



ACT
Government

Transport Canberra and
City Services

FREEDOM OF INFORMATION COVERSHEET

The following information is provided pursuant to section 28 of the *Freedom of Information Act 2016*.

FOI reference: TCCSFOI 21-065

Information to be published	Status
1. Access application	Published
2. Decision notice and schedule	Published
3. Documents	Published
4. Additional information identified	n/a
5. Fees	n/a
6. Processing time (in working days)	34 days
7. Decision made by Ombudsman	n/a
8. Additional information identified by Ombudsman	n/a
9. Decision made by ACAT	n/a
10. Additional information identified by ACAT	n/a



ACT
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and City Services

Freedom of Information – Access Application Form

Privacy notice

The personal information you supply on this form will only be used for the purpose of processing your request. Your application must include an email or postal address to which the respondent can send notices under the *Freedom of Information Act 2016* (the Act). If all or some of this information is not collected, Transport Canberra and City Services may not be able to communicate with you, inhibiting their obligations under the Act. This could mean the request cannot be dealt with. Your personal information will not be disclosed to a third party without your consent unless statutory obligations require otherwise.

The Transport Canberra and City Services Privacy Policy contains information on how you can access or seek to correct any of your personal information that is held by the Transport Canberra and City Services, as well as the process for lodging a complaint about an alleged breach of the *Information Privacy Act 2014*. The Privacy Policy can be found at www.cityservices.act.gov.au.

Applicant details

I wish to make an access application to Transport Canberra and City Services under the *Freedom of Information Act 2016*.

Name		
Address (where notices relating to this request can be sent – either postal or electronic)		
Telephone (Business hours)		
Telephone (Mobile)		
Email		

What documents are you requesting under the Act?

I am seeking the scoping proposal and resultant feasibility study for the intersection upgrades at Sulwood Drive and Mannheim Street in Kambah.

This information will provide important information for public consultation on the options explored and issues raised for consideration by the community and government as part of the upgrade.

Fee waver


If you wish to apply for a fee waiver, the Act sets out a number of provisions to do so:

- The information being requested was previously publicly available but no longer is.
- The information being requested is of special benefit to the public (Ombudsman guidelines see Section 66).
- The applicant is a concession card holder and demonstrates a material connection with the information requested (concession cards include a current health care or pensioner card issued under the [Social Security Act 1991](#); a current pensioner concession card issued in relation to a pension under the [Veterans' Entitlements Act 1986](#) or [the Military Rehabilitation and Compensation Act 2004](#); a current gold card; or a card prescribed by regulation).
- The applicant is a not-for-profit organisation and the application relates to the activities or purposes of the organisation.
- The applicant is a member of the Legislative Assembly.

Transport Canberra and City Services must waive any fees for providing information if the information was not publicly available and the agency makes the information publicly available before or within 3 working days after giving it to the applicant.

To apply for a fee waver please complete the following.

I would like to apply for a fee waiver because (state reason/s from the list above). [provide details and evidence of how this reason applies]	
I would like	a copy of these documents sent to the above email address

Applicant's signature	Date of request
	23/6/2021

[REDACTED]

[REDACTED]

Freedom of Information Request - Reference 21-065

I refer to your application for access to government information received by Transport Canberra and City Services (TCCS) on 24 June 2021 under the *Freedom of Information Act 2016* (FOI Act) seeking the following government information:

“the scoping proposal and resultant feasibility study for the intersection upgrades at Sulwood Drive and Mannheim Street in Kambah.”

Authority

I am an Information Officer appointed by the Director-General under section 18 of the Act to deal with access applications made under Part 5 of the FOI Act.

Timeframes

A decision was initially due on 22 July 2021. Thank you for agreeing to an extension until 12 August 2021.

Decision on access

In accordance with the FOI Act, a search was conducted of records held by TCCS. This search identified two records as relevant to your request.

As is standard with feasibility studies, it is important to note that the information within the document is conceptual and proposed options or plans are likely to vary. As the purpose of a study is to ascertain if a proposed project could be successfully achieved, consultation is limited. It is standard practice that, should a feasibility study lead to a project, community consultation is sought during the design stage.

In reviewing the information within this document, I have found it contrary to the public interest to disclose some information. As such, I have decided to provide you with partial access to this government information. My reasons for this decision are detailed in the statement of reasons below.

Statement of Reasons

In making my decision on disclosing government information, I must identify all relevant factors in schedule 2 of the FOI Act and determine, on balance, where the public interest lies. In reaching my access decision, I have taken the following into account:

Factors favouring disclosure in the public interest (Schedule 2, Section 2.1)

- Section 2.1(a)(i) - promote open discussion of public affairs and enhance the government's accountability;
- Section 2.1(a)(ii) - contribute to positive and informed debate on important issues or matters of public interest;
- Section 2.1(a)(ii) - inform the community of the government's operations, including the policies, guidelines and codes of conduct followed by the government in its dealings with members of the community.

Factors favouring non-disclosure (Schedule 2, Section 2.2)

- Schedule 2.2(a)(ii) - prejudice the protection of an individual's right to privacy or any other right under the *Human Rights Act 2016*;
- Section 2.2 (a)(iii) - prejudice the security, law enforcement or public safety; and
- Schedule 2.2(a)(xii) - prejudice the competitive commercial activities of an agency.

I consider that it is in the public interest to release most of the information within the records identified as relevant to your application. However, in some instances, I have found that the disclosure of some information to be contrary to the public interest.

Information relating to privacy

In reviewing the information in scope of your applications, the personal information of third parties was identified, including the names and contact details of these parties. Deletions have been applied to information where it would prejudice the protection of an individual's right to privacy or any other right under the *Human Rights Act 2004*.

Factors in favour of release can still be met while protecting the personal information of these individuals. The protection of this information outweighs disclosure in this instance.

Public Safety

Information about the location of underground infrastructure is included in the drawings. Such infrastructure may fall under National legislation related to the identification of critical infrastructure and protection from acts of terrorism.

I have considered that the disclosure of this information may prejudice the security of infrastructure and potentially expose it to acts of vandalism. In this instance, I have found that the disclosure of this type of information could prejudice security or public safety and, on this basis the disclosure is contrary to public interest.

Considering the type of information to be withheld from release, I am satisfied that the factors in favour of release can still be met while protecting this information. In this instance, I find more weight in the factors favouring non-disclosure than in the public interest factors that favour release.

Competitive commercial activities

I have also identified cost estimates which are significant to future procurement negotiations. I have found that the disclosure of this information is likely to prejudice the competitive commercial activities of TCCS and are therefore contrary to the public interest to disclose.

Out of scope information

Some information within the records includes information on other proposed projects which is not relevant to the information you are seeking. However, I have included these sections of the report for context.

A copy of the information, with deletions applied to information, which is contrary to the public interest, is enclosed at Attachment B.

Online publishing – disclosure log

Under section 28 of the Act, TCCS maintains an online record of access applications called a disclosure log. Your original access application, my decision and documents will be published in the TCCS disclosure log between 3 – 10 business days from the date of this decision.

Your personal contact details will not be published. You may view the TCCS' disclosure log at <https://www.cityservices.act.gov.au/about-us/freedom-of-information/disclosure-log>.

Ombudsman review

My decision on your access request is a reviewable decision as identified in Schedule 3 of the Act. You have the right to seek an Ombudsman review of this outcome under section 73 of the Act within 20 working days from the day that my decision is published in TCCS' disclosure log or a longer period allowed by the Ombudsman.

If you wish to request a review of my decision, you may write to the Ombudsman at:

The ACT Ombudsman
GPO Box 442
CANBERRA ACT 2601
Via email: actfoi@ombudsman.gov.au

ACT Civil and Administrative Tribunal (ACAT) review

Under section 84 of the Act, if a decision is made under section 82 on an Ombudsman review, you may apply to the ACAT for review of the Ombudsman decision.

Further information may be obtained from ACAT at:

ACT Civil and Administrative Tribunal
Level 4, 1 Moore Street
GPO Box 370
CANBERRA CITY ACT 2601
Telephone: (02) 6207 1740
www.acat.act.gov.au

If you have any queries concerning the directorate's processing of your request, or would like further information, please contact the TCCS FOI team on (02) 6207 2987 or email to tccs.foi@act.gov.au.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Cherie Hughes', written in a cursive style.

Cherie Hughes
Information Officer

11 August 2021


FREEDOM OF INFORMATION REQUEST SCHEDULE

Please be aware that under the *Freedom of Information Act 2016*, some of the information provided to you will be released to the public through the ACT Government's Open Access Scheme. The Open Access release status column of the table below indicates what documents are intended for release online through open access.

Personal information or business affairs information will not be made available under this policy. If you think the content of your request would contain such information, please inform the contact officer immediately.

Information about what is published on open access is available online at: https://www.tccs.act.gov.au/about-us/freedom_of_information/disclosure-log

File number		WHAT ARE THE PARAMETERS OF THE REQUEST				
FOI – 21-065		Scoping proposal and resultant study in the intersection upgrades at Sulwood Drive and Mannheim Street in Kambah				
Ref No	Page Number	Description	Date	Status	Reason for non-release or deferral	Open Access release status
1	1-21	Major Projects Canberra – Infrastructure Delivery Partners Group – Mount Taylor Carpark, Sulwood Drive, Mannheim Street intersection, Wanniasa and Hume Circle, Fyshwick Design Services – Project Brief - 35496	6 May 2020	Full access		Documents to be published.
2	22-346	Mount Taylor Feasibility Report – Mount Taylor Design Services – ACT Reference No. 35496	14 April 2021	Partial access	<p>Schedule 2, Section 2.2 (a)(ii) - Prejudice the Protection of an Individual's Right to Privacy</p> <p>Pages 23, 48-49, 110-130, 132-137, 140-167, 169, 258-261, 264, 266, 269, 271, 273, 298, 333-339, 341-344</p> <p>Section 2.2 (a)(iii) - prejudice the security, law enforcement or public safety</p>	

					<p>Pages 51-52, 74, 77-80, 87-92 113-137, 143-145, 150-166, 252, 259, 302-303, 341-345</p> <p>Schedule 2.2(a)(xii) - prejudice the competitive commercial activities of an agency</p> <p>Pages 61 ,66, 68, 82, 94. 104, 174 - 247</p>	
						



MAJOR PROJECTS CANBERRA INFRASTRUCTURE DELIVERY PARTNERS GROUP

MOUNT TAYLOR CARPARK, SULWOOD DRIVE- MANNHEIM STREET INTERSECTION, WANNIASSA AND HUME CIRCLE, FYSHWICK DESIGN SERVICES

PROJECT BRIEF

Final Version Dated: 06/05/2020

PROJECT NO: 35496

Major Projects Canberra
Infrastructure Delivery Partners Group
Level 2, Nature Conservation House
153 Emu Bank
Belconnen ACT 2617

PO Box 158
Canberra ACT 2601

Cleared by ClientDate.....

Cleared by
IDPG ManagerDate.....

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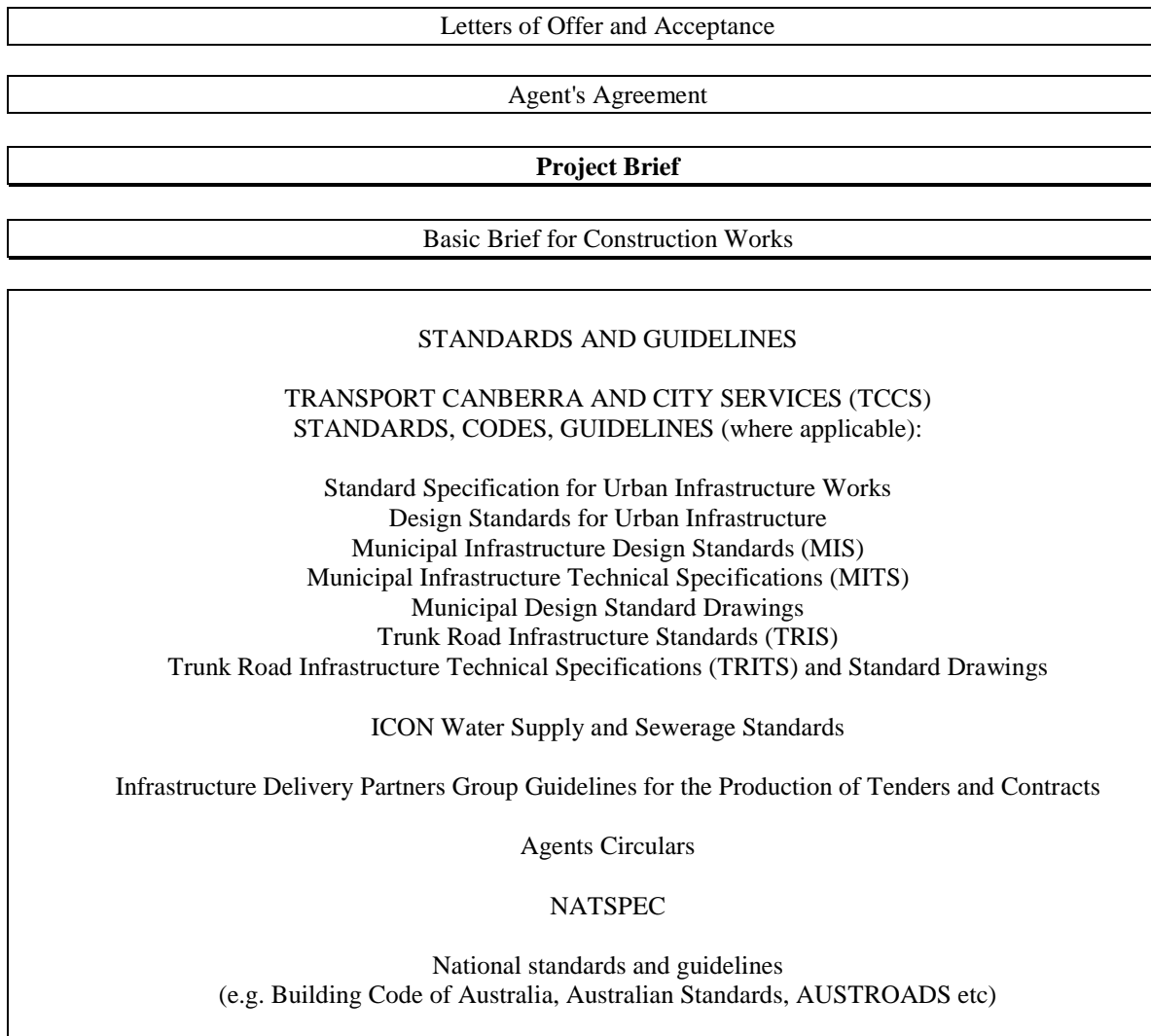
ENGINEERING PROJECT BRIEF

1.0 INTRODUCTION

The brief for this project comprises this **Project Brief** together with the **Basic Brief for Construction Works**.

The Project Brief details project specific requirements, the Basic Brief details the general requirements and administrative procedures (including content of submissions), and the Reference documents provide guidance on technical matters.

The following indicates how this document relates to other key documents used in the engagement of the Consultant.:



2.0 OBJECTIVES

Infrastructure Delivery Partners (IDP) Group on behalf of the Transport Canberra and City Services proposes to undertake the feasibility study and design of intersection improvement works at two locations:

Package A: Mount Taylor Carpark, Sulwood Drive / Mannheim Street Intersection

Package B: Wanniasa and at Hume Circle, Fyshwick.

The objective of this brief is to engage a suitably experienced and qualified consultant to undertake feasibility studies including: investigation and conditions assessment of nominated intersections, undertake traffic analysis, develop network scenario modelling, recommend development options, develop and finalise design and documentation for the nominated intersections upgrading works.

The main objective of this project is to improve safety for all users ensuring the intersections remain open to traffic at their current regulated speed with an acceptable functional performance, free from defects in the road substructure and with an improved whole of life cycle of the asset.

This work aims to achieve the outcomes of the Road Safety Strategy to provide a Vision Zero crash toll, and produce appropriate technical drawings and report to:

Package A

- Feasibility Study level and Design level (to Document Readiness) for the upgrading of Mount Taylor and Sulwood Drive Intersection as defined in this document;
- Feasibility Study level for developing design options for the Mount Taylor Car Park extension; and
- Feasibility Study level for a new shared path along Sulwood Drive between Drakeford Drive and Athllon Drive as defined in this document;
-

Package B

- Feasibility Study level and Design Level (to Preliminary Sketch Plans) for the upgrading of Hume Circle, as defined in this document.

The feasibility studies proposed in this brief are the essential first step to provide more context to these projects and the consultant is to clearly identify the issues and constraints currently experienced at the nominated sites and address them in their studies.

3.0 BACKGROUND

Canberra has the highest car dependency in Australia. Responding to urban infill, population change and increasing vehicle numbers on the Territory roads, it is paramount to upgrade some existing intersections, particularly those presenting a high risk to motorists with several points of conflict. The aim of the Roads ACT network is to put in place 'Safe Systems' to minimise harm to all road users.

The nominated intersections in this document were originally constructed in the simplest form, an uncontrolled intersection. With the growth of Canberra, development of the areas has expanded from simple low traffic volume areas, to very high traffic flow. This has led to high recorded crashes, longer queue lengths and time delays experienced by users as well as delays encountered by the Public Transport system. The increase in numbers of pedestrians and cyclists using the intersections also creates safety issues with more conflicts with vehicles due to higher vehicle volumes.

The high number of accidents, in combination with increasing traffic volumes leading to increasing difficulties to merge due to the reduction of safe gaps within traffic flow, calls for the need to investigate alternative methods to control traffic movement at the nominated intersections.

For the Sulwood Drive / Mannheim Street Intersection and Hume Circle sites, an upgrade is to be undertaken through redesigning the intersection. The aim of intersection designs is to improve traffic flow and reduce the likelihood of crashes. This is achieved by controlled vehicle manoeuvres and / or reducing the number of points of conflict.

The factors that influence the intersection designs are:

- Traffic volume and characteristics (initially with low volumes and adequate gaps in traffic flow, these may be unsignalised);
- Appropriate design vehicle turning paths;
- Human factors, including sight distance requirements and reaction times; and
- Crash history.

4.0 PROJECT DESCRIPTION

4.1 SITE

Package A - Mount Taylor Carpark, Sulwood Drive / Mannheim Street Intersection:



Package B - Hume Circle-Canberra Avenue, Wentworth Avenue and Sturt Avenue Roundabout:



4.2 DESCRIPTION OF WORK

The Consultant will be required to undertake investigation and condition assessment of the nominated intersections as necessary, undertake traffic analyses, recommend development options, develop and finalise design and documentation for the nominated intersections' upgrading works. Works at Mount Taylor Carpark, Sulwood Drive / Mannheim Street Intersection might include modification to kerbs and footpath in the proximity of the intersection.

Works under this consultancy are summarised in the following paragraphs:

Package A

At Mount Taylor Carpark, Sulwood Drive / Mannheim Street Intersection:

- review construction documents of the Mount Taylor Car park in order to incorporate design to the existing car park;
- undertake the feasibility study: the Consultant will be required to undertake investigative, consultative and design work to identify solutions which can be delivered in accordance with local and national standards and specifications for arterial roads. The feasibility study shall include a safe dedicated right turn into the Mount Taylor Car Park, develop design options for the Mount Taylor Car Park extension (including a new gravel carpark and associated pedestrian and cycle links to support the use of Mt Taylor's recreational walking trails) and undertake feasibility study for a new shared path along Sulwood Drive between Drakeford Drive and Athllon Drive.
- undertake design stages up to Document Readiness (DR) for the intersection and on Sulwood Drive at proximity of the entry and exit points of Mount Taylor carpark including the safe dedicated right turn into the carpark. The work shall include widening works for turning and slip lanes on the southern verge and overall, maximise the efficiency of the road network and increase road safety to the community (**Note: Design options for the Mount Taylor Car Park extension and the new shared path shall remain at feasibility study level**);
- pavement widening design on the southern side of Sulwood Drive at the two-access point to the car park area near Mannheim Street to improve safe turning exits;
- undertake designs for potential construction of a median traffic island to provide a two-stage pedestrian crossing of Sulwood Drive near the intersection with Mannheim Street;

- prepare Document Readiness and tender documents (for Mount Taylor/Sulwood Drive/Mannheim Street), including cost estimates, bill of quantities/schedules of rates, specifications, Safety in Design Risk Assessment and Report, Request for Tender documents and other supporting documents;
- assess requirements for NCA Works Approval (WA)/Development Approval (DA) submission, and submit NCA Works Approval/Development Approval application if required;
- circulation of documents to Government and Key Stakeholders;
- undertake construction approval work to allow for construction; and
- design other associated civil and landscape works.

Package B

Hume Circle – Canberra Avenue, Wentworth Avenue and Sturt Avenue Roundabout:

- Review feasibility studies prepared by AECOM and R.D. Gossip Consulting Engineers (refer Section 5.2 Background Information);
- undertake traffic analysis of the broader network using appropriate modelling for the road network out to, and including Canberra Avenue, Wentworth Avenue and Sturt Avenue;
- Identify constraints and opportunities, develop preliminary geotechnical, drainage and utilities (existing and proposed) investigations;
- improve connectivity between public transport and light rail, encourage public transport use and improve traffic flows;
- undertake a feasibility study with options analysis (minimum 3 options) including multi criteria assessment (MCA) of options and cost estimate, and recommend a preferred option for an intersection upgrade to reduce crashes, improve safety and increase traffic/intersection capacity for all users at the intersection of Canberra Avenue/Sturt Avenue/Wentworth Avenue (Hume Circle). The Consultant will be required to undertake investigative, consultative and design work to identify solutions which can be delivered in accordance with local and national standards and specifications for arterial roads;
- undertake design stages up to Preliminary Sketch Plan (PSP) level for the proposed upgrading of Hume Circle;and
- assess requirements for NCA Works Approval (WA)/Development Approval (DA) submission.

4.3 SCOPE OF SERVICES

The scope of this brief is the provision (in accordance with the Standard *Construction Related Services Agreement* between the Territory and the consultant) of the following services relating to the works described in section 4.2.

4.3.1. Project Inception Meeting

The consultant is to schedule a start-up meeting once engaged. The meeting is to include discussion of the program. Minutes of the meeting are to be taken by the Consultant and distributed to attendees within two business days of the meeting.

4.3.2 Review of Available Data/Reports

Review construction documents such as construction documents of the Mount Taylor Carpark and other appropriate documents and identify any additional data that may be required for design. The above information should be collected, reviewed and collated prior to undertaking any field reconnaissance or further studies.

4.3.3. Field Reconnaissance

Field reconnaissance involving a thorough examination of the site to provide further information on features identified in the available data/reports and to potentially reveal features not identified during previous assessments. These are to be included and reported on.

4.3.4. Utility Services Investigations

Conduct utility services investigations including intrusive site works (potholing and/or non-destructive hydro and vacuum excavation) to locate and determine the impact on existing services of the intersection upgrades.

4.3.5 Identify Constraints and Opportunities

4.3.5.1. Traffic Analysis – Strategic Transport Modelling

In order to obtain daily traffic volumes of the roads surrounding the subject intersection, traffic surveys need to be undertaken at the nominated and nearby intersections. The traffic modelling will be carried out to support proposed developments.

- **Note 1:** Consultants must use traffic modelling software to deliver this task and include details of their nominated software packages in their tender submissions.
- **Note 2:** The consultant is required then to undertake a sensitivity analysis test for each nominated intersection based on the available data provided by ACT Government, traffic data and characteristics collected (road geometry and intersection layout, traffic volumes, traffic speed survey, public transport, cyclists and pedestrians, crash data analysis, and physical observations, etc.) to identify potential remedial and improvement options and constraints.
- **Note 3:** Consultants, in their tender submissions, should acknowledge that the ACT Government will hold the proprietary ownership on all the traffic modelling and any associated files (such as aerial images, programming scripts, Excel files, O-D matrices, etc.) developed during the project. Therefore, the consultant is required to provide all these files upon completion of the services.

4.3.5.2. Public Transport and Active Travel Facilities

- Review of existing public transport linkages and determine the likely demand for the Public Transport use from adjacent residential developments.
- On-road and off-road cycling requirements and alternative arrangements where required to enhance the use of Active Travel as a viable transport option.
- Connectivity, safety and directness to trunk cycle/pedestrian paths should be identified.
- The assessment of the active travel network should be based on the latest available information.

4.3.5.3. Topography

Organise a full site survey, where required, and upon approval, engage registered surveyors to undertake potholing of underground services and sub-surface conditions.

4.3.5.4. Services

Investigate, determine and confirm the location of existing services in the area and where necessary provide advice on service relocations and/or protection to accommodate the works.

4.3.5.5. Drainage

The Consultant is required to provide landscape and drainage designs (note: provide concept designs only for the new shared path along Sulwood Drive between Drakeford Drive and Athllon Drive) for the road reservation that include TCCS requirements to meet new code requirements and landscape solutions that improve local amenity.

4.3.5.6. Geotechnical Investigation

Preliminary geotechnical investigations (at feasibility study stage) will be undertaken, based on desktop analysis and site walk over. Advice on known and visible geotechnical constraints will be reported on. Further geotechnical investigations will be undertaken at design stage based on the findings from preliminary geotechnical investigations.

4.3.5.7. Road Traffic Noise Modelling

Identify and analyse traffic noise impacts on adjacent land uses (predominantly residential) and identify possible solutions inside the road reservation to minimise or avoid any additional buffer requirement. Buffer and noise mitigation solutions are to be included inside the agreed road reservation.

4.3.6 Options Study

- Develop a number of technically feasible options (consultant to allow for minimum 3 options) and explore these against the identified constraints/ opportunities and estimated cost;
- Undertake a Multi Criteria Analysis of Options using benefit cost analysis (applicable for the Hume Circle site only); and
- Prepare a brief report summarising outcomes and recommend a preferred option for consideration by Government.

4.3.7 Order of Costs

The consultant is to provide an itemised cost estimate for the preferred option to support future design phases and future capital works budget bids. This will be itemised with unit rates and a total cost including detail design, tender phase, procurement, contract management and other construction costs. In preparation of the 'Order of Cost' staging and timing of construction components should be considered.

4.3.8 Deliverables

- Prepare a comprehensive Feasibility Study Report (draft and final versions) documenting all items above, technical design issues, concept drawings and consultation with key stakeholders.
- Produce appropriate technical drawings and report that include but are not limited to:
 - Alignment options;
 - Future Public Transport requirements;
 - Active travel and equestrian crossing requirements;
 - Interface with any future adjacent land use in the surrounded areas;
 - Cross and longitudinal drainage; and
 - Detail the required road reservations for the project for inclusion on relevant plans and databases including the Territory Plan and ACTmapi.

4.3.9 Reports

4.3.9.1 Feasibility Study

The Consultant is to provide three (3) hard copies and one electronic copy (in PDF format) of the draft Report and drawings (in A3 format) for review by the relevant agencies, Project Officer and Client.

The Consultant is to provide three (3) hard copies and one electronic copy (in PDF format) of the final Report and drawings (in A3 format) for the Project Officer and Client.

4.3.9.2 Preliminary Sketch Plan (PSP) - Conceptual Design

The Consultant is to prepare and submit a PSP Conceptual Design comprising a report and conceptual design plans (PSPs) which address the issues noted in Section 3.4 of the Basic Brief including all matters discussed above.

The consultant shall undertake the following, as a minimum, to prepare and submit:

- Design documentation to address all relevant matters raised in this brief.
- PSP designs, plans (drawings) shall be suitable for circulation to Government and other key stakeholders.
- Stakeholder consultation.
- Construction cost estimate.

The following are the numbers of copies required:

- 3 x A3 colour hardcopies of drawings, report and 1 x softcopy in Adobe Acrobat (.pdf) format created at a minimum size of A3 with a resolution of 600 DPI or higher. These drawings must be oriented correctly with respect to the original.
- 1 x softcopies of the Preliminary design report including specification and cost estimates.
- 2 x CDs/USB drives – All documentation.

4.3.9.3 NCA Works Approval / Development Application Submission

The Consultant is to assess and advise whether NCA Works Approval (WA) and/or Development Application (DA) submission may be required. A WA and/or DA submission (to the requirements of NCA and/or ACTPLA), if required, is to be prepared by the Consultant for signature by the proponent and submission to respective agencies.

4.3.9.4 Final Design/Document Readiness (DR) (applicable for Mount Taylor Car Park/ Sulwood Drive / Mannheim Street site only)

Final Design and Documentation is required, which addresses the issues noted in Sections 3.5 and 3.6 of the Basic Brief.

The consultant shall undertake the following, as a minimum, to prepare and submit:

- Incorporate review comments and progress the design documentation from Preliminary Sketch Plan (PSP) to Final Design/Document Readiness (DR) stage;
- The report will outline design parameters, extent of required service relocations (and upgrades if required) and details including but not limited to:
 - Erosion and sediment control proposals;
 - Traffic control devices including proposals for traffic management during construction;
 - Proposed Ancillary works such as temporary traffic control devices, tree removals, where required;
 - Report on other factors affecting the project eg. adjoining contracts, client requirements, seasonal factors, the supply of special materials, special maintenance or management requirements, etc;
 - Where applicable, a drainage master plan showing contours, catchment boundaries and areas, estimated flows and flow paths; and
 - Updated costings of all identified construction works.
- Ensure Final Designs clearly show how the design responds to the site conditions and outcomes of the DA and Works Approval submissions (where applicable) including priorities of public and government stakeholder consultations, environmental assessment outcomes;
- Determination of the extent of earthworks required for the works, including quantities; and identification of any areas of deep excavation; filling; excavation in rock; and earthworks plan/strategies for the management of any spoil material generated by the works;
- The design drawings must include typical and detailed cross sections, horizontal and vertical alignments, long sections, utility service details (with critical cross sections and long sections), traffic management concepts, staging and sequence of works and all details required to define the scope of the project, sufficient for construction of the works;
- Confirmation of liaison with all service providers to confirm their requirements and including necessary approvals for completion of Development Application;
- The design shall incorporate safety in design principles and provide a safety in design report as per statutory requirements;
- Final Designs to the detail necessary for TCCS Design Approval and to the highest quality achievable within the identified construction budget;
- Request for Tender (RFT) documents including pre-tender estimates;
- Provision of Concept Traffic Management Drawings/Document that expresses the designer's intentions with respect to the construction of the works and at the same time minimises inconvenience to the public. The concept plan shall incorporate safety in design principles; and
- Indicative construction delivery program that minimises inconvenience to the public and meets project budget.

The following are the numbers of copies required:

- 3 hard and 1 electronic copy of the report

- 3 hard and 1 electronic copy of drawings (3 x A3 hardcopies of drawings in Adobe Acrobat (.pdf) format created at a minimum size of A3 with a resolution of 600 DPI or higher. These drawings must be oriented correctly with respect to the original.)
- 2 x CDs/USB drives – All documentation

4.3.9.5 Consultations

Stakeholder consultation

MPC will facilitate formal consultation with the Asset owners and other ACT Government stakeholders at the Feasibility Study and PSP stage. Ten working days are to be allowed for this circulation and for review and response.

The Consultant shall carry out necessary consultation with all stakeholders / authorities and shall ensure that approvals have been obtained from relevant authorities whose assets/responsibilities may be impacted upon by the works. These include, but are not limited to, Roads ACT, Infrastructure Delivery (TCCS), City Presentation including Urban Treescapes, EPSD Directorate, NCA, Parks and City Services (for construction occupation of park land), Service Authorities, Local residents and businesses impacted by the works, and other relevant organisations.

Public stakeholder consultation

There will be one session of public consultation for the PSP phase of the project. The minimum time required for the consultation phase is two (2) weeks.

Key external stakeholders are the local Community Council, key commercial or community organisations in the area, the organisations and businesses surrounding Hume Circle.

The key internal and other stakeholders for this program include but are not limited to:

- Major Projects Canberra (MPC)
- City Places and Infrastructure – TCCS
- Roads ACT – TCCS
- Infrastructure Delivery – TCCS
- Capital Works – TCCS
- City Presentation – TCCS
- Urban Trees – TCCS
- The Environment, Planning and Sustainable Development Directorate
- Service authorities, including but not limited to
 - ActewAGL
 - Evo Energy
 - Icon Water
 - Telstra/Optus/iiNet
- Proposed bus improvement upgrade work
- Local residents immediately impacted
- Health ACT
- Businesses and other stakeholders impacted by these works

The consultant shall liaise with the above-mentioned stakeholders, report on and implement their requirements as appropriate

4.3.10 Project Management and Client Liaison

The Consultant shall adhere to the following requirements:

- A fortnightly progress meeting to report on progress, and identify and discuss issues;
- Weekly updates by email;
- Verbal updates on an as-needs basis;
- Financial tracking;
- Program and milestones; and
- Monthly reports which details the progress made during the month, progress due in the forthcoming month, any critical risks or issues that have arisen and how the risks or issues will be dealt with, cash flow and program.

5.0 DESIGN INFORMATION

5.1 STANDARDS

Works are to comply with the standards and guidelines identified in:

- Basic Brief
- Standard Specification for Urban Infrastructure Works
- Design Standards for Urban Infrastructure
- Municipal Infrastructure Design Standards (MIS)
- Municipal Infrastructure Technical Specifications (MITS)
- Municipal Design Standard Drawings
- Trunk Road Infrastructure Standards (TRIS)
- Trunk Road Infrastructure Technical Specifications (TRITS) and Standard Drawings
 - Austroads – Design Guides and publications
 - Design for access and mobility AS/NZS 1428.4.1:2009
 - *Work Health and Safety Act 2011 (ACT)*
 - Other relevant Acts and Ordinances currently in force in the ACT.
 - Current and relevant Australian /New Zealand Standards
- ICON Water Supply and Sewerage Standards
- Infrastructure Delivery Partners Group Guidelines for the Production of Tenders and Contracts
- Agents Circulars
- NATSPEC
- Other standards and design guidelines as appropriate (e.g. Building Code of Australia, Australian Standards, AUSTRROADS etc)

Additional standards for this project are:

- Standard Specification for Urban Infrastructure Works (TCCS) and relevant sections of TCCS
- TCCS Ref No: 08 - Requirements for Works as Executed Quality Records;
- TCCS Ref No: 07 - Requirements for Operational Acceptance Submission;
- TCCS Ref No: 09 - Requirements for Final Acceptance Submissions;
- TCCS Ref No: 06 - Requirements for Design Acceptance Submissions;
- TCCS Ref No: 04 - Guidelines for the Protection of Public Landscape Assets Adjacent to Development Works;
- TCCS Ref No: 10 - Requirements for Landscape Consolidation and Final Handover for Soft Landscape Works;
- TCCS Drafting Standard;

- Development Control Code for Best Practice Waste Management in the ACT. Available on line at https://www.cityservices.act.gov.au/_data/assets/pdf_file/0008/1315754/Development-Control-Code-for-Waste-Management-2019.pdf
- Safety in Design (<https://www.safeworkaustralia.gov.au/safe-design>); and
- Other relevant standards and design guides as appropriate.
- National Security Requirements in line with Australia's Strategy for Protecting Crowded Places from Terrorism.

All other relevant Standards/Acts/Guidelines prevalent under ACT rules, regulations and legislations. TCCS MIS/TRIS reference other standards and guidelines. If the Standards are considered inappropriate then alternative Standards may be accepted subject to agreement in discussion with MPC and TCCS.

5.2 BACKGROUND INFORMATION

The following feasibility study reports are enclosed with the RFT (provided separately as a file upload):

- Black Spot Feasibility Study-Hume Circle Roundabout dated 16 May 2013 completed AECOM.
- Mass Application of Engineering Treatments for Rear-end Crashes Feasibility Study for Site 6 Hume Place dated 6 December 2017 completed by R.D. Gossip Pty Ltd Consulting Engineers.

5.3 SPECIAL REQUIREMENTS

- The Consultant will be required to:
 - Incorporate available information / infrastructure, by reviewing previous studies and recommendations;
 - Addressing the objectives mentioned above while preparing design and documentation up to Document Readiness stage;
 - Improve active travel access through the provision of on road cycle facilities through the intersection, where practical and appropriate; and
 - Undertake sustainable design practice where appropriate.
- The Consultant shall allow for, as a minimum, assessment of existing conditions and locations of on-site assets. This includes (as relevant) provision and utility of existing services, drainage, existing pedestrian access/movement and safety.
- The Consultant shall allow for organising/scoping appropriate site investigations such as site survey, geotechnical investigation, service locations, assessment for tree removal, etc. required for completing the design.
- The Consultant shall allow for attendance of key personnel at fortnightly meetings, recording and circulation of minutes within two business days of the meeting.
- The Consultant shall ensure that the detailed design plans and design reports cover all the requirements for the construction of the proposed infrastructure works, including a cost estimate. Cost estimates are to include size of contingency allowances and all activities to complete the project.
- The Consultant shall allow for and arrange all works and development approvals. Application processing fees associated with these items are reimburseable.
- The Consultant shall carry out necessary consultation with all stakeholders / authorities and shall ensure that approvals have been obtained from relevant authorities whose

assets/responsibilities may be impacted upon by the works. These include, but are not limited to, Roads ACT, Infrastructure Delivery (TCCS), City Presentation including Urban Treescapes, EPSD Directorate, NCA, Parks and City Services (for construction occupation of park land), Service Authorities, Local residents and businesses impacted by the works, and other relevant organisations.

- The Consultant shall carry out necessary consultation with businesses and residents impacted by the proposed works (if any). These shall be discretely and professionally undertaken at all times.

6.0 PROGRAM

The following milestone dates apply to this project:

STAGE	TIMING
Tender Release for Consultancy	06 May 2020
Tender Closes	04 June 2020
Award Consultant Contract	June 2020
Submission of Feasibility Study Report (Mt Taylor/Sulwood Drive/Mannheim Street, including the new shared path)	October 2020
Submission of Feasibility Study Report for Hume Circle	November 2020
Submission of PSP documents (Mt Taylor/Sulwood Drive/Mannheim Street)	January 2021
Submission of draft Final Design documents (Mt Taylor/Sulwood Drive/Mannheim Street)	February 2021
Submission of Final Design/ Tender Documents (Mt Taylor/Sulwood Drive/Mannheim Street)	March 2021
Submission of PSP documents (Hume Circle)	March 2021

7.0 BUDGET

The Budget has been identified from TCCS for the Better Intersections – Intersection Improvements Program.

8.0 QUALITY ASSURANCE

8.1 INFRASTRUCTURE PROCUREMENT REQUIREMENTS

General

The Consultant shall undertake the design in accordance with Quality Assurance requirements detailed in Attachment 'A' (forms USF944 and USF960 as applicable). A Project Quality Plan for the Design Phase is required to be submitted within 2 weeks of engagement.

Design Verification

In particular, the Consultant shall submit a design plan and/or a design verification plan in accordance with Quality Requirements - Document Submission Form **USF960**.

Design Changes

The consultant shall notify Infrastructure Delivery Partners Group (IDPG) in writing where the need for a significant design change becomes evident and shall obtain IDPG's written approval for any significant design change.

A significant design change is a change to an IDPG approved design which;

- (i). significantly affects the basis of the IDPG design approval, or
- (ii). significantly affects a formal commitment regarding the design made directly by IDPG to another agency, or
- (iii). affects IDPG's specified requirements.

At final design (Document Readiness) stage the consultant is to certify that the design meets all statutory requirements and Brief requirements.

9.0 LIAISON

All liaison with Infrastructure Delivery Partners Group is to be through the Project Officers:

Name: Jody Yap

Telephone: (02) 6205 0530

Facsimile: (02) 6207 5564

Email: jody.yap@act.gov.au

ATTACHMENT A – QUALITY REQUIREMENTS TABLES**QUALITY REQUIREMENTS FORM USF944**

PROJECT : MOUNT TAYLOR/ SULWOOD DRIVE INTERSECTION, WANNIASSA AND HUME CIRCLE, FYSHWICK DESIGN SERVICES

CLIENT: _____ **TCCS** _____ **PROJECT No :** _____ **35496.100** _____

SERVICE ROLE: _____ *(insert as applicable)*
 [Project Director, Project/Construction/Works Manager, Consultant, Contractor]

QUALITY STANDARD : *AS/NZS ISO 9001:2008 (as interpreted by HB90.3-2000)*

QUALITY REQUIREMENTS INDEX

Where information is to be specified enter **YES** in Column 1

Details to be Specified	Table / Form Title
Yes	Table 1 - Document Submission
Yes	Table 2 - Design Verification Methods
Yes	Table 3 - Design Review Points
	Table 4 - Measurement/Design Data
	Table 5 - Notification of Intention to Commence Project Activities
	Table 6 - Traceability Requirements
	Table 7 - Processes Requiring Validation
	Table 8 - Witness / Hold Points
	Table 9 - Principal Supplied Products
	Table 10 - Servicing Work
	Table 11 - Quality Records
	USF957 - Certificate of Compliance

QUALITY REQUIREMENTS TABLE 1 (formerly USF945)

DOCUMENT SUBMISSION				
Document	No. of Copies	When to be Submitted	To be Available for Inspection on Request	Comments
Quality Plan Procedure	1	with proposal/tender.		
PQP for Design Phase, or the Total Project.	2	14 days after award of Consultancy.		
Quality Records (<i>refer to specific table</i>)				

QUALITY REQUIREMENTS TABLE 2 (formerly USF946)

DESIGN VERIFICATION METHODS	
<p>The Consultant/Project Manager shall provide in the Design Verification Plan(s) to undertake design verification of the following components in accordance with the nominated method(s). Such verification shall not relieve the Consultant/Project Manager of the responsibility for design.</p> <p><i>(Refer ISO 9001:2008 Cl 7.3.5 and see HB90.3-2000 Page 60 for examples of design verification methods).</i></p>	
Design Components	Nominated Design Verification Method
Feasibility Study Reports	Consultant to nominate
Document Readiness Report, Drawings and Cost Estimates	Consultant to nominate
Tender Documents	Consultant to nominate

QUALITY REQUIREMENTS TABLE 3 (formerly USF947)

DESIGN REVIEW POINTS			
<p>The Consultant/Project Manager shall include in their Design Verification Plan the following Design Reviews and the involvement of the parties nominated below. Such Design Reviews shall be arranged by the service provider and all parties are to be notified ten working days prior to the Design Review. <i>(Refer ISO 9001:2008 Cl 7.3.4 and HB90.3-2000 Pages 58-59 for guidance).</i></p>			
Design Component	Stage of Design	Nominated Parties to Participate in Design Review	Comments
Feasibility Study Reports		IDPG, TCCS	Following consultant's own internal review
Detail Design documentation – Document Readiness Report, Drawings and Cost Estimate	DR	IDPG, TCCS	Following consultant's own internal review
Tender Documentation		IDPG, TCCS	Following consultant's own internal review

QUALITY REQUIREMENTS TABLE 4 (formerly USF948)

MEASUREMENT / DESIGN DATA		
<p>The following measurements and/or design data are to be submitted for verification of adequacy. <u>Note:</u> Such verification shall not relieve the Project Director / Consultant / Subconsultant / Specialist Consultant / Contractor (<i>delete as applicable</i>) of responsibility for providing design services/constructed works in accordance with the specification requirements. <i>(Refer ISO 9001:2008 Cl7.3.2 and HB90.3-2000 Pages 55-56 for guidance)</i></p>		
Required Data	Date to be Submitted	Entity to be submitted to

QUALITY REQUIREMENTS TABLE 6 (formerly USF950)

TRACEABILITY REQUIREMENTS

Enter details of items for which it is necessary to trace the history, application, or location by means of recorded identification.

Refer to Quality Record Requirements (Table 11) for more specific requirements of Records of Traceability.

(Refer ISO 9001:2008 C17.5.3 and HB90.3-2000 Page 72 for guidance).

Item	Extent of Trace	
	Start	Finish



Mount Taylor Feasibility Report

Mount Taylor Design Services

ACT Reference No. 35496-NCT-100
Prepared for IDPG on behalf of TCCS
14 April 2021

Document Control

Document:	Mount Taylor Feasibility Report
File Location:	\\AUCBFSV002\Projects\3002809 Mt Taylor Hume Circle\100 Concept - Feasibility\105 Deliverables\105-4 Feasibility Study Report\Mt Taylor\3002809 MTHC - MT Feasibility Report Rev 2.docx
Project Name:	Mount Taylor Design Services
Project Number:	3002809
Revision Number:	Rev 2

Revision History

Revision No.	Date	Prepared by	Reviewed by	Approved for Issue by
Rev 1	22 January 2021	Various		
Rev 2	14 April 2021	Various		

Issue Register

Distribution List	Date Issued	Number of Copies
IDPG, TCCS	14 April 2021	1

SMEC Company Details

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The information within this document is and shall remain the property of:
IDPG on behalf of TCCS

Important Notice

This report is confidential and is provided solely for the purposes of documenting the Mount Taylor Design Services. This report is provided pursuant to a Consultancy Agreement between SMEC Australia Pty Limited (“SMEC”) and IDPG on behalf of TCCS, under which SMEC undertook to perform a specific and limited task for IDPG on behalf of TCCS. This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

This report must be read as a whole. The executive summary is not a substitute for this. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents, or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

Unless expressly agreed otherwise in writing, SMEC does not accept a duty of care or any other legal responsibility whatsoever in relation to this report, or any related enquiries, advice or other work, nor does SMEC make any representation in connection with this report, to any person other than IDPG on behalf of TCCS. Any other person who receives a draft or a copy of this report (or any part of it) or discusses it (or any part of it) or any related matter with SMEC, does so on the basis that he or she acknowledges and accepts that he or she may not rely on this report nor on any related information or advice given by SMEC for any purpose whatsoever.

Executive Summary

SMEC has been engaged by Infrastructure Delivery Partners Group on behalf of Transport Canberra and City Services to undertake the options development of Mt Taylor carpark extension and shared user path (SUP) design between Athllon Drive and Drakeford Drive, and the detailed design of Sulwood Drive – Mannheim Street intersection upgrade including the entrance and egress of the existing carpark. The Infrastructure Delivery Partners Group are a part of Major Projects Canberra, the ACT Government directorate with the responsibility for directing and managing all aspects of major projects invested in by the ACT Government.

This report outlines the options developed during the feasibility study for Package A – Mt Taylor, shared user path, carpark and intersection design. These packages are intended to solve several issues, these are:

- The existing carpark on the northern side of Sulwood Drive, at the intersection of Mannheim Street is currently experiencing capacity concerns with overflow vehicles parking informally in the northern verge of Sulwood Drive. The capacity issues associated with the carpark are largely due to the adjacent Mt Taylor Nature Reserve and associated walking trails.
- Sulwood Drive between Drakeford Drive and Athllon Drive has no formal off-road cyclist or pedestrian facilities despite both Athllon Drive and Drakeford Drive both having facilities that are frequently used. Pedestrian and cyclist facilities along this length of Sulwood Drive will connect the Athllon Drive, Drakeford Drive facilities, Mt Taylor Nature Reserve, and the Kambah residential area.
- The existing Mt Taylor car park at the Mannheim Street/ Sulwood Drive intersection is a left in only arrangement with right turn in movements banned via NO RIGHT TURN signage. It was observed during site visits that many vehicles ignore this signage and undertake the right turn in movement across Sulwood Drive, which is an 80 km/h speed environment.

The locality of the Mt Taylor project is presented in Figure 0-1 below.

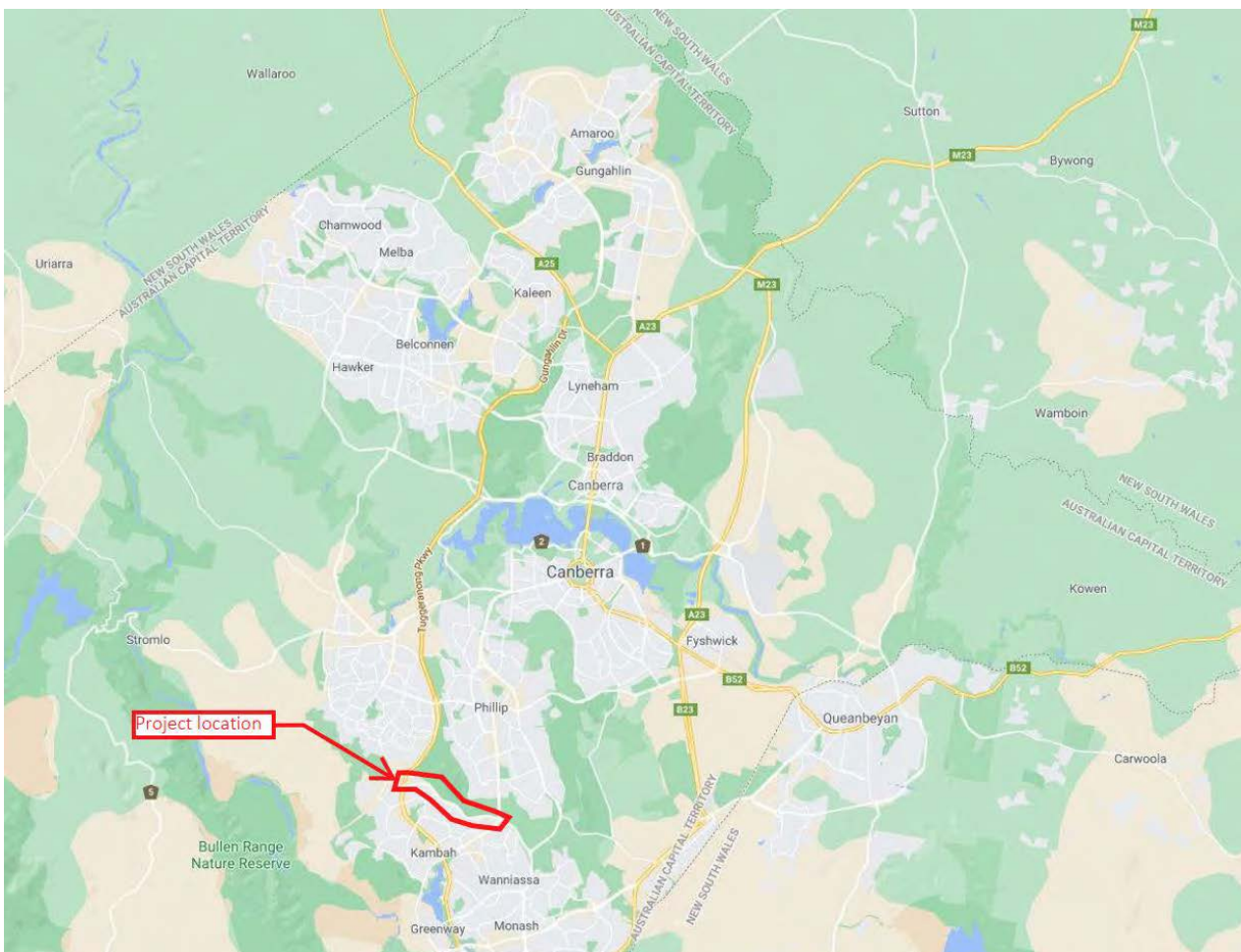


Figure 0-1: Mt Taylor project locality

The project area is shown in Figure 0-2 below.



