 2107:2016.[2] The design internal noise level range for residences are presented in Table 1.

Table 1 AS/NZS 2107 internal noise criteria—Residential Buildings

Type of occupancy/activity	Recommended Design Sound Level L_{eq} dB(A)
Houses and apartments in inner city areas or entertainment districts or near major roads	
Apartment common areas	45 – 50
Living areas	35 – 45
Sleeping areas	35 – 40

[1] Berglund, Lindvall and Schwela, 1999, "*Guidelines for Community Noise*"

[2] Australian/New Zealand Standard 2107:2016 *Acoustics—Recommended design sound levels and reverberation times for building interiors.*

3.3 Environmental noise policy

Whilst not applicable to this assessment, it is important to note the allowable noise levels under the *Environment Protection (Noise) Policy* 2007 (Noise EPP). For fixed domestic machine noise (such as from external air conditioning condensers), a noise level of up to 52 dB(A) is allowed during the day (unless a higher background noise exists). This shows that an acceptable noise level in outdoor residential areas is considered to be 52 dB(A) during the day under the Noise EPP.

3.4 Internal vibration levels

AS 2670.2–1990 has been used to assess vibration from traffic at the existing nursing home. We note that AS 2670.2–1990 has been superseded by AS ISO 2631.2–2014 *Mechanical Vibration and Shock – Evaluation of human exposure to whole body vibration Part 2: Vibration in buildings (1 Hz to 80 Hz)*, however AS 2670.2–1990 been used to assess vibration in this instance as it provides satisfactory magnitudes of building vibration in respect to residential structures for both day and night periods.

AS2670.2-1990 provides guidance for the evaluation of human exposure to whole-body vibration from continuous and shock-induced vibration in buildings. It provides guidelines for thresholds of varying levels of human comfort and associated reactions if these thresholds are exceeded. The residential satisfactory magnitudes of vibration are outlined in Table 2.

Table 2 Ranges of satisfactory residential vibration

Place	Time	Continuous or intermittent vibration, mm/s (RMS)	Transient vibration excitation with several occurrences per day, mm/s (RMS)
Residential	Day	0.2 – 0.4	3 – 9
	Night	0.14	0.14 – 2

For context, the threshold of human perception for vibration is approximately 0.15 mm/s RMS and a level of 0.35 mm/s RMS is barely noticeable.

4 Noise monitoring

4.1 Details

Background noise monitoring along High Street was undertaken between 11 am Wednesday 30 August and 3 pm Wednesday 6 September 2017. The location of the noise monitoring is presented in Figure 2.

