Appendix A

The Guidelines

STATE PLANNING COMMISSION

GUIDELINES

For the preparation of a

Development Report
Mount Lofty Golf Estate

Mount Lofty Golf Estate Pty Ltd
March 2022

State Planning Commission
Department for Trade and Investment

www.plan.sa.gov.au

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1. BACKGROUND

On 17 December 2020, the then Minister for Planning and Local Government ('the Minister') declared the Mount Lofty Golf Estate to be assessed as a Major Development pursuant to Section 46 of the *Development Act 1993* (the Act).

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 State Planning Commission (SPC) is responsible for setting the level of assessment required (Environmental Impact Statement, Public Environmental Report or Development Report) and provides Guidelines for the preparation of the assessment document.

Due to the nature of proposal, the need for a broader assessment and investigation of the following is required:

- Tourist accommodation and associated land uses, including major events,
- Bushfire protection requirements,
- Native vegetation clearances requirements,
- The interface with the Mount George Conservation Park,
- The potential impacts on the Mount Lofty Ranges Watershed including water resources such as watercourses, dam, lakes, wetlands and floodplains, and associated water quality,
- The impacts on the surrounding traffic networks during construction and operation, and
- Servicing and infrastructure required for the site.

The SPC has determined, subject to consideration of section 63 of the *Development Regulations 2008* that the proposal will be subject to the processes of a **Development Report** (DR), as set out in Section 46D of the Act. A DR was considered appropriate due to the nature and scale of the issues to be investigated.

The *Development Act 1993* requires that a DR be publicly exhibited for a period of at least 15 business days and for a public meeting to be held during this period.

The SPC has now prepared Guidelines (this document) for the Mount Lofty Golf Estate and associated infrastructure based upon the significant issues relating to the proposed development. The DR should be prepared in accordance with these Guidelines and should describe what the proponent wants to do, what the environmental effects will be and how the proponent intends to manage the project.

The DR should cover both the construction and ongoing operation of the development and, where possible, should outline opportunities to incorporate best practice design and management.

For the purposes of environmental impact assessment under the *Development Act 1993*, the meaning of 'environment' is taken to include an assessment of environmental (biological and physical), social and economic effects associated with the development and how those effects can be managed.

In this context, this document forms the guidelines as set by the SPC specifically prepared for this application. The guidelines have been developed to properly define the expected impacts (extent, nature and significance) associated with the proposal in the manner suggested, the proposed mitigation strategies, and on balance whether such impacts are acceptable.

2. DESCRIPTION OF PROPOSAL

The proponent of the proposed development is the Mt Lofty Golf Estate Pty Ltd. The site is described as Allotment 53 in Deposited Plan 59212 (Certificate of Title: CT 5891/805). A proposed site plan is included in Appendix 1.

The proponent seeks to undertake works at the existing Stirling Golf Club incorporating the following:

- The construction of tourist accommodation in a new hotel building (3 to 5 levels), 20 private retreats (pods) and one service pod,
- New clubhouse facility and pro-shop, administration areas and change rooms,
- Retention and improvements to the 18-hole golf course,
- Conservation works and adaptive reuse of a local heritage place to accommodate a multipurpose café, retail and function space,
- Car parking for 200 spaces in two parking areas, and
- Tree removal (including native vegetation) and associated landscaping.

An emergency access would be formalised via the western entry at Golf Links Road.

The estimated minimum project cost is anticipated to be approximately $40 million.

3. MAJOR DEVELOPMENT PROCESS AND ROLE OF GUIDELINES

The Major Development assessment process enables the Minister for Planning to utilise impact assessment as a strategic tool.

Impact assessment enables the holistic consideration of proposals that might otherwise be of a nature or scale that is not expected through the regular development assessment process and/or Planning and Design Code.

The major development assessment process has several steps:

These Guidelines are prepared to inform the preparation of the DR. They set out the assessment issues associated with the proposal along with their scale of risk as determined by the SPC.

A DR 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 DR 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 Planning and Design Code, the State Planning Policy and any matter prescribed by the Regulations under the Act.

Whilst not mandatory for this DR, due to it being declared under the Development Act, the DR may also address the State Planning Policies given they are now a relevant planning instrument.

The completed DR is submitted (by the proponent) to the Minister for public release and is subsequently referred to the relevant Council and government agencies for comment.

An opportunity for public comment will occur when the completed DR is released. Public exhibition is undertaken for a minimum period of 15 business days, however the Minister for Planning has the power to extend this if necessary. An advertisement will be placed in the *Advertiser*, The Courier *(Mount Barker)* and on the SA Planning Portal inviting submissions.

Copies of the submissions from the public, relevant Council and government agencies will be provided to the proponent. The proponent must then prepare a 'Response Document' to address the matters raised during the public exhibition period.

An Assessment Report is then prepared by the SPC. The Assessment Report and the Response Document will be available for inspection and purchase at a place and period, determined by the Minister.

Availability of each of these documents will be notified by advertisements in *The Advertiser, The Courier (Mount Barker)* and on the Plan SA Portal inviting submissions. A copy of the DR, Response Document and the Assessment Report will be provided to the relevant Council.

In deciding whether the proposal will be approved and any conditions that will apply, the Minister for Planning must have regard to:

- provisions of the appropriate Planning and Design Code
- the *Development Act 1993* and *Development Regulations 2008*
- if relevant, the Building Code of Australia
- the South Australian Planning Strategy
- the DR, Response Document and the State Planning Commission's Assessment Report
- *Landscape South Australia Act 2019* – Water Affecting Activity Control Policy and Western Mount Lofty Ranges Water Allocation plan
- if relevant, the *Environment Protection Act 1993* and any other relevant government policy and/or legislation.

The Minister 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. DEVELOPMENT REPORT (DR)

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

The report will include the following:

Summary
The DR should include a concise summary of the matters set out in Section 46D of the *Development Act 1993* and include all aspects covered under the headings set out in the Guidelines, in order for the reader to obtain a quick but thorough understanding of the proposal and the resulting environmental impacts.

Introduction
The introduction to the DR should cover the following:

- background to, and objectives of, the proposed development,
- details of the proponent,
- staging and timing of the proposal, including expected dates for construction and operation,
- relevant legislative requirements and decision making processes, and
- purpose and description of the DR process.

Need for the Proposal
A statement of the objectives and justification for the proposal, including:

- the specific objectives that the proposal is intended to meet, including market requirements,
- expected local, regional and state benefits and costs, including those that cannot be adequately described in monetary or physical terms (e.g. effects on visual amenity), and
- a summary of environmental, economic and social arguments to support the proposal, including the consequences of not proceeding with the proposal.

Description of the Proposal
The description of the proposal should include the following information:

- the nature of the proposal and location,
- site selection and justification provided as to the suitability of the site,
- site layout plans (including indicative land division plan),
- a description of the existing environment (including the immediate and broader location),
- a description of the current land use activities occurring in the area,
- details of all buildings and structures associated with the proposed development and structures to be demolished,
- details of any other infrastructure requirements and availability,
- details of the construction methods to be used,
- details of the operation of the proposed development, including proposed maintenance programs,
- the relevant Planning and Design Code zones,
- identification of the nearest sensitive receivers and their distances from various site activities that have potential to cause off-site impacts,
- management arrangements for the construction and operational phases (including Environmental Management and Monitoring Plans),
- the construction and commissioning timeframes (including staging), and
- a contingency plan for delays in construction.

Assessment of expected environmental, social and economic effects
The assessment of effects should include all issues identified in these Guidelines and cross referenced to supporting technical references.

Avoidance, Mitigation, Management and Control of adverse effects
The proponent's commitment to meet conditions proposed to avoid, mitigate, satisfactorily manage and/or control any potentially adverse impacts of the development on the physical, social or economic environment, must be clearly stated as part of the DR.

The design of the proposal should be flexible enough to incorporate changes to minimise any impacts highlighted by this evaluation or post-operation monitoring programs.

Consistency with Government policy
The *Development Act 1993* requires the DR to state the consistency of the expected effects of the proposed development:

- with the relevant Planning and Design Code policy and Planning Strategy,
- with the objects of the *Environment Protection Act 1993*, the general environmental duty and relevant environment protection policies,
- water affecting activities in accordance with the *Landscape South Australia Act 2019*, and
- native vegetation clearance in accordance with the *Native Vegetation Act 1991.*

Plans and Forms

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

- **Context and locality plans** should illustrate and analyse the existing environment and site conditions and the relationship of the proposal to surrounding land, buildings and waters. The plan should be drawn to a large scale and be readily legible. The plan(s) should indicate:
  - any neighbouring buildings, infrastructure or facilities, including identification of all nearest sensitive receivers and their distances from proposed activities that may pose air and noise impacts, and the likely use of existing or proposed neighbouring buildings (e.g. dwellings),
  - location of any watercourse, dams, underground wells and/or any other environmentally sensitive areas,
  - location of any State or Local Heritage Places and cultural heritage areas in relation to the site,
  - separation distances from the main building complex to any existing vegetation that poses a fire hazard,
  - location of existing native vegetation, regulated or significant trees (including those on Council land that will be affected by the proposal),
  - known sites for protected, threatened or vulnerable species, including migratory species, on the site, the adjoining land,
  - existing roads and access tracks (public and private), and
  - any other information that would help to set the context for the locality.

- **Site plan(s)** (drawn at a scale of 1:1000 or 1:2000) clearly indicating all proposed buildings, structures and landscape works with individual development sites drawn at a scale of 1:500.

- **Site plan(s)** outlining the location(s) of firefighting water sources, including capacity, locations of outlets and access for fire fighting vehicles.

- **Elevations** (drawn at a scale of 1:100 or 1:200) of all sides of buildings and other structures, with levels and height dimensions provided in Australian Height Datum, existing tree canopy and landscape.

- **Cross sections** of buildings and other structures, including ground levels, floor levels, ceiling heights and maximum height in Australian Height Datum, existing tree canopy and landscape.

- A **schedule of external materials, finishes and colours,** supported by a physical materials sample board.

- Coloured high resolution **perspectives** of the proposal shown in context from various locations, including longer views from strategic approaches to the site.

- **Landscaping plan(s)**, including the incorporation of any native vegetation or significant trees on the site and/or adjoining land.

- **Electricity powerline survey plan** that shows indicative high voltage powerline easement corridor and the location of towers within easement.

- **Sequencing and staging plans** if staged Building Rules Consent is to be sought.

- Any **technical or engineering drawings** and specifications including geotechnical data.

Specialist Reports and Details

- A **Design Statement** outlining the design philosophy proposed the evolution of the proposal (including options explored and discounted) from the initial concept to the final design, and addressing the following matters from a design perspective:
  - Site access, circulation and way finding strategy (for the variety of public users and modes of transport),
  - Servicing strategy, including emergency access,
  - Building site selection,
  - Built form and visual impact,
  - Materiality,
  - Landscaping, including the proposal's response to the unique landscape setting and any work in the public realm,
  - Environmentally Sustainable Design,
  - Universal/equitable access, and
  - Adaptive reuse of the Local Heritage Place

- A report on **Environmentally Sustainable Design** which outlines environmentally sustainable design measures, including any water sensitive design and renewable energy initiatives proposed.

- An **Economic Impact Assessment** that describes the existing environment in which the project is set and assesses the magnitude of change to the economic environment resulting from the project.

- A **Hazard Management Plan** that considers the risks and hazards associated with all components of, and activities associated with, the proposed development. The plan is to address public and workplace safety and emergency response strategies.

- A **Bushfire Management Strategy** to include the following:
  - The provision of firefighting water supplies, pumps and firehose reels,
  - A Bushfire Survival Plan (BSP), including emergency procedures, the identification of evacuation triggers and potential reduction of operating hours or closures on days of heightened fire danger,
  - Training and practicing of emergency procedures for all staff, and
  - Measures to minimise fire risk, including landscaping and vegetation management to reduce fire risk.

- A **Fauna and Flora Assessment and Management Plan**, (including a **Native Vegetation Clearance Data Report**) prepared by an Accredited Consultant approved by the Native Vegetation Council. The assessment should undertake a survey of the vegetation and fauna (including EPBC Act Listed threatened species and communities), detail compliance with the impact mitigation hierarchy and describe how the significant environmental benefit would be achieved. A landscaping plan should include including details about vegetation clearance and maintenance around the accommodation

pods and the main building complex and any clearance required due to other structures / access arrangements (including on Council land).

- A **Transport and Access Impact Assessment** prepared by a suitably qualified traffic and access engineer. The assessment should evaluate current and proposed access arrangements including the effect on the arterial road network and car parking, as well as vehicle interface with the local road network. The impacts on the arterial and local road networks are to be considered to an extent which encompasses Stirling Township. Any assessment must include the traffic and access impact for the construction period as well as any ongoing operations and maintenance including details of the transport vehicle sizes and movements outside of normal gazetted heavy vehicles and how any impacts will be minimised and / or mitigated.

- A **Cultural Heritage Management Plan** (CHMP) prepared by an appropriately qualified heritage expert that includes an assessment of the potential impact of the proposal on First Nation peoples cultures and the wider community heritage. The CHMP must outline measures to be taken before, during and after the proposed development to manage and protect First Nation peoples cultural and the wider community heritage. The CHMP should include a cultural heritage survey identifying areas of First Nation people's significance. This survey should identify any archaeological, anthropological or historical sites, or sites of significance according to First Nation people's tradition.

- A **Heritage Impact Statement** (HIS) prepared by an appropriately qualified heritage expert, that includes an assessment of the Local Heritage Place including research to review and confirm the extent of listing, detailed description of the proposed conservation, reconstruction and new work to the Local Heritage Place (including proposed adjacent built form elements or additional services infrastructure), and the heritage impact of these works on the heritage and cultural values of the Local Heritage Place.

- A **Waste Management and Minimisation Plan** (for demolition, construction and operation) detailing the sources of waste (including spoil and removed vegetation), the location of waste management storage areas (including the separation of waste streams, such as recyclables, hard waste and e-waste) and disposal facilities located on site or within laydown areas and provide details of how these facilities will be serviced. The plan should assess the impact on the local waste management and disposal facilities. The plan should also document the decommissioning and rehabilitation strategy for the development.

- A **Soil Erosion and Drainage Management Plan** which describes the site characteristics, including the existing topography and stormwater runoff characteristics. The plan should describe the measures proposed to prevent soil erosion and contaminated runoff from leaving the site during construction (including any opportunities for retention and reuse). The Plan should describe the drainage management to prevent contamination of groundwater on site.

- A **Surface Water Management Plan**, which describes proposed activities on water resources such as watercourses, lakes, floodplains, springs, wetlands, waterholes and surface water storage structures such as the construction, modification or removal of dams or basins. The plan should detail how these activities will be carried out, materials to be used (including specifications) and machinery/tools required to carry out the works. The anticipated impacts of these activities and the measures and actions proposed to reduce or mitigate the impact on the stability and integrity of the water resources are to be addressed. These activities must meet requirements as set out in the Hills and Fleurieu Water Affecting Activity Control Policy and or Western Mount Lofty Ranges Water Allocation Plan. Information about WAA including specific examples can be found here: https://www.landscape.sa.gov.au/hf/water/managing-water/water-affecting-activities

- **Integrated Water Management Plan** (IWMP) that incorporates measures and actions to address (but not be limited to) the following issues:

- Site plan identifying all water related features and infrastructure for the storage, treatment and/or reuse of potable water, stormwater, wastewater and irrigation water.
- Water balance information, including the total water needs of all components of the development.
- Total wastewater generation from the development (based on projected wastewater volumes per day).
- A description of how all wastewater is collected, managed and relayed/discharged to the Adelaide Hills Council CWMS connection point on Golflinks Road (including computations to demonstrate acceptable control discharge to the effluent treatment facility at Stirling and details of any upgrades to the system that may be required).
- Predicted stormwater generation volumes and details of stormwater quality improvements, including the location and sizing of bio-retention swales and basins, anticipated quality improvements and details of any other proposed stormwater quality treatment features.
- Contingencies to address any detrimental effects, especially on local hydrology.

- **Construction Environmental Management Plan** (CEMP) that documents proposed construction phase measures to minimise potential impacts on the environment, including hazards and risks, proposed mitigation measures and any residual risks and incorporates measures and actions to address (but not be limited to) the following matters:
  - Construction noise management (e.g. from machinery noise),
  - Air emissions (e.g. from dust),
  - Waste Management strategies detailing the collection, storage and disposal of construction waste to comply with the Environment Protection (Waste to Resources) Policy 2010,
  - Dilapidation report,
  - Construction wastewater collection and treatment to ensure that the general obligations of the Environment Protection (Water Quality) Policy 2015 and SA Public Health (Wastewater) Regulations 2013 are met,
  - Prevention of soil erosion and treatment of polluted stormwater prior to discharge from the site (including any opportunities for retention and reuse),
  - Communication and complaint resolution,
  - Emergency and evacuation procedures including a Fire Management Plan, prepared in consultation with the Country Fire Service, and
  - Monitoring program to monitor those items listed above.

- An **Operational Environmental Management Plan** (OEMP) that describes how operations, will be managed to mitigate negative impacts to the environment, and public health and the amenity, and how any ongoing environmental management requirements will be implemented and monitored.

- Details of **Site Services and Infrastructure** including utility services (water, gas, electricity, domestic and commercial / industrial wastewater treatment and disposal, drainage, trenches or conduits); location of ground and roof plant and equipment (fire booster; electricity transformer; air conditioning; solar panels etc.).

- **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 because of the proposed development.

- **Social Impact Statement** that describes the characteristics and demographics of the local and regional community (including neighbouring land owners and land uses) and the impacts on affected groups of people (such as their way of life, life chances, health and culture).

Sources of Information

- All sources of information (e.g. reference documents, literature services, research projects, authorities consulted) should be fully referenced, and reference should be made to any

uncertainties in knowledge. Where judgements are made, or opinions given, these need to be clearly identified as such, and the basis on which these judgements or opinions are made need to be justified. The expertise of those making the judgements including the qualifications of consultants and authorities should also be provided.

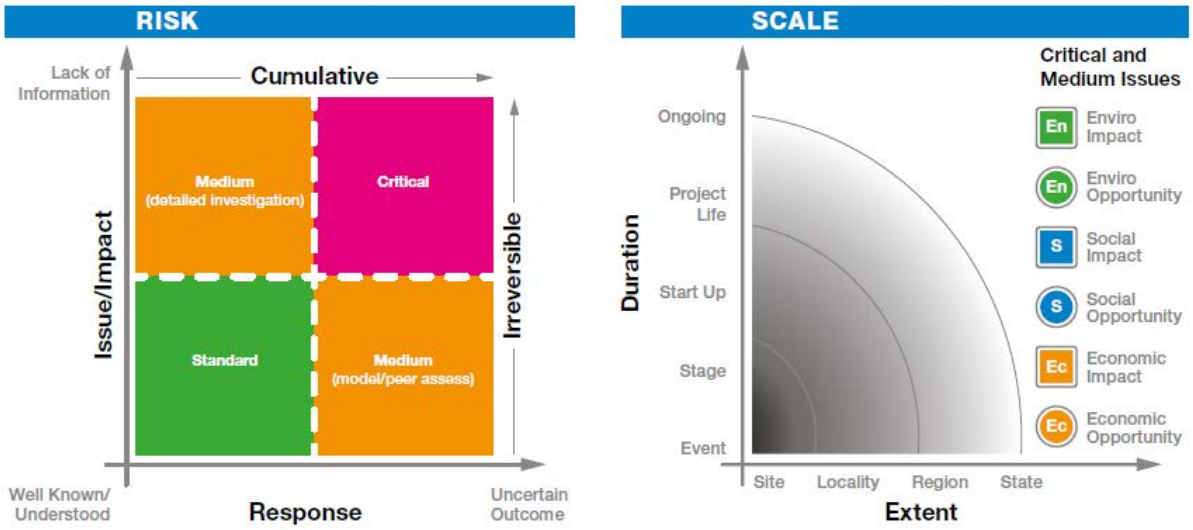
- Any technical and additional information relevant to the DR that is not included in the text should be included in appendices.

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 proponent: 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 requirement includes a description of the issue/impact and a description of the action or investigation needed.

To assist with the assessment of the DR the proponent is requested to provide a table (as an appendix) that cross references each Guideline requirement (action or investigation needed) with the relevant section and page of the DR.

NOTE: The investigative requirements of the DR do not negate the need for the proponent to obtain all necessary licences, permits and/or management plans prior to undertaking any investigations or works in relation to this DR. It also does not negate the need for the proponent to comply with any legislative obligations or duty of care under the relevant legislation.

			Risk		Scale		Level of assessment
No	Issue/Impact	Description	Issue/Impact	Response	Duration	Extent	
1.	Tourism and economic development and job creation	The proposal will have an impact on the local and State's economy during construction and operations and may result in immediate and long terms effects on residents, businesses and surrounding uses. The development will create jobs for various occupations associated with the golf course and its upkeep, tourist accommodation, functions, events and also during construction. The proponent advises that food, services and employment opportunities will be sourced locally, where possible. From an economic perspective the proponent has advised the total capital expenditure for the proposal is some $35 million. In addition there will be broader economic benefits to the local Adelaide Hills community	The proposal has the potential to significantly boost the local and state economy through local, regional, interstate and potentially international tourism. The proposal will have a positive impact in terms of job creation from an ongoing perspective and during construction. The proposal will be ancillary to surrounding tourist accommodation.	Demonstration of how the proposal is likely to have a positive economic impact on the locality and for job creation during construction and ongoing and for the locality community (spin-off from increased visitors to the region), including how it will be complementary to existing tourist accommodation offerings in close proximity	Ongoing	Locality, Regional and State	The proposal will attract local, regional, interstate and international visitors. This has the potential to boost the local economy, particularly if local produce and employment is sourced =**CRITICAL**
2.	Design / Visual amenity	The proposed development is located in the Mt Lofty Ranges and requires a bespoke approach to the siting, design and architecture in response to the scenic value and natural character of the area.	The need for a high quality design that is complementary to the locality and maximising views to and from the buildings is well understood. The contextual setting in a peri-urban landscape is well understood. Further consideration and details will be required on aspects of the architectural response and impacts on surrounding sensitive land uses.	The proponent has engaged in the Design Review process and the design is well progressed. Further design resolution is required as the development progresses. In addition to the elevations and site plans the documentation should include an analysis of the visual impact (near and distant views). In principle support is given for robust and genuine materials – the description of the final selection of materials and finishes will be required in the report.	Ongoing	Locality and Regional	The issue is well understood but the response requires further design resolution with the need for further assessment on the bespoke requirements. The extent of the impacts beyond the subject site requires assessment. = **CRITICAL**
3.	Landscaping	The proposal is for a high quality hospitality and recreation focused development that will celebrate and enhance the landscape setting. This	Integration with the landscape into the built form to minimise the impact of the architectural response to the land.	Continued collaboration with the local landscape architect is required to ensure the landscape and natural environment informs all aspects of	Ongoing	Locality and Regional	The response requires further design resolution with the need for further assessment on the

			Risk		Scale		Level of assessment
No	Issue/Impact	Description	Issue/Impact	Response	Duration	Extent	
		development presents a significant opportunity due to its location and unique landscape setting and has the potential to become a leading precedent for developments of this kind.	Connectivity within and beyond the site should be explored, including connections with existing walking trails.	the architectural response to minimise the impact of an architectural response to the land.			integration of the development into the landscape. = **CRITICAL**
4.	Traffic and access	The proposal significantly increases vehicle movements to the site, with the increase in visitors and employees and service vehicles. The proposal includes a 200 space car park. The proposal also includes a function facility and the occasional large events which will increase demand for vehicular access. The overall traffic to the site will include different modes of transport – including cars, share vehicles, coaches, bicycles and the like. The proposal also involves the transportation of infrastructure and construction materials to site.	The site is located near residential properties with access from a local road to the golf course, which also provides access for residents. These residents may be impacted from the increase in traffic movement as a result of the development – this includes normal operation of the golf course, functions and special events. Potential issues with the movement strategy have been identified with the potential for conflicts between back of house and front of house functions. Traffic may introduce impacts to the arterial and local road network, including the delivery of materials and infrastructure. There are likely to be traffic impacts during construction.	A detailed traffic assessment is required for the immediate locality and the wider area. Traffic management strategies will be required to be put in place. This includes everyday operation of the Golf course, functions and special events. The conflicts with the movement strategy between users should be further explored and be addressed in the design strategy. A bushfire management strategy will also be required, in the case of an emergency.	Ongoing and during construction	Locality and Regional	The proposal requires ongoing access for visitors and employees to the site and also for the transportation of infrastructure and construction materials and ongoing access for materials and workforce attendance. The site is located within a high Bushfire area and traffic management during emergencies is required. = **CRITICAL**
5.	Bushfire	The proposed development is located within a High Bushfire Risk area and in close proximity to hazardous vegetation, including Mount George Conservation Park.	The CFS needs to undertake a Bushfire Attack Level (BAL) assessment of the proposed development. The main hotel complex and the tourist accommodation pods are at high risk of being impacted by bushfires unless mitigation strategies, including siting away from hazardous vegetation and landscaping and vegetation clearance to reduce bushfire risk are introduced.	The current documents provide limited detail of risk assessment and mitigation strategies. Suitable separation distances are needed from the forest vegetation east, south east and south of the main hotel complex to achieve BAL 29, BAL 19 or BAL 12.5. A change to the siting of the building and/or vegetation clearance may be needed to achieve a minimum requirement of BAL 29 (BAL 12.5 is the preferred option). Plans clearly need to outline these separation distances and how they will be achieved.	Ongoing	Locality and Regional	The issue is well understood and advice provided by the SA CFS will need to be addressed to lower the risk to the development. Ongoing and final assessment of bushfire hazards and mitigation strategies is required. = **CRITICAL**

			Risk		Scale		Level of assessment
No	Issue/Impact	Description	Issue/Impact	Response	Duration	Extent	
				The current landscaping plan does not address vegetation clearance and landscaping requirements to lower the bushfire risk for the accommodation pods.			
6.	Conservation	To the east of the proposal is the Mount George Conservation Park, the traditional lands of the Peramangk Peoples.	Conservation values of the Park are to be maintained and native fauna accessing the golf course to be protected. Aboriginal culture is to be respected.	Details will be required of any impacts on the conservation values of the area, including the introduction of exotic plant or animal species.	Ongoing	Locality, Regional, State	There is a potential impact on the Conservation Park and habitat for native fauna. A final report is required identifying potential impacts against the EPBC for consideration. There is a need for further assessment. = **MEDIUM**
7.	Environmental Sustainability	The proposed development is located in a highly valued rural landscape where environmental sustainability is important	The need for a high level of environmental sustainability to showcase ESD initiatives in a natural setting.	A variety of ESD initiatives should be implement into the design. The proponent should showcase the project's sustainability ambitions in a bold and distinctive manner.	Ongoing	Locality, Regional and State	The issue is well understood but the response requires further resolution and consideration of ESD initiatives. = **MEDIUM**
8.	Land Use	The proposal will have an impact on surrounding land owners and uses, in the immediate and long term due to the intensification of the land use and introduction of tourist accommodation.	The proposal introduces land uses which are compatible with the Planning and Design Code provisions	The issues are well understood and need to be outlined in the report – including visual amenity, noise, traffic, and lighting.	Ongoing	Locality and Regional	The report should outline the impacts of the intensification of the land use on the land. **=MEDIUM**
9.	Native Vegetation	The removal of native vegetation is proposed (although intended to be kept to a minimum), including possibly threatened species and ecological communities.	There are potentially significant impacts on native vegetation, including threatened species and ecological communities through the clearance of vegetation and habitat and disturbance and edge effects. The interaction of the development in relation to the Native Vegetation Heritage Agreement is required to be detailed.	A detailed description is required of the quantity and condition of native vegetation proposed to be cleared, the effect on habitat and conservation values (including any changes to the Native Vegetation Heritage Agreement).	During construction	Locality, Regional and State and potentially National	The receiving natural environment is potentially negatively impacted by the development. Need for further assessment on the location, extent, condition and impact on native vegetation and habitat (especially threatened species and ecological communities). Need for investigation of offset opportunities. = **MEDIUM**
10.	Native Fauna	The site is located in a peri-urban area and adjacent the Mt George Conservation Park. The proposal involves significant construction and also clearance of native	The proposal involves construction of new buildings and clearance of native vegetation. Particularly given its peri-urban location and being adjacent a Conservation Park there is the potential	An analysis of the impacts on native Fauna is required, including under the EPBC Act.	During construction and ongoing	Local, Regional and State and potentially National	The receiving natural environment is potentially negatively impacted by the development. Need for further assessment

			Risk		Scale		Level of assessment
No	Issue/Impact	Description	Issue/Impact	Response	Duration	Extent	
		vegetation which has the potential to impact on native fauna and habitat.	to impact on native fauna and habitat and potentially threatened species, including Chestnut-rumped Heathwren, White-throated Needletail, South Australian Bassian Thrush, Southern Brown Bandicoot. Greater visitation levels to the site would increase human disturbance to local native fauna.				**= MEDIUM**
11.	Flooding and Water Quality	The proposed development is located within the Mount Lofty Ranges Catchment (Area 2) Overlay, which seeks to ensure that development has a neutral or beneficial effect on the water quality harvested from secondary reservoirs or diversion weir catchments. The Hazards (Flooding – Evidence –Required) Overlay seeks the management of potential flooding of infrastructure and buildings.	The issues are well understood. The site is located in close proximity to a watercourse and high flood prone area. The proposal includes construction of new habitable buildings and infrastructure which could be impacted during times of flooding. The design, location and siting of buildings will need to take this into account as well as any mitigation measures required.	The current plan does not provide a detailed description of the various effects on water quality and methods for managing this. Demonstration of how stormwater and wastewater/effluent will be managed will be required. Details will be required to address the land slope (not exceeding 20%), rainwater tanks of 1000L and swales that divert clean stormwater away from areas where it could be contaminated. Further investigations are required to understand the stability, erosion levels of the Cox Creek waterway running through the site and appropriate erosion control measures.	During construction and ongoing.	Locality, Regional and State	The receiving environment is potentially negatively impacted by the development. Need for further assessment and offset opportunities. **= MEDIUM**
12.	Surface water	The proposed development is located within the Onkaparinga (reservoir) catchment. Cox creek (stream order 4) runs through the development area. Creek restoration and crossing work has been identified. There are two off-stream surface water sutures on site. There are policies and principles related to capture, extraction	There is potential for impacts on the integrity and geomorphology of the watercourse and surface water storage structures (i.e. dam or lake) and on downstream flows from both an ecological or downstream community perspective.	The current plan does not provide detailed information to enable an assessment as to whether any of these adverse outcomes are likely to result from the development. Detailed information must include the following: how these activities will be carried out, materials to be used (including specifications) and machinery/tools required to carry out the works. The anticipated	During construction and ongoing.	Locality and Regional	There is potential impacts on receiving water resources. Proposed development needs to meet the requirements set out in the Hills and Fleurieu Water Affecting Activity Control Policy and Western Mount Lofty Ranges Water Allocation plan. There is a need for further assessment. **= MEDIUM**

			Risk		Scale		Level of assessment
No	Issue/Impact	Description	Issue/Impact	Response	Duration	Extent	
		and diversion of surface water resources, particular those catchments upstream from reservoirs.		impacts of these activities and the measures and actions proposed to reduce or mitigate the impact on the stability and integrity of the water resources must be addressed.			
13.	Heritage – First Nations people	The proposed development has the potential to impact on sites and places of Indigenous heritage through disturbance during construction.	The proposed development may have impacts heritage sites, objects and remains of the First nation people.	A detailed description on existing First nation people's heritage or management of such heritage matters that may arise during the construction phase.	Construction	Locality and State, Regional	Investigations are required to be undertaken and more information to be provided. = **MEDIUM**
14.	Heritage - European	The site contains a Local Heritage Place and proposes partial demolition, restoration, conservation, reuse and new built form elements adjacent the Local Heritage Place	The proposal will have a material impact on a Local Heritage Place.	The proponent is aware of the issue and requirements. A Heritage Impact Statement will be required on the works affecting the heritage place – and associated plans and documentation (prior to any approval for this component of works).	Construction and operation	Locality	A Heritage Impact Statement and plans, elevations and materials schedule will be required. **=MEDIUM**
15.	Waste Management – Stormwater and Construction and Operational Environmental Management	The proposed development would require a range of impacts to be minimised, mitigated and monitored through an environmental management plan framework across the construction and operational phases.	The potential impacts would need to be adequately addressed to mitigate adverse impacts.	The current document provides limited information on the proposed construction and operational management techniques and measures.	During construction and ongoing.	Locality and Regional	More information is required. = **STANDARD**
16.	Effects on the physical Environment	The site is located in a sensitive area, with a sloping topography. The proposal is likely to result in exaction and fill on the land which will have an impact on the natural landform.	The potential impacts would need to be adequately detailed and addressed to mitigate adverse impacts on the natural landform.	A description of any works which will affect the natural topography of the land and mitigation measures.	Construction and ongoing	Locality and Regional	Details are to be provided in the report. **=STANDARD**
17.	Environment Food Production Area (EFPA)	The Site is located within the EFPA where productive agricultural land is expected to be retained for such land uses and the land cannot be subdivided for residential purposes.	The site has an existing non-agricultural land use. Land division for residential purposes will not be allowed.	The intention of any further subdivisions should be identified in the report.	Ongoing	Locality, Regional and State	Details are to be provided in the report. **=STANDARD**

State Assessment Requirements

CRITICAL ASSESSMENT

1. Tourism and Economic Development / Employment and Job Creation

Guideline 1: The proposal will result in significant job creation and has the potential to be an economic stimulus for the area. The proposal will have an impact on the local and State's economy during construction and operations and may result in immediate and long terms effects on residents, businesses and surrounding uses.

1.1 *Identify any potential economic effects on tourism, recreation, and any secondary economic effects, including the potential to attract value add development and commercial ventures. Describe the positive and negative effects of this, including the current situation.*

1.2 *Describe potential employment opportunities and the expected impacts on the local workforce during construction and operational stages. In particular the proposal's anticipated effect on State and local investment and the region as a whole, employment generation and flow-on impacts on local business and also effects on accommodation supply and demand.*

1.3 *Describe how the proposal aligns with the State tourism organisation (SATC) to ensure that positive outcomes are being delivered.*

2 Design / Visual Amenity

Guideline 2: The proposal is for tourist accommodation, functions and recreation focussed land uses with high visual amenity and in the Mt Lofty Ranges, in a rural landscaped setting adjacent the Mount George Conservation Park. Any development on the site requires a bespoke approach to the siting, design and architecture in response to the scenic value and natural character of the area.

2.1 *Evaluate the proposal against the Office for Design and Architecture SA's Principles of Good Design, including input from the Government Architect through the State Design Review process. Demonstrate how the development responds to the six principles: 'Context, Inclusive, Durable, Value, Performance and Sustainable.'*

2.2 *Demonstrate that the development provides a high quality design that complements the natural landscaped setting and surrounding locality.*

2.3 *Describe the proximity of the proposed structures the nearest dwellings and describe any potential impacts of the proposal on quality of lifestyle and how the visual landscape and amenity will be altered by the development, for residents and visitors, for both near and distant views.*

2.4 *Describe the effects of the proposal on the visual amenity and landscape quality for residents, visitors and tourists and views from nearby roads. Refer to construction, operation, maintenance aspects of the proposal.*

2.5 *Demonstrate that the development will result in a high quality arrival experience in relation to movement and legibility, materiality, seamless integration of landscape and architecture, built form massing, architectural expression and extent of car parking.*

2.6 *Identify the strategies undertaken to reduce the built form massing to ensure views to the surrounding tree canopy from key pedestrian viewpoints are maintained.*

2.7 *Buildings should be designed and sited to manage visual impacts. Provide visualisations that demonstrate the approach to the development from the elevated position of the main Golflinks*

Road roadway, and from the Heysen Trail and Cox Creek dam to demonstrate how the development sits within the landscape and the effective integration of landscape and architecture.

2.8 *Provide a detailed schedule of external materials, finishes and colours, supported by a physical materials sample board to demonstrate the commitment to materials that are robust and genuine.*

2.9 *Demonstrate the guest movement strategy within the site, including access for People with Restricted Mobility.*

2.10 *Demonstrate the fire and life safety and egress strategy for each of the building elements.*

2.11 *Describe any community consultation processes conducted by the proponent for the proposal and indicate community attitudes towards the proposal, where identified.*

3. Landscaping

Guideline 3: The proposal is for a high quality hospitality and recreation focused development that will celebrate and enhance the landscape setting and its high quality integration with the built form is important. This development presents a significant opportunity due to its location and unique landscape setting and has the potential to become a leading precedent for developments of this kind.

3.1 *Describe the nature and condition of the existing physical environment in the proposal's environs, including reference to geology, geomorphology, soils, hydrology and atmosphere.*

3.2 *Provide a detailed landscaping plan that includes surface and edge treatments, seating and platform elements, lighting, tree and planting selections and size, wayfinding, retaining walls, and proposed restoration works to Cox Creek.*

3.3 *Provide details of the interfaces and demonstrate how the landscape integrates and merges into the built form to minimise the impact of the architectural response to the land.*

3.4 *Outline mitigation measures and their likely effectiveness in minimising or avoiding disturbance to the physical environment (including surface and underground waters) during construction and maintenance.*

4. Traffic and Access

Guideline 4: The proposal incorporates a variety of land uses including an upgrade to the existing 18-hole recreational golf course and construction of new tourist accommodation, restaurant, function facility and special events, which will significantly increase vehicle movements to the site. The proposal includes a 200 space car park and will also have a number of service vehicles accessing the site. Emergency service vehicles will require safe and convenient access to the site, especially taking into consideration CFS vehicles, as this is a high bushfire risk area.