Figure 0-2: Mt Taylor project extents

PACKAGE 1 - SHARED USER PATH

Key features of the shared user path for Mt Taylor include:

- User safety and accessibility tie into design compliance, noting the significant earthworks required to adhere to MIS05 / Australian Standards (AS 1428.1). Rider comfort is also considered as the use of landings negatively impact the rider experience.
- Connectivity to the existing residential path networks, and minimising the number of road crossings, especially of Sulwood Drive which has a posted speed limit of 80 km/hr
- CPTED requirements; passive surveillance has been noted to be an important aspect to the SUP location
- Impact on existing utilities; Possible impact to an Icon Water bulk water main has been noted as a hard constraint.
- Impact on the environment, options have been developed to minimise the impact on the environment, especially environmentally sensitive areas such as Box Gum Grassy Woodlands

PACKAGE 2 - CARPARK

Key features of the carpark options for Mt Taylor include:

- Increase capacity by ~100%
- Provision of accessible carparking spaces
- Minimise impact on the environment, and the earthworks required.
- Safe entrance and egress options, including additional lanes on Sulwood Drive to accommodate turning paths (options 2 & 3 only)

PACKAGE 3 - INTERSECTION UPGRADE

Key features of the intersection upgrade option for Sulwood Drive-Mannheim Street intersection include:

- Provision of additional turning lanes on Sulwood Drive to facilitate entry and egress from the carpark.
- Providing an option of a two-stage uncontrolled pedestrian crossing
- Options to signalise the existing intersection to control movements for both vehicles, and pedestrians.
- Future proofing option of signalising a duplicated Sulwood Drive.
- Development of a four-way intersection, breaking into the existing carpark at Mannheim Street to control movements into the carpark.

OPTIONS ASSESSMENT PROCESS

The options were developed to comply to relevant standards, consider the constraints identified in the areas surrounding the project areas and the objectives of the project. These options were then assessed via a multi-criteria analysis.

A multi-criteria analysis, MCA, is an evaluation procedure that is used to assess a suite of options in an effort identify the most appropriate option for further consideration. The analysis can consider both quantifiable measures and intangible (qualitative) criteria together to create a comparative score for each of the considered options, with the highest scoring option being the most appropriate for further consideration and development.

The MCA process scores each option against a set of criteria that have been identified as important in the context of the project. Through consultation with the assessment team, these criteria are agreed and weighted as function of their relative importance and relevance to the project, with the product of score and weighting for each criteria aggregated for each option to generate an overall score.

The MCA workshop was attended by the project team, ACT Government representatives and key stakeholders to assess the options developed, determine a preferred option for each package and provide input on issues and further assessments required for each package of works.

PREFERRED OPTION

Package 1 – Shared user path

The MCA process did not clearly identify a preferred option, however highlighted aspects of the options where improvements could be made. From this process SMEC developed two additional options for the shared user path.

- Option 4a: The shared user path is adjacent to the northern side of Sulwood Drive similar to option 4 put forward for the MCA, however removes the crossings of Sulwood Drive by moving the shared user path behind the existing Mt Taylor Reserve carpark. This option would have a significant impact on endangered ecological communities associated with the nature reserve., and would likely trigger requirements for Impact Assessment
- Option 5: Positioning the shared user path on the southern side of Sulwood Drive between the carriageway and existing earthworks mounds adjacent to the Kambah residences. This option requires safety barrier in locations given limited cross-sectional width the shared path must be within the clear zone of Sulwood Drive. The safety barrier will protect vulnerable road users from errant vehicles.

Option 5 has been identified as the preferred option for the shared user path. The advantages of this option include the reduced impact on utilities, no impacts on known endangered ecological communities, high level of passive surveillance of the path given proximity to Sulwood Drive, connectivity to residents and provides for recreational cyclists of all levels. The safety barrier necessitated by the option will add to the costs of the shared path, however there is potential that the length of the safety barrier required could be reduced by positioning the path further from the carriageway, outside of the clear zone.

Package 2 – Carpark

The MCA process clearly identified a preferred option for extending the existing carpark to the west of the existing carpark. This option has been confirmed as the preferred option with TCCS. This has advantages of providing access to the favoured walking location in Mt Taylor Reserve, as well as avoiding pedestrians crossing Sulwood Drive to access Mt Taylor. This option is a one-way carpark given the physical constraints of the site; the road corridor and Mt Taylor Reserve, and could utilise the intersection upgrade access option for the existing carpark entrance. Given the arrangement of the preferred option, the carpark extension would need to be constructed alongside Package 3 – Intersection and access upgrade. The concurrent construction is required given that construction of the carpark expansion will not address the safety issues raised as part of the project brief.

Package 3 – Intersection and access upgrade

The MCA process did not provide a clear preferred option for the intersection upgrade. SMEC has considered the advantages and disadvantages of the options developed. Traffic modelling showed that the intersection when assessed given its current arrangement performed above the minimum requirements for the design criteria providing a Level of Service (LoS) D, however when assessed in the network the intersection returned a LoS of E in the 2041 PM peak.

Following consultation with the ACT Government and key stakeholders it was determined that Option 1 – Signalisation of the intersection was the preferred option. This was due to the option provided a value-for-money solution that caters for current and future traffic volumes, provides for safe movements of pedestrians in all directions and maintains existing movements in a safe manner.

The preferred option for Package 3 will require the carpark expansion to be constructed concurrently. Given the lane lengths required for the right turn bay for eastbound traffic to enter the carpark a temporary connection would need to be installed between the access lane and the existing carpark.

NEXT STEPS

Package 1 – Shared user path

The following activities will need to be undertaken to progress the package:

- Confirm location and approximate depths of utilities.
- Begin consultation with utility providers to understand each provider's requirements
- Undertake geotechnical investigations along the proposed alignment to understand the subsoil conditions along the path
- Further develop the alignment of the option to identify any issues and how the option will interact with the other packages
- Obtain topographical survey of the alignment

Package 2 – Carpark

The following activities will need to be undertaken to progress the package:

- Confirm location and approximate depths of utilities.
- Begin consultation with utility providers to understand each provider's requirements
- Obtain topographical survey of the alignment
- Investigate interaction between packages

Package 3 – Intersection and access upgrade

The following activities will need to be undertaken to progress the package:

- Confirm location and approximate depths of utilities.
- Begin consultation with utility providers to understand each provider's requirements
- Obtain topographical survey of the alignment
- Determine deceleration length for right turn into carpark
- Determine separation between carpark exit and Mannheim Street/ Sulwood Drive intersection
- Investigate interaction between packages

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1 Introduction

1.1 Project Background

Mount Taylor Hume Circle Design Services project is split into two distinct packages: Mt Taylor, Kambah and Hume Circle, Fyshwick. This feasibility report is solely regarding the Mt Taylor package of works. Mt Taylor comprises of three individual sub packages of work. A description of these packages and the level of design work to be undertaken on the packages is detailed below:

- Package 1 – Shared User Path: This package relates to the development of a shared user path connecting Athllon Drive in the east and Drakeford Drive to the west. The shared user path will run adjacent to Sulwood Drive. This package will be developed through a feasibility study (this report) only.
- Package 2 – Carpark expansion: This package relates to the expansion of the existing carpark to provide additional parking spaces. The primary driver for this package is the existing carpark is heavily utilised and additional parking opportunities are required for users. This package will be developed through a feasibility study (this report) only.
- Package 3 – Mt Taylor Carpark Access Improvements: This package relates to improving the access and egress into the existing Mt Taylor Carpark adjacent to the Manheim Street/ Sulwood Drive intersection. The primary driver of this project is to improve safety of motorists entering the carpark from Sulwood Drive. It has been observed on site that many westbound motorists on Sulwood Drive would perform illegal right turns into the carpark entry. Given the high-speed environment, these manoeuvres are likely to result in serious or fatal crashes. This package is being developed through a feasibility study (this report) and continuing through Preliminary Sketch Plan (PSP) and Document Readiness (DR).

Sulwood Drive is currently a two-lane undivided roadway with one travel lane in both directions. When Sulwood Drive was constructed it was intended as a temporary connection between Drakeford Drive and Athllon Drive, however it currently is used as a Major Collector Road for Kambah and Wanniasa suburbs. Large earth mounds exist between the boundaries of residential areas and the southern Sulwood Drive travel lane. These earth mounds are used as noise mitigation measures for the nearby residents. The Mt Taylor Nature Reserve is a large trip generator for Sulwood Drive with many recreational users utilising the walking paths accessed from Sulwood Drive.

It is noted that a duplication for Sulwood Drive is planned for the long-term planning pipeline (20+ years). Initial traffic volumes obtained from CSTM modelling show that the traffic volumes expected in 2041 indicate the duplication of Sulwood Drive would not be required, from a traffic saturation perspective, within this time.

The overall objectives of these intersection upgrades are to primarily improve road safety, prevent anti-social behavior, improve amenities for residents and the local community and provide accessibility for recreational users of the Mt Taylor Nature Reserve.

1.2 Project Location

The Mt Taylor package of works is in the suburb of Kambah, in the south-western region of Canberra, as shown in Figure 1-1 below.

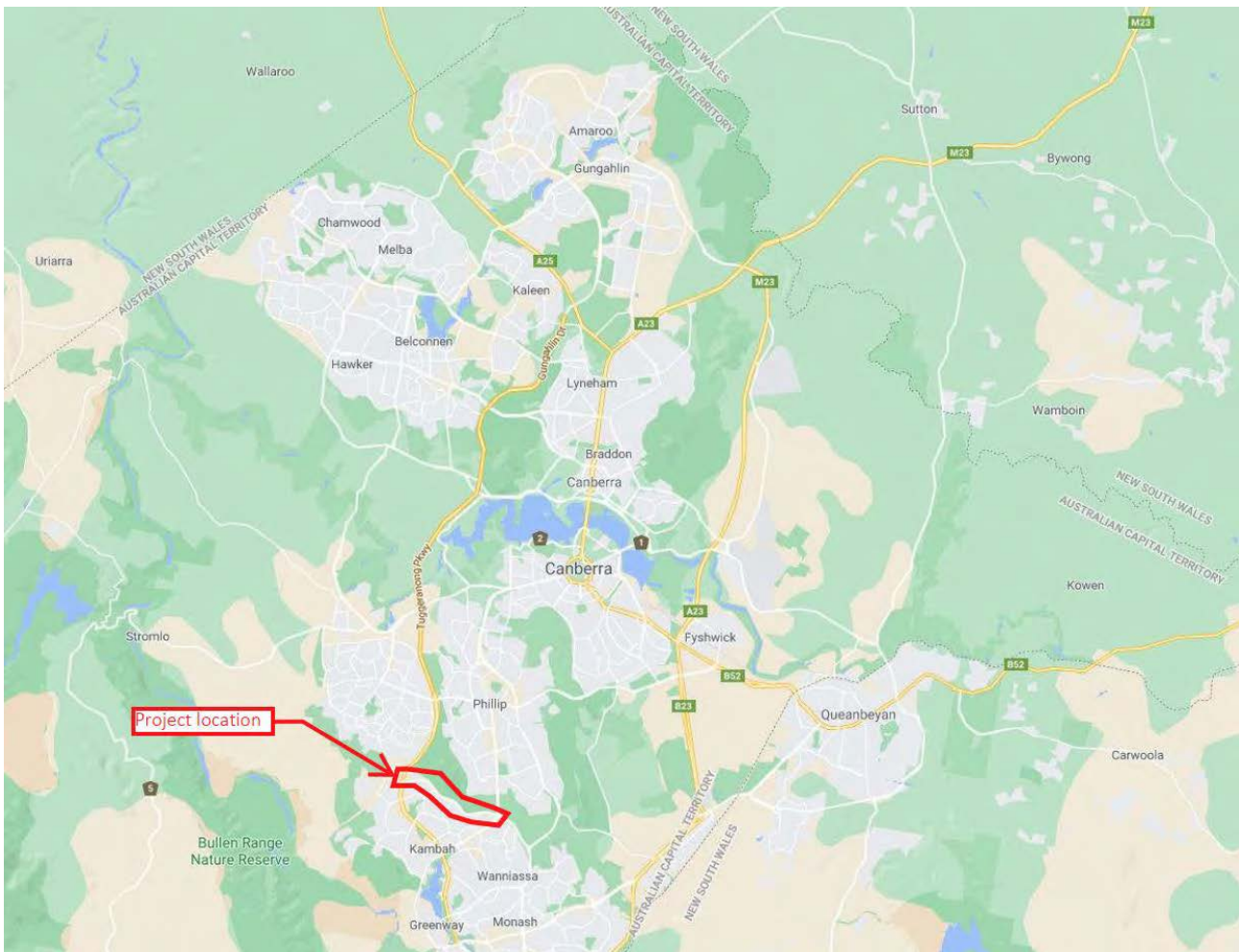


Figure 1-1: Mt Taylor package locality

Sulwood Drive is located at the northern edge of the suburbs of Kambah and Wanniasa and along the southern boundary of the Mt Taylor Nature Reserve with connections to the residential areas via several local roads, namely; Inkster Street, Manheim Street, Livingston Street and Colquhoun Street. The length of Sulwood Drive is shown in Figure 1-2 below.

The shared user path extends from Drakeford Drive (western extent of Sulwood Drive) to Athllon Drive (eastern extent of Sulwood Drive) adjacent to the Sulwood Drive which results in an approximate project length of 3.8 km. The project area for the shared user path is displayed in Figure 1-2.



Figure 1-2: Shared user path site extent
(Source: ACTmapi, October 2020)

The carpark expansion and access improvement packages are centred around the existing Mt Taylor carpark at the intersection of Sulwood Drive and Mannheim Street. The project area of both packages is shown in Figure 1-3 below.



Figure 1-3: Sulwood Drive - Mannheim Street Intersection and access to existing Carpark
(Source: ACTmapi, October 2020)

1.3 Project Objectives

When establishing a brief for the project, IDPG and TCCS identified the following objectives for the study:

- 1) Improve safety for all users
- 2) Ensuring intersections remain open to traffic at their current regulated speed with an acceptable functional performance
- 3) Improved whole of life cycle of the asset
- 4) Provide additional amenities for residents, commuters and recreational road users in the area of the project

1.4 This Report

IDPG on behalf of TCCS has commissioned an options and feasibility study within the Mt Taylor Hume Circle design services project.

This Feasibility Report has been prepared to document the background and outcomes of the options assessment process for Mt Taylor packages of works associated with this project; including shared user path, carpark extension and intersection upgrade at Sulwood Drive – Mannheim Street. The report records the options considered, the constraints and implications of these options the multi-criteria analysis process that was used to identify a preferred option and provides a brief overview of the proposed way forward for the development of the strategic design for each package of works. The proposed way forward has been developed by SMEC based on the preferred options agreed by TCCS.

2 Design Criteria

The following summarises the key elements of the design criteria that have been adopted to develop the design options. The design criteria was issued to and accepted by the client on 12 October 2020.

2.1 Design Standards

Relevant design standards have been referenced to ensure that the proposed options are compliant with the latest practice. The specific standard utilised is dependent on the design component but would include the following:

- Relevant Territory standards (Municipal Infrastructure Standards)
- AUSTRROADS Guide to Road Design
- Relevant Australian Standards

2.2 Road Design Criteria

The Austroads Guide to Road Design is the primary reference material for this aspect of the project. Tables 2-1 presents a summary of the proposed design criteria for Sulwood Drive.

Table 2-1: Design criteria – Sulwood Drive

Criteria	Value	Comment
Road Classification	Sulwood Drive - Major Collector Road Mannheim Street – Minor Collector Road	
Design Speed	90 km/h	
Posted Speed	80 km/h	
Through movement design vehicle (Sulwood Drive – Mannheim Street intersection)	Service vehicle (8.8 m) Radius 12.5 m	Austrroads Guide to Road Design Part 4 – table 5.1
Through movement design vehicle (Carpark access)	Service vehicle (8.8 m) Radius 12.5 m	Austrroads Guide to Road Design Part 4 – table 5.1
Checking vehicle (intersection and carpark)	Single unit truck/bus (12.5 m) Radius 12.5 m	Austrroads Guide to Road Design Part 4 – table 5.1
Horizontal Alignment		
Desirable min horizontal radius	399 m	Austrroads Guide to Road Design Part 3, section 7.6.1
Vertical Alignment		
Desirable max grade	6.0%	Austrroads Guide to Road Design Part 3, section 8.5.3 and 8.5.6. The existing vertical geometry will be utilised where possible. Where the existing
Absolute max grade	7.0%	
Desirable min grade	1.0%	

Criteria	Value	Comment
Absolute min grade	0.5%	exceeds these limitations. The client will be notified, and issues discussed
Crest VC K value – Desirable min. (deceleration coefficient = 0.36)	35.5	Austroads Guide to Road Design Part 3, Table 8.7.
Crest VC K value – Absolute min. (deceleration coefficient = 0.46)	25.5	1.1 m to 0.2 m (midblock – object on the road) 1.5 second reaction time
Approach Sight Distance	126 m	Austroads Guide to Road Design Part 4A, Section 3.2.1
Stopping Sight Distance - Desirable min. (deceleration coefficient = 0.36)	126 m	Austroads Guide to Road Design Part 3, Table 5.5.
Stopping Sight Distance - Absolute min. (deceleration coefficient = 0.46)	107 m	Based on 1.5 second reaction time
Safe Intersection Stopping Sight Distance	201 m	Austroads Guide to Road Design Part 4A, Table 3.2 Based on 1.5 second reaction time
Median		
Adjacent to a right turn bay to control turning path (minimum width)	0.5 m	Austroads Guide to Road Design Part 3, section 4.7.1
Shelter Type 2 post with dual 300 mm lanterns and/or pedestrian repeater lanterns (absolute minimum)	1.8 m	Transport for NSW, Traffic Signal Design guide, Section 5, Part 5.3
Shelter pedestrians and traffic signals (preferred width to allow for maintenance)	2.5 m	Austroads Guide to Road Design Part 4A, section 6.1.2
Shelter turning vehicles and traffic signals (i.e. includes a 3.5 m wide adjacent traffic lane) (minimum width)	6.0 m	Residual median width is 2.5 m
Cross section		
Traffic lane width	3.5 m	Austroads Guide to Road Design Part 3, section 4
Turning lane width	3.5 m (desirable) 3.0 m (absolute minimum)	
Cross fall – existing pavement	Existing retained	
Cross fall – new pavement	3%	
Maximum cross fall	5%	
Minimum outer shoulder	2.0 m	

Criteria	Value	Comment
Minimum inner shoulder	1.0 m	
Verge	1.5 m	
Clear zone – Fill batter	10.0 m	Batter slope 4:1 or greater, AADT > 6000, Austroads Guide to Road Design, Part 6, table 4.1
Clear zone – Cut batter	6.5 m	Batter slope 4:1 or greater, AADT > 6000, Austroads Guide to Road Design, Part 6, table 4.1
Kerb types	Standard ACT kerb and gutter	
Preferred fill slope	4H to 1V	
Absolute steepest fill slope	2H to 1V	
Preferred cut slope	4H to 1V	
Absolute steepest cut slope	2H to 1V	

2.3 Shared User Path Criteria

Table 2-2: Shared User Path Design Criteria

Criteria	Value	Comment
Width	3.0 m	
Desirable cross fall	2.5%	MIS05
Maximum cross fall	4%	MIS05
Desirable maximum grade	3%	MIS05
Absolute maximum grade	5%	MIS05
Horizontal Curves minimum	10 – 94 m	Based on 20-50 km/hr. Austroads Guide to Road Design Part 6A, Table 5.6
Minimum separation from traffic lanes	5.0 m	Municipal Infrastructure Standards 05: Active Travel Facilities, table 5.5. Rigid barrier may be used to reduce the clearance where required
Clearance to obstacles	1.0 m min.	MIS05

2.4 Carpark Design Criteria

Table 2-3: Carpark Design Criteria

Criteria	Value	Comment
User Vehicle Class	2	AS2890.1
Angle Parking (30°)		AS2890.1 (30° parking)

Criteria	Value	Comment
Length	5.4 m min. (nominally)	(Note: Accessible parking not allowed at 30°)
Width	2.3 m min.	
Aisle Width	3.0 m min.	
Angle Parking (45°)		AS2890.1 (45° parking)
Length	5.4 m min. (nominally)	(Note: accessible parking requires additional 2.4 m Wide and 5.4 m Long shared space next to vehicle, and 2.4 m by 2.4 m space in front or behind)
Width	2.5 m min.	
Aisle Width	3.7 m min.	
Angle Parking (90°)		AS2890.1 (90° parking)
Length	5.4 m min.	(Note: accessible parking requires additional 2.4 m Wide and 5.4 m Long shared space next to vehicle, and 2.4 m by 2.4 m space in front or behind)
Width	2.5 m min.	
Aisle Width	5.8 m min.	
Parallel Parking		AS2890.1
Length	6.3 m min.	(Note: accessible parallel parking required 3.2 m Wide and 7.8 m Long car park with a 1.6 m Wide by 7.8 m Long shared area on non-trafficked side)
Width	2.1 m min.	
Aisle Width	3.0 m min.	
Accessible Parking		AS2890.1
Number of accessible spaces:	1 accessible carpark	
1-20 additional carparks	2 accessible carparks	
21-50 additional carparks	3 accessible carparks	
51-70 additional carparks		
Access Driveway Width	6.0 - 9.0 m	AS2890.1

2.5 Intersection Design

A traffic assessment will be undertaken for Sulwood Drive – Mannheim Street intersection to determine the appropriate layout for the intersection based on the project traffic volumes. This assessment will also determine the number of traffic lanes required on each approach. Upon completion of the assessment the intersection layout, whether it be signalised or not, the design will be developed using Austroads Guide to Road Design Part 4A and 4B as the primary design resource. This will include checking of the swept path of the design and checking vehicles in accordance with Austroads Guide to Road Design Part 4.

2.6 Traffic Modelling Parameters

Table 2-4: Traffic Modelling Parameters

Parameter	Value	Comments
Cycle Time	Up to 130 seconds depending on surrounding intersection cycle lengths	To be confirmed with TCCS
Phasing/sequence	Phasing will depend on design and intersection requirements	To be confirmed with TCCS

Parameter	Value	Comments
Minimum green	8 seconds	
Intergreen	4- or 5-seconds yellow depending on prevailing speed, all-red time based on geometry	To be confirmed with TCCS
Pedestrian clearance	SIDRA defaults	To be confirmed with TCCS
Max Degree of Saturation	0.9	
Level of Service (Delay RTA NSW Method)	D or better	
Peak flow period	30 minutes	
Lane length	Measured	
Basic saturation flow	1850 tcu/hr	
Lane width	Measured	
Peak factor	Surveyed (current), 95% (future)	
Approach travel distance	Measured	

Strategic transport modelling will be undertaken using the CSTM with input parameters and data to be provided by TCCS.

3 Planning and Environmental Assessment

3.1 Planning

The area impacted by the various options for this development is relatively unconstrained from a Planning perspective. However, the various options would trigger different planning approval pathways due to the presence of ecologically sensitive land and/or various planning overlays.

The Mount Taylor Nature Reserve is a designated area under the National Capital Plan, as a hill and buffer zone. The Mount Taylor Nature Reserve is also covered by a Heritage overlay under the Territory Plan. Any works protruding into the Nature Reserve would trigger the requirement for a cultural heritage assessment and Works Approval from the NCA – note that there are no exemptions for works in Designated Areas.

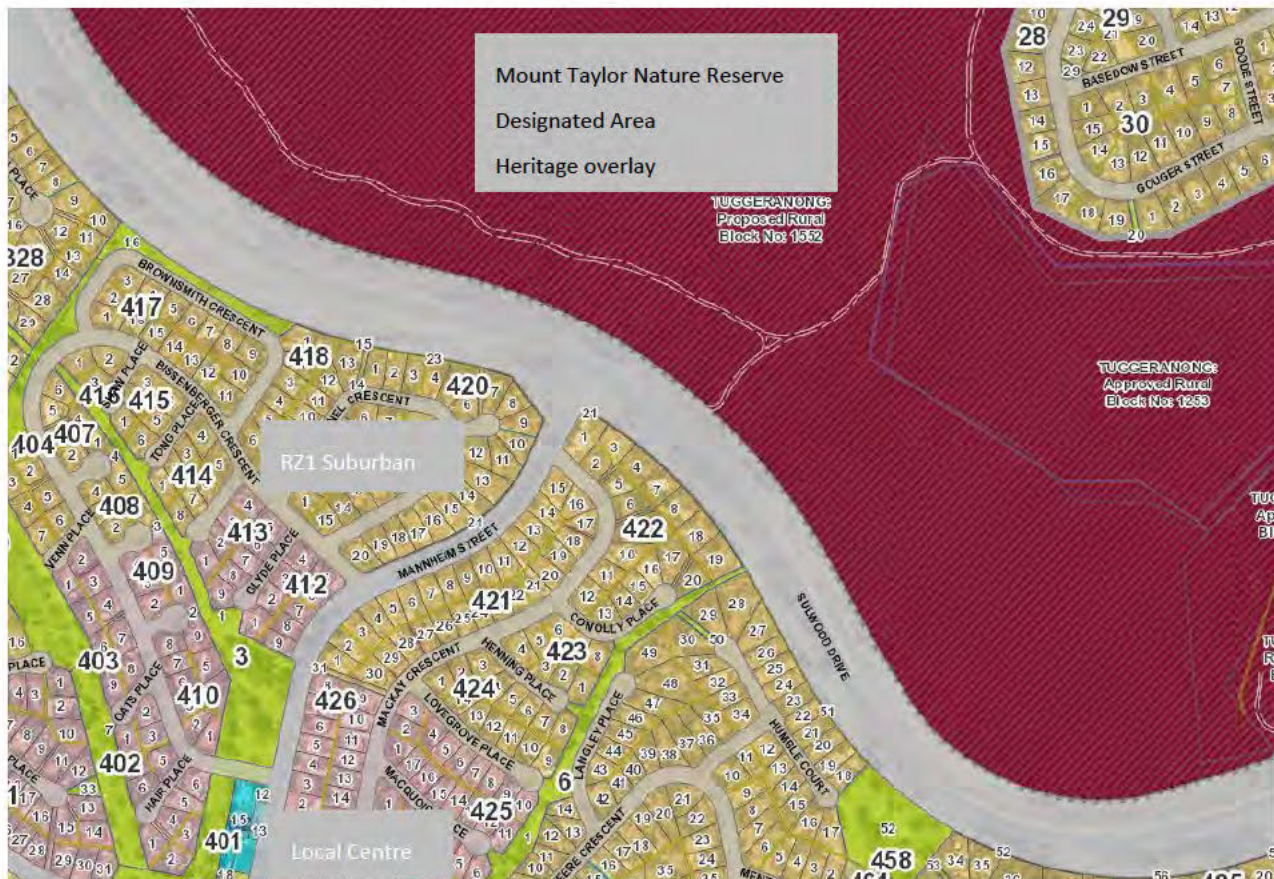


Figure 3-1: Land zoning under the Territory Plan (ActMapi December 2020)

The road reserve comprises some areas of ecological sensitivity, however in the ground-truthing undertaken by SMEC, the vegetation communities within the road reserve have been found to be degraded.

A Threatened Ecological Community, Box Gum Woodland, was found present on the northern side of the road reserve, opposite Mannheim Street, adjacent to the entrance to Mount Taylor Nature Reserve (shown in Figure 3-2 in green). An assessment would be undertaken of the preferred alignment of the car park to confirm the disturbance footprint and confirm that the extent of impact would not be 'significant' under Commonwealth EPBC Act or ACT Nature Conservation Act legislation. If the impact is deemed 'significant', consideration would be required under Schedule 4 of the Planning and Development Act (i.e. Impact Assessment or request for an Environmental Significance Opinion).

Containing works to within the road reserve will be important for avoiding the need for a Works Approval (due to the designated land overlay).

The road reserve is generous, so this is not considered to impose a significant constraint. Provided the proposal can be contained to within the road reserve, the proposal would be subject to a DA in the Merit Track, or may be able to be

considered as exempt works under Schedule 1 of the Planning and Development Act. The Planning approval pathway should be confirmed with EPSDD once plans are progressed to PSP stage, through a pre-lodgement meeting.

SMEC understands that there has been considerable interest from residents in the local area, and it would be advantageous to consult with local residents/Community Council prior to DA lodgment. There would be value in consulting with residents and park users prior to progressing the site selection further, to ensure the selected location of the car park will be used to an appropriate capacity.

Relevant DA considerations:

- TSZ1 Transport and Services Zone Development Code
- CPTED General Code
- Access and Mobility General Code
- Parking and Vehicular Access General Code
- Planning for Bushfire Risk Mitigation General Code
- Minimize light spill to sensitive ecological areas in the adjoining nature reserve and nuisance to residents
- Signs General Code
- Sediment and Erosion Control
- Stormwater runoff / diversion of overland flow

3.2 Ecology

SMEC undertook a ground truthing exercise at Mount Taylor in September 2020. This confirmed that the biodiversity values mapped in ACTmapi as occurring within the study area appear to be correct and that the boundaries of vegetation community types reflect the public mapping.

In terms of ecological constraints, the EPBC Act and NC Act protected Grassy Box Gum Woodland Threatened Ecological Community (TEC) is of most concern. This occurs in the area directly adjacent to the northern side of the existing car park site on Mount Taylor (Area 1 shown in Figure 3-2), and immediately adjacent to the north at Area 2 (shown in Figure 3-3), 3 (shown in Figure 3-4), and 4 (shown in Figure 3-5). Additionally, EPBC and NC Act Endangered Small Purple Pea (*Swainsonia recta*) has been recorded within ~200m from Areas 1 and 2. More careful boundary mapping (vegetation) and or habitat or specimen searches (of EPBC and NC Act listed Pink Tailed Worm Lizard, Golden Sun Moth, Small Purple Pea, and hollow bearing trees) may need to be conducted to protect biodiversity values here if developments are to encroach.

The removal of the EPBC and NC Act Threatened Ecological Community may require the referral of the project to the Commonwealth Department of Agriculture, Water and the Environment as a controlled action under the EPBC Act, and/or trigger assessment under Schedule 4 of the Planning and Development Act 2007 (i.e. EIS in the Impact Track or request for an Environmental Significance Opinion).

Any developments in Area 3 would need to be careful not to impact on Pink Tailed Worm Lizard habitat as well as the Grassy Box Gum Woodland TEC.

The potential alternative (Area 4) on the west side of Mount Taylor on the corner of Colquhoun Street is quite constrained and it appears to consist of high-quality native vegetation, including several large hollow bearing trees, with several orchid species sighted. The EPBC Act and NC Act protected Grassy Box Gum Woodland Threatened Ecological Community (TEC) likely extends beyond the existing ACTmapi polygon further into the road reserve.

Area 5 on the southern side of Sulwood Drive, west of Mannheim Street, which is already cleared would have the least impact on biodiversity values.



Figure 3-2: Area 1 - Existing carpark - Mannheim Street



Figure 3-3: Area 2 - Livingston Avenue – Alternate location for additional parking capacity with good connectivity to the reserve



Figure 3-4: Area 3 - Inkster Street - Alternate location for additional parking capacity with some connectivity to the reserve



Figure 3-5: Area 4 - Colquhoun Street - Alternate location for additional parking capacity with some connectivity to the reserve



Figure 3-6: Southern side of Sulwood Drive, west of Mannheim Street – Alternate location for additional parking capacity

3.3 Heritage Assessment

As previously noted, a heritage overlay is present on Mount Taylor. This relates to listing 20136. Aboriginal Places – Canberra Nature Park Fire Trails, with one site of note occurring within Mount Taylor. Further information on this listing is available [here](#). The Heritage Office listing states as follows:

“These places are all part of the physical evidence of a traditional way of life that is no longer practised within the ACT. The presence of artefact scatters in these localities demonstrates past occupation and use of these places by Aboriginal people. Stone was an extremely important element of Aboriginal culture, essential to their day-to-day living. Stone artefacts thus constitute an enduring record of Aboriginal technology and settlement patterns. The individual artefacts at the sites also have significance due to their potential to contribute to research about Aboriginal stone technology.”

If works are to extend to the Nature Reserve, a Cultural Heritage Assessment would be required to determine the extent of impact on areas of Aboriginal Cultural Heritage.

Other areas covered by the proposed options, within the road reserve, are highly disturbed by previous development and the creation of drainage bunds. A pre-lodgement meeting is recommended to confirm DA lodgement requirements; however, it is unlikely that a Cultural Heritage Assessment would be required for works within the road reserve.

Alternatively, if the exempt public works pathway under Schedule 1 of the Planning and Development Act is confirmed as an option, consultation with ACT Heritage may be required, prior to obtaining an exemption certificate from a private certifier.

4 Multi Criteria Analysis

4.1 Multi Criteria Analysis

A multi-criteria analysis, MCA, is an evaluation procedure that is used to assess a suite of options in an effort identify the most appropriate option for further consideration. The analysis can consider both quantifiable measures and intangible (qualitative) criteria together to create a comparative score for each of the considered options, with the highest scoring option being the most appropriate for further consideration and development.

The MCA process scores each option against a set of criteria that have been identified as important in the context of the project. Through consultation with the assessment team, these criteria are agreed and weighted as function of their relative importance and relevance to the project, with the product of score and weighting for each criteria aggregated for each option to generate an overall score.

A multi-criteria analysis with associated options development and an evaluation workshop was used on each of the Mt Taylor sub-packages; shared user path, carpark and intersection/access upgrade to comparatively evaluate the options and identify a preferred option for each sub-package. The MCA method identified in the Transport for NSW *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives* (June 2018) was adopted for the Mt Taylor Package A of Mt Taylor Hume Circle Design Services Project, consisting of the following steps:

- 1) Define Objectives & Options
- 2) Define Criteria
- 3) Weight Criteria
- 4) Options Scoring
- 5) Aggregate Results & Rank
- 6) Sensitivity Analysis

The objective of the MCA was to engage with key stakeholders to assess the relative merits of the developed options and their elements to identify a preferred option.

4.2 Workshop Details

A Multi-Criteria Analysis (MCA) workshop was held on the 16th of December 2020 and completed with a follow-up Workshop #2 on 17th of December 2020. It was hosted in a virtual environment through the MS Teams platform and attended by the following project team members and key stakeholder representatives:

Workshop #1 – 16th December 2020

- Jody Yap (ACT Government)
- Leigh Costa (ACT Government)
- Colin Maher (Act Government)
- Anthonie Lambert (ACT Government)
- Kamal Uddin (ACT Government)
- Tessa Roberts (ACT Government)
- Steven Hare (ACT Government)
- Dilip Thapa (ACT Government)
- Snezana Dimitrovska (ACT Government)
- Ilija Kovacevic (ACT Government)
- Nahin Rahman (ACT Government)
- ██████████ (SMEC)
- ██████████ (SMEC)
- ██████████ (SMEC)
- ██████████ (SMEC)
- ██████████ (SMEC)
- ██████████ (SMEC)

Workshop #2 – 17th December 2020

- Jody Yap (ACT Government)
- Leigh Costa (ACT Government)
- Anthonie Lambert (ACT Government)
- Kamal Uddin (ACT Government)
- Steven Hare (ACT Government)
- Dilip Thapa (ACT Government)
- Snezana Dimitrovska (ACT Government)
- [REDACTED] (SMEC)
- [REDACTED] (SMEC)
- [REDACTED] (SMEC)
- [REDACTED] (SMEC)
- [REDACTED] (SMEC)

The workshop provided attendees with a briefing on the workshop agenda, and content, including project constraints, traffic analysis outputs, options developed, an outline of the MCA process, the proposed MCA criteria and their weightings. These were provided ahead of the workshop to illicit discussion on the criteria and their weighting to confirm them prior to the workshop. No feedback was received, so the proposed criteria and corresponding weighting were taken forward into the workshop.

Refer to Sections 5.8 for the Multi-Criteria Analysis overview and outcomes of the shared user path, Section 6.9 for the MCA overview and outcomes for the carpark options and Section 7.9 for the MCA overview and outcomes of the intersection / access upgrade for Sulwood Drive – Mannheim Street intersection. The workshop presentation, including annotated findings is included in Appendix F.

5 Package 1 – Shared User Path

5.1 Constraints

5.1.1 Environmental

From ground truthing aspects of the site during the site inspection, and desktop review, the following were identified within the road reserve at various locations on the northern side (Mt Taylor side) of Sulwood Drive:

- Grassy Box Gum Woodlands
- Small Purple Pea
- Pink Tailed Work Lizard
- Golden Sun Moth
- Hollow bearing trees

Greater detail of these locations is provided in Section 6.1.1.

There were no environmental impacts identified on the southern side of Sulwood Drive.

From the site inspection it was also noted that the incorporation of a shared used path on the Mt Taylor Reserve side of Sulwood Drive would disrupt the 'natural landscape' reducing the aesthetics of the reserve.

5.1.2 Adjacent Land Use

It has been identified that Sulwood Drive may be a duplication (to the south) in the future (20+ years). This has been considered during the development of all aspects of the Mt Taylor Project. The shared user path options to the south of Sulwood Drive have been developed close to the property boundary, as this allows any future duplication works, and provides connectivity to the existing residential path network. Proximity to residential properties abutting the road reserve would need to be considered and discussed with the community council. The shared user path option developed north of Sulwood Drive is predominately positioned in a cleared area adjacent to the roadway, with the shared user path crossing Sulwood Drive in the area of the existing Mt Taylor carpark as continuing through the carpark would pose a significant safety risk for cyclists and moving the shared user path behind the existing carpark will impact various threatened species and endangered ecological communities.

Some sections of the road reserve on the northern side of Sulwood Drive appear to be trafficked by vehicles, this would provide a safety concern if the shared user path were to be in this location. Barriers or guard railing may need to be used to provide physical separation from Sulwood Drive in places.

If the shared user path were developed on the northern side of Sulwood Drive, there would be poor connectivity to residential areas and the existing pedestrian connections. Conflicts between pedestrians/ cyclists and motorists on Sulwood Drive would arise if crossings of Sulwood Drive are required. Safe options to allow crossings of Sulwood Drive would need to be considered in various locations. Regardless there would be increased pedestrian and cyclist activity attempting to cross the 80 km/hr road at various locations resulting in a significant road safety issue.

The existing mounds on the southern side of Sulwood Drive could be acting partly as noise barriers (even though not their intended design). There may be resistance from residents to cutting into these mounds for the provision of the shared user path at the location developed in this report.

5.1.3 Drainage

Drainage constraints have also been identified especially toward the western end of the shared path site near Drakeford Drive where Sulwood Drive crosses Village Creek. The SUP alignment will require further investigations to confirm the drainage requirements for the SUP crossing Village Creek.

The majority of the existing drainage comprises of vegetated swales and small culvert crossings along the shared user path. The proposed drainage catchments will reflect the existing drainage catchment scenario where practically possible. SMEC will provide similar drainage infrastructure to existing case and will utilizing vegetated swales and extension of existing transverse drainage.

5.1.4 Utilities

Evo Energy

There are multiple High Voltage (HV) lines under [REDACTED].
Underground HV line crosses under [REDACTED]:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

There are also a couple of HV overhead lines that cross the project site along the project extent:

- Western Colquhoun Street intersection
- Adjacent to Conolly Place
- Just west of Livingston Avenue

Low Voltage (LV) street lighting line is in [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

Service location and possible relocation will be required to be confirmed once the preferred option is approved and PSP design underway. Initial consultation with Evoenergy has begun, highlighting the overall project requirements. Further consultation is required once utility investigations and a civil design is complete to assess the impacts to existing assets. Where proposed pavement crosses underground HV cables, adequate cover and protection will be provided as per Evoenergy standard requirements.

Gas

[REDACTED]
[REDACTED]. The gas main [REDACTED]
[REDACTED].

A 250 mm steel gas main [REDACTED]
[REDACTED].

Telstra/NBN

[REDACTED]
[REDACTED].

Icon Sewer

[REDACTED]
[REDACTED].

Icon Water

Horizontal Constraints

A 900 mm Steel bulk water main is located in [REDACTED]
[REDACTED]. The water main reduces to an 825 mm diameter steel main to the [REDACTED]. Along this bulk main there are also a number of valves (air, pressure relief and scour). These have been identified along the proposed SUP horizontal alignment (Options 1-3) at the approximate chainages:

- CH 90 – valve on the 375 mm cast Iron main

- CH 220 – PRV and hydrant at junction of 375 mm, 150 mm and 900 mm main
- CH 700 – Air valve adjacent to eastern Colquhoun Street intersection
- CH 960 – Double air valve and maintenance hole adjacent to Hinckley Street Cul-de-sac
- CH 1400 – Scour valve
- CH 1640 – double air valve
- CH 1750 – maintenance hole
- CH 1810 – scour valve
- CH 2160 – double air valve
- CH 2450 – scour valve
- CH 2600 – double air valve on the 900 mm bulk main and 375 mm cast iron main, and maintenance hole in the 900 mm bulk main
- CH 2980 – scour valve
- CH 2060 – double air valve
- CH 3130 – valve and temporary zone valve
- CH 3180 and CH 3280 valve and maintenance holes respectively
- CH 3520 – Scour valve
- CH 3560 – double air valve

A 150 mm iron reticulation main [REDACTED]

[REDACTED]

[REDACTED]

Vertical Constraints

Initial contact with ICON Water was established, and As Builts drawings were provided of the existing 900 mm bulk water main which were reviewed, and a cover check assessment was conducted. There are several locations where impact to the water main has been flagged. Table 5-1 identifies locations where there could be clash points between the design level and the bulk supply main:

Table 5-1: Proposed cover and potential conflicts

Option	Design levels				Conversion from ICON Water As Builts			
	Chainage	Existing level (m)	Design Level (m)	Designed Cut (-)/Fill (+) (m)	Pipe Invert Level (m)	natural surface level (m)	Existing cover from top of pipe (m)	Proposed Cover (m)
2	80	612.763	614.213	1.450	611.590	615.541	2.950	4.400
2	395	622.677	623.983	1.306	631.393	632.972	0.579	1.885
2	640	637.385	636.212	-1.173	636.011	638.193	1.182	0.009
2	940	649.273	647.514	-1.759	645.935	648.953	2.018	0.259
2	1500	648.423	648.249	-0.174	633.832	635.822	0.990	0.816
2	2000	650.224	649.955	-0.269	648.182	649.831	0.649	0.380
2	2020	649.860	650.487	0.627	648.182	649.831	0.649	1.276
2	2588	654.111	651.09	-3.021	648.995	650.333	0.338	-2.683
2	2620	656.088	649.74	-6.348	654.558	656.201	0.643	-5.705
2	2840	637.639	638.74	1.101	632.064	633.216	0.152	1.253
1	80	612.763	614.213	1.450	611.590	615.541	2.950	4.400
1	500	629.236	628.993	-0.243	625.678	627.470	0.792	0.549
1	580	633.921	633.625	-0.296	634.645	636.675	1.030	0.734
1	900	645.775	646.114	0.339	646.557	649.803	2.246	2.585
1	1500	648.423	648.249	-0.174	633.832	635.822	0.990	0.816
1	1720	650.039	649.798	-0.241	649.041	650.059	0.018	-0.223
1	2000	650.224	649.946	-0.278	648.182	649.831	0.649	0.371
1	2020	649.86	650.254	0.394	648.182	649.831	0.649	1.043
1	2500	647.092	647.616	0.524	646.216	647.453	0.237	0.761
1	2600	655.439	653.51	-1.929	648.995	650.333	0.338	-1.591
1	2640	654.919	651.312	-3.607	654.558	656.201	0.643	-2.964
1	2800	639.923	641.372	1.449	635.234	636.675	0.442	1.891
3	80	612.763	614.213	1.450	611.590	615.541	2.950	4.400
3	560	632.471	632.65	0.179	634.645	636.675	1.030	1.209
3	1720	650.039	649.798	-0.241	649.041	650.059	0.018	-0.223
3	2000	650.224	649.946	-0.278	648.182	649.831	0.649	0.371
3	2020	649.86	650.254	0.394	648.182	649.831	0.649	1.043

Further investigation and liaison with Icon Water will be required during PSP and DR design stages along this horizontal alignment to resolve these conflict points. Further site investigations will be required to verify the on ground and vertical location of the existing water network, i.e. electronic wandering the asset. A formal procedure to engage with Icon Water to obtain in principal agreement will be required during the future design stages.

Some changes to the design may be required in sections to avoid clashing with the existing watermain to prevent relocation, this will be determined when the exact location of the water main is confirmed.

5.1.5 Pavement / Geotechnical

A typical pavement profile for the shared user path has been proposed for this stage of project. Further investigations will be required to confirm appropriateness of this profile.

Geotechnical investigations have recently been completed in the location of the Sulwood Drive and Mannheim Street to understand subsoil conditions. The field samples have been tested and report provided in Appendix H. This information will be used during the PSP and DR development of the project. The laboratory results and report have been appended in Appendix H.

The assumption has been made that the subsoil conditions are consistent for the full length of the Sulwood Drive carriageway, this has allowed for a uniform treatment to be adopted for the length of the shared user path. This will need to be confirmed in later stages of design development.

5.1.6 Other - Earth Mounds, Noise and Safety

Access to the existing Mount Taylor Carpark and walking trail at Mannheim Street is a key consideration for the shared user path options. Discussions with park rangers indicate that the Mt Taylor walking trail beginning at the Sulwood Drive/Mannheim Street intersection is the most popular with recreational users given the greater cardiovascular workout from this route. Therefore, connectivity between the proposed shared user path and the walking trail is vital to the success of the shared user path project. Section 7 provides more information on the pedestrian crossing options at Sulwood Drive - Mannheim Street Intersection.

It is unknown if the earth mounds located between the residences and westbound travel lane of Sulwood Drive were intended to be provided as a noise mitigation measure for the residents, however the mounds are believed to provide a visual barrier and noise mitigation measure for residents from Sulwood Drive. It is believed that removal of these mounds would require considerable community consultation.

It is noted that there is currently a dirt track running adjacent to the property boundary northern most residents. This dirt track is believed to be used as a fire truck access for respond to hazards present at the rear of these properties as well as a route for pedestrian traffic. Given the dirt track is not visible from Sulwood Drive given the earth mounds and none of the residents front towards Sulwood Drive, there is poor passive surveillance and lighting if the track is formalised, and consideration to lighting the shared user path may need to be considered if the preferred option is developed further.

5.1.7 Related Projects

Athllon Drive Duplication (Southern Section) Sulwood Drive to Drakeford Drive Preliminary Sketch Plan

It is understood that Cardno are currently undertaking PSP design for Athllon Drive Duplication between Sulwood Drive to Drakeford Drive. The design incorporates a Shared user path. Understanding of the PSP allows the design options generated for the Sulwood Drive shared user path to tie into the proposed Athllon Drive shared user path.

Sulwood Drive Optional Improvements – Drawings, and Investigations for Minor New Works Projects – Report – R.D. Gossip Pty Ltd

TCCS provided drawings and draft report by R.D. Gossip investigating the possibility of creating:

- A turning lane for westbound traffic at the entry point to the car park
- A new car park facility on the southern verge of Sulwood Drive west of Mannheim Street
- Pedestrian crossing facilities on either, or both sides of Mannheim Street
- A path along Sulwood Drive between Drakeford Drive and Athllon Drive.