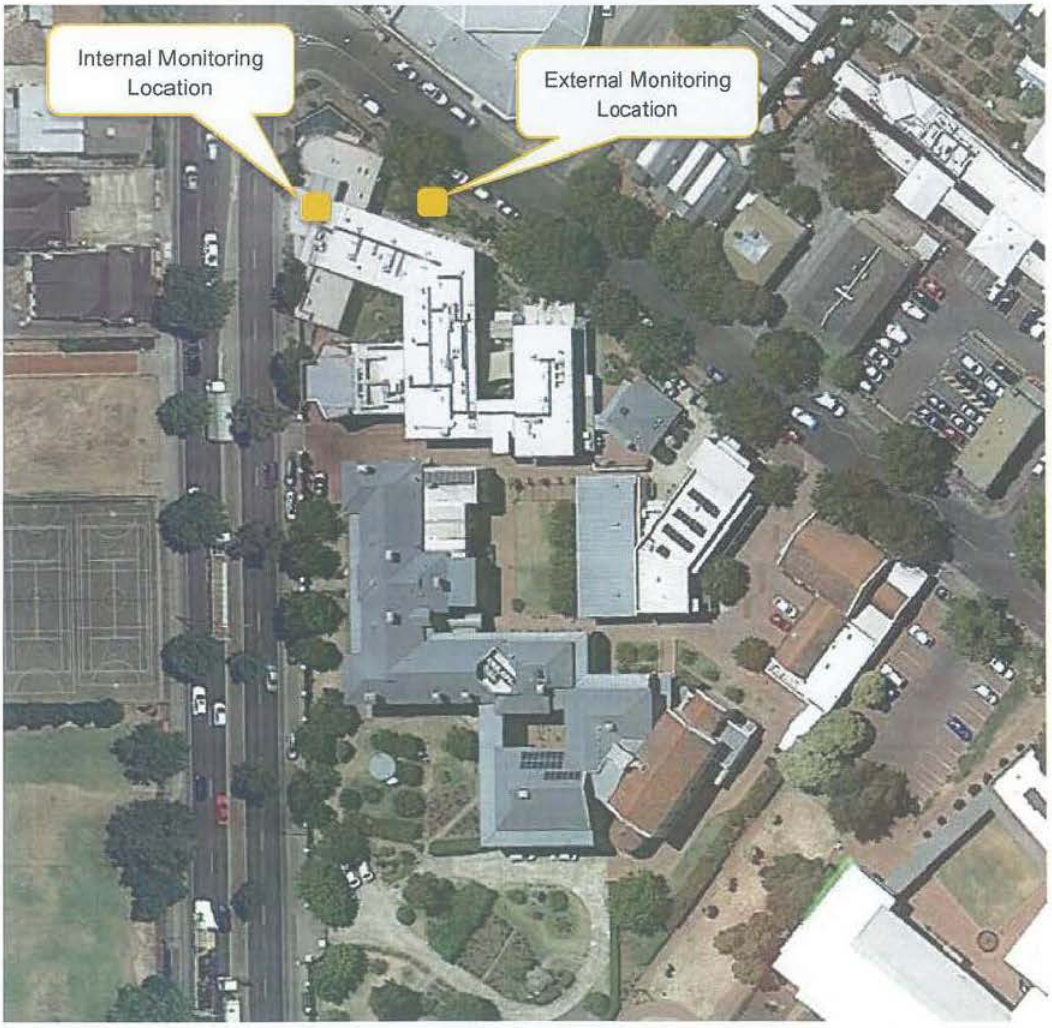


Figure 2 Measurement location

Additionally attended noise and vibration monitoring was undertaken internally within the existing nursing home, in the rooms closest to Portrush Road. Measurements occurred between 10 and 11 am on Wednesday 30 August 2017.

4.2 Instrumentation

The attended noise measurements were taken with a calibrated Brüel & Kjær 2250 sound level meter, which is a Type 1 instrument suitable for field and laboratory use. The unattended noise measurements were taken with a calibrated Rion NL-42 sound level meter, which is a Type 2 instrument suitable for field use.

Both sound level meters were calibrated before and after the measurements using a Type 1 Brüel & Kjær 4231 sound level calibrator, and the calibration was found to have not drifted. Both the sound level meters and calibrator carry current calibration certificates from a NATA accredited laboratory. Copies of the calibration certificates are available on request.

Vibration measurements were undertaken with a Svantek 948 sound and vibration meter, which is a Type 1 instrument suitable for field and laboratory use.

4.3 Procedure

Noise measurements were undertaken in accordance with the following:

- The microphone of the sound level meter was at a height of approximately 1.2 m above the ground.
- A wind shield was used during all measurements
- Noise measurements were undertaken for a period of 15 minutes.

Vibration measurements were undertaken in accordance with the following:

- Accelerometer was adhered to the floor with beeswax
- Vibration was measured in 1 second intervals
- Both RMS and Peak velocity levels were recorded

4.4 Results

Attended noise results

The results of the attended noise monitoring are presented in Table 3.