4.1 *Describe the existing transport and access arrangements to and around the site, including access from the arterial and local road network, private roads and gated areas. Detail the existing and proposed road surface treatments and traffic control devises (line marking etc) and detail any proposed road upgrades / new roads and egress points.*

4.2 *Identify all vehicle types required to utilise the existing and any proposed new access routes, specifically the heavy vehicles anticipated. Identify any road surface upgrades required as a result of the development and any heavy vehicle movements (including over-size/over-mass) that require approval through the National Heavy Vehicle Regulator.*

4.3 *Provide details of the site-wide movement strategy in relation to servicing, operations, traffic, legibility of front and back of house areas, with the view to providing discrete servicing and a seamless and welcoming guest experience.*

4.4 *Provide confirmation of waste storage locations and transfer pathways with consideration given to amenity impacts – ie location of bin rooms relative to guest arrival spaces.*

4.5 *Provide confirmation of the adequacy of Back of House facilities informed by the hotel operator/consultant and the technical and operational aspects of the development.*

4.6 *Undertake a Transport Assessment to determine transport impacts (including traffic impacts on the local and arterial road network) and measures to manage and / or mitigate the impacts during the construction and operational phases. The impacts on the arterial and local road networks are to be considered to an extent which encompasses Stirling Township.*

4.7 *Identify any potential effects of construction traffic including noise and dust and associated mitigation measures.*

4.8 *Demonstrate emergency service vehicle access to the site and manoeuvrability.*

Bushfire Hazard

Guideline 5: The site is located within a high bushfire area and development is to be sited and designed to minimise the threat and impact of bushfires on life and property. Buildings and structures should be located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

5.1 *Evaluate and identify any bushfire risks on the site, in particular how risks from bushfire will be minimised with regards to the potential for uncontrolled bushfire events, high levels and exposure to ember attack, impact from burning debris, radiant heat, likelihood and direct exposure to flames from a fire front.*

5.2 *Provide an outline of the bushfire management strategy and details of the access arrangements for emergency service vehicles (to achieve SA CFS requirements), including road construction for fire-fighting vehicles/ turning options, location of firefighting water and outlets, (including any bushfire protection systems comprising firefighting equipment, all-weather hardstands, firehose reels and pumps). The bushfire strategy should also include the development of a bushfire survival plan, including triggers for evacuation and/or closure or reduction of business hours and the transportation of guests and staff.*

5.3 *Explain how the buildings and structures will be designed, configured, sited and the use of materials in order to reduce the impact of bushfire (i.e. buildings should reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of buildings on stilts and located on flatter sites and away from vegetated areas that pose an unacceptable bushfire risk).*

5.4 *Address vegetation clearance and landscaping needed to mitigate the bushfire risk, particularly around the tourist accommodation pods and to the east, south-east of the main hotel complex.*

MEDIUM ASSESSMENT

Conservation

Guideline 6: The proposal is in an area which has high conservation value being adjacent the Mount George Conservation Park, the traditional lands of the Peramangk Peoples.

6.1 *Identify the potential effects and measures to avoid and or mitigate the proposal on the local, regional, state or national conservation status of individual species and vegetation communities during both construction and maintenance (including species listed in the SA National Parks and Wildlife Act 1972 and the Commonwealth Environment Protection Biodiversity Conservation Act 1999).*

6.2 *Identify the potential effects and measures to avoid and or mitigate the proposal on the local, regional, state or national conservation status of sites, objects and areas of significance to First Nations people during both construction and operation.*

6.3 *Describe the volume and source of cut and fill required for all proposed built form and associated works, including access tracks, permanent and temporary structures, and the effect on the natural topography of the site.*

6.4 *Identify any exotic plant or animal species that may have a risk of spreading and mitigation measures.*

Environmental Sustainability

Guideline 7: The proposed development comprises built form in a highly valued landscaped rural setting. Environmentally Sustainable Design (ESD) measures, consistent with the Planning and Design Code should be achieved - to maximise natural sunlight access and ventilation, maximise passive environmental performance and minimise energy consumption and reliance on mechanical cooling and heating. Tourism development comprising multiple accommodation is expected to be clustered to minimise environmental and contextual impact.

7.1 *Provide details of the Environmentally Sustainable Design (ESD) techniques proposed for the development including holistic solutions to building performance and services. Demonstrate if and how the development achieves the following:*

7.1.1 incorporates integrated passive design principles and climate-responsive techniques and features such as building and window orientation, use of eaves, verandahs and shading structures, water harvesting, at ground landscaping, green walls, green roofs and photovoltaic cells.

7.1.2 is sited and designed to maximise passive environmental performance and minimise energy consumption and reliance on mechanical systems, such as heating and cooling.

7.1.3 is sited, oriented and designed to maximise natural sunlight access and ventilation to main activity areas, habitable rooms, common areas and open space.

7.2 *Provide details on the roofscapes including external materials selection, facade systems and green infrastructure in collaboration with landscape, structural and sustainability consultants to ensure delivery of the design intent*

Land use

Guideline 8: The proposal will have an impact on surrounding land owners and uses, in the immediate and long term due to the intensification of the land use and introduction of tourist accommodation. The land use and interface issues will require consideration, such as visual amenity, traffic, noise.

8.1 *Identify the existing land uses of the subject site and surrounds.*

8.2 *Describe the new land uses proposed for the subject site, including the general break down of floor areas.*

8.3 *Evaluate the compatibility of the land use with the Planning and Design Code provisions. This includes the recreation zone, relevant overlays and general provisions.*

8.4 *Identify the level of interference to landowners, land uses and activities in the immediate and surrounding environs and outline any mitigation measures to alleviate or avoid impacts on land owners and land uses. This includes traffic, noise, light spill, hours, likely hours of operation for functions and special events/live music, odours and any other interface issues.*

8.5 *Describe the implications, if any, of securing any easements.*

Native Vegetation

Guideline 9: The proposed development is located on land which currently holds significant stands of native vegetation, some requiring removal to facilitate the proposed construction. Development should avoid delicate or environmentally sensitive areas, including areas of native vegetation. Wherever possible areas of native vegetation are to be protected, retained and restored in order to sustain biodiversity, threatened species and vegetation communities, fauna habitat, ecosystem services, carbon storage and amenity values.

9.1 *Describe the location, condition and significance of native vegetation on the subject site, including individual species and communities. Include reference to areas that have Heritage Agreements under the* Native Vegetation Act 1991 *and any proposed alterations to or implications for the Heritage Agreement.*

9.2 *Identify any threatened plant species listed under the EPBC Act, such as Osborn's Eyebright (Euphrasia collina sibsp. Osbornii), Clover Glycine, Plum Leek-orchid).*

9.3 *Describe the location, condition and significance of native vegetation species and communities that may need to be cleared or disturbed during both the construction and operation phases. This should include clearing for all buildings, structures, exclusion zones and access arrangements.*

9.4 *Identify significant wildlife habitat and movement corridors.*

9.5 *Describe the potential impacts on native vegetation fragmentation and the ability of communities or individual species to recover, regenerate or be rehabilitated during all phases of development.*

9.6 *Identify the habitat value of native vegetation and the potential for habitat fragmentation during both construction and maintenance (and decommissioning). Include a description of the effects of any fragmentation that may occur over the life of the project.*

9.7 *Outline measures to mitigate effects on native vegetation by addressing the mitigation hierarchy, including any compensatory activities in already degraded areas and use of existing easements. Make reference to guidelines produced by the Native Vegetation Council and*

outline the effectiveness of any mitigation measures adopted during both construction and maintenance.

Native Fauna

Guideline 10: The site is located in a peri-urban area, adjacent the Mt George Conservation Park. The proposal involves significant construction and also clearance of native vegetation which has the potential to impact on native fauna and habitat. Greater visitation levels to the site would increase human disturbance to local native fauna.

10.1 *Identify significant wildlife habitat and movement corridors including a description of the location, extent, condition and significance of native fauna populations, including individual species and communities in the proposal's environs and any threatened species, such as chestnut-rumped Heathwren, White-throated Needletail, South Australian Bassian Thrush, Southern Brown Bandicoot.*

10.2 *Identify the effect of the loss of habitat for fauna.*

10.3 *Outline measures to mitigate the effects on native fauna, including any compensatory activities in already degraded areas and use of existing easements.*

Flooding and Water Quality

Guideline 11: The proposed development is located within the Mount Lofty Ranges Catchment (Area 2) Overlay which seeks a neutral or beneficial effect on the water quality harvested from secondary reservoirs or diversion weir catchments. It is also located in the Hazards (Flooding) Overlay where development should adopt a precautionary approach to mitigate potential impacts on people, property, infrastructure and the environment from potential flood risk through the appropriate siting and design of development.

11.1 *Identify any risks and implications of causing or exacerbating land degradation, especially soil erosion.*

11.2 *Identify the potential for pollution (including, but not limited to, sedimentation) of wetlands, watercourses, drainage channels and groundwater (especially at crossing points during construction), including the implications of this pollution and how these impacts will be minimised.*

11.3 *Describe potential changes to hydrology (e.g. drainage patterns or groundwater characteristics), including the implications of these changes and identify major and minor flows.*

11.4 *Identify the potential impacts on people, property, infrastructure and the environment from potential flood risk.*

11.5 *Provide details of how wastewater will be managed to demonstrate that potential adverse impacts on water quality within secondary reservoir and weir catchment areas are minimised and surface and groundwater is protected from wastewater discharge pollution.*

11.6 *Provide detail of any change to the watercourse and its bed, banks, wetlands and floodplains and any works that will interfere with existing hydrology.*

11.7 *Provide details of how stormwater will be managed during operation and the incorporation of Water Sensitive Urban Design (WSUD) principles. The above matters should be addressed in stormwater management plans.*

Surface Water

Guideline 12: *Part 8 of the Landscape South Australia Act 2019 (LSA Act) defines provisions for the conservation, management or protection of water resources. The Hills and Fleurieu Landscape Board specifically manage surface water resources, including activities in and around watercourses, lakes and dams. The Hills and Fleurieu Water Affecting Activities Control Policy and the relevant Water Allocation Plans set out the principles for managing WAA. The subject site is located within the Onkaparinga catchment. The development has the potential to impact water resources identified on site.*

12.1 *Provide detail of any proposed water affecting activities including: description of the proposed activity, materials to be used (and specifications); how the works will be undertaken and machinery/tools to be used to complete the work, construction specifications and stormwater design plans for underground pipe systems and detention and retention systems.*

12.2 *Provide details on identified environmental risks during and after construction and provide measures and actions to minimise and or mitigate the identified risks.*

Heritage – First Nations People

Guideline 13: The proposed development has the potential to impact on sites / locations of First Nation people through disturbance during construction.

13.1 *Identify any effects sites of archaeological or anthropological significance for First Nation people (including but not limited to those listed in the Register of the National Estate and the SA Register of Aboriginal Sites and Objects). Indicate any consultation with local Aboriginal organisations that have an in interest in the area.*

13.2 *Outline measures adopted to avoid or minimise impacts on sites of archaeological or anthropological significance for First Nations people.*

Heritage – European

Guideline 14: The proposed development has the potential to impact on sites / locations of European heritage through disturbance during construction. The site contains a Local Heritage Place which is proposed for adaptive reuse.

14.1 *Identify any effects on post European settlement sites of archaeological or anthropological significance (especially but not limited to those listed in the Register of the National Estate, State Heritage Register or Interim List for the State Register and lists of places of local heritage value).*

14.2 *Identify any works affecting the Local Heritage Place on the site and any merits associated with the works (i.e. how the development maintains the heritage and cultural values of the Local Heritage Place through conservation, ongoing use and adaptive reuse).*

14.3 *Provide details of proposed conservation, reconstruction and new work to the Local Heritage Place (including proposed adjacent built form elements or additional services infrastructure), and demonstrate how the works, materials and colours are either consistent with or complement the heritage values of the Local Heritage Place.*

STANDARD ASSESSMENT

Waste Management –/ Construction Environment Management Plan

Guideline 15: The proposed development would require a range of impacts to be minimised, mitigated and monitored through an environmental management plan framework across the construction and operational phases.

15.1 *Document the development's construction techniques, methodology, including site preparation works, activities, timeframes and staging (if proposed). Detail the proposed management arrangements to mitigate the negative environmental, public health and amenity impacts and subsequent implementation of these procedures.*

15.2 *Outline the timing of construction and the time of year it is likely to occur.*

15.3 *Identify the location, extent and details of all infrastructure and site services required on site to support the development including, but not limited, to solar arrays, water tanks, chemical storage, and generators. Detail all utilities to be provided or connecting, including water, gas, electricity, wastewater treatment and disposal, drainage, trenches or conduits.*

15.4 *Prepare a waste management and minimisation plan which documents all waste streams during construction and operation, identifies the location of waste storage areas and disposal facilities. Identify the opportunities for recycling and reuse of equipment and componentry.*

Effects on Physical Environment

Guideline 16: The site is located in a sensitive area, with a sloping topography and the proposal is likely to result in works that affect the natural landform – including excavation and fill on the land and form.

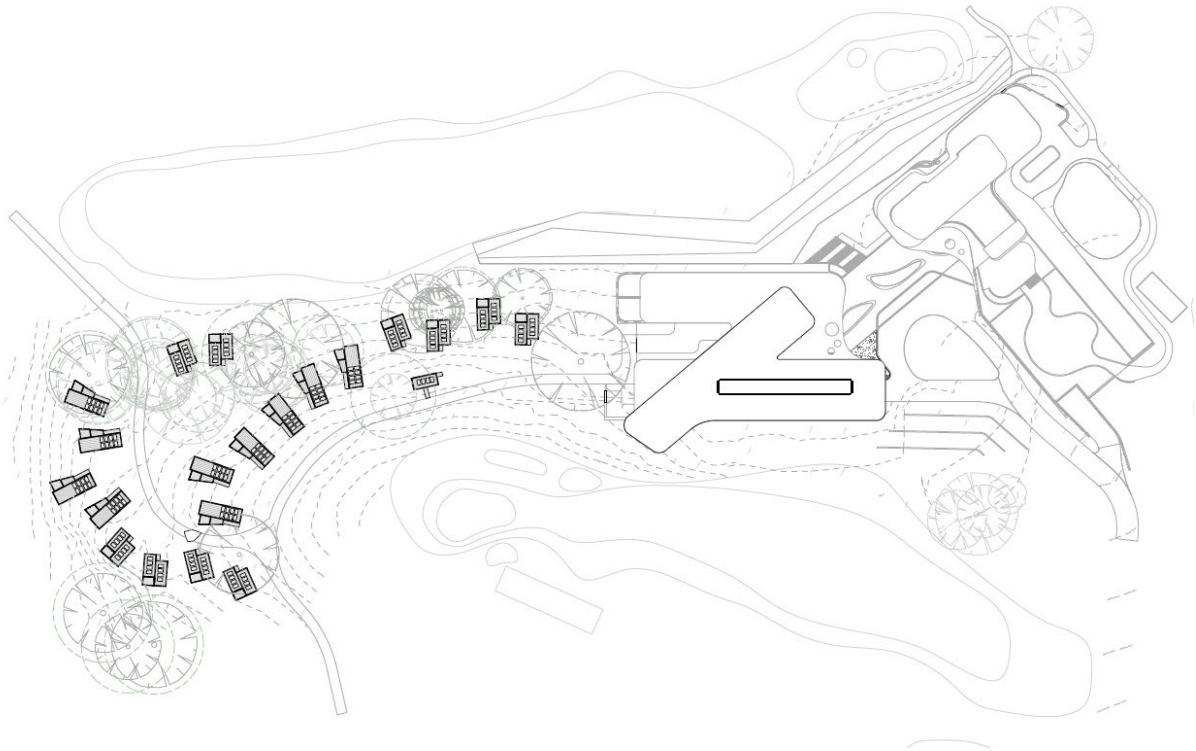
16.1 *Provide details on the proposed works that are likely to impact the natural landform – details of excavation and fill, and the associated impacts (during construction and operation) and mitigation impacts.*

Environment Food Production Area (EFPA)

Guideline 17: The site is within the EFPA where productive agricultural land is expected to be retained for such land uses and the land cannot be subdivided for residential purposes.

17.1 *Provide details of any future land divisions likely to be proposed on the site – given that valuable rural, landscape, environmental and food production areas are to be protected from urban encroachment and no residential land division is permitted.*

APPENDIX 1 – SITE PLAN



APPENDIX 1 – USEFUL DOCUMENTS

Legislation

- *Planning Development and Infrastructure Act, 2016*
- *Planning, Development and Infrastructure (General) Regulations 2017*
- *Development Act 1993*
- *Development Regulations 2008*
- *Environment Protection Act 1993*
- *Native Vegetation Act 1991*
- *Landscape South Australia Act 2019*
- *Native Title Act 1994*
- *Aboriginal Heritage Act 1988*
- *Heritage Places Act 1993*
- *National Parks and Wildlife Act 1972*
- *National Parks and Wildlife (Protected Animals - Marine Mammals) Regulations 2010*
- *SA Public Health (Wastewater) Regulations 2013*

Strategy & Policy

- Planning and Design Code
- State Planning Policies, 2019
- *Environment Protection (Noise) Policy 2007*
- *Environment Protection (Water Quality) Policy 2015*
- *Environment Protection (Air Quality) Policy 2016*
- Hills and Fleurieu Water Affecting Activity Control Policy 2021
- Western Mount Lofty Ranges Water Allocation Plan 2013
- South Australia's Waste Strategy 2020 – 2025, Green Industries SA
- Building Code of Australia

Guidelines

- Guide for applications to clear native vegetation, 2020
- EPA Construction environmental management plans guidelines, 2021
- Office for Design and Architecture SA's (ODASA) Principles of Good Design

Appendix B

Detail Survey - Alexander & Symonds

REV	DATE	DESCRIPTION	CALC	FIELD
0	22.04.2020	INITIAL RELEASE	JTH	JTH

ADDITIONS, AMENDMENTS AND APPROVALS

LEGEND

47.51TK TOP KERB
47.36WT WATER TABLE
45.16FL FLOOR LEVEL
48.12IL INVERT LEVEL
TAP
WATER METER
SPRINKLR / IRRIG VALVE
HYDRANT
DOMESTIC OUTLET
DOWNPIPE
DOMESTIC SUMP
STORMWATER M'HOLE
SEP / GRATING
47.87GU GUTTER LEVEL
47.87UE UNDERSIDE EAVE LEVEL
48.12OH OH WIRE LEVEL
TEL. COMM. PILLAR / PIT
TRAFFIC LIGHT
SIGN / BUS SIGN
LITTER BIN
MAIL BOX / SIGNAL BOX
TICKET MACHINE
ROAD / ELEC. SERVICE
WATER SV / FP
ELEC. / GAS METER
GAS SERVICE
PSM
PEG / TBM
SURVEY MARKS
BOREHOLE
POWER / LIGHT POLE
CABLE MARKER
STOBIE / WOODEN POLE
POST / BOLLARD
SEWER MH / IO / SIP
UNKNOWN POINT / SERVICE
SEWER VENT
EDGE OF VEGETN
ROAD SIGN / HOARD.
TREE / SHRUB
Possible REGULATED / SIGNIFICANT TREE by measurement only (trunk greater than 2.0m circumference). Professional advice from council / arborist required.
SPOON DRAIN
ELEC OVERHEAD
BOTTOM OF BANK
TOP OF BANK
CHANGE OF GRADE
DRAIN
SEWER PIPE UG
TEL. COMM. UG
WATER PIPE UG
BUILDING
WALL
GI BUILDING
CONCRETE
FENCE
GATE

COORDINATE SYSTEM

VERTICAL:	AHD
HORIZONTAL:	GROUND PLANE ORIENTED TO: MGA 2020 ZONE 54
SCALE: GROUND	(CSF = 1.00004942)

ADOPTED STATION & AUTHORITY

PSM 6628/2372	RL:	498.939 SDB
PSM 6628/2370	E:	293981.268 SDB
	N:	6125168.965 SDB

SDB denotes SA Government survey data base values (Dated: 06/ 03 / 2020)

0 2 4 8 12 16 20 m

1:200

ORIGINAL SHEET SIZE A0

Notes:
Property boundaries shown hereon as DCDB have been sourced from the relevant government authority and may be of poor accuracy. DCDB data has been provided for general information only.

CONTOUR INTERVAL:	0.5m min, 2.0m MAJ	
SURVEY:	JTH	APRIL 2020
DRAWN:	JTH	22.04.2020
CHECKED:	MRE	22.04.2020

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+ Construction + Mining +
+ Spatial Information Management +

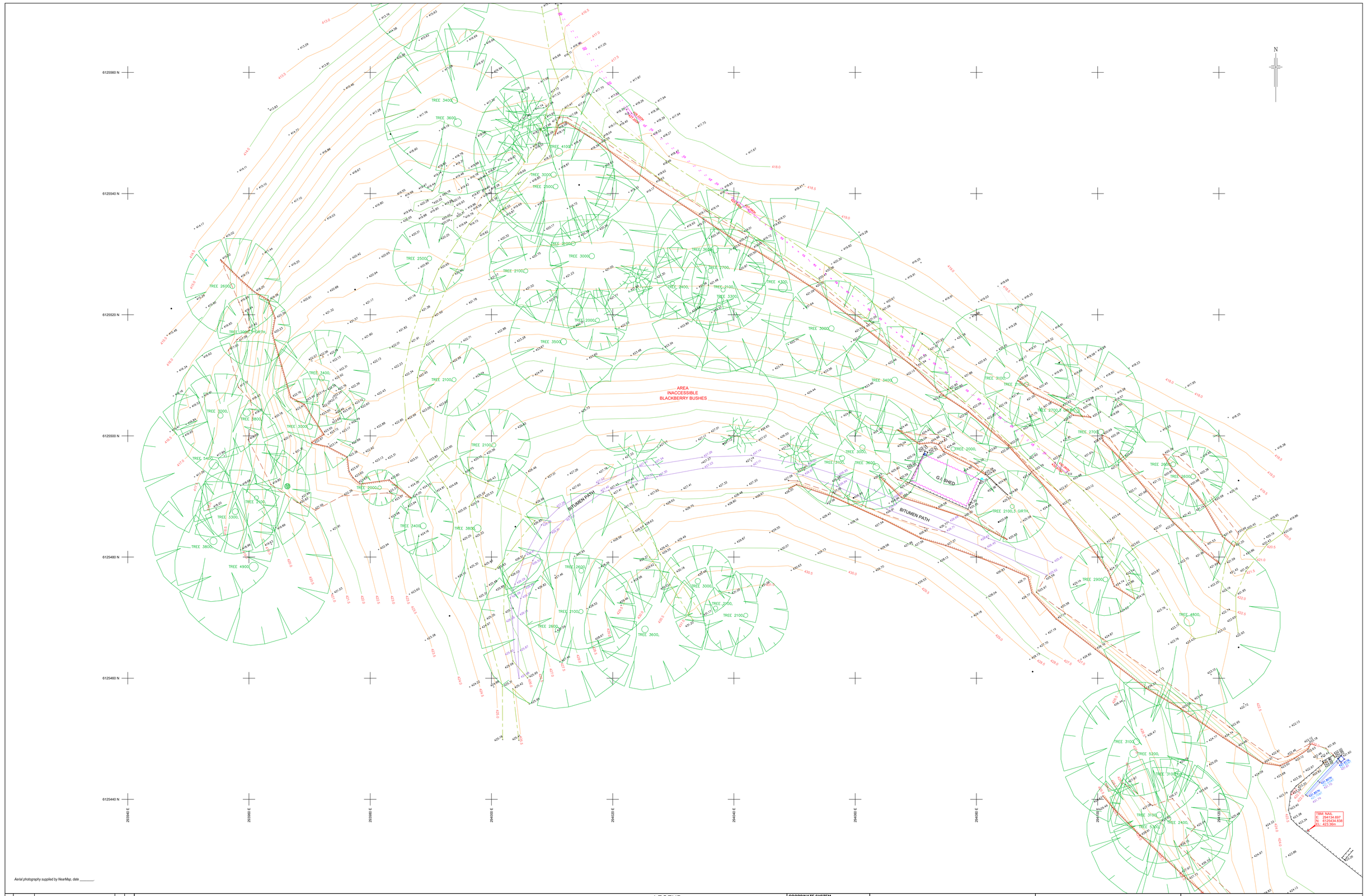
Alexander Symonds Surveying Consultants

DETAIL AND LEVEL SURVEY
STIRLING GOLF CLUB
STIRLING

DRAWING No. A036720 DETAIL

SHEET 1 OF 1

REVISION 0



REV	DATE	DESCRIPTION	CALC	FIELD
ADDITIONS, AMENDMENTS AND APPROVALS				

LEGEND

- 47.517K TOP KERB
- 47.394W WATER TABLE
- 45.18FL FLOOR LEVEL
- 48.12IL INVERT LEVEL
- TAP
- WATER METER
- SPRINKLER / IRRIG VALVE
- HYDRANT
- DOMESTIC OUTLET
- DOWNPIPE
- DOMESTIC SUMP
- STORMWATER MHOLE
- SEP / GRATING
- TEL. COMM. PILLAR / PIT
- TRAFFIC LIGHT
- SIGN / BUS SIGN
- LITTER BIN
- MAIL BOX / SIGNAL BOX
- TICKET MACHINE
- ROAD / ELEC. SERVICE
- WATER SV / FP
- ELEC. / GAS METER
- GAS SERVICE
- PSM / PEG / TBM
- SURVEY MARKS
- BOREHOLE
- POWER / LIGHT POLE
- CABLE MARKER
- STOBIE / WOODEN POLE
- POST / BOLLARD
- SEWER MH / IO / SIP
- UNKNOWN POINT / SERVICE
- Possible REGULATED / SIGNIFICANT TREE by measurement only (trunk greater than 2.0m circumference). Professional advice from council / arborist required.
- EDGE OF VEGETN
- ROAD SIGN / HOARD.
- TREE / SHRUB
- BOTTOM OF BANK
- TOP OF BANK
- CHANGE OF GRADE
- DRAIN
- SEWER PIPE UG
- TEL. COMM. UG
- WATER PIPE UG
- BUILDING
- WALL
- GI BUILDING
- CONCRETE
- FENCE
- GATE

COORDINATE SYSTEM

VERTICAL:	AHD
HORIZONTAL:	GROUND PLANE ORIENTED TO: MGA 2020 ZONE 54
SCALE: GROUND	(CSF = 1.00004942)

ADOPTED STATION & AUTHORITY

PSM 6628/2370	RL:	462.33 SDB
PSM 6628/2370	E:	293981.268 SDB
	N:	6125168.965 SDB

SDB denotes SA Government survey data base values

0 2 4 8 12 16 20 m

1:200

ORIGINAL SHEET SIZE A0

Notes
Property boundaries and easements shown hereon have been compiled from government records and show discrepancies to Certificate of Title dimensions. Boundaries have not been verified by field survey. Construction or design on or near boundaries or easements will require additional survey work.

CONTOUR INTERVAL:	MIN 0.5m MAJ 2.0m	
SURVEY:	DJH	02.06.2021
DRAWN:	DJH	09.06.2021
CHECKED:	SJC	14.06.2021

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Alexander Symonds Surveying Consultants

DETAIL & LEVEL SURVEY
STIRLING GOLF CLUB
STIRLING

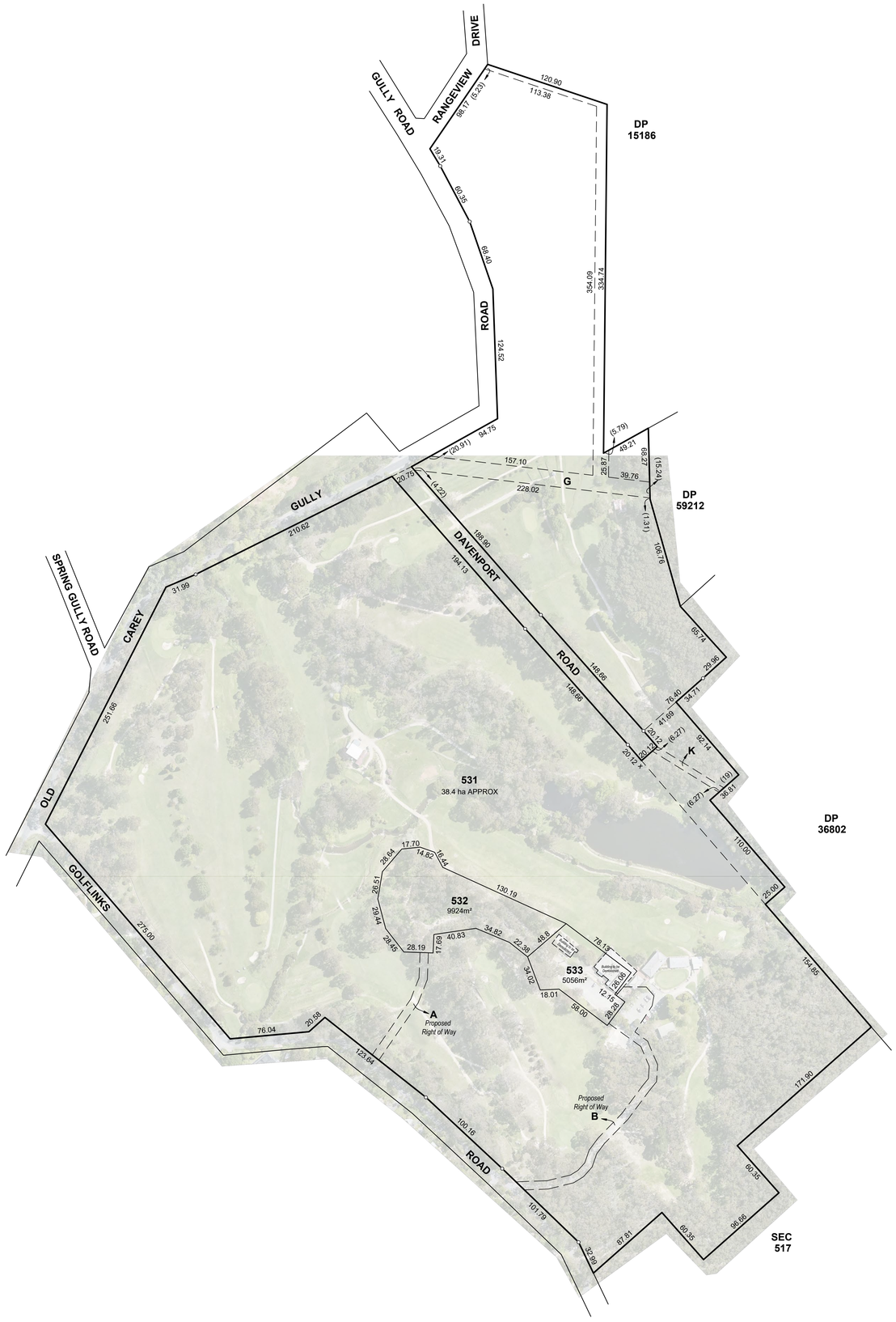
DRAWING No. 21A1821-Detail(0)_MGA20P

SHEET 1 OF 1

REVISION 0

Appendix C

Plan of Subdivision - Alexander & Symonds



N
W E
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Plan SA ---------
Development No. / /
Adelaide Hills Council

Proposed Plan of Division
Allotment 53 in DP 59212
Hundred of Onkaparinga
in the area named
STIRLING

CT 5891/805

SCALE 1:2000 METRES
0 20 40 60 80 100

No. of proposed allotments 3

Buildings to be demolished.

Portion of Allotment 531 marked A is to be subject to a Right of Way in favour of Allotment 532.

Portion of Allotment 531 marked B is to be subject to a Right of Way in favour of Allotment 533.

Portion of Allotment 531 marked G is subject to an easement to Distribution Lessor Corporation (Subject to Lease 8890000) (T 2520855)

Portion of Allotment 531 marked K is subject to a Free and Unrestricted Right of Way

Refer to CT for easement details.

Dimensions and areas are subject to survey.

Original Sheet Size B1

Glenn Ian Hordacre
LICENSED SURVEYOR

REF: 21A1821	STIRLING GOLF CLUB
DWG NO.: 21A1821PROP(B)	
REVISION: B	
RHF 20.09.2022	

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Appendix F

Economic Analysis - Hudson Howells

IDEAS | PEOPLE | TRUST

Economic Analysis of the Mount Lofty Golf Estate Development

A report for Trice on behalf of Mount Lofty Golf Estate

28 May 2024

Table of contents

Tables

Abbreviations

BCR	benefit cost ratio
CBA	cost benefit analysis
fte	full time equivalent
GOS	gross operating surplus
GRP	gross regional product
GSP	gross state product
I-O	Input Output
IRR	internal rate of return
NPV	net present value
RISE	Regional Industry Structure and Employment
SAGR	South Australian Government Region
SATC	South Australian Tourism Commission
SPC	State Planning Commission
TRA	Tourism Research Australia

Document history and status

Doc Version	Doc Status	Issued To	Qty Elec	Date	Reviewed	Approved
1	Draft	Tiana Della Putta	1 Word	18/03/2024	ADM	ADM
2	Final	Tiana Della Putta	1 Word	18/04/2024	ADM	ADM
3	Revised Final	Tiana Della Putta	1 Word	28/05/2024	ADM	ADM

Last Saved:	28/05/2024 4:48:00 PM
File Name:	Mount Lofty Golf Estate Development Economic Analysis_Final_240528
Project Manager:	Anders Magnusson
Principal Author/s:	Abbie Dix
Name of Client:	Trice on behalf of Mount Lofty Golf Estate
Name of Project:	Economic Analysis of the Mount Lofty Golf Estate Development
Document Version:	3
Job Number:	ES2401

Executive summary

In December 2020, the then Minister for Planning and Local Government declared the Mount Lofty Golf Estate to be assessed as a Major Development pursuant to Section 46 of the *Development Act 1993*. Due to the nature of proposal, the State Planning Commission (SPC) determined the need for a broader assessment. The SPC determined that the proposal would be subject to the processes of a development report. The guidelines of the development report include the requirement for an economic impact assessment that describes the existing environment in which the project is set and assesses the magnitude of change to the economic environment resulting from the project (State Planning Commission 2022). BDO EconSearch completed the economic impact assessment component of the development report for the Mount Lofty Golf Estate development in 2022 (BDO EconSearch 2022).

In addition to an update of the previous work, provision of a consolidated cost benefit analysis that considers the overall cost and benefits of the project was requested. This report provides updated results of the economic impact assessment and the results of the additional cost benefit analysis.

The Stirling Golf Club was founded by five members of the Royal Adelaide Golf Club in 1925 and was originally named Mount Lofty Golf Estate. The project vision is to revitalise the club and upgrade the property to a world class resort whilst bringing back the original name, preserving its cultural and historic importance for the future. The Mount Lofty Golf Estate development is proposed to cost a total of $109 million over a three-year period. It will include the development of a hotel with units, serviced apartments, a function room, restaurant, sports bar, gallery and café, and wellness centre. In addition to the hotel, the proposed development includes refurbishment of the perfumery, improvements to the 18-hole golf course, golf course facilities building, 257 car parking spaces, and a new pedestrian trail.

Method of analysis

Extended input-output (I-O) analysis was employed for estimation of regional economic impacts. Cost benefit analysis (CBA) was used to quantify efficiency and productivity gains and the net social benefit to the community.

The regional and state level economic impacts were estimated using an extension of the conventional input-output method. Over the past decade BDO EconSearch has developed an extended I-O model known as the RISE model (Regional Industry Structure and Employment). I-O models are widely used to assess the economic contribution of existing levels of economic activity and the economic impacts of shocks. The indicators used in impact analysis typically include employment, contribution to gross regional product (GRP)/gross state product (GSP) and household income which are used in this report. RISE models for the Adelaide Hills South Australian Government Region (SAGR) and South Australia were used for the assessment.

A CBA was undertaken to determine the net benefit of the Mount Lofty Golf Estate development. The proposed development project was compared against a base case scenario, as described below.

Base case: The Mount Lofty Golf Estate development project is not funded, and the Stirling Golf Club operation continues as usual.

Project case: The Mount Lofty Golf Estate development project is carried out as described; increasing business activity and tourism in the region.

The CBA was conducted over a 30-year period with a 7 per cent discount rate and three standard evaluation criteria were employed: net present value (NPV); benefit cost ratio (BCR); and internal rate of return (IRR).

Economic impact analysis

Construction phase

Over the three year period of construction, the development is expected to contribute GRP of $50.5m including household income of $35.8m to the Adelaide Hills economy. Additionally, the proposed development is expected to support the employment of 159 fte jobs in the Adelaide Hills SAGR on average over the three years of construction. These estimates include the construction of the development and flow-on effects in the broader economy (Table ES-1).

Statewide, the development is expected to contribute GSP of $108.7m including household income of $71.1m to the South Australian economy. Additionally, the proposed development is expected to support the employment of 274 fte jobs in the state on average over the three years of construction. These estimates include the construction of the development and flow-on effects in the broader economy (Table ES-1).