5.2 Options Development

5.2.1 Design Development

Upon initial investigations into potential alignments and existing conditions of the corridor, an issue was encountered with the existing vertical grades, several areas of the corridor required vertical grades of the shared user path above those stipulated in the design criteria. Several options had to be developed to address these issues. These options are:

- Option 1 – Provision of landings for grades >5% - compliant to AS1428.1
- Option 2 – Max gradient of 5% (as per design criteria) – complaint to MIS05 and design criteria
- Option 3 – Grades closely matching the existing ground – non-compliant.

Following the development of these options, both the northern and southern sides of Sulwood Drive between Drakeford Drive to Athllon Drive were considered as viable options for the new shared user path to be located. There were a number of advantages identified for the southern side of Sulwood Drive including; an existing dirt track running adjacent to Kambah residences, connectivity to residents, no impacts on threatened ecological communities associated with the Mt Taylor Nature Reserve and the path is outside of the clear zone of Sulwood Drive improving safety for the users. Some of the disadvantages of utilising the south side of Sulwood Drive are limited passive surveillance from motorists on Sulwood Drive to pedestrians utilising the shared user path, major ICON water assets running parallel to the existing dirt track, and potential light spill from the shared user path into residential properties.

The advantages of the alignment using the northern side of Sulwood Drive are avoiding interacting with ICON Water assets for long periods of the alignment, side roads that need to be crossed experience lower volumes of traffic, provide direct access to Mt Taylor car park and walking trails. The disadvantages include potential impacts on endangered ecological communities associated with the Mt Taylor Nature Reserve, the width of the cleared area adjacent to the Sulwood Drive carriageway would result in the shared user path being within the clear zone decreasing safety for users, a pinch point exists at the Mt Taylor car park where the shared path must cross Sulwood Drive or impact sensitive ecological communities, and potential impact on the Evo Energy HV cables. The northern option also introduces several conflict points between path users and Sulwood Drive, as path users require links into the existing residential path network on the southern side of Sulwood Drive.

The following outlines the options developed for the shared user path assessed during the MCA Workshop.

5.2.2 Option 1 – Southern alignment, provision of landings for grades >5%

OPTION DESCRIPTION

Option 1 has been positioned to formalise the existing dirt track between the earth mounds and Kambah residences south of Sulwood Drive carriageway. The vertical alignment of option 1 has been developed to provide a balance between conforming to the design criteria as much as possible, whilst providing an option to minimise earthworks and therefore a more economical approach. This option favours safety, with the provision of horizontal (0% grade) 1.2 m long landings every 9 m, with a maximum 7% grade. This option allows slightly greater than the 5% maximum allowable grades set out in the Design Criteria, however with the 1.2 m landings, it is compliant with Australian Standards (AS 1428.1). This option does have a negative impact on the rider comfort. The design plans and long section for this option is presented in Appendix A.

From this option development a couple of design issues identified include:

- Fill batters affecting existing drainage channel between both ends of Colquhoun Street
- Large cuts of existing mounds, it is understood these mounds did not have a design purpose as Sulwood Drive was not intended to remain as a permanent road. Overland water flow needs to be considered further, as well as impact to residents.

OPTION RATIONALE

This option balances cost with design criteria, with safety and accessibility being a primary consideration during this option development. Whilst some areas have longitudinal grades slightly steeper than the maximum grades allowed in MIS05, the provision of landings intermittently (every 9 metres) when grades are greater the 5% provides a refuge for path users and is compliant with Australian Standards (AS 1428.1). This option reduces the extent of earthworks required (in comparison to Option 2 below) which is reflected in the cost estimates in Section Appendix E.

The cut required to achieve these grades around the park area is substantial, (up to 6 m), and has been noted as a potential point of conflict with the bulk water within the vicinity of the SUP. During the MCA it was discussed that the bulk water main is a hard constraint, so potential redesign at this point may be required to avoid conflict. It has been proposed to undertake further investigations to locate the water main for the whole project length.

Table 5-2: Option 1 advantages and disadvantages

Advantages	Disadvantages
Compliant with AS 1428.1	Reduced rider comfort
Accessible path	Moderate earthworks required
Improved safety outcomes for path users	Impact to Icon Water assets

5.2.3 Option 2 – Southern alignment, max gradient of 5% (as per design criteria)

OPTION DESCRIPTION

Option 2 has been positioned to formalise the existing dirt track between the earth mounds and Kambah residencies south of Sulwood Drive carriageway. The vertical alignment of option 2 has been developed to comply entirely with the ACT Municipal Infrastructure Standards, MIS05, and the design criteria provided to IDPG/TCCS. This shows areas of significant earthworks required to maintain the longitudinal grades to a maximum of 5%. Refer to Section 5.5 for the impact on cost. There is a significant risk of this alignment impacting an Icon Water asset resulting in the need to relocate or protect the asset. The MCA identified the bulk water main as a hard constraint, and redesign may be required to avoid the requirement of asset relocation at the park.

OPTION RATIONALE

This option has been provided to show the alignment and cost implications of the provision of a shared user path adhering to the Municipal Infrastructure Standards, MIS05.

This option requires substantial cut, approximately 10,000 m³ more cut than option 1 detailed above. Option 2 provide the safest option to path users with the grade being compliant with MIS05. Anecdotal evidence suggests that avoiding the landings as detailed in Option 1, provides a smoother and more comfortable ride to path users.

Table 5-3: Option 2 advantages and disadvantages

Advantages	Disadvantages
Compliant with MIS05 and AS 1428.1	Impact to Icon Water assets
Accessible path	Substantial earthworks required
Improved rider comfort	
Improved safety outcomes for path users	

5.2.4 Option 3 – Southern Alignment, conforming to existing ground and vertical alignment

OPTION DESCRIPTION

Option 3 has been positioned to formalise the existing dirt track between the earth mounds and Kambah residencies south of Sulwood Drive carriageway. The vertical alignment of option 3 provides a ground conforming design following the alignment of the existing dirt track. It is noted this option will require substantially less earth works, however will also have longitudinal grades above those stipulated in the Australian Standards AS 1428.1, MIS05 and the Design Criteria. This would reduce accessibility to the path as it would make it very difficult for disabled and young/ old users. The risk of the shared user path impacting the ICON Water asset as the existing cover will be largely unchanged.

OPTION RATIONALE

This option will provide lower costs due to the reduced earth works required, and a more comfortable ride to cyclists with the omission on the stepped landings. However, the steep grades could make it inaccessible, and a risk to user safety.

Table 5-4: Option 3 advantages and disadvantages

Advantages	Disadvantages
Reduced Earthworks required	Impact to Icon Water assets
Smoother ride, however steeper grades	Non-compliant with AS 1428.1 and MIS05
	Impacts to accessibility due to steep grades, may prevent some users
	Safety issues due to steep grades

5.2.5 Option 4 – Northern alignment, conforming to existing ground and vertical alignment

OPTION DESCRIPTION

Option 4 refers to the 2D alignment developed during a previous feasibility study undertaken by R. D Gossip and provided to SMEC by ACT Government. The shared user path lies in the northern verge of Sulwood Drive for most of the length of the proposed shared user path. The SUP crosses Sulwood Drive twice; to the west of Mannheim Street intersection, to avoid the existing Mt Taylor carpark. The SUP then travels along the southern verge of Sulwood Drive, crossing Mannheim Street, then crossing back to the northern verge of Sulwood Drive to the east of Mannheim Street intersection. The SUP ties into the existing path network at Athllon Drive and Drakeford Drive.

Following the northern verge, the SUP also must cross both Colquhoun Street intersections.

This option also ties into the existing path network, including into the pedestrian underpass of Sulwood Drive between the two Colquhoun Street intersections. There is also the provision of two additional uncontrolled crossings of Sulwood Drive at Livingston Avenue and Inkster Street with pedestrian refuges.

The vertical alignment of this option exceeds the 5% maximum vertical grade stipulated with a maximum vertical grade of 6.75% for 56 m, approximately 250 m west of the Sulwood Drive/ Livingston Avenue intersection. Another area the 5% vertical grade is exceeded, with a maximum grade of 5.5% for 405 m approximately 475 m east of Drakeford Drive/ Sulwood Drive intersection.

OPTION RATIONALE

This option could provide improved views, greater passive surveillance for path users and provides direct access to the Mt Taylor walking trail. Clear zones, and possible barriers need to be considered to ensure safety of path users from vehicles travelling 80 km/hr on Sulwood Drive.

SMEC have investigated the possibility of the SUP passing on the north of the existing carpark. This requires substantial cut within the road reserve boundary, in an environmentally sensitive area. It may also impact the significant drainage channel within the area. Further implications of this options are explored in section 5.8.7. This option keeps path users on the northern side of Sulwood Drive for the entire length of the SUP and avoids possible conflict of crossing Sulwood Drive and provides a safer route than path user passing through the existing carpark.

Table 5-5: Option 4 advantages and disadvantages

Advantages	Disadvantages
Improved connected for through movement, with no road crossings for A to B users.	Impact to HV Evo Energy underground cables
Grade conforming resulting in smoother ride, however steeper grades	Non-compliant with AS 1428.1 and MIS05
	Greater number of uncontrolled road crossing for residential users
	Impacts to accessibility due to steep grades, may prevent some users
	Safety issues due to steep grades
	Possible environmental impacts to Mt Taylor Reserve

5.3 Treatment at Intersections

Following the development of the alignments another issue was raised, all the proposed alignments intersected side roads. As such, the safety of shared user path users may be compromised. To address this, several intersection treatments have been considered during this options development stage for Livingston Avenue, Inkster Street, Mannheim Street and Colquhoun Street. The following three options are outlined with their associated benefits. The costs are outlined as an extra over in section 5.7:

5.3.1 Chicane with bollards

The bollards act as a visual indicator to path users to identify that an intersection is approaching. This treatment will not physically reduce speed, however, will alert the cyclist or pedestrian to the approaching intersection, to encourage a speed reduction. Refer to Figure 5-1 for proposed bollard treatment.

Given the requirement for emergency fire vehicles to be able to access this path, the central bollard may be able to be lockage to ensure authorised vehicle entry.



Figure 5-1: Bollard treatment at intersections

(Austroads Guide to Road Design Part 6A, 2017, Source Queensland Department of Transport and Main Roads (n.d.)).

The chicane produces a bend in the shared user path that path users must navigate and persuades a speed reduction prior to the intersection.

This intersection treatment has been applied to the above three SUP options and is reflected in the cost estimates detailed below in Section 5.7 .

This option provides visible identification of the intersection; however, it will be the responsibility of the path user to slow down and/or stop at the intersection to avoid conflict with vehicles. It is not deemed to safest option.

5.3.2 Raised Zebra Crossing

A raised Zebra Crossing with associated signage, as detailed in the ACT Standards Drawing ACTSD-3531 ensure vehicles are aware of cyclist and pedestrian crossings these side roads.

The raised pavement platform ensures a physical obstacle to reduce vehicle speed providing a safe crossing environment for path users. The addition of a 'STOP' line for vehicles turning left from Sulwood Drive onto the side streets forces motorists to stop and observe the roadside environment with the intent that this will improve the opportunity for motorists to observe cyclists approaching the crossing.

The cost of this intersection treatment has been detailed in an extra over cost for the SUP options in Section 5.7 below.

5.3.3 Signalisation

Signalising the intersections is considered the safest treatment to move cyclists and pedestrians over roads. Signals direct the movement of traffic across the intersection, minimising the risk of conflict. Signalisation comes at an expense and is often only considered when there is sufficient demand to warrant the expense of installation and associated running costs.

The cost of installation of signals has been detailed as an extra over cost for the SUP options detailed in Section 5.7.

5.4 Drainage

There is stormwater drainage infrastructure along the existing goat access track. From a desktop review, most of the stormwater runoff is via concrete lined inverts through the cut throughs to the residential roads south of Sulwood Drive into the stormwater network. There is a 250 m length of stone lined open channel toward Drakeford Drive. The proposed SUP encroaches this channel, and it is proposed this channel will be shifted to allow for the proposed SUP. The catchment areas are primarily between the existing path and the top of the earth mounds, preventing runoff into the adjoining properties.

SMEC propose to tie into the existing stormwater infrastructure where possible and provide new the existing culverts where required to ensure they are at the correct level to the SUP. Headwalls with rock protection at entry and exit, with 375 mm diameter pipe are proposed where existing underground infrastructure is to be made new. Drain modelling was used to generate the 'worst case scenario' on the largest catchment for a 2-year flood event. A 375 mm diameter pipe for stormwater was calculated to be enough for the runoff, in compliance with MIS08.

Further investigations will be required at PSP design, once the preferred option has been approved and detailed survey of the area is undertaken to ascertain the stormwater infrastructure RLs and how they match up to the proposed SUP.

5.5 Landscaping

EnviroLinks Design have provided a tree assessment report of the Mt Taylor project site, including the southern alignment of the shared user path, intersection, and carpark sites. The following is a summary of their findings. The full Tree Assessment had been appended in Appendix G.

Most trees within the project site are on unleased territory land and require approval for removal or tree damaging activities. There are no registered trees within the project site area. The trees consist primarily of native planted trees along the road corridor, there are a limited number of remanent trees, self-seeded natives, and a selection of planted exotic tree species.

The assessment identified:

- high quality tree group
- 3 high quality trees
- 21 medium quality tree groups
- 3 medium quality individual trees

- 2 poor quality tree groups: and
- 2 poor quality trees.

The three high quality trees and the majority of the medium quality trees identified are within the vicinity of the southern SUP (horizontal alignment of Option 1-3), providing significant visual amenity value to the area, and one tree noted to be a significant landscape marker. It has been noted that the majority of the groups of medium quality trees had been planted for informal road screening, and that the effect of the group would not be significantly impacted by selected tree removals.

The shared user path will require substantial areas of cut within the road reserve area, the batters are proposed to be grassed to minimise erosion. SMEC propose to restore areas as per MIS06.

5.6 Streetlighting

Acor Rudds have reviewed the shared user path options and provided the following comments.

Lighting Category

- Footpath to be category PP5 to AS/NZS 1158.3.1. TCCS confirmation required as part of detailed design.
- Where possible, existing street lighting will be retained and reused at pedestrian crossing areas. Where this is not possible, category PX1 will be used on V category roads in accordance to AS/NZS 1158.4.

Design Considerations

- Option 1, 2 & 3 have the same horizontal footpath alignment and will have the same lighting requirements.
- Columns locations will require further review as part of detailed design to limit obtrusive light into neighbouring properties due to close proximity.

5.7 Order of Cost Estimate

5.7.1 Basis of Estimate

An opinion of the order of cost to deliver the Mt Taylor Shared User Path options have been developed based on proposed design solution detailed in the options drawings contained in Appendix A. The estimate is preliminary in nature based on high level option concepts sketches of key infrastructure components associated with the proposed alignments. It therefore should be used as an indicative guide of potential project costs only. Furthermore, it should be noted that the purpose of the order of cost estimate is for comparison between options, and as such the estimate methodology has ensured that consistent assumptions have been made across options.

5.7.2 Contingency

A 50% contingency has been made for unknowns that may occur during construction due to latent conditions or issues with the documentation. This contingency is based on deterministic methods.

5.7.3 Summary of Estimate

A summary of the order of cost estimates (2021 dollars) for each of the considered options is contained in Table 5-6:.

Table 5-6: Options assessment order of cost estimate (\$January 2021)

Mt Taylor Shared User Path Option	\$ (Excl. GST)
Option 1 – Max 7% grade with 1.2 m landings every 9 m for grades >5%	██████████
Option 2 – Maximum grade 5%	██████████
Option 3 – Ground conforming	██████████
Option 4 – Northern alignment, ground conforming * ¹	██████████
Extra Over – Raised Zebra Crossing (3 intersections - Inkster St, Mannheim St, Livingston Ave)	██████████
Extra Over – Signalised Intersections (3 intersections - Inkster St, Mannheim St, Livingston Ave)	██████████

*¹ Earthworks for option 4 was assumed to be similar to option 3. Option 4 costs are based off a 2D alignment and will be subject to change if taken forward as the preferred option.

5.7.4 Estimate Assumptions

The assumptions made during the development of the order of cost estimate are detailed below.

5.7.5 Estimate Inclusions

The order of cost estimate for each of the project options includes:

- Site clearance
- Bulk earthworks
- Stormwater drainage
- Incidental works including fencing, gates, and the like.
- Road works including subgrade preparation, subbase, and base course.
- Shared user Path
- Line and pavement marking
- Road & Shared Path signage
- Signalised intersection works provided as an indicative extra over cost.
- Street lighting for Shared user path
- Preliminaries (5%)
- Design, procurement, and Management Fees (15%)
- Contingency (50%)

5.7.6 Estimate Exclusions

The order of cost estimate for each of the project options excludes the following items:

- Escalation beyond estimate date
- New In-ground services
- Diversion / Relocation of existing services
- Demolition of existing services
- Earth works associated with tying into the existing path network at Athllon Drive, Design is to tie into the Proposed Athllon Drive PSP design provided by IDPG/TCCS. No 3D design received.
- Reinstatement of noise walls/earth mounds
- Landscaping including drainage on batters of SUP.

- Road furniture such as barriers and the like
- Any retaining walls that may be deemed applicable.

5.8 Multi Criteria Analysis – Shared user path

5.8.1 MCA Criteria

5.8.1.1 Evaluation Criteria

Four criteria were considered throughout the MCA process and the some of the key considerations associated with each of the criteria are outlined in Table 5-7.

Table 5-7: MCA evaluation criteria

Criteria	Considerations
Road User Safety	<ul style="list-style-type: none"> • Road geometry • CPTED • Interaction with vehicles (intersections) • Proximity to Sulwood Drive
Operation	<ul style="list-style-type: none"> • Ride comfort • Access to path / network integration • Accessibility • Amenity
Environmental and Residential Impacts	<ul style="list-style-type: none"> • Impact on nature reserve • Impacts on plantings / vegetation • Impacts on adjacent land providers • Noise impacts • Streetlighting and light spill
Utility Impacts	<ul style="list-style-type: none"> • Impact on existing utilities • Need for relocation/protection

5.8.1.2 Other Criteria

In addition to the above criteria, there are numerous other evaluation criteria that are relevant to the Mt Taylor shared user path options. These criteria include:

- Emergency services access
- Public Transport
- Contamination
- Noise impacts
- Local connectivity to existing path network
- Drainage

5.8.2 Weightings

Prior to the workshop the project team discussed and developed proposed weightings to be adopted for the MCA assessment criteria. These weightings were distributed to the client, and MCA stakeholders for discussion ahead of the workshop. No comments were received on the proposed criteria or weightings and as such they were adopted in the MCA. A Sensitivity Analysis was conducted on the outputs, to ensure a robust score was provided. Table 5-8: outlines the criteria and weighting applied to this MCA process.

Table 5-8: MCA Weightings

Criteria	Weighting
User Safety	35 %
Operation	35 %
Environmental and Residential Impacts	20 %
Utility Impacts	10 %

5.8.3 Options Scoring of Criteria

Each option was then scored on a 1 to 5 scale to rank them from a very poor performing option (1) to a moderate performing option (3) to an option that performs very well (5) against each of the key criteria based on discussion by attendees at the MCA workshop. A score of 3 was targeted as the median score for each criterion to ensure that none was assigned an inflated or understated value in the MCA process. Total scores of each option for a given criteria have been calculated as the product of the score and weighting (i.e. Score x Weighting) and documented in the following section to the nearest 0.1 of a point.

Attendees in the MCA workshop provided feedback on Option 1, 2, 3 and 4, the resultant scoring is presented below. The scoring yielded very close outcomes between options 2 and 4. The MCA workshop identified areas within options 2 and 4 which could be improved to ultimately design an additional option which would score higher against the MCA criteria. Feedback from attendees during the workshop recommended the assessment of a purely northern option as part of the study, which has subsequently been investigated and detailed further in Section 5.8.6. An option to provide the SUP along the southern side of Sulwood Drive on the roadside of the noise mound has also been developed and is discussed further in section 5.8.6.

5.8.3.1 User Safety

The discussion on user safety centered around likely accident rates, and accessibility requirements for different elements such as geometry, interaction with vehicles, crime prevention through environmental design (CPTED), and overall proximity to Sulwood Drive. Options 1-3 have the same horizontal alignment, with impacts of the vertical grades being discussed. Option 4 being mainly in the northern verge was discussed, namely in regard to the number of crossings of Sulwood Drive being required to link into the existing path network, and the two crossings of Sulwood Drive, being unlikely to be conformed with to avoid the existing carpark.

Option 3 scored least favorably in regard to safety as grades up to 14% impacted the safe operation of the path. Option 4 score was also impacted by the possibility of uncompliant vertical grades making the path inaccessible and unsafe for path users. The proximity and increased number of road crossings (especially Sulwood Drive being 80km/hr.) reduced the score of option 4. The scoring for the user safety criteria is provided in Table 5-9:.

Table 5-9: User Safety Scores

	Option 1	Option 2	Option 3	Option 4
Score	3	4	2	3
Weight	35 %			
Total	1.1	1.4	0.7	1.1

5.8.3.2 Operation

Key considerations on the operation criteria included rider comfort, with option 2 being clearly most preferable, and option 3 and 4 performing the poorest. Options 1, 2 and 3 were all similar given the same horizontal alignment, and performed better than option 4, in regard to access to the path network. In terms of accessibility in an operational sense, option 2 was identified as best, given the compliance to MIS standards. Discussion around the purpose of the shared user path was undertaken in the workshop, with clarity required on if the shared user path was primarily intended to integrate with the local residential areas and existing path networks, or be a connector path.

The landings in Option 1 were considered likely to impact rider comfort and flagged as difficult to construct. The scoring for the operation criteria is provided in Table 5-10:.

Table 5-10: Operation Scores

	Option 1	Option 2	Option 3	Option 4
Score	3	4	2	3
Weight	35 %			
Total	1.1	1.4	0.7	1.1

5.8.3.3 Environmental and Residential impacts

The discussion on environmental impacts centred around impact to the Mt Taylor nature reserve, including Box Gum Woodland and plantings within the road reserve boundary. All options provided are within the road reserve boundary, with all options having minimal impact to the environment.

Residential impacts were greater for options 1, 2 and 3, with the horizontal alignment of these options being close the property boundaries along the southern verge of Sulwood Drive. It was discussed that there could be resistance from residents for this horizontal alignment, and if the path was lit, light spill could be an issue.

The scoring for the Environmental and residential impact criteria is provided in Table 5-11:.

Table 5-11: Environmental and Residential Impact Scores

	Option 1	Option 2	Option 3	Option 4
Score	3	2	3	4.5
Weight	20 %			
Total	0.6	0.4	0.6	0.9

5.8.3.4 Utility Impacts

The 900 mm bulk water main in close proximity to the horizontal alignment of option 1, 2 and 3 was identified as a critical constraint, with the location of this main critical to the progression of these options, or potential redesign required. Relocation of the bulk supply main was considered not an option. Possible protection for options 1 and 2 could be considered, however with the extent of cut required for option 2, redesign may be required around the park area.

The HV underground cables were also identified as a constraint in the [REDACTED], impacting Option 4.

The scoring for the Utility Impacts criteria is provided in Table 5-12:.

Table 5-12: Utility Impacts Scores

	Option 1	Option 2	Option 3	Option 4
Score	2	2	4	3
Weight	10 %			
Total	0.2	0.2	0.4	0.3

5.8.4 Overall Option Scoring

The scoring for each of the criteria described above was combined to give an overall weighted score for each Option. The overall scoring indicated a notionally tied result during the workshop between Option 2 and Option 4. Option 2 scored marginally better (3.4) than Option 4 (3.3). Options 1 and 3 scored worse than these two options and can be removed from consideration. The overall scoring from the workshop is provided in Table 5-13:.

Table 5-13: Overall MCA scores

Weighting	Option 1	Option 2	Option 3	Option 4
Aggregate Score	2.9	3.4	2.4	3.3

5.8.5 Sensitivity Analysis

A sensitivity analysis was undertaken to assess the impact of varying the weightings for each category ranking. The weighting of each criteria was revised by $\pm 10\%$ to determine if variability in the weightings would impact on the resultant preferred option. Results of this analysis are documented in Table 5-14:. In all scenarios Option 2 performed marginally better than Option 4, with Option 1 and 3 consistently the worst performing options.

Table 5-14: Sensitivity analysis outcomes

SUP				
Sensitivity Scenario	Option 1	Option 2	Option 3	Option 4
User safety up 10%	2.9	3.5	2.3	3.3
User safety down 10%	2.9	3.3	2.5	3.3
Operation up 10%	2.9	3.5	2.3	3.3
Operation down 10%	2.9	3.3	2.5	3.3
Enviro & residential up 10%	2.9	3.3	2.4	3.5
Enviro & residential down 10%	2.9	3.5	2.4	3.1
Utilities down 10%	2.8	3.3	2.6	3.3
Utilities up 10%	2.9	3.5	2.4	3.1

5.8.6 Additional investigations following MCA

During the MCA, the participants raised several issues with the options presented primarily related to the safety of the SUP users. These issues related to:

- As part of Option 4 (northern alignment) pedestrians/ cyclists are required to cross Sulwood Drive to avoid impacts on the existing Mount Taylor carpark. Given the high-speed environment of Sulwood Drive, the requirement for pedestrians to cross the road will introduce a significant safety risk to the project
- The positioning of southern alignment (option 1-3) limits the potential of passive surveillance of pedestrians increasing safety risks along the alignment.

Given these concerns two additional options were developed to address these concerns. These options are detailed below.

5.8.6.1 Option 5 – Southern alignment on the roadside of the noise mounds, matching existing vertical alignment

In response to the deficiencies raised by the MCA participants regarding the alignment of Options 1-3, an additional option was developed to address these concerns, namely addressing the CPTED and utility conflict issues. This option has developed the shared user path on the gravelled area between the western travel lane of Sulwood Drive and earth mounds to the south of Sulwood Drive. Some of the key points of this option include:

- Less significant impact to utilities, namely Icon Water's bulk water main.
- earthworks requirements are more balanced than other options
- Improved CPTED outcomes
- Will require a barrier between the SUP and Sulwood Drive in sections in areas where there is insufficient space for clear zone.
- The vertical grades were modelled to match the existing vertical alignment. This results in two areas that the vertical grades exceed the 5% maximum stipulated in the design criteria. The maximum vertical grade experienced on this option is 6.75%

- Alignment crosses Livingston Avenue, Inkster Street and Mannheim Street. The crossings of these side roads will need to be further investigated
- Links to the existing path network need to be further considered. This may involve extending cut throughs, through the noise mounds to provide access to the surrounding residential areas.
- Requirements for shared user path to provide for fire service vehicles is eliminated.

This option has been developed to an early feasibility standard to identify if the option is possible and identify major constraints that may have precluded the option.

OPTION DESCRIPTION

Option 5 is positioned on the southern side of Sulwood Drive, on the roadside of the noise mound, for the majority of the SUP length. The section between Drakeford Drive and the underpass of Sulwood Drive (between the Colquhoun Street intersections) will follow the property boundary to minimise impact to the existing stormwater drainage channel. The SUP will cut through the noise mound near the underpass and remain on the southern side of Sulwood Drive on the roadside of the noise mound for the extent of the path.

Refuge islands will be provided on Livingston Avenue and Inkster Street to provide a two-stage crossing for vulnerable path users, as well as provide a visual reminder to vehicles of the path crossing. Path users will cross Mannheim Street at the proposed signalised intersection.

OPTION RATIONALE

This option significantly reduces the risk of conflict with the Icon Water bulk water main, which was identified during the MCA as a hard constraint. It was also established that duplication of Sulwood Drive is not planned in the 20+ year forecast, opening the potential for this option. For this to be a viable option, a safety barrier between the SUP and Sulwood Drive would be required where the clear zone is insufficient to ensure the safety of path users from vehicles travelling 80 km/hr on Sulwood Drive.

Table 5-15: Option 5 advantages and disadvantages

Advantages	Disadvantages
Reduced Earthworks required	Safety barriers along SUP required where clear zone is insufficient
Minimal impact to Icon Water assets	Safety issues due to steep grades
Greater CEPTED performance	Impacts to accessibility due to steep grades, may prevent some users

OPINION OF COST ESTIMATE

An opinion of the order of costs was developed for this option using the methodology stipulated in Section 5.7. The summary of the cost estimate (2021 dollars) is presented in Table 5-16.

Table 5-16: Order of cost estimate - Option 5 (\$ January 2021)

Mt Taylor Shared User Path Option	\$ (Excl. GST)
Option 5 – Southern alignment on roadside of noise mound	██████████

5.8.6.2 Option 4A - northern alignment, removing crossing of Sulwood Drive

The MCA workshop also identified the need to explore a northern alignment that would remove the pedestrian crossings of Sulwood Drive, as R.D Gossips 2D alignment brought the SUP to the south of Sulwood Drive to avoid the existing carpark. After the MCA it was investigated if the SUP could be placed between the existing carpark and Mt Taylor Nature Reserve refer to Figure 5-2 or Appendix A3. This removes the multiple road crossings which detracted from RD Gossip option 4 in the MCA scoring.

Figure 5-2 demonstrates the extent of earthworks required in environmentally sensitive Box Gum Grassy Woodland to construct this path. The earthworks may impact an existing major stormwater channel, and further investigation as to

the impact, and potential redesign requires further investigations. It must be noted that to accommodate the major stormwater drainage channel, works may impact beyond the road reserve boundary into the Mt Taylor Reserve.

Allowing the shared user path to continue past the carpark also poses potential safety issues. If the path users are encouraged to continue along the travel lane of the existing carpark, there is a potential of crashes between users and vehicles entering/ exiting parking spaces. If the path continues behind the existing carpark there is the potential for collisions between pedestrians entering the Mt Taylor Reserve walking trail from the car park and cyclists using the shared user path.

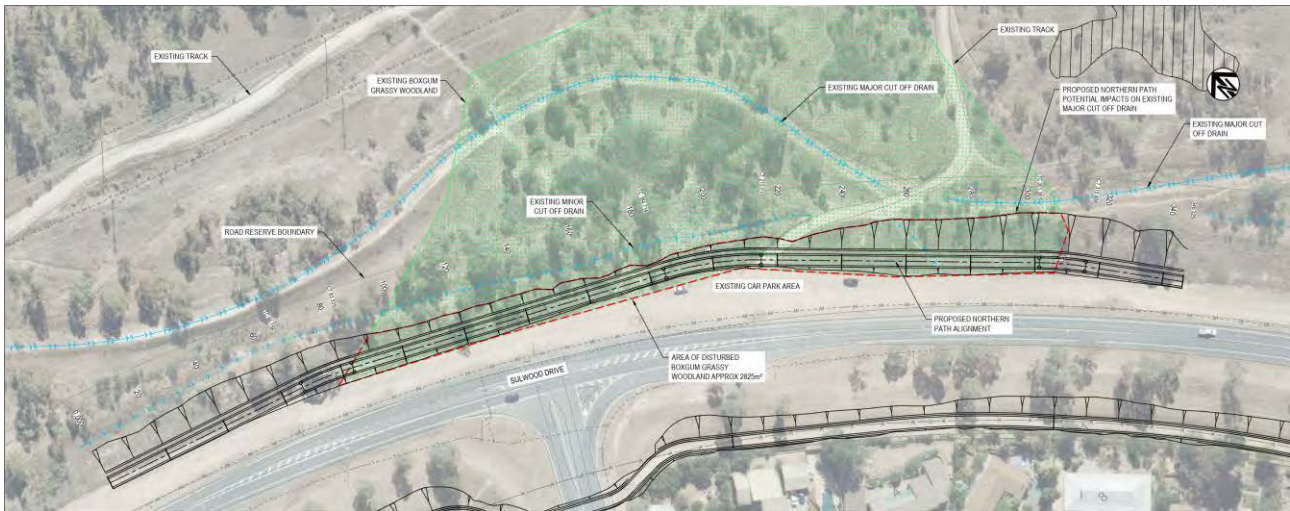


Figure 5-2: Northern path alignment

Planning and environmental impacts

From an approval's perspective, works within the Mount Taylor Nature Reserve would require consideration by the NCA under a Works Application. Even if the northern SUP can be contained to the road reserve, it is likely that construction would impact areas of ecologically sensitive communities which may trigger further assessment and/or impact assessment, in consultation with the ACT Conservator of Flora and Fauna and/or under the Commonwealth EPBC Act.

The northern alignment of the SUP intersects areas that are identified by SMEC through a desktop assessment (ACTMapi) and brief ground truthing exercise as potentially containing threatened woodland directly opposite Mannheim Street. Additional works may also be required to reconfigure drainage within Mount Taylor to accommodate the northern alignment of the SUP, however, have not been considered in this advice.

On the western side of Mount Taylor on the corner of Colquhoun Street, the northern alignment of the SUP traverses through a reasonably constrained area which appears to consist of high-quality native vegetation, including several large hollow bearing trees, with several orchid species. In this location, the EPBC Act and NC Act protected Grassy Box Gum Woodland Threatened Ecological Community (TEC) likely extends beyond the existing ACTmapi polygon further into the road reserve.

Further ecological assessment would be needed to confirm the presence of EPBC Act and ACT Nature Conservation Act listed threatened ecological community Whit box-yellow box – Blakely's red gum grassy woodlands and derived native grasslands (Box Gum Woodland) within the alignment of the northern SUP. The removal of the EPBC and NC Act Threatened Ecological Community may require the referral of the project to the Commonwealth Department of Agriculture, Water and the Environment as a controlled action under the EPBC Act, and/or trigger assessment under Schedule 4 of the Planning and Development Act 2007 (i.e. EIS in the Impact Track or request for an Environmental Significance Opinion), or if within a Designated Area, consideration by the National Capital Authority.

From an environmental constraints' perspective, the preferred option is that which avoids impacts on ecologically sensitive areas. As the southern SUP option does not impact any areas of threatened ecological communities, this would be preferred.

SMEC highly recommends against putting the SUP through the existing carpark due to potential conflict with light poles, stormwater pits and vehicles.

OPTION DESCRIPTION

This option follows the alignment of option 4, however instead of crossing to the southern side of Sulwood Drive at Mannheim Street to avoid the carpark, this option provides a path on the Mt Taylor (north) side of the existing carpark. This requires substantial cut within the road reserve boundary, in an environmentally sensitive area. It may also impact the significant drainage channel within the area. Further implications of this options are explored in section 5.8.7. This option keeps path users on the northern side of Sulwood Drive for the entire length of the SUP and avoids possible conflict of crossing Sulwood Drive and provides a safer route than path user passing through the existing carpark.

Table 5-17: Option 6 - Advantages and disadvantages

Advantages	Disadvantages
Avoids crossing of Sulwood Drive	Substantial cut within the road reserve boundary
Smoother ride, however steeper grades	Non-compliant with AS 1428.1 and MIS05, with safety implications
	Impacts to accessibility due to steep grades, may prevent some users
	Environmental impacts to environmentally sensitive areas
	Greater number of uncontrolled road crossing for residential users
	Impact to HV Evo Energy underground cables

OPINION OF COST ESTIMATE

An opinion of the order of costs was developed for this option using the methodology stipulated in Section 5.7. The summary of the cost estimate (2021 dollars) is presented in Table 5-18.

Table 5-18: Order of cost estimate - Option 4A (\$ January 2021)

Mt Taylor Shared User Path Option	\$ (Excl. GST)
Option 4A – Northern alignment, Sulwood Drive crossings eliminated	██████████

5.8.7 Preferred Option

The MCA process did not identify a clear preferred option for the shared user path. However, the process did highlight two options (options 2 and 4) which were preferable compared to all options. The key area that option 4 (northern alignment, matching existing vertical grades) was deficient related to user safety. This was due to the need for the path to cross Sulwood Drive twice in the area of the Sulwood Drive/ Mannheim Street intersection due to the pinch point created by the Mt Taylor car park. During the MCA the need to investigate an alignment that remained in the northern verge eliminating the need to cross Sulwood Drive. Allowing the shared user path to continue along the travel lane of the existing carpark would cause a significant safety risk as vehicles will be entering and exiting parking spaces and may not be able to observe shared path users. This is particularly relevant for cyclist using the path as they will more than likely be travelling at a higher speed than pedestrians and will not be able to stop as quickly in emergency situations. The alternative is to align the shared path to the north of the existing car park, this may result in a safety risk between cyclists using the shared path and pedestrians entering the Mt Taylor walking trail, there is also a considerable impact on endangered ecological communities related to the Mt Taylor Nature reserve.

The key areas that detracted from options suggesting an alignment south of Sulwood Drive was the limited passive surveillance of its location leading to potential anti-social behaviour, potential utilities impacts, notably a large Icon Water asset that ran longitudinally under the proposed alignment and steep grades experienced along the route. To address these issues an option was investigated moving the alignment into the southern verge of Sulwood Drive. This option moved the works away from the ICON Water asset, increases the passive surveillance of the shared path users

as it can be observed by motorists using Sulwood Drive and the vertical grades are more reasonable, with a maximum grade of approximately 6.75% as opposed to the 10+%. The option will require the use of a safety barrier for the length of the alignment to ensure the safety of the shared path users, this will increase the costs associated with this option.

Given these additional investigations and issues raised during the MCA workshop, Option 5 - Southern side of Sulwood Drive between road and noise mound, matching existing vertical alignment would be the preferred option to be developed further in subsequent design stages. This is due to no impacts on endangered ecological communities, high level of passive surveillance of the path, connectivity to residents and provides for recreational cyclists of all levels. The safety barrier necessitated by the option will add to the costs of the shared path, however there is potential that a safety barrier would be required for Option 4 - Northern alignment, conforming to existing ground and vertical alignment given the width of the northern verge and the clear zone requirements for an 80 km/h road such as Sulwood Drive.

The intersection treatments for the side roads were not discussed during the MCA, however, were discussed with the ACT Government project team following submission of the draft Mount Taylor feasibility study. It was determined given the low pedestrian volumes currently and estimated traffic volumes of Inkster Street and Livingston Street pedestrian refuges would be used where the preferred option crosses these side roads. Given a signalised intersection is proposed at the Mannheim Street/ Sulwood Drive intersection, the SUP would connect into the signalised intersection.

6 Package 2 - Carpark Extension

6.1 Constraints

6.1.1 Environmental

The ground truthing exercise undertaken at Mount Taylor confirmed that the biodiversity values mapped in ACTmapi as occurring within the study area appear to be correct and that the boundaries of vegetation community types reflect the public mapping.

In terms of ecological constraints, the EPBC Act and NC Act protected Grassy Box Gum Woodland Threatened Ecological Community (TEC) is of most concern. This occurs in the area directly adjacent to the northern side of the existing car park site on Mount Taylor (Area 1) refer to Figure 6-1, and immediately adjacent to the north at Area 2, 3 and 4, Figure 6-2, Figure 6-3, and Figure 6-4 respectively. Additionally, EPBC and NC Act Endangered Small Purple Pea (*Swainsonia recta*) has been recorded within ~200 m from Areas 1 and 2 (Figure 6-1 and Figure 6-2 respectively). More careful boundary mapping (vegetation) and or habitat or specimen searches (of EPBC and NC Act listed Pink Tailed Worm Lizard, Golden Sun Moth, Small Purple Pea, and hollow bearing trees) may need to be conducted to protect biodiversity values here if developments are to encroach.

The removal of the EPBC and NC Act Threatened Ecological Community may require the referral of the project to the Commonwealth Department of Agriculture, Water and the Environment as a controlled action under the EPBC Act, and/or trigger assessment under Schedule 4 of the Planning and Development Act 2007 (i.e. EIS in the Impact Track or request for an Environmental Significance Opinion) or if within a Designated Area, consideration by the National Capital Authority.

Any developments in Area 3 in Figure 6-3 would need to be careful not to impact on Pink Tailed Worm Lizard habitat as well as the Grassy Box Gum Woodland TEC.

The potential alternative (Area 4 - Figure 6-4) on the west side of Mount Taylor on the corner of Colquhoun Street is quite constrained and it appears to consist of high-quality native vegetation, including several large hollow bearing trees, with several orchid species sighted. The EPBC Act and NC Act protected Grassy Box Gum Woodland Threatened Ecological Community (TEC) likely extends beyond the existing ACTmapi polygon further into the road reserve.

Area 5 in Figure 6-5, on the southern side of Sulwood Drive, west of Mannheim Street, which is already cleared would have the least impact on biodiversity values.



Figure 6-1: Area 1 - Existing carpark - Mannheim Street



Figure 6-2: Area 2 - Livingston Avenue – Alternate location for additional parking capacity with good connectivity to the reserve



Figure 6-3: Area 3 - Inkster Street - Alternate location for additional parking capacity with some connectivity to the reserve



Figure 6-4: Area 4 - Colquhoun Street - Alternate location for additional parking capacity with some connectivity to the reserve



Figure 6-5: Area 5 - Southern side of Sulwood Drive, west of Mannheim Street – Alternate location for additional parking capacity

6.1.2 Pavement Design

Pavement profiles for full depth asphalt and typical carpark have been designed based on the following assumptions:

- AADT and %HV have been approximated based on traffic counts provided. AADT and %HV will need to be provided at a later stage for verification. Should a significant difference be encountered, a pavement redesign will be necessary.
- An insitu subgrade CBR value of 3% was adopted, to be confirmed by the future geotechnical investigation. Again, should a significant difference be encountered, a pavement redesign will be necessary.
- A full depth asphalt (FDA) alternative (PT-1A) for the intersection was provided assuming new construction from subgrade level upwards. This is the reason why UZF/SMZ layers were incorporated in the pavement design. This represents a conservative approach, considering deflection and layer moduli back-calculated values are not available at this stage. Once deflection testing data becomes available, the suitability of the existing pavement materials will be evaluated and incorporated into the pavement design as required.
- A high early strength lean mix concrete (HES LMC) alternative (PT-1B) was included in case an expedited pavement is required for traffic accommodation during construction. The need for this pavement will be reassessed after construction staging is finalised.
- A typical carpark pavement (PT-2) has been used for the purpose of developing the opinion of costs.

6.1.3 Adjacent Land Use

Possible duplication of Sulwood Drive (to the South) in the future (20+ years) has been considered during the development of options. This has the possibility of impacting proposed carpark extension on the South of Sulwood Drive.

SMEC design options remain within the road reserve boundaries for all aspects of this package of the project. It is noted the ecological constraints within the road reserve boundary on the northern side of Sulwood Drive.

6.1.4 Drainage

The existing car park contains several inlet drainage pits. During the PSP stage it is proposed to retain the existing pits and pipes, while extended any further drainage infrastructure required. The drainage design will investigate the potential for grass swales. Additional carparking spaces and pavement are proposed over the existing compacted hard earth verges. Formalising these on the existing grade would not increase runoff considerably. Further investigation

would be required once detailed survey is received for the area to ensure proposed infrastructure can tie into existing if the project is to move forward in the PSP and DR design phases.

6.1.5 Utilities

Evo Energy

There are HV underground electricity cables that runs [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Further investigations on utility location would be required if the carpark extension at Colquhoun Street is taken forward to PSP and DR design. In principal agreement would be required at PSP stage, there is a HV electricity [REDACTED].

Initial consultation with Evoenergy has begun to identify any major impacts or conflicts with the existing infrastructure. Where proposed pavement crosses underground HV cables, this infrastructure will be located, and adequate cover and protection will be provided as per Evoenergy standard requirements.

Street Lighting

Existing street lighting poles are located at the road intersection along Sulwood Drive. The car park options will look to retain the existing lighting poles where possible, though minor adjustments may be required.

Telstra/NBN

There does not appear to be Telstra/NBN infrastructure with the option site extents. Confirmation to be sought at PSP stages.

Gas

There does not appear to be gas infrastructure with the option site extents. Confirmation to be sought at PSP stages.

Icon Sewer

There does not appear to be sewer infrastructure with the option site extents. Confirmation to be sought at PSP stages.

Icon Water

There is a 150 mm reticulation main in [REDACTED]. This is not anticipated to be affected by the carpark option developed on [REDACTED].

There is a 900 mm bulk supply water main [REDACTED]. This is not anticipated to impact Options 2 and 3 car parking options.

6.1.6 Other – Earth Mounds, Noise, Safety, CPTED

Streetlight will need to be considered for Option 1 – Colquhoun Street to minimise ‘unsocial’ behaviour that has been reported at this site.

Options 2 and 3 are close to Sulwood Drive and the intersection and may get spill over lighting from the road. Additional lighting may also be considered to minimise the ‘unsocial’ behaviour reported in the area.

The options 2 and 3 provided for additional parking utilises mainly already trafficked areas of the road reserve and does not encroach on the earth mounds or into environmentally sensitive areas.

6.1.7 Geotechnical

A typical pavement profile for the carpark has been proposed for this stage of project. Geotechnical investigations have been undertaken in the location of the Sulwood Drive and Mannheim Street to understand subsoil conditions. This information is intended to be used during the PSP and DR development of the access improvement package. Given the majority of car park expansion options are geographically located in the area surrounding the Mannheim Street/ Sulwood Drive intersection, it is believed the information gathered from these investigations could be used for the car park expansion. One of the options developed is in a different geographical location and would require additional investigations. The geotechnical report detailing the findings of the investigations is provided in Appendix H.

6.2 Carpark Survey Counts

Survey counts of the existing carpark occupancy showed at peak AM and peak PM weekday timing, the carpark reached a maximum of 51% capacity. On the weekend, this was reduced to a maximum of 31% capacity. Observation of the site during the project data collection period also noted that the carpark capacity was not fully utilised nor overflowing. A potential explanation for this is COVID19 pandemic may have affected usage of the site or have changed the peak usage time as many users may be working from home.

Imagery seen from Google Earth (27th April 2019) show the carpark is near capacity, however this is not mimicked in imagery in ACTmapi or Metromap.

6.3 Options Development

6.3.1 Design Development

The existing carpark at Mt Taylor adjacent to Mannheim Street has 53 car parking spaces. The project brief requests additional carparking capacity within the vicinity of this walking trail. The initial design philosophy for the additional facilities was to investigate expansion of the existing car park and to investigate the possibility of providing a second parking facility and access to Mt Taylor in an attempt distribute users throughout the reserve. As such, several areas were identified as potential carpark sites, and these have been outlined below:

- Area 1 – Existing carpark at Mannheim Street
- Area 2 – North of Sulwood Drive/ Livingston Avenue intersection
- Area 3 – North of Sulwood Drive/ Inkster Street intersection
- Area 4 – Colquhoun Street to access the walking trailing off Colquhoun Street
- Area 5 – Southern side of Sulwood Drive at Mannheim Street intersection

These areas are shown in Figure 6-6 below.

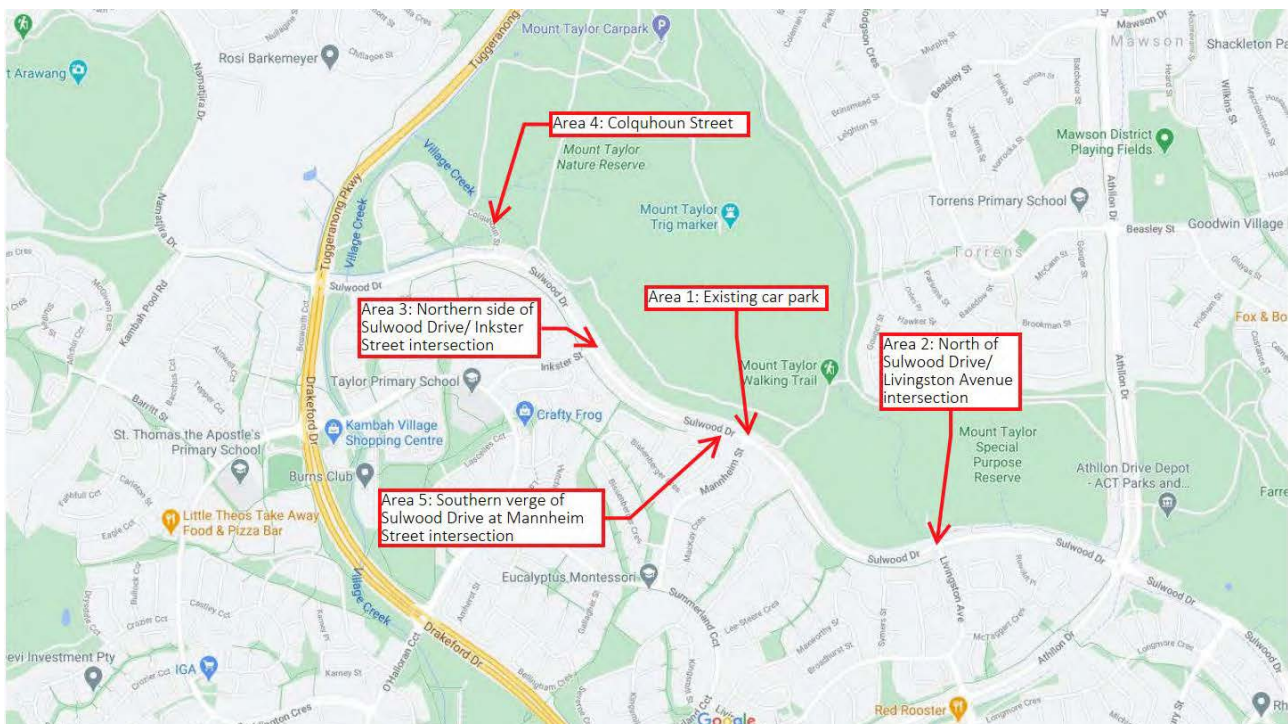


Figure 6-6: Areas investigated for additional car park facilities
(Source: Google Maps, 2021)

To understand usage patterns and viability of some of the areas identified above, park rangers responsible for the nature reserve were consulted. Areas 2 and 3; on the northern side of Sulwood Drive opposite Livingston Avenue and Inkster Street were not developed after the site visit and conversations with the Mt Taylor Park Rangers. These areas were bounded by environmental constraints, as well as not having access to a walking trail, and not in close enough

proximity to the walking trail that the Park Rangers highlighted as the preferred walking location due to the gradient and length providing a good cardiovascular workout.