Table 3 Attended noise results

Measurement Location	L_{eq} dB(A)	L_{90}, dB(A)
Downstairs – under light well	49	44
Upstairs – adjacent light well	47	36

Table 3 shows that typical internal L_{eq} values were approximately 7 – 14 dB(A) greater than the recommended AS 2107 internal noise criteria for bedrooms. A general assessment of noise levels within bedrooms on the first floor was undertaken and the L_{eq} was found to range from 40 – 45 dB(A).

Unattended noise results

A summary of the unattended noise monitoring levels are presented in Table 4.

Table 4 Summary of unattended monitoring noise levels

Time Period	Average L_{max}, dB(A)	Average L_{eq} dB(A)	Average L_{90}, dB(A)
Day (7 am – 10 pm)	75	58	48
Night (10 pm – 7 am)	72	54	40

Measured noise levels followed a typical diurnal cycle, with day time traffic L_{eq} noise levels approximately 4 dB(A) greater than night time levels.

The graphed noise levels for the measurement period are presented in Appendix A.

Vibration results

The results of the attended vibration measurements are presented in Table 5. The observed maximum traffic event is measured over a 1 second interval and is representative of a large truck passing directly past the building. Typical vibration levels are well below the observed maximum event.

Table 5 Vibration results

Axis	Vibration type	Observed Maximum Traffic Event, mm/s
X	Peak	0.47
	RMS	0.24
Y	Peak	0.34
	RMS	0.17
Z	Peak	0.98
	RMS	0.6

Results from the vibration testing indicate that observed maximum vibration levels marginally exceed the 'Continuous or intermittent vibration' criteria. However, the observed maximum traffic event is within the acceptable range for residential structures during the night time period (less than 2 mm/s) for 'Transient vibration excitation with several occurrences per day'.

5 Discussion

5.1 External noise levels

The average measured external noise level for the duration of the noise logging was 56 dB(A). This level is exceeds the WHO criteria for protecting moderate annoyance (50 dB(A)) by 6 dB(A). As the noise levels in the area are controlled by traffic noise, the noise levels during the night are approximately 50 dB(A). However, whilst the external noise levels are greater than the WHO criteria, it is possible to control noise ingress with appropriate facade constructions.

5.2 Internal noise levels

The unattended background noise logging has shown that noise levels between 10 am and 11 am, when the internal noise testing occurred, are consistent in level with highest outdoor levels during the logging period. As such, the worst case traffic noise intrusion resulted in an exceedance of the AS 2107 internal noise criteria for bedrooms by approximately 7 – 14 dB(A) in the closest rooms to Portrush Road. The exceedance of AS 2107 will decrease for rooms further from Portrush Road. It was noted during the inspection that noise ingress to existing spaces was controlled via flanking through external windows and doors.

To mitigate against traffic noise intrusion, varying levels of treatment are outlined below, based on the facade distance from Portrush Road. It is important to note that the internal noise criteria is based on the intended room use and less sensitive spaces require less extensive treatment. The level of treatment recommended for a room use is outlined in Table 6, based on the facade mark-ups presented in Figure 3 and Figure 4. Please note that all recommended treatments are indicative only and further input is required during the detailed design stage of apartments.

Table 6 Room treatment classification

Room Type	Mark-up Colour	Sound Exposure Category Treatment
Bedroom	Red	Cat A
	Blue	Cat B
	Green	Cat C
Living areas (all rooms other than bathrooms, laundries etc.).	Red	Cat B
	Blue	Cat C
	Green	No Treatment Required

Figure 3 Facade classifications - ground floor

Figure 4 Facade classifications - first floor

As an example, should a bedroom fall within a section of facade marked up in red, it should be treated with Cat A treatments. Likewise if a living room was located in a section of facade marked up in red, it should be treated with Cat B treatments

Note that external doors should only be treated if they are within a bedroom or living area.

Windows and external glass doors – Cat A

- A proprietary double-glazed window system that can achieve the acoustic performance requirement of $R_W + C_{tr}$ 37; OR
- A secondary 10.38 mm laminated glazed window with a minimum 180 mm air gap from existing window

- A proprietary sliding glass door system that can achieve the acoustic performance requirement of $R_W + C_{tr}$ 32 (where practical).

