City of West Torrens
Between the City and the Sea

Planning System Implementation Review
West Torrens Submission

December 2022

Contents

Discussion Paper – *Planning, Development and Infrastructure Act 2016* Reform Options

Public Notifications and Appeals

1. What type of applications are currently not notified that you think should be notified?

West Torrens is somewhat supportive of the intention behind the statement made by the State Planning Commission (SPC) following the Phase Three engagement on the Code:

> *"development which is envisaged in the zone should not be subject to notification; except where either acceptable standards of built form or intensity are exceeded, and/or the development is likely to result in substantial impacts on the amenity of adjacent dwellings located on land in another zone."*

Under the rescinded Development Regulations and Council's Development Plan there were some public notification triggers that were beneficial to the development process and more closely aligned with the sentiment that development likely to result in substantial impacts on the amenity of adjacent dwellings be notified. These notification triggers included:

- Development Regulations:
  Schedule 9—Public notice categories, Part 1:
  2 Except where the development is classified as non-complying under the relevant Development Plan, any development which comprises—
  a) the construction of any of the following (or of any combination of any of the following):
     I. 1 or more detached dwellings;
     II. 1 or more single storey dwellings;
     III. 1 or more sets of semi-detached dwellings, provided that no such dwelling is more than 2 storeys high;
     IV. 3 or more row dwellings or 1 or more additional row dwellings, provided that no such dwelling is more than 2 storeys high; or
  b) the alteration of, or addition to, a building so as to preserve the building as, or to convert it to, a building of a kind referred to in paragraph (a); or
  c) a change in the use of land to residential use that is consequential on the construction of, or conversion of a building to, a building of a kind referred to in paragraph (a), or on the resumption of use of such a building; or
  d) the construction of (or of any combination of) a carport, garage, shed, pergola, verandah, fence, swimming pool, spa pool or outbuilding if it will be ancillary to a dwelling; or
  da) the construction, installation or alteration of a private bushfire shelter; or
  e) the construction of a farm building on land used for farming, or the alteration of, or addition to, a building on land used for farming that preserves the building as, or converts it to, a farm building; or
  f) the division of land which creates not more than 4 additional allotments;
  g) a kind of development which, in the opinion of the relevant authority, is of a minor nature only and will not unreasonably impact on the owners or occupiers of land in the locality of the site of the development.

The parts underlined from Schedule 9 identified times when development would trigger notification, the parts underlined would generally pick up infill development, where West Torrens receives a considerable number of development applications for 1 into 4+ allotments. A benefit of this was that it aligned with what we have heard the community want to be notified about and provided opportunity for neighbours to identify items that are pushing the boundary of policy, that would benefit from amendment to improve performance e.g. height island, overlooking. It provided an opportunity for neighbours to understand what was possibly going to be developed near to them prior to the construction.

- Development Plan- Urban Corridor Zones:
  *Any development listed as Category 1 and located on adjacent land to a **Residential Zone** or **Historic Conservation Area** that:*

  (a) is 3 or more storeys, or 11.5 metres or more, in height

  (b) exceeds the 'Building Envelope - Interface Height Provisions'.

The Code identifies that the height is now 4 or more building levels and is adjacent land to a neighbourhood-type zone **AND** adjoins an allotment containing an existing low-rise (up to 2 building levels) building used for residential purposes, rather than when just adjacent the Residential/Neighbourhood type zone as seen in the Development Plan.

As a result fewer applications are notifiable due to tweaking of the height and development type in adjacent zone parameters. This does not reflect community expectation around public notification and it is argued by West Torrens that irrespective of the zone, impacts on existing residential development should be considered. The original intent of the new planning system was that stronger consultation would be undertaken upfront on Code policies and therefore less notification would be required at the development assessment stage.

It is nonsensical that all properties within 60 metres of the development site and those people who see the onsite sign could have a say about a small scale structure such as a carport on boundary for a length longer than that prescribed in the Code yet a neighbour separated by one non-residential property (who is on a zone boundary) would not be notified of a 4 storey or more residential flat building (as shown in the above example).

To go one step further, West Torrens would seek that any residential flat building over 4 storeys (e.g. 5 or more storeys) should be notified irrespective of its proximity to a zone boundary.

The ability to notify residents is to empower residents. It provides:

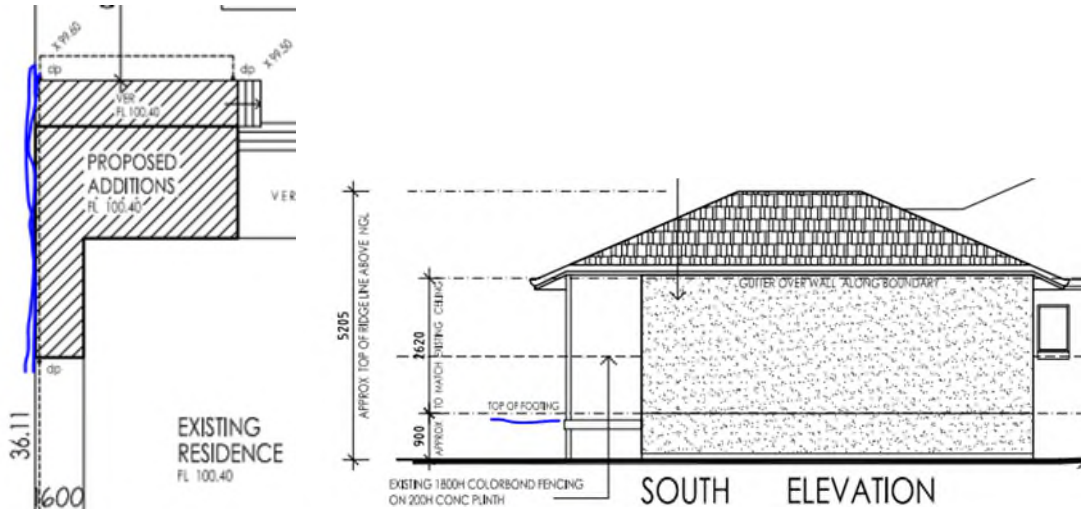
- Insight and understanding of what is happening around them,
- Clarity on what their zone is about,
- Opportunity to identify what they may want to do with their land, and
- Opportunity during notification to identify areas of concern in a development application, which often leads to a development that is more responsive to its locality.