The following options are considered viable options, and were developed for further consideration in the MCA workshop:

- Option 1 – Colquhoun Street
- Option 2 – South of Sulwood Drive
- Option 3 – Extension of existing carpark Northern side of Sulwood Drive

RELATED PROJECTS

Sulwood Drive Adjacent to Mannheim Street Verge Improvements - Construction Drawings

TCCS have provided the construction drawings for the 2018 Sulwood Drive Verge Improvements/Carpark upgrade at the existing carpark site. It is understood that no investigations were done for this project, however the construction drawings provide detail of what was constructed onsite. SMEC will endeavour to utilise the upgrades as much as possible in the design, whilst adhering to the projects objectives and scope of improving safety and increasing capacity at the carpark site.

Sulwood Drive Optional Improvements – Drawings, and Investigations for Minor New Works Projects – Report – R.D. Gossip Pty Ltd

TCCS provided drawings and draft report by R.D. Gossip investigating the possibility of creating:

- A turning lane for westbound traffic at the entry point to the car park
- A new car park facility on the southern verge of Sulwood Drive west of Mannheim Street
- Pedestrian crossing facilities on either, or both sides of Mannheim Street
- A path along Sulwood Drive between Drakeford Drive and Athllon Drive.

6.3.2 Option 1 – Colquhoun Street

OPTION DESCRIPTION

This option has been developed for access of Colquhoun Street (Area 4) approximately 1.35 km north west of the existing Mt Taylor carpark. The intention of the option was to formalise an existing access track and provide parking facilities to provide alternate location to enter the reserve. The layout of the proposed car park is reproduced in Figure 6-7. The option provides 57 new 90° parking bays with the facility being accessed off Colquhoun Street reducing the concentration and potentially reducing traffic demand on Sulwood Drive. The plans developed for this option are presented in Appendix B. This option has the potential to increase traffic along Colquhoun Street which may be met by some resistance from local residents. The option also requires the clearing of a large section of endangered ecological community for construction and operation. Discussions with park rangers suggest there is various anti-social behaviour and illegal dumping occurring in this area. There is potential providing a formal parking facility and streetlighting may act as a deterrent for anti-social behaviour.

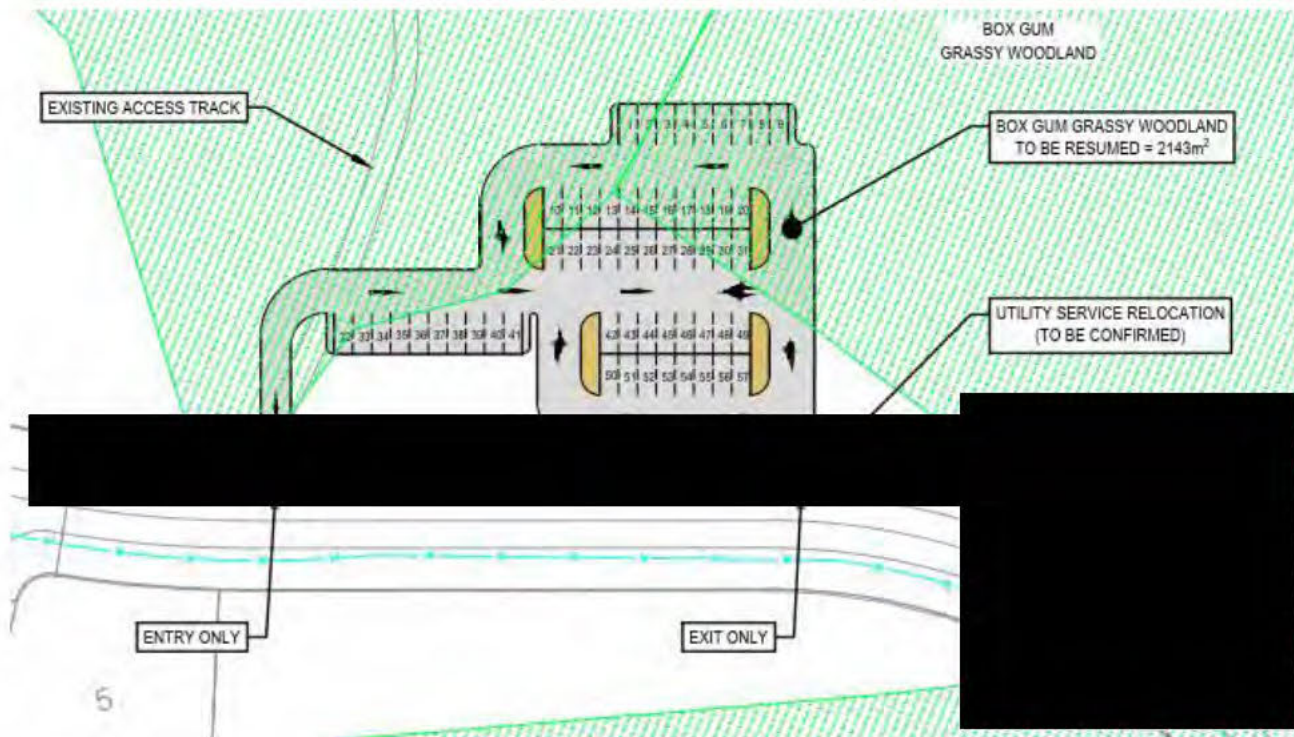


Figure 6-7: Option 1 - additional carparking off Colquhoun Street

OPTION RATIONALE

Points to note regarding Option 1:

- Advantageous as it distributes traffic along Sulwood Drive, providing access to a different aspect of Mt Taylor.
- There are two posted walking tracks accessible from this location. However anecdotal evidence from the Mt Taylor Rangers suggested these walking trails were not used as much given the gradient not being as favourable as the existing site to provide a cardiovascular workout.
- Access to proposed carpark at lower speeds.
- Existing dedicated right turn deceleration lane on Sulwood Drive onto Colquhoun Street.
- Most of the proposed carpark area is outside of the road reserve boundary and within the Nature Reserve. Further investigations would be required to determine impact to the Box Gum Grassy Woodland area that is impacted by the carpark.
- Does not link into the proposed shared user path or existing path network
- The Mt Taylor Rangers suggest this area is not as utilised area, illegal dumping site, anti-social activity and syringes have been found in the vicinity.
- Environmental constraints – the option encroaches on areas of Box Gum Grassy Woodland within the Nature Reserve.
- The carpark footprint lies outside of the road reserve and within the Nature Reserve.
- Resistance from surrounding residents due to potential congestion on small street
- Doesn't add accessible parking to existing car park, or provide additional parking within the existing car park site

6.3.3 Option 2 – South of Sulwood Drive and west of Mannheim Street

OPTION DESCRIPTION

This option has been developed adjacent to the westbound travel lane on Sulwood Drive (Area 5 – Southern side of Sulwood Drive at Mannheim Street intersection). The intention of the option was to primarily cater for westbound motorists on Sulwood Drive that are currently performing illegal right turn across Sulwood Drive. The option provides parking facilities on both sides of the roadway eliminating the need for motorists to undertake right turns across Sulwood Drive. Figure 6-8 shows the layout of the option.

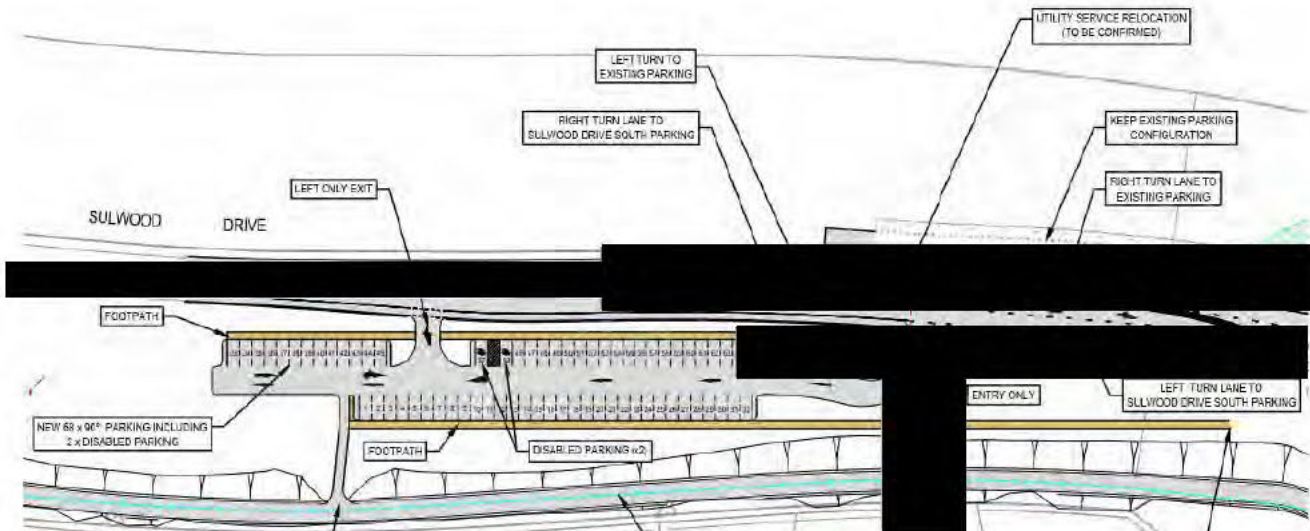


Figure 6-8: Option 2 Southern side of Sulwood Drive

Given the parking facility is on the southern side of Sulwood Drive the area is not constrained by ecological or planning restrictions. There are 68 new 90° parking bays including 2 accessible parking bays provided in this option. The existing carpark at Mt Taylor is retained, with the addition of an eastbound right turn lane for access to the existing carpark on Sulwood Drive and a westbound left turn lane to enter the new carpark. The egress provides options to turn left or right onto Sulwood Drive. Pedestrians that utilise this option will need to cross Sulwood Drive on foot to access the Mt Taylor walking trail.

OPTION RATIONALE

Points to note regarding Option 2:

- There will be increased risk of conflict between vehicles and pedestrians with more pedestrian attempting to cross Sulwood Drive. A safe option for crossing is provided as part of the intersection upgrade option, at Sulwood Drive - Mannheim Street intersection. This option provides access the proposed shared user path with a crossing of Sulwood Drive at Mannheim Street.
- Left only exit at the car park egress is provided as there was insufficient space for a two-part manoeuvre for vehicles turning right.
- If duplication of Sulwood Drive is to occur in the future all carparks on the Sulwood Drive side of the carpark would have to be removed (34 spaces including the accessible parking space) leaving 32 spaces.
- low impact on environmental constraints.
- Left deceleration lane into carpark ~55 m – non-compliant with AGRD Part4A; require a minimum of 70 m. this is unachievable due to the proximity to the Mannheim Street – Sulwood Drive intersection.
- Greater number of parking spaces available to be implemented
- Reduces need for westbound motorists to undertake right turn movements across Sulwood Drive.

6.3.4 Option 3 – Extension of Existing Carpark

OPTION DESCRIPTION

This option explores the extension of the existing carpark, providing additional carparking at a site that is currently under capacity. This option provides an additional 52 new 90° carparking bays by extending the existing carpark further west of the Sulwood Drive/ Mannheim Street intersection. It also involves the reconfiguration of 8 existing parallel parking bays and has the option to reconfigure 6 existing 90° carparking bays into 4 accessible parks closest to the Mt Taylor walking trail entrance. Dedicated left and right turn lanes are provided at the entrance of the carpark extension to allow for safe movements into the car park.

A pedestrian crossing across Sulwood Drive has been provided at the intersection for people using the proposed shared user path or the existing path network within the adjoining residential areas.

This option was not progressed as there was insufficient space for safe vehicle turning paths of at the entrance and egress of the carpark at Mannheim Street. There was also greater potential for conflict between vehicles given the two directions of traffic movement, at two different speeds.

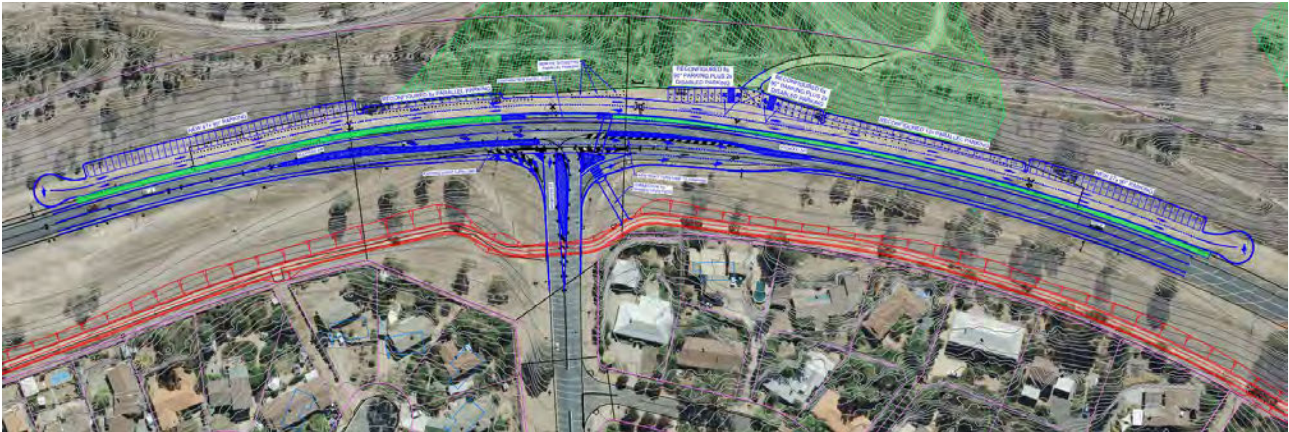


Figure 6-11: Option 5 – reconfiguration and extension to east and west with two-way access

6.5 Drainage

There is stormwater drainage infrastructure within the existing carpark and along the [REDACTED]. From a desktop review, Option 1 will drain into the existing stormwater culvert and pipe network on [REDACTED], along with the proposal for three additional culverts with 375 mm diameter pipes connecting to the existing network within the carpark area.

Options 2 and 3 will utilise the existing stormwater infrastructure, with open channel inverts into existing culverts, or via pipes into existing network. The catchment areas are primarily between the existing path and the top of the earth mounds both north and south of Sulwood Drive.

SMEC propose to tie into the existing stormwater infrastructure where possible and make new the existing culverts where required, including the potential to grate the existing culverts in the existing carpark which are currently bounded by bollards, to improve usability and safety.

Headwalls with rock protection at entry and exit, with 375 mm diameter pipe are proposed where open channels are to go underground. Drain modelling was used to generate the ‘worst case scenario’ on the largest catchment for a 2-year flood event. A 375 mm diameter pipe for stormwater was calculated to be enough for the runoff, in compliance with MIS08.

Further investigations will be required at PSP design, once the preferred option has been approved and detailed survey of the area is undertaken to ascertain the stormwater infrastructure RLs and how they match up to the proposed SUP.

6.6 Landscaping

EnviroLinks Design have provided a tree assessment report of the Mt Taylor project site, including the southern alignment of the shared user path, intersection and carpark sites. The following is a summary of their findings. The full Tree Assessment had been appended in Appendix G.

The majority of trees within the project site are on unleased territory land and require approval for removal or tree damaging activities. There are no registered trees within the project site area. The trees consist primarily of native planted trees along the road corridor, there are a limited number of remanent trees, self-seeded natives and a selection of planted exotic tree species.

The assessment identified:

- high quality tree group
- 3 high quality trees
- 21 medium quality tree groups

- 3 medium quality individual trees
- 2 poor quality tree groups: and
- 2 poor quality trees.

The high-quality tree group identified borders Option 1 Colquhoun Street, is a stand of Eucalyptus Melliodora. The trees are a mix of mature and over mature, noting the over mature trees have hollows and may provide good habitat value. The group also reads well in the landscape as a strong visual element.

Medium quality trees exist within the sites for Option 2 on the southern side of Sulwood Drive, and Option 3, extending the existing carpark. It has been noted that the majority of the groups of medium quality trees had been planted for informal road screening, and that the effect of the group would not be significantly impacted by selected tree removals.

There are minimal landscaping requirements within the sites for the options proposed for increasing the capacity of carparking at Sulwood Drive. SMEC propose to restore boundary areas as per MIS06.

6.7 Streetlighting

Acor Rudds have reviewed the shared user path options and provided the following comments.

Lighting Category:

- Carparks category PC2 to AS/NZS 1158.3.1. TCCS confirmation required as part of detailed design.
- Disabled car parks to be lit to category PCD to AS/NZS 1158.3.1 TCCS confirmation required as part of detailed design.

Design Considerations:

Option 1 - Colquhoun Street Parking:

- Addition of carpark lighting will not affect existing streetlighting on Colquhoun Street.
- New dedicated streetlighting required for the carpark.

Option 2 - Sulwood South Parking:

- Increase to overall carriageway width for a long section of Sulwood drive and new carpark will require some relocation of existing streetlighting infrastructure.
- Addition of carpark will require modifications to existing streetlighting on Sulwood Drive to accommodate turning lanes etc.
- New streetlighting will be required on Sulwood drive on the western side of the intersection.
- Footpath immediately adjacent the carpark will not require supplementary lighting. This section of footpath will be illuminated via the carpark lighting.
- 2 x disabled carparks will require 1 x dedicated lighting column.

Option 3 - Sulwood North Parking (West carpark):

- Increase to overall carriageway width for a long section of Sulwood drive and new carpark will require some relocation of existing streetlighting infrastructure.
- Addition of carpark will require modifications to existing streetlighting on Sulwood Drive to accommodate turning lanes etc.
- New streetlighting will be required on Sulwood drive on the western side of the intersection.
- Due to the narrow width of the new median between the road and the carpark, lighting cannot be installed in this location for safety reasons. As such, all lighting is located on the outer verges.

6.8 Order of Cost Estimate

6.8.1 Basis of Estimate

An opinion of the order of cost to deliver the Carpark extension options was been developed based on proposed design solution detailed in the options drawings contained in Appendix B. The estimate is preliminary in nature based on high level option concepts sketches of key infrastructure components associated with the proposed route alignments. It therefore should be used as an indicative guide of potential project costs only. Furthermore, it should

be noted that the purpose of the order of cost estimate is for comparison between options, and as such the estimate methodology has ensure that consistent assumptions have been made across options.

6.8.2 Contingency

A 50% contingency has been made for unknowns that may occur during construction due to latent conditions or issues with the documentation. This contingency is based on deterministic methods.

6.8.3 Summary of Estimate

A summary of the order of cost estimates (2021 dollars) for each of the considered options is contained in Table 6-1:

Table 6-1: Options assessment order of cost estimate (\$January 2021)

Project Option	\$ (Excl. GST)
Option 1 – Colquhoun Street	██████████
Option 2 – South of Sulwood Drive	██████████
Option 3 – Extend Existing	██████████

6.8.4 Estimate Assumptions

The assumptions made during the development of the order of cost estimate are detailed below.

Assume existing road and carpark pavement does not require rehabilitation.

6.8.5 Estimate Inclusions

The order of cost estimate for each of the project options includes:

- Site clearance
- Bulk earthworks
- Stormwater drainage
- Landscaping to verge including drainage
- Incidental works including fencing, gates, and the like
- Road works including subgrade preparation, subbase, and base course
- Pedestrian footpaths
- Road furniture such as crash barriers and the like
- Line and pavement marking
- Road signage
- Street lighting including conduits
- Preliminaries (5%)
- Design, procurement and Management Fees (15%)
- Contingency (50%)

6.8.6 Estimate Exclusions

The order of cost estimate for each of the project options excludes the following items:

- Escalation beyond estimate date
- New In-ground services
- Diversion / Relocation of existing services
- Demolition of existing services
- Any structural works if deemed necessary

6.9 Multi Criteria Analysis - Carpark

6.9.1 MCA Criteria

6.9.1.1 Evaluation Criteria

Four criteria were considered throughout the MCA process for the carpark, some of the key considerations associated with each of the criteria are outlined in Table 6-2.

Table 6-2: MCA evaluation criteria

Criteria	Considerations
User Safety	<ul style="list-style-type: none"> • Pedestrian movement in carpark • Pedestrian interaction with roads • Access/egress safety • CPTED • Antisocial behaviour and dumping • Proximity to Sulwood Drive
Operation	<ul style="list-style-type: none"> • Number of spaces • Access • Legibility • Ease of use
Mt Taylor Access	<ul style="list-style-type: none"> • Access point to Mt Taylor • Proximity to Mt Taylor entrance
Environmental and Residential Impacts	<ul style="list-style-type: none"> • Impact on nature reserve • Impacts on plantings / vegetation • Noise impacts • Land acquisition requirements • Impacts on adjacent land providers

6.9.1.2 Other Criteria

In addition to the above criteria, there are numerous other evaluation criteria that are relevant to the Mt Taylor carpark options. These criteria include:

- Streetlighting
- Public Transport
- Contamination
- Drainage and overland flow paths from Mt Taylor

Whilst these criteria are regarded as important considerations for the project, it was believed unlikely that there would be substantive differences between the options. As such these criteria were not incorporated into the MCA as they would contribute the identification of a preferred option and tend to dilute the strength of other criteria.

6.9.2 Weightings

Prior to the workshop the project team discussed and developed proposed weightings to be adopted for the MCA assessment criteria. These weightings were distributed to the client and MCA stakeholders for discussion ahead of the workshop. No comments were received on the proposed criteria or weightings and as such they were adopted in the MCA. A Sensitivity Analysis was conducted on the outputs to ensure a robust score was undertaken. Table 6-3: outlines the criteria and weighting applied to this MCA process for the carpark options.

Table 6-3: MCA Weightings

Criteria	Weighting
User Safety	25 %
Operation	25 %
Mt Taylor Access	30 %
Environmental and Residential Impacts	20 %

6.9.3 Options Scoring of Criteria

Each option was then scored on a 1 to 5 scale to rank them from a very poor performing option (1) to a moderate performing option (3) to an option that performs very well (5) against each of the key criteria based on discussion by attendees at the MCA workshop. A score of 3 was targeted as the median score for each criterion to ensure that none was assigned an inflated or understated value in the MCA process. Total scores of each option for a given criteria have been calculated as the product of the score and weighting (i.e. Score x Weighting) and documented in the following section to the nearest 0.1 of a point.

Attendees in the MCA workshop provided feedback on Option 1, 2, and 3, the resultant scoring is presented below. The scoring yielded a clear preferable option, this being option 3, to extend the existing carpark to the west.

6.9.3.1 User Safety

The discussion on user safety centered around likely safety implications for different elements such as:

- Pedestrian movements, and length of travel within the carpark,
- Pedestrian interaction with roads, such as option two requiring pedestrians to cross Sulwood Drive to access the Mt Taylor walking trail,
- Access and egress from the carpark,
- CPTED requirements,
- The carparks overall proximity to Sulwood Drive, geometry, interaction with vehicles,

It was considered that in option 1 pedestrians would have a relatively short length of travel to navigate the carpark. Similarly, option 2 had footpaths that pedestrians could access, limiting the potential conflict with vehicles. Option 3 had the greatest distance that pedestrians would need to travel through the carpark, coupled with having to travel through the existing carpark also to access the walking trail.

Option 2 was the only option where pedestrian would have to cross a road as they would be required to cross Sulwood Drive (80 km/hr.) which reduced the score. Access and egress of option 1 of Colquhoun street scored best, as Colquhoun Street is a lower speed road, with a lower volume of vehicles. It was discussed that the Colquhoun St – Sulwood Drive intersection would likely require upgrading if this option were taken forward. It was agreed with the client that the upgrade of this intersection be assumed for the analysis of this option.

In terms of CPTED, option 1 scored worse, given the low level of passive surveillance. Option 2 and 3 were notably better and scored similarly. Option 3 is the furthest from Sulwood Drive, so scored best, with option 2 being slightly better than option 1 in terms of proximity to Sulwood Drive. The scoring for the user safety criteria is provided in Table 6-4:

Table 6-4: User Safety Scores

	Option 1	Option 2	Option 3
Score	4	2	3
Weight	25 %		
Total	1.0	0.5	0.8

6.9.3.2 Operation

Operational discussion centred primarily around access to the carpark, and the legibility of the general layout within the carpark. It was assumed that an upgrade to the egress of the carpark (option 3) in line with the intersection upgrade option 2 would be done prior or in conjunction with this option.

A key consideration of option 1 was again the access to Colquhoun Street from Sulwood Drive, and the need to improve this intersection to provide a deceleration lane for eastbound vehicles turning left into Colquhoun Street, and a right turn acceleration lane for vehicle turning right onto Sulwood Drive.

Option 2 has opposing movements within a short distance, although advantageous as it splits the volume of vehicles in carparks across Sulwood Drive.

In terms of legibility, referring to how people access and move around within the carpark, it was considered that option 1 could create confusion. In option 2 vehicles would have to potentially reverse out of the western end of the carpark. Option 3 scored the best, as a very simple one-way carpark. The ease of use criteria was agreed to have been covered with the considerations above. The scoring for the operation criteria is provided in Table 6-5:

Table 6-5: Operation Scores

	Option 1	Option 2	Option 3
Score	3	2	4
Weight	25 %		
Total	0.8	0.5	1.0

6.9.3.3 Mt Taylor Access

The primary consideration of this criteria was the proximity of the carpark to a Mt Taylor walking trail. A weighting on the preferred trail being the trail near the existing carpark was given due to was resounding support that this trail was preferred for its cardiovascular workout.

Option 1 received the poorest score given the trail it accesses was not deemed as popular as the trail near the existing carpark. Option 2 scored higher than option 1 given it services the more popular trail, however pedestrians would have to cross Sulwood Drive. Option 3 scored the highest. The scoring for the Mt Taylor Access criteria is provided in Table 6-6:

Table 6-6: Mt Taylor Access Scores

	Option 1	Option 2	Option 3
Score	2	3	4
Weight	30 %		
Total	0.6	0.9	1.2

6.9.3.4 Environmental and Residential Impacts

Discussions around the environmental impacts of the carpark, scored option 1 lowest, given the carpark lies within the nature reserve, and would likely require land acquisition and impacts on Box Gum Grassy Woodland currently within the nature reserve area.

Options 2 and 3 were similar in scoring with some disturbances within the road reserve boundary being possible, however mostly the carpark footprint lies within impacted areas.

In terms of impacts to adjacent landowners, options 1 has the potential to change the nature of traffic on Colquhoun Street which may be met by resistance from some residents. It was identified that only one house fronts onto the proposed carpark. Option 2 is closer to resident than Option 3, with option 2 having a large earth mound separating the carpark from the property boundary. The scoring for the Environmental and residential impact criteria is provided in Table 6-7.

Table 6-7: Environmental and Residential Impact Scores

	Option 1	Option 2	Option 3
Score	1	4	4.5
Weight	20 %		
Total	0.2	0.8	0.9

6.9.4 Overall Option Scoring

The scoring for each of the criteria described above was combined to give an overall weighted score for each Option. The overall scoring indicated a clear result during the workshop with the preferred option being Option 3, extension of the existing carpark to the west. Options 1 and 2 scored worse than the preferred option 3 and can be removed from consideration. The overall scoring from the workshop is provided in Table 6-8:.

Table 6-8: Overall MCA scores

Weighting	Option 1	Option 2	Option 3
Aggregate Score	2.6	2.7	3.9

6.9.5 Sensitivity Analysis

A sensitivity analysis was undertaken to assess the impact of varying the weightings for each category ranking. The weighting of each criteria was revised by $\pm 10\%$ to determine if variability in the weightings would impact on the resultant preferred option. Results of this analysis are documented in Table 6-9: In all scenarios Option 3 performed consistently better than options 1 and 2.

Table 6-9: Sensitivity analysis outcomes

Carpark			
Sensitivity Scenario	Option 1	Option 2	Option 3
User safety up 10%	2.8	2.6	3.7
User safety down 10%	2.3	2.8	4.0
Operation up 10%	2.6	2.6	3.9
Operation down 10%	2.5	2.8	3.8
Mt Taylor Access up 10%	2.5	2.7	3.9
Mt Taylor Access down 10%	2.6	2.7	3.8
Enviro & residential up 10%	2.4	2.9	3.9
Enviro & residential down 10%	2.7	2.5	3.8

6.9.6 Preferred Option

The MCA process identified option 3 as the preferred option and this was accepted by the ACT Government. It was raised during the MCA that the existing exit of the carpark poses a safety issue as no provision for vehicles exiting the carpark wishing to travel west has been provide in the existing Sulwood Drive cross section. As such, a short storage lane would be required on Sulwood Drive for these vehicles exiting the carpark. Given the proximity of the existing carpark exit and the Mannheim Street/ Sulwood Drive intersection, an extension of the carpark to the east would be required to provide adequate separation. This works has been incorporated into Package 3 – Intersection Upgrade.

It is recommended that Package 2 – Carpark extension and Package 3 – Intersection and access improvement be constructed concurrently. This is due to Package 2 not addressing the safety issues raised in the project brief regarding vehicles undertaking illegal and dangerous movements to enter the carpark.

7 Package 3 - Intersection Upgrade

7.1 Constraints

7.1.1 Environmental

From ground truthing aspects of the site during the site inspection, and desktop review, the following were identified within the road reserve at various locations on the northern side (Mt Taylor side) of Sulwood Drive:

- Grassy Box Gum Woodlands
- Small Purple Pea
- Pink Tailed Work Lizard
- Golden Sun Moth
- Hollow bearing trees

Greater detail of these locations is provided in Section 6.1.1.

There were no environmental impacts identified on the southern side of Sulwood Drive.

The intersection upgrade will only impact the southern aspect of Sulwood Drive at Mannheim Street intersection. As such there are no environmental impacts to note.

7.1.2 Adjacent Land Use

Mounds on the southern side of Sulwood Drive pose a physical constraint, as large amounts of spoil earthworks will be produced if these are to be removed. The mounds are not thought to have been built as noise barriers given Sulwood Drive was not intended as a permanent road when constructed however given they provide a visual barrier and noise mitigation role removal of these mounds would require consultation with affected residents. These earth mounds currently impact sight distances, making the Mannheim Street- Sulwood Drive intersection non-compliant with ARGD Part 4A.

Property boundaries also pose an absolute boundary to the extent of works. And the possibility of Sulwood Drive duplication in the future has also been taken into consideration during this options development phase.

The existing Mt Taylor car park poses a constraint to the north of the intersection, as one part of this project is to increase carparking capacity.

7.1.3 Utilities

Evo Energy

A HV underground electricity cable runs in the [REDACTED] for the project extent. A HV underground cable also [REDACTED].

Streetlight cables [REDACTED].

There is also a Streetlight cable in [REDACTED].

Initial consultation with Evoenergy has not identified any major impacts or conflicts with their infrastructure. Where proposed pavement crosses underground HV cables, this infrastructure will be located, and adequate cover and protection will be provided as per Evoenergy standard requirements.

Telstra/NBN

Telecommunication cables [REDACTED].

Gas

There does not appear to be gas infrastructure with the option site extents. Confirmation to be sought at PSP stages.

Icon Sewer

There does not appear to be sewer infrastructure with the option site extents. Confirmation to be sought at PSP stages.

Icon Water

There is a 900 mm water main that [REDACTED]
[REDACTED]

7.1.4 Drainage

From a desktop review and site inspection, there is existing stormwater infrastructure within the site. This includes existing kerb and gutter draining into [REDACTED]. Where pavement widening occurs, new kerb and gutter, and culverts are proposed to tie into the existing stormwater network.

Further investigation would be required once detailed survey is received for the area to ensure proposed infrastructure can tie into existing if the project is to move forward in the PSP and DR design phases.

7.1.5 Other

Site gradient and site distances at the intersection will need to be considered, especially if duplication is to occur. Currently the sight distances at the intersection is not compliant with ARGD Part 4A as the earth mound on the south eastern aspect of the intersection impacts vision.

7.1.6 Geotechnical

A typical pavement profile for pavement widening has been proposed for this stage of project. Geotechnical investigations have been undertaken in the location of the Sulwood Drive and Mannheim Street to understand subsoil conditions. This information is intended to be used during the PSP and DR development of this package of works. The geotechnical report developed from these investigations has been appended in Appendix H.

7.2 Option Development

7.2.1 Site Observations

Site observations were made by members of the project team from SMEC on August 22nd, 2020, predominantly at Sulwood Drive - Mannheim Street intersection. Observations were also made along various aspects of the proposed shared user path, and Livingston Street, Inkster Street, Colquhoun Street, Athllon Drive and Drakeford Drive intersections. The following is noted from this inspection:

- Drivers perform illegal manoeuvres at the entrance and exit the existing carpark.
- Drivers currently use the area on the southern side of Sulwood Drive west of the Mannheim Street intersection to perform the turn into the existing carpark. A safe right turn lane for westbound traffic on Sulwood Drive is required, especially if additional carparking is going to be provided on the southern side of Sulwood Drive where these turns are currently performed.
- Site gradient will need to be considered, especially if Sulwood Drive is duplicated to the south. The intersection site distance will need to be assessed.
- There were numerous environmental constraints identified, these are detailed in Section 3. The intersection works do not impact these environmental areas, other than possible reconfigurations of the existing carpark that may be done with the intersection and access upgrade.
- Well used 'goat track' exists along the property boundary on the southern side of Sulwood Drive. There are some cuts through to residential areas accessing the 'goat track'. It was also identified that there are a few points (Mannheim Street and Livingston Street) where the path network would benefit extension to the new proposed shared path.
- The gradient changes along the northern side of Sulwood Drive also would suggest larger earthworks would be required to provide a comfortable ride to path users.

7.2.2 Design Development

The scope of the intersection upgrade includes pavement widening of Sulwood Drive to the south to improve safety, access and egress to the existing carpark and minimise disruption to through traffic on Sulwood Drive at the intersection. Four options have been developed for the Sulwood Drive – Mannheim Street intersection (the intersection from here in) and are outlined below:

- Option 1 – Signalisation of the intersection
- Option 2 – Signalisation of the intersection, duplication of Sulwood Drive

- Option 3 – Existing intersection arrangement, right turn lane for carpark entrance and acceleration lane for right-turn egress from the existing carpark.
- Option 4 – Four-way signalised intersection at Mannheim Street, extension of carpark to east of intersection.

RELATED PROJECTS

Sulwood Drive Optional Improvements – Drawings, and Investigations for Minor New Works Projects – Report – R.D. Gossip Pty Ltd

TCCS provided drawings and draft report by R.D. Gossip investigating the possibility of creating:

- A turning lane for westbound traffic at the entry point to the car park
- A new car park facility on the southern verge of Sulwood Drive west of Mannheim Street
- Pedestrian crossing facilities on either, or both sides of Mannheim Street
- A path along Sulwood Drive between Drakeford Drive and Athllon Drive.

7.2.3 Option 1 – Signalisation of the intersection

OPTION DESCRIPTION

This option signalises the existing single-lane intersection to provide controlled movements for vehicles, as the current unsignalized arrangement is not compliant with sight distances as per AGRD Part 4A. It also provides a controlled option for pedestrians crossing both Sulwood Drive and Mannheim Street. Refer to Figure 7-1 for intersection design.

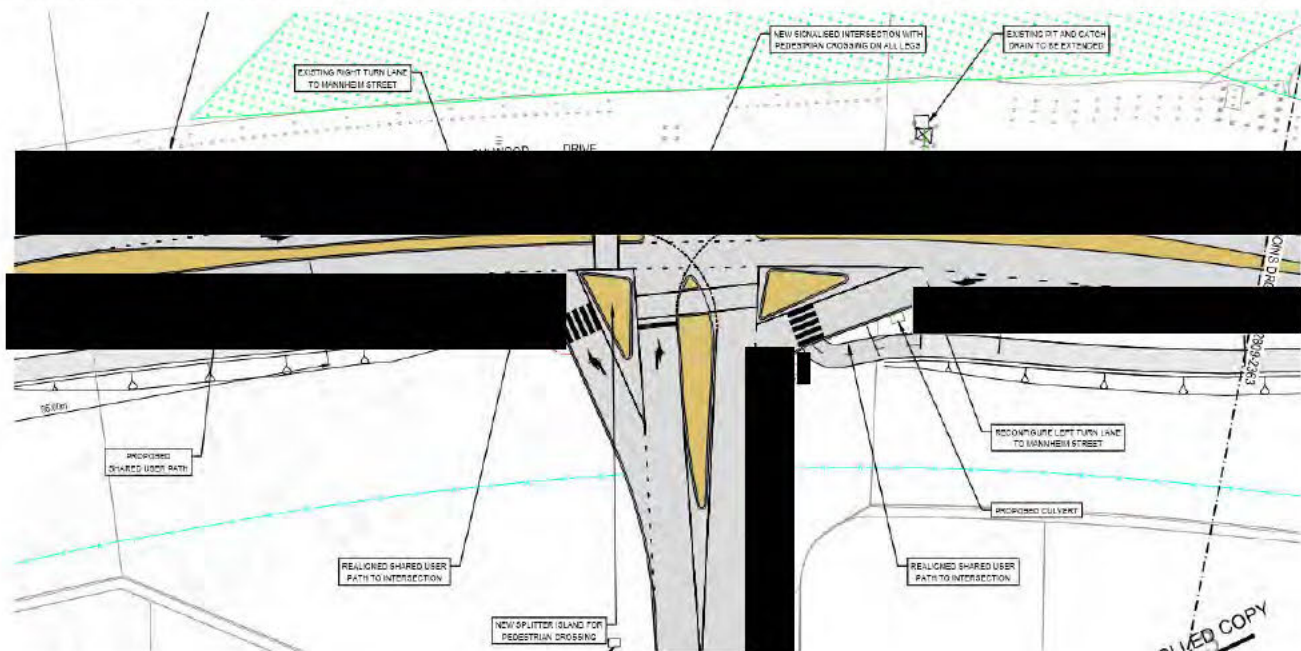


Figure 7-1: Option 1 - Signalised one-lane each way

This option also provides a dedicated right-turn lane for access into the existing carpark on the north side of Sulwood Drive, and a dedicated acceleration lane for westbound vehicles exiting the carpark to join the westbound traffic stream on Sulwood Drive. Refer to Appendix C for the intersection drawings.

By signalising the intersection greater control of traffic flows can be exerted by amending the phasing of the intersection depending on traffic growth in the area. The signals also provide for safe controlled means for pedestrians and vulnerable road users to cross Sulwood Drive to access the Mt Taylor Reserve or the residential area of Kambah.

As part of this option, the egress of the existing carpark has been extended toward the east, as per the confirmed preferred option, refer to Appendix I. This is to provide sufficient length for weaving for vehicles traveling westbound on Sulwood Drive given the acceleration lane from the carpark egress, and the left turn lane onto Mannheim Street. The addition in cost to extend the exit is outlined as additional cost 1a in section 7.6.

OPTION RATIONALE

Points to note regarding Option 1:

- Signalised intersection providing safe movements for vehicles through phasing, and pedestrian crossings on Mannheim Street, and the western approach leg of Sulwood Drive.
- Links into the proposed shared user path, links Kambah residents to Mt Taylor Reserve
- Dedicated right turn lane from Sulwood Drive into the entrance of the existing carpark
- Dedicated acceleration lane for vehicles exiting the carpark and traveling westbound.
- Raised medians separating traffic directions, housing signals and allowing pedestrian movement
- Will require some pavement widening, and new stormwater infrastructure
- Uncontrolled right turn movement across Sulwood Drive for westbound motorists to access carpark

7.2.4 Option 2 – Signalisation of the intersection, duplication of Sulwood Drive

OPTION DESCRIPTION

Option 2 is intended to future proofed the intersection to accommodate the future duplication planned for Sulwood Drive. Duplicating the intersection ensures enough capacity to accommodate these future volumes. This has similar safety benefits of providing controlled vehicular and pedestrian movements at the intersection. Refer to Figure 7-2 or drawings in Appendix C

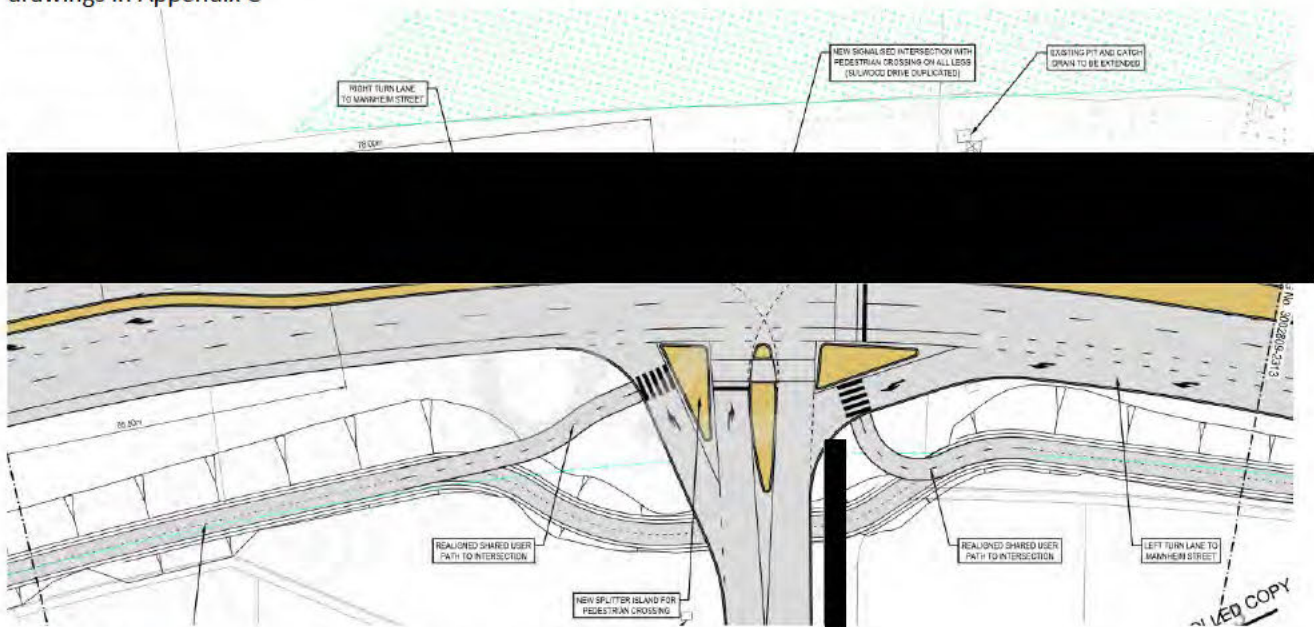


Figure 7-2: Option 2 Signalised duplicated intersection

OPTION RATIONALE

Points to note regarding to option 2:

- Signalised intersection providing safe movements for vehicles through phasing, and pedestrian crossings on Mannheim Street and the western approach leg of Sulwood Drive.
- Links into the proposed shared user path
- Dedicated right turn lane from Sulwood Drive into the entrance of the existing carpark
- Dedicated acceleration lane for vehicles exiting the carpark and traveling westbound.
- Raised medians separating traffic directions, housing signals and allowing pedestrian movement
- Pavement widening for turn lanes and road duplication will be required
- New stormwater infrastructure will be required at the intersection and along median (to be designed at PSP level when preferred option has been identified and survey obtained).
- Uncontrolled right turn movement across Sulwood Drive for westbound motorists to access carpark

7.2.5 Option 3 – Existing intersection arrangement, right turn lane for carpark entrance, and acceleration lane for right-turn egress from the existing carpark.

OPTION DESCRIPTION

Option 3 provides a two-stage pedestrian crossing of Sulwood Drive by means of a median pedestrian refuge on the eastern aspect of the intersection. A link from the shared user path is provided, with a raised zebra crossing provided on Mannheim Street as per the shared user path design. This option also incorporates a dedicated right turn lane into the carpark, and an acceleration lane on Sulwood Drive for vehicles exiting the carpark and traveling west. Refer to intersection drawings in Appendix C. No signalisation of the intersection is proposed for this option resulting in uncontrolled pedestrian movements at the intersection and limited controls over vehicle movements. Discussions with the client previously has highlighted that median pedestrian refuges are undesirable for high speed roads such as Sulwood Drive.

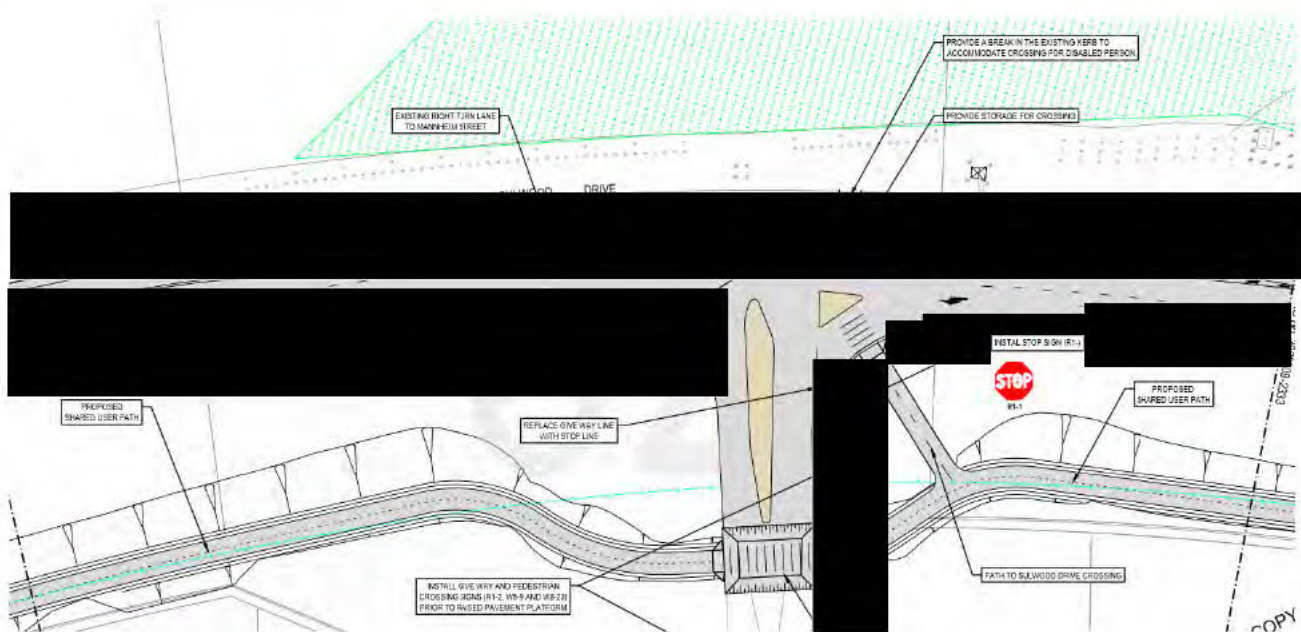


Figure 7-3: Option 3 provision of two-stage pedestrian crossing of Sulwood Drive at the existing intersection

OPTION RATIONALE

Points to note regarding Option 3:

- Insufficient sight distances as per AGRD Part 4A due to earth mound on the south eastern aspect of the intersection
- Minimal pavement widening proposed
- median refuge pedestrian crossing provided on Sulwood Drive
- Insufficient capacity to accommodate the volumes generated in the 2041 CSTM model.
- Uncontrolled pedestrian movements at intersection
- Dedicated right turn bay for westbound vehicles entering existing car park
- Uncontrolled right turn movement across Sulwood Drive for westbound motorists to access carpark

7.2.6 Option 4 – Four-way signalised intersection at Mannheim Street, extension of carpark to east of intersection.

OPTION DESCRIPTION

Option 4 proposes the removal of carparking spaces to the west of the Mannheim Street/ Sulwood Drive intersection with these spaces being reinstated to the east of the intersection. The Mannheim Street/ Sulwood Drive intersection is then converted to a 4-way signalised intersection with the 4th leg being the access to the Mt Taylor car park. The intent of reconfiguring the intersection to this layout was to provide controlled movements into the car park. The result of this would be safer movements into the car park. There is also the provision of a dedicated acceleration lane for vehicles exiting the carpark and travelling westbound along Sulwood Drive.