External doors other than external glass doors – Cat A

- If existing external doors are of solid core construction, new acoustic seals should be installed around sides and top and a dropdown seal at the bottom acoustically equivalent to Raven RP8si.
- If existing external doors are not of solid core construction, a new 45 mm solid core door with acoustic seals should be installed.

Windows and external glass doors – Cat B

- A retrofitted secondary glazing window system with a minimum 100 mm air gap and either 10 mm acrylic panel, or a window system incorporating at least 6.38 mm thick laminated glass; OR
- A new or retrofitted 10.5 mm Vlam Hush glazed window with acoustic seals
- A proprietary sliding glass door system that can achieve the acoustic performance requirement of $R_W + C_{tr}$ 30.

External doors other than external glass doors – Cat B

- If existing external doors are of solid core construction, new acoustic seals should be installed around sides and top and a dropdown seal at the bottom acoustically equivalent to Raven RP8si.
- If existing external doors are not of solid core construction, a new 40 mm solid core door with acoustic seals should be installed.

Windows and external glass doors – Cat C

- A retrofitted secondary glazing window system with a minimum 100 mm air gap and 4.5mm acrylic panel; OR
- A retrofitted secondary glazing window system with a minimum 50 mm air gap and either 10 mm acrylic panel, or a window system incorporating at least 6.38 mm thick laminated glass; OR
- A new or retrofitted 6.5 mm Vlam Hush glazed window with acoustic seals
- A proprietary sliding glass door system that can achieve the acoustic performance requirement of $R_W + C_{tr}$ 30.

Light well

During the site inspection it was noted that internal noise levels in the downstairs area close to Portrush Road were controlled by noise ingress via the light well. Due to its location, the thickness of current glazing within the light well could not be determined. We recommend that the light well be used to service an apartment common area as it currently meets the internal noise criteria for such a space. Should a different room use be selected for the light well, further investigation is required to determine the existing construction and formulate a mitigation strategy.

5.3 Vibration

As stated previously, results from the vibration testing indicate that observed maximum vibration levels marginally exceed the 'Continuous or intermittent vibration' criteria and were within the acceptable range for residential structures during the night time period (less than 2 mm/s) for 'Transient vibration excitation with several occurrences per day'.