Table ES-1 Summary contribution of the construction phase to Adelaide Hills SAGR and South Australia, 2024/25 to 2026/27

	Adelaide Hills SAGR	South Australia
Expenditure ($m)	63.4	101.4
GRP/GSP ($m)		
Direct	29.4	44.1
Flow-on	21.1	64.7
Total GRP/GSP Impact	*50.5*	*108.7*
Employment (fte)[a]		
Direct	95	120
Flow-on	64	154
Total Employment Impact	*159*	*274*
Household Income ($m)		
Direct	22.5	32.0
Flow-on	13.3	39.1
Total Household Income Impact	*35.8*	*71.1*

[a] GRP and household income impacts are a total over the three-year construction period and employment impacts are an average over the same period.

Source: BDO EconSearch analysis

Operating phase

The operating phase includes the economic activity associated with the operation of the Mount Lofty Golf Estate and associated tourism expenditure. Results have been presented in Table ES-2 for operating years one, five and ten onwards.

By the tenth year of operation, the development is expected to contribute GRP of $24.4m, household income of $9.7m, and support the employment of 170 fte jobs annually in the Adelaide Hills economy. This includes the operation of the estate, associated tourism expenditure at other businesses, and flow-on effects in the broader economy.

Statewide, the development is expected to contribute GSP of $31.0m, household income of $12.9m, and support the employment of 197 fte jobs annually in the South Australian economy by the tenth year of

operation. This includes the operation of the estate, associated tourism expenditure at other businesses, and flow-on effects in the broader economy.

Table ES-2 Summary contribution of the operating phase to Adelaide Hills SAGR and South Australia

	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
Adelaide Hills			
GRP ($m)			
Direct	8.9	15.7	17.5
Total	13.5	22.2	24.4
Employment (fte)			
Direct	96	107	108
Total	137	166	170
Household Income ($m)			
Direct	4.6	5.2	5.3
Total	7.4	9.2	9.7
South Australia			
GSP ($m)			
Direct	9.0	15.8	17.6
Total	17.9	28.2	31.0
Employment (fte)			
Direct	96	107	108
Total	157	192	197
Household Income ($m)			
Direct	4.6	5.2	5.3
Total	9.6	12.3	12.9

Source: BDO EconSearch analysis

Cost benefit analysis

While the impact analysis illustrates the economic activity arising from the proposed development, the CBA shows whether or not the proposed investment represents an efficient use of resources. The results (Table ES-3) indicate that according to the three evaluation criteria used, the project would increase net social benefit.

- The NPV of $9.2 million indicates that, relative to the base case, the project will generate a net benefit to the community of $9.2 million over a 30-year period. The decision rule is that the investment will be worthwhile if the NPV is greater than zero.
- The BCR of 1.05 indicates, in a broad sense, that for each dollar invested $1.05 will be returned over the life of the project. For a project to be viable, the BCR must be greater than 1.0.
- The IRR of 7.8 per cent indicates that the project is expected to generate an annual rate of return of 7.8 per cent for society. The decision rule for a project to be viable is that the IRR be greater than the discount rate which, for this project and projects of this kind is 7 per cent.

Accordingly, the net benefits of investing in the development (project case) outweigh the net benefits of not investing in the project (base case). The positive result is driven by the benefits to the broader region of increased visitor expenditure, as the on-site costs and benefits are approximately equivalent (Table ES-3).

Table ES-3 Summary cost benefit analysis results

Cost or benefit	Contribution to NPV of the Project case (PV)
Project capital expenditure and base case capital replacement	-$94.1m
Operational costs	-$108.1m
Operational revenue	$193.2m
Visitation GOS	$14.9m
Residual value of capital	$3.6m
Native vegetation removal	-$0.1m
Net benefits (NPV) ($m)	$9.2m
Benefit Cost Ratio	1.05
Internal rate of Return	7.8%

Source: BDO EconSearch analysis

There are significant unquantified benefits associated with this project as described in the development report (URPS 2021). The CBA results would be more favourable towards the development if these were able to be included. These include improvement to landscape quality, adaptive reuse of a local heritage item, improvement to water quality treatment, better connectivity to Heysen Trail, better accessibility for service vehicles and fire-fighting vehicles, improvement to the golf club as an important community asset, and improved meeting facilities for social and community interaction.

1. Introduction

In December 2020, the then Minister for Planning and Local Government declared the Mount Lofty Golf Estate to be assessed as a Major Development pursuant to Section 46 of the *Development Act 1993*. Due to the nature of the proposal, the State Planning Commission (SPC) determined the need for a broader assessment. The SPC determined that the proposal will be subject to the processes of a development report. The guidelines of the development report include the requirement for an economic impact assessment that describes the existing environment in which the project is set and assesses the magnitude of change to the economic environment resulting from the project (State Planning Commission, 2022). BDO EconSearch completed the economic impact assessment component of the development report for the Mount Lofty Golf Estate development in 2022 (BDO EconSearch 2022).

In addition to an update of the previous work, provision of a consolidated cost benefit analysis that considers the overall costs and benefits of the project was requested. This report provides updated results of the economic impact assessment and the results of the additional cost benefit analysis.

The proposed development is for tourist accommodation and golf course and associated club facilities (ancillary bar, gymnasium and function rooms), together with landscaping, subdivision, and tree and native vegetation removal. The proposed development is summarised as follows:

- Construction of a 3-5 level tourist accommodation building comprising 56 units, 15 two bedroom serviced apartments, 15 three bedroom serviced apartments and 2 penthouse serviced apartments. Together with back of house, plant storage and maintenance areas, function room, restaurant and external terrace, sports bar, gallery and cafe, and wellness centre.
- Adaptive reuse of the local heritage perfumery building as a retail, cafe and multipurpose function space.
- Golf course facilities building - 2-5 level building comprising function facilities, cart storage and clubhouse, pro-shop, administration areas, gym, and change rooms.
- Retention of the 18-hole golf course with improvements.
- Car parking, access and waste management including a total of 257 car parking spaces. Including:
    - 200 formalised car parking spaces and a porte cochère (set-down/pick-up) facility at the tourist accommodation and golf club facilities building;
    - 20 spaces adjacent to the Perfumery Building accessible from Old Carey Gully Road; and
    - 37 spaces for staff only adjacent to the circulation road connecting from Old Carey Gully Road with further informal parking opportunities within the site.
- Subdivision of the land allotments (1 into 3) to formalise the areas for tourist accommodation, golf course facilities building and balance of the site for leasing purposes.
- Stormwater detention basin, creek and lake restoration activities including planting natives in the beds, erosion control works and creek crossings.
- Construction of entry wall and new entry signage at the existing Golflinks Road entry.
- New dedicated pedestrian trail adjacent to Golflinks Road.

Following the completion of the project, it is anticipated that the Mount Lofty Golf Estate will become a recognised destination which will showcase the best that the Adelaide Hills has to offer. The goal is for the

resort to become an important and integrated part of the region's tourist offerings and to contribute significantly to the region achieving its tourism goals and awards.

The South Australian Regional Visitor Strategy for Adelaide Hills in 2025, developed by the South Australian Tourism Commission (SATC), outlines the tourism priorities for the Adelaide Hills region. Overall, the region aims to convert more visitors to stay overnight, encourage day trippers to linger longer, spend more and grow repeat visitation (SATC 2021). The development of the Mount Lofty Golf Estate will create additional accommodation within the region which will encourage and facilitate more overnight visitors. Additionally, the redevelopment of the golf course will encourage day trippers to stay longer in the region to play golf, spend more, and visit more frequently.

The strategy also specified the regions priority to support the development of experiences that reflect the *Adelaide Hills Interpretation Plan* themes of food and beverage, towns and villages (including twilight activities), art, heritage and culture (including Aboriginal), nature and lifestyle (including soft adventure, wellness, hiking, cycling and horse riding) (SATC 2021). The Mount Lofty Golf Estate will include the redevelopment of the Stirling Golf Course, which will improve the nature and lifestyle offering with the region.

This report presents the results of an economic analysis of the proposed development, including an economic impact analysis and a cost benefit analysis.

The remainder of this report is structured as follows:

Section 2 methods of analysis and data

Section 3 economic impact analysis results

Section 4 cost benefit analysis and sensitivity analysis of results.

2. Method

2.1. Cost benefit analysis

An objective of this economic analysis was to undertake a cost benefit analysis (CBA) to determine the net benefit of the Mount Lofty Golf Estate development project. The proposed project was compared against a base case scenario, as described below. The base case and project case are detailed in the following sections.

Base case: The Mount Lofty Golf Estate development project is not funded, and the Stirling Golf Club operation continues as usual.

Project case: The Mount Lofty Golf Estate development project is carried out as described; increasing business activity and tourism in the region.

2.1.1. Method of analysis

The cost benefit analysis conducted for this project conforms to South Australian and Commonwealth Government guidelines for conducting evaluations of public sector projects (Department of Treasury and Finance (2008) and Department of Finance and Administration (2006)).

The starting point for the economic analysis was to develop the 'base case' scenario, that is, the benchmark against which the project was compared.

Given that costs and benefits were specified in real terms (i.e. constant 2024 dollars), future values were converted to present values by applying a discount rate of 7 per cent. The choice of discount rate is consistent with the rate advised by Infrastructure SA (2022).

The economic analysis was conducted over a 30-year period and results were expressed in terms of net benefits, that is, the incremental benefits and costs of the project case relative to those generated by the base case. The evaluation criteria employed for this analysis are described below.

Net present value (NPV) - discounted project benefits less discounted project costs. Under this decision rule the project is considered to be potentially viable if the NPV is greater than zero. The NPV for the project (Dev) was calculated as an incremental NPV, using the standard formulation:

$$NPV_{Dev} = PV(B_{Dev} - B_{Base\ Case}) - PV(C_{Dev} - C_{Base\ Case})$$

Internal rate of return (IRR) - the discount rate at which the NPV of the project is equal to zero. Under this decision rule the project is considered to be potentially viable if the IRR is greater than the benchmark discount rate (i.e. 7 per cent).

Benefit cost ratio (BCR) - the ratio of the present value of benefits to the present value of costs. Under this decision rule the project is considered to be potentially viable if the BCR is greater than one. The ratio was expressed as:

$$BCR_{Dev} = \frac{PV(B_{Dev} - B_{Base\ Case})}{PV(C_{Dev} - C_{Base\ Case})}$$

2.1.2. Costs and benefits

The costs and benefits of the project were measured using a 'with' and 'without' project framework, that is, quantification of the incremental changes associated with the option (i.e. the project case) compared to the base case. The method, data sources and assumptions used to quantify these values are described below. Consideration was given to those benefits and costs likely to occur over a 30-year period. The major economic costs and benefits of the project are listed in Table 2-1.

Table 2-1 In-scope costs and benefits of the cost benefit analysis

Item	Cost or Benefit	Agent	Description
Base Case			
Existing operational revenue	Benefit	Stirling Golf Club	Revenue from operating the existing Stirling Golf Club.
Existing operational cost	Cost	Stirling Golf Club	Cost of operating the existing Stirling Golf Club.
Capital replacement	Cost	Stirling Golf Club	Cost of replacing capital incurred by the Stirling Golf Club to maintain their assets and operation.
Project Case			
Operational revenue	Benefit	Mount Lofty Golf Estate	Direct revenue generated from operating the Mount Lofty Golf Estate business.
Visitation gross operating surplus (GOS)	Benefit	Existing businesses in the region	Increase in GOS for businesses in the Adelaide Hills due to increased tourism.
Residual Value of Capital	Benefit	Mount Lofty Golf Estate	Residual value of the assets constructed under the project case at the end of the cost benefit analysis time horizon.
Construction	Cost	Mount Lofty Golf Estate	Capital expenditure for the development.
Operational costs	Cost	Mount Lofty Golf Estate	Annual ongoing operating expenditure associated with operating the Mount Lofty Golf Estate business.
Native vegetation removal	Cost	Community	The estimated social cost of native vegetation removal associated with the development. The significant environmental benefit offset value estimated by the development report has been used in this analysis for the purpose of representing this social cost.

2.1.3. Data and assumptions

Construction costs

Construction costs are expected to total $109.2m across 3 financial years with $20.0m in 2024/25, $53.5m in 2025/26 and $35.7m in 2026/27 (Trice, pers. comm.). Construction is expected to occur between March 2025 and March 2027. A summary of the itemised costs over the construction period are summarised in Table 2-2.

Table 2-2 Itemised construction cost assumptions for years 2024/25 to 2026/27

Element	2024/25 Year 1 ($)	2025/26 Year 2 ($)	2026/27 Year 3 ($)	Total ($)
Demolition	197,625	0	0	197,625
Primary Construction	19,552,375	35,942,175	23,961,450	79,456,000
Pod Accommodation	0	0	0	0
FF&E Accommodation	0	1,668,000	1,112,000	2,780,000
ICT	250,000	0	0	250,000
Artwork	0	30,000	20,000	50,000
Headworks - Upgrades to Entrance Roads	0	900,000	600,000	1,500,000
Refurbishment on Perfumery + Outdoor	0	1,200,000	800,000	2,000,000
Civil Works upgrade to fire tracks	0	300,000	200,000	500,000
SAPN Augmentation + Generator	0	480,000	320,000	800,000
Marketing, Branding + Campaigning	0	45,000	30,000	75,000
Contingency All Up	0	5,256,518	3,504,345	8,760,863
Escalation to End of 2025	0	3,122,371	2,081,581	5,203,952
Escalation to Completion	0	4,570,805	3,047,203	7,618,008
Total	20,000,000	53,514,869	35,676,579	109,191,448

Source: Trice, pers. comm.

Operational revenue, costs, and employment

The total revenue and operational costs assumed under the base case are based on the existing Stirling Golf Club operation. Total annual revenue for business-as-usual is assumed to be $1.38m, and total costs are assumed to be $1.39m under the base case scenario throughout the 30-year period (Trice, pers. comms.).

A timeline of total revenue and operating costs once construction is complete under the project case is estimated below. Operation is expected to commence in April 2027, with the first full year of operation in 2027/28. Table 2-3 summarises these values at operation years one, five and ten onwards.

Table 2-3 Revenue and operating cost assumptions for 2027/28, 2031/32 and 2036/37 onwards

	Year 1 of operation ($) 2027/28	Year 5 of operation ($) 2031/32	Year 10 of operation and onwards ($) 2036/37
Revenue	11,945,758	21,276,980	24,107,971
Sales Expenses			
F&B Division	1,373,349	2,615,037	2,971,199
Spa Division	34,967	60,433	69,090
Conference	221,516	496,482	533,623
Minor Operating Department	744,491	1,262,858	1,389,886
Total Sales Expenses	*2,374,323*	*4,434,809*	*4,963,798*
Payroll Expenses			
Total Payroll Expenses	*3,343,450*	*3,463,260*	*3,463,260*
Other Operating Expenses			
Room Division	1,448,530	2,285,409	2,633,149
F&B Division	378,196	662,789	750,714
Spa Division	31,221	67,902	77,629
Diving & Watersport	112,682	187,767	203,677
Minor Operating Department	97,214	127,475	140,764
Administration & General	341,405	395,254	443,133
Human Resources	117,219	142,480	157,310
Sales & Marketing	234,437	253,763	280,174
POMEC (Maintenance)	196,744	180,999	200,486
Energy	220,096	334,942	379,974
Insurance	35,166	38,251	43,277
Total Other Operating Expenses	*3,212,909*	*4,677,030*	*5,310,288*
Total expenses	8,930,681	12,575,099	13,737,346

Source: Ron Meerwald, pers. comm.

A timeline of the breakdown of employment required to operate the estate once construction is complete is estimated below. Table 2-4 summarises these values at operation years one, five and ten onwards.

Table 2-4 Employment assumptions for 2027/28, 2031/32 and 2036/37 onwards

Position Staff Number (FTEs)	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
General Manager	1	1	1
Assistant General Managers	2	2	2
Housekeeping Staff (Guest Service Grade 1)	25	28	28
Reception (Guest Service Grade 4)	6	6	6
Golf Club Staff	13	13	13
Food and Beverage (Grade 1)	9	9	9
Food and Beverage Manager	2	2	2
Chefs	1	1	1
Cook (Grade 2)	3	3	3
Cook (Grade 4)	2	2	2
Gardening Staff and Ranger	9	9	9
Administration Staff	3	3	3
Total FTE	76	79	79

Source: URPS 2021

Visitation

The expected increase in visitation to the region after the project is complete was estimated using the total number of bed nights made available by the estate. It is assumed that 86 accommodation units will be functional for 2027/28 (Ron Meerwald, pers. comm.).

Table 2-5 summarises the assumptions used to estimate the increased tourism to the region as a result of the newly developed accommodation units. Total nights and expenditure per visitor was estimated based on the Adelaide Hills SAGR tourist expenditure profile (TRA 2021).

Table 2-5 Visitation assumptions for developed accommodation units, 2027/28, 2031/32 and 2036/37 onwards

	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
Built Units			
One Bedroom Suite	40	40	40
Two Bedroom Suite	26	26	26
Three Bedroom Suite	20	20	20
Guests per rooms			
One Bedroom Suite	1.2	1.2	1.2
Two Bedroom Suite	3	3	3
Three Bedroom Suite	5	5	5
Overall Occupancy			
One Bedroom Suite	50%	73%	76%
Two Bedroom Suite	50%	73%	76%
Three Bedroom Suite	45%	67%	69%
Additional nights			
One Bedroom Suite	8,760	12,826	13,281
Two Bedroom Suite	14,235	20,841	21,581
Three Bedroom Suite	16,425	24,291	25,153
Total	*39,420*	*57,958*	*60,014*
Additional domestic nights	30,898	45,428	47,040
Additional domestic visitors	11,200	16,467	17,051
Additional international nights	8,522	12,530	12,974
Additional international visitors	501	736	762

Source: Ron Meerwald, pers. comm.

After the completion of the development, the Developer expects an additional 17,000 rounds of golf will be played at the Mount lofty Golf Estate in addition to the current activity on the site (URPS 2021). Due to the improvements to the golf course research indicates that 25 per cent of the additional 17,000 rounds of golf will be played by visitors who are not in-house guests (URPS 2021). Consequently, this will bring additional visitors to the region.

Table 2-6 summarises the assumptions used to estimate the increased expenditure to the region as a result of the increased rounds of golf played. It is assumed that the number of additional visitors to the region will be the same from 2027/28 onwards. Note these domestic day trip visitors are in addition to the visitors who are expected to stay at the hotel (Table 2-5).

The expenditures by the additional visitors resulting from the development generates additional activity (revenue and expenditures) by local businesses providing goods and services to the visitors. These costs include expenditures on intermediate goods and services (e.g. food, electricity, accountancy services, etc.) and on wages. A RISE model of the Adelaide Hills SAGR was used to estimate these visitation costs within the region, based on the expected tourist expenditure profile (TRA 2021). Annual visitor expenditure was

estimated increase by $6.3m from in-house guests and $1.1m from additional rounds of golf by year 10 of operation (2036/37).

Table 2-6 Visitation assumptions for additional rounds of golf, 2027/28 onwards

	2027/28 onwards
Additional rounds of golf	17,000
Rounds of golf played by visitors who are not in house guests	25%
Day trip visitors proportion	*10%*
Overnight visitors proportion (not in house guests)	*15%*
Additional overnight visitors (not in house guests)	2,550
Domestic	*2,441*
International	*109*
Additional domestic day trip visitors	1,700

Source: URPS 2021

Visitation gross operating surplus (GOS)

A RISE model of the Adelaide Hills SAGR was used to estimate the gross operating surplus generated by businesses servicing the additional visitors within the region, based on the expected tourist expenditure profile. Visitation GOS is a measure of the additional business profit received by local businesses through the increased tourism expenditure. It estimates the proportion of visitor expenditure that remains in the region as opposed to flowing out of the region. For example, expenditure on fuel is split into the margin accruing to the local service station (assumed to remain within the region) and the value of the fuel itself (assumed to be an import from a refinery outside of the region). A similar approach was taken for retail goods. This avoids overstating the impact of visitor expenditure on the region. Sales of other visitor items, such as accommodation and food service, result in a much higher proportion of impact retained within the region.

Residual value of capital

The value of assets constructed was assumed to decrease linearly to zero over a 40-year period, implying a 40-year asset life. With construction only occurring under the project case, the base case has no residual value of capital.

Capital replacement

An annual cost of $33,000 for capital replacement has been included under the base case (Trice, pers. comms.). This cost reflects the cost of replacing capital over the 30-year period that would be incurred by the Stirling Golf Club to maintain their assets and operation under the base case.

Native vegetation removal

The estimated social cost of native vegetation removal associated with the development was included as a cost under the project case. The significant environmental benefit offset value estimated by the *Native Vegetation Clearance* report of $117,794 (Succession Ecology 2024) was used to represent this social cost.

2.2. Economic impact analysis

The economic impact analysis uses an extension of the conventional input-output method. Over the past decade BDO EconSearch has developed an extended input-output model known as the RISE model (Regional Industry Structure & Employment). The RISE model provides a comprehensive economic framework that is extremely useful in the resource planning process, particularly for regional economic impact applications.

The indicators used in impact analysis typically include employment, gross regional product and household income which are used in this report.

2.2.1. Economic activity

Economic activity indicators: the focus of this report is the generation of economic activity resulting from the development. The key economic activity indicators considered in the analysis are employment, gross regional product (GRP)/gross state product (GSP) and household income.

Economic impact: changes in economic activity are referred to as economic impacts. Generally, changes in economic activity indicators result from some stimulus or external shock imposed. In this analysis the concept of economic impact includes the increase in economic contribution from the construction and operation of the development, i.e. the contribution the development makes to the economy. This economic impact is measured in terms of the economic activity indicators referred to above.

2.2.2. Indicators of economic activity defined

Employment units: Employment numbers are usually reported in either full time equivalent (fte) units or total job units defined as follows:

- fte: is a way to measure a worker's involvement in a project or industry activity. An fte of 1.0 means that the person is equivalent to a full-time worker, while an fte of 0.5 signals that the worker is only half-time. Typically, different scales are used to calibrate this number, depending on the type of industry and scope of the analysis but the basic calculation is the total hours worked divided by average annual hours worked in full-time jobs.
- Jobs: is used to refer to the number of workers employed in an industry or on a project at any point in time. It typically refers to either:
    - the maximum number of workers required at any point over the analytical period or the duration of the project; or
    - the average number of workers required over the analytical period/duration of the project. This can be calculated on a daily, weekly, monthly or annual basis.

In this report employment has been reported in terms of fte units on a per annum basis.

Gross regional product (GRP)/Gross state product (GSP): is a measure of the contribution of an activity to the economy. GRP/GSP is measured as value of gross output (business revenue) less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as the sum of household income, gross operating surplus and gross mixed income net of payments to owner managers and taxes less subsidies on products and production. It represents payments to the primary inputs of production (labour, capital and land). Using GRP/GSP as a measure of economic impact avoids the problem of double counting that may arise from using value of output for this purpose. GRP/GSP are regional and state level equivalents of gross domestic product.

Household income: is a component of Gross State Product (GSP) and Gross Regional Product (GRP) and is a measure of wages and salaries, drawings by owner operators and other payments to labour including overtime payments and income tax, but excluding payroll tax.

2.2.3. Categories of economic activity

A useful way to think about economic activity and economic impact (as measured by employment, GRP/GSP, household income, etc.) is using the concept of a 'supply chain'. The supply chain, in the context of an infrastructure project, includes the planning and management of all activities involved in sourcing and procurement, conversion of materials, and all the logistics management activities. It also includes coordination and collaboration with suppliers, intermediaries and third-party service providers.

Broadly speaking there are four categories of employment, GRP/GSP and household income along the infrastructure supply chain.

1. Direct employment, GRP/GSP and household income – this is employment, GRP/GSP and household income in those firms, businesses and organisations that are directly engaged in providing goods and services to the development.
2. First round employment, GRP/GSP and household income - refers to employment, GRP/GSP and household income in firms that supply inputs and services to the 'direct employment' businesses, i.e. those categorised under #1 above.
3. Industrial-support employment, GRP/GSP and household income - is the term applied to 'second and subsequent round' effects as successive waves of output increases occur in the economy to provide industrial support, as a response to the original expenditure. This category excludes any employment, GRP/GSP and household income associated with increased household consumption.
4. Consumption-induced employment, GRP/GSP and household income - is the term applied to as those effects induced by increased household income associated with the original expenditure. The expenditure of household income associated with all three categories of employment, GRP/GSP and household income (direct, first round and industrial-support) will generate economic activity that will in itself generate jobs, GRP/GSP and household income.

Flow-on (or indirect) economic impact is the sum of categories 2, 3 and 4. In this analysis *direct and flow-on* employment, GRP/GSP and household income generated by the supply chain have been reported.

For this project these categories of economic impact will apply to the construction and operation of the development and to the increase in expenditures made by visitors to the region.

2.2.4. Economic impact modelling

RISE models based on the 2019/20 financial year of the Adelaide Hills SAGR and state of South Australia were used to make regional and state economic estimates.

Input-output (I-O) models are widely used to assess the economic contribution of existing levels of economic activity and the economic impacts of shocks. The models are based upon I-O tables that describe the interdependencies between industries within the regional economy and with the economy outside of the region. This makes the comprehensive economic framework provided by the RISE model extremely useful for disentangling the direct and flow-on effects of activity in a regional economy.

The I-O method used in the RISE model has been extended to incorporate population and unemployment changes. Modelling population change allows for the estimation of impacts on population driven sectors, such as government administration, health, defence and education. Modelling unemployment change allows estimation of an offsetting effect on consumption-induced flow-on impacts as some new employees may

have previously claimed unemployment benefits in the region and some may be new to the region. These extensions improve the reliability of RISE model estimates compared to conventional I-O models.

2.2.5. Data and assumptions

In addition to the assumptions embodied in the input-output model itself, it was necessary to make other general assumptions in estimating the economic impacts:

- The impacts were measured using a model that represents the structure of the regional economy for the year in which the most recent data are available (2019/20). However, over time there are likely to be improvements in primary factor productivity in these economies. To allow for the improvements an across-the-board (all sectors) labour productivity improvement rate of 0.5 per cent per annum for subsequent years of the construction and operation phases have been incorporated into the modelling.
- When new jobs are created, it should be determined where the people come from to fill those jobs. In some cases, the jobs will be taken by previously unemployed locals or by someone who is currently employed locally but whose own job is taken by a previously unemployed local. In both cases the impact of the newly created job and associated income is partially offset by the fact that someone who was previously receiving unemployment benefits for example is no longer doing so. To calculate this effect requires estimates of the parameter rho, the proportion of new jobs that are likely to be filled by previously unemployed locals. For the construction and operating phases, it was estimated to be 0.6 for the Adelaide Hills SAGR and 0.9 for South Australia.

3. Economic impact analysis results

3.1. Construction phase

The capital cost estimates for the development are detailed in Section 2.1.3. The development will involve a total capital investment of $109 million (Trice, pers. comm.). The economic impact of the development will be determined by the extent of local labour and raw materials used and the level of expenditures associated with the specialised contractors and equipment that will occur in the region.

Gross regional product (GRP)/Gross state product (GSP)

GRP/GSP is a measure of the net contribution of an activity or industry to the regional economy. It represents payments to the primary inputs of production (labour, capital and land) and is a regional and state level equivalent of gross domestic product. Estimates for the 3-year construction period are provided in Table 3-1 for the Adelaide Hills SAGR and in Table 3-2 for South Australia.

The total contribution to GRP/GSP as a result of construction expenditure is expected to be:

- Adelaide Hills SAGR: $50.5m, including $29.4m directly and $21.1m in flow-on impacts
- South Australia: $108.7m, including $44.1m directly and $64.7m in flow-on impacts.

Employment (fte)

Employment is a key indicator of both regional economic activity and the welfare of regional households. The estimates presented in Table 3-1 and Table 3-2 show that the employment effect is expected to be on average over the three-year period:

- Adelaide Hills SAGR: 159 fte jobs, including 95 fte jobs directly and 64 flow-on fte jobs
- South Australia: 274 fte jobs, including 120 fte jobs directly and 154 flow-on fte jobs.

Household Income

Household income is a component of Gross State Product (GSP) and Gross Regional Product (GRP) and is a measure of wages and salaries other payments to labour. The estimates presented in Table 3-1 and Table 3-2 show that the total contribution to household income is expected to be:

- Adelaide Hills SAGR: $35.8m, including $22.5m directly and $13.3m in flow-on impacts
- South Australia: $71.1m, including $32.0m directly and $39.1m in flow-on impacts.

Table 3-1 Economic impact of the Mount Lofty Golf Estate Development on the Adelaide Hills SAGR region, construction phase, 2024/25 to 2026/27

	2024/25	2025/26	2026/27	Total [a]
Expenditure in Region ($m)	11.9	30.9	20.6	63.4
GRP ($m)				
Direct	5.5	14.4	9.6	29.4
Flow-on	4.0	10.3	6.8	21.1
Total GRP Impact	*9.5*	*24.6*	*16.4*	*50.5*
Employment (fte)				
Direct	54	139	92	95
Flow-on	37	93	62	64
Total Employment Impact	*90*	*232*	*154*	*159*
Household Income ($m)				
Direct	4.2	10.9	7.3	22.5
Flow-on	2.5	6.5	4.3	13.3
Total Household Income Impact	*6.8*	*17.4*	*11.6*	*35.8*

[a] GRP and household income impacts are a total over the three-year construction period and employment impacts are an average over the same period.

Source: BDO EconSearch analysis

Table 3-2 Economic impact of the Mount Lofty Golf Estate Development on South Australia, construction phase, 2024/25 to 2026/27

	2024/25	2025/26	2026/27	Total [a]
Expenditure in SA ($m)	19.0	49.4	33.0	101.4
GSP ($m)				
Direct	8.3	21.5	14.3	44.1
Flow-on	12.2	31.5	21.0	64.7
Total GSP Impact	*20.5*	*52.9*	*35.3*	*108.7*
Employment (fte)				
Direct	69	176	116	120
Flow-on	88	224	149	154
Total Employment Impact	*156*	*400*	*265*	*274*
Household Income ($m)				
Direct	6.1	15.5	10.4	32.0
Flow-on	7.4	19.0	12.7	39.1
Total Household Income Impact	*13.5*	*34.5*	*23.0*	*71.1*

[a] GRP and household income impacts are a total over the three-year construction period and employment impacts are an average over the same period.

Source: BDO EconSearch analysis

3.2. Operating phase

The second component of the economic impact estimates relates to the operating phase of the proposed development. There are two elements related to the operating phase, the operation of the estate and the additional visitor expenditure attributed to the project. The operating costs for the development and the tourism assumptions are detailed in Section 2.1.3.

3.2.1. Operation

The economic impact of operating the development is presented for the Adelaide Hills SAGR and South Australia for operation years one, five and ten onwards in Table 3-3 to Table 3-4.

Table 3-3 Economic impact of the Mount Lofty Golf Estate Development on the Adelaide Hills SAGR region, operation, 2027/28, 2031/32 and 2036/37 onwards

	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
GRP ($m)			
Direct	6.5	12.4	14.1
Flow-on	3.8	5.4	5.9
Total GRP Impact	*10.3*	*17.7*	*20.0*
Employment (fte)			
Direct	75	79	79
Flow-on	34	49	53
Total Employment Impact	*109*	*128*	*132*
Household Income ($m)			
Direct	3.3	3.5	3.5
Flow-on	2.3	3.3	3.7
Total Household Income Impact	*5.6*	*6.8*	*7.2*

Source: BDO EconSearch analysis

Table 3-4 Economic impact of the Mount Lofty Golf Estate Development on South Australia, operation, 2027/28, 2031/32 and 2036/37 onwards

	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
GSP ($m)			
Direct	6.6	12.5	14.2
Flow-on	6.9	9.6	10.5
Total GSP Impact	*13.4*	*22.1*	*24.7*
Employment (fte)			
Direct	75	79	79
Flow-on	48	68	73
Total Employment Impact	*123*	*147*	*152*
Household Income ($m)			
Direct	3.3	3.5	3.5
Flow-on	3.9	5.5	6.1
Total Household Income Impact	*7.2*	*9.0*	*9.5*

Source: BDO EconSearch analysis

3.2.2. Tourism

The economic impact of additional tourism is presented for the Adelaide Hills SAGR and South Australia for operation years one, five and ten onwards in Table 3-5 and Table 3-6.

Table 3-5 Economic impact of the Mount Lofty Golf Estate Development on the Adelaide Hills SAGR region, tourism, 2027/28, 2031/32 and 2036/37 onwards

	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
GRP ($m)			
Direct	2.4	3.3	3.4
Flow-on	0.8	1.1	1.2
Total GRP Impact	*3.3*	*4.5*	*4.6*
Employment (fte)			
Direct	21	28	29
Flow-on	7	9	9
Total Employment Impact	*28*	*38*	*38*
Household Income ($m)			
Direct	1.3	1.8	1.8
Flow-on	0.5	0.7	0.7
Total Household Income Impact	*1.8*	*2.4*	*2.5*

Source: BDO EconSearch analysis

Table 3-6 Economic impact of the Mount Lofty Golf Estate Development on South Australia, tourism, 2027/28, 2031/32 and 2036/37 onwards

	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
GSP ($m)			
Direct	2.4	3.3	3.4
Flow-on	2.0	2.8	2.8
Total GSP Impact	*4.4*	*6.1*	*6.2*
Employment (fte)			
Direct	21	28	29
Flow-on	13	17	17
Total Employment Impact	*34*	*45*	*46*
Household Income ($m)			
Direct	1.3	1.8	1.8
Flow-on	1.1	1.5	1.6
Total Household Income Impact	*2.4*	*3.3*	*3.4*

Source: BDO EconSearch analysis

3.2.3. Total operating phase

The combined contribution to GRP/GSP, employment and household income as a result of the operation of the development and associated tourism increase to each region is summarised in Table 3-7. Results have been presented for operation years one, five and ten onwards.

By the tenth year of operation, the development is expected to support GRP of $24.4m, employment of 170 fte jobs and $9.7m of household income in the Adelaide Hills economy, including operation of the estate, associated tourism expenditure at other businesses, and flow-on effects in the broader economy.

Statewide, the development is expected to contribute GSP of $31.0m, household income of $12.9m, and support the employment of 197 fte jobs annually in the South Australian economy by the tenth year of operation. This includes the operation of the estate, associated tourism expenditure at other businesses, and flow-on effects in the broader economy.

Table 3-7 Summary contribution of the operating phase to the Adelaide Hills SAGR and South Australia, 2027/28, 2031/32 and 2036/37 onwards

	Year 1 of operation 2027/28	Year 5 of operation 2031/32	Year 10 of operation and onwards 2036/37
Adelaide Hills			
GRP ($m)			
Direct	8.9	15.7	17.5
Total	13.5	22.2	24.4
Employment (fte)			
Direct	96	107	108
Total	137	166	170
Household Income ($m)			
Direct	4.6	5.2	5.3
Total	7.4	9.2	9.7
South Australia			
GSP ($m)			
Direct	9.0	15.8	17.6
Total	17.9	28.2	31.0
Employment (fte)			
Direct	96	107	108
Total	157	192	197
Household Income ($m)			
Direct	4.6	5.2	5.3
Total	9.6	12.3	12.9

Source: BDO EconSearch analysis

3.3. Analysis of potential secondary economic effects

As outlined in Section 3.2, once the development is complete, the operating phase of the project will have a significant secondary impact on the local and state economy. Secondary economic activity is measured by flow-on impacts, Section 2.2.3 outlines the definition and breakdown of flow-on economic activity. The industries with flow-on impacts in GRP/GSP and employment have increased demand in the market. These industries therefore have increased opportunity for further investment, and the potential to attract value add development and commercial ventures.

The five industries with the highest associated flow-on economic activity within the Adelaide Hills SAGR are summarised in Table 3-8. These sectors are ranked by the GRP contribution of the flow-on economic activity from year 10 and onwards of operation. The industries most impacted by the operating phase of the development in the Adelaide Hills SAGR region are retail trade, administration and support services, wholesale trade, professional scientific and technical services, and rental hiring and real estate. These industries have the highest flow-on economic activity and therefore have the most significantly increased opportunities for investment as a result of the development.

Table 3-8 Flow-on economic contribution of the top five sectors in 2036/37 and onwards of operation in the Adelaide Hills SAGR, ranked by GRP

	Flow-on GRP ($m)	Flow-on Employment (fte)
Retail Trade	0.81	9
Admin & Support Services	0.58	12
Wholesale Trade	0.46	3
Professional, Scientific & Technical Services	0.40	5
Rental Hiring & Real Estate	0.35	2

Source: BDO EconSearch analysis

The five industries with the highest associated flow-on economic activity in South Australia are summarised in Table 3-9. These sectors are ranked by the GSP contribution of the flow-on economic activity from year 10 and onwards of operation. The industries most impacted by the operating phase of the development in South Australia are retail trade, professional scientific and technical services, wholesale trade, administration and support services, and finance. These industries have the highest flow-on economic activity and therefore have the most significantly increased opportunities for investment as a result of the development.

Table 3-9 Flow-on economic contribution of the top five sectors in 2036/37 and onwards of operation in South Australia, ranked by GSP

	Flow-on GSP ($m)	Flow-on Employment (fte)
Retail Trade	1.18	13
Professional, Scientific & Technical Services	0.83	7
Wholesale Trade	0.80	5
Admin & Support Services	0.81	12
Finance	0.70	1

Source: BDO EconSearch analysis

4. Cost benefit analysis results

4.1. Results

The primary focus of the cost benefit analysis in this study was the costs and benefits that accrue as a result of the project. That is, the cost benefit analysis was used to determine whether the project would increase net social benefits relative to the base case.