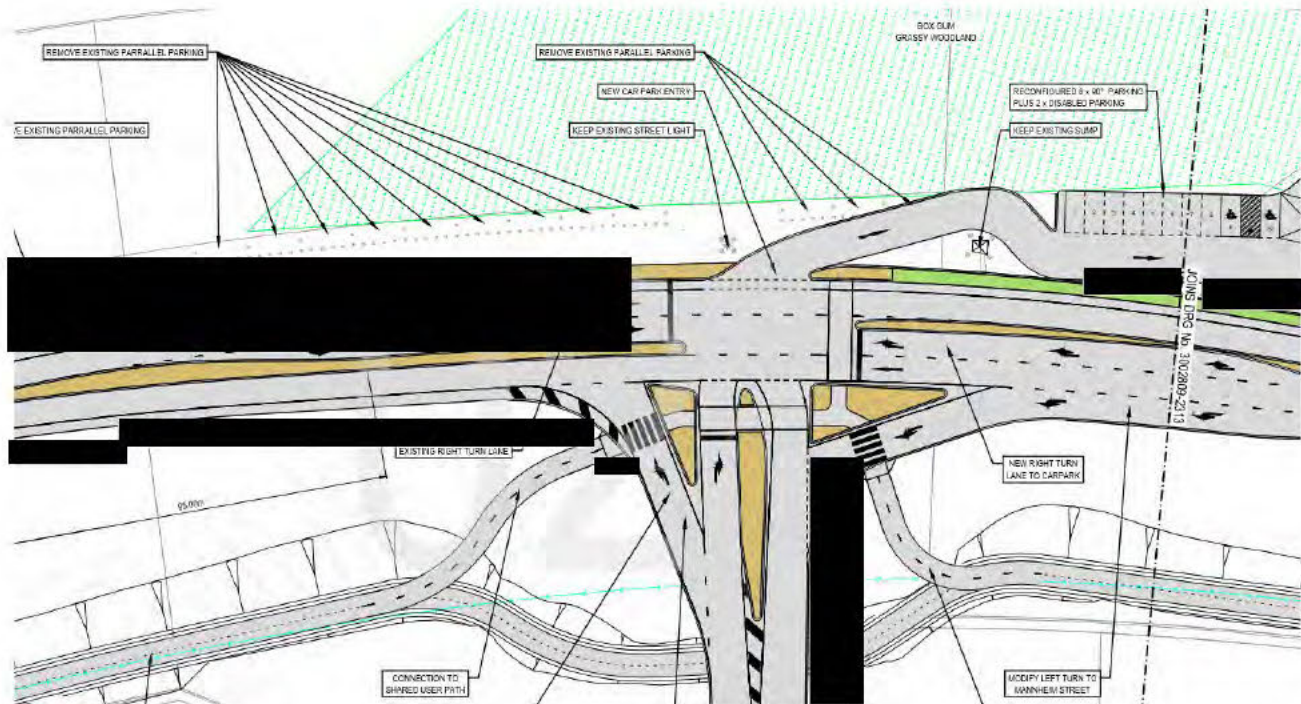


Figure 7-4: Option 4 - signalised four-way intersection

OPTION RATIONALE

Point to note regarding Option 4:

- All vehicular and pedestrian movements controlled by signals at the intersection
- Additional capacity feasible by extending the carpark to the east.
- Dedicated right turn lane provided at the intersection for accessing the carpark
- Dedicated acceleration lane provided for vehicles exiting the carpark and traveling westbound on Sulwood Drive.
- Insufficient capacity to accommodate vehicle volumes generated in the 2041 CSTM model.
- Relocation/ removal of existing street lighting to accommodate for turn movements
- Size of vehicle able to access carpark from westbound travel way restricted due to turn movements
- Additional leg on intersection has negative impact on intersection and network performance compared to Options 1 and 2.
- Signalised intersection providing safe movements for vehicles through phasing, and pedestrian crossings on Mannheim Street and the western approach leg of Sulwood Drive.

7.3 Drainage

From a desktop review, there is stormwater infrastructure at the intersection. There are existing culverts at the intersection that will be retained, and/or shifted to align with pavement widening where possible. SMEC propose to tie into the existing stormwater infrastructure where possible and make new the existing culverts. Drain modelling was used to generate the 'worst case scenario' on the largest catchment for a 2-year flood event. A 375 mm diameter pipe for stormwater was calculated to be enough for the runoff, in compliance with MIS08.

Along the northern median of Sulwood Drive where the existing/proposed (option 4) carpark is, grass lined channels are proposed in the landscaping to catch runoff, into existing pits within the carpark area. The catchment areas are primarily within the road reserve area.

Further investigations will be required at PSP design, once the preferred option has been approved and detailed survey of the area is undertaken to ascertain the stormwater infrastructure RLs and how they match up to the proposed preferred intersection design.

7.4 Landscaping

EnviroLinks Design have provided a tree assessment report of the Mt Taylor project site, including the southern alignment of the shared user path, intersection and carpark sites. The following is a summary of their findings. The full Tree Assessment had been appended in Appendix G.

The majority of trees within the project site are on unleased territory land and require approval for removal or tree damaging activities. There are no registered trees within the project site area. The trees consist primarily of native planted trees along the road corridor, there are a limited number of remanent trees, self-seeded natives and a selection of planted exotic tree species.

The assessment identified:

- high quality tree group
- 3 high quality trees
- 21 medium quality tree groups
- 3 medium quality individual trees
- 2 poor quality tree groups: and
- 2 poor quality trees.

The intersection upgrade options will impact on groups of medium quality tree groups. It has been noted that the majority of the groups of medium quality trees had been planted for informal road screening, and that the effect of the group would not be significantly impacted by selected tree removals.

There are minimal landscaping requirements within the sites for the options proposed for the intersection upgrade at Sulwood Drive – Mannheim Street. SMEC propose to restore boundary areas as per MIS06.

7.5 Streetlighting

Acor Rudds have reviewed the shared user path options and provided the following comments.

Lighting Category

- Sulwood Drive to be category V3 to AS/NZS 1158.1.1. TCCS confirmation required as part of detailed design.
- Mannheim to be category V5 to AS/NZS 1158.1.1. TCCS confirmation required as part of detailed design.
- Pedestrian crossings likely to be category PX1 on V category roads to AS/NZS 1158.4. TCCS confirmation required as part of detailed design.
- Disabled car parks to be lit to category PCD to AS/NZS 1158.3.1. TCCS confirmation required as part of detailed design.

Design Considerations

Option 1:

- Increase to overall carriageway width for a long section of Sulwood drive will require some relocation of existing streetlighting infrastructure.
- New streetlighting required on Sulwood drive on both sides of the intersection.
- Will require 2 x combined streetlighting and pedestrian crossing lighting columns.

Option 2:

- Significant increase to overall carriageway width for a long section of Sulwood drive will require significant relocation of existing streetlighting infrastructure.
- Significant amount of new streetlighting required on Sulwood drive on both sides of the intersection.
- Will require 2 x combined streetlighting and pedestrian crossing lighting columns.

Option 3:

- Minimal changes to existing streetlighting infrastructure.
- Will require 1 dedicated pedestrian crossing lighting column.
- Will require the addition of 2 x pedestrian crossing luminaires to existing streetlighting columns.

Option 4 (North side of Sulwood – East carpark):

- This option has the most complicated intersection lighting design due to the new carpark entry opposite Mannheim Street.
- Significant increase to overall carriageway width for a very long section of Sulwood Drive will require major modifications to existing streetlighting infrastructure.
- Significant amount of new streetlighting required on Sulwood drive on both sides of the intersection.
- Locating lighting columns on the north side of Sulwood Drive is challenging due to the narrow median separating the road and the new carpark. This median is not wide enough to allow standard streetlighting columns to be installed within it as it will not provide sufficient clearance from traffic. Locating streetlighting columns in the median must be avoided for this reason with the exception of combined traffic signalisation and streetlighting columns.
- Will require 1 x combined traffic signalisation and streetlighting column.
- Will require 2 x combined streetlighting and pedestrian crossing lighting columns
- 4 x disabled carparks will require 2 x dedicated lighting columns.

7.6 Order of Cost Estimate

7.6.1 Basis of Estimate

An opinion of the order of cost to deliver the Sulwood Drive – Mannheim Street intersection upgrade options was developed based on proposed design solution detailed in the options drawings contained in Appendix C. The estimate is preliminary in nature based on high level option concepts sketches of key infrastructure components associated with the proposed route alignments. It therefore should be used as an indicative guide of potential project costs only. Furthermore, it should be noted that the purpose of the order of cost estimate is for comparison between options, and as such the estimate methodology has ensure that consistent assumptions have been made across options.

7.6.2 Contingency

A 50% contingency has been made for unknowns that may occur during construction due to latent conditions or issues with the documentation. This contingency is based on deterministic methods.

7.6.3 Summary of Estimate

A summary of the order of cost estimates (2021 dollars) for each of the considered options is contained in Table 7-1:

Table 7-1: Options assessment order of cost estimate (\$January 2021)

Project Option	\$ (Excl. GST)
Option 1 – Single lane signalisation*	██████████
Option 1a – additional cost for option 1 to extend exit to the east and associated pavement works	██████████
Option 2 – Two-lane signalisation	██████████
Option 3 – Two-stage pedestrian crossing	██████████
Option 4 – breaking into existing carpark	██████████

* - Costs do not include extension of carpark to east for proposed carpark exit treatment.

7.6.4 Estimate Assumptions

The assumptions made during the development of the order of cost estimate are detailed below.

Assume existing road pavement does not require rehabilitation.

7.6.5 Estimate Inclusions

The order of cost estimate for each of the project options includes:

- Site clearance
- Bulk earthworks
- Stormwater drainage
- Landscaping to verge including drainage
- Incidental works including fencing, gates, and the like
- Road works including subgrade preparation, subbase, and base course
- Pedestrian footpaths
- Road furniture such as crash barriers and the like
- Line and pavement marking
- Road signage
- Street lighting including conduits
- Signalised intersection works on Sulwood Drive – Mannheim Street intersection as indicated on drawings
- Preliminaries (5%)
- Design, procurement and Management Fees (15%)
- Contingency (50%)

7.6.6 Estimate Exclusions

The order of cost estimate for each of the project options excludes the following items:

- Escalation beyond estimate date
- New In-ground services
- Diversion / Relocation of existing services
- Demolition of existing services
- Duplication of Sulwood Drive works
- Extension of carpark to separate merge of car park exit lane and left turn lane into Mannheim Street from Sulwood Drive.

7.7 Strategic Transport Modelling

The current version of the Canberra Strategic Transport Model (CSTM) was provided by TCCS for use in the Mount Taylor carpark intersection modelling. This was used to determine growth on Sulwood Drive and Mannheim Street from 2020 to 2041.

Flow diagrams from the CSTM are shown in Figure 7-5 through Figure 7-8 for 2021 AM, 2021 PM, 2041 AM and 2041 PM respectively. These show a modest amount of traffic using Sulwood Drive in 2021, with a significant increase in 2041 caused by congestion on surrounding major roads. Particularly in the PM peak period, there is a large change in the traffic volume on Sulwood Drive, from approximately 500 vehicles/hour in 2021 to approximately 1300 vehicles/hour in 2041.



Figure 7-5: 2021 AM Hourly Volumes and V/C



Figure 7-6: 2021 PM Hourly Volumes and V/C

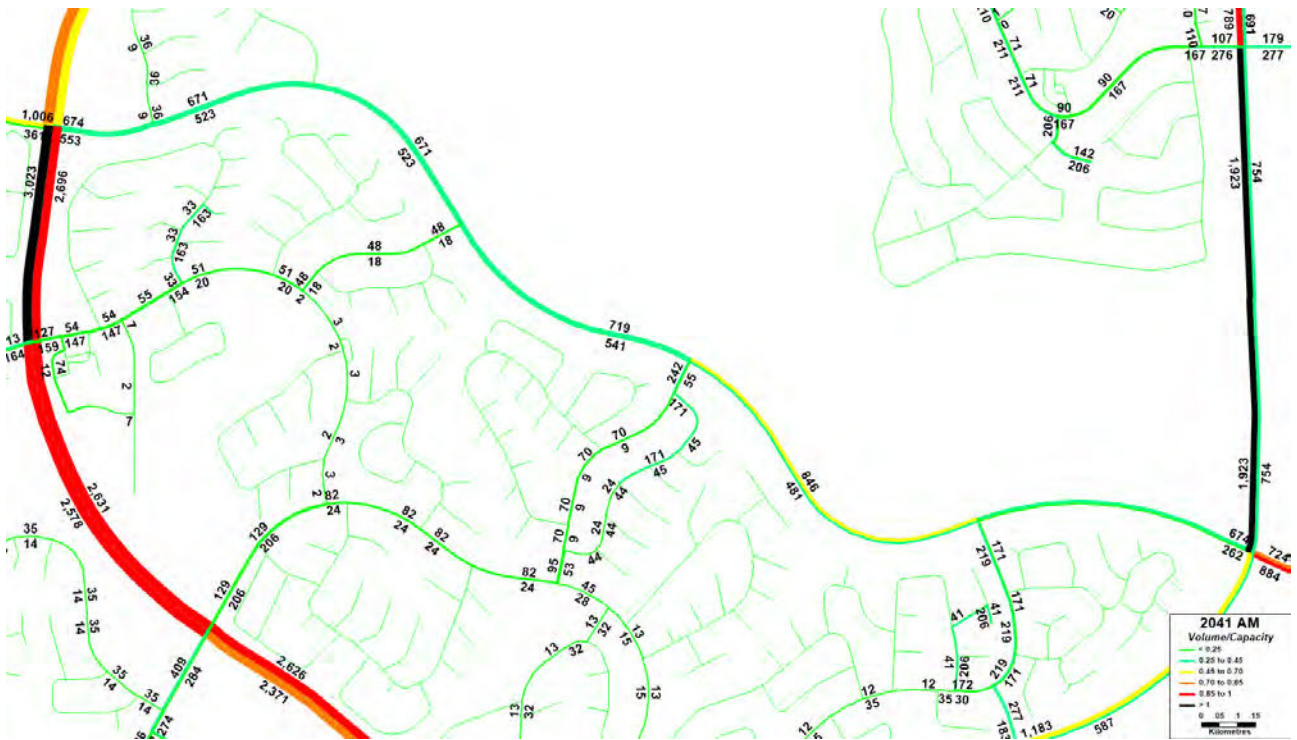


Figure 7-7: 2041 AM Hourly Volumes and V/C



Figure 7-8: 2041 PM Hourly Volumes and V/C

7.8 Intersection Modelling

The performance of the Sulwood Drive – Mannheim Street intersection has been tested using SIDRA Intersection 9. The network functionality of SIDRA Intersection has been used, with the carpark entry and exit points as separate intersections. This allows an evaluation of the interaction between closely spaced and adjacent intersections, for example the impact of queue propagation between and through intersections.

Traffic growth calculated using the CSTM outputs for 2016, 2021 and 2041, has been applied using absolute growth rather than relative growth. Relative growth – the percentage change in volumes – works when there are small and steady changes and where the base year observed, and modelled volumes are very similar. Absolute growth – the change in vehicles – is used otherwise. In the absence of a weekend growth model, for the weekend period, the average of AM and PM growth from the CSTM has been applied to the existing (2020) weekend travel patterns to obtain a 2041 weekend model.

7.8.1 Model Calibration

The SIDRA Intersection models use default settings except where required by the ACT Guidelines for SIDRA Analysis Draft V1.0 (2016).

7.8.2 Intersection Layouts

The SIDRA Intersection network layouts of each intersection option are shown in Figure 7-9 through Figure 7-12.



Figure 7-9: Option 1 SIDRA Network Layout

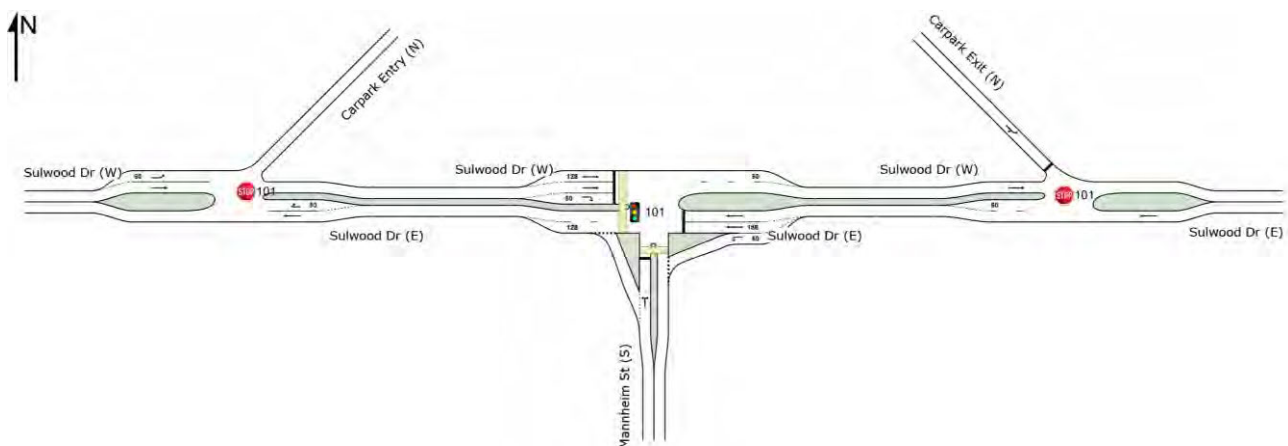


Figure 7-10: Option 2 SIDRA Network Layout



Figure 7-11: Option 3 SIDRA Network Layout

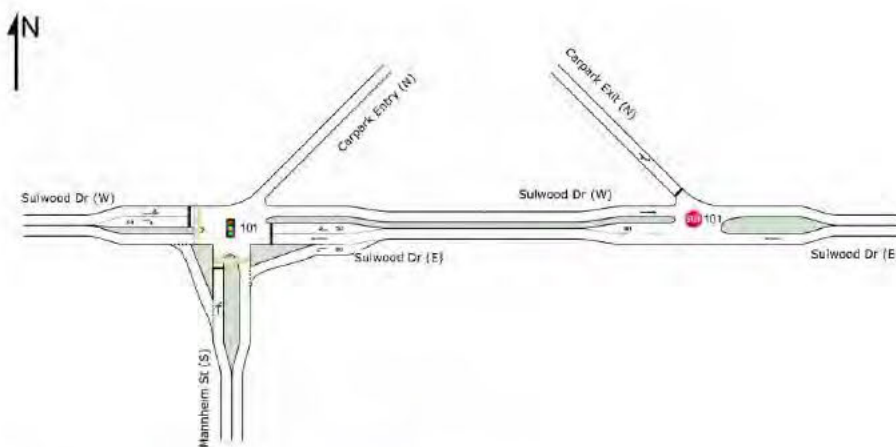


Figure 7-12: Option 4 SIDRA Network Layout

7.8.3 Intersection Performance

Intersection performance in SIDRA Intersection is reported in terms of average delay and Level of Service (LoS). Delay is the amount of time added to a vehicle’s trip due to congestion (i.e. at free flow speeds, there is no delay) and average delay is the total accumulated delay divided by the number of vehicles using an intersection. Level of Service is a simplified expression of performance, from A through F, where F represents a breakdown in performance, and is based on delay. A description of intersection LoS is given in Table 7-2

Table 7-2: Intersection Level of Service Criteria

Level of Service	Signals (Delay)	Give-way (Delay)	Description
A	$D < 10 \text{ s}$	$D < 10 \text{ s}$	Good operation
B	$10 \text{ s} \leq D < 20 \text{ s}$	$10 \text{ s} \leq D < 15 \text{ s}$	Good with acceptable delays and spare capacity
C	$20 \text{ s} \leq D < 35 \text{ s}$	$15 \text{ s} \leq D < 25 \text{ s}$	Satisfactory
D	$35 \text{ s} \leq D < 55 \text{ s}$	$25 \text{ s} \leq D < 35 \text{ s}$	Operating near capacity
E	$55 \text{ s} \leq D < 80 \text{ s}$	$35 \text{ s} \leq D < 50 \text{ s}$	At capacity
F	$D \geq 80 \text{ s}$ or $\text{DoS} > 1$	$D \geq 50 \text{ s}$ or $\text{DoS} > 1$	Unsatisfactory with excessive queuing

The performance of the Sulwood Drive – Mannheim Street intersection in each option, both in terms of average delay and Level of Service (LoS) is shown in Table 7-3. The results shown reflect the performance of the intersection within the network model, not in isolation. This indicates that, at the intersection level, Option 3 will not work, Options 1 and 4 provide adequate performance while Option 2 provides excellent performance.

Table 7-3: SIDRA Intersection Performance

Scenario	2041 AM		2041 PM		2041 WE	
	Delay	LoS	Delay	LoS	Delay	LoS
Option 1	14.5 s	B	51.4 s	D	10.9 s	B
Option 2	14.1 s	B	15.6 s	B	11.1 s	B
Option 3	520.0 s	F*	401.8 s	F*	47.4 s	F*
Option 4	19.6 s	B	31.1 s	C	14.7 s	B

* Level of Service reported for give-way intersections is worst movement LoS

7.8.4 Network Performance

In a network of intersections, SIDRA Intersection determines a *Network Level of Service* (Network LoS), which is based on *speed efficiency*, or the actual operating speed as a proportion of desired speed. The performance of each option is shown in Table 7-4. In contrast to the intersection results, this shows the overall impact of the intersection and driveways. The difference suggests that the carpark accesses could have a significant impact on the performance of the system, however the overall performance is still acceptable. As with the intersection assessment, Option 3 fails while Option 2 offers the best performance. LoS D represents roughly a halving of operational speeds, which for a signalised intersection during peak hour is generally acceptable.

Table 7-4: SIDRA Network Performance (Level of Service)

Scenario	2041 AM	2041 PM	2041 WE
Option 1	B	E	B
Option 2	B	D	B
Option 3	F	F	D
Option 4	C	D	B

7.9 Multi Criteria Analysis – Intersection/Access upgrade

7.9.1 MCA Criteria

7.9.1.1 Evaluation Criteria

Three criteria were considered through the MCA process for the intersection/access upgrade options, some of the key considerations associated with each of the criteria are outlined in Table 7-5:.

Table 7-5: MCA evaluation criteria

Criteria	Considerations
User Safety	<ul style="list-style-type: none"> Safety performance of intersections Vulnerable road users
Operation	<ul style="list-style-type: none"> Efficiency of intersection operation Impacts on road network
Constructability	<ul style="list-style-type: none"> Impact on existing road network Impacts on existing carpark

7.9.1.2 Other Criteria

In addition to the above criteria, there are numerous other evaluation criteria that are relevant to the Mt Taylor shared user path options. These criteria include:

- Streetlighting
- Emergency services access
- Public Transport
- Contamination
- Noise impacts
- Drainage

Whilst these criteria are regarded as important considerations for the project, it was believed unlikely that there would be substantive differences between the options. As such these criteria were not incorporated into the MCA as they would contribute the identification of a preferred option and tend to dilute the strength of other criteria.

7.9.2 Weightings

Prior to the workshop the project team discussed and developed proposed weightings to be adopted for the MCA assessment criteria. These weightings were distributed to the client, and MCA stakeholders for discussion ahead of the workshop. No comments were received on the proposed criteria or weightings and as such they were adopted in the MCA. A Sensitivity Analysis was conducted on the outputs to ensure a robust score was undertaken. Table 7-6: outlines the criteria and weighting applied to this MCA process.

Table 7-6: MCA Weightings

Criteria	Weighting
User Safety	40 %
Operation	40 %
Constructability	20 %

7.9.3 Options Scoring of Criteria

Each option was then scored on a 1 to 5 scale to rank them from a very poor performing option (1) to a moderate performing option (3) to an option that performs very well (5) against each of the key criteria based on discussion by attendees at the MCA workshop. A score of 3 was targeted as the median score for each criterion to ensure that none was assigned an inflated or understated value in the MCA process. Total scores of each option for a given criteria have been calculated as the product of the score and weighting (i.e. Score x Weighting) and documented in the following section to the nearest 0.1 of a point.

Attendees in the MCA workshop provided feedback on Option 1, 2, 3 and 4 against corresponding criteria, the resultant scoring is presented below. The scoring yielded equal score between options 2 and 4, with option 1 also

being very close. The MCA workshop identified areas within options 1, 2 and 4 which could be improved to increase the score and provide a preferred option.

7.9.3.1 User Safety

The discussion on intersection user safety centered around the safety performance of the intersection and the movements of vulnerable road users, such as cyclists and pedestrians. It was highlighted that for Options 1, 2 and 3 right turn into the carpark is still uncontrolled, however a right-turn lane is provided. Options 1 and 3 vehicles accessing the carpark westbound on Sulwood Drive only have to cross one lane of traffic, and two lanes of traffic for option 2. This movement is controlled by signal phasing in Option 4.

All options provide an acceleration lane at the egress of the carpark for vehicles wanting to travel westbound on Sulwood Drive. Options 1 and 3 were discussed to be too close to the left turn lane from Sulwood Drive onto Mannheim Street, with weaving being a consequence around this arrangement. Option 2 was slightly better in terms of weaving as there is an additional lane to separate accelerating vehicles from the carpark, and vehicles slowing down to turn left onto Mannheim Street. Option 4 performed best for this right-turn out of the carpark, as the egress for the intersection was an additional 220 m east of the existing carpark egress, increasing the space between these maneuvers.

Option 3 performed poorly as it is unsignalized and does not provide a controlled crossing for pedestrians across Sulwood Drive. The crossing of Mannheim Street via a raised Zebra Crossing rather than controlled signal phasing was also highlighted as a safety concern, as the expected signed behavior vs the actual behavior of cyclists is quite different.

The tight turning paths were highlighted at the entrance to Option 4, and flagged as needing further investigations, as it could cause queuing across the intersection. The scoring for the user safety criteria is provided in Table 7-7:.

Table 7-7: User Safety Scores

	Option 1	Option 2	Option 3	Option 4
Score	4	3.5	1.5	4.5
Weight	40 %			
Total	1.6	1.4	0.6	1.8

7.9.3.2 Operation

Key considerations on the operation criteria included efficiency of intersection operation and the impacts on the road network. Option 1 and 4 were considered to perform very similarly with consensus that Option 4 would perform slightly better. Option 2 provided the best level of service, LoS, with a LoS of B. Option 3 performs the worst and fails in 2041 due to line of site from Mannheim Street getting onto Sulwood Drive. The scoring for the operation criteria is provided in Table 7-8:.

Table 7-8: Operation Scores

	Option 1	Option 2	Option 3	Option 4
Score	3	4	1	3
Weight	40 %			
Total	1.2	1.6	0.4	1.2

7.9.3.3 Constructability

The discussion on constructability primarily focused on the impact on the existing road network. Option 1 would require substantial work very close to live traffic. Option 2 could have some of the pavement work done offline, given the increase areas of new pavement proposed in this option. Option 3 was considered the best in terms of constructability, as impacts primarily were on Mannheim Street with the construction of the raised zebra crossing, which was considered lower impact given the shorter duration of time it would cause impact for. Option 4 also requires substantial work close to live traffic. The scoring for constructability criteria is provided in Table 7-9:.

Table 7-9: Constructability Scores

	Option 1	Option 2	Option 3	Option 4
Score	3	2	4	3
Weight	20 %			
Total	0.6	0.6	0.8	0.6

7.9.4 Overall Option Scoring

The scoring for each of the criteria described above was combined to give an overall weighted score for each option. The overall scoring indicated a notionally tied result during the workshop between Option 2 and Option 4, with option 1 also being very similar in scoring. Option 2 and 4 (scored 3.6) scored marginally better than option 1 (score 3.4). Option 3 scored worse than the other options can be removed from consideration. The overall scoring from the workshop is provided in Table 7-10:

Table 7-10: Overall MCA scores

Weighting	Option 1	Option 2	Option 3	Option 4
Aggregate Score	3.4	3.6	1.8	3.6

7.9.5 Sensitivity Analysis

A sensitivity analysis was undertaken to assess the impact of varying the weightings for each category ranking. The weighting of each criteria was revised by $\pm 10\%$ to determine if variability in the weightings would impact on the resultant preferred option. Results of this analysis are documented in Table 7-11. In all scenarios Option 3 performed the worst. Option 4 performed slightly better than options 1 and 2 with an increased percentage to the safety criteria and a reduced percentage to the operations criteria. Option 4 performed on par with Option 2 for all other scenarios other than if an increase to the operations percentage where option 2 performed better.

Table 7-11: Sensitivity analysis outcomes

Access Arrangements				
Sensitivity Scenario	Option 1	Option 2	Option 3	Option 4
User safety up 10%	3.5	3.6	1.7	3.8
User safety down 10%	3.3	3.6	1.9	3.5
Operation up 10%	3.4	3.7	1.6	3.5
Operation down 10%	3.5	3.5	2.0	3.7
Constructability up 10%	3.4	3.5	2.1	3.5
Constructability down 10%	3.5	3.7	1.5	3.7

7.9.6 Preferred Option

From the MCA workshop it is clear that Option 3 was not a viable option given its very low score compared to the other 3 options and therefore this option can be removed from consideration.

Option 2 was one of the highest rated options given a high score for the operation of the intersection. This was due to the network and intersection performing at this highest level of service for the options assessed. However, the option required approximately \$1.5 million dollars more to construct than all other options and traffic modelling showing that duplication of Sulwood Drive would not be required for 20+ years, may exclude the option. The option also scored lower in the safety criteria due to the merge of the auxiliary lane for vehicles exiting the carpark and the development of the left turn lane into Mannheim Street may have led to weaving movements resulting in the option introducing a road safety hazard to the network.

Option 1 scored slightly lower than Options 2 and 4, however is also the cheapest signalised option for the intersection. Traffic modelling showed that the intersection when assessed on its own performed above the minimum

requirements for the design criteria providing a Level of Service (LoS) D, however when assessed in the network the intersection returned a LoS of E in the 2041 PM peak. The option also scored lower than Option 4 in terms of safety as similar to Option 2 the merge for the auxiliary lane for vehicles exiting the car park and the development of the left turn lane into Mannheim Street occur at the same location creating a potential weaving issue.

Option 4 scored the highest in terms of user safety by moving the exit to the car park further east along Sulwood Drive allowing sufficient separation between the merge of the auxiliary lane for vehicles exiting the car park and the development of the left lane into Mannheim Street. In addition, controlling the movement for westbound vehicles entering the carpark via signals improved the safety of the intersection. Option 4 did not score as highly in the operation criteria due to a lower LoS being provided than Option 2, however the intersection returned satisfactory performance compared to the design criteria with a LoS no lower than D being returned for all 2041 peaks assessed. The concern with the option raised during the MCA workshop related to the turn paths at the entry of the carpark, the turn paths must be checked to ensure vehicles to achieved the angles required to enter the carpark to ensure this option is viable before further development, this may also include identification of streetlighting and existing drainage that may need to be relocated. The option was the second most expensive at approximately [REDACTED], however a contributor to this was the additional pavement shown associated with the carpark extension, if the number of additional parking spaces is reduced the cost estimate will also reduce.

Consultation with the ACT Government and relevant stakeholders following the submission of the draft Mount Taylor feasibility report confirmed Option 1 – Signalisation of the intersection as the preferred option. This option was selected for the following reasons:

- Provides safe pedestrian movements crossing Sulwood Drive
- Caters for current and future traffic volumes
- Retains existing movements.
- Complements other Mount Taylor packages

It is recommended that Package 2 – Carpark extension and Package 3 – Intersection and access improvement be constructed concurrently. This is due to the length of turn lanes required for the right turn into the carpark placed further west along Sulwood Drive than the existing entrance. This would therefore require temporary connections from the right turn bay connecting to the existing carpark.

8 Conclusions and Next Steps

8.1 Study Findings

8.1.1 Constraints analysis

This Options Study has identified numerous constraints that exist within Package A Mt Taylor – shared user path, carpark and intersection/access upgrade options. These constraints include:

- Planning requirements (both Territory and National levels)
- Local ecology
- Drainage
- Utility location, primarily ICON Water the Evo Energy
- The established design criteria

Some of these constraints are significant and have impacted on the design development and options selection process. Consultation has been undertaken with relevant stakeholders to better understand the nature of these constraints and inform the optioneering process.

8.1.2 Options Development

8.1.2.1 Package 1 – Shared User Path

The following options were developed for Package 1 – Shared User Path:

- Option 1 – Southern alignment, provision of landings for grades >5%
- Option 2 – Southern alignment, max gradient of 5%
- Option 3 – Southern alignment, conforming to existing ground and vertical alignment
- Option 4 – Northern alignment, conforming to existing ground and vertical alignment
- Option 4A – Northern alignment, removing crossing of Sulwood Drive
- Option 5 – Southern alignment on the roadside of noise mounds, matching existing vertical alignment

Details of each of the options developed can be found in Appendix A.

8.1.2.2 Package 2 – Carpark

The following options were developed for Package 2 – Carpark:

- Option 1 – Colquhoun Street
- Option 2 – South of Sulwood Drive and west of Mannheim Street
- Option 3 – Extension of Existing Carpark

Details of each of the options developed can be found in Appendix B.

8.1.2.3 Package 3 – Intersection Upgrade

The following options were developed for Package 3 – Intersection Upgrade:

- Option 1 – Signalisation of the intersection
- Option 2 – Signalisation of the intersection, duplication of Sulwood Drive
- Option 3 – Existing intersection arrangement, right turn for carpark entrance, and acceleration lane for right turn egress from the carpark
- Option 4 – Four-way signalised intersection at Mannheim Street, extension of carpark to east of intersection

Details of each of the options developed can be found in Appendix C.

8.1.3 Options Assessment

A multicriteria analysis of the shared user path, carpark and intersection upgrade options at Mt Taylor was undertaken to identify a preferred option for each of these sub-packages. An initial assessment in the MCA workshop was inconclusive of a preferred option for the shared user path and intersection upgrade sub-packages. Option 3 to extend the existing carpark on the northern verge of Sulwood Drive to the west of the existing carpark was clearly identified as the preferred option for the sub-package of work.

8.2 Confirmed Preferred Options

The following outlines the confirmed preferred options for each package considering feedback obtained during the MCA, additional investigation undertaken by SMEC after the workshop, consultation with the client and key TCCS stakeholders and information presented in SMEC's draft feasibility report and drawing submitted on January 22nd, 2021. A package of drawings of the preferred options has been appended in Appendix I.

8.2.1 Confirmed Preferred Option

8.2.1.1 Package 1 – Shared User Path

Option 5 – SUP on the southern side of Sulwood Drive, between the existing earthworks mounds and Sulwood Drive carriageway was determined to be the preferred option for this package following consultation with TCCS and key stakeholders. This option was selected as the preferred option given the option:

- Separates the pedestrian and car park vehicular movements.
- Removes conflicts with the preferred signals arrangement at Mannheim St intersection.
- Removes potential encroachment into sensitive environmental area along northern verge of Sulwood Drive
- Is more likely to service local residents
- Will provide some form of pedestrian facility on side roads crossings
- Avoids potential conflicts with utilities (ICON Water bulk watermain)
- Provided improved constructability and less impact to the local community
- Addresses the passive surveillance and CPTED issues raised with other southern alignments during the MCA

A plan showing the alignment of the preferred option is provided in Appendix I.

8.2.1.2 Package 2 – Carpark

Option 3 – extension of existing carpark to the west was identified as the preferred option from the MCA workshop scoring. This option has been confirmed as the preferred option following consultation with TCCS and key stakeholders. This option was selected as the preferred option given:

- Existing high demand in the area for walking tracks
- Integrates with future planning of Sulwood Drive
- Integrates with other Mt Taylor packages
- Utilisation of existing infrastructure

A plan showing the location and layout of the preferred option is provided in Appendix I.

It is recommended that Package 2 – Carpark and Package 3 – Intersection Upgrade be constructed simultaneously.

8.2.1.3 Package 3 – Intersection Upgrade

The MCA workshop and traffic analysis undertaken by SMEC identified that signalising the Mannheim Street – Sulwood Drive intersection was required to ensure adequate operation of the intersection given future traffic volumes. Option 1 – Signalisation of intersection (single travel lane in either direction) was selected as the preferred option following consultation with TCCS and key stakeholders. This option was selected as the preferred option given:

- Duplication of Sulwood Drive is not required for 20+ years, so duplication of the intersection as part of this project would result in redundant works
- The option integrates with other packages of work
- Superior value-for-money
- Existing arrangement with carpark entrance and exit location is retained

- Provides connections for pedestrians to the proposed shared user path, Mt Taylor Nature Reserve, and car park.

A plan showing the layout of the preferred option is provided in Appendix I.

It is recommended that Package 2 – Carpark and Package 3 – Intersection Upgrade be constructed simultaneously.

8.2.2 Next Steps

These options have been considered and will be designed through PSP with the same design team to ensure continuity of design and staging between packages.

8.2.2.1 Package 1 – Shared User Path

The following activities will need to be undertaken to progress the package:

- Confirm location and approximate depths of utilities.
- Begin consultation with utility providers to understand each provider's requirements
- Undertake geotechnical investigations along the proposed alignment to understand the subsoil conditions along the path
- Further develop the alignment of the option to identify any issues and how the option will interact with the other packages
- Obtain topographical survey of the alignment

8.2.2.2 Package 2 - Carpark

The following activities will need to be undertaken to progress the package:

- Confirm location and approximate depths of utilities.
- Begin consultation with utility providers to understand each provider's requirements
- Obtain topographical survey of the alignment
- Investigate interaction between packages

8.2.2.3 Package 3 – Intersection upgrade

The following activities will need to be undertaken to progress the package:

- Confirm location and approximate depths of utilities.
- Begin consultation with utility providers to understand each provider's requirements
- Obtain topographical survey of the alignment
- Determine deceleration length for right turn into carpark
- Determine separation between carpark exit and Mannheim Street/ Sulwood Drive intersection
- Investigate interaction between packages

Appendix A Drawings Package 1 - Shared User Path

Appendix A1 – Options 1-3

Appendix A2 – Option 4a - Northern alignment option at carpark

Appendix A3 – Option 5 - Southern alignment on roadside of noise mound



MT TAYLOR SHARED USER PATH, KAMBAH

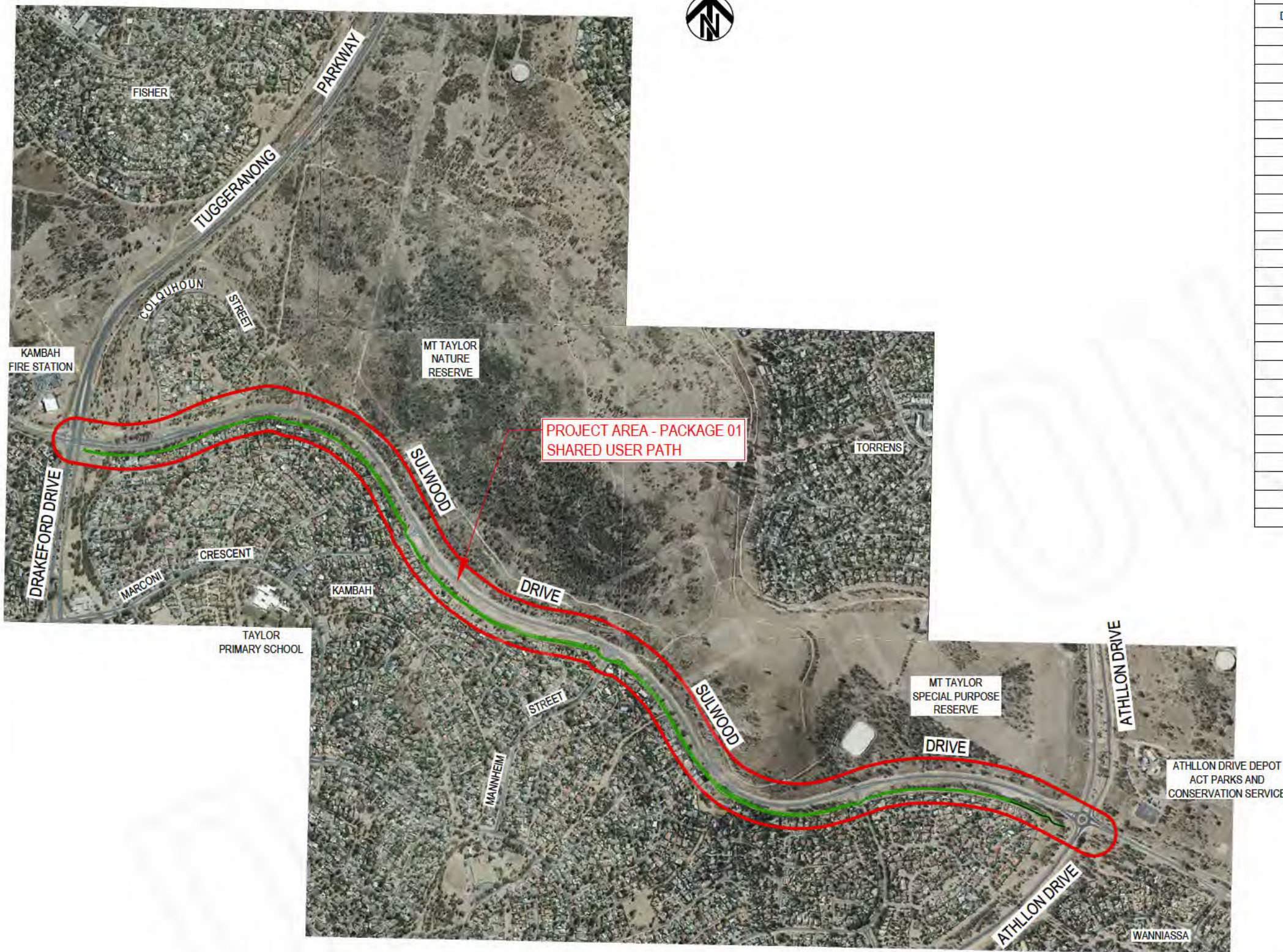
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NOVEMBER 2020



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Project Number 3002809



LOCALITY PLAN
SCALE 1: 7500

DRAWING INDEX	
DRAWING NUMBER	DRAWING TITLE
3002809-2100	COVER SHEET
3002809-2101	LOCALITY PLAN AND DRAWING INDEX
3002809-2102	GENERAL NOTES AND LEGEND
3002809-2106	TYPICAL SECTIONS (SHARED USER PATH)
3002809-2111	OPTION 01 - MCP PLAN AND LONGITUDINAL SECTION SHEET 1 OF 6
3002809-2112	OPTION 01 - MCP PLAN AND LONGITUDINAL SECTION SHEET 2 OF 6
3002809-2113	OPTION 01 - MCP PLAN AND LONGITUDINAL SECTION SHEET 3 OF 6
3002809-2114	OPTION 01 - MCP PLAN AND LONGITUDINAL SECTION SHEET 4 OF 6
3002809-2115	OPTION 01 - MCP PLAN AND LONGITUDINAL SECTION SHEET 5 OF 6
3002809-2116	OPTION 01 - MCP PLAN AND LONGITUDINAL SECTION SHEET 6 OF 6
3002809-2121	OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 1 OF 6
3002809-2122	OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 2 OF 6
3002809-2123	OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 3 OF 6
3002809-2124	OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 4 OF 6
3002809-2125	OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 5 OF 6
3002809-2126	OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 6 OF 6
3002809-2131	OPTION 03 - MC30 PLAN AND LONGITUDINAL SECTION SHEET 1 OF 6
3002809-2132	OPTION 03 - MC30 PLAN AND LONGITUDINAL SECTION SHEET 2 OF 6
3002809-2133	OPTION 03 - MC30 PLAN AND LONGITUDINAL SECTION SHEET 3 OF 6
3002809-2134	OPTION 03 - MC30 PLAN AND LONGITUDINAL SECTION SHEET 4 OF 6
3002809-2135	OPTION 03 - MC30 PLAN AND LONGITUDINAL SECTION SHEET 5 OF 6
3002809-2136	OPTION 03 - MC30 PLAN AND LONGITUDINAL SECTION SHEET 6 OF 6

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REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL	TITLE	NAME

REVISION IN PROGRESS

DESIGNER	DESIGNER	DESIGNER	DESIGNER	DESIGNER	DESIGNER	DESIGNER	DESIGNER	DESIGNER

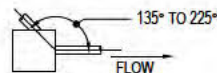
SMC
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SMC AUSTRALIA PTY LTD
© ABN 47 065 475 140
SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE
LYNEHAM ACT 2602 AUSTRALIA
SMC PROJECT No 3002809

DISCIPLINE	PRELIM	FINAL

PROJECT TITLE		MOUNT TAYLOR SHARED USER PATH FEASIBILITY STUDY	
LOCALITY PLAN AND DRAWING INDEX			
SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	FEASIBILITY	3002809-2101	A

GENERAL:

- DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- DIMENSIONS SHOWN FOR PIPES REFER TO THE NOMINAL PIPE DIAMETER IN MILLIMETRES.
- DIMENSIONS SHOWN FOR BOX CULVERTS REFER TO THE BOX CULVERT'S NOMINAL INTERNAL HEIGHT x SPAN IN MILLIMETRES.
- STATIONS AND REDUCED LEVELS ARE IN METRES.
- REDUCED LEVELS ARE RELATED TO THE AUSTRALIAN HEIGHT DATUM.
- THE CO-ORDINATE SYSTEM USED IN ALL DRAWINGS IS THE CANBERRA MAP GRID (STROMLO).
- ALL LOCATIONS, ORIENTATION AND LEVELS SHALL BE VERIFIED ON SITE BEFORE COMMENCING ANY WORK. DO NOT OBTAIN DIMENSIONS FROM SCALING. EXISTING SURFACE LEVELS ON THE DRAWINGS ARE INDICATIVE ONLY. REFER DISCREPANCIES TO THE PRINCIPAL AUTHORISED PERSON.
- THE DOCUMENTED DRAINAGE SYSTEM IS DETAILLED ONLY FOR THE PERMANENT ROAD CONFIGURATION UNLESS NOTED OTHERWISE. CONSTRUCTION DRAINAGE SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
- PIPES THROUGH PITS ARE TO BE ALIGNED WITH THE UPSTREAM PIPE CENTRELINE TO THE OUTLET PIPE CENTRELINE AT DOWNSTREAM PIT FACE AS SHOWN:



- ANY PERMITS FOR DIVERSION WORKS REQUIRED DURING CONSTRUCTION SHALL BE OBTAINED PRIOR TO CONSTRUCTION WORKS.
- EXISTING STORMWATER DRAINAGE PIPES, PITS AND MANHOLES WITHIN THE LIMIT OF WORKS SHALL BE REMOVED OR MODIFIED AS SPECIFIED. ANY EXPOSED EXISTING REINFORCEMENT TO BE PROTECTED IN ACCORDANCE WITH REQUIREMENTS FOR NEW CONSTRUCTION.

DRAINAGE PIPE AND CULVERTS

- ALL PIPES ARE TO BE STEEL REINFORCED SPUN CONCRETE UNLESS NOTED OTHERWISE. ALL CONCRETE PIPES SHALL HAVE HS3 TYPE INSTALLATION AS PER AS3725.
- CONCRETE PIPE CLASSES FOR CROSS DRAINAGE CULVERTS HAVE BEEN DETERMINED FOR OPERATIONAL TRAFFIC LOADING (W80, A160, M1600, S1600 & HLP400), BASED ON TYPE HS3 SUPPORT AND TRENCH OR EMBANKMENT CONDITION. INSTALLATION TO AS3725 SPECIFICATION UNLESS OTHERWISE NOTED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE COVER FOR CONSTRUCTION LOADINGS. TABLE BELOW PROVIDES MINIMUM COVER REQUIREMENTS FOR VARIOUS CONSTRUCTION LOADINGS.

CONSTRUCTION LOADING	MINIMUM HEIGHT ABOVE PIPE (CLASS 2) (mm)	MINIMUM HEIGHT ABOVE PIPE (CLASS 3) (mm)	MINIMUM HEIGHT ABOVE PIPE (CLASS 4 TO 8) (mm)
CPAA CONSTRUCTION VEHICLE - VIBRATORY PLATE (UP TO 135 kg WEIGHT)	150	150	150
CPAA CONSTRUCTION - VIBRATORY TRENCH ROLLER (2t)	300	300	300
CPAA CONSTRUCTION - SMOOTH DRUM VIBRATORY ROLLER (7t STATIC WEIGHT)	500	400	300
CPAA CONSTRUCTION - SMOOTH DRUM VIBRATORY ROLLER (10t STATIC WEIGHT) AND T44 TRUCK LOAD	600	400	400
CAT 651	1500	900	700

- CONCRETE PIPES ARE TO BE RUBBER RING JOINTED SPIGOT AND SOCKET TYPE UNLESS NOTED OTHERWISE.
- FINISH SURFACE LEVEL SHOWN IN THE LONGITUDINAL SECTIONS AT HEADWALL LOCATIONS IS THE LEVEL OF THE EMBANKMENT SLOPE IF NO HEADWALL/PIPE WAS PRESENT. THE CONTRACTOR SHALL FULLY FILL AROUND AND OVER THE PIPES TO PROVIDE THE REQUIRED COVER TO THE PIPES.

SCOUR PROTECTION:

- THE THICKNESS OF THE RIP-RAP PROTECTION SHALL BE A MINIMUM OF TWICE THE D₉₀ STONE SIZE SPECIFIED ON THE DRAWINGS. THE STONE SHALL BE WELL GRADED IN ACCORDANCE WITH THE FOLLOWING TABLE:

ROCK SIZE	% PASSING (BY WEIGHT)
2 x D ₉₀	100%
D	40-60%
0.3 x D _s	1 - 20%

- ROCK IS TO BE HARD, DENSE, DURABLE, RESISTANT TO WEATHERING AND ANGULAR IN SHAPE.
- THE PROPERTIES OF THE ROCK SHALL BE IN ACCORDANCE WITH RMS SPECIFICATION R55 TO THE SATISFACTION OF THE PRINCIPAL AUTHORISED PERSON.
- AN APPROXIMATE GUIDE TO STONE SHAPE IS THE BREADTH OR THICKNESS OF A SINGLE STONE SHOULD BE NOT LESS THAN ONE-THIRD ITS LENGTH.
- STONE SHOULD BE DARK IN COLOUR EITHER GREY OR DARK BROWN SIMILAR TO SOIL PROFILE.
- GEOTEXTILE UNDER ROCK FILLED MATTRESS AND RIP-RAP IN ACCORDANCE WITH RMS SPECIFICATIONS R63.
- ALL ROCK MATTRESSES TO COMPRISE GALMAC COATED WIRE WITH UPVC COATING AND AGGREGATES TO AS2758.4. CONSTRUCTED IN ACCORDANCE WITH RMS SPECIFICATIONS R55.