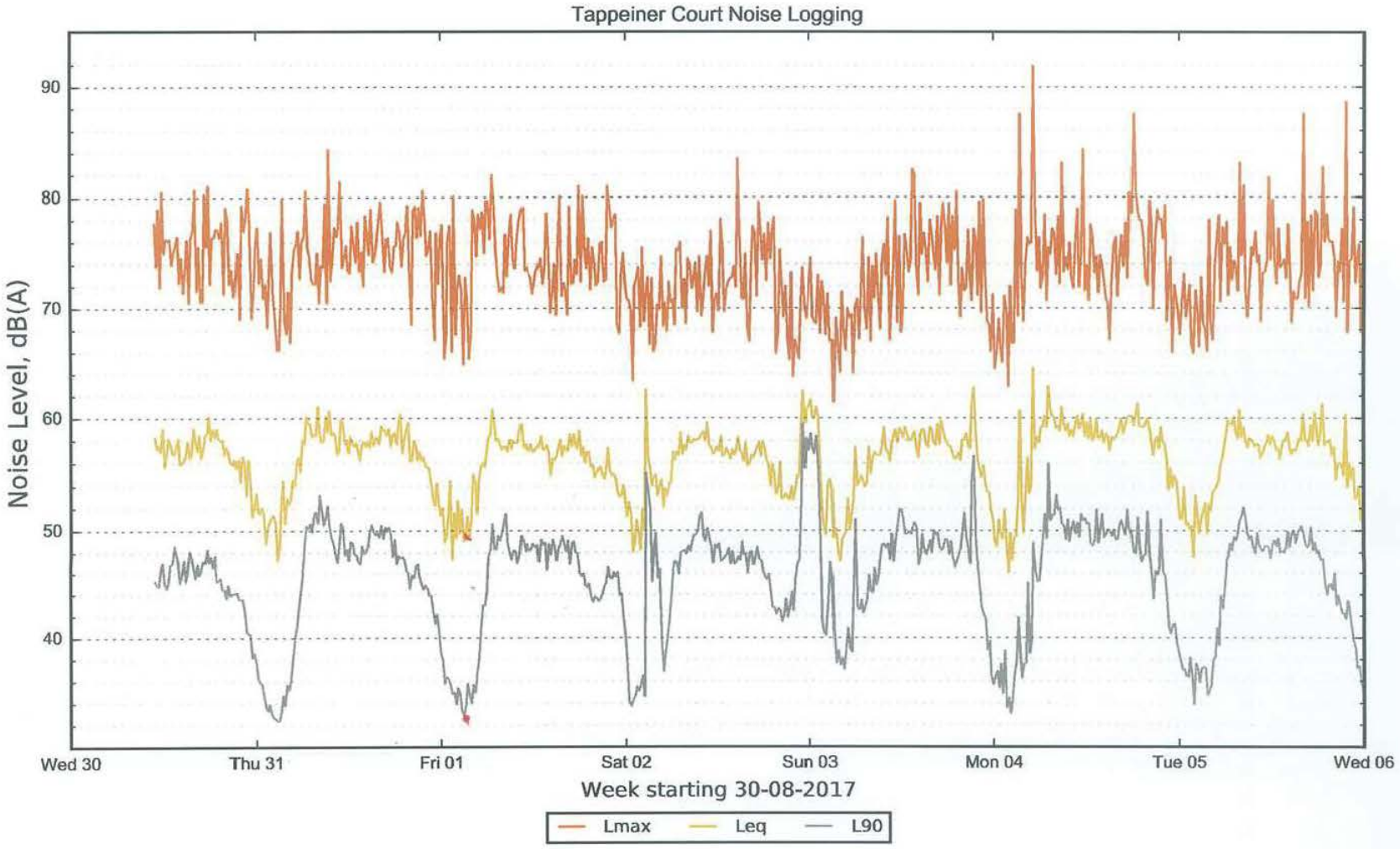
In our experience, operational vibration from road traffic is typically negligible at distances greater than a few metres from road traffic. Typical vibration levels were below 0.2 mm/s during the monitoring period with peaks occurring only when a heavy vehicle passed by. Additionally, there are very limited options in treating existing structures for traffic-induced vibration. We are of the opinion that traffic noise intrusion is the greater issue for the future internal amenity of the existing Tappeiner Court Nursing Home.

6 Conclusion

A traffic noise intrusion assessment has been undertaken for the existing Tappeiner Court Nursing Home, Kensington. External traffic noise levels were measured at the nursing home for one week. Additionally internal noise levels were measured at 10 am on a weekday. It was found that traffic noise levels exceeded the WHO criteria for protecting moderate annoyance (50 dB(A)) by 2 dB(A) and internal noise levels exceeded AS 2107 criteria by up to 14 dB(A). Indicative facade treatments have been outlined to control noise ingress from Portrush Road to proposed self-contained units.

Observed maximum vibration levels were found to marginally exceed the 'Continuous or intermittent vibration' criteria. However, we are of the opinion that traffic noise intrusion to the proposed units is the greater issue and requires mitigation measures to be implemented.

Appendix A – Noise logging results


Tappeiner Court Noise Logging
Noise Level, dB(A)
90
80
70
60
50
40
Wed 30
Thu 31
Fri 01
Sat 02
Sun 03
Mon 04
Tue 05
Wed 06
Week starting 30-08-2017
Lmax
Leq
L90