The results of the analysis have been expressed in terms of three evaluation criteria, the net present value (NPV), the internal rate of return (IRR) and the benefit cost ratio (BCR). The NPV is a measure of the aggregate, annual net benefits (i.e. benefits - costs) of the project over a 30-year period, discounted (i.e. expressed as a present value) using a discount rate of 7 per cent. If the NPV for a scenario is positive, then it is preferred to the base case. The BCR is a ratio of the present value of benefits to the present value of costs after 30 years and the IRR is the discount rate at which the NPV of the project equals zero after 30 years. While the impact analysis illustrates the economic activity arising from the proposed investment, the CBA shows whether or not the proposed investment represents a more efficient allocation of resources. The results (Table 4-1) indicate that according to the three evaluation criteria used, the project would increase net social benefit.

- The NPV of $9.2 million indicates that, relative to the base case, the project will generate a net benefit to the community of $9.2 million over a 30-year period. The decision rule is that the investment will be worthwhile if the NPV is greater than zero.
- The BCR of 1.05 indicates, in a broad sense, that for each dollar invested $1.05 will be returned over the life of the project. For a project to be viable, the BCR must be greater than 1.0.
- The IRR of 7.8 per cent indicates that the project is expected to generate an annual rate of return of 7.8 per cent for society. The decision rule for a project to be viable is that the IRR be greater than the discount rate which, for this project and projects of this kind is 7 per cent.

Accordingly, the net benefit of developing the Mount Lofty Golf Estate outweighs the net benefit of not undertaking the project (base case). The positive result is driven by the benefits to the broader region of increased visitor expenditure, as the on-site costs and benefits are approximately equivalent (Table 4-1). For more detailed results see Appendix 1.

Table 4-1 Summary of cost benefit analysis results

Cost or benefit	Contribution to NPV of the Project case (PV)
Project capital expenditure and base case capital replacement	-$94.1m
Operational costs	-$108.1m
Operational revenue	$193.2m
Visitation GOS	$14.9m
Residual value of capital	$3.6m
Native vegetation removal	-$0.1m
Net benefits (NPV) ($m)	$9.2m
Benefit Cost Ratio	1.05
Internal rate of Return	7.8%

Source: BDO EconSearch analysis

There are significant unquantified benefits associated with this project as described in the development report (URPS 2021). The CBA results would be more favourable towards the development if these were able to be included. These include improvement to landscape quality, adaptive reuse of a local heritage item, improvement to water quality treatment, better connectivity to Heysen Trail, better accessibility for service vehicles and fire-fighting vehicles, improvement to the golf club as an important community asset, and improved meeting facilities for social and community interaction.

4.2. Sensitivity analysis

The results of the CBA were re-estimated using values for key variables that reflect the uncertainty of those variables. The sensitivity analysis included the following:

(a) discount rate

(b) construction cost

(c) increase in visitation

(d) development operational revenue

(e) development operational costs

The range of values used for each uncertain variable and detailed results of the sensitivity analysis are set out in Table 4-2 along with the conclusions. Note that the sensitivity analysis for each uncertain variable was undertaken by holding all other variables constant at their 'assumed' values.

Table 4-2 Results of the sensitivity analysis

(a) Discount rate

Scenario	Discount rate	NPV	BCR	IRR	Conclusion
High	10%	-19.1	0.88	7.8%	The result remains positive when applying a low discount rate but becomes unviable for a high discount rate.
Assumed	7%	9.2	1.05	7.8%	
Low	4%	61.9	1.23	7.8%	

(b) Total construction cost

Scenario	Cost	NPV	BCR	IRR	Conclusion
High	115%	-4.4	0.98	6.7%	The result becomes unviable if construction costs are increased by 15 per cent. This represents the case of a 15 per cent budget overrun.
Assumed	100%	9.2	1.05	7.8%	
Low	85%	22.9	1.12	9.2%	

(c) Increase in visitation

Scenario	Increase	NPV	BCR	IRR	Conclusion
High	150%	16.7	1.08	8.4%	The result remains positive if the increase visitation is only 50 per cent of that expected. A higher-than-expected increase in visitation makes the result more positive.
Assumed	100%	9.2	1.05	7.8%	
Low	50%	1.8	1.01	7.2%	

(d) Total operational revenue

Scenario	Revenue	NPV	BCR	IRR	Conclusion
High	115%	40.8	1.20	10.3%	The result becomes unviable if operational revenue under the project case is 15 per cent lower than expected.
Assumed	100%	9.2	1.05	7.8%	
Low	85%	-22.3	0.89	4.9%	

(e) Total operational costs

Scenario	Cost	NPV	BCR	IRR	Conclusion
High	115%	-9.6	0.96	6.1%	The result becomes unviable if operational costs under the project case are 15 per cent higher than expected.
Assumed	100%	9.2	1.05	7.8%	
Low	85%	28.0	1.15	9.3%	

Source: BDO EconSearch analysis

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Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.

Appendix 1 Detailed CBA model

Appendix Table 1-1 Detailed CBA model [a]

	PV	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2051/52	2052/53	2053/54
Base case												
Benefits ($m)												
Operational revenue	17,066,936	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363
Total benefits ($m)	17,066,936	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363	1,375,363
Costs ($m)												
Capital replacement	409,498	33,000	33,000	33,000	33,000	33,000	33,000	33,000	33,000	33,000	33,000	33,000
Operational costs	17,240,961	1,389,387	1,389,387	1,389,387	1,389,387	1,389,387	1,389,387	1,389,387	1,389,387	1,389,387	1,389,387	1,389,387
Total Costs ($m)	17,650,459	1,422,387	1,422,387	1,422,387	1,422,387	1,422,387	1,422,387	1,422,387	1,422,387	1,422,387	1,422,387	1,422,387
Development case												
Benefits ($m)												
Operational revenue	210,226,395	0	0	2,986,440	11,945,758	14,927,945	17,016,382	19,123,486	21,276,980	24,107,971	24,107,971	24,107,971
Visitation GOS	14,850,426	0	0	282,002	1,128,007	1,232,172	1,336,338	1,440,503	1,544,668	1,590,885	1,590,885	1,590,885
Residual value of capital	3,586,041	0	0	0	0	0	0	0	0	0	0	27,297,862
Total benefits ($m)	228,662,863	0	0	3,268,441	13,073,765	16,160,117	18,352,720	20,563,989	22,821,648	25,698,856	25,698,856	52,996,718
Costs ($m)												
Construction costs	94,556,264	20,000,000	53,514,869	35,676,579	0	0	0	0	0	0	0	0
Operational costs	125,354,001	0	0	2,232,670	8,930,681	10,193,800	11,100,636	11,958,845	12,575,099	13,737,346	13,737,346	13,737,346
Native vegetation removal	110,088	117,794	0	0	0	0	0	0	0	0	0	0
Total Costs ($m)	220,020,352	20,117,794	53,514,869	37,909,250	8,930,681	10,193,800	11,100,636	11,958,845	12,575,099	13,737,346	13,737,346	13,737,346
Incremental benefits ($m)	211,595,927	-1,375,363	-1,375,363	1,893,078	11,698,402	14,784,754	16,977,357	19,188,626	21,446,285	24,323,493	24,323,493	51,621,355
Incremental costs ($m)	202,369,893	18,695,407	52,092,482	36,486,863	7,508,294	8,771,413	9,678,249	10,536,458	11,152,712	12,314,959	12,314,959	12,314,959
Net benefits (NPV) ($m)	9,226,034	-20,070,770	-53,467,845	-34,593,784	4,190,108	6,013,341	7,299,107	8,652,168	10,293,573	12,008,534	12,008,534	39,306,396
Benefit Cost Ratio	1.05											
Internal rate of Return	7.8%											

[a] Years 2032/33 - 2050/51 are hidden for presentational purposes.

Source: BDO EconSearch analysis

1300 138 991
www.bdo.com.au

AUDIT • **TAX** • **ADVISORY**

NEW SOUTH WALES
NORTHERN TERRITORY
QUEENSLAND
SOUTH AUSTRALIA
TASMANIA
VICTORIA
WESTERN AUSTRALIA

Appendix G

Landscape Master Plan - Oxigen

SITE MASTERPLAN

LEGEND

1. Old Carey Gully Road Access
2. Staff carpark
3. Perfumery carpark
4. Perfumery courtyard
5. Tree orchard
6. Perfumery gardens
7. Cox Creek improvements
8. Heysen trail connection
9. Stormwater quality improvement basin
10. Deck
11. Lawn terrace
12. Practice putting green
13. Tourist accommodation drop-off
14. Pedestrian concourse
15. Golflinks road main access
16. Entry Avenue
17. Emergency maintenance vehicle access only
18. Dedicated pedestrian trail

KEY

- Internal path
- Internal driveway
- Heysen trail connection
- Carpark entries
- Sewer holding tank
- Perfumery sewer tank
- Stormwater basin
- Roof rainwater drainage pipe
- Internal drainage pipe
- Overland flow direction
- Gravity sewer from hotel
- Sewer rising main to pump station
- Perfumery gravity sewer
- Existing rising main to pump station
- Existing rising main to treatment plant

ECOLOGY

- Creek Revegetation zone
- Revegetation zone
- Trees to be removed

OLD CAREY GULLY ROAD
HEYSEN TRAIL
PERFUMERY
COX CREEK
TOURIST ACCOMMODATION
35M BUFFER
35M BUFFER
GOLFLINKS ROAD
GOLFLINKS ROAD
MANNA GUM AVE
TO S.E. FREEWAY

Mount Lofty Golf Estate

oxigen

1:1500 (A1), 1:3000 (A3)

0 10 25 50m

N

Appendix H

Sustainability Strategy Report – Dsquared

dsquared

Mount Lofty Golf Estate

Sustainability Strategy Report

D Squared Consulting Pty Ltd
Trading as dsquared
ACN 159 612 067
ABN 38 159 612 067

Suite 5, 241 Pirie Street
Adelaide SA 5000
T: 0404 568 053
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Project Number: 2623

Issue	Date	Change	Checked	Approved
01	07/09/2022	Development Report Issue	JB	DD
02	03/03/2024	Minor updates to suit revised Master Plan	JB	DD

Our vision is to think beyond the square.

Our mission is to reduce the impact on the environment of our client's actions by providing innovative solutions, challenging perceived thinking, and pushing the boundaries of achievement whilst using all resources in a sustainable way.

We confirm that all work has been undertaken in accordance with our ISO 9001 accredited quality management system.

Acknowledgement of country

The dsquared team wish to acknowledge the Traditional Custodians of all country throughout Australia, and their cultural, spiritual, physical, and emotional connection with their land, waters, and community. We pay our respects to all Elders past, present, and emerging.

Contents

1 Introduction

1.1 Introduction

This report presents the Sustainability Strategies and Ecologically Sustainable Design (ESD) initiatives proposed for the Mount Lofty Golf Estate development, which will reduce the development's impact on the environment in both construction and operation.

The proposed development has been designed with a holistic approach to ESD, creating an exemplar environment for all users including visitors, guests, and staff, while minimising energy use and greenhouse gas emissions.

This report follows the development of the master plan and building designs by the design team led by R-Architecture. Computer building simulation design techniques have been employed to inform the design initiatives and to assess the sustainability performance of the built form.

1.2 Strategy

The sustainability strategy and outcomes proposed are summarised as follows:

2 Performance

2.1 Green Star certification

The project is registered with the Green Building Council of Australia to obtain a certified Green Star As-Built rating using the new Green Star Buildings v1 rating tool, which is the GBCA's next-generation rating tool replacing the previous 'Design and As-Built v1.3' tool.

The project is targeting a 5 Star outcome under the GBCA's new Buildings v1 rating tool. The GBCA defines 5 Stars as 'Australian Excellence' in sustainable building design.

Obtaining a third-party certified Green Star rating acts as a verification method for the project's ESD design initiatives and modelled performance outcomes. This approach will ensure ESD remains a core part of the project scope throughout the detailed design and construction phases.

2.2 Energy

The development is being designed and will be constructed to meet the energy efficiency requirements of the Green Building Council of Australia's Green Star Buildings v1 rating tool, which are as follows:

- The development will achieve at least 10% better energy and greenhouse gas emissions performance compared with a NCC / BCA 2019 deemed-to-satisfy reference case; and
- The façade and building fabric will exceed the NCC / BCA 2019 deemed-to-satisfy requirements for energy efficiency and thermal performance.

Preliminary modelling of the proposed concept design indicates that the development's **energy consumption will be 25% lower** than a NCC 2019 deemed-to-satisfy reference case, and its **carbon emissions from energy use will be 18% lower**. Refer to section 3 for a list of energy efficiency initiatives which will contribute to achieving these outcomes.

	Reference Building (NCC 2019 code compliant)	Mount Lofty Golf Estate	Improvement
Energy use (MJ p.a.)	3,412,264	2,557,868	25%
CO_2 emissions (kg CO_2e p.a.)	365,214	298,418	18%

Energy modelled performance summary

	Reference Building (NCC 2019 code compliant)			Mount Lofty Golf Estate		
	Electricity kWh p.a.	Gas MJ p.a.	CO_2 emissions kg CO_2e p.a.	Electricity kWh p.a.	Gas MJ p.a.	CO_2 emissions kg CO_2e p.a.
Hotel	375,681	443,790	185,390	387,452	0	162,730
Facilities Building	404,465	159,948	179,824	323,067	0	135,688
Total	**780,146**	**603,738**	**365,214**	**710,519**	**0**	**298,418**

Energy modelled performance results

2.3 Carbon emissions

The development will be all-electric and will not use fossil fuels (natural gas) for heating, cooling, or hot water services, promoting the transition to 100% renewable energy from off-site and on-site sources.

20% of the development's annual electrical demand will be supplied by on-site renewable energy via a rooftop solar PV system.

A Zero Carbon Action Plan will be prepared and will include strategies for how the project will achieve net zero carbon emissions in operation. This includes strategies for phasing-out and eliminating all fossil fuels from the development and transitioning away from petrol- and diesel-powered golf carts and grounds maintenance vehicles and equipment.

2.4 Daylight

All hotel suites and public facilities (golf club, restaurant, and function rooms) have access to daylight in accordance with Green Star standards.

The daylight access has been verified using IES Virtual Environment building computer simulation software, with modelled results as follows. Sample plots from the daylight modelling are provided in Appendix A.

	Occupied floor area (sqm)	Compliant area (sqm) *(Note 1)*	Compliant % *(Note 2)*	Green Star result
Facilities Building	1,802	993	55%	Complies
Hotel Building	3,084	1,488	48%	Complies
Whole development	**4,886**	**2,481**	**51%**	**1 out of 2 points achieved**

Daylight modelling results

Note 1: Compliance target is a minimum of 160 lux of daylight achieved during >80% of daytime hours.
Note 2: Green Star targets are 40% compliant area for 1 point, or 60% for 2 points.

Refer also to Appendix A for sample daylight modelling plots.

2.5 Water

The development will achieve at least a 10% reduction in potable water use when compared to a reference building in accordance with the Green Star Buildings v1 rating tool requirements.

Preliminary water balance modelling indicates the development will achieve a 33% reduction in potable water demand when compared with a 'standard practice' reference case as defined by the Green Building Council of Australia. This exceeds Green Star Water Use requirements under the Buildings v1 rating tool.

A 50 kL rainwater storage tank will be provided and harvest rainwater for landscape irrigation, laundry services, and washdown of bin rooms and golf carts, which will contribute 13% of the buildings' total annual water demands, or 25% of the buildings' non-potable water demands.

	Standard practice	Mount Lofty Golf Estate
Total water demand (kL p.a.)	6,380	4,884
Rainwater contribution (kL p.a.)	Nil	639 (13% of demand)
Resultant potable water demand (kL p.a.)	6,380	4,245
Improvement achieved	-	33%

Water modelling results

3 Initiatives

3.1 Passive Design

The following passive design features are included:

1. Buildings are oriented north which captures free heating from the winter sun. External shade elements and balconies provide shade protection from the summer sun.
2. The building form, façade shading elements, and glazing system specifications have been informed by energy performance modelling and computer simulation techniques.
3. High performance double-glazed facades are provided throughout the development. Glass systems' solar heat gain coefficients (SHGCs) have been optimised for each building type depending on solar exposure, to provide an optimum balance between summer and winter comfort.

   Façade glazing systems will meet the following performance specifications.

	U-value Whole of system $W/m^2.K$	Solar Heat Gain Coefficient (SHGC)	Visible Light Transmittance (VLT)	Glazing system type
Hotel Building	3.2 or less	0.40 or less	45% or higher	Double-glazed Neutral glass with low-E performance coating
Facilities Building	3.2 or less	0.40 or less	45% or higher	Double-glazed Neutral glass with low-E performance coating

Façade glazing performance specifications

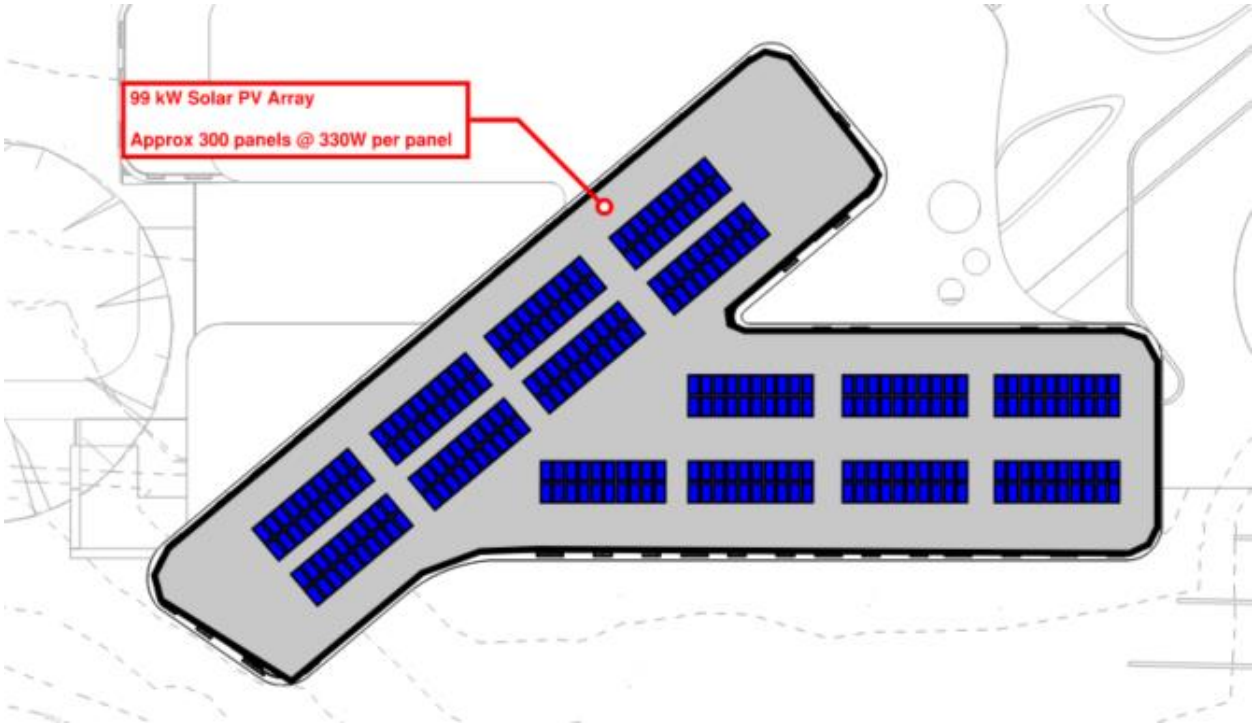
4. Natural ventilation is available in all hotel rooms and the gallery/café space, thereby reducing mechanical cooling demands.
5. The external façade will be subject to air leakage pressure testing to ATTMA standards, and the façade supplier required to meet prescribed air leakage rates as per GBCA / Green Star Standards. As well as significantly reducing the air conditioning energy consumption, this will also improve the indoor air quality, particularly during high external air pressure conditions.
6. Passive cooling from green roof, façade planters, and green landscaping around the buildings. Water transpiration from the plants and landscaping provides a natural cooling effect.
7. Light-coloured roof finishes and landscaping finishes will minimise heat absorption and reduce the heat island effect in accordance with Green Star standards. Roof finishes will have a solar reflective index (SRI) of minimum 82 and hardscaping elements at ground level will have a solar reflective index (SRI) of minimum 39.
8. Daylight is provided to all hotel rooms and indoor public spaces (Restaurant, Function Room, Golf Club and Sports Bar) which reduces artificial lighting demand.

3.2 Energy

The following Energy initiatives are included:

1. The buildings are fully electrified including cooling, heating, hot water, and cooking. No fossil fuels / natural gas services are provided to the buildings.
2. A rooftop solar PV array provides renewable energy to power the building. Energy balance modelling demonstrates the system will provide at least 20% of the site's annual energy demand.

   A solar PV layout sketch is shown as follows (refer also to Appendix B).



Proposed solar PV array

3. HVAC systems comprise high-efficiency air-cooled heat pump thermal plant for heat rejection and heat injection. All central plant is contained within distinct plant enclosures which minimises acoustic impacts and visual obtrusiveness of plant equipment.
   - A ground-loop heat exchange system is being explored as an alternative heat rejection strategy, in collaboration with specialist consultants GeoExchange. This option will further improve heating and cooling system efficiencies and will provide a natural and renewable source of thermal energy from the ground.
4. A shared condenser water loop system will provide heating and cooling energy to the Hotel and Facilities buildings using an efficient centralised approach.
5. Heat recovery between HVAC and domestic hot water systems via the shared condenser water loop system. In summer when HVAC systems are in cooling mode and rejecting heat from the occupied spaces into the condenser water loop, the rejected heat energy will be recovered and used to heat water for showering and other domestic hot water uses.
6. High-efficiency electric heat pump domestic hot water plant. System efficiency rating (Coefficient of Performance) will be in excess of 300% efficient.

7. All hotel rooms have access to natural ventilation via private balconies. Air-conditioning will shut down automatically whenever the balcony door is left open, to save energy when guests choose to open up their room and allow natural ventilation and external breezes to enter.
8. Air-conditioning and lighting in hotel rooms will switch off automatically when rooms are unoccupied.
9. Economy cycle HVAC mode provides free-cooling in public spaces (Restaurant, Function Room, Golf Club and Sports Bar).
10. Demand-controlled ventilation including indoor CO_2 monitoring will reduce thermal loads in public spaces (Restaurant, Function Room, Golf Club and Sports Bar) whilst maintaining a high indoor air quality at all times.
11. Automatic BMS controls for retail and commercial HVAC systems with distinct thermal zoning to suit the comfort needs of individual areas.
12. Energy efficient LED lighting throughout.
13. Energy metering and sub-metering of distinct load centres, connected to a fully integrated BMS.

3.3 Water

The following Water initiatives are included:

1. A rainwater capture and reuse system will provide rainwater for landscape irrigation, laundry services, and washdown of golf carts/waste storage rooms. A 50 kL rainwater storage tank will contribute 13% of the development's total water demand / 25% of non-potable water demand.
2. Landscaping comprises native and drought-tolerant planting species which have low irrigation water demands.
3. Water efficient fittings with the following minimum WELS ratings:
    - Taps 6 Stars
    - WCs 4 Stars
    - Urinals 4 Stars
    - Showers 4 Stars
4. Selecting water-efficient washing machines and dishwashers which are within one Star of the highest available water rating.
5. No water will be consumed for HVAC heat rejection purposes, i.e. no cooling towers. All HVAC heat rejection will be air-cooled or via ground heat exchange.
6. Stormwater systems designed such that pre-development peak stormwater outflows will not be exceeded, and all stormwater run-off will be appropriately treated before discharge to the local waterways. The use of stormwater detention tanks will contribute to meeting these outcomes.

3.4 Waste

The following Waste initiatives are included:

1. Construction waste will be minimised through efficient design techniques including standardisation and off-site pre-fabrication wherever practicable. A minimum 90% diversion from landfill rate will be targeted.
2. Separate bins will be provided for organic waste, recyclable waste, and general waste, to encourage and facilitate diversion of waste from landfill.

3. Waste storage facilities for the collection and disposal of general, recyclable, organic waste, and bulky waste, which will be separated on site to facilitate ease of disposal for recycling.
4. A site-specific Operational Waste Management Plan will be developed in accordance with Green Building Council of Australia guidelines for best practice waste management. The Plan will inform the design of waste storage and handling facilities, waste bin provisions, and signage requirements.

3.5 Indoor Environment Quality

The following Indoor Environment Quality initiatives are included:

1. All hotel suites have access to natural ventilation via private balconies.
2. Mechanical ventilation will be provided to hotel rooms when balcony doors are closed, and to all public spaces. Outside air supplies will be in accordance with Green Star and AS1668.2 minimum requirements.
3. Daylight access is provided in all hotel suites and public spaces (Restaurant, Function Room, Golf Club and Sports Bar) in accordance with Green Star criteria (minimum 160 lux of daylight during at least 80% of daytime hours).
4. Glare from sunlight is managed through a combination of external shade elements, internal blinds, and building orientation (north-facing aspect).
5. Views to the surrounding natural landscapes are available in all occupied spaces.
6. The use of low VOC and low formaldehyde paints, sealants, adhesives, carpets, coverings, and furniture.
7. Acoustic performance in occupied spaces will be in accordance with Green Star and AS 2107 standards. Façade systems, acoustic treatments to internal ceilings and walls, and services plant will be designed to meet Green Star acoustic standards. This includes background noise levels, reverberation levels, and acoustic privacy requirements.
8. Air conditioning systems will be centralised, concealed, and located in acoustically sheltered plant areas, such that external noise will not impact on the amenity of guests, customers, or staff.

3.6 Construction

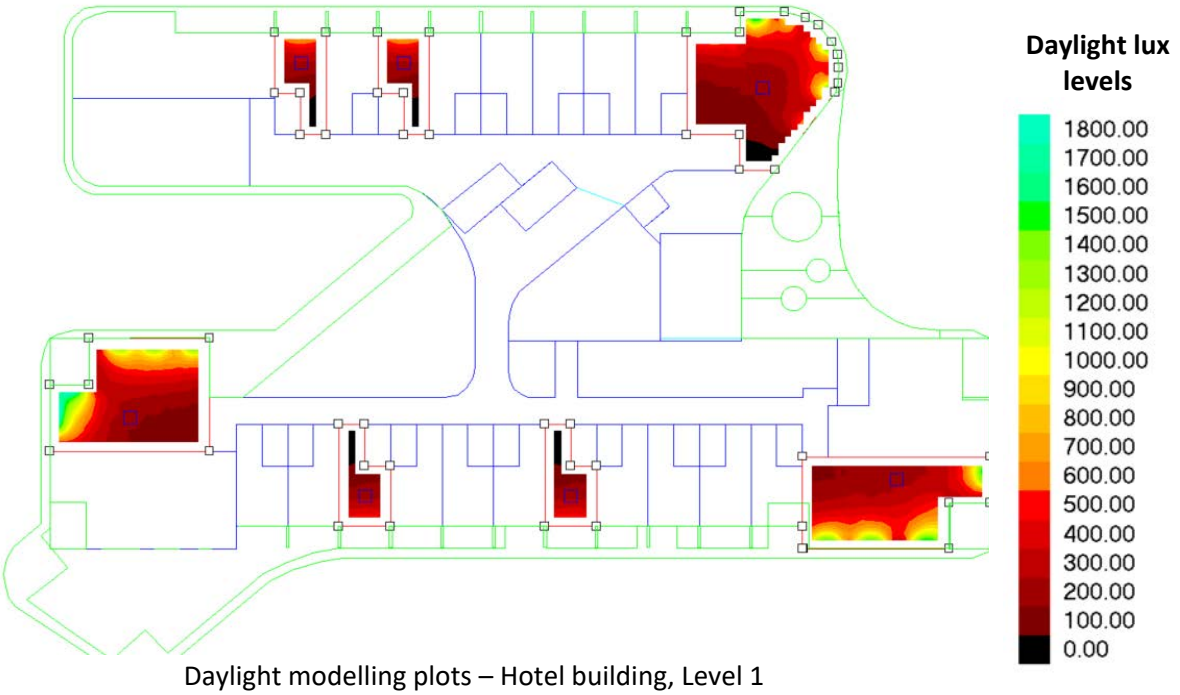
The following Construction initiatives are included:

1. Embodied carbon of construction (i.e. ‘upfront emissions’) will be at least 10% lower than a reference case, in line with Green Star requirements.
2. Refrigerants with low Global Warming Potential (GWP) ratings will be specified for central thermal plant and hot water plant.
3. Building materials which are made from recycled materials e.g. fly ash in concrete, reinforcement bar, recycled content floor coverings, and recycled insulation products, wherever viable.
4. Head contractor will be required to implement an Environmental Management Plan compliant with Green Star standards.
5. Using off site pre-fabrication techniques to reduce on site construction time, waste, and greenhouse gas emissions, wherever practicable.
6. Locally sourced materials and labour will be sought wherever viable.
7. Using Building Information Modelling (BIM) as a design and construction management tool to minimise on-site clashes and abortive/wasteful work.

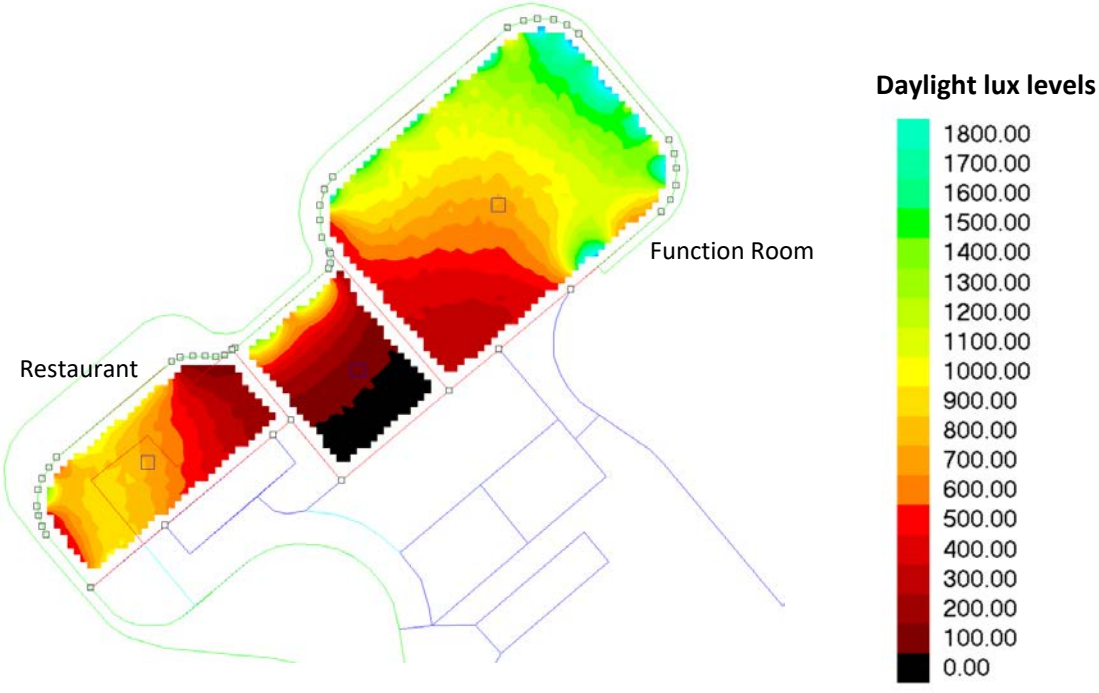
3.7 Community and Social Sustainability

The following social sustainability initiatives are included:

1. The development includes a Wellness Centre, Gym, and extensive common outdoor amenity space.
2. The Facilities building is designed and located as a shared gathering point for various users and visitors including golf players, hotel patrons, restaurant customers, gym users, and Function Room guests. Shared outdoor terraces encourage interaction and community between the various user groups.
3. A communal creche / childcare is provided in the Hotel building.
4. All public spaces have good access to daylight, ventilation, and views to the surrounding landscapes.
5. Heritage listed Scent Factory building from the historic Mount Lofty Flower Farm will be restored as part of the development works, and incorporated as an attraction feature for guests and visitors to the development.
6. Local ecology and vegetation will be featured and integrated into the development.

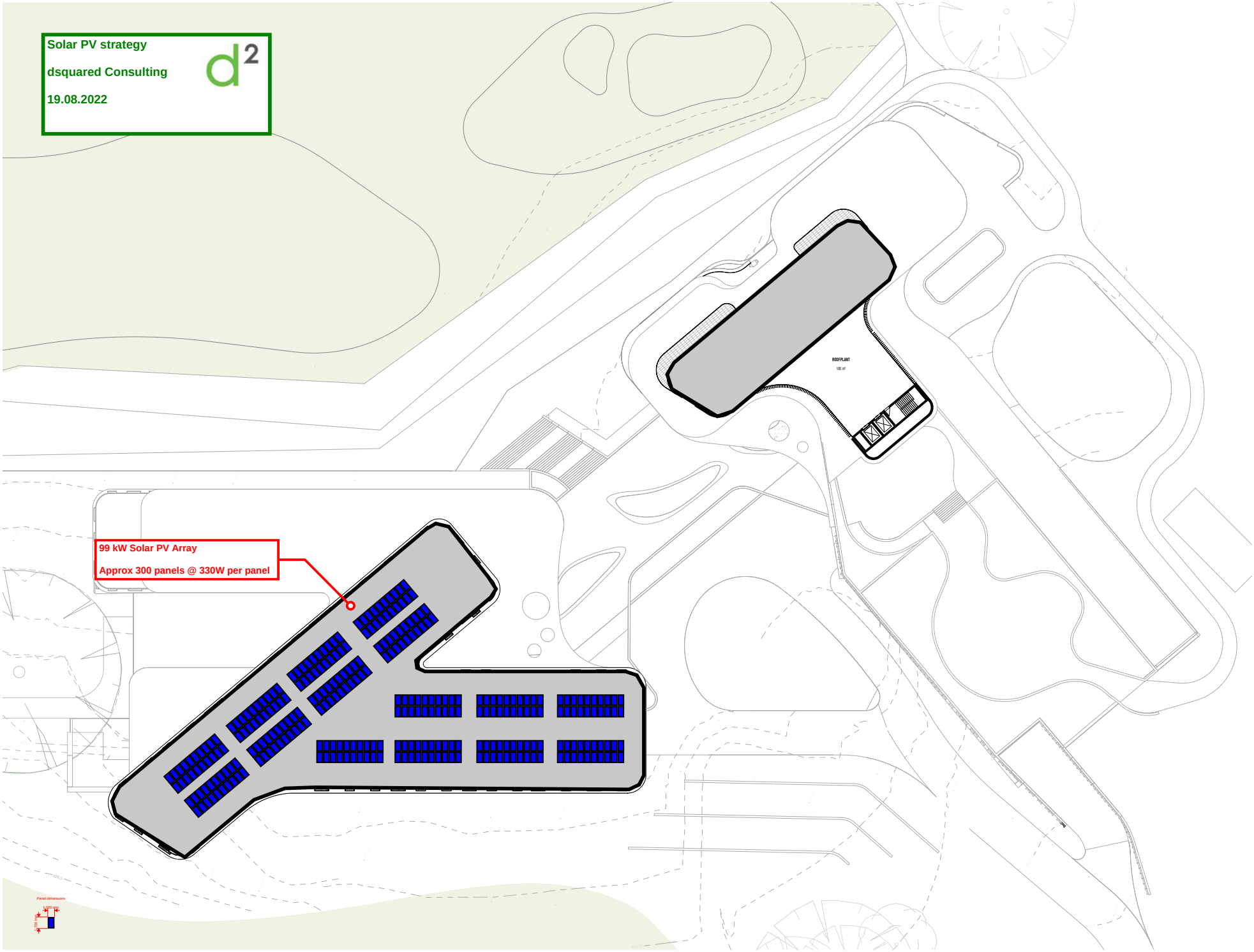


Daylight modelling plots – Hotel building, Level 1



Daylight modelling plots – Facilities building, Level 1

Appendix B Solar PV sketch layout



HOTEL DEVELOPMENT SUMMARY

35 GOLFLINKS RD, STIRLING, SA.

DEVELOPMENT SITE AREA	
HOTEL	
SUITES	56 SUITES
SERVICED APARTMENT - 2 BED	15 APARTMENTS
SERVICED APARTMENT - 3 BED	15 APARTMENTS
PENTHOUSE APARTMENTS	2 APARTMENTS
TOTAL	88 UNITS
TOTAL	20 UNITS - 1 BEDROOM
PARKING	
CAR SPACES - MAIN BUILDING	200 SPACES
CAR SPACES - PERFUMERY OVERFLOW	50 SPACES

AREA SUMMARY

AREA TYPE	AREA
FACILITIES	
BACK OF HOUSE / SERV - LG	1039 m²
BACK OF HOUSE / SERV - LVL 1	233 m²
GROUND FLOOR - F&B	325 m²
GROUND FLOOR - GOLF	429 m²
LEVEL 1	1393 m²
LEVEL 2	570 m²
LEVEL 3	447 m²
LOWER GROUND	937 m²
SERVICES CORE-L3	54 m²
	5426 m²
FACILITIES CARPARK	
FIRST FLOOR CARPARK	1461 m²
GROUD FLOOR CARPARK	1886 m²
LOADING BAY	67 m²
	3413 m²
HOTEL	
GROUND FLOOR	1095 m²
LEVEL 1	2334 m²
LEVEL 2	1659 m²
LEVEL 3	1921 m²
LOWER GROUND	1149 m²
	8157 m²
HOTEL CARPARK	
HOTEL CARPARK	1352 m²
LOWER GROUND CARPARK	1515 m²
	2867 m²
Grand total: 19	19864 m²

No.	Description	Date
A	CONSULTANT REVIEW	20.10.21
B	DA SUBMISSION	01.12.21

PROJECT
MOUNT LOFT GOLF ESTATE

ADDRESS
35 GOLF LINKS ROAD, STIRLING SA 5152

Scale@A1	1:250
Scale@A3	1:500
Date:	01.12.21
Drawn:	Author

SHEET NAME
LEVEL 3 PLAN

SHEET NO.
TP06

REVISION:
B

PRELIMINARY *NOT FOR CONSTRUCTION*

r architecture
architecture | interior design | urban design | landscape
ph: 8362 0328 e: studio@rarchitecture.com.au

Appendix I

Traffic and Access Impact Statement – Cirqa

MOUNT LOFTY GOLF ESTATE
GOLFLINKS ROAD, STIRLING

TRAFFIC AND ACCESS IMPACT STATEMENT

CIRQA™

DISCLAIMER

DOCUMENT CONTROL

Report title:	Mount Lofty Golf Estate (Stirling Golf Club Redevelopment) Traffic and Access Impact Statement
Project number:	21117
Client:	Trice Pty Ltd
Client contact:	Sonia Mercorella

Version	Date	Details/status	Prepared by	Approved by
Draft	6 Sep 22	For review	ABH	BNW
V1.0	8 Dec 22	For submission	ABH	BNW
V1.1	20 Mar 23	Update	ABH	BNW
V1.2	14 Mar 24	Updated proposal	ABH	BNW
V1.3	28 Mar 24	Minor updates	ABH	BNW
V1.4	30 May 24	Updated plans	ABH	BNW

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

CIRQA has been engaged to provide design and assessment advice for the Mount Lofty Golf Estate at 35 Golflinks Road, Stirling. Specifically, CIRQA has been engaged to provide advice in respect to traffic and parking aspects of the proposal.