DRAINAGE STRUCTURES:

- STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ACTING ON COMPLETED STRUCTURES. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND PROVISION OF ANY TEMPORARY BRACING, PROPPING, ETC. ACQUIRED DURING CONSTRUCTION. STRUCTURES SHALL BE MAINTAINED IN A STABLE CONDITION AT ALL TIMES AND NO PART SHALL BE OVERSTRESSED.
- PROVIDE A BLINDING LAYER CONCRETE NO LESS THAN 50mm THICK.
- UNSUITABLE FOUNDING MATERIAL FOR PIPES AND STRUCTURES SHALL BE REMOVED OR IMPROVED AT THE PIPE'S DIRECTION.
- FOR LOCATION AND LEVEL OF PITS AND HEADWALLS REFER DRAINAGE DRAWING SCHEDULES.
- ALL REINFORCEMENT SHALL COMPLY WITH AS/NZS 4671 GRADE D500L (FITMENTS) AND D500N (TYPICAL).
- WHERE A CONNECTION IS MADE TO AN EXISTING DRAINAGE PIPE OR PIT, THE LEVEL OF THAT ELEMENT MUST BE SURVEYED PRIOR TO CONSTRUCTION, IF ANY DISCREPANCIES REFER TO THE PRINCIPAL AUTHORISED PERSON FOR CLARIFICATION.

SERVICES:

- ALL EXISTING SERVICE LOCATIONS SHOWN ON DRAWINGS ARE INDICATIVE ONLY AND ARE TO BE VERIFIED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING SERVICES DURING CONSTRUCTION.
- THE CONTRACTOR SHALL SET OUT THE WORKS PRIOR TO EXCAVATION. WHERE A CONFLICT OR INCONSISTENCY BECOMES APPARENT THE CONTRACTOR SHALL NOTIFY THE PRINCIPAL AUTHORISED PERSON IMMEDIATELY.
- ALL DISTURBED SURFACES ARE TO BE RESTORED TO ORIGINAL CONDITION, UNLESS NOTED OTHERWISE.
- ALL SERVICES TRENCHES IN EXISTING PAVEMENT OR IN AREAS WHERE NEW PAVEMENT IS TO BE CONSTRUCTED SHALL BE BACKFILLED WITH DGS20 COMPACTED TO 95% MDD.
- LOCATION AND LEVEL OF ALL SERVICES CROSSINGS OF PROPOSED WORKS MUST BE CHECKED FOR CONFLICT WITH EXISTING SERVICES. ANY CONFLICTS TO BE RESOLVED WITH THE PRINCIPAL AUTHORISED PERSON.
- WORK BENEATH OVERHEAD AND OVER UNDERGROUND POWERLINES TO BE TAKEN WITH CARE IN ACCORDANCE WITH THE "WORKING IN THE VICINITY OF OVERHEAD AND UNDERGROUND ELECTRICAL LINES" CODE OF PRACTICE FROM WORKSAFE AUSTRALIA.

PAVEMENT NOTES:

- PAVEMENT PROFILES ARE PROVIDED ON DRG 3002750-PV-1 01.
- PAVEMENT INTERFACE JOINTS SHALL BE LOCATED OUTSIDE VEHICULAR WHEEL PATHS.
- THE NOMINATED THICKNESS OF A LAYER OF DENSE GRADED ASPHALT MUST BE WITHIN THE LIMITS SPECIFIED IN RMS SPECIFICATION R116. LAYER THICKNESS SHOULD EXCEED THE MAXIMUM NOMINAL STONE SIZE BY AT LEAST 10 TIMES, BUT NO MORE THAN 5 TIMES. NOMINAL LAYER THICKNESS TO BE IN ACCORDANCE WITH RMS SPECIFICATION R116.

NOMINAL AGGREGATE SIZE (mm)	RECOMMENDED THICKNESS (mm)
7	20
10	30
14	40
20	75

- IF UNSUITABLE SUBGRADE MATERIALS IS ENCOUNTERED ONE OF THE FOLLOWING MEASURES ARE TO BE EMPLOYED, SUBJECT TO APPROVAL:

- DRAINAGE AND DRYING OF THE INSITU MATERIAL
- EXCAVATION AND REPLACEMENT OF SOFT MATERIAL WITH SELECT MATERIAL
- STABILISATION OF TOP 300mm SUBGRADE MATERIAL WITH QUICK SET CEMENT
- PROVISION OF A WORKING PLATFORM OF CEMENT TREATED MATERIAL
- USE OF GEOTEXTILES
- ALL WORKS IN ACCORDANCE WITH RMS SPECIFICATION R44.

- THE AGGREGATE SPREAD RATE AND BANDER APPLICATION RATE FOR SPRAYED SEALS ARE SUBJECT TO CONFIRMATION AT CONSTRUCTION.
- QUICK DRY PRIME (QDP) TO BE CONSTRUCTED TO MANUFACTURERS SPECIFICATIONS.
- PRIME, AMC00, AMC4 AND AMC7 TO BE CONSTRUCTED IN ACCORDANCE WITH RMS SPECIFICATION R106.

EARTHWORKS NOTES

- SOFT GROUND ENCOUNTERED IN ACCESS ROADS PLATFORMS SHALL BE STABILISED USING ROCKFILL/ EARTHFILL OR OTHER APPROVED TREATMENTS.
- TEMPORARY BATTER SLOPES SHALL NOT BE STEEPER THAN 1V:2H.
- IN ADDITION TO TEMPORARY SITE DRAINAGE THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING IF REQUIRED DURING REMOVAL AND REPLACEMENT OF INSITU MATERIAL.

FOUNDATION AND EARTHWORKS NOTES

- PRIOR TO THE PLACEMENT OF ANY FILL ALL FOUNDATIONS FOR EARTHWORKS SHALL BE INSPECTED AND APPROVED BY THE SITE GEOTECHNICAL REPRESENTATIVE.

EROSION AND SEDIMENT CONTROL

- ALL EROSION AND SEDIMENT CONTROLS ARE TO BE CONSTRUCTED ACCORDING TO THE BEST PRACTICE REQUIREMENTS OF "MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION - BLUE BOOK" LANDCOM 4TH ED MARCH 2004 AND VOLUME 2 - MAIN ROAD CONSTRUCTION. EXAMPLE EROSION AND SEDIMENT CONTROL MEASURES FOR CONSTRUCTION ARE PROVIDED. THESE ARE PRINCIPLE EXAMPLES FOR REFERENCE AND REQUIRE FURTHER DETAIL FOR CONSTRUCTION ACTIVITIES.
- PROGRESSIVE EROSION AND SEDIMENT CONTROL PLANS (PESCP'S) FOR ALL STAGES OF THE PROJECT ARE TO BE PREPARED AND IMPLEMENTED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
- THE PESCP'S SHOULD DETAIL CONTROLS SUCH AS SEDIMENT FENCES, DIVERSION DRAINS, DRAIN LINES, SAND BAGS AND GRAVEL BAGS.
- REDUCE THE AREA OF SOIL DISTURBANCE BY RETAINING VEGETATION, STAGGING WORKS AND BY MINIMISING THE CONSTRUCTION FOOTPRINT.
- PROGRESSIVELY REVEGETATE OR STABILISE DISTURBED AREAS SUCH AS TEMPORARY TOPSOIL STOCKPILES, VERGES AND BATTERS.
- STOCKPILES ARE TO BE STABILISED IF LEFT FOR 2 WEEKS OR MORE.
- PRIOR TO ANY WORKS, INSTALL DIVERSION DRAINS, SEDIMENTATION PONDS AND OTHER SURFACE RUNOFF CONTROL MEASURES TO CONTROL RUNOFF ONTO, ACROSS AND FROM THE SITE; AND TO TRAP SEDIMENT.
- PROVIDE FOR RAINFALL EVENTS BY ENSURING THE FUNCTIONALITY AND CAPACITY OF EROSION AND SEDIMENT CONTROL, PROVIDING ADDITIONAL CONTROLS WHERE REQUIRED, STABILISING BARE GROUND AND TEMPORARY STOCKPILES AND AVOIDING GROUND DISTURBANCE.
- INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROLS DAILY AND WITHIN 24 HOURS OF RAINFALL EVENTS.
- INTERCEPT OFFSITE SURFACE FLOW AND DIVERT OR ALLOW THROUGH CROSS DRAINAGE PIPES/CULVERTS WITHOUT MIXING WITH CONSTRUCTION RUNOFF.
- IN AREAS OF HIGH VELOCITY RUNOFF, REDUCE FLOW VELOCITIES USING APPROPRIATE MEASURES SUCH AS CHECK DAMS AND DIVERT TO STABLE LOCATIONS OR CONTROLS.
- ENSURE CONSTRUCTION RUNOFF DOES NOT DIRECTLY DISCHARGE FROM SITE. USE SEDIMENT CONTROLS TO FILTER RUNOFF BEFORE DISCHARGING.
- ALL OPEN DRAINAGE CHANNELS ARE TO BE LINED WITH MATERIAL SUCH AS GEO-FABRIC JUTE MESH OR SOIL STABILISING AGENT.
- CHECK DAMS ARE TO BE INSTALLED AT APPROPRIATE INTERVALS ALONG LINED DRAINAGE CHANNELS TO REDUCE EROSION POTENTIAL OF THE FLOW.
- ENSURE THAT THE SOIL AND WATER MANAGEMENT PLAN DESCRIBES THE MANAGEMENT OF TEMPORARY CONSTRUCTION PONDS, INCLUDING ACCEPTED WATER QUALITY PRACTICES AND STANDARDS SUCH AS FLOCCULATION AND SETTLING, TESTING FOR TSS, TURBIDITY, PH, OIL AND GREASE, DEWATERING AND DOCUMENTATION OF RESULTS.
- DURING ALL STAGES OF CONSTRUCTION. IN CATCHMENTS WHERE SEDIMENT PONDS ARE LOCATED, CONSTRUCTION RUNOFF IS TO BE DIVERTED TO SEDIMENT PONDS VIA DIVERSION DRAINS, TEMPORARY CATCH DRAINS, AND PERMANENT OR TEMPORARY DRAINAGE PIPES OR SIMILAR.
- LOCATION AND DESIGN OF SEDIMENT PONDS TO BE CONFIRMED ON SITE AND MODIFIED AS REQUIRED.

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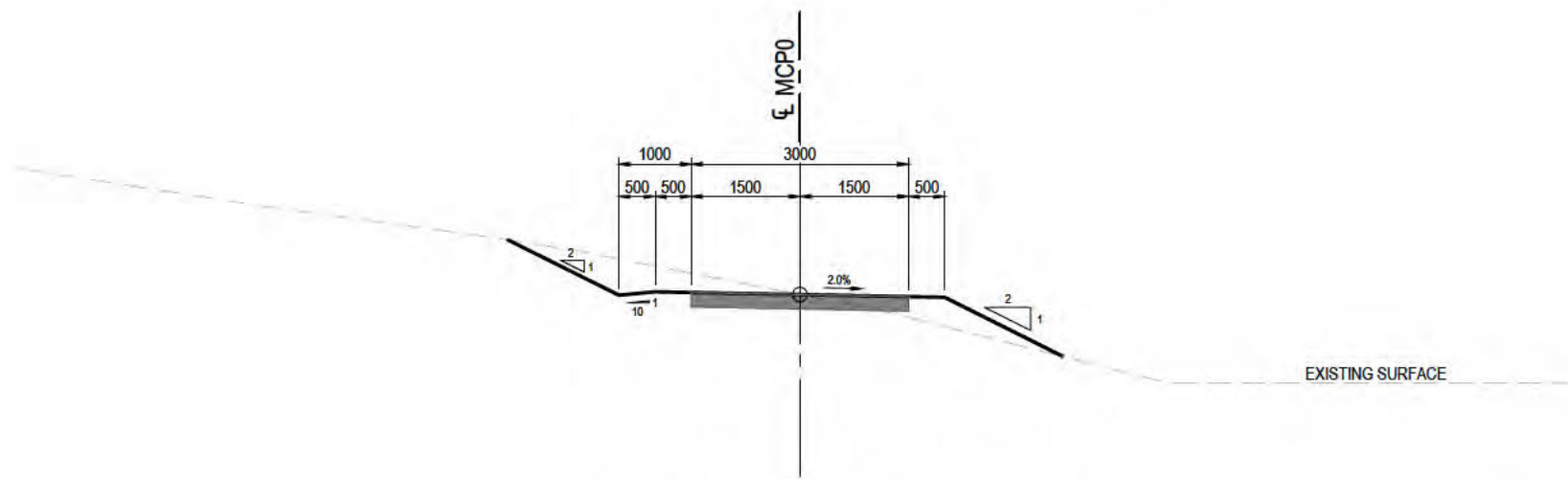
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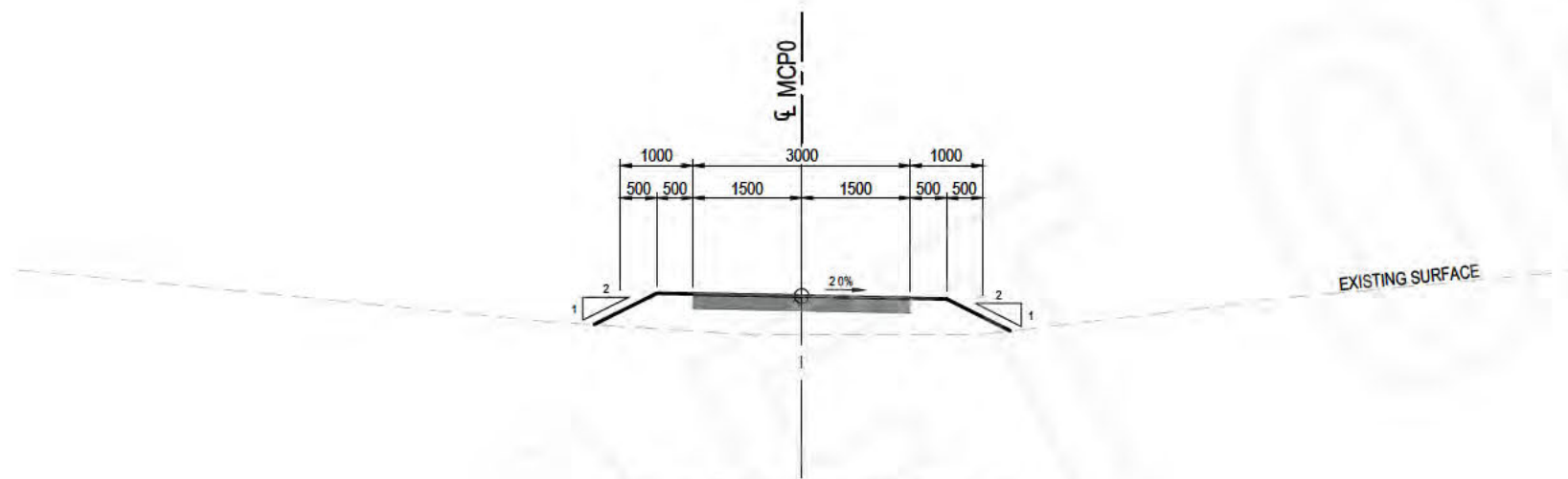
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PROJECT TITLE MOUNT TAYLOR SHARED USER PATH FEASIBILITY STUDY		GENERAL NOTES	
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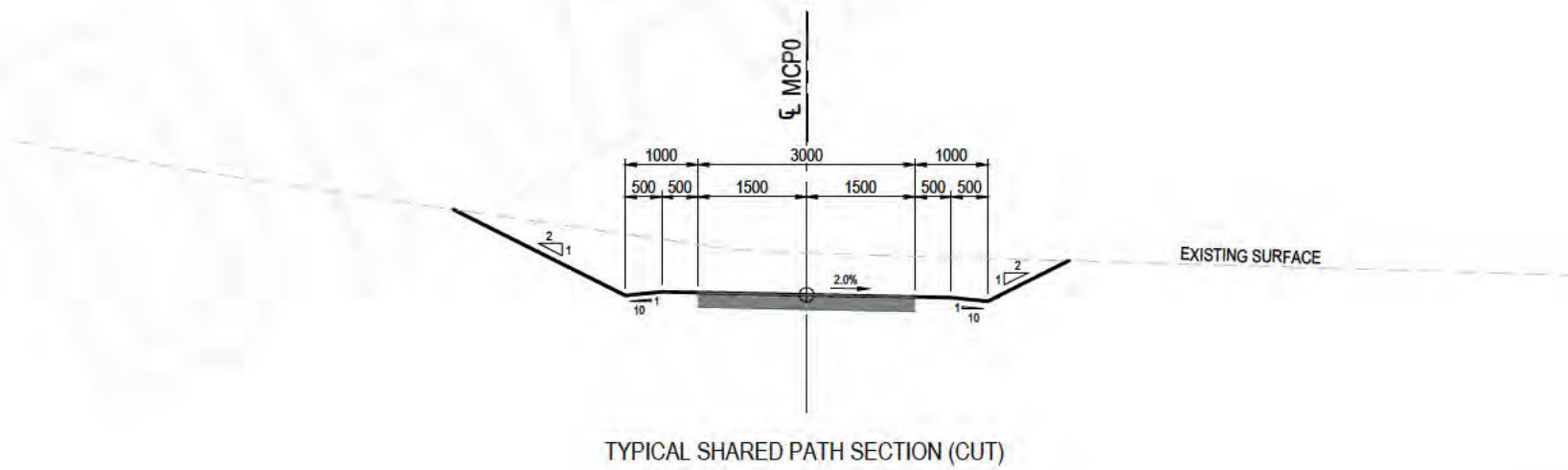
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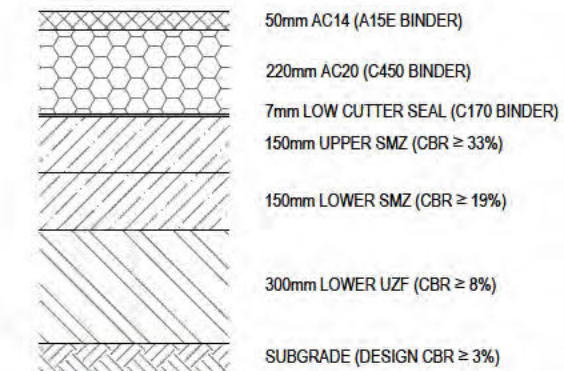
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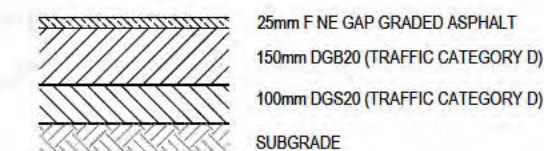
TYPICAL SHARED PATH SECTION (FILL)



TYPICAL SHARED PATH SECTION (CUT)



PAVEMENT TYPE 2A
PAVEMENT WIDENING
FULL DEP H ASPHALT



PAVEMENT TYPE 5
ASPHALT SHARED USER PATH

NOTE:
1. PAVEMENT DESIGN TO BE CONF RMED AT DR PHASE

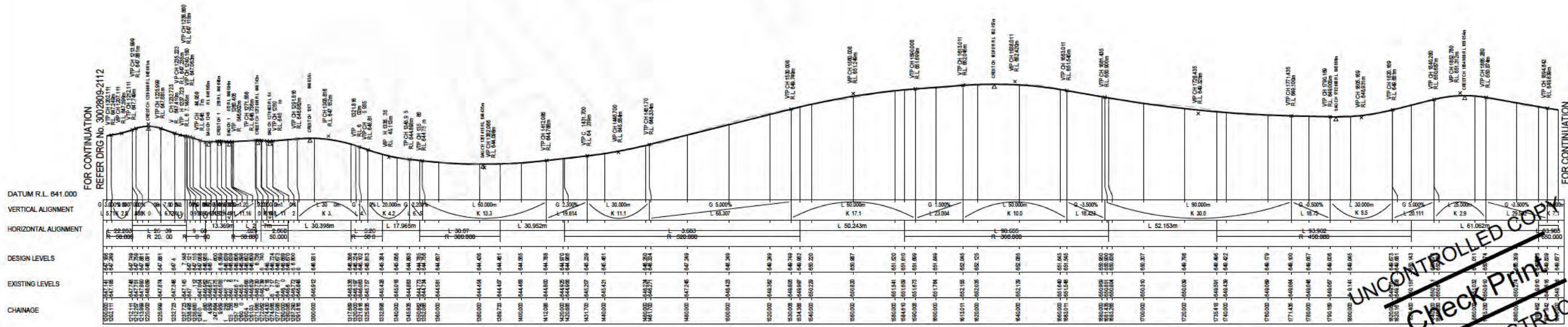
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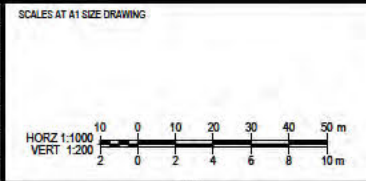
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LONGITUDINAL SECTION ALONG CONTROL MCP0
HORIZONTAL 1: 1000
VERTICAL 1: 200

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SMC PROJECT No 3002809

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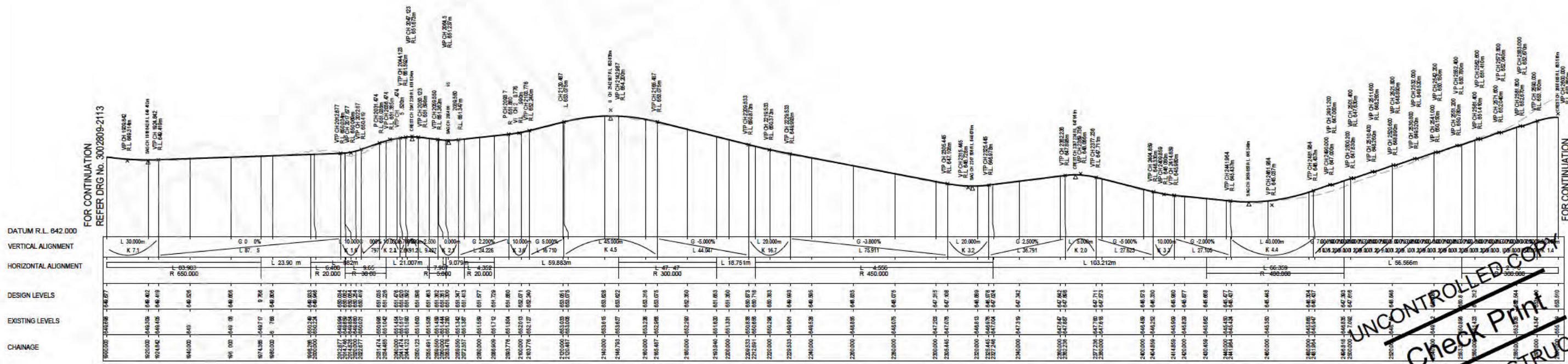
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LONGITUDINAL SECTION ALONG CONTROL MCP0
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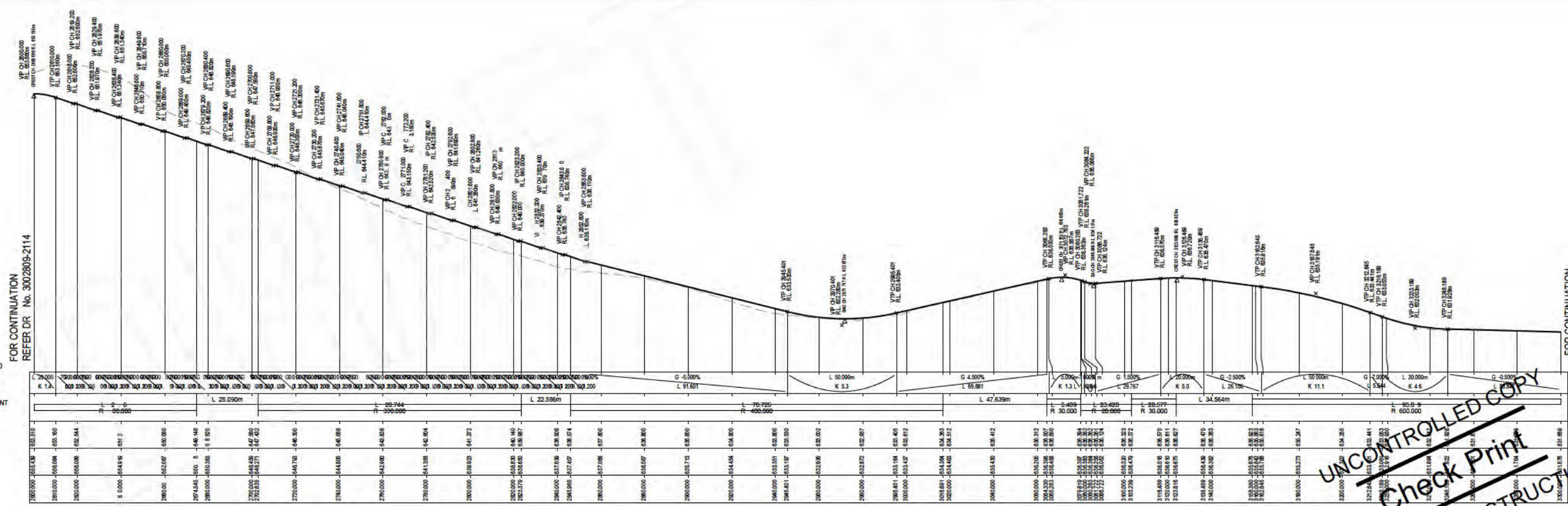
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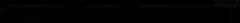
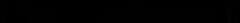
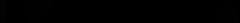
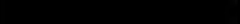
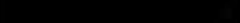
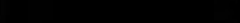
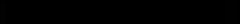
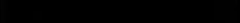
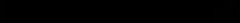
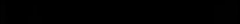
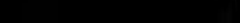
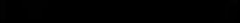
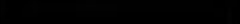
SMC
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© ABN 47 065 475 140
SUITE 2, LEVEL 1, 243 NORTH-BOURNE AVENUE
LYNEHAM ACT 2602 AUSTRALIA
SMC PROJECT No 3002809

CHECK PRINT		PRELIM <input type="checkbox"/>	FINAL <input type="checkbox"/>
DISCIPLINE		INITIAL	DATE
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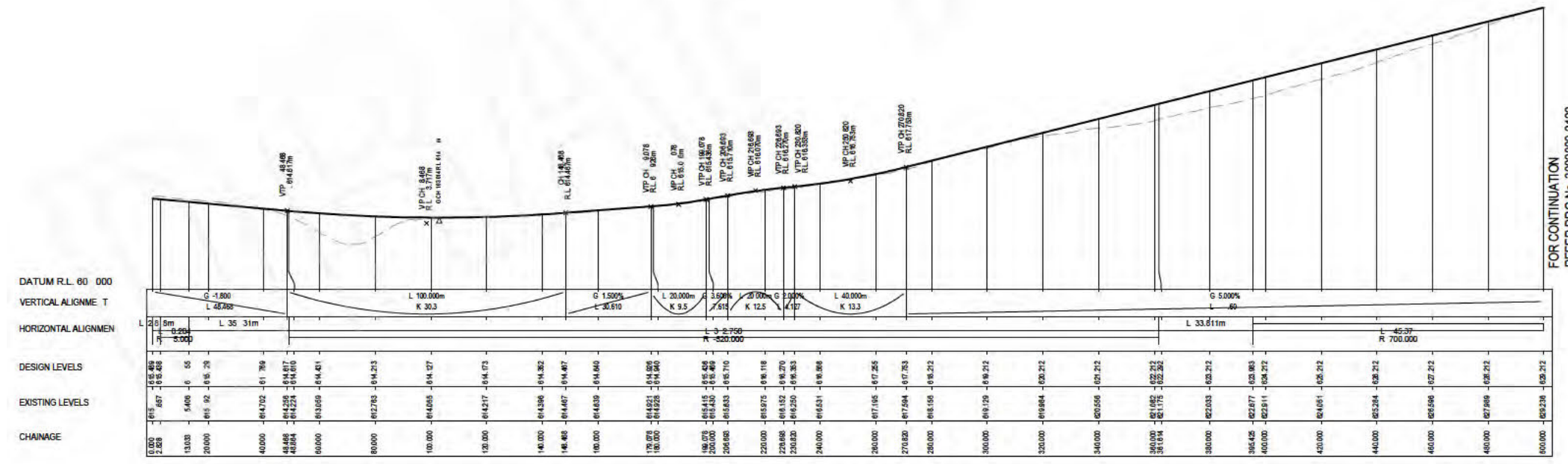
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LEGEND

-  NEW SHARED USER PATH
-  PROPOSED VEE CHANNEL LINED

-  EXIST NG CHANNEL LINED
-  EXIST NG VEE CHANNEL LINED
-  EXIST NG VEE CHANNEL UNLINED
-  EXIST NG CULVERT
-  EXIST NG WATER MAIN
-  EXIST NG SEWER MAIN
-  EXIST NG GAS MA N
-  EXIST NG STREET LIGHTING
-  EXIST NG ELECTRICITY HV
-  EXIST NG ELECTRICITY ABOVE GROUND
-  EXIST NG TELSTRA
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150mm ON ORIGINAL



LONGITUDINAL SECTION ALONG CONTROL MC20 (VERTICAL GRADE MAXIMUM 5%)

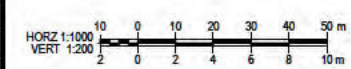

HORIZONTAL 1:1000
VERTICAL 1:200

FOR CONTINUATION
REFER DRG No. 3002809-2122

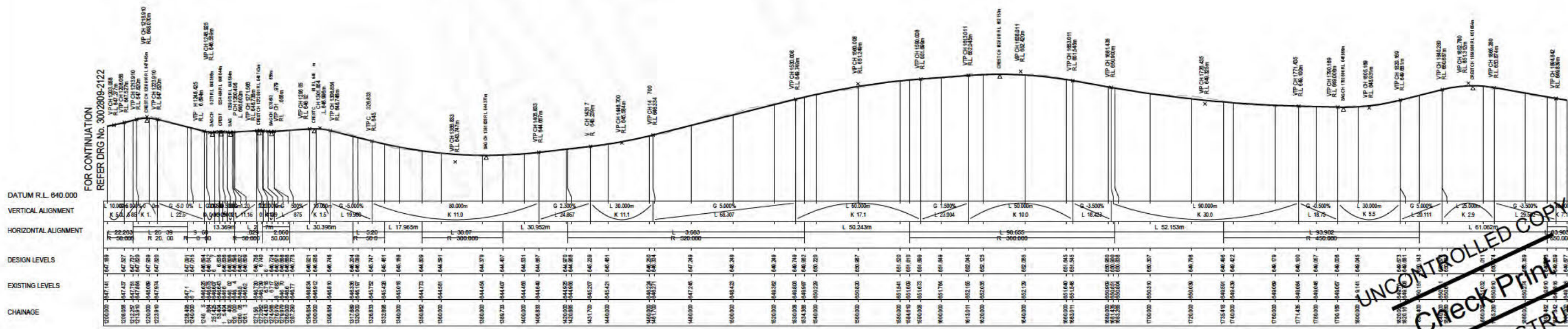
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		DESIGN CHECK			
PROJECT MANAGER		DESIGNER  Member of the Stantec Group SMEC AUSTRALIA PTY LTD © ABN 47 065 475 140 SUITE 2, LEVEL 1, 243 NORTH-BOURNE AVENUE LYNEHAM ACT 2602 AUSTRALIA SMEC PROJECT No 3002809			
PROJECT DIRECTOR					
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DISCIPLINE		DATE		SCALE AS SHOWN	
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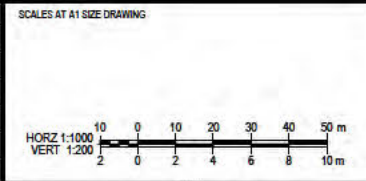
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DESIGNER

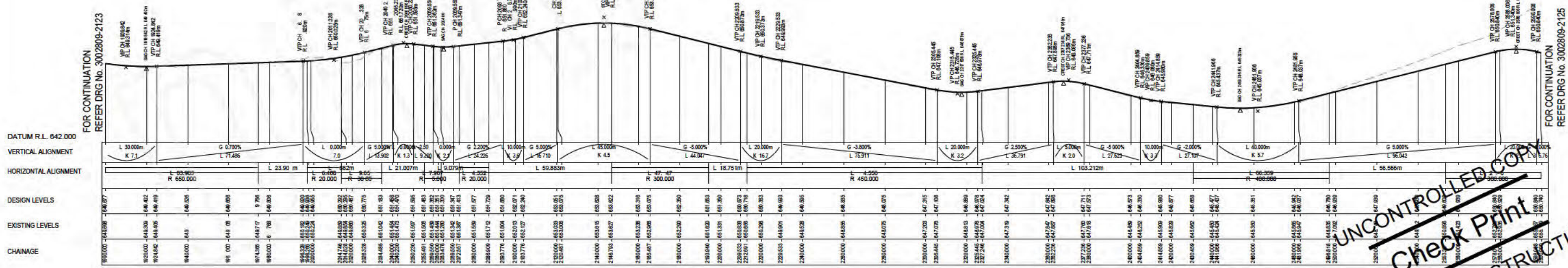
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ABN 47 065 475 140
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LYNEHAM ACT 2602 AUSTRALIA
SMC PROJECT No 3002809

CHECK PRINT		PRELIM <input type="checkbox"/>	FINAL <input type="checkbox"/>
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PROJECT TITLE MOUNT TAYLOR SHARED USER PATH FEASIBILITY STUDY OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 3 OF 6		SCALE AS SHOWN	PHASE FEASIB LITY	PROJECT / DRAWING No. 3002809-2123	REVISION A
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150mm ON ORIGINAL

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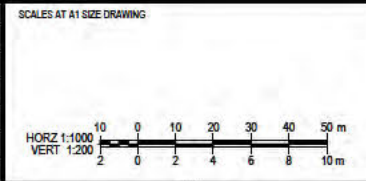
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HORIZONTAL 1 : 1000
VERTICAL 1 : 200

FOR CONTINUATION
REFER DRG No. 3002809-2123

FOR CONTINUATION
REFER DRG No. 3002809-2125

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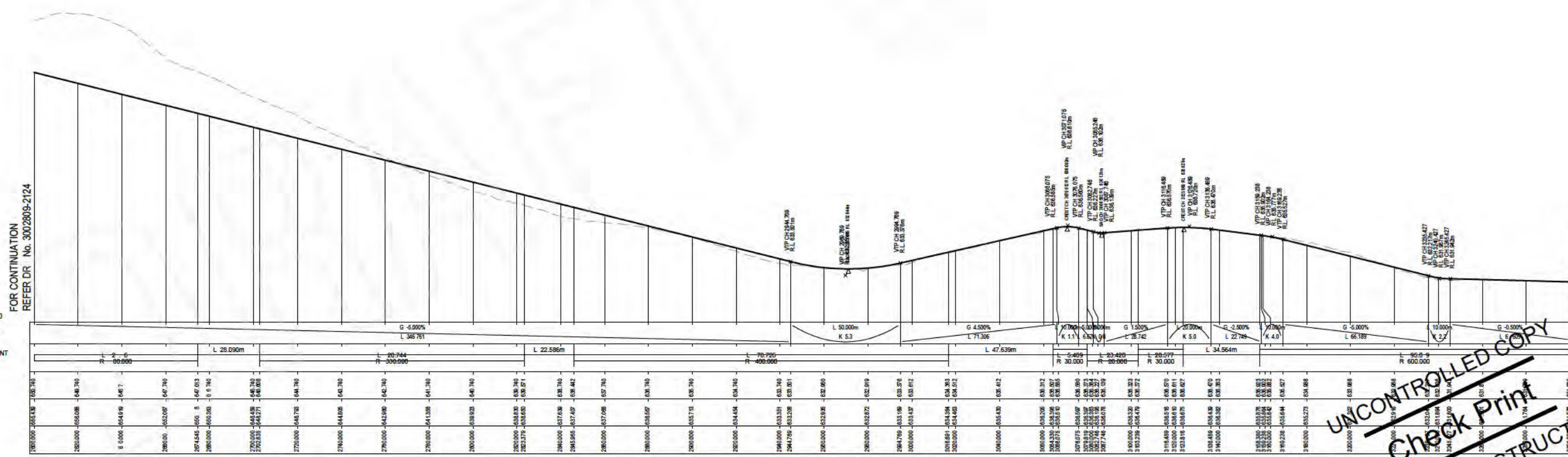
DESIGNER
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LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002809

CHECK PRINT		PRELIM	FINAL
DISCIPLINE		INITIAL	DATE
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DISCIPLINE			
BACKDRAFTED/CORRECTED			
CONFIRMED			

PROJECT TITLE MOUNT TAYLOR SHARED USER PATH FEASIBILITY STUDY OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 4 OF 6		SCALE AS SHOWN	PHASE FEASIB LITY	PROJECT / DRAWING No. 3002809-2124	REVISION A
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SCALE 1: 1000



LONGITUDINAL SECTION ALONG CONTROL MC20 (VERTICAL GRADE MAXIMUM 5%)
HORIZONTAL 1: 1000
VERTICAL 1: 200

150mm ON ORIGINAL
A1
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FOR CONTINUATION
REFER DR No. 3002809-2124

FOR CONTINUATION
REFER DRG No. 3002809-2126

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TITLE	NAME
DRAFTER	[REDACTED]
DRAFTING CHECK	[REDACTED]
DESIGNER	[REDACTED]
DESIGN CHECK	[REDACTED]
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PROJECT DIRECT	[REDACTED]

SCALES AT A1 SIZE DRAWING

HORIZ 1:1000
VERT 1:200

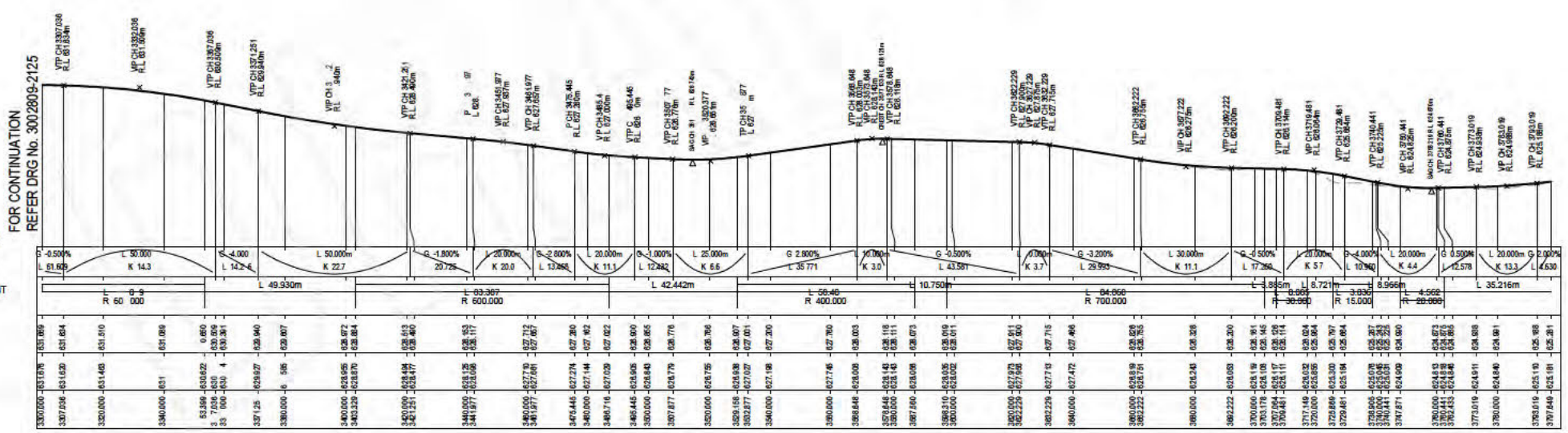
DESIGNER

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LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002809

CHECK PRINT		PRELIM <input type="checkbox"/>	FINAL <input type="checkbox"/>
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PROJECT TITLE MOUNT TAYLOR SHARED USER PATH FEASIBILITY STUDY OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 5 OF 6		SCALE AS SHOWN	PHASE FEASIB LITY	PROJECT / DRAWING No. 3002809-2125	REVISION A
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SCALE 1: 1000



LONGITUDINAL SECTION ALONG CONTROL MC20 (VERTICAL GRADE MAXIMUM 5%)



HORIZONTAL 1: 1000
VERTICAL 1: 200


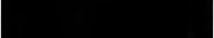
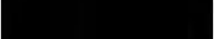
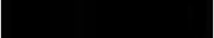
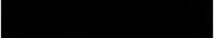
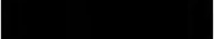
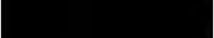
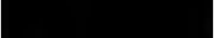
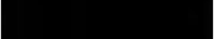
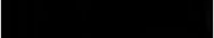



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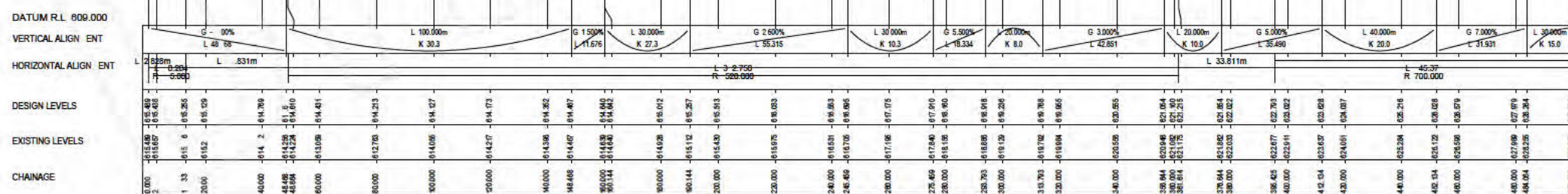
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						TITLE PROJECT MANAGER	
SCALES AT A1 SIZE DRAWING HORIZ 1:1000 VERT 1:200		DESIGNER SMEC Member of the Stantec Group SMEC AUSTRALIA PTY LTD © ABN 47 065 475 140 SUITE 2, LEVEL 1, 243 NORTH-BOURNE AVENUE LYNEHAM ACT 2602 AUSTRALIA SMEC PROJECT No 3002809		CHECK PRINT PRELIM <input type="checkbox"/> FINAL <input type="checkbox"/> INITIAL DATE			
PROJECT TITLE MOUNT TAYLOR SHARED USER PATH FEASIBILITY STUDY OPTION 02 - MC20 PLAN AND LONGITUDINAL SECTION SHEET 6 OF 6		SCALE AS SHOWN	PHASE FEASIB LITY	PROJECT / DRAWING No. 3002809-2126	REVISION A		

LEGEND

-  NEW SHARED USER PATH
-  PROPOSED VEE CHANNEL LINED

-  EXIST NG CHANNEL LINED
-  EXIST NG VEE CHANNEL LINED
-  EXIST NG VEE CHANNEL UNLINED
-  EXIST NG CULVERT
-  EXIST NG WATER MAIN
-  EXIST NG SEWER MAIN
-  EXIST NG GAS MA N
-  EXIST NG STREET LIGHTING
-  EXIST NG ELECTRICITY HV
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-  EXIST NG OPTUS OPTICAL FIBRE

150mm ON ORIGINAL



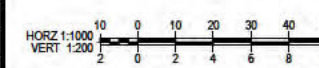
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 HORIZONTAL 1: 1000
 VERTICAL 1: 200

FOR CONTINUATION
 REFER DRG No. 3002809-2132

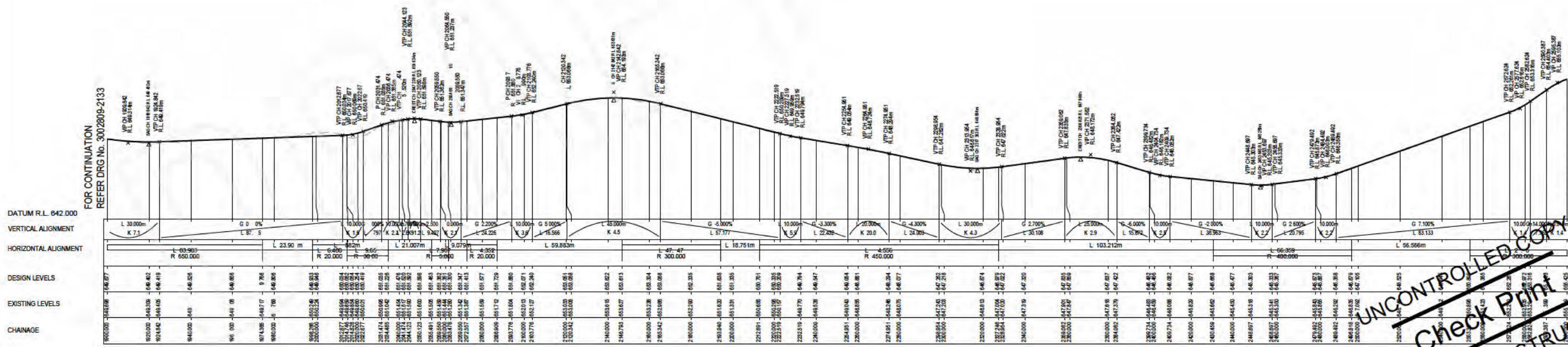
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SCALES AT A1 SIZE DRAWING HORIZ 1:1000 VERT 1:200				DESIGNER SMEC Member of the Stantec Group SMEC AUSTRALIA PTY LTD © ABN 47 065 475 140 SUITE 2, LEVEL 1, 243 NORTH-BOURNE AVENUE LYNEHAM ACT 2602 AUSTRALIA SMEC PROJECT No 3002809	
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SCALE AS SHOWN		PHASE FEASIB LITY		PROJECT / DRAWING No. 3002809-2131	
REVISION A		DATE		BY	

150mm ON ORIGINAL



LONGITUDINAL SECTION ALONG CONTROL MC30 (VERTICAL GRADE CLOSELY MATCHING THE EXISTING GROUND)

HORIZONTAL 1: 1000
VERTICAL 1: 200

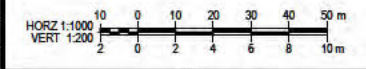
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REFER DRG No. 3002809-2133

FOR CONTINUATION
REFER DRG No. 3002809-2135

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REVISION
IN PROGRESS

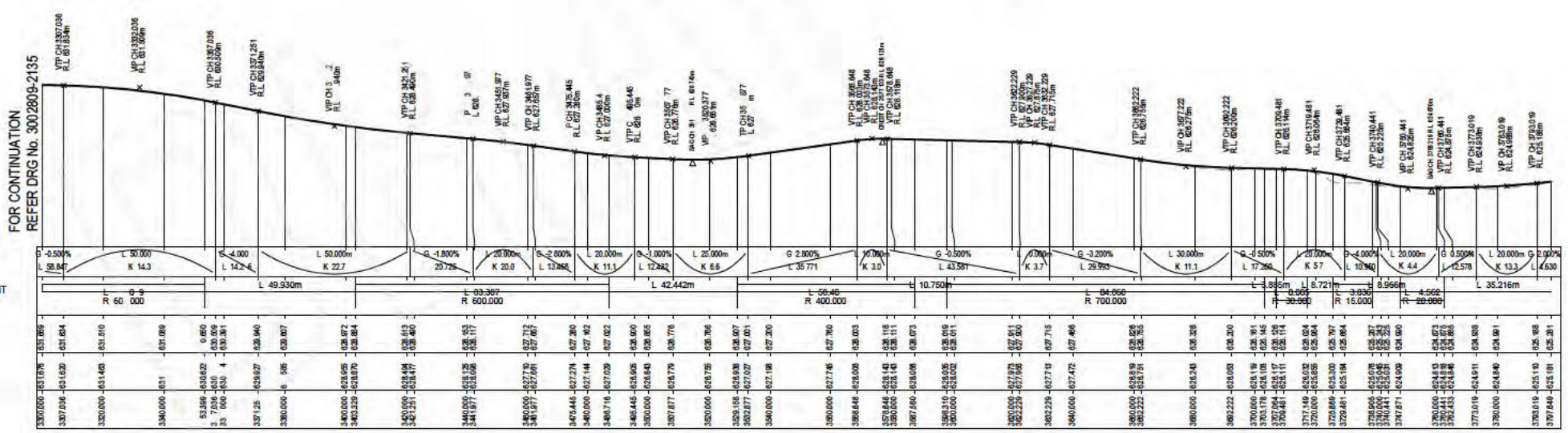


DESIGNER

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LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002809

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DISCIPLINE		INITIAL	DATE
DISCIPLINE			
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DISCIPLINE			
BACKDRAFTED/CORRECTED			
CONFIRMED			

PROJECT TITLE		MOUNT TAYLOR SHARED USER PATH FEASIBILITY STUDY OPTION 03 - MC30 PLAN AND LONGITUDINAL SECTION SHEET 4 OF 6	
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AS SHOWN	FEASIBILITY	3002809-2134	A

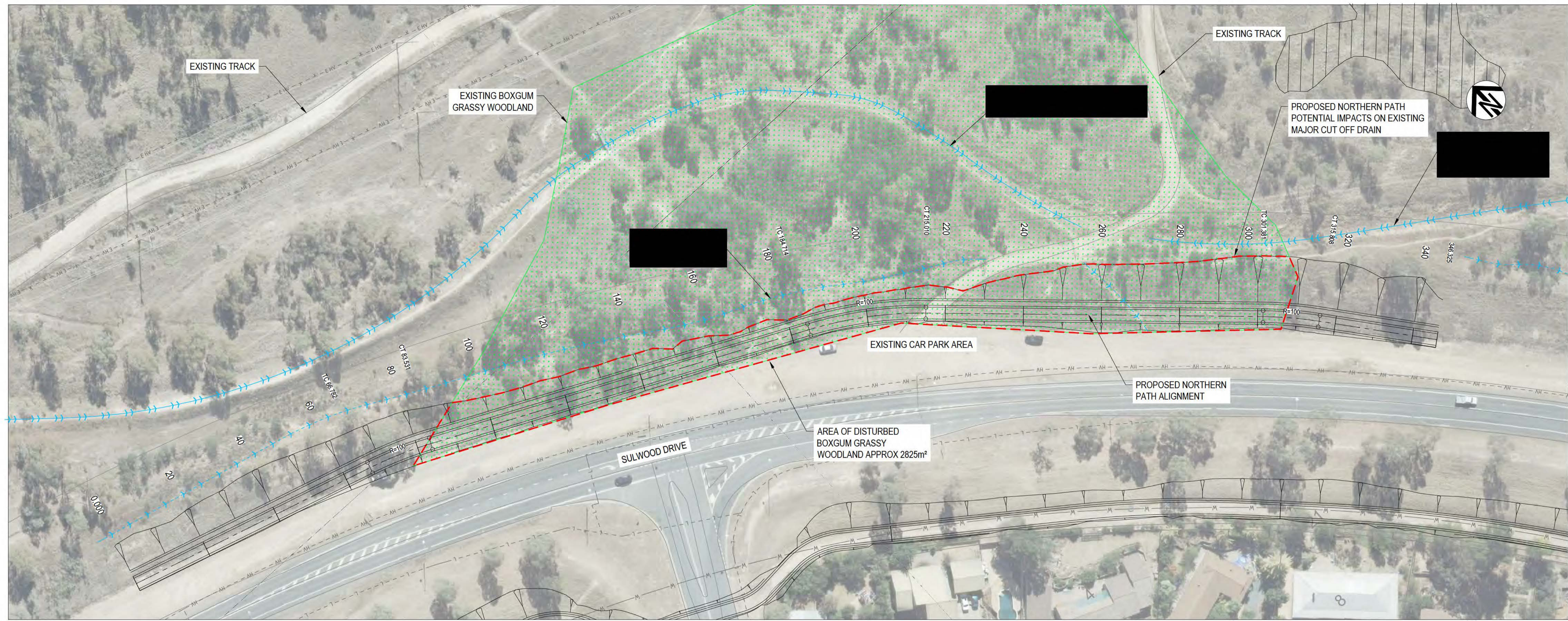


LONGITUDINAL SECTION ALONG CONTROL MC30 (VERTICAL GRADE CLOSELY MATCHING THE EXISTING GROUND)
 HORIZONTAL 1:1000
 VERTICAL 1:200

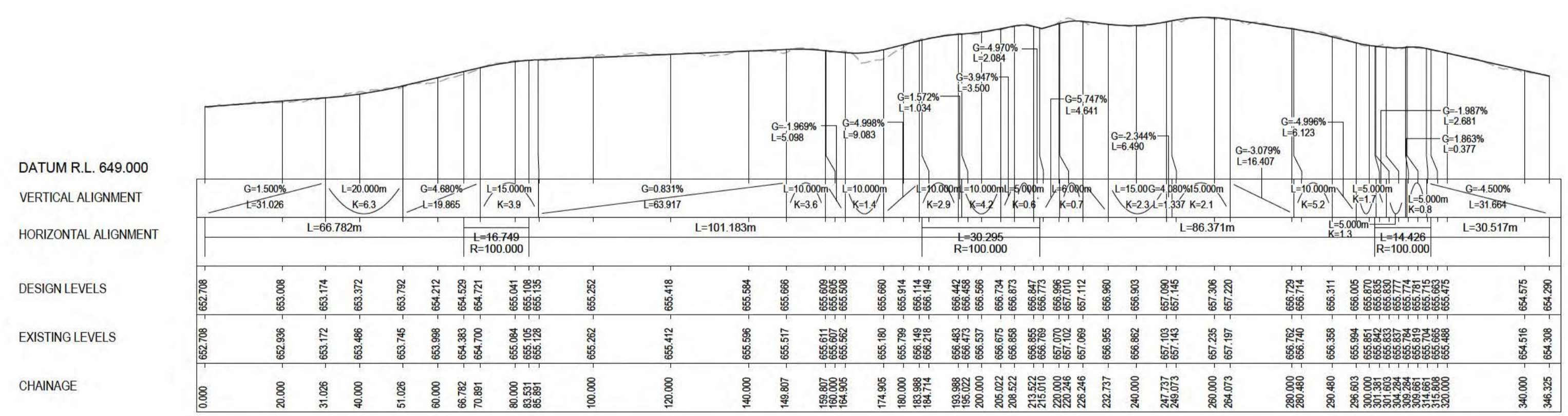
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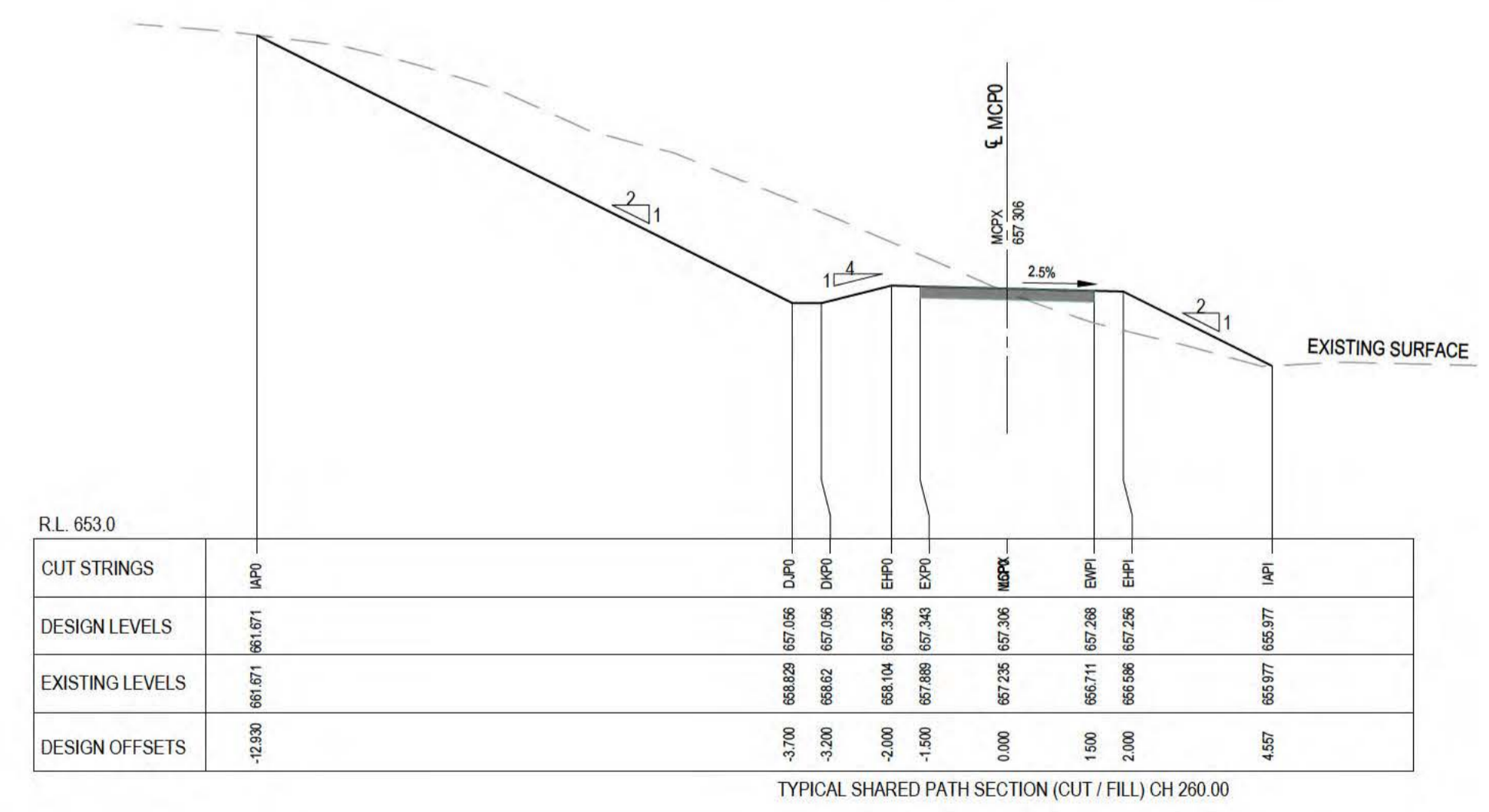
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				REVISION A	



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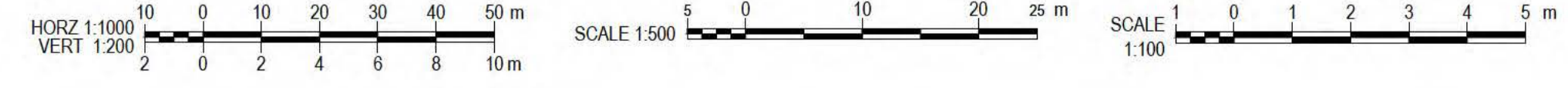


LONGITUDINAL SECTION ALONG CONTROL MCPX
HORIZONTAL 1: 1000
VERTICAL 1: 200



TYPICAL SHARED PATH SECTION (CUT / FILL) CH 200.00

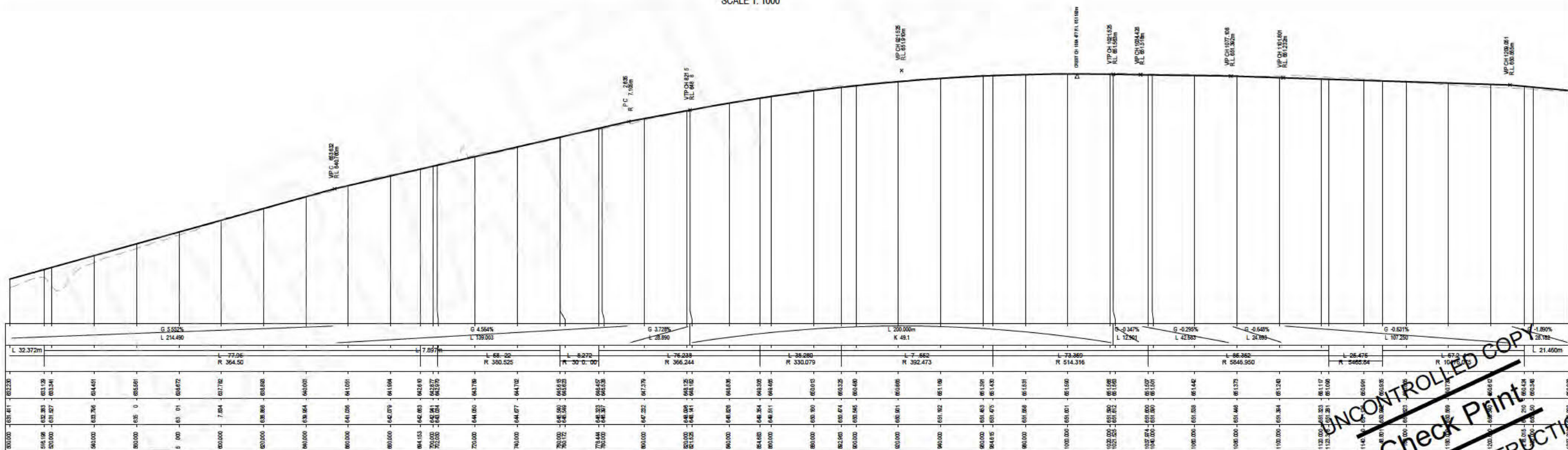
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**MOUNT TAYLOR
NORTHERN PATH ALIGNMENT**

**INFORMATION DOCUMENT
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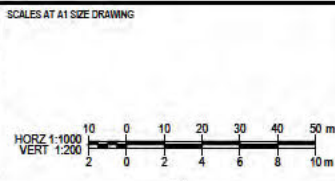
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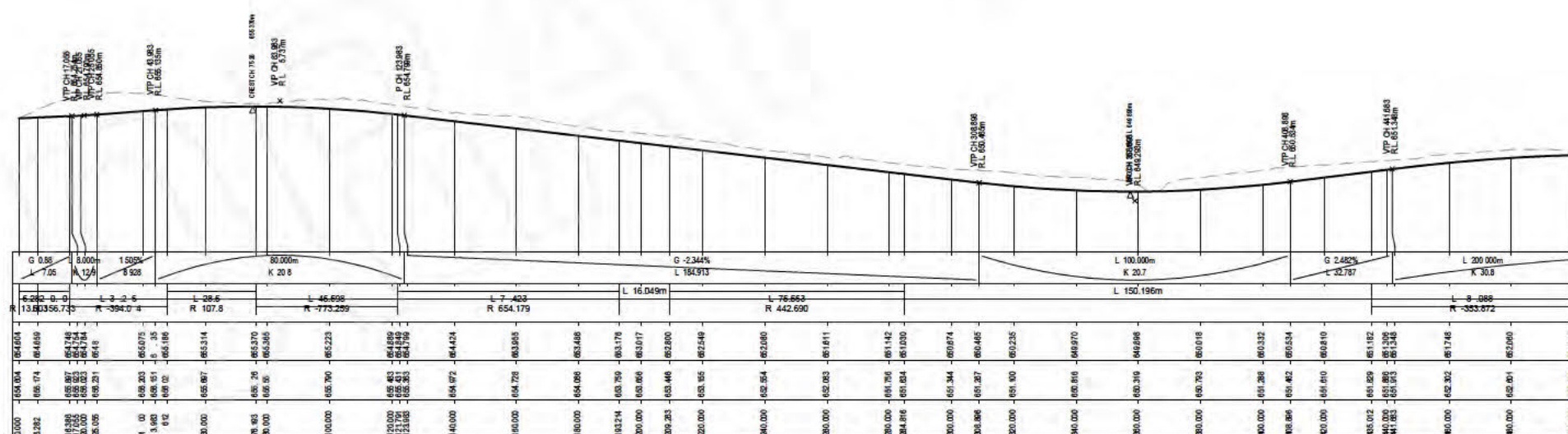
SMEC
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LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002809

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PLAN
SCALE 1: 1000



LONGITUDINAL SECTION ALONG CONTROL MCP3
HORIZONTAL 1: 1000
VERTICAL 1: 200

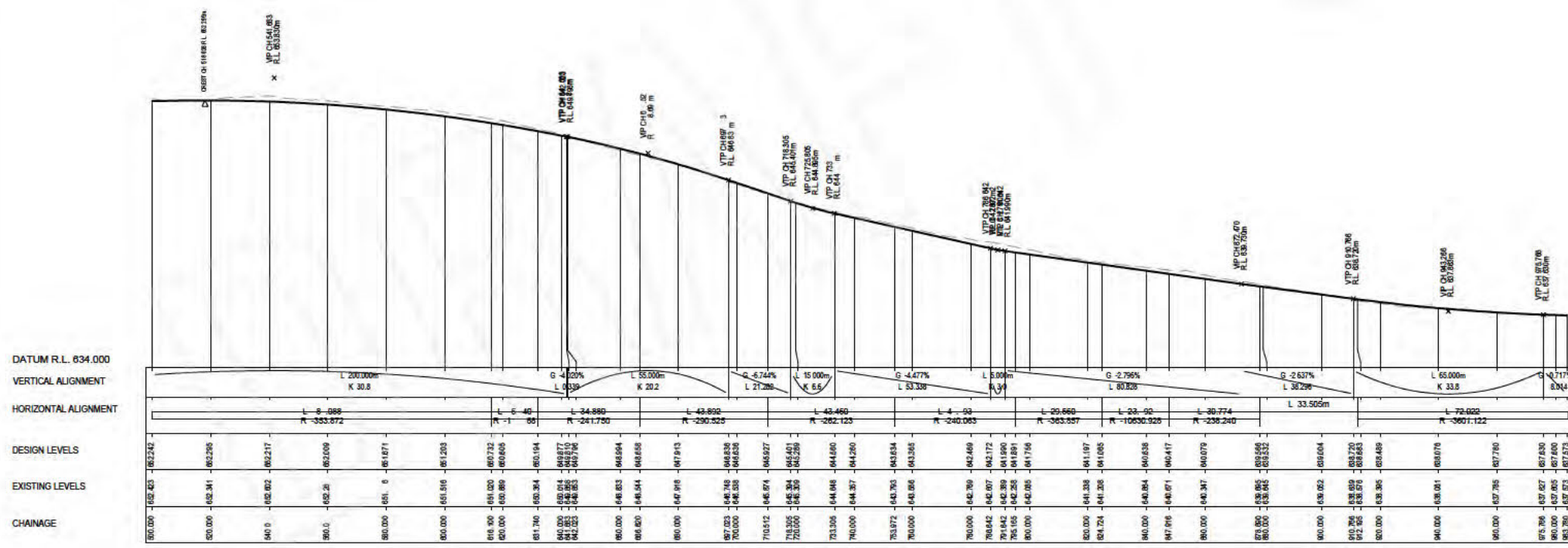
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LONGITUDINAL SECTION ALONG CONTROL MCP3
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VERTICAL 1 : 200

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PROJECT DIRECTOR		SMC		SCALE AS SHOWN PHASE FEASIBILITY PROJECT / DRAWING No. 3002809-2155 REVISION A							

Appendix B Drawings Package 2 - Carpark Extension



ACT
Government

Transport Canberra & City Services

MT TAYLOR CARPARK, SULWOOD DRIVE - MANNHEIM STREET INTERSECTION, WANNIASSA

FEASIBILITY STUDY PACKAGE 02

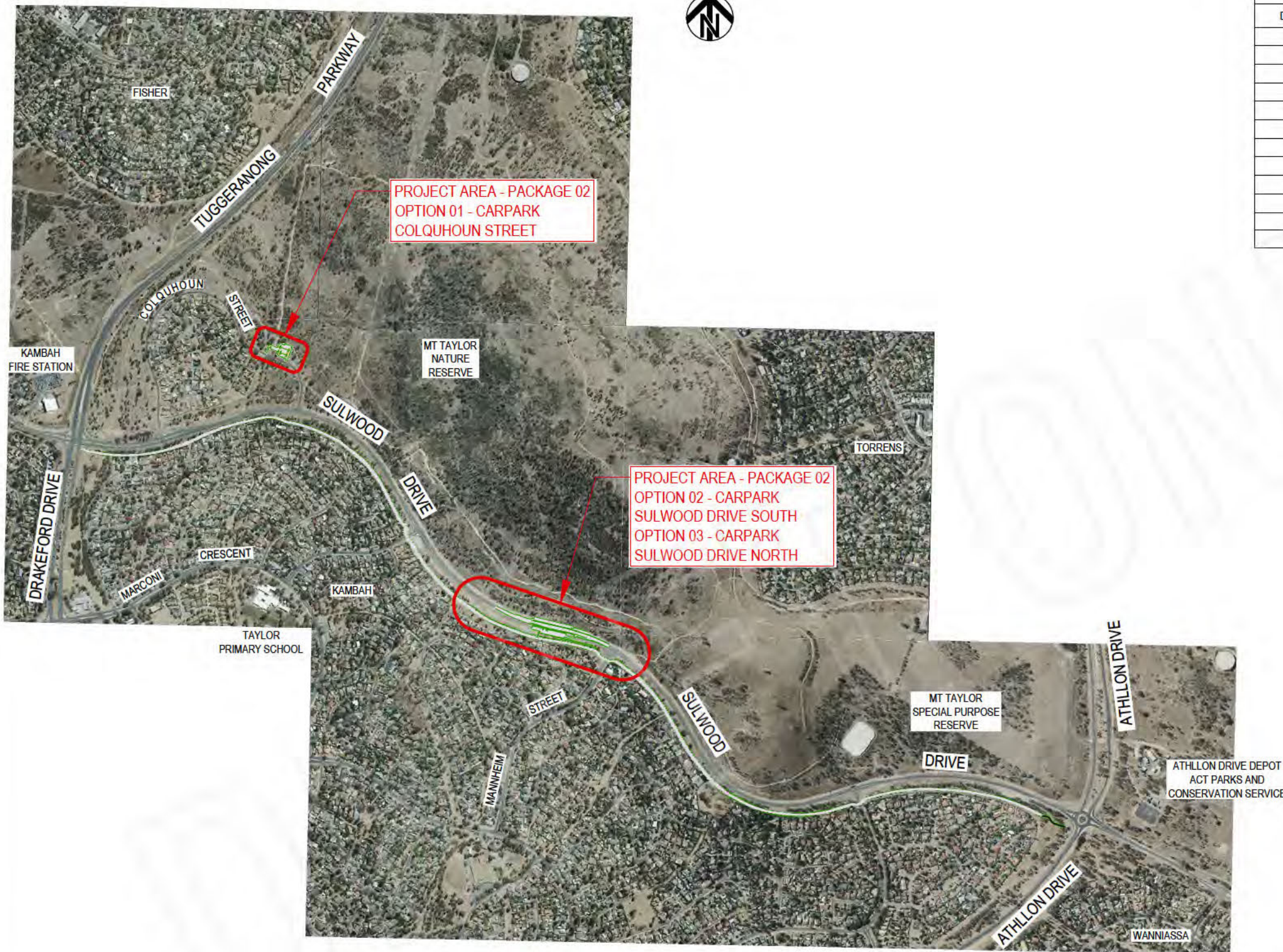
NOVEMBER 2020



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Project Number 3002809



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DRAWING NUMBER	DRAWING TITLE
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3002809-2201	LOCALITY PLAN AND DRAWING INDEX
3002809-2202	GENERAL NOTES AND LEGEND
3002809-2204	LEGEND
3002809-2211	OPTION 01 - COLQUHOUN STREET GENERAL ARRANGEMENT PLAN SHEET 1
3002809-2221	OPTION 02 - SULWOOD DRIVE SOUTH GENERAL ARRANGEMENT PLAN SHEET 1
3002809-2231	OPTION 03 - SULWOOD DRIVE NORTH GENERAL ARRANGEMENT PLAN SHEET 1

LOCALITY PLAN
SCALE 1: 7500

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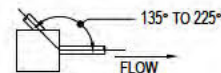
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LOCALITY PLAN AND DRAWING INDEX				
SCALE	PHASE	PROJECT / DRAWING No.	REVISION	
AS SHOWN	FEASIB LITY	3002809-2201	A	

GENERAL:

1. DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. DIMENSIONS SHOWN FOR PIPES REFER TO THE NOMINAL PIPE DIAMETER IN MILLIMETRES.
3. DIMENSIONS SHOWN FOR BOX CULVERTS REFER TO THE BOX CULVERT'S NOMINAL INTERNAL HEIGHT x SPAN IN MILLIMETRES.
4. STATIONS AND REDUCED LEVELS ARE IN METRES.
5. REDUCED LEVELS ARE RELATED TO THE AUSTRALIAN HEIGHT DATUM.
6. THE CO-ORDINATE SYSTEM USED IN ALL DRAWINGS IS THE CANBERRA MAP GRID (STROMLO).
7. ALL LOCATIONS, ORIENTATION AND LEVELS SHALL BE VERIFIED ON SITE BEFORE COMMENCING ANY WORK. DO NOT OBTAIN DIMENSIONS FROM SCALING. EXISTING SURFACE LEVELS ON THE DRAWINGS ARE INDICATIVE ONLY. REFER DISCREPANCIES TO THE PRINCIPAL AUTHORISED PERSON.
8. THE DOCUMENTED DRAINAGE SYSTEM IS DETAILLED ONLY FOR THE PERMANENT ROAD CONFIGURATION UNLESS NOTED OTHERWISE. CONSTRUCTION DRAINAGE SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
9. PIPES THROUGH PITS ARE TO BE ALIGNED WITH THE UPSTREAM PIPE CENTRELINE TO THE OUTLET PIPE CENTRELINE AT DOWNSTREAM PIT FACE AS SHOWN:



10. ANY PERMITS FOR DIVERSION WORKS REQUIRED DURING CONSTRUCTION SHALL BE OBTAINED PRIOR TO CONSTRUCTION WORKS.
11. EXISTING STORMWATER DRAINAGE PIPES, PITS AND MANHOLES WITHIN THE LIMIT OF WORKS SHALL BE REMOVED OR MODIFIED AS SPECIFIED. ANY EXPOSED EXISTING REINFORCEMENT TO BE PROTECTED IN ACCORDANCE WITH REQUIREMENTS FOR NEW CONSTRUCTION.

DRAINAGE PIPE AND CULVERTS

1. ALL PIPES ARE TO BE STEEL REINFORCED SPUN CONCRETE UNLESS NOTED OTHERWISE. ALL CONCRETE PIPES SHALL HAVE HS3 TYPE INSTALLATION AS PER AS3725.
2. CONCRETE PIPE CLASSES FOR CROSS DRAINAGE CULVERTS HAVE BEEN DETERMINED FOR OPERATIONAL TRAFFIC LOADING (W80, A160, M1600, S1600 & HLP400), BASED ON TYPE HS3 SUPPORT AND TRENCH OR EMBANKMENT CONDITION. INSTALLATION TO AS3725 SPECIFICATION UNLESS OTHERWISE NOTED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE COVER FOR CONSTRUCTION LOADINGS. TABLE BELOW PROVIDES MINIMUM COVER REQUIREMENTS FOR VARIOUS CONSTRUCTION LOADINGS.

CONSTRUCTION LOADING	MINIMUM HEIGHT ABOVE PIPE (CLASS 2) (mm)	MINIMUM HEIGHT ABOVE PIPE (CLASS 3) (mm)	MINIMUM HEIGHT ABOVE PIPE (CLASS 4 TO 8) (mm)
CPAA CONSTRUCTION VEHICLE - VIBRATORY PLATE (UP TO 135 kg WEIGHT)	150	150	150
CPAA CONSTRUCTION - VIBRATORY TRENCH ROLLER (2t)	300	300	300
CPAA CONSTRUCTION - SMOOTH DRUM VIBRATORY ROLLER (7t STATIC WEIGHT)	500	400	300
CPAA CONSTRUCTION - SMOOTH DRUM VIBRATORY ROLLER (10t STATIC WEIGHT) AND T44 TRUCK LOAD	600	400	400
CAT 65t	1500	900	700

3. CONCRETE PIPES ARE TO BE RUBBER RING JOINTED SPIGOT AND SOCKET TYPE UNLESS NOTED OTHERWISE.
4. FINISH SURFACE LEVEL SHOWN IN THE LONGITUDINAL SECTIONS AT HEADWALL LOCATIONS IS THE LEVEL OF THE EMBANKMENT SLOPE IF NO HEADWALL/PIPE WAS PRESENT. THE CONTRACTOR SHALL FULLY FILL AROUND AND OVER THE PIPES TO PROVIDE THE REQUIRED COVER TO THE PIPES.

SCOUR PROTECTION:

1. THE THICKNESS OF THE RIP-RAP PROTECTION SHALL BE A MINIMUM OF TWICE THE D₉₀ STONE SIZE SPECIFIED ON THE DRAWINGS. THE STONE SHALL BE WELL GRADED IN ACCORDANCE WITH THE FOLLOWING TABLE:

ROCK SIZE	% ASSNG (BY WEIGHT)
2 x D ₉₀	100%
D	40-60%
0.3 x D ₅	1 - 20%

2. ROCK IS TO BE HARD, DENSE, DURABLE, RESISTANT TO WEATHERING AND ANGULAR IN SHAPE.
3. THE PROPERTIES OF THE ROCK SHALL BE IN ACCORDANCE WITH RMS SPECIFICATION R55 TO THE SATISFACTION OF THE PRINCIPAL AUTHORISED PERSON.
4. AN APPROXIMATE GUIDE TO STONE SHAPE IS THE BREADTH OR THICKNESS OF A SINGLE STONE SHOULD BE NOT LESS THAN ONE-THIRD ITS LENGTH.
5. STONE SHOULD BE DARK IN COLOUR EITHER GREY OR DARK BROWN SIMILAR TO SOIL PROFILE.
6. GEOTEXTILE UNDER ROCK FILLED MATTRESS AND RIP-RAP IN ACCORDANCE WITH RMS SPECIFICATIONS R63.
7. ALL ROCK MATTRESSES TO COMPRISE GALMAC COATED WITH UPVC COATING AND AGGREGATES TO AS2758.4. CONSTRUCTED IN ACCORDANCE WITH RMS SPECIFICATIONS R55.

DRAINAGE STRUCTURES:

1. STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ACTING ON COMPLETED STRUCTURES. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND PROVISION OF ANY TEMPORARY BRACING, PROPPING, ETC. ACQUIRED DURING CONSTRUCTION. STRUCTURES SHALL BE MAINTAINED IN A STABLE CONDITION AT ALL TIMES AND NO PART SHALL BE OVERSTRESSED.
2. PROVIDE A BLINDING LAYER CONCRETE NO LESS THAN 50mm THICK.
3. UNSUITABLE FOUNDING MATERIAL FOR PIPES AND STRUCTURES SHALL BE REMOVED OR IMPROVED AT THE PAPER'S RECTION.
4. FOR LOCATION AND LEVEL OF PITS AND HEADWALLS REFER DRAINAGE DRAWING SCHEDULES.
5. ALL REINFORCEMENT SHALL COMPLY WITH AS/NZS 4671 GRADE D500L (FITMENTS) AND D500N (TYPICAL).
6. WHERE A CONNECTION IS MADE TO AN EXISTING DRAINAGE PIPE OR PIT, THE LEVEL OF THAT ELEMENT MUST BE SURVEYED PRIOR TO CONSTRUCTION, IF ANY DISCREPANCIES REFER TO THE PRINCIPAL AUTHORISED PERSON FOR CLARIFICATION.

SERVICES:

1. ALL EXISTING SERVICE LOCATIONS SHOWN ON DRAWINGS ARE INDICATIVE ONLY AND ARE TO BE VERIFIED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING SERVICES DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL SET OUT THE WORKS PRIOR TO EXCAVATION. WHERE A CONFLICT OR INCONSISTENCY BECOMES APPARENT THE CONTRACTOR SHALL NOTIFY THE PRINCIPAL AUTHORISED PERSON IMMEDIATELY.
4. ALL DISTURBED SURFACES ARE TO BE RESTORED TO ORIGINAL CONDITION, UNLESS NOTED OTHERWISE.
5. ALL SERVICES TRENCHES IN EXISTING PAVEMENT OR IN AREAS WHERE NEW PAVEMENT IS TO BE CONSTRUCTED SHALL BE BACKFILLED WITH DGS20 COMPACTED TO 95% MDD.
6. LOCATION AND LEVEL OF ALL SERVICES CROSSINGS OF PROPOSED WORKS MUST BE CHECKED FOR CONFLICT WITH EXISTING SERVICES. ANY CONFLICTS TO BE RESOLVED WITH THE PRINCIPAL AUTHORISED PERSON.
7. WORK BENEATH OVERHEAD AND OVER UNDERGROUND POWERLINES TO BE TAKEN WITH CARE IN ACCORDANCE WITH THE "WORKING IN THE VICINITY OF OVERHEAD AND UNDERGROUND ELECTRICAL LINES" CODE OF PRACTICE FROM WORKSAFE AUSTRALIA.

PAVEMENT NOTES:

1. PAVEMENT PROFILES ARE PROVIDED ON DRG 3002750-PV-1 01.
2. PAVEMENT INTERFACE JOINTS SHALL BE LOCATED OUTSIDE VEHICULAR WHEEL PATHS.
3. THE NOMINATED THICKNESS OF A LAYER OF DENSE GRADED ASPHALT MUST BE WITHIN THE LIMITS SPECIFIED IN RMS SPECIFICATION R116. LAYER THICKNESS SHOULD EXCEED THE MAXIMUM NOMINAL STONE SIZE BY AT LEAST 10 TIMES, BUT NO MORE THAN 5 TIMES. NOMINAL LAYER THICKNESS TO BE IN ACCORDANCE WITH RMS SPECIFICATION R116.

NOMINAL AGGREGATE SIZE (mm)	RECOMMENDED THICKNESS (mm)
7	20
10	30
14	4
20	75

4. IF UNSUITABLE SUBGRADE MATERIALS IS ENCOUNTERED ONE OF THE FOLLOWING MEASURES ARE TO BE EMPLOYED, SUBJECT TO APPROVAL:

- DRAINAGE AND DRYING OF THE INSITU MATERIAL
- EXCAVATION AND REPLACEMENT OF SOFT MATERIAL WITH SELECT MATERIAL
- STABILISATION OF TOP 300mm SUBGRADE MATERIAL WITH QUICK SET CEMENT
- PROVISION OF A WORKING PLATFORM OF CEMENT TREATED MATERIAL
- USE OF GEOTEXTILES
- ALL WORKS IN ACCORDANCE WITH RMS SPECIFICATION R44.

5. THE AGGREGATE SPREAD RATE AND BANDER APPLICATION RATE FOR SPRAYED SEALS ARE SUBJECT TO CONFIRMATION AT CONSTRUCTION.
6. QUICK DRY PRIME (QDP) TO BE CONSTRUCTED TO MANUFACTURERS SPECIFICATIONS
7. PRIME, AMC00, AMC4 AND AMC7 TO BE CONSTRUCTED IN ACCORDANCE WITH RMS SPECIFICATION R106

EARTHWORKS NOTES

1. SOFT GROUND ENCOUNTERED IN ACCESS ROADS PLATFORMS SHALL BE STABILISED USING ROCKFILL/ EARTHFILL OR OTHER APPROVED TREATMENTS.
2. TEMPORARY BATTER SLOPES SHALL NOT BE STEEPER THAN 1V:2H.
3. IN ADDITION TO TEMPORARY SITE DRAINAGE THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING IF REQUIRED DURING REMOVAL AND REPLACEMENT OF INSITU MATERIAL.

FOUNDATION AND EARTHWORKS NOTES

1. PRIOR TO THE PLACEMENT OF ANY FILL ALL FOUNDATIONS FOR EARTHWORKS SHALL BE INSPECTED AND APPROVED BY THE SITE GEOTECHNICAL REPRESENTATIVE.

EROSION AND SEDIMENT CONTROL

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE CONSTRUCTED ACCORDING TO THE BEST PRACTICE REQUIREMENTS OF "MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION - BLUE BOOK" LANDCOM 4TH ED MARCH 2004 AND VOLUME 2 - MAIN ROAD CONSTRUCTION. EXAMPLE EROSION AND SEDIMENT CONTROL MEASURES FOR CONSTRUCTION ARE PROVIDED. THESE ARE PRINCIPLE EXAMPLES FOR REFERENCE AND REQUIRE FURTHER DETAIL FOR CONSTRUCTION ACTIVITIES.
2. PROGRESSIVE EROSION AND SEDIMENT CONTROL PLANS (PESCP'S) FOR ALL STAGES OF THE PROJECT ARE TO BE PREPARED AND IMPLEMENTED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. THE PESCP'S SHOULD DETAIL CONTROLS SUCH AS SEDIMENT FENCES, DIVERSION DRAINS, DRAIN LINES, SAND BAGS AND GRAVEL BAGS.
4. REDUCE THE AREA OF SOIL DISTURBANCE BY RETAINING VEGETATION, STAGGING WORKS AND BY MINIMISING THE CONSTRUCTION FOOTPRINT.
5. PROGRESSIVELY REVEGETATE OR STABILISE DISTURBED AREAS SUCH AS TEMPORARY TOPSOIL STOCKPILES, VERGES AND BATTERS.
6. STOCKPILES ARE TO BE STABILISED IF LEFT FOR 2 WEEKS OR MORE.
7. PRIOR TO ANY WORKS, INSTALL DIVERSION DRAINS, SEDIMENTATION PONDS AND OTHER SURFACE RUNOFF CONTROL MEASURES TO CONTROL RUNOFF ONTO, ACROSS AND FROM THE SITE; AND TO TRAP SEDIMENT.
8. PROVIDE FOR RAINFALL EVENTS BY ENSURING THE FUNCTIONALITY AND CAPACITY OF EROSION AND SEDIMENT CONTROL, PROVIDING ADDITIONAL CONTROLS WHERE REQUIRED, STABILISING BARE GROUND AND TEMPORARY STOCKPILES AND AVOIDING GROUND DISTURBANCE.
9. INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROLS DAILY AND WITHIN 24 HOURS OF RAINFALL EVENTS.
10. INTERCEPT OFFSITE SURFACE FLOW AND DIVERT OR ALLOW THROUGH CROSS DRAINAGE PIPES/CULVERTS WITHOUT MIXING WITH CONSTRUCTION RUNOFF.
11. IN AREAS OF HIGH VELOCITY RUNOFF, REDUCE FLOW VELOCITIES USING APPROPRIATE MEASURES SUCH AS CHECK DAMS AND DIVERT TO STABLE LOCATIONS OR CONTROLS.
12. ENSURE CONSTRUCTION RUNOFF DOES NOT DIRECTLY DISCHARGE FROM SITE. USE SEDIMENT CONTROLS TO FILTER RUNOFF BEFORE DISCHARGING.
13. ALL OPEN DRAINAGE CHANNELS ARE TO BE LINED WITH MATERIAL SUCH AS GEO-FABRIC JUTE MESH OR SOIL STABILISING AGENT.
14. CHECK DAMS ARE TO BE INSTALLED AT APPROPRIATE INTERVALS ALONG LINED DRAINAGE CHANNELS TO REDUCE EROSION POTENTIAL OF THE FLOW.
15. ENSURE THAT THE SOIL AND WATER MANAGEMENT PLAN DESCRIBES THE MANAGEMENT OF TEMPORARY CONSTRUCTION PONDS, INCLUDING ACCEPTED WATER QUALITY PRACTICES AND STANDARDS SUCH AS FLOCCULATION AND SETTLING, TESTING FOR TSS, TURBIDITY, PH, OIL AND GREASE, DEWATERING AND DOCUMENTATION OF RESULTS.
16. DURING ALL STAGES OF CONSTRUCTION. IN CATCHMENTS WHERE SEDIMENT PONDS ARE LOCATED, CONSTRUCTION RUNOFF IS TO BE DIVERTED TO SEDIMENT PONDS VIA DIVERSION DRAINS, TEMPORARY CATCH DRAINS, AND PERMANENT OR TEMPORARY DRAINAGE PIPES OR SIMILAR.
17. LOCATION AND DESIGN OF SEDIMENT PONDS TO BE CONFIRMED ON SITE AND MODIFIED AS REQUIRED.

150mm ON ORIGINAL
160
140
130
120
110
100
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			PROJECT DIRECTOR		
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		DESIGNER			
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		SCALE AS SHOWN		PHASE FEASIB LITY	
		REVISION A		GENERAL NOTES AND LEGEND	

LEGEND

PROPOSED

-  PROPOSED PAVEMENT
-  PROPOSED MEDIAN
-  PROPOSED MEDIAN LANDSCAPE
-  PROPOSED VEE CHANNEL LINED
-  PROPOSED VEE CHANNEL UNLINED
-  PROPOSED STORM WATER PIPE

EXIST NG

-  EXIST NG CHANNEL LINED
-  EXIST NG VEE CHANNEL LINED
-  EXIST NG VEE CHANNEL UNLINED
-  EXIST NG CULVERT
-  EXIST NG WATER MAIN
-  EXIST NG SEWER MAIN
-  EXIST NG GAS MAIN
-  EXIST NG STREET LIGHTING
-  EXIST NG ELECTRICITY HV
-  EXIST NG ELECTRICITY ABOVE GROUND
-  EXIST NG TELSTRA
-  EXIST NG OPTUS
-  EXIST NG OPTUS OPTICAL FIBRE
-  EXIST NG MEDIAN / TRAFFIC ISLAND

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A1

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			PROJECT DIRECTOR		

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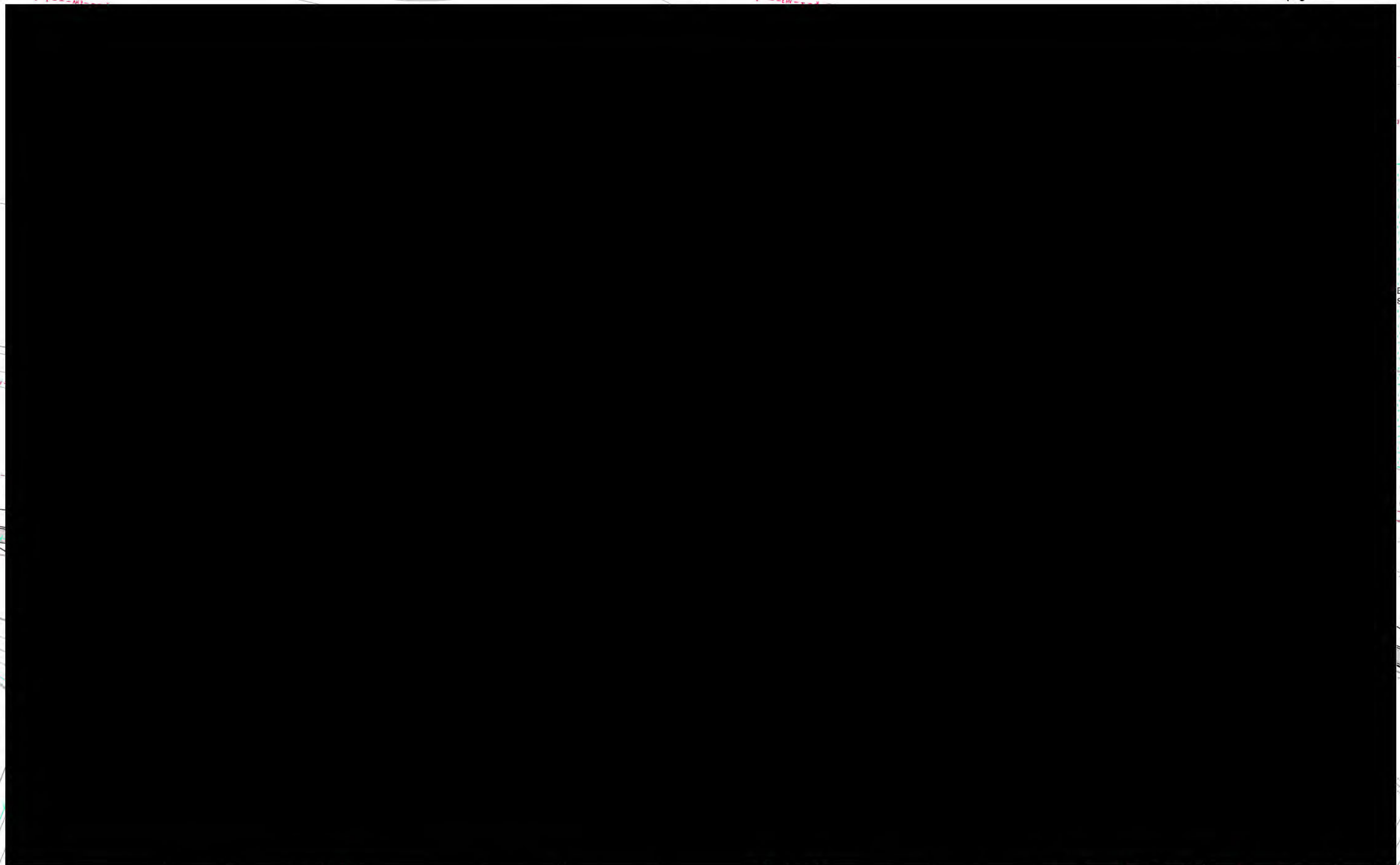

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LEGEND			
SCALE AS SHOWN	PHASE FEASIBILITY	PROJECT / DRAWING No. 3002809-2204	REVISION A

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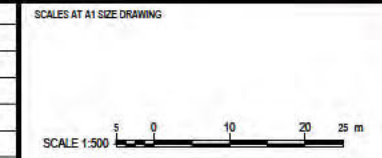


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PROJECT MANAGER	[REDACTED]
PROJECT DIRECTOR	[REDACTED]



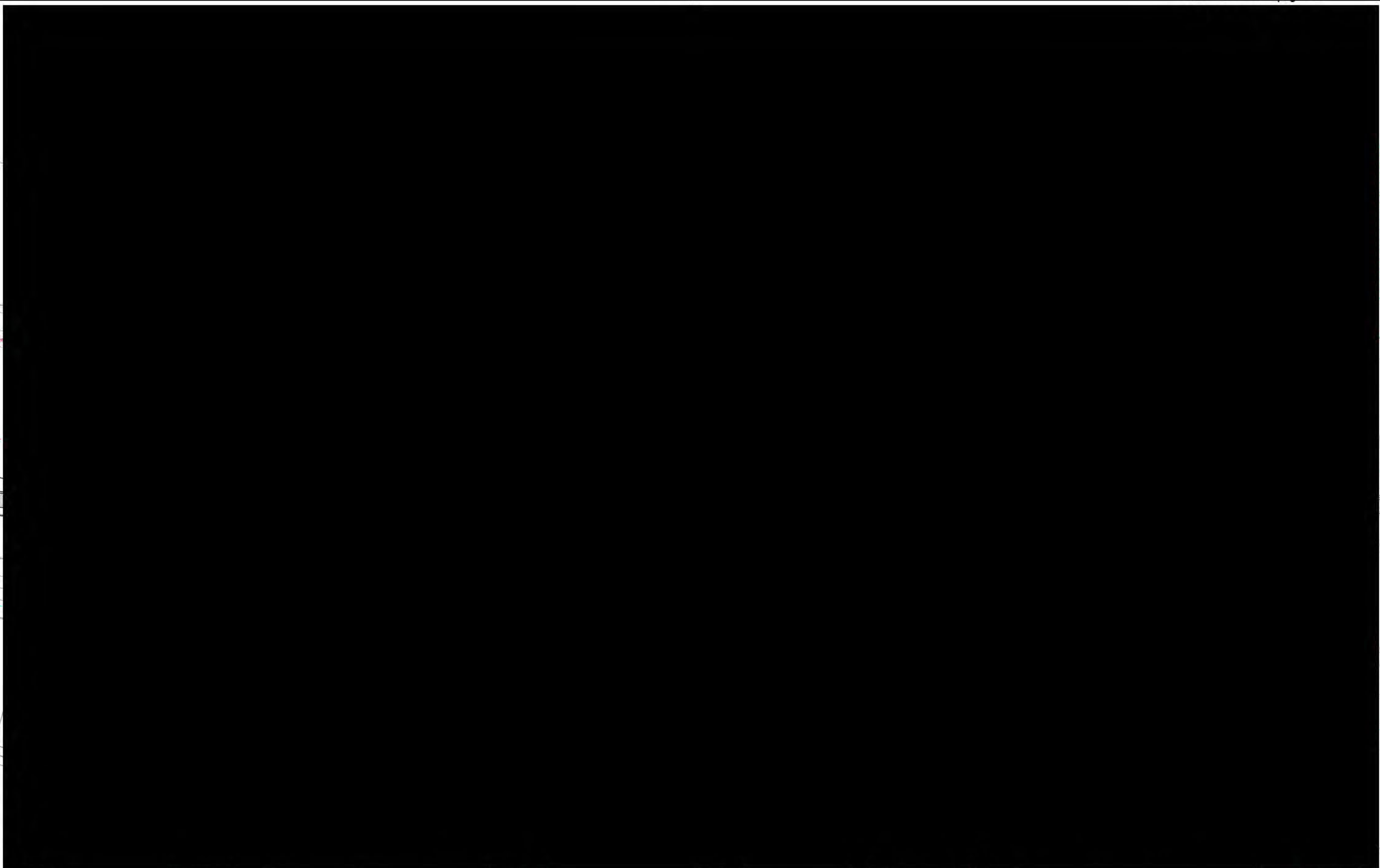
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MOUNT TAYLOR CARPARK, SULWOOD DR - MANNHEIM ST INTERSECTION WANNIASSA - FEASIBILITY STUDY			
OPTION 02 - SULWOOD DRIVE SOUTH GENERAL ARRANGEMENT PLAN SHEET 1			
SCALE AS SHOWN	PHASE FEASIBILITY	PROJECT / DRAWING No. 3002809-2221	REVISION A



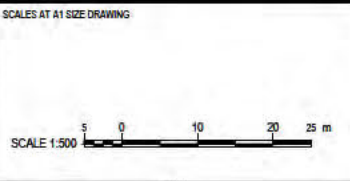
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PROJECT DIRECTOR	[REDACTED]