This report provides a review of the subject site, the proposed development, its access and parking provisions and the associated traffic impact on the adjacent road network.

The proposal comprises the redevelopment of the Stirling Golf Club to provide tourist accommodation, golf course (existing) and associated club facilities (ancillary bar, gymnasium and function rooms), together with landscaping, subdivision, tree and native vegetation removal (to be referred to as Mount Lofty Golf Estate).

Vehicle access to the site will primarily be provided via the existing two-way access point on Golflinks Road and an access point on Old Carey Gully Road (albeit emergency vehicle access will also be accommodated at an additional access on Golflinks Road). The site has been designed such that all vehicles can enter and exit in a forward direction. The parking and access areas within the site will be provided in accordance with the relevant Australian Standards. Adequate areas for waste storage and collection have been provided within the site.

A total of 200 formalised parking spaces plus a porte cochère (set-down/pick-up) facility will be provided within the hotel and golf facility buildings. Additional parking will also be provided adjacent the 'Perfumery' building (20 spaces) and a 37-space staff car park adjacent the circulation road connecting from Old Carey Gully Road with further informal parking opportunities within the site. There would be a shortfall in parking provision when assessed against the Deemed to Satisfy criteria of the Planning and Design Code. However, such an assessment grossly overestimates realistic demands associated with the proposed uses given the shared and complimentary parking arrangements that will be achieved within the site. An alternative assessment based on realistic demand rates (taking into account data from comparable developments) identifies that the proposed provision will be adequate to accommodate the overall peak parking requirements during key demand periods (and at all other times). Such an approach is contemplated by the Planning and Design Code (which allows application of lower parking rates where justified based on specific development and land use considerations).

The proposal is conservatively forecast to generate an additional 40 to 85 movements during the site's peak hours. While there will be an increase in

movements on Golflinks Road and Old Carey Gully Road, the additional movements would be accommodated without significant impact on traffic conditions. Notably, the future traffic volumes on Golflinks Road would remain within the level typically associated with a local road and the proposal therefore will not change the nature or function of Golflinks Road (nor other adjacent roads).

Detailed analysis has also been prepared in respect to weekday am and pm peak hours and the weekend (Saturday) peak hour conditions at surrounding key intersections as well as the site's access point on Golflinks Road. The analysis identifies that the access point and key intersections surrounding the site would easily accommodate the additional movements with minimal impact. The analysis has also been prepared on a conservative basis and realistic results would be even better than suggested by the assessment. While minor shoulder sealing treatments would be of benefit on Golflinks Road and its intersection with Old Carey Gully Road, major upgrades to the adjacent road network are not considered necessary to accommodate the additional volumes forecast. In addition to these road works, it is proposed to provide a path within the site (but publicly accessible) to improve pedestrian and cyclist amenity and safety (as an alternative to utilising the Golflinks Road carriageway).

A sitewide Master Plan is attached in Appendix A.

2. BACKGROUND

2.1 SUBJECT SITE

The subject site is located on the corner of Old Carey Gully Road and Golflinks Road, Stirling. The site is bound by residential properties to the north, Mount George Conservation Park to the east, Golflinks Road to the south and Old Carey Gully Road to the west. Figure 1 illustrates the location of the subject site with respect to the adjacent road network.

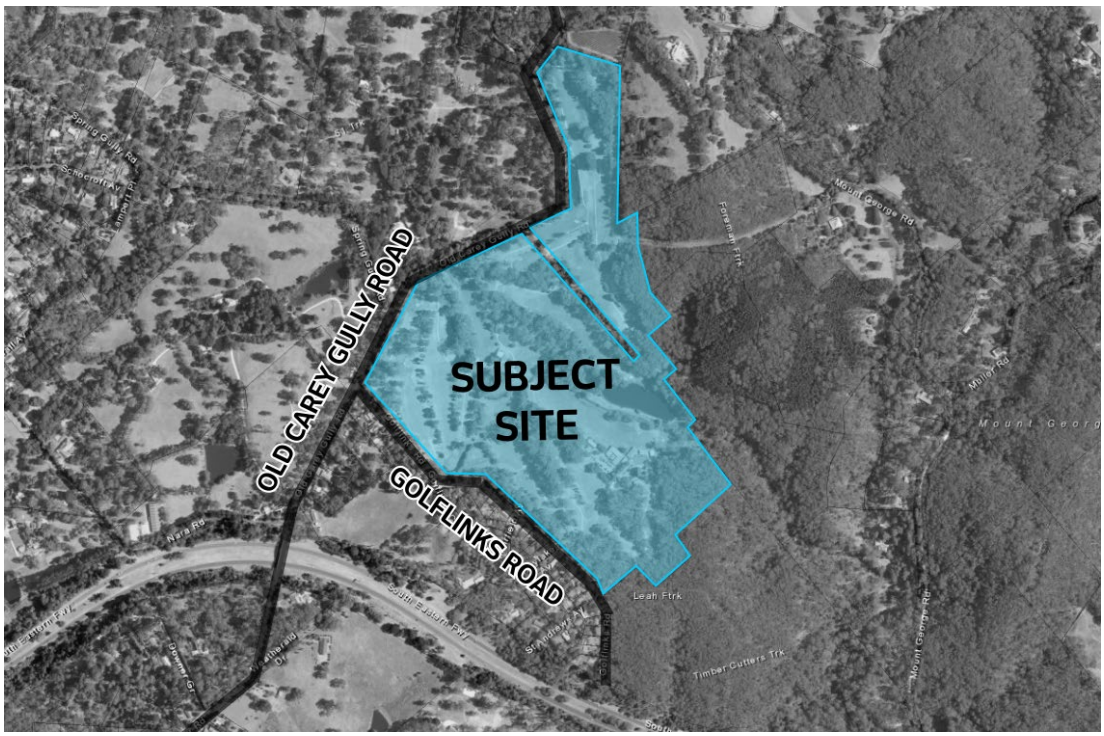

Figure 1 – Location of the subject site with respect to the adjacent road network

The Planning and Design Code identifies that the site is located within a Recreation Zone, with the following Overlays applicable:

- Environment and Food Production Area;
- Hazards (Bushfire – High Risk);
- Hazards (Flooding – Evidence Required);
- Local Heritage Place;
- Mount Lofty Ranges Water Supply Catchment (Area 2);
- Native Vegetation;
- Prescribed Water Resources Area;

- State Significant Native Vegetation;
- Traffic Generating Development; and
- Water Resources.

The subject site is currently occupied by the existing Stirling Golf Club including the 18-hole golf course and its associated clubroom, pro-shop, five motel rooms, offices, maintenance buildings and the 'Perfumery' building. The Club hosts functions and weddings (for up to 300 guests) as well as regular events. Notably, commercial vehicles (such as refuse collection vehicles, delivery vehicles and buses) currently access the site via Golflinks Road.

General vehicle access is provided via a primary access point on Golflinks Road (near the southern end of the site), at which all turning movements are permitted. The site contains an easement for Davenport Road, which is an unsealed track that runs from Carey Gully Road along the Heysen Trail through the site. Maintenance access points are also provided on Carey Gully Road.

The primary parking areas are located to the east and south of the main buildings. A total of 71 parking spaces are provided in these areas. Additional informal parking is also available within the site.

2.2 ADJACENT ROAD NETWORK

Golflinks Road is a local road under the care and control of Adelaide Hills Council. Golflinks Road generally comprises an approximately 5.5 m to 6.0 m wide carriageway with a single traffic lane in each direction. No Stopping restrictions apply on both sides of Golflinks Road. Traffic data recorded by Adelaide Hills Council indicates that the Average Annual Daily Traffic (AADT) volume is in the order of 444 vehicles per day (vpd). In comparison, 'local roads' are typically considered to have upper volume limits in the order of 1,500 to 2,000 vpd (such levels relate to amenity considerations as technical capacity would be higher). The default urban speed limit of 50 km/h applies on Golflinks Road.

Old Carey Gully Road is a minor collector road under the care and control of Adelaide Hills Council. Old Carey Gully Road comprises a 6.2 m wide carriageway (approximate) with a single traffic lane each direction. No Stopping restrictions apply on both sides of Old Carey Gully Road. The speed limit varies along the stretch of Old Carey Gully Road adjacent the site. Approximately 50 m north of the Cox Creek crossing, the speed limit changes with a 50 km/h zone south of this point and an 80 km/h zone north of this point. Traffic data recorded by Austraffic (on behalf of CIRQA) indicates Old Carey Gully Road has a daily traffic volume of approximately 1,625 vpd (which is well below the upper level of 3,000 vpd typically associated with minor collector roads).

Old Carey Gully Road and Golflinks Road form a priority-controlled T-intersection (with priority assigned to Old Carey Gully Road). All turning movements are permitted at this intersection.

A review of available crash statistics provided by the Department for Infrastructure and Transport (DIT) (for the last available 5-year period) indicates that there have been no reported crashes on Golflinks Road or at the intersection of Old Carey Gully Road/Golflinks Road. Only one reported crash is identified within the DIT data as having occurred within the vicinity of the site. The crash was a 'hit fixed object' single car crash that occurred at night and occurred towards the north-eastern corner of the site (at the bend in Old Carey Gully Road).

2.3 WALKING AND CYCLING

No footpaths or bicycle lanes are provided on either Golflinks Road or Old Carey Gully Road (both pedestrians and cyclists are required to share the carriageway with vehicles).

The Heysen Trail is located within the subject site (along the north-eastern side of the site). The Heysen Trail is South Australia's premier walking trail comprising approximately 1,200 km of trail between Cape Jervis (on the Fleurieu Peninsula) to Parachilna Gorge (in the Flinders Ranges). Given the subject section's location within the Adelaide Hills and relatively close proximity to Adelaide, the adjacent section forms one of the higher use portions of the trail.

3. PROPOSED DEVELOPMENT

3.1 LAND USE AND YIELD

The traffic and parking assessments have been based upon plans prepared by R Architecture (Drawings TP00 to TP17 dated 31 August 2023). Specifically, the proposed development comprises redevelopment of the subject site including:

- construction of a three to five level tourist accommodation building comprising 56 units, 15 two-bedroom serviced apartments, 15 three-bedroom serviced apartments and 2 penthouse serviced apartments. Together with, back of house, plant storage and maintenance areas, function room (537 m² with a capacity for 270 patrons), restaurant (200 m² internal area with an 89 m² external terrace with a capacity for 80 patrons), sports bar (185 m² with capacity for 80 patrons), gallery and cafe (combined 190 m² area with capacity for 85 patrons) and wellness centre (74 m²);
- adaptive reuse of the Local Heritage Perfumery building as a retail, cafe and multipurpose function space (190 m² combined area and a capacity for 50 patrons);
- golf course facilities building comprising function facilities, cart storage and clubhouse (138 m² and 52 patron capacity), pro-shop (100 m²), administration areas, gym (125 m²) and change rooms;
- retention of the 18-hole golf course with improvements;
- car parking, access and waste management including 200 car parking spaces within the tourist accommodation and golf facilities buildings, plus dedicated areas for staff and the perfumery with an additional 57 spaces (257 spaces in total);
- subdivision of the land (1 into 3) allotments to formalise the areas for tourist accommodation, golf course facilities building and balance of the site for leasing purposes;
- stormwater detention basin, creek and lake restoration activities including planting natives in the beds, erosion control works and creek crossings;
- construction of entry wall and new entry signage at the existing Golflinks Road entry; and
- new dedicated pedestrian trail adjacent Golflinks Road.

A whole of site master plan prepared by Oxigen is attached in Appendix A.

3.2 ACCESS AND PARKING DESIGN

Vehicle access to the site will be provided via three locations, namely the existing access points on Golflinks Road and Old Carey Gully Road as well as a new

emergency access point on Golflinks Road. The access arrangements are detailed further below.

The existing crossover on Golflinks Road and associated internal circulation road is proposed to provide access to the various parking areas, the loading/service bay and a porte cochère (set-down/ pick-up lane). The existing geometry of the site access will be retained (which currently accommodates two-way movements as well as commercial vehicle movements associated with the existing site uses).

The existing central access on Old Carey Gully Road will continue to be utilised for access for the site. This access will be utilised for vehicle access to the 'Perfumery' building as well as a staff car parking area. The access will be sealed and widened to accommodate two-way movements (i.e. a minimum width of 6.0 m with additional flaring to accommodate vehicle turns). Figure 2 illustrates a concept layout of the access. It is also proposed that the existing speed limit change (located west of the access point) be shifted further east such that this access will be located within a 60 km/h (not a 80 km/h zone). Such an outcome is considered desirable to optimise road safety at this location. Liaison has been undertaken with Council representatives who are supportive of the relocation and have noted it would be desirable to shift the speed limit change east of the Heysen Trail to also provide safety benefits for trail users crossing Old Carey Gully Road.

Minor trimming of roadside vegetation may also be required (to the north of the access) to ensure adequate sight distance provisions between drivers exiting the access and others travelling along Old Carey Gully Road. This can be confirmed as part of detailed design.

Figure 2 – Access treatment on Old Carey Gully Road to accommodate two-way movements

An additional emergency vehicle (only) access will be provided further west on Golflinks Road for an additional option for CFS fire appliance access to access the site (CFS vehicles will also be able to utilise the other access points and internal access routes). Detailed design of the vehicle connection to and within the site shall ensure conformance with the relevant provisions of the Planning and Design Code.

No change in the use of Davenport Road is proposed as part of the project. The unmade road will be retained as a fire access track and as part of the Heysen Trail. Maintenance access for the golf course will also utilise sections of Davenport Port for access to/from the holes located north of it (as currently occurs).

In addition to the vehicular provisions, pedestrian connections will be provided within the site. Notably, this includes the provision of a path aligned (effectively) parallel to Golflinks Road. This path will be made publicly accessible and will be available for the surrounding community (as well as guests, visitors and staff of the site) to utilise for walking (as well as cycling) rather than the carriageway of Golflinks Road.

The site will be serviced by parking areas within the two hotel/golf club buildings with a total of 200 parking spaces provided (of which four spaces will be reserved exclusively for use by people with disabilities). An additional three cars can be accommodated within the porte cochère (albeit this can also accommodate buses).

In addition, 20 spaces will be provided adjacent the 'Perfumery' and a further 37 staff only spaces will be provided adjacent the circulation road connecting to the Old Carey Gully Road access. It is also noted that, if needed for large events, parking can be accommodated on the golf course holes (albeit such use would be rare/infrequent and not considered a typical design demand scenario).

The detailed design of the parking areas shall comply with the requirements of Australian/New Zealand Standard, *Parking Facilities Part 1: Off-street car parking* (AS/NZS 2890.1:2004) and Australian/New Zealand Standard, *Parking Facilities Part 6: Off-street parking for people with disabilities* (AS/NZS 2890.6:2009) in that:

- regular parking spaces shall be at least 2.5 m wide and 5.4 m long (or 4.8 m long with 0.6 m overhang);
- the parking spaces for use by persons with disabilities shall be 2.4 m wide and 5.4 m long (with an adjacent shared space of the same dimension);
- the parking aisles shall be at least 5.8 m wide (albeit the primary circulation aisle will be 6.5 m where two-way to accommodate commercial vehicle movements);
- 1.0 m end-of-aisle extensions shall be provided beyond the last parking spaces in a 'blind' aisle;
- turn-around bays shall be provided at the end of the 'blind' aisles in publicly accessible parking areas;
- ramp gradients where only car access is required shall have a maximum grade of 1 in 5 with adjacent 1 in 8 transitions. Where commercial vehicle access is required, grades shall not exceed 1 in 6.5 (albeit will generally be flatter) with transitions also to be provided (detailed design should ensure site levels achieve the required ramping requirements of the relevant Australian Standards and that vertical clearance analysis is done for commercial vehicle areas); and
- a minimum headheight of 2.3 m shall be achieved within the general parking areas with a greater provision of at least 3.8 m for the service bay and associated access area (this will need to be confirmed as part of detailed design and can be conditioned accordingly).

3.3 DELIVERIES AND SERVICING

Deliveries and servicing (including refuse collection) will occur via a dedicated service bay within the eastern hotel building. This area will accommodate vehicles up to 10.4 m in length allowing for a range of refuse collection vehicles and other delivery vehicles to access the site (albeit delivery vehicles would mostly be smaller than this size).

Figure 3 illustrates the turn path for a 10.4 m truck to enter and exit the site in a forward direction.

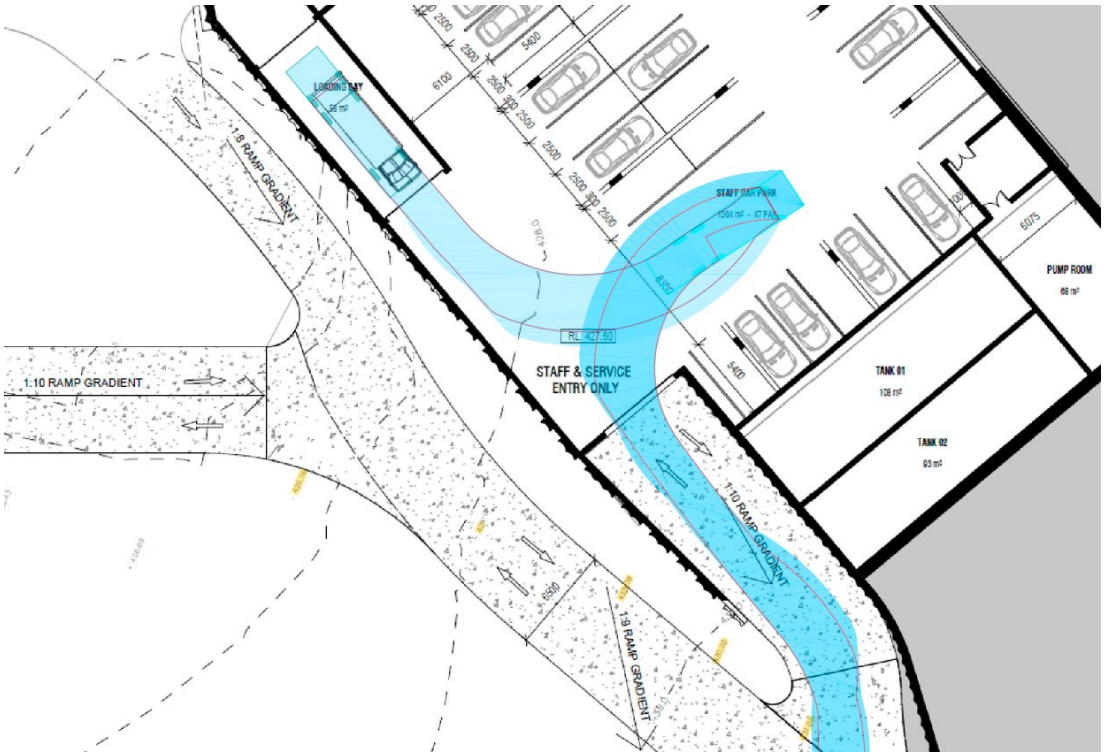

Figure 3 – 10.4 m refuse collection vehicle turning movements

The porte cochère will accommodate bus movements as well as CFS vehicle movements (allowing for turnaround by vehicles up to 12.5 m in length) as illustrated in Figure 4.

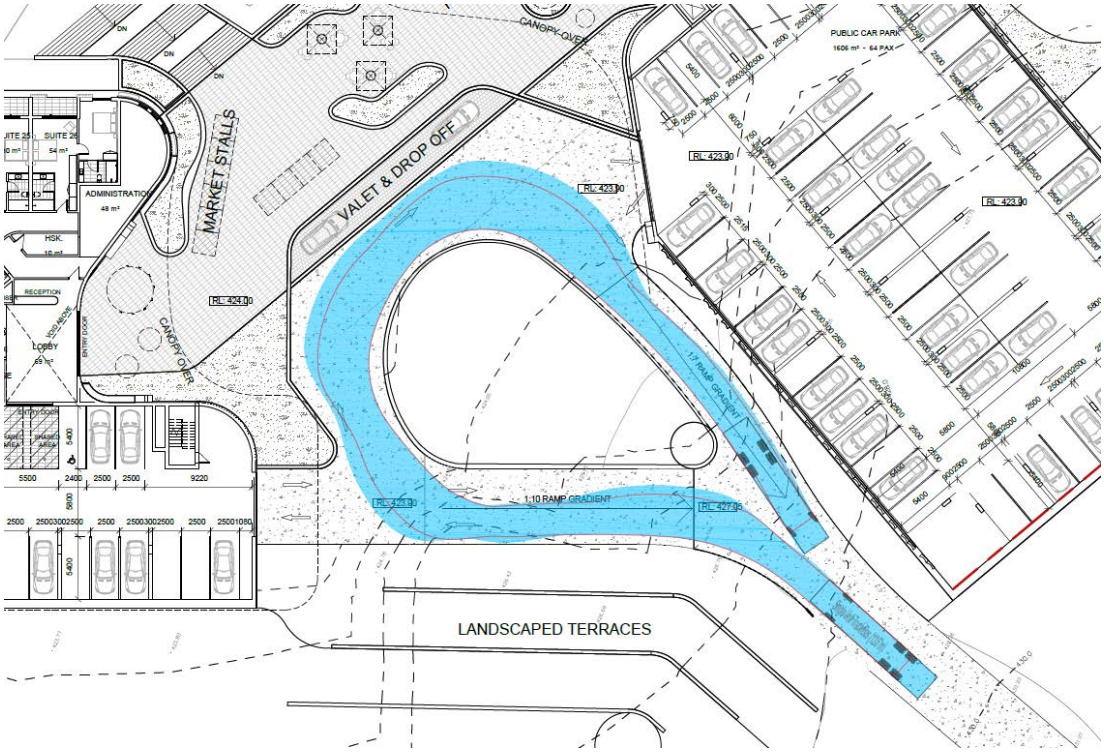

Figure 4 – 12.5 m bus turnaround movement in porte cochère

In respect to the accommodation of commercial vehicles associated with the site on Golflinks Road, it is noted that such vehicles are already required for access to/from the site. This includes heavy rigid trucks for refuse collection/deliveries and buses for weddings/functions. Notably, the proposed function facility will have a similar (albeit slightly smaller) capacity than that currently identified for the site. Therefore, while the number of times buses are utilised per year may increase (if more weddings/functions are held), the number over a single hour (typical period for assessment of traffic impacts) would be unlikely to be associated with a notable change. Similarly, while there will be increased demands for servicing and deliveries, this does not necessarily mean a commensurate increase in commercial vehicle movements, particularly refuse collection trucks, as the existing services could have additional capacity available within the existing services. There would likely be an increase in the number of delivery movements made by commercial vehicles, however these would generally be smaller than the refuse collection vehicles (i.e. small to medium rigid vehicles).

4. PARKING ASSESSMENT

The Planning and Design Code identifies a number of parking rates applicable to this development:

- tourist accommodation – one car parking space per accommodation unit/ guest room;
- hotel – one space for every 2 m² of total floor area in a public bar, plus one space for every 6 m² of total floor area available to the public in a lounge or beer garden, plus one space per two gaming machines, plus one space per three seats in a restaurant [applied to the food and beverage components of the hotel];
- indoor recreation facility – 4.5 spaces per 100 m² of total floor area [applied to the gymnasium and wellness centre]; and
- meeting hall [applied to the function room] – 0.2 spaces per seat.

For the purposes of this assessment, it is assumed that parking demands associated with the golf course and its facilities (clubroom, pro-shop etc.) remain as per the current situation as there are no specific applicable rates for golf courses (albeit a literature review has indicated similar golf courses, including their various facilities, have been traditionally assessed on the basis of four spaces per hole – this would equate to 72 spaces which is similar to the existing provisions).

On this basis the proposed uses within the site would require 281 parking spaces (rounded) plus the additional 71 spaces currently provided for the golf club and its facilities. However, the above rates are typically applied to standalone developments and are excessively conservative (and onerous) for application to the subject proposal.

Specifically, the above rates include no allowance for consideration of realistic occupancy rates and that the food, beverage, function, Perfumery building, gym and wellness areas are largely (and, in some instances, wholly) ancillary to the accommodation component.

There will also be shared demands between the tourist accommodation and the golf club (i.e. hotel guests who play golf at the site). Additionally, such an assessment does not consider the differing peaks of the uses (particularly the golf course compared to the proposed components) and the ability to provide a shared and complimentary parking arrangement within the site.

Notably, while the proposal would not strictly meet the Deemed to Satisfy criteria of the Code in respect to parking provision, it is noted that Performance Objective

5.1 of the General Development Policies (Transport, Access and Parking) states the following:

> *"Sufficient on-site vehicle parking and specifically marked accessible car parking places are provided to meet the needs of the development or land use having regard to factors that may support a reduced on-site rate…"* (our emphases)

The Planning and Design Code therefore contemplates acceptance of lower parking provisions (than suggested by the specified rates) based on development and land use considerations.

In comparison to the direct application of the Code's rates, it is noted that the recently approved Dock One Hotel in Port Adelaide was assessed by GTA Consultants (traffic consultants) on the basis of surveys at a number of similar suburban accommodation sites (and subsequently approved by the State Commission Assessment Panel). GTA adopted the average demand rate of 0.44 spaces per bedroom on a weekday evening and 0.4 spaces per bedroom on a weekend evening for assessment of the Hotel. It is noted that, if the 85th percentile rates were adopted, the demands would be 0.61 spaces per bedroom on a weekday evening and 0.58 spaces per bedroom on a weekend evening.

Notably, GTA stated that the accommodation "*… would not typically be above 85% occupancy during normal operating conditions*". Furthermore, the hotel included a 270 m² restaurant which was assessed at being wholly ancillary to the accommodation use and no additional parking was provided for that use.

If the higher 85th percentile rate calculated from the GTA information was adopted, there would be a demand for 53 spaces during a weekday peak evening and 50 spaces during a weekend peak evening. While not addressed in the GTA assessment, it is noted that peak parking demands at accommodation facilities during the day between 10:00 am and 6:00 pm) are much lower (in the order of 20% to 25%) than the evening peaks as guests are typically off-site at these times.

It is acknowledged that the locality of the Dock One Hotel provides a higher level of public transport accessibility. It is therefore considered that, for the accommodation component, the higher 85th percentile rates noted above should be adopted for the assessment of the proposal.

In respect to the other uses on the site, it is anticipated that the food and beverage uses will largely be ancillary to the accommodation uses (i.e. patrons of these areas would generally also be guests of the hotel). Nevertheless, there would be potential for the general public to also access the facilities. Accordingly, it is considered pertinent to include a proportion of additional demand for these

areas. For the gym, wellness centre and the Perfumery gift shop, it has been assumed that these will be wholly ancillary to the tourist accommodation and golf club (however, the Perfumery café/function area has been included in the assessment). For the existing golf club, it is assumed that the current provision of 71 spaces is equivalent to its peak design demand.

In order to further consider likely demands associated with the overall proposal, an assessment has been made of three key demand periods, namely the hotel peak period (weekday evening), the golf course peak (Saturday lunch) and the hotel weekend peak period (weekend evenings). The following assumptions have been adopted for the two scenarios:

- weekday (hotel) peak
  - the tourist accommodation units will generate at a peak demand for 53 spaces (based on the higher 85th percentile rates from the GTA survey data);
  - the food and beverage components will generate at 50% of the Planning and Design Code rates (i.e. assuming peak occupancy but that half of the patrons are hotel guests and the remaining half are general public requiring parking); and
  - the golf club use generates a demand for 25% of its peak.
- weekend lunch (golf) peak
  - the tourist accommodation units will generate at a demand for 14 spaces (based on a conservative assumption of 50% of guests remaining on-site during the day – noting that those playing golf are essentially 'double counted' in the golf club demand);
  - the food and beverage components will generate at 50% of the Planning and Design Code rates (i.e. assuming 50% of the patrons during the lunch period are hotel guests and the remaining 50% are general public requiring parking); and
  - the golf club use generates a demand for its full peak of 65 spaces.
- weekend evening (secondary hotel) peak
  - the tourist accommodation units will generate at a peak demand for 50 spaces (based on the higher 85th percentile weekend rates from the GTA survey data);
  - the food and beverage components will generate at 25% of the Planning and Design Code rates (i.e. assuming 75% of the patrons are hotel guests and the remaining 25% are general public requiring parking); and
  - the golf club use generates a demand for 25% of its peak.

On the basis of the above, the parking assessment indicates an overall demand for 149 parking spaces during the weekday evening peak, 164 spaces during the Saturday lunch period and 125 parking spaces during the weekend hotel peak period. Such levels of demand would easily be accommodated with the proposed 257 spaces (including the Perfumery and staff car park spaces) plus additional porte cochère spaces. In addition, there are additional informal/overflow parking areas within the site that could be used in the infrequent/unlikely event of higher demands (use of overflow areas can be managed by staff on an as needs basis).

Notably, even if maximum theoretical requirement of 86 spaces for the tourist accommodation was realised (i.e. DTS/DPF rate applied to this component) with the other above assumptions adopted for the other components, the peak 'requirement' on-site would be for 236 parking spaces. As above, this is a conservative assumption, as it would occur during the lunch time period and tourist accommodation demands at this time would not peak. Nevertheless, this demonstrates that, even assessed conservatively, there would be adequate parking provision within the site.

It is noted that the above parking assessment methodology was the same as that adopted by CIRQA for the 35 South Marina's hotel development in North Haven which was approved by SCAP in 2020. The 35 South project was similar to the current proposal in that it considered the development of a hotel with associated food, beverage and function areas around an existing recreational (marina) use. The 35 South assessment (and its approval) acknowledged the variance in temporal demands associated with such a mixed-use development as applied above.

5. TRAFFIC GENERATION AND DISTRIBUTION

5.1 CONSTRUCTION PHASE

5.1.1 CONSTRUCTION TRAFFIC GENERATION

Movements generated during the construction phase would relate to the removal of demolition waste and delivery of construction equipment and materials as well as the movement of workers associated with the project. These movements will be associated with a range of vehicle types (from light vehicles to heavy commercial). Specific details are not yet available in respect to the number of anticipated staff/trades associated with the construction nor commercial vehicle movements. Such details will be dependent on the selection of the construction contractor, their construction methodology and timing. This could be further reviewed as part of the preparation of a Construction Environmental Management Plan (CEMP) once development approval has been achieved. However, for the purposes of this assessment, the following commentary is provided in respect to construction traffic management considerations.

Based on other projects CIRQA has provided advice on, it is anticipated that there would typically be 20 to 30 staff/trades on site each day during construction (this will vary depending on the construction phase). Assuming all workers drive to the site, this would result in at least 30 to 60 light vehicle movements per day (albeit this may be slightly higher as some workers may need to undertake additional trips). Generally, it is considered that in the order of 100 light vehicle movements could be generated per day (of construction). Vehicles associated with workers will typically be light/domestic vehicles (up to dual-cab 'ute' in size or similar).

Vehicle types associated with the construction of the infrastructure will include a range of demolition, general construction/delivery vehicles and earthmoving equipment. It is anticipated that such movements would be undertaken by 19.0 m Semi-Trailers or smaller rigid trucks (i.e. general access vehicles). Should access to the site be sought with larger and/or specialised vehicles (including Restricted Access Vehicles, oversize and/or overmass vehicles), access permits would be required to be sought from the National Heavy Vehicle Regulator (NHVR) and the relevant road authorities (the respective Councils and/or DIT). While numbers would need to be confirmed by the construction contractor, based on CIRQA's experience, it is anticipated there would be typically be in the order of 20 to 40 commercial vehicle movements per day (albeit, as with staff/trades movements, this will vary depending on the construction phase).

In order to minimise impacts on Golflinks Road and surrounding residents, it is recommended that the construction methodology seeks to:

- utilise the Old Carey Gully Road access for construction vehicle and equipment access as well as construction staff/trades access to the maximum extent feasible. Internal access provisions (including a suitable creek crossing) will need to be implemented for commercial vehicle access to the building sites during construction;
- in the event that access is for construction vehicles and/or equipment is required by Golflinks Road (not feasibly achieved via the Old Carey Gully Road access), liaise with Council in respect to the required movements and consider the need for temporary traffic control to accommodate the movements; and
- retain as much construction equipment/plant on-site during the duration of the construction phase to minimise movements by heavy vehicles to/from the site.

5.1.2 CONSTRUCTION TRAFFIC DISTRIBUTION

While subject to the specific construction contractor's methodology, as above, it is recommended that construction traffic be distributed primarily via the Old Carey Gully Road access point.

Other than a small proportion of trades/construction staff originating from the north of the site or those locally based, it is anticipated that the vast majority of construction related movements would be undertaken via the South Eastern Freeway. Movements between the South Eastern Freeway and the site would utilise the route via Pomona Road, Gould Road, Old Mount Barker Road and Old Carey Gully Road.

5.2 OPERATIONAL PHASE

5.2.1 OPERATIONAL TRAFFIC GENERATION

The RTA's "*Guide to Traffic Generating Developments*" (the RTA Guide), and its subsequent updates, are documents commonly used by traffic engineers in order to determine the forecast traffic generation of a variety of land uses. The RTA Guide identifies the following peak period trip generation rates applicable to this development:

- tourist accommodation – 0.4 trips per unit; and
- restaurant/café/function room – 5.0 trips per 100 m² gross floor area;

On the basis of the above rates, the proposed (additional) uses are forecast to generate 107 additional peak hour trips. However, as with parking, not all uses will peak at the same time and the food and beverage facilities will largely be ancillary to tourist accommodation. Adopting similar assumptions as the parking

assessment, it forecast that the peak traffic generation of the site would be in the order of 42 to 70 additional peak hour trips (assuming all uses are at full occupancy).

This would equate to a theoretical increase of approximately 560 additional daily movements. However, this assumes full occupancy of all uses on site which would rarely (if ever) occur. Typically, there will be fluctuations in occupancy of the various uses and the actual increase in the AADT volume would be more likely to be in the order of 290 additional daily trips (noting that volumes associated with the golf club are already accommodated on the adjacent road network).

To further demonstrate that realistic volumes will be less than suggested by a purely theoretical assessment, traffic volumes have been recorded at the Novotel Barossa tourist accommodation facility and golf course. This site was selected due to being of a comparable mix of uses (including conference and function uses) and size (albeit, notably, the Novotel Barossa has a larger accommodation offering with 140 rooms). The Novotel Barossa also experiences a high level of occupancy. The traffic data recorded at the Novotel Barossa (over a week in September 2023) indicated an average traffic volume of approximately 300 trips per day (and a peak in the order of 350 daily trips on the recorded Saturday). Noting the proposed development tourist accommodation will be approximately 60% the capacity of the Novotel Barossa, this suggest even lower volumes could be associated with the proposal.

The majority of movements associated with the development will be light/ domestic vehicles, however, there will also be some commercial vehicle movements associated with service and delivery movements (a proportion of which would already be generated by the existing uses). The following movements associated with the new development yields are anticipated:

- one linen service per day;
- two food and beverage deliveries per day;
- one to two 'non-perishables' delivery per day; and
- one to two refuse collection service per day.

Accordingly, in the order of five to seven additional commercial vehicle movements would be anticipated each day (albeit this will fluctuate depending on scheduling as well as site occupancy). In reality, there are existing service and delivery movements currently associated with the golf facilities and there will be some efficiencies achieved (i.e. additional waste volumes collected as part of the existing collection services).

5.2.2 OPERATIONAL TRAFFIC DISTRIBUTION

To determine the distribution of the above movements, the following assumptions were made:

- 80% of generated traffic enters and exits the site via the access point on Golflinks Road and 20% enters/exits via the Old Carey Gully Road access;
- all traffic utilising the Golflinks Road access enters and exits the site from the north-western side of the access (given Golflinks Road forms a 'dead-end' to the south-east of the access);
- 80% of traffic is distributed to/from the south via Old Carey Gully Road;
- 20% of traffic is distributed to/from the north via Old Carey Gully Road; and
- movements during the site's peak period are split 50% inbound and 50% outbound.