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MOUNT TAYLOR CARPARK, SULWOOD DR - MANNHEIM ST INTERSECTION WANNIASSA - FEASIBILITY STUDY			
OPTION 03 - SULWOOD DRIVE NORTH GENERAL ARRANGEMENT PLAN SHEET 1			
SCALE AS SHOWN	PHASE FEASIBILITY	PROJECT / DRAWING No. 3002809-2231	REVISION A

Appendix C Drawings Package 3 – Intersection Upgrade



ACT
Government

Transport Canberra & City Services

MT TAYLOR INTERSECTION UPGRADE, SULWOOD DRIVE - MANNHEIM STREET INTERSECTION, WANNIASSA

FEASIBILITY STUDY PACKAGE 03

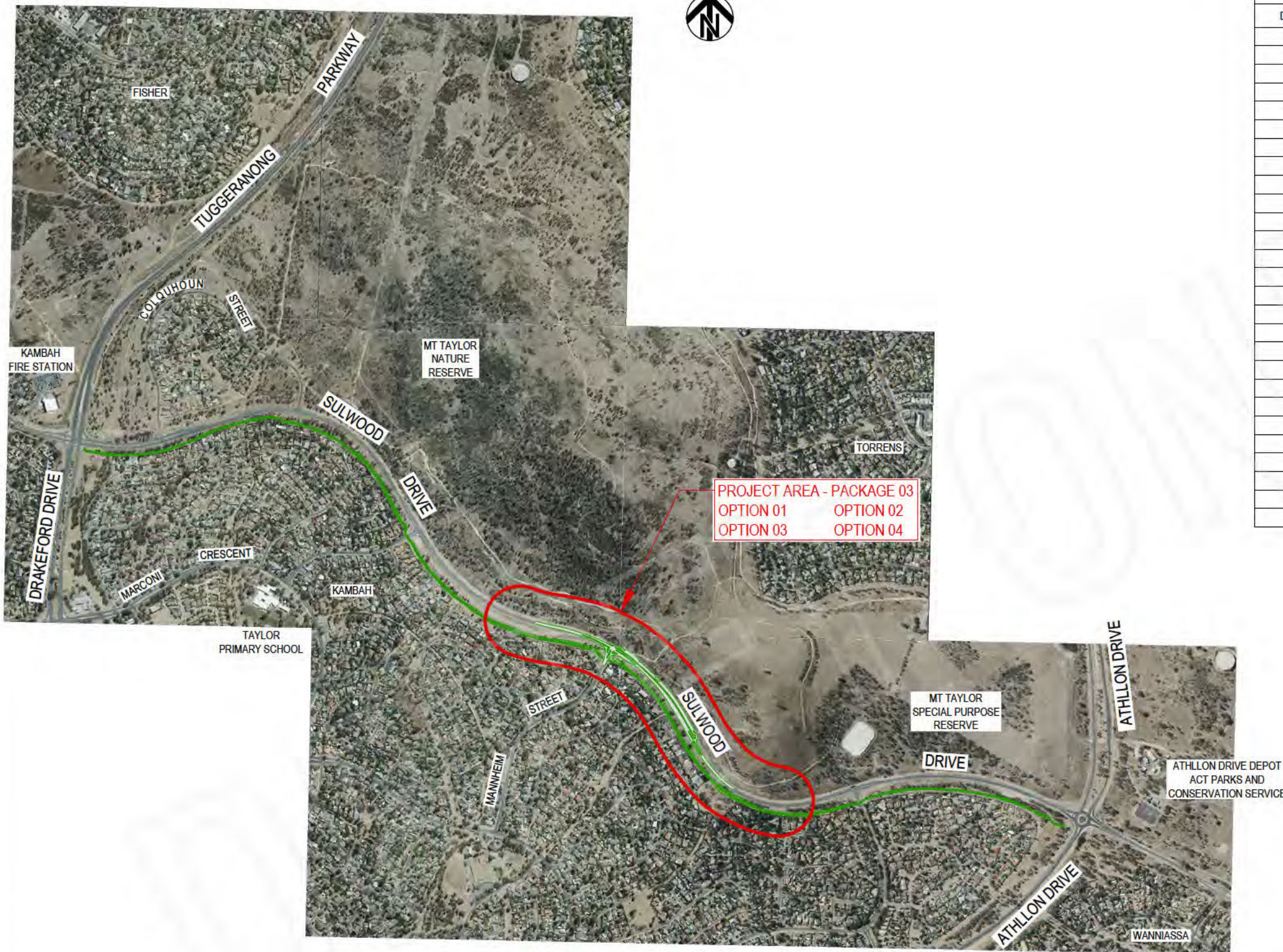
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Project Number 3002809



LOCALITY PLAN
SCALE 1: 7500

DRAWING INDEX	
DRAWING NUMBER	DRAWING TITLE
3002809-2300	COVER SHEET
3002809-2301	LOCALITY PLAN AND DRAWING INDEX
3002809-2302	GENERAL NOTES
3002809-2304	LEGEND
3002809-2311	OPTION 01 GENERAL ARRANGEMENT PLAN SHEET 1 OF 4
3002809-2312	OPTION 01 GENERAL ARRANGEMENT PLAN SHEET 2 OF 4
3002809-2313	OPTION 01 GENERAL ARRANGEMENT PLAN SHEET 3 OF 4
3002809-2314	OPTION 01 GENERAL ARRANGEMENT PLAN SHEET 4 OF 4
3002809-2321	OPTION 02 GENERAL ARRANGEMENT PLAN SHEET 1 OF 4
3002809-2322	OPTION 02 GENERAL ARRANGEMENT PLAN SHEET 2 OF 4
3002809-2323	OPTION 02 GENERAL ARRANGEMENT PLAN SHEET 3 OF 4
3002809-2324	OPTION 02 GENERAL ARRANGEMENT PLAN SHEET 4 OF 4
3002809-2331	OPTION 03 GENERAL ARRANGEMENT PLAN SHEET 1 OF 4
3002809-2332	OPTION 03 GENERAL ARRANGEMENT PLAN SHEET 2 OF 4
3002809-2333	OPTION 03 GENERAL ARRANGEMENT PLAN SHEET 3 OF 4
3002809-2334	OPTION 03 GENERAL ARRANGEMENT PLAN SHEET 4 OF 4
3002809-2341	OPTION 04 GENERAL ARRANGEMENT PLAN SHEET 1 OF 5
3002809-2342	OPTION 04 GENERAL ARRANGEMENT PLAN SHEET 2 OF 5
3002809-2343	OPTION 04 GENERAL ARRANGEMENT PLAN SHEET 3 OF 5
3002809-2344	OPTION 04 GENERAL ARRANGEMENT PLAN SHEET 4 OF 5
3002809-2345	OPTION 04 GENERAL ARRANGEMENT PLAN SHEET 5 OF 5

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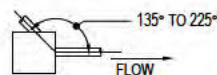
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PROJECT TITLE SULWOOD DRIVE - MANNHEIM STREET INTERSECTION, INTERSECTION UPGRADE - FEASIBILITY STUDY			
LOCALITY PLAN AND DRAWING INDEX			
SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	FEASIBILITY	3002809-2301	A

GENERAL:

1. DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. DIMENSIONS SHOWN FOR PIPES REFER TO THE NOMINAL PIPE DIAMETER IN MILLIMETRES.
3. DIMENSIONS SHOWN FOR BOX CULVERTS REFER TO THE BOX CULVERT'S NOMINAL INTERNAL HEIGHT x SPAN IN MILLIMETRES.
4. STATIONS AND REDUCED LEVELS ARE IN METRES.
5. REDUCED LEVELS ARE RELATED TO THE AUSTRALIAN HEIGHT DATUM.
6. THE CO-ORDINATE SYSTEM USED IN ALL DRAWINGS IS THE CANBERRA MAP GRID (STROMLO).
7. ALL LOCATIONS, ORIENTATION AND LEVELS SHALL BE VERIFIED ON SITE BEFORE COMMENCING ANY WORK. DO NOT OBTAIN DIMENSIONS FROM SCALING. EXISTING SURFACE LEVELS ON THE DRAWINGS ARE INDICATIVE ONLY. REFER DISCREPANCIES TO THE PRINCIPAL AUTHORISED PERSON.
8. THE DOCUMENTED DRAINAGE SYSTEM IS DETAILLED ONLY FOR THE PERMANENT ROAD CONFIGURATION UNLESS NOTED OTHERWISE. CONSTRUCTION DRAINAGE SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
9. PIPES THROUGH PITS ARE TO BE ALIGNED WITH THE UPSTREAM PIPE CENTRELINE TO THE OUTLET PIPE CENTRELINE AT DOWNSTREAM PIT FACE AS SHOWN:



10. ANY PERMITS FOR DIVERSION WORKS REQUIRED DURING CONSTRUCTION SHALL BE OBTAINED PRIOR TO CONSTRUCTION WORKS.
11. EXISTING STORMWATER DRAINAGE PIPES, PITS AND MANHOLES WITHIN THE LIMIT OF WORKS SHALL BE REMOVED OR MODIFIED AS SPECIFIED. ANY EXPOSED EXISTING REINFORCEMENT TO BE PROTECTED IN ACCORDANCE WITH REQUIREMENTS FOR NEW CONSTRUCTION.

DRAINAGE PIPE AND CULVERTS

1. ALL PIPES ARE TO BE STEEL REINFORCED SPUN CONCRETE UNLESS NOTED OTHERWISE. ALL CONCRETE PIPES SHALL HAVE HS3 TYPE INSTALLATION AS PER AS3725.
2. CONCRETE PIPE CLASSES FOR CROSS DRAINAGE CULVERTS HAVE BEEN DETERMINED FOR OPERATIONAL TRAFFIC LOADING (W80, A160, M1600, S1600 & HLP400), BASED ON TYPE HS3 SUPPORT AND TRENCH OR EMBANKMENT CONDITION. INSTALLATION TO AS3725 SPECIFICATION UNLESS OTHERWISE NOTED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE COVER FOR CONSTRUCTION LOADINGS. TABLE BELOW PROVIDES MINIMUM COVER REQUIREMENTS FOR VARIOUS CONSTRUCTION LOADINGS.

CONSTRUCTION LOADING	MINIMUM HEIGHT ABOVE PIPE (CLASS 2) (mm)	MINIMUM HEIGHT ABOVE PIPE (CLASS 3) (mm)	MINIMUM HEIGHT ABOVE PIPE (CLASS 4 TO 8) (mm)
CPAA CONSTRUCTION VEHICLE - VIBRATORY PLATE (UP TO 135 kg WEIGHT)	150	150	150
CPAA CONSTRUCTION - VIBRATORY TRENCH ROLLER (2t)	300	300	300
CPAA CONSTRUCTION - SMOOTH DRUM VIBRATORY ROLLER (7t STATIC WEIGHT)	500	400	300
CPAA CONSTRUCTION - SMOOTH DRUM VIBRATORY ROLLER (10t STATIC WEIGHT) AND T44 TRUCK LOAD	600	400	400
CAT 65t	1500	900	700

3. CONCRETE PIPES ARE TO BE RUBBER RING JOINTED SPIGOT AND SOCKET TYPE UNLESS NOTED OTHERWISE.
4. FINISH SURFACE LEVEL SHOWN IN THE LONGITUDINAL SECTIONS AT HEADWALL LOCATIONS IS THE LEVEL OF THE EMBANKMENT SLOPE IF NO HEADWALL/PIPE WAS PRESENT. THE CONTRACTOR SHALL FULLY FILL AROUND AND OVER THE PIPES TO PROVIDE THE REQUIRED COVER TO THE PIPES.

SCOUR PROTECTION:

1. THE THICKNESS OF THE RIP-RAP PROTECTION SHALL BE A MINIMUM OF TWICE THE D₉₀ STONE SIZE SPECIFIED ON THE DRAWINGS. THE STONE SHALL BE WELL GRADED IN ACCORDANCE WITH THE FOLLOWING TABLE:

ROCK SIZE	% ASSNG (BY WEIGHT)
2 x D ₉₀	100%
D	40-60%
0.3 x D _s	1 - 20%

2. ROCK IS TO BE HARD, DENSE, DURABLE, RESISTANT TO WEATHERING AND ANGULAR IN SHAPE.
3. THE PROPERTIES OF THE ROCK SHALL BE IN ACCORDANCE WITH RMS SPECIFICATION R55 TO THE SATISFACTION OF THE PRINCIPAL AUTHORISED PERSON.
4. AN APPROXIMATE GUIDE TO STONE SHAPE IS THE BREADTH OR THICKNESS OF A SINGLE STONE SHOULD BE NOT LESS THAN ONE-THIRD ITS LENGTH.
5. STONE SHOULD BE DARK IN COLOUR EITHER GREY OR DARK BROWN SIMILAR TO SOIL PROFILE.
6. GEOTEXTILE UNDER ROCK FILLED MATTRESS AND RIP-RAP IN ACCORDANCE WITH RMS SPECIFICATIONS R63.
7. ALL ROCK MATTRESSES TO COMPRISE GALMAC COATED WIRE WITH UPVC COATING AND AGGREGATES TO AS2758.4. CONSTRUCTED IN ACCORDANCE WITH RMS SPECIFICATIONS R55.

DRAINAGE STRUCTURES:

1. STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ACTING ON COMPLETED STRUCTURES. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND PROVISION OF ANY TEMPORARY BRACING, PROPPING, ETC. ACQUIRED DURING CONSTRUCTION. STRUCTURES SHALL BE MAINTAINED IN A STABLE CONDITION AT ALL TIMES AND NO PART SHALL BE OVERSTRESSED.
2. PROVIDE A BLINDING LAYER CONCRETE NO LESS THAN 50mm THICK.
3. UNSUITABLE FOUNDING MATERIAL FOR PIPES AND STRUCTURES SHALL BE REMOVED OR IMPROVED AT THE PIPE'S POSITION.
4. FOR LOCATION AND LEVEL OF PITS AND HEADWALLS REFER DRAINAGE DRAWING SCHEDULES.
5. ALL REINFORCEMENT SHALL COMPLY WITH AS/NZS 4671 GRADE D500L (FITMENTS) AND D500N (TYPICAL).
6. WHERE A CONNECTION IS MADE TO AN EXISTING DRAINAGE PIPE OR PIT, THE LEVEL OF THAT ELEMENT MUST BE SURVEYED PRIOR TO CONSTRUCTION, IF ANY DISCREPANCIES REFER TO THE PRINCIPAL AUTHORISED PERSON FOR CLARIFICATION.

SERVICES:

1. ALL EXISTING SERVICE LOCATIONS SHOWN ON DRAWINGS ARE INDICATIVE ONLY AND ARE TO BE VERIFIED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING SERVICES DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL SET OUT THE WORKS PRIOR TO EXCAVATION. WHERE A CONFLICT OR INCONSISTENCY BECOMES APPARENT THE CONTRACTOR SHALL NOTIFY THE PRINCIPAL AUTHORISED PERSON IMMEDIATELY.
4. ALL DISTURBED SURFACES ARE TO BE RESTORED TO ORIGINAL CONDITION, UNLESS NOTED OTHERWISE.
5. ALL SERVICES TRENCHES IN EXISTING PAVEMENT OR IN AREAS WHERE NEW PAVEMENT IS TO BE CONSTRUCTED SHALL BE BACKFILLED WITH DGS20 COMPACTED TO 95% MDD.
6. LOCATION AND LEVEL OF ALL SERVICES CROSSINGS OF PROPOSED WORKS MUST BE CHECKED FOR CONFLICT WITH EXISTING SERVICES. ANY CONFLICTS TO BE RESOLVED WITH THE PRINCIPAL AUTHORISED PERSON.
7. WORK BENEATH OVERHEAD AND OVER UNDERGROUND POWERLINES TO BE TAKEN WITH CARE IN ACCORDANCE WITH THE "WORKING IN THE VICINITY OF OVERHEAD AND UNDERGROUND ELECTRICAL LINES" CODE OF PRACTICE FROM WORKSAFE AUSTRALIA.

PAVEMENT NOTES:

1. PAVEMENT PROFILES ARE PROVIDED ON DRG 3002750-PV-1 01.
2. PAVEMENT INTERFACE JOINTS SHALL BE LOCATED OUTSIDE VEHICULAR WHEEL PATHS.
3. THE NOMINATED THICKNESS OF A LAYER OF DENSE GRADED ASPHALT MUST BE WITHIN THE LIMITS SPECIFIED IN RMS SPECIFICATION R116. LAYER THICKNESS SHOULD EXCEED THE MAXIMUM NOMINAL STONE SIZE BY AT LEAST 10 TIMES, BUT NO MORE THAN 5 TIMES. NOMINAL LAYER THICKNESS TO BE IN ACCORDANCE WITH RMS SPECIFICATION R116.

NOMINAL AGGREGATE SIZE (mm)	RECOMMENDED THICKNESS (mm)
7	20
10	30
14	4
20	75

4. IF UNSUITABLE SUBGRADE MATERIALS IS ENCOUNTERED ONE OF THE FOLLOWING MEASURES ARE TO BE EMPLOYED, SUBJECT TO APPROVAL:

- DRAINAGE AND DRYING OF THE INSITU MATERIAL
- EXCAVATION AND REPLACEMENT OF SOFT MATERIAL WITH SELECT MATERIAL
- STABILISATION OF TOP 300mm SUBGRADE MATERIAL WITH QUICK LIME OR CEMENT
- PROVISION OF A WORKING PLATFORM OF CEMENT TREATED MATERIAL
- USE OF GEOTEXTILES
- ALL WORKS IN ACCORDANCE WITH RMS SPECIFICATION R44.

5. THE AGGREGATE SPREAD RATE AND BINDER APPLICATION RATE FOR SPRAYED SEALS ARE SUBJECT TO CONFIRMATION AT CONSTRUCTION.
6. QUICK DRY PRIME (QDP) TO BE CONSTRUCTED TO MANUFACTURERS SPECIFICATIONS
7. PRIME, AMC00, AMC4 AND AMC7 TO BE CONSTRUCTED IN ACCORDANCE WITH RMS SPECIFICATION R106

EARTHWORKS NOTES

1. SOFT GROUND ENCOUNTERED IN ACCESS ROADS PLATFORMS SHALL BE STABILISED USING ROCKFILL/ EARTHFILL OR OTHER APPROVED TREATMENTS.
2. TEMPORARY BATTER SLOPES SHALL NOT BE STEEPER THAN 1V:2H.
3. IN ADDITION TO TEMPORARY SITE DRAINAGE THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING IF REQUIRED DURING REMOVAL AND REPLACEMENT OF INSITU MATERIAL.

FOUNDATION AND EARTHWORKS NOTES

1. PRIOR TO THE PLACEMENT OF ANY FILL ALL FOUNDATIONS FOR EARTHWORKS SHALL BE INSPECTED AND APPROVED BY THE SITE GEOTECHNICAL REPRESENTATIVE.

EROSION AND SEDIMENT CONTROL

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE CONSTRUCTED ACCORDING TO THE BEST PRACTICE REQUIREMENTS OF "MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION - BLUE BOOK" LANDCOM 4TH ED MARCH 2004 AND VOLUME 2 - MAIN ROAD CONSTRUCTION. EXAMPLE EROSION AND SEDIMENT CONTROL MEASURES FOR CONSTRUCTION ARE PROVIDED. THESE ARE PRINCIPLE EXAMPLES FOR REFERENCE AND REQUIRE FURTHER DETAIL FOR CONSTRUCTION ACTIVITIES.
2. PROGRESSIVE EROSION AND SEDIMENT CONTROL PLANS (PESCP'S) FOR ALL STAGES OF THE PROJECT ARE TO BE PREPARED AND IMPLEMENTED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. THE PESCP'S SHOULD DETAIL CONTROLS SUCH AS SEDIMENT FENCES, DIVERSION DRAINS, DRAIN LINES, SAND BAGS AND GRAVEL BAGS.
4. REDUCE THE AREA OF SOIL DISTURBANCE BY RETAINING VEGETATION, STAGGING WORKS AND BY MINIMISING THE CONSTRUCTION FOOTPRINT.
5. PROGRESSIVELY REVEGETATE OR STABILISE DISTURBED AREAS SUCH AS TEMPORARY TOPSOIL STOCKPILES, VERGES AND BATTERS.
6. STOCKPILES ARE TO BE STABILISED IF LEFT FOR 2 WEEKS OR MORE.
7. PRIOR TO ANY WORKS, INSTALL DIVERSION DRAINS, SEDIMENTATION PONDS AND OTHER SURFACE RUNOFF CONTROL MEASURES TO CONTROL RUNOFF ONTO, ACROSS AND FROM THE SITE, AND TO TRAP SEDIMENT.
8. PROVIDE FOR RAINFALL EVENTS BY ENSURING THE FUNCTIONALITY AND CAPACITY OF EROSION AND SEDIMENT CONTROL, PROVIDING ADDITIONAL CONTROLS WHERE REQUIRED, STABILISING BARE GROUND AND TEMPORARY STOCKPILES AND AVOIDING GROUND DISTURBANCE.
9. INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROLS DAILY AND WITHIN 24 HOURS OF RAINFALL EVENTS.
10. INTERCEPT OFFSITE SURFACE FLOW AND DIVERT OR ALLOW THROUGH CROSS DRAINAGE PIPES/CULVERTS WITHOUT MIXING WITH CONSTRUCTION RUNOFF.
11. IN AREAS OF HIGH VELOCITY RUNOFF, REDUCE FLOW VELOCITIES USING APPROPRIATE MEASURES SUCH AS CHECK DAMS AND DIVERT TO STABLE LOCATIONS OR CONTROLS.
12. ENSURE CONSTRUCTION RUNOFF DOES NOT DIRECTLY DISCHARGE FROM SITE. USE SEDIMENT CONTROLS TO FILTER RUNOFF BEFORE DISCHARGING.
13. ALL OPEN DRAINAGE CHANNELS ARE TO BE LINED WITH MATERIAL SUCH AS GEO-FABRIC JUTE MESH OR SOIL STABILISING AGENT.
14. CHECK DAMS ARE TO BE INSTALLED AT APPROPRIATE INTERVALS ALONG LINED DRAINAGE CHANNELS TO REDUCE EROSION POTENTIAL OF THE FLOW.
15. ENSURE THAT THE SOIL AND WATER MANAGEMENT PLAN DESCRIBES THE MANAGEMENT OF TEMPORARY CONSTRUCTION PONDS, INCLUDING ACCEPTED WATER QUALITY PRACTICES AND STANDARDS SUCH AS FLOCCULATION AND SETTLING, TESTING FOR TSS, TURBIDITY, PH, OIL AND GREASE, DEWATERING AND DOCUMENTATION OF RESULTS.
16. DURING ALL STAGES OF CONSTRUCTION. IN CATCHMENTS WHERE SEDIMENT PONDS ARE LOCATED, CONSTRUCTION RUNOFF IS TO BE DIVERTED TO SEDIMENT PONDS VIA DIVERSION DRAINS, TEMPORARY CATCH DRAINS, AND PERMANENT OR TEMPORARY DRAINAGE PIPES OR SIMILAR.
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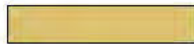


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			PROJECT MANAGE																			
			PROJECT DIRECTOR																			
			DESIGNER	<p>SMEC Member of the Stantec Group SMEC AUSTRALIA PTY LTD © ABN 47 065 475 140 SUITE 2, LEVEL 1, 243 NORTH-BOURNE AVENUE LYNEHAM ACT 2602 AUSTRALIA SMEC PROJECT No 3002809</p>																		
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			<p>PROJECT TITLE: SULWOOD DRIVE - MANNHEIM STREET INTERSECTION, INTERSECTION UPGRADE - FEASIBILITY STUDY</p> <p style="text-align: center;">GENERAL NOTES</p>																			
SCALE AS SHOWN	PHASE FEASIBILITY	PROJECT / DRAWING No. 3002809-2302	REVISION A																			

LEGEND

PROPOSED

-  PROPOSED PAVEMENT
-  PROPOSED MEDIAN
-  PROPOSED MEDIAN LANDSCAPE
-  PROPOSED VEE CHANNEL LINED

EXIST NG

-  EXIST NG CHANNEL LINED
-  EXIST NG VEE CHANNEL LINED
-  EXIST NG VEE CHANNEL UNLINED
-  EXIST NG CULVERT
-  EXIST NG WATER MAIN
-  EXIST NG SEWER MAIN
-  EXIST NG GAS MAIN
-  EXIST NG STREET LIGHTING
-  EXIST NG ELECTRICITY HV
-  EXIST NG ELECTRICITY ABOVE GROUND
-  EXIST NG TELSTRA
-  EXIST NG OPTUS
-  EXIST NG OPTUS OPTICAL FIBRE
-  EXIST NG MEDIAN / TRAFFIC ISLAND

150mm ON ORIGINAL
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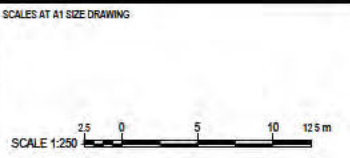


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REVISION
IN PROGRESS

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DRAFTING CHECK	[REDACTED]
DESIGNER	[REDACTED]
DESIGN CHECK	[REDACTED]
PROJECT MANAGER	[REDACTED]
PROJECT DIRECTOR	[REDACTED]



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LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002809

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PROJECT TITLE SELWOOD DR - MANNHEIM ST INTERSECTION, WANNIASSA INTERSECTION UPGRADE - FEASIBILITY STUDY		SCALE AS SHOWN		PHASE FEASIBILITY		PROJECT / DRAWING No. 3002809-2314		REVISION A	
OPTION 01 GENERAL ARRANGEMENT PLAN SHEET 4 OF 4									

MT TAYLOR NATURE RESERVE

BOX GUM GRASSY WOODLAND

RIGHT TURN LANE TO MANNHEIM STREET

NEW SIGNALISED INTERSECTION WITH PEDESTRIAN CROSSING ON ALL LEGS (SULWOOD DRIVE DUPLICATED)

EXISTING PIT AND CATCH DRAIN TO EXISTING DRAIN

78.00m

D DRIVE



150mm ON ORIGINAL
150
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PATH TO INTERSECTION

PATH TO INTERSECTION

LEFT TURN LANE TO MANNHEIM STREET

PROPOSED SHARED USER PATH

NEW SPLITTER ISLAND FOR PEDESTRIAN CROSSING

EXISTING PIT

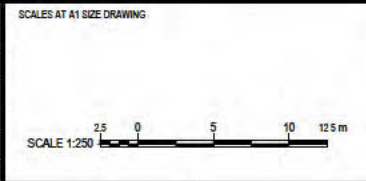
MATCH TO EXISTING

MANNHEIM STREET

UNCONTROLLED COPY
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		DRAFTING CHECK				
		DESIGNER				
DESIGN CHECK						
PROJECT MANAGER						
PROJECT DIRECTOR						



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SMEC PROJECT No 3002809

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PROJECT TITLE		REVISION	
SULWOOD DR - MANNHEIM ST INTERSECTION, WANNIASSA INTERSECTION UPGRADE - FEASIBILITY STUDY		A	
OPTION 02			
GENERAL ARRANGEMENT PLAN			
SHEET 2 OF 4			
SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	FEASIBILITY	3002809-2322	A

MT TAYLOR
NATURE RESERVE



MOUNT TAYLOR
WALING TRACK

BOX GUM
GRASSY WOODLAND

NEW ACCELERATION LANE
FROM EXISTING PARKING

EXISTING PIT AND CATCH
DRAIN TO BE EXTENDED

JOINS DRG No. 3002809

DRG No. 3002809-2314

PROPOSED
SHARED USER PATH

UNCONTROLLED COPY
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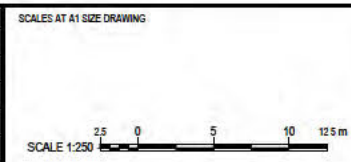
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150mm ON ORIGINAL
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					DESIGN CHECK	[REDACTED]
					PROJECT MANAGER	[REDACTED]
					PROJECT DIRECTOR	[REDACTED]

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SMEC PROJECT No 3002809

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PROJECT TITLE		REVISION	
SOLWOOD DR - MANNHEIM ST INTERSECTION, WANNIASSA INTERSECTION UPGRADE - FEASIBILITY STUDY		A	
OPTION 02 GENERAL ARRANGEMENT PLAN SHEET 3 OF 4			
SCALE	PHASE	PROJECT / DRAWING No.	
AS SHOWN	FEASIBILITY	3002809-2323	

MT TAYLOR NATURE RESERVE

BOX GUM GRASSY WOODLAND

PROVIDE A BREAK IN THE EXISTING KERB TO ACCOMMODATE CROSSING FOR DISABLED PERSON

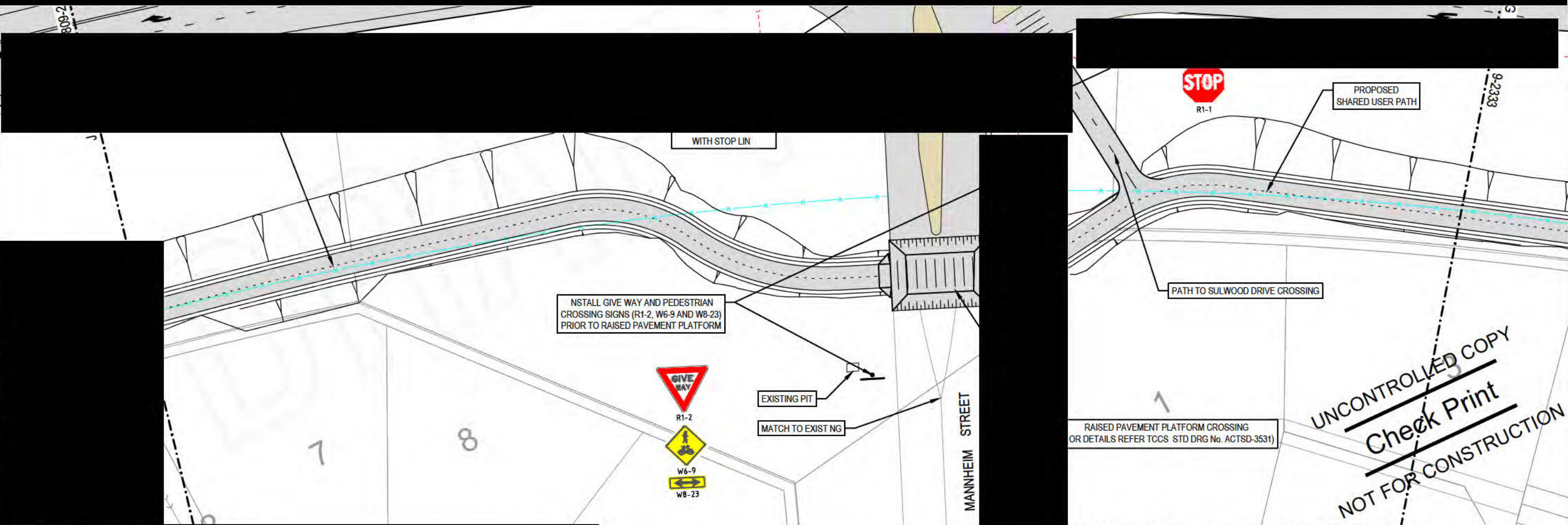
PROVIDE STORAGE FOR CROSSING

EXISTING PIT AND CATCH DRAIN

EXISTING RIGHT TURN LANE TO MANNHEIM STREET



150mm ON ORIGINAL
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DRAFTING CHECK																			
DESIGNER																			
DESIGN CHECK																			
PROJECT MANAGER																			
PROJECT DIRECTOR																			

SCALES AT A1 SIZE DRAWING

SCALE 1:250

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LYNEHAM ACT 2602 AUSTRALIA
SMEC PROJECT No 3002809

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DISCIPLINE		
BACKDRAFTED/CORRECTED		
CONFIRMED		

PROJECT TITLE: **SULWOOD DR - MANNHEIM ST INTERSECTION, WANNIASSA INTERSECTION UPGRADE - FEASIBILITY STUDY**

OPTION 03
GENERAL ARRANGEMENT PLAN
SHEET 2 OF 4

SCALE AS SHOWN	PHASE FEASIBILITY	PROJECT / DRAWING No. 3002809-2332	REVISION A
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MT TAYLOR
NATURE RESERVE



MOUNT TAYLOR
WALING TRACK

BOX GUM
GRASSY WOODLAND

EXISTING PIT AND CATCH DRAIN

SULWOOD DRIVE

809-233

LANE ONE FORM

NEW ACCELERATION LAN
FROM EXISTING PARKING

CONS DRG No. 3002809-2334

JO1

PROPOSED
SHARED USER PATH

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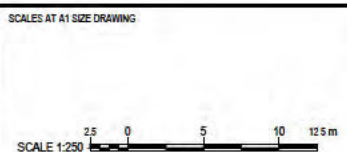
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					PROJECT MANAGER	[REDACTED]
					PROJECT DIRECTOR	[REDACTED]

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PROJECT TITLE		PROJECT / DRAWING No.		REVISION
SULWOOD DR - MANNHEIM ST INTERSECTION, WANNIASSA INTERSECTION UPGRADE - FEASIBILITY STUDY		3002809-2333		A
OPTION 03 GENERAL ARRANGEMENT PLAN SHEET 3 OF 4		SCALE	PHASE	
		AS SHOWN	FEASIBILITY	

MT TAYLOR
NATURE RESERVE

BOX GUM
GRASSY WOODLAND

REMOVE EXISTING PARRALLEL PARKING

REMOVE EXISTING PARALLEL PARKING

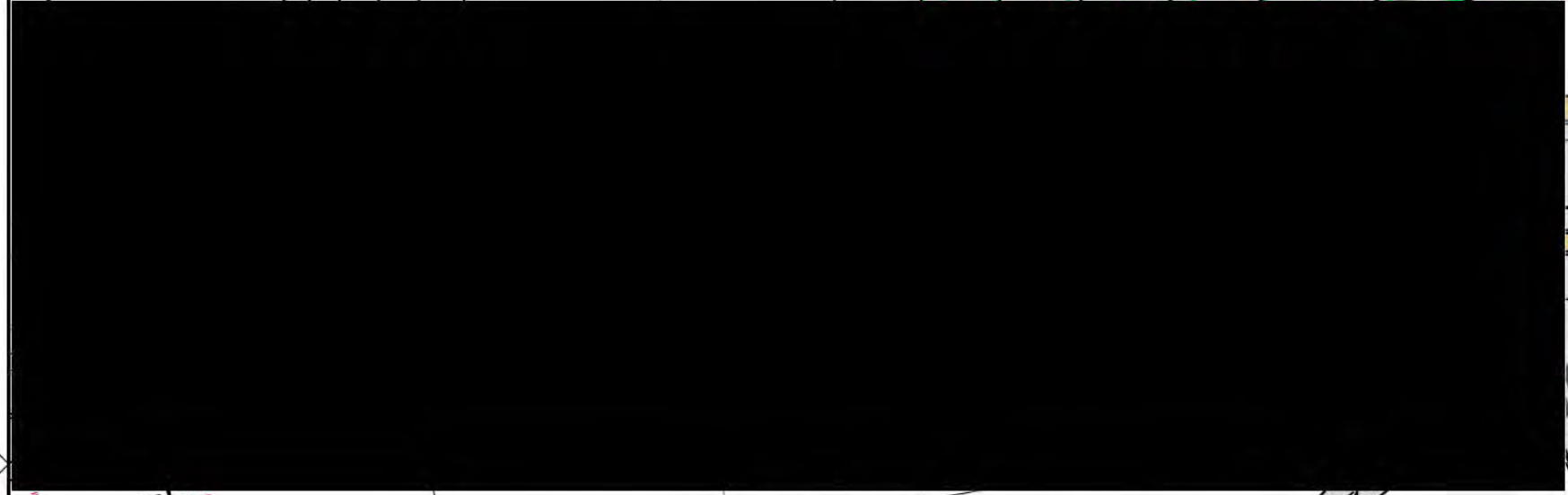
NEW CAR PARK ENTRY

RECONFIGURED 8 x 90 PARKING
PLS 2 x DISABLED PARKING

REMOVE EXISTING PARRALLEL PARKING

KEEP EXISTING STREET LIGHT

EXISTING PIT AND CATCH DRAIN



3 No. 3002809-2313

NEW RIGHT TURN
LANE TO CARPARK

95.00

CONNECTION TO
SHARED USER PATH

NEW CULVERT

PROPOSED
SHARED USER PATH

NEW LEFT TURN
SLIP LANE

NEW SPLITTER ISLAND FOR
PEDESTRIAN CROSSING

MODIFY LEFT TURN TO
MANNHEIM STREET

CONNECTION TO
SHARED USER PATH

EXISTING PIT

MATCH TO EXISTING

MANNHEIM STREET

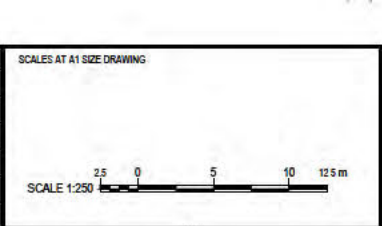
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PROJECT MANAGER																			
PROJECT DIRECTOR																			

SCALES AT A1 SIZE DRAWING	DESIGNER
SCALE 1:250	<p>SMEC Member of the Stantec Group SMEC AUSTRALIA PTY LTD © ABN 47 065 475 140 SUITE 2, LEVEL 1, 243 NORTHBOURNE AVENUE LYNEHAM ACT 2602 AUSTRALIA SMEC PROJECT No 3002809</p>

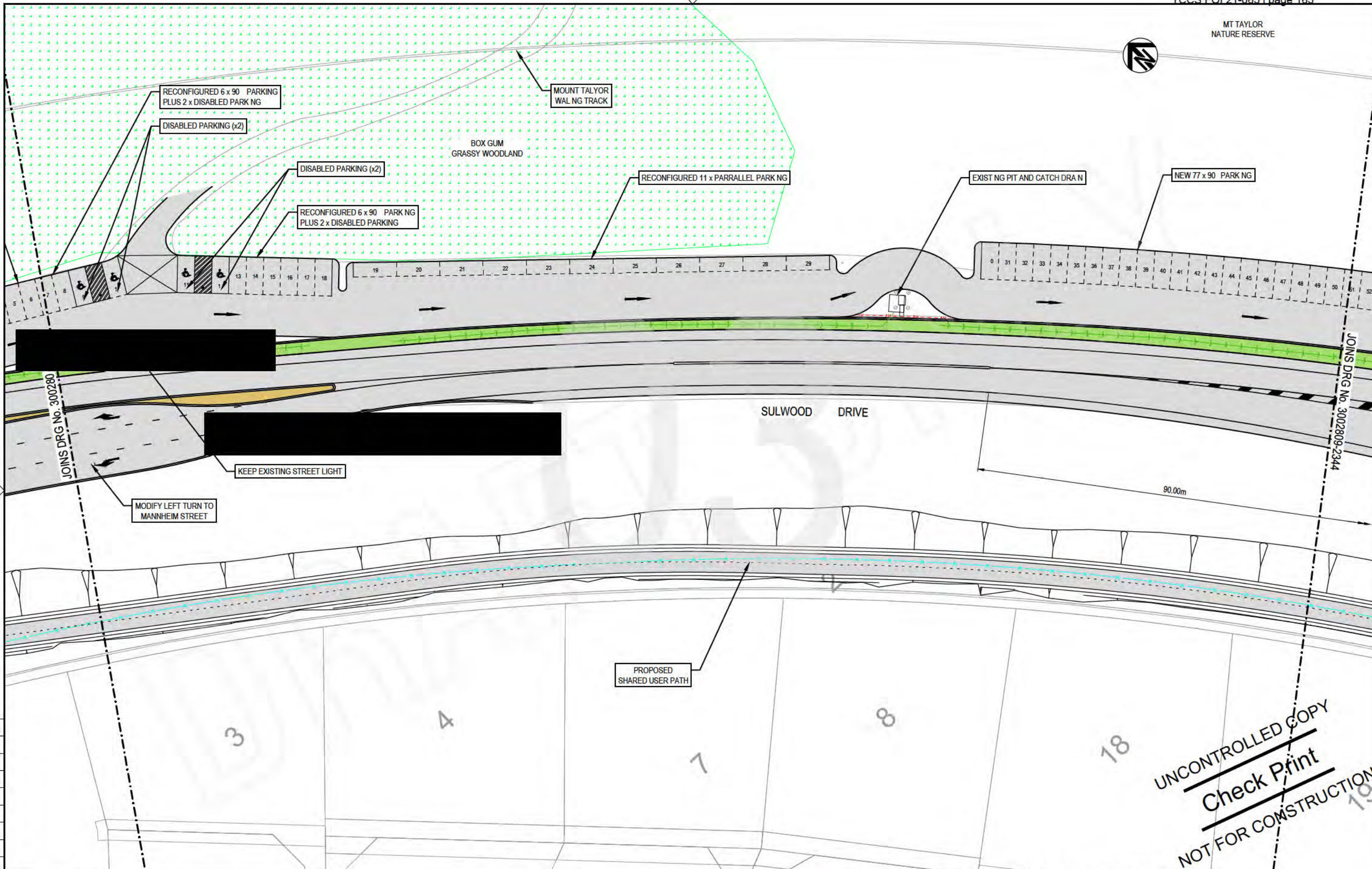


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BACKDRAFTED/CORRECTED			
CONFIRMED			

PROJECT TITLE	SCALE	PHASE	PROJECT / DRAWING No.	REVISION
66 WOOD DR - MANNHEIM ST INTERSECTION, WANNIASSA INTERSECTION UPGRADE - FEASIBILITY STUDY	AS SHOWN	FEASIBILITY	3002809-2342	A

OPTION 04 GENERAL ARRANGEMENT PLAN SHEET 2 OF 5	
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MT TAYLOR NATURE RESERVE



150mm ON ORIGINAL
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Check Print
NOT FOR CONSTRUCTION

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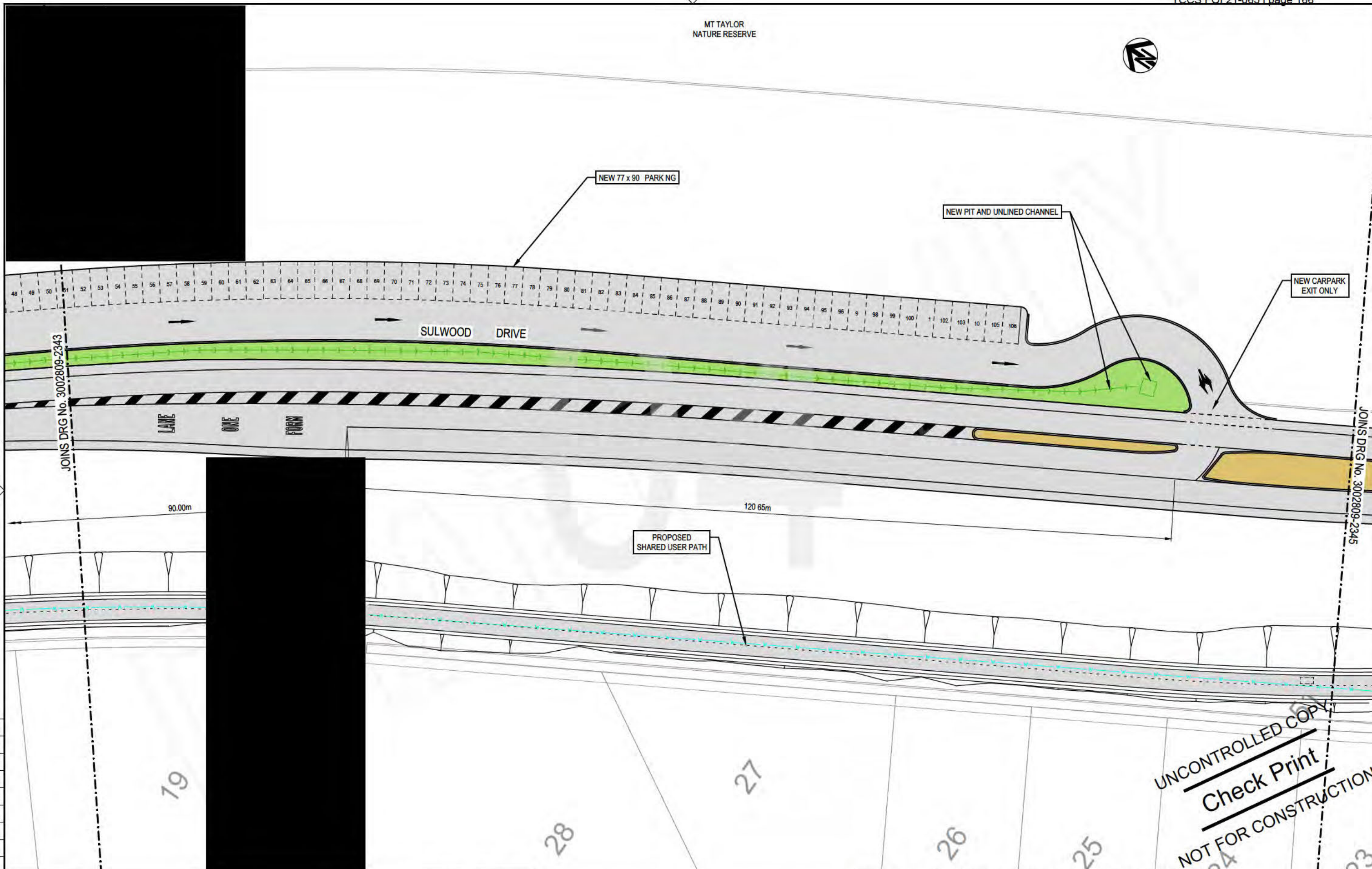
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OPTION 04 GENERAL ARRANGEMENT PLAN SHEET 3 OF 5		PROJECT / DRAWING No. 3002809-2343	
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MT TAYLOR
NATURE RESERVE



150mm ON ORIGINAL

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PROJECT TITLE	SULWOOD DR - MANNHEIM ST INTERSECTION, WANNIASSA INTERSECTION UPGRADE - FEASIBILITY STUDY
OPTION	OPTION 04
GENERAL ARRANGEMENT PLAN	
SHEET	SHEET 4 OF 5
SCALE	AS SHOWN
PHASE	FEASIBILITY
PROJECT / DRAWING No.	3002809-2344
REVISION	A

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Appendix D Ecological Assessment Tech Note

Technical Memo

Technical Memo No	TN-05	Date of Issue	13 October 2020
Subject/Title	Mount Taylor, Kambah and Hume Circle, Fyshwick Ecology Assessment		
Revision Details	01		
Author	[REDACTED]		
Reviewed by	[REDACTED]		
Prepared for	[REDACTED]	Attention to	[REDACTED]

1 Purpose

SMEC conducted ground truthing of biodiversity mapping on 22 September 2020 of both Hume Circle and Mount Taylor project areas. The survey extent areas are shown in figures included.

1.1 Mount Taylor

The ground truthing exercise undertaken at Mount Taylor confirmed that the biodiversity values mapped in ACTmapi as occurring within the study area appear to be correct and that the boundaries of vegetation community types reflect the public mapping.

In terms of ecological constraints, the EPBC Act and NC Act protected Grassy Box Gum Woodland Threatened Ecological Community (TEC) is of most concern. This occurs in the area directly adjacent to the northern side of the existing car park site on Mount Taylor (Area 1), and immediately adjacent to the north at Area 2, 3 and 4. Additionally, EPBC and NC Act Endangered Small Purple Pea (*Swainsonia recta*) has been recorded within ~200m from Areas 1 and 2. More careful boundary mapping (vegetation) and or habitat or specimen searches (of EPBC and NC Act listed Pink Tailed Worm Lizard, Golden Sun Moth, Small Purple Pea, and hollow bearing trees) may need to be conducted to protect biodiversity values here if developments are to encroach.

The removal of the EPBC and NC Act Threatened Ecological Community may require the referral of the project to the Commonwealth Department of Agriculture, Water and the Environment as a controlled action under the EPBC Act, and/or trigger assessment under Schedule 4 of the Planning and Development Act 2007 (i.e. EIS in the Impact Track or request for an Environmental Significance Opinion).

Any developments in Area 3 would need to be careful not to impact on Pink Tailed Worm Lizard habitat as well as the Grassy Box Gum Woodland TEC.

The potential alternative (Area 4) on the west side of Mount Taylor on the corner of Colquhorn Street is quite constrained and it appears to consist of high-quality native vegetation, including several large hollow bearing trees, with several orchid species sighted. The EPBC Act and NC Act protected Grassy Box Gum Woodland Threatened Ecological Community (TEC) likely extends beyond the existing ACTmapi polygon further into the road reserve.

Area 5 on the southern side of Sulwood Drive, west of Mannheim Street, which is already cleared would have the least impact on biodiversity values.



Figure 1. Area 1 - Existing carpark - Mannheim Street



Figure 2. Area 2 - Livingston Avenue – Alternate location for additional parking capacity with good connectivity to the reserve



Figure 3. Area 3 - Inkster Street - Alternate location for additional parking capacity with some connectivity to the reserve



Figure 4. Area 4 - Colquhoun Street - Alternate location for additional parking capacity with some connectivity to the reserve



Figure 5. Southern side of Sulwood Drive, west of Mannheim Street – Alternate location for additional parking capacity

1.2 Hume Circle

No native biodiversity values of concern were mapped or found at the Hume circle site.