Based on the above distribution, the forecast additional (site) peak hour volumes at the site access and the Golflinks Road/Old Carey Gully Road intersection are illustrated in Figure 5 (note that this figure excludes existing traffic associated with the site which is already accommodated on the road network). This has been based on the worst-case generation of 70 additional peak hour trips.

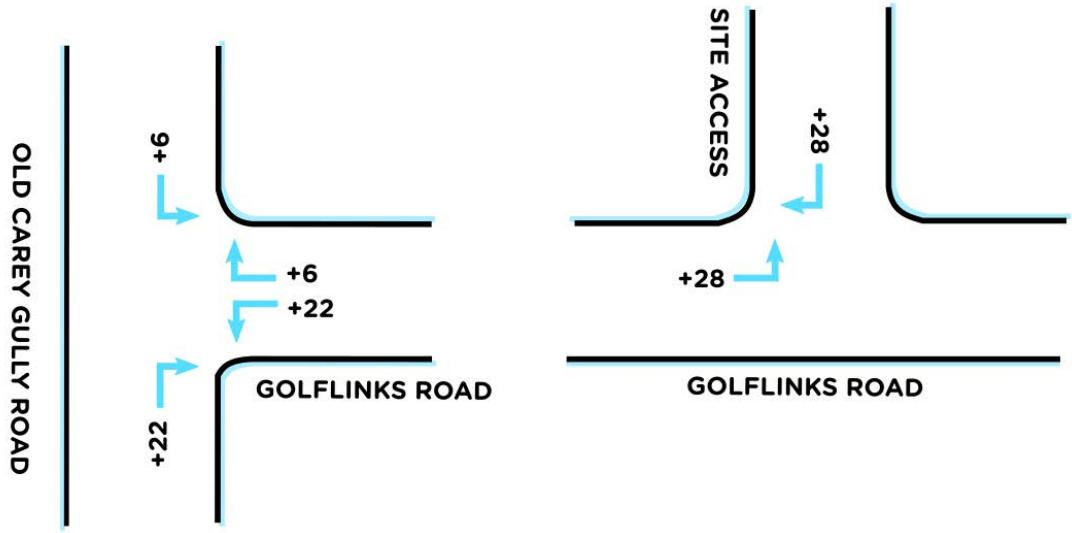

Figure 5 – Conservatively forecast additional traffic distributed onto the road network

The majority of movements would then be distributed to/from Stirling and the South Eastern Freeway via the Old Mount Barker Road–Pomona Road route. The forecast distribution of movements at the access points and on the adjacent road network is provided in Appendix B.

6. TRAFFIC IMPACT

6.1 CONSTRUCTION PHASE

The number of vehicle movements associated with the construction phase would not be significant. Notably, the peak hour volumes during the construction phase would be well below that forecast for the operational phase. Detailed capacity analysis of impacts during the construction phase is not considered warranted (the analytic results would simply show more favourable results than identified for the operational phase as detailed in the following sub-section).

However, it is acknowledged that the construction phase would have a higher level of commercial vehicle movements to/from the site. As detailed above, to minimise impacts on Golflinks Road, it is recommended that vehicle access during construction be undertaken via the Old Carey Gully Road access (particularly large commercial vehicles such as Semi-Trailers) to the maximum extent feasible.

The impacts of the construction vehicle movements should be considered further as part of the development with a CEMP prepared once the construction contractor has been appointed and their methodology identified. Further liaison with Council should be undertaken as the methodology is refined.

6.2 OPERATIONAL PHASE

The proposed development will result in the distribution of additional movements along Golflinks Road. While the proportional increase will be relatively high, the future traffic volumes on Golflinks Road would remain well below the capacity of a local road which is typically taken to be 1,500 vpd (notably, this upper level is based on amenity factors, rather than technical capacities which would be much higher). Therefore, while other road users (such as adjacent residents) would experience an increase in movements, the additional traffic activity is not considered excessive nor unreasonable. Importantly, the proposal would not change the nature or function of Golflinks Road. Similarly, future volumes on Old Carey Gully Road would be within the level associated with its function as a minor collector road (i.e. less than 3,000 vpd).

It is acknowledged that there would be an increase in commercial vehicle movements on Golflinks Road (in the order of five additional commercial vehicle movements per day). However, such vehicles already access the site for deliveries and servicing and are already accommodated via Golflinks Road. There would, however, be benefit in providing shoulder sealing along Golflinks Road to assist with accommodation of the additional commercial vehicle movements (where feasible). Generally, this can be achieved in the vicinity of the intersection with Old Carey Gully Road as well as along the north-eastern ern side of Golflinks Road (such works on the southern side would impact embankments and gardens at the front of residential properties and be difficult to achieve without significant

impact). Figure 6 illustrates the intent of the shoulder sealing (widening) with an additional 0.5 to 1.0 m sealing undertaken where possible.

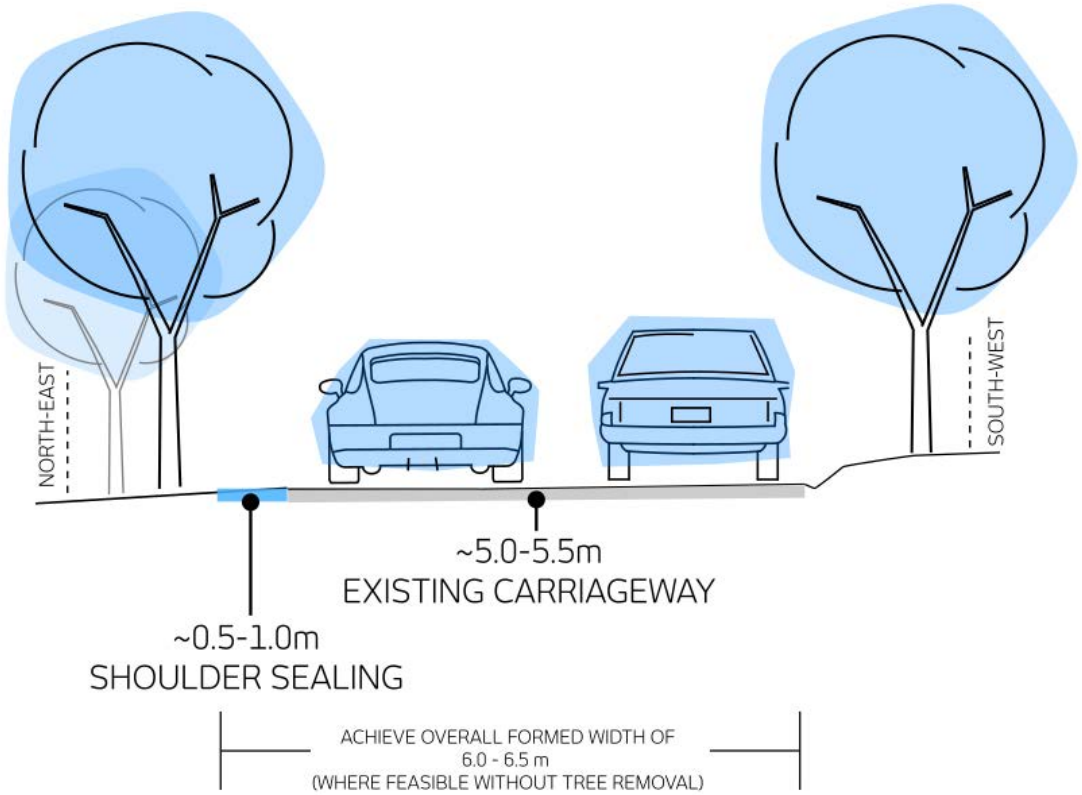

Figure 6 - High-level cross section of the potential shoulder sealing arrangement

In addition, Figure 7 illustrates the opportunities where shoulder sealing is generally achievable (as above, the treatments have been identified to optimise width where possible without requiring removal of trees within the verge). This has been discussed with representatives of Council's civil services section who were supportive of the proposed arrangements. Formalisation of the developer agreement to undertake the works can be addressed as the application progresses (along with further design detail in respect to these treatments). These works will provide additional clearances (including passing clearances) and improve accommodation of two-way flow along Golflinks Road.

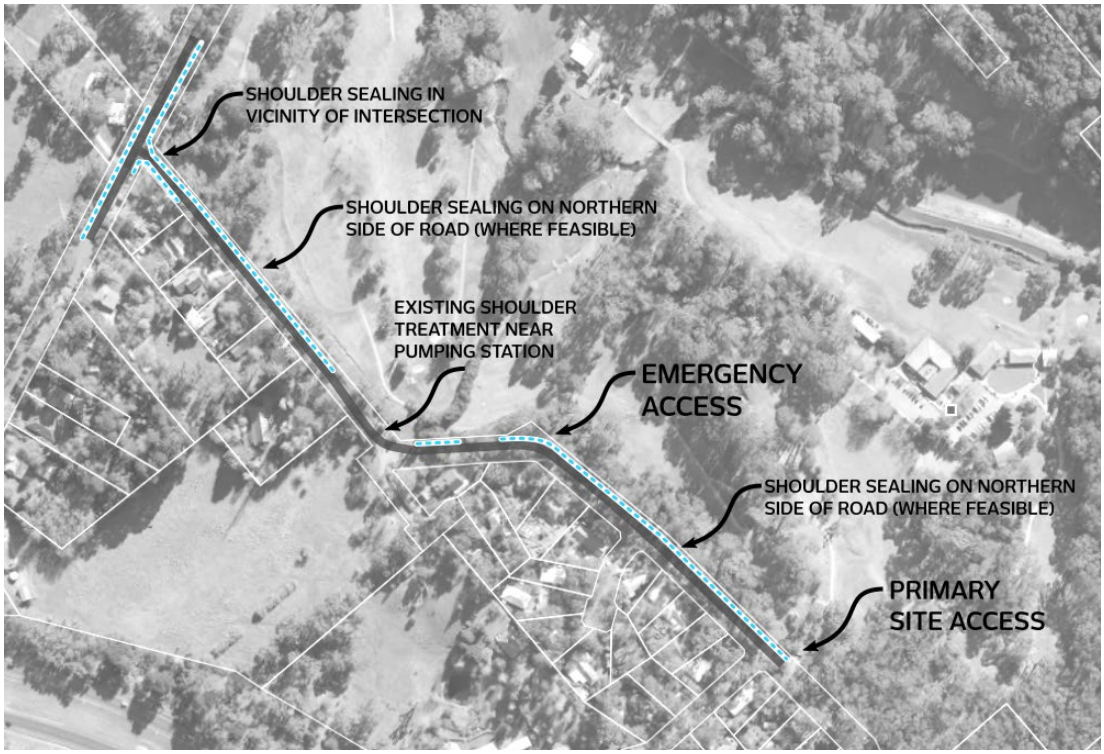

Figure 7 – Opportunities for shoulder sealing along Golflinks Road

In addition to the works noted above on Golflinks Road, to provide an alternative access route for pedestrians (and cyclists), a separated path is proposed within the site. This path will generally follow the alignment of Golflinks Road ('meandering' around trees/vegetation and topographic features). The path will be made publicly available and accessible (i.e. residents of the surrounding area will be able to utilise the path as well as guests, visitors and staff of the subject site). Representatives of Council's Civil Services department have confirmed support for the proposed path.

In respect to peak hour impacts, the peak period associated with the site would not directly align with the peak commuter (am and pm) periods. Volumes during the site's peak hour associated with other (non-site) users of the adjacent roads would be relatively low.

Nevertheless, to provide a conservative assessment, analysis has been prepared of the impact of the proposal if its peak generation aligned with weekday am and pm peak hours as well as the Saturday peak hour. The further assessment has been undertaken for the Golflinks Road access point (which will accommodate the greater volumes of the proposed access points) and intersections associated with the primary access route through Stirling and to/from the South Eastern Freeway (the distribution to other intersections beyond this route would be very low and have minimal, if not negligible impact).

To inform the analyses, traffic surveys were undertaken at key surrounding intersections adjacent the site and within Stirling township on a weekday (10 August 2022) and on a Saturday (13 August 2022). The impact of the proposal on these intersections has been assessed utilising SIDRA intersection analysis software and is detailed for the key access points and intersections in the following sub-sections. The detailed SIDRA output for each location is provided in Appendices C to H.

6.3 GOLFLINKS ROAD SITE ACCESS

The SIDRA analysis (refer Appendix C) identifies the following key results in relation to the impact of additional volumes at the site's access point on Golflinks Road:

- there will be extremely low increases in average delays at the intersection (0.2 or less additional seconds delay or less for any one movement during the weekday and weekend peak hours);
- there will be very low increases in 95th percentile queues at the intersection (less than one additional vehicle in the 95th percentile queue for any one movement during the weekday and weekend peak hours); and
- Levels of Service of 'A' (the best level of service) will be retained for all movements during the weekday and weekend peak hours.

Movements associated with this site will almost exclusively be left-in and right-out movements. Noting that the access point has sufficient geometry to accommodate movements in a two-way manner (including commercial vehicle access movements), the existing layout is considered appropriate.

6.4 GOLFLINKS ROAD/OLD CAREY GULLY ROAD INTERSECTION

The SIDRA analysis (refer Appendix D) identifies the following key results in relation to the impact of additional volumes at the intersection of Golflinks Road/Old Carey Gully Road:

- there will be very low increases in average delays at the intersection (0.5 or less additional seconds delay or less for any one movement during the weekday and weekend peak hours);
- there will be very low increases in 95th percentile queues at the intersection (less than one additional vehicle in the 95th percentile queue for any one movement during the weekday and weekend peak hours); and
- Levels of Service of 'A' (the best level of service) will be retained for all movements during the weekday and weekend peak hours.

It is also noted that the increase in traffic would not warrant the provision of separated turn lanes as per the warrants of the Austroads' "*Guide to Traffic Management – Part 6: Intersections, Interchanges and Crossings Management*". It would, however, be desirable to undertake basic shoulder sealing in the vicinity of the intersection as per the Austroads' requirements (given the increase in right-turn movements from Old Carey Gully Road to Golflinks Road).

As noted above, there will be a small increase in the number of additional commercial vehicle movements associated with the proposal. However, such vehicles already undertake movements to/from the site via the intersection of Old Carey Gully Road to Golflinks Road. The existing intersection geometry is adequate to accommodate the swept paths of the commercial vehicles anticipated to be associated with the development (11 m rigid vehicles or shorter). Figure 8 illustrates the associated turn paths for the design vehicle.

Figure 8 – Indicative commercial vehicle swept paths at the Golflinks Road/Old Carey Gully Road intersection

6.5 OLD CAREY GULLY ROAD/OLD MOUNT BARKER ROAD INTERSECTION

The SIDRA analysis (refer Appendix E) identifies the following key results in relation to the impact of additional volumes at the intersection of Old Carey Gully Road/Old Mount Barker Road:

- there will be extremely low increases in average delays at the intersection (0.2 additional seconds delay or less for any one movement during the weekday and weekend peak hours);
- there will be very low increases in 95th percentile queues at the intersection (less than one additional vehicle in the 95th percentile queue for any one

movement during the weekday and weekend peak hours with no increase in queues for some movements); and

- Levels of Service of 'A' (the best level of service) will be retained for all movements during the weekday and weekend peak hours.

The existing intersection geometry is sufficient to accommodate the additional traffic movements. In particular, commercial vehicle movements (which will typically be undertaken between the north-eastern and western legs) will be easily accommodated within the existing traffic lanes (refer Figure 9).

Figure 9 – Indicative commercial vehicle swept paths at the Old Carey Gully Road/Old Mount Barker Road intersection

6.6 OLD MOUNT BARKER ROAD/GOULD ROAD INTERSECTION

The SIDRA analysis (refer Appendix F) identifies the following key results in relation to the impact of additional volumes at the intersection of Old Mount Barker Road/Gould Road:

- there will be extremely low increases in average delays at the intersection (0.3 additional seconds delay or less for any one movement during the weekday and weekend peak hours);
- there will be very low increases in 95th percentile queues at the intersection (less than one additional vehicle in the 95th percentile queue for any one movement during the weekday and weekend peak hours with no increase in queues for some movements); and
- Levels of Service of 'A' (the best level of service) will be retained for all movements during the weekday and weekend peak hours.

A review of commercial vehicle turn paths (for movements to/from the site via the Freeway) indicates the existing intersection geometry will easily accommodate the associated turning movements. Figure 10 illustrates the commercial vehicle paths for the intersection as well as the staggered intersection of Gould Road with Pomona Road.

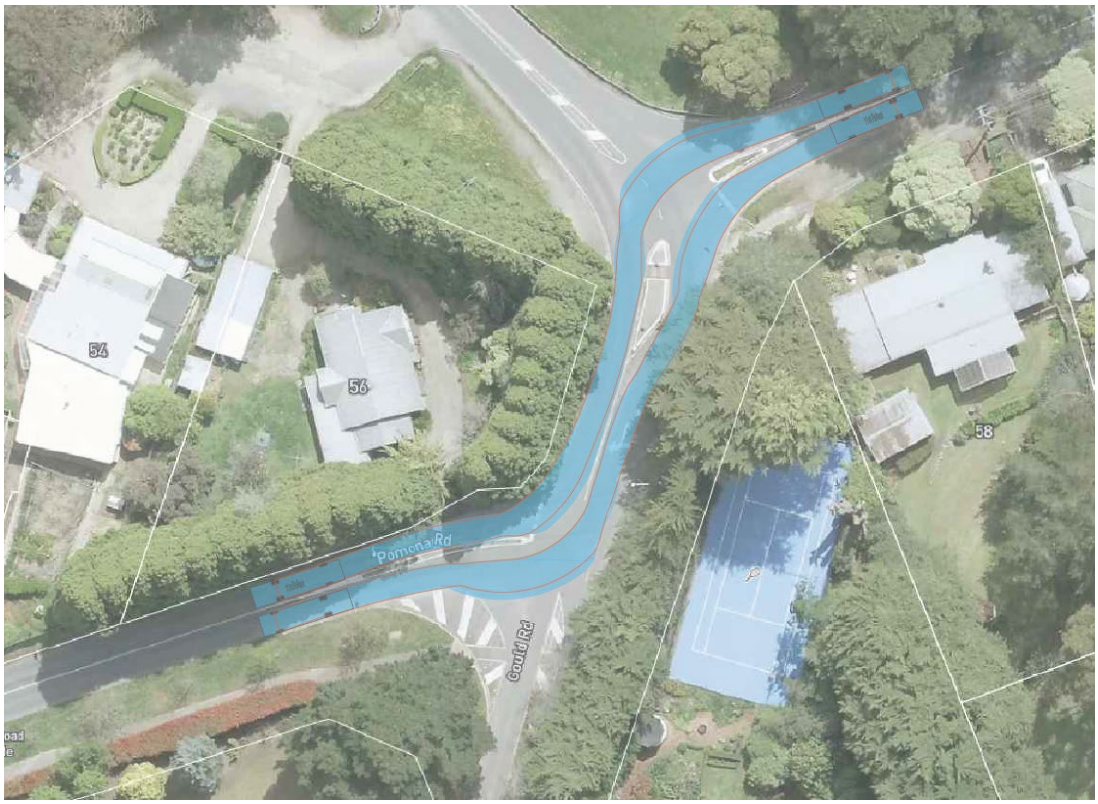

Figure 10 – Indicative commercial vehicle swept paths at the intersections of Gould Road with Old Mount Barker Road and Pomona Road

6.7 GOULD ROAD/POMONA ROAD INTERSECTION

The SIDRA analysis (refer Appendix G) identifies the following key results in relation to the impact of additional volumes at the intersection of Gould Road/Pomona Road:

- there will be extremely low increases in average delays at the intersection (0.4 additional seconds delay or less for any one movement during the weekday and weekend peak hours);
- there will be very low increases in 95th percentile queues at the intersection (less than one additional vehicle in the 95th percentile queue for any one movement during the weekday and weekend peak hours with no increase in queues for some movements); and

- Levels of Service of 'A' (the best level of service) will be retained for all movements during the weekday and weekend peak hours.

As illustrated in Figure 9 above, commercial vehicle movements associated with the site would easily be accommodated at the intersection. It is noted that there is some existing deterioration/potholing of the pavement on the Pomona Road approach which would desirably be addressed by Council (regardless of the subject proposal). Council may also wish to consider replacement of the missing pavement bars on the Pomona Road approach to the intersection to assist with its delineation.

6.8 POMONA ROAD/MOUNT BARKER ROAD/AVENUE ROAD INTERSECTION

The SIDRA analysis (refer Appendix H) identifies the following key results in relation to the impact of additional volumes at the intersection of Pomona Road/Mount Barker Road/Avenue Road:

- there will be low increases in average delays at the intersection (typically less than one additional second delay for most movements during the weekday and weekend peak hours, albeit delays movements out of Pomona Road increase by 1 to 3 seconds);
- there will be low increases in 95th percentile queues at the intersection (less than one additional vehicle in the 95th percentile queue for any one movement during the weekday and weekend peak hours with the exception of movements out of Pomona Road which would have an increase of 1.5 vehicles to the 95th percentile queue, albeit still well within acceptable levels); and
- Levels of Service of 'B' or better for all movements will be retained during the weekday and weekend peak hours.

Noting the roundabout control of the intersection (and partial dual lane arrangements), movements (including those by commercial vehicles) will be easily accommodated.

6.9 TRAFFIC IMPACT CONCLUSIONS

As above, while it is acknowledged that there will be an increase in movements on the adjacent road network as a result of the proposal, it is considered that the traffic impacts will be within acceptable levels and not result in significant impact on other road users in the vicinity of the site. Notably, the analysis identifies that there would be minimal change in traffic conditions on the adjacent road network. It is also reiterated that the assessment is conservative as it has applied the proposal's peak traffic generation directly to the existing peak hour movements on both weekdays and the weekend. In reality, these would not directly and

completely align and conditions will be even better than suggested by the analysis. Some minor shoulder sealing treatments as well as an internal (but publicly accessibly) path have been suggested to assist with the accommodation of the additional movements. However, major upgrades are not considered necessary or warranted as a result of the proposal.

APPENDIX A

SITE MASTER PLAN PREPARED BY OXIGEN

SITE MASTERPLAN

LEGEND

1. Old Carey Gully Road Access
2. Staff carpark
3. Perfumery carpark
4. Perfumery courtyard
5. Tree orchard
6. Perfumery gardens
7. Cox Creek improvements
8. Heysen trail connection
9. Stormwater quality improvement basin
10. Deck
11. Lawn terrace
12. Practice putting green
13. Tourist accommodation drop-off
14. Pedestrian concourse
15. Golflinks road main access
16. Entry Avenue
17. Emergency maintenance vehicle access only
18. Dedicated pedestrian trail

KEY

- Internal path
- Internal driveway
- Heysen trail connection
- Carpark entries
- Sewer holding tank
- Perfumery sewer tank
- Stormwater basin
- Roof rainwater drainage pipe
- Internal drainage pipe
- Overland flow direction
- Gravity sewer from hotel
- Sewer rising main to pump station
- Perfumery gravity sewer
- Existing rising main to pump station
- Existing rising main to treatment plant

ECOLOGY

- Creek Revegetation zone
- Revegetation zone
- Trees to be removed

OLD CAREY GULLY ROAD
HEYSEN TRAIL
PERFUMERY
COX CREEK
TOURIST ACCOMMODATION
35M BUFFER
35M BUFFER
GOLFLINKS ROAD
GOLFLINKS ROAD
MANNA GUM AVE
TO S.E. FREEWAY

Mount Lofty Golf Estate

oxigen

1:1500 (A1), 1:3000 (A3)

0 10 25 50m

N

APPENDIX B

FORECAST PEAK HOUR DISTRIBUTION

Forecast Distribution of Peak Hour Trips

Total Peak Hour Trips	70
Inbound (50%)	35
Outbound (50%)	35

		Additional Trips
Golflinks Road Access		
Access [N]	Left Out	
	Right Out	28
Golflinks Rd [E]	Right In	
	Straight Thru	
Golflinks Rd [W]	Left In	28
	Straight Thru	
Old Carey Gully Road Access		
Old Carey Gully Rd [N]	Left In	
	Straight Thru	
Access [E]	Left Out	7
	Right Out	
Old Carey Gully Rd [S]	Right In	7
	Straight Thru	
Golflinks/Old Carey Gully		
Old Carey Gully Rd [N]	Left In	6
	Straight Thru	7
Golflinks Rd [E]	Left Out	22
	Right Out	6
Old Carey Gully Rd [S]	Right In	22
	Straight Thru	7
Old Carey Gully/Old Mount Barker		
Old Carey Gully Rd [N]	Left Out	3
	Right Out	26
Old Mount Barker Rd [E]	Right In	3
	Straight Thru	0
Old Mount Barker Rd [W]	Left In	26
	Straight Thru	0
Old Mount Barker/Gould		
Old Mount Barker Rd [E]	Left Out	25
	Right Out	1
Old Mount Barker Rd [W]	Left In	1
	Straight Thru	0
Gould Road [S]	Right In	25
	Straight Thru	0
Gould/Pomona		
Gould Road [N]	Right In	24
	Straight Thru	1
Gould Road [S]	Left In	0
	Straight Thru	1
Pomona Road [W]	Left Out	24
	Right Out	0
Pomona/Mt Barker/Avenue		
Pomona Road [E]	Left Out	4
	Straight Thru	0
	Right Out	19
Mt Barker Rd [S]	Left Out	0
	Straight Thru	0
	Right Out	4
Avenue Rd [W]	Left Out	0
	Straight Thru	0
	Right Out	0
Mt Barker Rd [N]	Left Out	19
	Straight Thru	0
	Right Out	0

APPENDIX C

SIDRA ANALYSIS – GOLFLINKS ROAD SITE ACCESS

MOVEMENT SUMMARY

Site: 101 [WED AM Existing (Site Folder: Site Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Golflinks Road [E]															
5	T1	All MCs	31	2.0	31	2.0	0.016	0.0	LOS A	0.0	0.0	0.01	0.02	0.01	59.8
6	R2	All MCs	1	2.0	1	2.0	0.016	5.5	LOS A	0.0	0.0	0.01	0.02	0.01	56.9
Approach			32	2.0	32	2.0	0.016	0.2	NA	0.0	0.0	0.01	0.02	0.01	59.7
North: Site Access [N]															
7	L2	All MCs	1	2.0	1	2.0	0.003	5.6	LOS A	0.0	0.1	0.03	0.58	0.03	52.8
9	R2	All MCs	3	2.0	3	2.0	0.003	5.5	LOS A	0.0	0.1	0.03	0.58	0.03	52.5
Approach			4	2.0	4	2.0	0.003	5.5	LOS A	0.0	0.1	0.03	0.58	0.03	52.6
West: Golflinks Road [W]															
10	L2	All MCs	18	2.0	18	2.0	0.010	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	53.0
11	T1	All MCs	1	2.0	1	2.0	0.010	0.0	LOS A	0.0	0.0	0.00	0.55	0.00	55.2
Approach			19	2.0	19	2.0	0.010	5.3	NA	0.0	0.0	0.00	0.55	0.00	53.2
All Vehicles			55	2.0	55	2.0	0.016	2.3	NA	0.0	0.1	0.01	0.25	0.01	56.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Existing (Site Folder: Site Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Golflinks Road [E]															
5	T1	All MCs	18	2.0	18	2.0	0.010	0.0	LOS A	0.0	0.0	0.01	0.03	0.01	59.7
6	R2	All MCs	1	2.0	1	2.0	0.010	5.5	LOS A	0.0	0.0	0.01	0.03	0.01	56.7
Approach			19	2.0	19	2.0	0.010	0.3	NA	0.0	0.0	0.01	0.03	0.01	59.5
North: Site Access [N]															
7	L2	All MCs	1	2.0	1	2.0	0.006	5.6	LOS A	0.0	0.1	0.10	0.56	0.10	52.6
9	R2	All MCs	6	2.0	6	2.0	0.006	5.6	LOS A	0.0	0.1	0.10	0.56	0.10	52.3
Approach			7	2.0	7	2.0	0.006	5.6	LOS A	0.0	0.1	0.10	0.56	0.10	52.3
West: Golflinks Road [W]															
10	L2	All MCs	5	2.0	5	2.0	0.014	5.6	LOS A	0.0	0.0	0.00	0.12	0.00	56.4
11	T1	All MCs	21	2.0	21	2.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	58.9
Approach			26	2.0	26	2.0	0.014	1.1	NA	0.0	0.0	0.00	0.12	0.00	58.4
All Vehicles			53	2.0	53	2.0	0.014	1.5	NA	0.0	0.1	0.02	0.15	0.02	57.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Existing (Site Folder: Site Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Golflinks Road [E]															
5	T1	All MCs	1	2.0	1	2.0	0.001	0.0	LOS A	0.0	0.0	0.07	0.29	0.07	57.2
6	R2	All MCs	1	2.0	1	2.0	0.001	5.5	LOS A	0.0	0.0	0.07	0.29	0.07	54.5
Approach			2	2.0	2	2.0	0.001	2.8	NA	0.0	0.0	0.07	0.29	0.07	55.8
North: Site Access [N]															
7	L2	All MCs	1	2.0	1	2.0	0.007	5.6	LOS A	0.0	0.2	0.04	0.58	0.04	52.7
9	R2	All MCs	8	2.0	8	2.0	0.007	5.5	LOS A	0.0	0.2	0.04	0.58	0.04	52.5
Approach			9	2.0	9	2.0	0.007	5.5	LOS A	0.0	0.2	0.04	0.58	0.04	52.5
West: Golflinks Road [W]															
10	L2	All MCs	19	2.0	19	2.0	0.011	5.6	LOS A	0.0	0.0	0.00	0.52	0.00	53.2
11	T1	All MCs	2	2.0	2	2.0	0.011	0.0	LOS A	0.0	0.0	0.00	0.52	0.00	55.5
Approach			21	2.0	21	2.0	0.011	5.0	NA	0.0	0.0	0.00	0.52	0.00	53.4
All Vehicles			33	2.0	33	2.0	0.011	5.0	NA	0.0	0.2	0.02	0.52	0.02	53.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED AM Future (Site Folder: Site Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Golflinks Road [E]															
5	T1	All MCs	31	2.0	31	2.0	0.017	0.0	LOS A	0.0	0.0	0.01	0.02	0.01	59.8
6	R2	All MCs	1	2.0	1	2.0	0.017	5.5	LOS A	0.0	0.0	0.01	0.02	0.01	56.9
Approach			32	2.0	32	2.0	0.017	0.2	NA	0.0	0.0	0.01	0.02	0.01	59.7
North: Site Access [N]															
7	L2	All MCs	1	2.0	1	2.0	0.029	5.6	LOS A	0.1	0.7	0.07	0.57	0.07	52.6
9	R2	All MCs	35	2.0	35	2.0	0.029	5.6	LOS A	0.1	0.7	0.07	0.57	0.07	52.4
Approach			36	2.0	36	2.0	0.029	5.6	LOS A	0.1	0.7	0.07	0.57	0.07	52.4
West: Golflinks Road [W]															
10	L2	All MCs	49	2.0	49	2.0	0.028	5.6	LOS A	0.0	0.0	0.00	0.56	0.00	52.9
11	T1	All MCs	1	2.0	1	2.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.56	0.00	55.1
Approach			51	2.0	51	2.0	0.028	5.5	NA	0.0	0.0	0.00	0.56	0.00	52.9
All Vehicles			118	2.0	118	2.0	0.029	4.1	NA	0.1	0.7	0.03	0.42	0.03	54.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Future (Site Folder: Site Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Golflinks Road [E]															
5	T1	All MCs	18	2.0	18	2.0	0.010	0.0	LOS A	0.0	0.0	0.02	0.04	0.02	59.6
6	R2	All MCs	1	2.0	1	2.0	0.010	5.5	LOS A	0.0	0.0	0.02	0.04	0.02	56.7
Approach			19	2.0	19	2.0	0.010	0.3	NA	0.0	0.0	0.02	0.04	0.02	59.5
North: Site Access [N]															
7	L2	All MCs	1	2.0	1	2.0	0.032	5.6	LOS A	0.1	0.7	0.12	0.57	0.12	52.5
9	R2	All MCs	38	2.0	38	2.0	0.032	5.7	LOS A	0.1	0.7	0.12	0.57	0.12	52.2
Approach			39	2.0	39	2.0	0.032	5.7	LOS A	0.1	0.7	0.12	0.57	0.12	52.2
West: Golflinks Road [W]															
10	L2	All MCs	37	2.0	37	2.0	0.031	5.6	LOS A	0.0	0.0	0.00	0.37	0.00	54.4
11	T1	All MCs	21	2.0	21	2.0	0.031	0.0	LOS A	0.0	0.0	0.00	0.37	0.00	56.7
Approach			58	2.0	58	2.0	0.031	3.5	NA	0.0	0.0	0.00	0.37	0.00	55.2
All Vehicles			116	2.0	116	2.0	0.032	3.7	NA	0.1	0.7	0.04	0.38	0.04	54.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Future (Site Folder: Site Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Golflinks Road [E]															
5	T1	All MCs	1	2.0	1	2.0	0.001	0.1	LOS A	0.0	0.0	0.12	0.29	0.12	57.0
6	R2	All MCs	1	2.0	1	2.0	0.001	5.6	LOS A	0.0	0.0	0.12	0.29	0.12	54.3
Approach			2	2.0	2	2.0	0.001	2.9	NA	0.0	0.0	0.12	0.29	0.12	55.6
North: Site Access [N]															
7	L2	All MCs	1	2.0	1	2.0	0.033	5.6	LOS A	0.1	0.7	0.07	0.58	0.07	52.7
9	R2	All MCs	40	2.0	40	2.0	0.033	5.6	LOS A	0.1	0.7	0.07	0.58	0.07	52.4
Approach			41	2.0	41	2.0	0.033	5.6	LOS A	0.1	0.7	0.07	0.58	0.07	52.4
West: Golflinks Road [W]															
10	L2	All MCs	51	2.0	51	2.0	0.029	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	53.0
11	T1	All MCs	2	2.0	2	2.0	0.029	0.0	LOS A	0.0	0.0	0.00	0.55	0.00	55.2
Approach			53	2.0	53	2.0	0.029	5.3	NA	0.0	0.0	0.00	0.55	0.00	53.1
All Vehicles			96	2.0	96	2.0	0.033	5.4	NA	0.1	0.7	0.03	0.56	0.03	52.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

APPENDIX D

SIDRA ANALYSIS – GOLFLINKS ROAD/OLD CAREY GULLY ROAD INTERSECTION

MOVEMENT SUMMARY

Site: 101 [WED AM Existing (Site Folder: Golflinks Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Existing Intersection
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Carey Gully Road [S]															
2	T1	All MCs	54	2.0	54	2.0	0.035	0.1	LOS A	0.1	0.5	0.07	0.12	0.07	58.8
3	R2	All MCs	12	0.0	12	0.0	0.035	5.7	LOS A	0.1	0.5	0.07	0.12	0.07	56.0
Approach			65	1.6	65	1.6	0.035	1.1	NA	0.1	0.5	0.07	0.12	0.07	58.3
East: Golflinks Road [E]															
4	L2	All MCs	26	0.0	26	0.0	0.024	5.7	LOS A	0.1	0.6	0.17	0.54	0.17	52.4
6	R2	All MCs	7	0.0	7	0.0	0.024	5.9	LOS A	0.1	0.6	0.17	0.54	0.17	52.1
Approach			34	0.0	34	0.0	0.024	5.8	LOS A	0.1	0.6	0.17	0.54	0.17	52.3
North: Old Carey Gully Road [N]															
7	L2	All MCs	4	0.0	4	0.0	0.041	5.5	LOS A	0.0	0.0	0.00	0.03	0.00	57.2
8	T1	All MCs	75	0.0	75	0.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.7
Approach			79	0.0	79	0.0	0.041	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.6
All Vehicles			178	0.6	178	0.6	0.041	1.6	NA	0.1	0.6	0.06	0.16	0.06	57.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Existing (Site Folder: Golflinks Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Existing Intersection
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Carey Gully Road [S]															
2	T1	All MCs	69	4.5	69	4.5	0.050	0.1	LOS A	0.1	0.9	0.09	0.16	0.09	58.3
3	R2	All MCs	22	0.0	22	0.0	0.050	5.7	LOS A	0.1	0.9	0.09	0.16	0.09	55.7
Approach			92	3.4	92	3.4	0.050	1.4	NA	0.1	0.9	0.09	0.16	0.09	57.7
East: Golflinks Road [E]															
4	L2	All MCs	19	0.0	19	0.0	0.017	5.7	LOS A	0.1	0.4	0.16	0.54	0.16	52.4
6	R2	All MCs	5	0.0	5	0.0	0.017	6.0	LOS A	0.1	0.4	0.16	0.54	0.16	52.2
Approach			24	0.0	24	0.0	0.017	5.8	LOS A	0.1	0.4	0.16	0.54	0.16	52.4
North: Old Carey Gully Road [N]															
7	L2	All MCs	4	0.0	4	0.0	0.037	5.5	LOS A	0.0	0.0	0.00	0.04	0.00	57.2
8	T1	All MCs	65	8.1	65	8.1	0.037	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.6
Approach			69	7.6	69	7.6	0.037	0.3	NA	0.0	0.0	0.00	0.04	0.00	59.5
All Vehicles			185	4.5	185	4.5	0.050	1.6	NA	0.1	0.9	0.06	0.16	0.06	57.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Existing (Site Folder: Golflinks Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Existing Intersection
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Carey Gully Road [S]															
2	T1	All MCs	62	1.7	62	1.7	0.042	0.1	LOS A	0.1	0.6	0.07	0.13	0.07	58.6
3	R2	All MCs	16	0.0	16	0.0	0.042	5.6	LOS A	0.1	0.6	0.07	0.13	0.07	55.9
Approach			78	1.4	78	1.4	0.042	1.2	NA	0.1	0.6	0.07	0.13	0.07	58.1
East: Golflinks Road [E]															
4	L2	All MCs	25	0.0	25	0.0	0.020	5.7	LOS A	0.1	0.5	0.14	0.54	0.14	52.5
6	R2	All MCs	4	0.0	4	0.0	0.020	5.9	LOS A	0.1	0.5	0.14	0.54	0.14	52.2
Approach			29	0.0	29	0.0	0.020	5.7	LOS A	0.1	0.5	0.14	0.54	0.14	52.4
North: Old Carey Gully Road [N]															
7	L2	All MCs	2	0.0	2	0.0	0.032	5.5	LOS A	0.0	0.0	0.00	0.02	0.00	57.3
8	T1	All MCs	61	0.0	61	0.0	0.032	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	59.8
Approach			63	0.0	63	0.0	0.032	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.7
All Vehicles			171	0.6	171	0.6	0.042	1.6	NA	0.1	0.6	0.06	0.16	0.06	57.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED AM Future (Site Folder: Golflinks Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Existing Intersection
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Carey Gully Road [S]															
2	T1	All MCs	61	1.7	61	1.7	0.054	0.1	LOS A	0.2	1.4	0.14	0.24	0.14	57.5
3	R2	All MCs	36	0.0	36	0.0	0.054	5.7	LOS A	0.2	1.4	0.14	0.24	0.14	54.9
Approach			97	1.1	97	1.1	0.054	2.2	NA	0.2	1.4	0.14	0.24	0.14	56.5
East: Golflinks Road [E]															
4	L2	All MCs	51	0.0	51	0.0	0.046	5.8	LOS A	0.2	1.2	0.18	0.55	0.18	52.4
6	R2	All MCs	15	0.0	15	0.0	0.046	6.1	LOS A	0.2	1.2	0.18	0.55	0.18	52.1
Approach			65	0.0	65	0.0	0.046	5.8	LOS A	0.2	1.2	0.18	0.55	0.18	52.3
North: Old Carey Gully Road [N]															
7	L2	All MCs	12	0.0	12	0.0	0.048	5.6	LOS A	0.0	0.0	0.00	0.07	0.00	56.9
8	T1	All MCs	82	0.0	82	0.0	0.048	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.3
Approach			94	0.0	94	0.0	0.048	0.7	NA	0.0	0.0	0.00	0.07	0.00	59.0
All Vehicles			256	0.4	256	0.4	0.054	2.6	NA	0.2	1.4	0.10	0.26	0.10	56.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Future (Site Folder: Golflinks Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Existing Intersection
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Carey Gully Road [S]															
2	T1	All MCs	77	4.1	77	4.1	0.069	0.1	LOS A	0.2	1.8	0.14	0.24	0.14	57.5
3	R2	All MCs	46	0.0	46	0.0	0.069	5.7	LOS A	0.2	1.8	0.14	0.24	0.14	54.9
Approach			123	2.6	123	2.6	0.069	2.2	NA	0.2	1.8	0.14	0.24	0.14	56.5
East: Golflinks Road [E]															
4	L2	All MCs	44	0.0	44	0.0	0.040	5.8	LOS A	0.2	1.1	0.17	0.55	0.17	52.4
6	R2	All MCs	13	0.0	13	0.0	0.040	6.2	LOS A	0.2	1.1	0.17	0.55	0.17	52.1
Approach			57	0.0	57	0.0	0.040	5.8	LOS A	0.2	1.1	0.17	0.55	0.17	52.3
North: Old Carey Gully Road [N]															
7	L2	All MCs	12	0.0	12	0.0	0.045	5.6	LOS A	0.0	0.0	0.00	0.08	0.00	56.8
8	T1	All MCs	73	7.2	73	7.2	0.045	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	59.2
Approach			84	6.3	84	6.3	0.045	0.8	NA	0.0	0.0	0.00	0.08	0.00	58.8
All Vehicles			264	3.2	264	3.2	0.069	2.5	NA	0.2	1.8	0.10	0.26	0.10	56.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Future (Site Folder: Golflinks Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Existing Intersection
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Old Carey Gully Road [S]															
2	T1	All MCs	69	1.5	69	1.5	0.060	0.1	LOS A	0.2	1.5	0.13	0.23	0.13	57.6
3	R2	All MCs	40	0.0	40	0.0	0.060	5.7	LOS A	0.2	1.5	0.13	0.23	0.13	55.0
Approach			109	1.0	109	1.0	0.060	2.2	NA	0.2	1.5	0.13	0.23	0.13	56.6
East: Golflinks Road [E]															
4	L2	All MCs	49	0.0	49	0.0	0.043	5.7	LOS A	0.2	1.1	0.16	0.55	0.16	52.4
6	R2	All MCs	12	0.0	12	0.0	0.043	6.1	LOS A	0.2	1.1	0.16	0.55	0.16	52.1
Approach			61	0.0	61	0.0	0.043	5.8	LOS A	0.2	1.1	0.16	0.55	0.16	52.4
North: Old Carey Gully Road [N]															
7	L2	All MCs	9	0.0	9	0.0	0.040	5.5	LOS A	0.0	0.0	0.00	0.07	0.00	56.9
8	T1	All MCs	68	0.0	68	0.0	0.040	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.3
Approach			78	0.0	78	0.0	0.040	0.7	NA	0.0	0.0	0.00	0.07	0.00	59.0
All Vehicles			248	0.4	248	0.4	0.060	2.6	NA	0.2	1.5	0.10	0.26	0.10	56.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

APPENDIX E

SIDRA ANALYSIS – OLD CAREY GULLY ROAD/ OLD MOUNT BARKER ROAD INTERSECTION

MOVEMENT SUMMARY

Site: 101 [WED AM Existing (Site Folder: Old Mt Barker Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Old Mount Barker Road [E]															
5	T1	All MCs	179	1.2	179	1.2	0.115	0.0	LOS A	0.2	1.6	0.06	0.11	0.06	58.9
6	R2	All MCs	37	2.9	37	2.9	0.115	5.6	LOS A	0.2	1.6	0.06	0.11	0.06	56.0
Approach			216	1.5	216	1.5	0.115	1.0	NA	0.2	1.6	0.06	0.11	0.06	58.4
North: Old Carey Gully Road [N]															
7	L2	All MCs	45	0.0	45	0.0	0.092	5.8	LOS A	0.3	2.3	0.21	0.55	0.21	52.6
9	R2	All MCs	63	0.0	63	0.0	0.092	6.6	LOS A	0.3	2.3	0.21	0.55	0.21	52.0
Approach			108	0.0	108	0.0	0.092	6.3	LOS A	0.3	2.3	0.21	0.55	0.21	52.2
West: Old Mount Barker Road [W]															
10	L2	All MCs	37	2.9	37	2.9	0.052	5.7	LOS A	0.2	1.3	0.08	0.23	0.08	55.4
11	T1	All MCs	53	4.0	53	4.0	0.052	0.1	LOS A	0.2	1.3	0.08	0.23	0.08	57.5
Approach			89	3.5	89	3.5	0.052	2.4	NA	0.2	1.3	0.08	0.23	0.08	56.6
All Vehicles			414	1.5	414	1.5	0.115	2.7	NA	0.3	2.3	0.10	0.25	0.10	56.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Existing (Site Folder: Old Mt Barker Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Old Mount Barker Road [E]															
5	T1	All MCs	105	2.0	105	2.0	0.082	0.1	LOS A	0.3	1.8	0.10	0.19	0.10	58.1
6	R2	All MCs	45	2.3	45	2.3	0.082	5.7	LOS A	0.3	1.8	0.10	0.19	0.10	55.3
Approach			151	2.1	151	2.1	0.082	1.8	NA	0.3	1.8	0.10	0.19	0.10	57.2
North: Old Carey Gully Road [N]															
7	L2	All MCs	25	0.0	25	0.0	0.076	5.8	LOS A	0.3	1.9	0.22	0.56	0.22	52.5
9	R2	All MCs	59	8.9	59	8.9	0.076	6.6	LOS A	0.3	1.9	0.22	0.56	0.22	51.6
Approach			84	6.3	84	6.3	0.076	6.3	LOS A	0.3	1.9	0.22	0.56	0.22	51.9
West: Old Mount Barker Road [W]															
10	L2	All MCs	56	3.8	56	3.8	0.067	5.8	LOS A	0.3	1.9	0.11	0.28	0.11	54.9
11	T1	All MCs	58	1.8	58	1.8	0.067	0.1	LOS A	0.3	1.9	0.11	0.28	0.11	57.0
Approach			114	2.8	114	2.8	0.067	2.9	NA	0.3	1.9	0.11	0.28	0.11	56.0
All Vehicles			348	3.3	348	3.3	0.082	3.2	NA	0.3	1.9	0.13	0.31	0.13	55.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Existing (Site Folder: Old Mt Barker Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Old Mount Barker Road [E]															
5	T1	All MCs	38	0.0	38	0.0	0.030	0.1	LOS A	0.1	0.7	0.08	0.20	0.08	58.0
6	R2	All MCs	18	0.0	18	0.0	0.030	5.6	LOS A	0.1	0.7	0.08	0.20	0.08	55.4
Approach			56	0.0	56	0.0	0.030	1.8	NA	0.1	0.7	0.08	0.20	0.08	57.1
North: Old Carey Gully Road [N]															
7	L2	All MCs	26	0.0	26	0.0	0.059	5.7	LOS A	0.2	1.4	0.16	0.55	0.16	52.7
9	R2	All MCs	48	0.0	48	0.0	0.059	5.9	LOS A	0.2	1.4	0.16	0.55	0.16	52.2
Approach			75	0.0	75	0.0	0.059	5.8	LOS A	0.2	1.4	0.16	0.55	0.16	52.4
West: Old Mount Barker Road [W]															
10	L2	All MCs	57	1.9	57	1.9	0.059	5.7	LOS A	0.2	1.7	0.06	0.31	0.06	54.8
11	T1	All MCs	44	2.4	44	2.4	0.059	0.0	LOS A	0.2	1.7	0.06	0.31	0.06	56.8
Approach			101	2.1	101	2.1	0.059	3.2	NA	0.2	1.7	0.06	0.31	0.06	55.7
All Vehicles			232	0.9	232	0.9	0.059	3.7	NA	0.2	1.7	0.10	0.36	0.10	54.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED AM Future (Site Folder: Old Mt Barker Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Old Mount Barker Road [E]															
5	T1	All MCs	179	1.2	179	1.2	0.117	0.0	LOS A	0.3	1.8	0.06	0.12	0.06	58.8
6	R2	All MCs	40	2.6	40	2.6	0.117	5.6	LOS A	0.3	1.8	0.06	0.12	0.06	55.9
Approach			219	1.4	219	1.4	0.117	1.1	NA	0.3	1.8	0.06	0.12	0.06	58.2
North: Old Carey Gully Road [N]															
7	L2	All MCs	48	0.0	48	0.0	0.123	5.8	LOS A	0.5	3.2	0.23	0.56	0.23	52.5
9	R2	All MCs	91	0.0	91	0.0	0.123	6.7	LOS A	0.5	3.2	0.23	0.56	0.23	51.9
Approach			139	0.0	139	0.0	0.123	6.4	LOS A	0.5	3.2	0.23	0.56	0.23	52.1
West: Old Mount Barker Road [W]															
10	L2	All MCs	64	1.6	64	1.6	0.069	5.7	LOS A	0.3	2.0	0.11	0.31	0.11	54.7
11	T1	All MCs	53	4.0	53	4.0	0.069	0.1	LOS A	0.3	2.0	0.11	0.31	0.11	56.7
Approach			117	2.7	117	2.7	0.069	3.2	NA	0.3	2.0	0.11	0.31	0.11	55.6
All Vehicles			475	1.3	475	1.3	0.123	3.1	NA	0.5	3.2	0.12	0.29	0.12	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Future (Site Folder: Old Mt Barker Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Old Mount Barker Road [E]															
5	T1	All MCs	105	2.0	105	2.0	0.084	0.1	LOS A	0.3	1.9	0.10	0.20	0.10	58.0
6	R2	All MCs	48	2.2	48	2.2	0.084	5.7	LOS A	0.3	1.9	0.10	0.20	0.10	55.2
Approach			154	2.1	154	2.1	0.084	1.8	NA	0.3	1.9	0.10	0.20	0.10	57.1
North: Old Carey Gully Road [N]															
7	L2	All MCs	28	0.0	28	0.0	0.106	5.8	LOS A	0.4	2.7	0.24	0.57	0.24	52.5
9	R2	All MCs	86	6.1	86	6.1	0.106	6.6	LOS A	0.4	2.7	0.24	0.57	0.24	51.7
Approach			115	4.6	115	4.6	0.106	6.4	LOS A	0.4	2.7	0.24	0.57	0.24	51.9
West: Old Mount Barker Road [W]															
10	L2	All MCs	83	2.5	83	2.5	0.085	5.8	LOS A	0.4	2.5	0.12	0.33	0.12	54.5
11	T1	All MCs	58	1.8	58	1.8	0.085	0.1	LOS A	0.4	2.5	0.12	0.33	0.12	56.5
Approach			141	2.2	141	2.2	0.085	3.5	NA	0.4	2.5	0.12	0.33	0.12	55.3
All Vehicles			409	2.8	409	2.8	0.106	3.7	NA	0.4	2.7	0.15	0.35	0.15	54.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Future (Site Folder: Old Mt Barker Road - Old Carey Gully Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Old Mount Barker Road [E]															
5	T1	All MCs	38	0.0	38	0.0	0.032	0.1	LOS A	0.1	0.8	0.09	0.22	0.09	57.8
6	R2	All MCs	21	0.0	21	0.0	0.032	5.6	LOS A	0.1	0.8	0.09	0.22	0.09	55.2
Approach			59	0.0	59	0.0	0.032	2.0	NA	0.1	0.8	0.09	0.22	0.09	56.8
North: Old Carey Gully Road [N]															
7	L2	All MCs	29	0.0	29	0.0	0.085	5.7	LOS A	0.3	2.1	0.18	0.56	0.18	52.7
9	R2	All MCs	76	0.0	76	0.0	0.085	6.0	LOS A	0.3	2.1	0.18	0.56	0.18	52.1
Approach			105	0.0	105	0.0	0.085	5.9	LOS A	0.3	2.1	0.18	0.56	0.18	52.3
West: Old Mount Barker Road [W]															
10	L2	All MCs	84	1.3	84	1.3	0.076	5.7	LOS A	0.3	2.3	0.08	0.36	0.08	54.4
11	T1	All MCs	44	2.4	44	2.4	0.076	0.0	LOS A	0.3	2.3	0.08	0.36	0.08	56.3
Approach			128	1.6	128	1.6	0.076	3.7	NA	0.3	2.3	0.08	0.36	0.08	55.0
All Vehicles			293	0.7	293	0.7	0.085	4.2	NA	0.3	2.3	0.11	0.40	0.11	54.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

APPENDIX F

SIDRA ANALYSIS – OLD MOUNT BARKER ROAD/ GOULD ROAD INTERSECTION

MOVEMENT SUMMARY

Site: 101v [WED AM Existing (Site Folder: Old Mt Barker Road - Gould Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	121	2.6	121	2.6	0.116	5.9	LOS A	0.4	3.2	0.22	0.57	0.22	52.1
3	R2	All MCs	74	4.3	74	4.3	0.116	6.2	LOS A	0.4	3.2	0.22	0.57	0.22	51.9
Approach			195	3.2	195	3.2	0.116	6.0	NA	0.4	3.2	0.22	0.57	0.22	52.0
East: Old Mount Barker Road [E]															
4	L2	All MCs	213	1.5	213	1.5	0.205	8.8	LOS A	0.9	6.4	0.32	0.87	0.32	50.8
5	T1	All MCs	24	4.3	24	4.3	0.205	10.4	LOS B	0.9	6.4	0.32	0.87	0.32	50.7
Approach			237	1.8	237	1.8	0.205	9.0	LOS A	0.9	6.4	0.32	0.87	0.32	50.8
West: Old Mount Barker Road [W]															
11	T1	All MCs	20	5.3	20	5.3	0.097	0.0	LOS A	0.0	0.0	0.00	0.53	0.00	55.5
12	R2	All MCs	156	4.1	156	4.1	0.097	5.6	LOS A	0.0	0.0	0.00	0.53	0.00	53.0
Approach			176	4.2	176	4.2	0.097	4.9	NA	0.0	0.0	0.00	0.53	0.00	53.3
All Vehicles			607	2.9	607	2.9	0.205	6.9	NA	0.9	6.4	0.20	0.68	0.20	51.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [WED PM Existing (Site Folder: Old Mt Barker Road - Gould Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	161	2.0	161	2.0	0.159	5.9	LOS A	0.7	4.7	0.23	0.57	0.23	52.1
3	R2	All MCs	111	1.0	111	1.0	0.159	6.1	LOS A	0.7	4.7	0.23	0.57	0.23	52.0
Approach			272	1.6	272	1.6	0.159	6.0	NA	0.7	4.7	0.23	0.57	0.23	52.1
East: Old Mount Barker Road [E]															
4	L2	All MCs	134	1.6	134	1.6	0.152	8.7	LOS A	0.6	4.5	0.32	0.88	0.32	50.7
5	T1	All MCs	29	10.7	29	10.7	0.152	11.4	LOS B	0.6	4.5	0.32	0.88	0.32	50.3
Approach			163	3.2	163	3.2	0.152	9.2	LOS A	0.6	4.5	0.32	0.88	0.32	50.6
West: Old Mount Barker Road [W]															
11	T1	All MCs	15	14.3	15	14.3	0.091	0.0	LOS A	0.0	0.0	0.00	0.54	0.00	55.4
12	R2	All MCs	148	4.3	148	4.3	0.091	5.6	LOS A	0.0	0.0	0.00	0.54	0.00	52.9
Approach			163	5.2	163	5.2	0.091	5.1	NA	0.0	0.0	0.00	0.54	0.00	53.1
All Vehicles			598	3.0	598	3.0	0.159	6.6	NA	0.7	4.7	0.19	0.65	0.19	51.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [SAT Existing (Site Folder: Old Mt Barker Road - Gould Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	172	0.0	172	0.0	0.147	5.9	LOS A	0.5	3.7	0.22	0.58	0.22	52.2
3	R2	All MCs	79	2.7	79	2.7	0.147	6.3	LOS A	0.5	3.7	0.22	0.58	0.22	52.0
Approach			251	0.8	251	0.8	0.147	6.0	NA	0.5	3.7	0.22	0.58	0.22	52.1
East: Old Mount Barker Road [E]															
4	L2	All MCs	92	2.3	92	2.3	0.100	8.9	LOS A	0.4	2.8	0.33	0.87	0.33	50.7
5	T1	All MCs	16	0.0	16	0.0	0.100	10.4	LOS B	0.4	2.8	0.33	0.87	0.33	50.8
Approach			107	2.0	107	2.0	0.100	9.1	LOS A	0.4	2.8	0.33	0.87	0.33	50.7
West: Old Mount Barker Road [W]															
11	T1	All MCs	18	5.9	18	5.9	0.113	0.0	LOS A	0.0	0.0	0.00	0.54	0.00	55.4
12	R2	All MCs	192	0.5	192	0.5	0.113	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.0
Approach			209	1.0	209	1.0	0.113	5.0	NA	0.0	0.0	0.00	0.54	0.00	53.2
All Vehicles			567	1.1	567	1.1	0.147	6.3	NA	0.5	3.7	0.16	0.62	0.16	52.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [WED AM Future (Site Folder: Old Mt Barker Road - Gould Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	116	2.7	116	2.7	0.133	6.0	LOS A	0.6	4.2	0.26	0.57	0.26	52.0
3	R2	All MCs	105	3.0	105	3.0	0.133	6.1	LOS A	0.6	4.2	0.26	0.57	0.26	51.8
Approach			221	2.9	221	2.9	0.133	6.1	NA	0.6	4.2	0.26	0.57	0.26	51.9
East: Old Mount Barker Road [E]															
4	L2	All MCs	244	1.3	244	1.3	0.233	8.8	LOS A	1.1	7.5	0.32	0.87	0.32	50.8
5	T1	All MCs	26	4.0	26	4.0	0.233	10.6	LOS B	1.1	7.5	0.32	0.87	0.32	50.7
Approach			271	1.6	271	1.6	0.233	9.0	LOS A	1.1	7.5	0.32	0.87	0.32	50.8
West: Old Mount Barker Road [W]															
11	T1	All MCs	22	4.8	22	4.8	0.095	0.0	LOS A	0.0	0.0	0.00	0.52	0.00	55.6
12	R2	All MCs	151	4.2	151	4.2	0.095	5.6	LOS A	0.0	0.0	0.00	0.52	0.00	53.1
Approach			173	4.3	173	4.3	0.095	4.8	NA	0.0	0.0	0.00	0.52	0.00	53.4
All Vehicles			664	2.7	664	2.7	0.233	6.9	NA	1.1	7.5	0.22	0.68	0.22	51.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [WED PM Future (Site Folder: Old Mt Barker Road - Gould Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	156	2.0	156	2.0	0.176	6.0	LOS A	0.8	5.7	0.25	0.57	0.25	52.1
3	R2	All MCs	142	0.7	142	0.7	0.176	6.1	LOS A	0.8	5.7	0.25	0.57	0.25	51.9
Approach			298	1.4	298	1.4	0.176	6.0	NA	0.8	5.7	0.25	0.57	0.25	52.0
East: Old Mount Barker Road [E]															
4	L2	All MCs	165	1.3	165	1.3	0.181	8.7	LOS A	0.8	5.5	0.32	0.87	0.32	50.7
5	T1	All MCs	32	10.0	32	10.0	0.181	11.7	LOS B	0.8	5.5	0.32	0.87	0.32	50.4
Approach			197	2.7	197	2.7	0.181	9.2	LOS A	0.8	5.5	0.32	0.87	0.32	50.7
West: Old Mount Barker Road [W]															
11	T1	All MCs	17	12.5	17	12.5	0.089	0.0	LOS A	0.0	0.0	0.00	0.53	0.00	55.4
12	R2	All MCs	143	4.4	143	4.4	0.089	5.6	LOS A	0.0	0.0	0.00	0.53	0.00	52.9
Approach			160	5.3	160	5.3	0.089	5.0	NA	0.0	0.0	0.00	0.53	0.00	53.2
All Vehicles			655	2.7	655	2.7	0.181	6.7	NA	0.8	5.7	0.21	0.65	0.21	51.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101v [SAT Future (Site Folder: Old Mt Barker Road - Gould Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	166	0.0	166	0.0	0.165	6.0	LOS A	0.7	4.9	0.26	0.58	0.26	52.1
3	R2	All MCs	111	1.9	111	1.9	0.165	6.3	LOS A	0.7	4.9	0.26	0.58	0.26	51.9
Approach			277	0.8	277	0.8	0.165	6.1	NA	0.7	4.9	0.26	0.58	0.26	52.0
East: Old Mount Barker Road [E]															
4	L2	All MCs	123	1.7	123	1.7	0.129	8.9	LOS A	0.5	3.7	0.33	0.88	0.33	50.7
5	T1	All MCs	18	0.0	18	0.0	0.129	10.7	LOS B	0.5	3.7	0.33	0.88	0.33	50.8
Approach			141	1.5	141	1.5	0.129	9.1	LOS A	0.5	3.7	0.33	0.88	0.33	50.8
West: Old Mount Barker Road [W]															
11	T1	All MCs	20	5.3	20	5.3	0.111	0.0	LOS A	0.0	0.0	0.00	0.54	0.00	55.4
12	R2	All MCs	186	0.6	186	0.6	0.111	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	53.1
Approach			206	1.0	206	1.0	0.111	5.0	NA	0.0	0.0	0.00	0.54	0.00	53.3
All Vehicles			624	1.0	624	1.0	0.165	6.4	NA	0.7	4.9	0.19	0.63	0.19	52.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

APPENDIX G

SIDRA ANALYSIS – GOULD ROAD/POMONA ROAD INTERSECTION

MOVEMENT SUMMARY

Site: 101 [WED AM Existing (Site Folder: Gould Road - Pomona Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	59	5.4	59	5.4	0.069	5.6	LOS A	0.0	0.0	0.00	0.27	0.00	55.1
2	T1	All MCs	69	0.0	69	0.0	0.069	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	57.6
Approach			128	2.5	128	2.5	0.069	2.6	NA	0.0	0.0	0.00	0.27	0.00	56.4
North: Gould Road [N]															
8	T1	All MCs	85	4.9	85	4.9	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	281	1.1	281	1.1	0.176	5.9	LOS A	0.9	6.3	0.26	0.57	0.26	51.9
Approach			366	2.0	366	2.0	0.176	4.5	NA	0.9	6.3	0.20	0.44	0.20	53.6
West: Pomona Road [W]															
10	L2	All MCs	108	1.9	108	1.9	0.163	5.8	LOS A	0.7	5.0	0.27	0.55	0.27	51.7
12	R2	All MCs	61	3.4	61	3.4	0.163	9.4	LOS A	0.7	5.0	0.27	0.55	0.27	51.5
Approach			169	2.5	169	2.5	0.163	7.1	LOS A	0.7	5.0	0.27	0.55	0.27	51.6
All Vehicles			664	2.2	664	2.2	0.176	4.8	NA	0.9	6.3	0.18	0.43	0.18	53.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Existing (Site Folder: Gould Road - Pomona Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	35	6.1	35	6.1	0.060	5.6	LOS A	0.0	0.0	0.00	0.18	0.00	55.7
2	T1	All MCs	78	2.7	78	2.7	0.060	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	58.4
Approach			113	3.7	113	3.7	0.060	1.7	NA	0.0	0.0	0.00	0.18	0.00	57.5
North: Gould Road [N]															
8	T1	All MCs	84	2.5	84	2.5	0.044	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	198	3.2	198	3.2	0.124	5.9	LOS A	0.6	4.3	0.24	0.57	0.24	51.9
Approach			282	3.0	282	3.0	0.124	4.1	NA	0.6	4.3	0.17	0.40	0.17	54.1
West: Pomona Road [W]															
10	L2	All MCs	194	1.1	194	1.1	0.207	5.8	LOS A	0.9	6.7	0.25	0.55	0.25	52.1
12	R2	All MCs	60	3.5	60	3.5	0.207	8.6	LOS A	0.9	6.7	0.25	0.55	0.25	51.9
Approach			254	1.7	254	1.7	0.207	6.5	LOS A	0.9	6.7	0.25	0.55	0.25	52.1
All Vehicles			648	2.6	648	2.6	0.207	4.6	NA	0.9	6.7	0.17	0.42	0.17	53.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Existing Future (Site Folder: Gould Road - Pomona Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	19	0.0	19	0.0	0.035	5.5	LOS A	0.0	0.0	0.00	0.17	0.00	56.1
2	T1	All MCs	48	0.0	48	0.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.17	0.00	58.5
Approach			67	0.0	67	0.0	0.035	1.6	NA	0.0	0.0	0.00	0.17	0.00	57.8
North: Gould Road [N]															
8	T1	All MCs	84	2.5	84	2.5	0.044	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	226	0.5	226	0.5	0.134	5.7	LOS A	0.7	4.6	0.17	0.56	0.17	52.2
Approach			311	1.0	311	1.0	0.134	4.1	NA	0.7	4.6	0.13	0.41	0.13	54.1
West: Pomona Road [W]															
10	L2	All MCs	229	0.9	229	0.9	0.180	5.7	LOS A	0.8	5.8	0.16	0.54	0.16	52.4
12	R2	All MCs	26	0.0	26	0.0	0.180	8.3	LOS A	0.8	5.8	0.16	0.54	0.16	52.3
Approach			256	0.8	256	0.8	0.180	6.0	LOS A	0.8	5.8	0.16	0.54	0.16	52.4
All Vehicles			634	0.8	634	0.8	0.180	4.6	NA	0.8	5.8	0.13	0.44	0.13	53.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED AM Future (Site Folder: Gould Road - Pomona Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	58	5.5	58	5.5	0.069	5.6	LOS A	0.0	0.0	0.00	0.26	0.00	55.1
2	T1	All MCs	72	0.0	72	0.0	0.069	0.0	LOS A	0.0	0.0	0.00	0.26	0.00	57.7
Approach			129	2.4	129	2.4	0.069	2.5	NA	0.0	0.0	0.00	0.26	0.00	56.5
North: Gould Road [N]															
8	T1	All MCs	87	4.8	87	4.8	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	306	1.0	306	1.0	0.192	5.9	LOS A	1.0	6.9	0.27	0.57	0.27	51.9
Approach			394	1.9	394	1.9	0.192	4.6	NA	1.0	6.9	0.21	0.44	0.21	53.5
West: Pomona Road [W]															
10	L2	All MCs	134	1.6	134	1.6	0.182	5.8	LOS A	0.8	5.7	0.27	0.55	0.27	51.7
12	R2	All MCs	60	3.5	60	3.5	0.182	9.8	LOS A	0.8	5.7	0.27	0.55	0.27	51.5
Approach			194	2.2	194	2.2	0.182	7.1	LOS A	0.8	5.7	0.27	0.55	0.27	51.6
All Vehicles			717	2.1	717	2.1	0.192	4.9	NA	1.0	6.9	0.19	0.44	0.19	53.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Future (Site Folder: Gould Road - Pomona Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	34	6.3	34	6.3	0.061	5.6	LOS A	0.0	0.0	0.00	0.18	0.00	55.8
2	T1	All MCs	80	2.6	80	2.6	0.061	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	58.4
Approach			114	3.7	114	3.7	0.061	1.7	NA	0.0	0.0	0.00	0.18	0.00	57.6
North: Gould Road [N]															
8	T1	All MCs	86	2.4	86	2.4	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	223	2.8	223	2.8	0.139	5.9	LOS A	0.7	4.9	0.24	0.57	0.24	51.9
Approach			309	2.7	309	2.7	0.139	4.2	NA	0.7	4.9	0.17	0.41	0.17	53.9
West: Pomona Road [W]															
10	L2	All MCs	219	1.0	219	1.0	0.226	5.8	LOS A	1.1	7.5	0.25	0.55	0.25	52.1
12	R2	All MCs	59	3.6	59	3.6	0.226	9.0	LOS A	1.1	7.5	0.25	0.55	0.25	51.9
Approach			278	1.5	278	1.5	0.226	6.5	LOS A	1.1	7.5	0.25	0.55	0.25	52.0
All Vehicles			701	2.4	701	2.4	0.226	4.7	NA	1.1	7.5	0.18	0.43	0.18	53.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Existing (Site Folder: Gould Road - Pomona Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Gould Road [S]															
1	L2	All MCs	20	0.0	20	0.0	0.035	5.5	LOS A	0.0	0.0	0.00	0.18	0.00	56.0
2	T1	All MCs	46	0.0	46	0.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	58.4
Approach			66	0.0	66	0.0	0.035	1.7	NA	0.0	0.0	0.00	0.18	0.00	57.6
North: Gould Road [N]															
8	T1	All MCs	82	2.6	82	2.6	0.043	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	All MCs	201	0.5	201	0.5	0.119	5.7	LOS A	0.6	4.1	0.17	0.56	0.17	52.2
Approach			283	1.1	283	1.1	0.119	4.0	NA	0.6	4.1	0.12	0.40	0.12	54.2
West: Pomona Road [W]															
10	L2	All MCs	204	1.0	204	1.0	0.164	5.7	LOS A	0.7	5.2	0.15	0.54	0.15	52.4
12	R2	All MCs	27	0.0	27	0.0	0.164	7.9	LOS A	0.7	5.2	0.15	0.54	0.15	52.3
Approach			232	0.9	232	0.9	0.164	6.0	LOS A	0.7	5.2	0.15	0.54	0.15	52.4
All Vehicles			581	0.9	581	0.9	0.164	4.5	NA	0.7	5.2	0.12	0.43	0.12	53.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

APPENDIX H

SIDRA ANALYSIS – POMONA ROAD/MOUNT BARKER ROAD/AVENUE ROAD INTERSECTION

MOVEMENT SUMMARY

Site: 101 [WED AM Existing (Site Folder: Mt Barker Road - Pomona Road - Avenue Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mount Barker Road [S]															
1	L2	All MCs	108	5.8	108	5.8	0.294	6.7	LOS A	1.8	13.2	0.58	0.59	0.58	51.8
2	T1	All MCs	437	4.6	437	4.6	0.294	6.6	LOS A	1.8	13.2	0.58	0.59	0.58	52.2
3	R2	All MCs	29	3.6	29	3.6	0.294	10.8	LOS B	1.8	13.0	0.59	0.60	0.59	51.2
Approach			575	4.8	575	4.8	0.294	6.8	LOS A	1.8	13.2	0.58	0.59	0.58	52.1
East: Pomona Road [E]															
4	L2	All MCs	54	2.0	54	2.0	0.367	10.0	LOS A	2.1	15.1	0.74	0.77	0.75	49.4
5	T1	All MCs	57	3.7	57	3.7	0.367	9.3	LOS A	2.1	15.1	0.74	0.77	0.75	49.6
6	R2	All MCs	118	2.7	118	2.7	0.367	13.4	LOS B	2.1	15.1	0.74	0.77	0.75	48.9
Approach			228	2.8	228	2.8	0.367	11.6	LOS B	2.1	15.1	0.74	0.77	0.75	49.2
North: Mount Barker Road [N]															
7	L2	All MCs	113	3.7	113	3.7	0.180	7.2	LOS A	1.0	7.0	0.52	0.61	0.52	51.8
8	T1	All MCs	347	7.3	347	7.3	0.492	6.1	LOS A	3.9	28.6	0.60	0.58	0.60	51.5
9	R2	All MCs	186	3.4	186	3.4	0.492	10.1	LOS B	3.9	28.6	0.60	0.58	0.60	50.8
Approach			646	5.5	646	5.5	0.492	7.4	LOS A	3.9	28.6	0.58	0.59	0.58	51.3
West: Avenue Road [W]															
10	L2	All MCs	221	1.9	221	1.9	0.563	9.0	LOS A	3.7	26.1	0.72	0.83	0.87	50.0
11	T1	All MCs	65	4.8	65	4.8	0.563	9.4	LOS A	3.7	26.1	0.72	0.83	0.87	50.2
12	R2	All MCs	122	1.7	122	1.7	0.563	13.4	LOS B	3.7	26.1	0.72	0.83	0.87	49.5
Approach			408	2.3	408	2.3	0.563	10.4	LOS B	3.7	26.1	0.72	0.83	0.87	49.8
All Vehicles			1858	4.2	1858	4.2	0.563	8.4	LOS A	3.9	28.6	0.63	0.66	0.67	51.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Existing (Site Folder: Mt Barker Road - Pomona Road - Avenue Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mount Barker Road [S]															
1	L2	All MCs	139	4.5	139	4.5	0.276	7.1	LOS A	1.7	12.7	0.64	0.63	0.64	51.6
2	T1	All MCs	311	6.4	311	6.4	0.276	7.2	LOS A	1.7	12.7	0.65	0.64	0.65	51.8
3	R2	All MCs	37	2.9	37	2.9	0.276	11.3	LOS B	1.7	12.4	0.65	0.64	0.65	50.8
Approach			486	5.6	486	5.6	0.276	7.5	LOS A	1.7	12.7	0.65	0.64	0.65	51.7
East: Pomona Road [E]															
4	L2	All MCs	49	8.5	49	8.5	0.335	12.5	LOS B	1.8	13.3	0.80	0.83	0.82	48.5
5	T1	All MCs	55	1.9	55	1.9	0.335	10.8	LOS B	1.8	13.3	0.80	0.83	0.82	48.9
6	R2	All MCs	60	1.8	60	1.8	0.335	15.0	LOS B	1.8	13.3	0.80	0.83	0.82	48.2
Approach			164	3.8	164	3.8	0.335	12.9	LOS B	1.8	13.3	0.80	0.83	0.82	48.5
North: Mount Barker Road [N]															
7	L2	All MCs	92	2.3	92	2.3	0.196	6.7	LOS A	1.1	7.5	0.47	0.57	0.47	52.2
8	T1	All MCs	523	3.8	523	3.8	0.683	6.3	LOS A	7.1	50.8	0.66	0.58	0.66	51.4
9	R2	All MCs	336	2.2	336	2.2	0.683	10.2	LOS B	7.1	50.8	0.68	0.58	0.68	50.5
Approach			951	3.1	951	3.1	0.683	7.7	LOS A	7.1	50.8	0.65	0.58	0.65	51.1
West: Avenue Road [W]															
10	L2	All MCs	129	4.9	129	4.9	0.337	6.5	LOS A	1.6	12.0	0.56	0.68	0.56	51.4
11	T1	All MCs	43	4.9	43	4.9	0.337	6.7	LOS A	1.6	12.0	0.56	0.68	0.56	51.8
12	R2	All MCs	95	4.4	95	4.4	0.337	10.9	LOS B	1.6	12.0	0.56	0.68	0.56	50.9
Approach			267	4.7	267	4.7	0.337	8.1	LOS A	1.6	12.0	0.56	0.68	0.56	51.3
All Vehicles			1868	4.1	1868	4.1	0.683	8.2	LOS A	7.1	50.8	0.65	0.63	0.65	51.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Existing (Site Folder: Mt Barker Road - Pomona Road - Avenue Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mount Barker Road [S]															
1	L2	All MCs	85	0.0	85	0.0	0.294	6.7	LOS A	1.9	13.2	0.61	0.60	0.61	51.9
2	T1	All MCs	401	2.1	401	2.1	0.294	6.7	LOS A	1.9	13.2	0.61	0.62	0.61	52.0
3	R2	All MCs	79	0.0	79	0.0	0.294	10.9	LOS B	1.8	13.0	0.62	0.63	0.62	50.8
Approach			565	1.5	565	1.5	0.294	7.3	LOS A	1.9	13.2	0.61	0.62	0.61	51.8
East: Pomona Road [E]															
4	L2	All MCs	87	0.0	87	0.0	0.526	12.8	LOS B	3.7	26.1	0.83	0.88	1.01	48.2
5	T1	All MCs	100	0.0	100	0.0	0.526	11.7	LOS B	3.7	26.1	0.83	0.88	1.01	48.4
6	R2	All MCs	122	0.0	122	0.0	0.526	15.9	LOS B	3.7	26.1	0.83	0.88	1.01	47.7
Approach			309	0.0	309	0.0	0.526	13.6	LOS B	3.7	26.1	0.83	0.88	1.01	48.1
North: Mount Barker Road [N]															
7	L2	All MCs	88	0.0	88	0.0	0.168	7.6	LOS A	0.9	6.0	0.54	0.63	0.54	51.6
8	T1	All MCs	467	1.6	467	1.6	0.585	6.7	LOS A	5.0	35.5	0.68	0.61	0.68	51.5
9	R2	All MCs	179	0.0	179	0.0	0.585	10.7	LOS B	5.0	35.5	0.68	0.61	0.69	50.7
Approach			735	1.0	735	1.0	0.585	7.7	LOS A	5.0	35.5	0.66	0.61	0.67	51.3
West: Avenue Road [W]															
10	L2	All MCs	179	1.2	179	1.2	0.499	8.3	LOS A	2.9	20.7	0.69	0.81	0.79	50.3
11	T1	All MCs	56	1.9	56	1.9	0.499	8.6	LOS A	2.9	20.7	0.69	0.81	0.79	50.6
12	R2	All MCs	128	0.0	128	0.0	0.499	12.7	LOS B	2.9	20.7	0.69	0.81	0.79	49.9
Approach			363	0.9	363	0.9	0.499	9.9	LOS A	2.9	20.7	0.69	0.81	0.79	50.2
All Vehicles			1973	1.0	1973	1.0	0.585	8.9	LOS A	5.0	35.5	0.68	0.69	0.73	50.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED AM Future (Site Folder: Mt Barker Road - Pomona Road - Avenue Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mount Barker Road [S]															
1	L2	All MCs	108	5.8	108	5.8	0.302	6.8	LOS A	1.9	13.8	0.60	0.60	0.60	51.7
2	T1	All MCs	437	4.6	437	4.6	0.302	6.7	LOS A	1.9	13.8	0.60	0.60	0.60	52.1
3	R2	All MCs	34	3.1	34	3.1	0.302	10.9	LOS B	1.9	13.5	0.61	0.61	0.61	51.1
Approach			579	4.7	579	4.7	0.302	7.0	LOS A	1.9	13.8	0.60	0.60	0.60	52.0
East: Pomona Road [E]															
4	L2	All MCs	58	1.8	58	1.8	0.406	10.4	LOS B	2.5	17.7	0.76	0.79	0.81	49.0
5	T1	All MCs	57	3.7	57	3.7	0.406	9.8	LOS A	2.5	17.7	0.76	0.79	0.81	49.2
6	R2	All MCs	138	2.3	138	2.3	0.406	13.9	LOS B	2.5	17.7	0.76	0.79	0.81	48.6
Approach			253	2.5	253	2.5	0.406	12.2	LOS B	2.5	17.7	0.76	0.79	0.81	48.8
North: Mount Barker Road [N]															
7	L2	All MCs	137	3.1	137	3.1	0.217	7.3	LOS A	1.2	8.6	0.53	0.62	0.53	51.7
8	T1	All MCs	347	7.3	347	7.3	0.494	6.1	LOS A	3.9	28.7	0.60	0.58	0.60	51.5
9	R2	All MCs	186	3.4	186	3.4	0.494	10.2	LOS B	3.9	28.7	0.60	0.58	0.60	50.7
Approach			671	5.3	671	5.3	0.494	7.5	LOS A	3.9	28.7	0.59	0.59	0.59	51.3
West: Avenue Road [W]															
10	L2	All MCs	221	1.9	221	1.9	0.573	9.3	LOS A	3.8	26.8	0.73	0.85	0.90	49.8
11	T1	All MCs	65	4.8	65	4.8	0.573	9.7	LOS A	3.8	26.8	0.73	0.85	0.90	50.0
12	R2	All MCs	122	1.7	122	1.7	0.573	13.7	LOS B	3.8	26.8	0.73	0.85	0.90	49.3
Approach			408	2.3	408	2.3	0.573	10.7	LOS B	3.8	26.8	0.73	0.85	0.90	49.7
All Vehicles			1911	4.1	1911	4.1	0.573	8.6	LOS A	3.9	28.7	0.64	0.68	0.69	50.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [WED PM Future (Site Folder: Mt Barker Road - Pomona Road - Avenue Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mount Barker Road [S]															
1	L2	All MCs	139	4.5	139	4.5	0.284	7.3	LOS A	1.8	13.2	0.66	0.64	0.66	51.5
2	T1	All MCs	311	6.4	311	6.4	0.284	7.4	LOS A	1.8	13.2	0.66	0.65	0.66	51.7
3	R2	All MCs	41	2.6	41	2.6	0.284	11.5	LOS B	1.7	12.8	0.67	0.65	0.67	50.7
Approach			491	5.6	491	5.6	0.284	7.7	LOS A	1.8	13.2	0.66	0.65	0.66	51.6
East: Pomona Road [E]															
4	L2	All MCs	54	7.8	54	7.8	0.411	14.2	LOS B	2.6	18.4	0.85	0.88	0.96	47.3
5	T1	All MCs	55	1.9	55	1.9	0.411	12.5	LOS B	2.6	18.4	0.85	0.88	0.96	47.8
6	R2	All MCs	80	1.3	80	1.3	0.411	16.6	LOS B	2.6	18.4	0.85	0.88	0.96	47.1
Approach			188	3.4	188	3.4	0.411	14.7	LOS B	2.6	18.4	0.85	0.88	0.96	47.3
North: Mount Barker Road [N]															
7	L2	All MCs	116	1.8	116	1.8	0.202	6.8	LOS A	1.1	7.7	0.48	0.58	0.48	52.1
8	T1	All MCs	523	3.8	523	3.8	0.703	6.4	LOS A	7.6	54.8	0.70	0.59	0.70	51.2
9	R2	All MCs	336	2.2	336	2.2	0.703	10.4	LOS B	7.6	54.8	0.70	0.59	0.71	50.4
Approach			975	3.0	975	3.0	0.703	7.8	LOS A	7.6	54.8	0.67	0.59	0.68	51.0
West: Avenue Road [W]															
10	L2	All MCs	129	4.9	129	4.9	0.343	6.6	LOS A	1.7	12.2	0.58	0.69	0.58	51.3
11	T1	All MCs	43	4.9	43	4.9	0.343	6.8	LOS A	1.7	12.2	0.58	0.69	0.58	51.7
12	R2	All MCs	95	4.4	95	4.4	0.343	11.0	LOS B	1.7	12.2	0.58	0.69	0.58	50.8
Approach			267	4.7	267	4.7	0.343	8.2	LOS A	1.7	12.2	0.58	0.69	0.58	51.2
All Vehicles			1921	3.9	1921	3.9	0.703	8.5	LOS A	7.6	54.8	0.67	0.65	0.69	50.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [SAT Future (Site Folder: Mt Barker Road - Pomona Road - Avenue Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mount Barker Road [S]															
1	L2	All MCs	85	0.0	85	0.0	0.304	6.8	LOS A	2.0	13.9	0.63	0.61	0.63	51.8
2	T1	All MCs	401	2.1	401	2.1	0.304	6.9	LOS A	2.0	13.9	0.64	0.63	0.64	51.9
3	R2	All MCs	83	0.0	83	0.0	0.304	11.0	LOS B	1.9	13.6	0.64	0.64	0.64	50.7
Approach			569	1.5	569	1.5	0.304	7.5	LOS A	2.0	13.9	0.64	0.63	0.64	51.7
East: Pomona Road [E]															
4	L2	All MCs	92	0.0	92	0.0	0.602	15.6	LOS B	5.1	35.4	0.90	0.94	1.19	46.4
5	T1	All MCs	100	0.0	100	0.0	0.602	14.4	LOS B	5.1	35.4	0.90	0.94	1.19	46.7
6	R2	All MCs	142	0.0	142	0.0	0.602	18.6	LOS B	5.1	35.4	0.90	0.94	1.19	46.0
Approach			334	0.0	334	0.0	0.602	16.5	LOS B	5.1	35.4	0.90	0.94	1.19	46.3
North: Mount Barker Road [N]															
7	L2	All MCs	113	0.0	113	0.0	0.187	7.7	LOS A	1.0	6.8	0.55	0.64	0.55	51.5
8	T1	All MCs	467	1.6	467	1.6	0.599	6.8	LOS A	5.4	37.8	0.70	0.62	0.71	51.4
9	R2	All MCs	179	0.0	179	0.0	0.599	10.9	LOS B	5.4	37.8	0.70	0.62	0.71	50.6
Approach			759	1.0	759	1.0	0.599	7.9	LOS A	5.4	37.8	0.67	0.62	0.69	51.2
West: Avenue Road [W]															
10	L2	All MCs	179	1.2	179	1.2	0.508	8.6	LOS A	3.0	21.3	0.70	0.82	0.82	50.1
11	T1	All MCs	56	1.9	56	1.9	0.508	8.8	LOS A	3.0	21.3	0.70	0.82	0.82	50.4
12	R2	All MCs	128	0.0	128	0.0	0.508	12.9	LOS B	3.0	21.3	0.70	0.82	0.82	49.7
Approach			363	0.9	363	0.9	0.508	10.1	LOS B	3.0	21.3	0.70	0.82	0.82	50.0
All Vehicles			2025	0.9	2025	0.9	0.602	9.6	LOS A	5.4	37.8	0.70	0.71	0.78	50.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix J

Waste Management and Minimisation Plan – Cirqa

MOUNT LOFTY GOLF ESTATE
GOLFLINKS ROAD, STIRLING

WASTE MANAGEMENT AND MINIMISATION PLAN

CIRQA™

DISCLAIMER

DOCUMENT CONTROL

Report title:	Mount Lofty Golf Estate (Stirling Golf Club Redevelopment Waste Management and Minimisation Plan
Project number:	21117
Client:	Trice Pty Ltd
Client contact:	Sonia Mercorella

Version	Date	Details/status	Prepared by	Approved by
Draft 1	15 Sep 22	For review	BNW	BNW
V1.0	08 Dec 22	For submission	BNW	BNW

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1. EXECUTIVE SUMMARY

CIRQA has been engaged to prepare a Waste Management and Minimisation Plan (WMMP) for the Mount Lofty Golf Estate development at 35 Golflinks Road, Stirling. The project forms the redevelopment of the existing Stirling Golf Club to provide tourist accommodation and associated hospitality facilities along with the existing golfing facilities.

This WMMP applies to waste generated from the site preparation and construction phase and the operational phases of the development. The WMMP has been prepared on the basis of plans prepared by R Architecture (Drawings TP01 to TP17 dated 29 November 2022).

The objective of the WMMP is to identify the guiding principles and procedures for the development during construction and operation. The WMMP has been prepared to reflect to requirements of the "*Environment Protection Act 1993*" and "*South Australia's Waste Strategy 2020-2025*". Specifically, the WMMP aligns with the waste management hierarchy identified in these documents prioritising the avoidance, minimisation, reuse and recycling of waste (in that order) over disposal to land fill.

The WMMP identifies potential sources of waste during the construction and operation phases and the principles, procedures and responsibilities for the management and minimisation of waste materials associated with the development.

The provisions contained within the WMMP should be subject to further review as the construction methodology is refined and periodically during the operation of the site (in particular, once the tourism operator has been confirmed).

2. BACKGROUND

2.1 OBJECTIVES

The purpose of this WMMP is to outline the management and minimisation of waste generated during both the construction and operational phases of the proposed development. The WMMP includes review of potential waste sources during construction and operation and details measures for the management, reuse, recycling and disposal of the various waste materials.

2.2 LEGISLATIVE REQUIREMENTS AND RELATED DOCUMENTATION

Within South Australia, the "*Environment Protection Act 1993*" (The Act) provides the legislative requirements in respect to the protection of the environment with the State. The Act includes consideration of the management and minimisation of waste. All waste management activities undertaken within and for the development (during both construction and operation) shall be undertaken in accordance with the requirement of The Act.

In addition to The Act, Green Industries SA has published "*South Australia's Waste Strategy 2020-2025*" which sets out a framework of policies, strategies and plans for the management of waste within South Australia whilst meeting the State Government's priority for economic growth. A key priority of SA's Waste Strategy is a transition to a 'circular economy' which it defines as:

> *"...an economic model that contemplates the production and goods and services:*
> - *by reducing reliance on virgin materials*
> - *on the basis of continuously functioning utility and an extended lifecycle*
> - *in a manner that eliminates, as far as is reasonably practicable, waste or pollution, or harm to the environment."*

To support the transition to a 'circular economy', the Waste Strategy identifies the follows priority actions (which can be incorporated into the management of waste materials for the subject development during construction and operation):

- avoid waste;
- improve resource recovery;
- increase use of recycled material and build demand and markets for recycled products;
- better manage material flows to benefit human health and wellbeing, the environment, and the economy; and
- improve information to support innovation, guide investment and enable informed consumer decisions.

Such priorities are reflected in the 'Waste Management Hierarchy' (which is also identified in The Act) as illustrated in Figure 1. The management of waste associated with the construction and operation of the proposed development will be undertaken in line with the hierarchy.

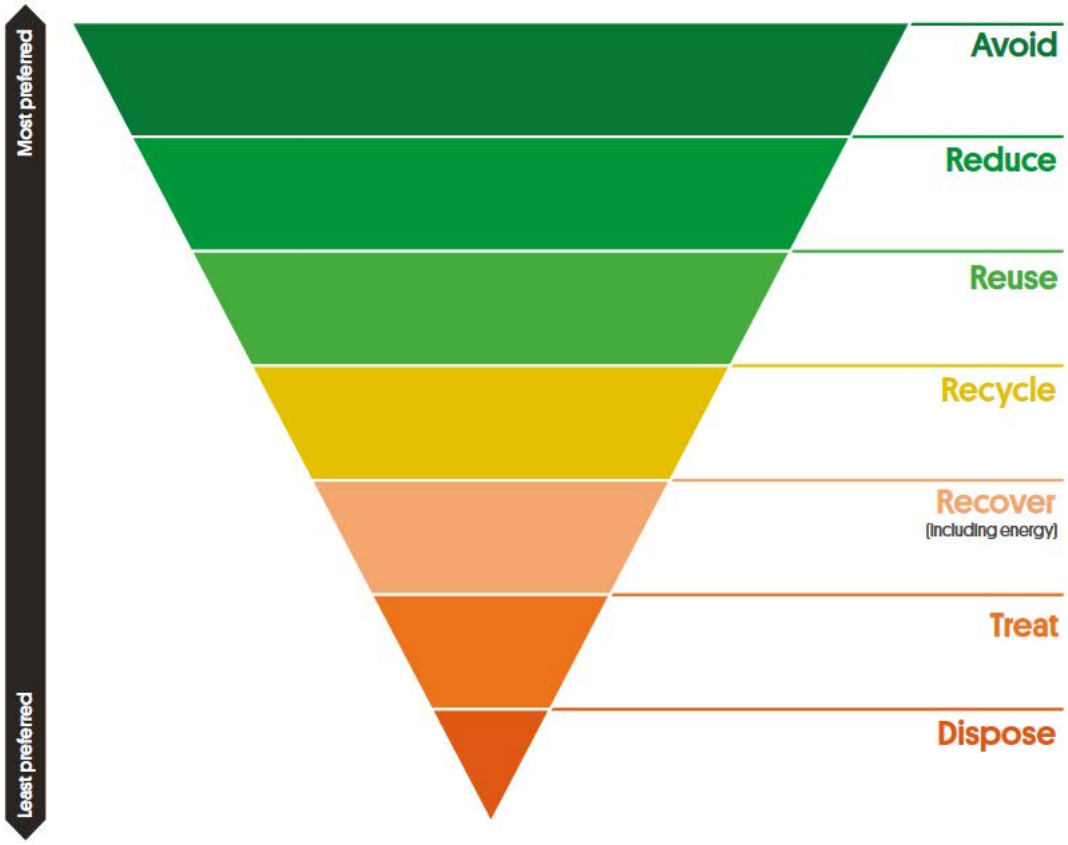

Figure 1 - Waste management hierarchy

(Source: after *"South Australia's Waste Strategy 2020-2025", 2020)*

3. PROJECT DESCRIPTION

3.1 SUBJECT SITE

The subject site is located on the corner of Old Carey Gully Road and Golflinks Road, Stirling. The site is bound by residential properties to the north, Mount George Conservation Park to the east, Golflinks Road to the south and Old Carey Gully Road to the west. Figure 1 illustrates the location of the subject site.

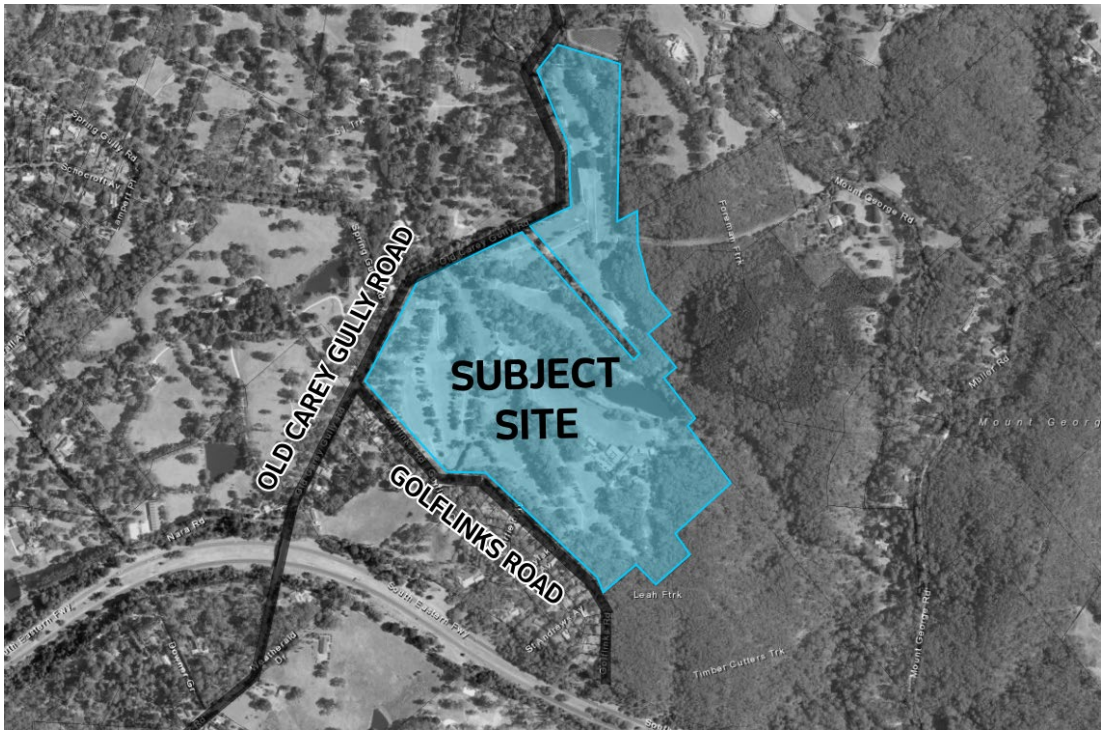

Figure 2 – Location of the subject site with respect to the adjacent road network

The subject site is currently occupied by the existing Stirling Golf Club including the 18-hole golf course and its associated clubroom, pro-shop, five motel rooms, offices, maintenance buildings and the 'Perfumery' building. The Club hosts functions and weddings (for up to 300 guests) as well as regular events. Waste generated by the existing facilities are generally separated and stored on-site (generally adjacent the clubroom building) and collected by private refuse collection contractors.

3.2 PROPOSED DEVELOPMENT

The proposed development comprises the demolition of the existing golf club buildings within the site and the construction of a new tourist accommodation facility. Specifically, the proposed development comprises:

- Hotel - 3-5 level hotel building comprising:
  - 56 hotel suites;

- 15 x two bedroom serviced apartments;
- 15 x three bedroom serviced apartments;
- 2 penthouse serviced apartments;
- back of house, plant storage and maintenance areas;
- a 537 m^2 function room;
- a 212 m^2 restaurant with 89 m^2 external terrace;
- a 186 m^2 sports bar.
- a 189 m^2 gallery and café; and
- a 94 m^2 wellness centre with 125m^2 gym and spa/massage treatment rooms.

- Private retreats – 'Pods'
  - 17 x one bedroom units; and
  - 1 x back of house Service Pod.
- Adaptive reuse of the existing perfumery:
  - refurbishment of the existing local heritage place to accommodate a multipurpose space for use as café, retail or functions;
  - extension to the Perfumery to include a covered outdoor dining area; and
  - orchard and perfumery garden plantings to reimagine the former use of the building as a "Scent Factory".
- Golf Course Facilities
  - retention of 18-hole golf course with improvements;
  - refurbished function facilities, cart storage and 138 m^2 clubhouse in new building; and
  - new 97 m^2 pro-shop, administration areas, gym and change rooms.

3.3 DEMOLITION AND CONSTRUCTION PHASE

The key construction activities to develop the new tourist accommodation facilities are anticipated to consist of the following:

- establishment of temporary construction site (offices, ablutions etc.) albeit during some stages of construction existing buildings may be utilised;
- demolition of a number of existing buildings, structures, paths and internal road/car park areas;
- clearance of vegetation where new works are proposed;
- earthworks/excavation where new works are proposed and (temporary) stockpiling of soils and fill;
- transport of construction equipment and materials to the site;

- construction of footings/foundations (concrete pouring);
- construction of new buildings and hard and soft landscaping;
- removal of construction waste materials (or reuse on-site where possible);
- rehabilitation of areas disturbed during the construction processes; and
- commissioning of the new facilities.

3.4 OPERATIONAL PHASE

The key activities associated with the development (once completed and occupied) will relate to the continued use of the golfing facilities, accommodation of tourists, operation of the food, beverage and hospitality uses and various servicing and maintenance activities associated with the various facilities within the site. This will include the collection, segregation, reuse, recycling and removal of waste materials generated by the site's uses in line with this WMMP.

4. WASTE MANAGEMENT

The Waste Management Hierarchy identified in Section 2 forms the basis of the approach to waste management (and minimisation) for the proposed development. Such an approach aligns with the requirements of the "*Environment Protection Act 1993*" as well as the "*South Australia's Waste Strategy 2020-2025*".

The management approach outlined in this WMMP will provide benefit to the owners and operators of the development as well as the broader community through reduced disposal costs, reduced liabilities and ethical/moral outcomes. The minimisation of waste materials will be particularly important for the tourist accommodation and hospitality uses given such uses traditionally generate relatively high levels of 'waste to landfill' (a reasonable proportion of which is avoidable).

4.1 DEMOLITION AND CONSTRUCTION PHASE

The demolition of existing buildings and infrastructure within the site and construction of the proposed development will result in the generation of a variety of waste materials. Table 1 identifies the primary potential sources of waste during these stages of the development.

Table 1 – Potential Sources of Waste during the Construction Phase

Waste Type	Activity
Spoil	Excavation and Site Preparation
Potentially Contaminated Soil	Excavation and Site Preparation
Clean Fill	Excavation and Site Preparation
Organic Waste/Vegetative Matter	Land and Vegetation Clearance
Waste Water	Demolition and Construction Processes
Waste Concrete	Demolition and Construction Processes
Scrap Metal	Demolition and Construction Processes
Timber Waste	Demolition and Construction Processes
Other Waste (Bricks, Plasterboard, Glass etc.)	Demolition and Construction Processes
Hazardous Materials/Chemicals	Demolition and Construction Processes

The various waste materials generated during the construction phases (including demolition) will be stored within the site and clearly separated for reuse, recycling or disposal. The ultimate locations and extent of area retained for separated waste storage will be identified once the construction contractor has been selected and its construction methodology identified. The WMMP can be updated once this has occurred (or, alternatively, this could form part of a Construction Environment Management Plan (CEMP). Given the size of the subject site, it is

anticipated that there will be ample area for the appropriate storage and segregation of waste materials during the construction phases.

During the construction phase, contractors and subcontractors will be required to adhere to the WMMP (and CEMP). The head contractor shall ensure that all workers/trades:

- take reasonable measures to avoid and minimise waste generation from their work;
- take reasonable measures to reuse and recycle waste materials from their work;
- minimise oversupply of materials and any oversupplied materials are returned to the supplier or reused/recycled; and
- appropriately separate waste streams and transfer to on-site collection and storage areas.

In addition, the head contractor/site manager will be responsible for:

- ensuring that adequate areas for the on-site storage of waste materials are set aside with clearly defined separation between waste types (including clear separation of materials for reuse and recycling);
- ensuring that there is coordination between subcontractors to minimise waste generation and maximisation of on-site reuse of waste materials;
- regularly monitor waste storage areas and containers to ensure appropriate waste separation is occurring and to minimise contamination or leakage;
- ensuring that works are inducted and trained in respect to the principles and requirements of the WMMP;
- ensuring contractors engaged to transport waste to recycling, reuse/recovery or disposal facilities are appropriately licenced; and
- ensuring that non-conformances are identified and corrective action is taken where required to ameliorate issues and/or hazards.

In respect to the management of hazardous waste during the construction phase, the following procedures shall be followed:

- all hazardous wastes are to be correctly identified and separated into individual categories;
- suspected hazardous waste will be treated as hazardous until confirmed otherwise; and

- all hazardous wastes are to be handled, stored (including clear signage identifying the waste and any associated risks) and disposed of in accordance with relevant legislation and policies.

Contractors transporting waste materials from the site to reuse/recovery, recycling or disposal facilities will be required to identify the intended facilities to ensure that they are appropriately licenced and relevant legislative requirements are met, that the principles of the WMMP are met and the maximum diversion from landfill is achieved.

4.2 OPERATIONAL PHASE

An assessment of the waste management considerations has been prepared based on typical generation rates adopted within SA (for instance, from Zero Waste's "*South Australian Better Practice Guide*", 2014). Specifically, the following rates have been adopted for the assessment of the proposal:

- tourist accommodation (applied to the hotel rooms and pods)
  - general waste – 5 L per bedroom per week;
  - recycling – 3 L per bedroom per week; and
  - green organics (including food waste) – 1.5 L per bedroom per week.
- high density apartment dwellings (applied to the apartments)
  - general waste – 30 L per bedroom per week;
  - recycling – 25 L per bedroom per week; and
  - green organics (including food waste) – 10 L per bedroom per week.
- bar (applied to the bar and clubhouse)
  - general waste – 5 L per 10 m² floor area per day;
  - recycling – 5 L per 10 m² floor area per day; and
  - green organics (including food waste) – 0.25 L per 10 m² floor area per day.
- restaurant (applied to restaurant, café, function area and perfumery building)
  - general waste – 30 L per 10 m² floor area per day;
  - recycling – 5 L per 10 m² floor area per day; and
  - green organics (including food waste) – 40 L per 10 m² floor area per day;
- retail (applied to pro-shop)
  - general waste – 5 L per 10 m² floor area per day;
  - recycling – 2.5 L per 10 m² floor area per day; and

- green organics (including food waste) – 0.25 L per 10 m² floor area per day.

- **office** (applied to golf administration area – noting that offices associated with the other uses are accounted for in the above rates)
  - general waste – 15 L per 10 m² floor area per week;
  - recycling – 15 L per 10 m² floor area per week; and
  - green organics (including food waste) – 2.5 L per 10 m² floor area per week.

For the gym and wellness centre, it is assumed that these are wholly ancillary to the tourist accommodation and waste associated with these uses is already accounted for in the 'per room' rates. In addition, a 30% discount has been applied to the café and perfumery areas (as café style dining typically generates lower rates than full service restaurants) and a 50% discount has been applied to the function room (as it would be unlikely that the function areas would be utilised at full occupancy every day of the week).

On the basis of the above rates, the new uses (excluding the golf facilities) are forecast to generate:

- **general waste** – 18,341 L per week;
- **recycling** – 4,612 L per week; and
- **green organics (including food waste)** – 21,776 L per week.

Based on the above, the following number of bins and servicing frequencies have been identified:

- **general waste** – ten (10x) 660 L bins serviced three times a week;
- **recycling** – four (4x) 660 L bins serviced twice a week (to maximise reuse and recycling, these will be further segregated to cardboard, plastics, glass and cans (one bin each); and
- **green organics (including food waste)** – eleven (12x) 660 L bins serviced three times per week.

In reality, lower levels of green organics waste will need to be collected from the site as the golf course will utilise a proportion for composting. Management and staff of the tourist accommodation and hospitality uses should maximise separation of green organic waste for composting (where safe and appropriate). Similarly, green waste (such as grass clippings, vegetation trimmings etc.) from the golf course maintenance will also be retained on-site for composting. External

areas (adjacent maintenance facilities) will be set aside for composting of organic materials and reuse within the golf course and landscaped areas within the site.

It is also likely that there will be additional efficiencies achieved in waste management than suggested by direct application of the above 'stand-alone' rates.

Nevertheless, as a worst case, the bin store areas have been designed to accommodate 28x 660L bins as illustrated on the R Architecture plans. The above assessment indicates that there will be a need for approximately 25 bins (660 L) and that sufficient room has therefore been provided to accommodate likely waste generation levels. Specifically, there will be a bin room on the lower ground floor (with room for 14 bins) and a bin room adjacent the service bay on Level 1 (with room for 14 bins). Staff will rotate bins between the two areas as required when they become full and for collection.

In addition to the above primary waste streams, it is anticipated that there would also be a range of secondary waste materials generated by the operation of the site. These include used batteries, used ink/toner cartridges, disused and electronics/IT equipment.

Waste materials not able to be reused within the site will be collected by waste contractors from the service bay on Level 1 for transport to recycling, recovery or waste disposal facilities. As detailed in the traffic impact report for the development, the service area has been designed to adequately and safely accommodate refuse collection vehicle movements.

The following specific responsibilities and tasks should be undertaken by building management/maintenance staff during the operation of the site:

- ensure that the waste area is secured to avoid theft and/or inappropriate use of the waste provisions;
- ensure that the waste area and transfer pathways are inspected and cleaned routinely to ensure these areas are kept hygienic and clear of loose waste;
- ensure that bins are labelled/signed appropriately to identify the relevant waste type;
- ensure that staff (including cleaning and maintenance contractors) are inducted and educated in respect to the appropriate management and disposal of waste within the site; and
- ensure that staff (including cleaning and maintenance contractors) adhere to the waste management arrangements and manage undesirable behaviour as and if required.

4.3 TRAINING AND EDUCATION

During both the construction and operational phases, site employees and contractors shall be inducted in respect to principles and procedures outlined in this WMMP. In particular, all employees and contractors are to have a clear understanding of the prioritisation of waste avoidance, reuse and recycling, the segregation of waste types and where they are stored.

5. WASTE MINIMISATION

5.1 WASTE AVOIDANCE AND MINIMISATION

The generation of waste will be avoided where possible during the construction phase by the strategic selection of materials during the detailed design and documentation of the project. In particular, the following outcomes shall be sought through the documentation, tendering and procurement stages of the development:

- the selection of materials for the proposal should include consideration of and, where possible/feasible, adopt options which reduce waste generation for the development;
- the specification and procurement of materials should be carefully planned to ensure that materials are not unnecessarily over-supplied;
- opportunities for prefabrication of items should also be explored during detailed design and procurement and adopted where practical to minimise surplus material;
- specification of recyclable materials and items where possible to minimise waste to landfill during construction;
- request that packaging materials utilised by suppliers are recyclable or returnable for reuse; and
- identify construction methodologies to minimise vegetation clearance and excavation where possible.

During the operation of the development, there will be a number of opportunities to avoid and minimise the generation of waste. Notably, significant proportions of waste generation at tourist facilities typically relate to packaging waste which can relatively easily be avoided or minimised. Best practice measures to avoid and minimise waste include:

- selection of goods and products with less packaging and returnable packaging;
- sourcing of goods and products locally, where possible (this could include on-site growing of herbs, fruits and/or vegetables);
- storage of perishable goods in appropriate conditions to avoid spoil;
- minimising the number of individually packaged toiletries within accommodation rooms (e.g. use refillable soap and shampoo dispensers instead of small individual products, non-essential toiletries provided on request only);

- requiring that single use plastic straws, cutlery and stirrers, polystyrene cups, bowls, plates and containers, and oxo-degradable plastic products not be supplied or used (noting that such products are banned by the "*Single-use and Other Plastic Products (Waste Avoidance) Act 2020*)";
- avoidance of single use plastic water bottles (for instance, use of glass bottles for water pitchers at conferences/functions);
- avoid use of paper napkins by using washable cloth napkins instead;
- use of cloth bags for collection of linen, towels and guest laundry items instead of plastic bags; and
- minimising printing of paper where possible (such as issuing of receipts/invoices via email or phone messaging, use double sided printing, etc.).

5.2 REUSE AND RECYCLING

In order to maximise opportunities for reuse of waste materials on or off site, waste streams are to be separated (during both construction and operational phases). Waste streams will be segregated into appropriate dedicated bins and/or storage areas within the site and, where not able to be reused within the site, transported to designated waste facilities (where possible, recycling facilities). In particular, during both construction and operation, waste material should be reused or recycled where possible including clean fill, concrete, brick, timber, metals, plastics, cardboard/paper and glass.

Segregation of waste streams will occur at the source (where practical) to minimise additional handling and inefficiencies. For instance, waste bins within tourist accommodation rooms will allow for segregation of general waste from recyclables to minimise waste to landfill and ease of waste separation by staff. Similarly, interim waste storage within kitchens, bars etc. will also include provisions for segregation at the source prior to transfer to the waste storage and collection areas.

Table 2 illustrates key opportunities for recycling and reuse associated with the operation of the development.

Table 2 - Recycling and Reuse Opportunities

Waste Type	Recycling/Reuse Opportunity
Clean Fill	Reuse within site or transport to other project sites for use
Rocks/Stones	Reuse within landscaping on-site or transport to other sites for use
Vegetation Trimmings/Grass Clippings	Mulch/compost and reuse for landscaping on-site
Waste Concrete or Bricks	Reuse within site, transport to other project sites for use or recycling facilities
Scrap Metal	Transport to scrap metal recycler
Timber Waste	Mulch on site and reuse for landscaping (if possible), pallets to be returned to supplier for reuse, other timber transported to salvage resellers
Food Supply Containers (Foam or Cardboard Boxes)	Returned to supplier for reuse
Recyclables (Glass, Cardboard, Plastic, Cans etc.)	Transport to recycling facilities
Green/Organic/Food Waste	Compost on-site where possible or transport to organic recycling facilities
Other (Batteries, Cartridges, Electronics)	Transport to recycling facilities

5.3 TREATMENT AND DISPOSAL

Where possible, waste materials should be reused on-site. For waste materials that cannot be used within the site, these will be collected by private waste contractors for off-site reuse and recycling (where possible) and final disposal (when reuse or recycling is not possible).

To manage the treatment and disposal of waste material during the construction and operational phases of the develop, the following measures will be implemented:

- waste material that cannot be reused or recycled will be clearly separated from those materials that can be;
- storage bins for all waste streams will be clearly signed/labelled to ensure mixing of waste types does not occur;
- staff (including cleaning and maintenance contractors) will be inducted in respect to the WMMP, its principles and the required waste management practices for the development; and
- hazardous materials will be disposed in accordance with relevant legislation and guidelines.

Waste contractors (including transport providers) shall be appropriately licenced for the removal and treatment of waste materials collected from the site. Similarly, facilities utilised for recycling and/or disposal shall also be licenced.

6. REVIEW

Given the construction contractor has not yet been selected and detailed construction methodology is not yet available, it is desirable that this WMMP is reviewed (and updated if necessary) prior to construction. This could be undertaken in conjunction with the preparation of a Construction Environment Management Plan (CEMP) for the project.

Similarly, the operator of the tourism accommodation has not yet been confirmed and, once identified, it would be desirable that the WMMP be reviewed and updated (if necessary). Many tourism accommodation operators have similar waste management policies and plans and there would be an opportunity to align and refine them with the WMMP (and vice versa) prior to opening of the facilities.

In addition, it is desirable that the WMMP be periodically reviewed once the development is operational to ensure that best practice measures are undertaken, relevant legislative requirements are met (particularly when these change over time) and that the objectives of the Plan remain relevant and are adequately addressed. Periodic review will also allow opportunities for emerging and future technologies (such as small scale waste to energy technology) to be considered for the site once feasible for implementation at such a facility.