There is merit in reconsidering a two tiered system for public notification. The 'who' gets notified needs to be considered rather than a blanket 'adjacent land'. In some instances it may be appropriate to notify more or less properties to reflect the level of impact the proposed development may have. There

appears to be instances on smaller allotments with more minor development types that there is an over notification, while on larger allotments with development that is likely to have impacts felt more broadly than the 60 metres is not adequate. In addition, Members of Council's Assessment Panel (CAP) have noted the overall quantum of matters being considered by CAP has been consistently lower than previous years, which is indicative of the reduction in opportunities for members of the public to provide comment on applications in their neighbourhood (and more matters being assessed by staff). Members of CAP have also identified that there continues to be evidence of a need for additional public information and community engagement about the Planning and Design Code. Comments received through representations on applications demonstrate that more needs to be done by both State and Local Government to help the community better understand the purpose and operations of the complex planning system.

There are also some clarity/wording amendments in relation to "wall height" which would be beneficial. Wall height is used to advise whether notification is required or not as per Table 5 of the Code. An example (extract from Code below with highlighted part identifying the relevant text) where this is not appropriate is the installation of a stump footing system. The actual impact on the neighbour is a wall of significant height, however notification is not triggered as the "top of footing" is at the top of the stump.

3. Any development involving any of the following (or of any combination of any of the following): (a) air handling unit, air conditioning system or exhaust fan (b) ancillary accommodation (c) building work on railway land (d) carport (e) deck (f) dwelling (g) dwelling addition (h) fence (i) outbuilding (j) pergola (k) private bushfire shelter (l) residential flat building (m) retaining wall (n) retirement facility (o) shade sail (p) solar photovoltaic panels (roof mounted) (q) student accommodation (r) supported accommodation (s) swimming pool or spa pool (t) verandah (u) water tank.	Except development that: 1. does not satisfy General Neighbourhood Zone DTS/DPF 4.1 or 2. involves a building wall (or structure) that is proposed to be situated on (or abut) an allotment boundary (not being a boundary with a primary street or secondary street or an excluded boundary) and: (a) the length of the proposed wall (or structure) exceeds 11.5m (other than where the proposed wall abuts an existing wall or structure of greater length on the adjoining allotment) or (b) the height of the proposed wall (or post height) exceeds 3m measured from the top of footings (other than where the proposed wall (or post) abuts an existing wall or structure of greater height on the adjoining allotment).



Images above show the length of dwelling addition on the wall and the south elevation shows the top of footing is 900mm above ground level, with a wall height of 2620mm however the total height from ground level is 3520mm.

West Torrens would support an investigation and consultation with community to ensure that the types of applications to be notified more closely aligned with community expectations. There has also been commentary that is there no point in notifying developments if representors cannot appeal an outcome.

2. What type of applications are currently notified that you think should not be notified?

Applications that are currently notified that shouldn't be notified are:

- Sites in one zone, located on an arterial road that propose a change in land use, where the adjoining properties to the rear are located in another zone (If the proposed land use is an envisaged land use and any new built form falls within accepted parameters, then no notification should be required). For example, a change from a shop to an office.
- All performance assessed applications where the requirements listed in the DPF's are met and the land use is envisaged.
- For consistency purposes it is seen that a land division in an Urban Corridor Zone is notifiable, whilst most zones have a clause that exempts land division from notification.

The ability for a relevant authority to deem something minor for the purpose of public notification is ideal. This allows for the relevant authority to review the application on its merits and determine the impact and where there would be no impact, provide the appropriate justification. Further on this point, if possible, a review through the Portal of items which are commonly deemed minor by Council staff would provide clarity as to what clarification/amendments may be helpful in identifying possible development types that could be removed from notification pending a review of the justification for not undertaking public notification.

3. What, if any, difficulties have you experienced as a consequence of the notification requirements in the Code? Please advise the Panel of your experience and provide evidence to demonstrate how you were adversely affected.

Difficulties being experienced as a consequence of the notification requirements include:

- Applicants not understanding the public notification process, particularly around electing to put the onsite notification sign up themselves. *Practice Direction 3- Notification of Performance Assessed Development Applications* is not clear on the consequences for doing this incorrectly.
- Table 5 is not written in clear and concise language. This makes it difficult to interpret and to know whether notification is required.
- The code does not list a lot of common land use forms such as educational, child care, etc. This makes it difficult for the layperson or applicant to know which pathway applies to their application.
- Residents are concerned that they aren’t being notified, this may be a result of community expectation around what they believe should be notified and how easy/difficult Table 5 can be to read.
- The 15 days of public notification doesn’t consider the timeframe for posting the letter which take up some of the assessment timeframe.
- Further clarification is required around the *minor* clause. Is the intention of the policy that it is a two part question? i.e.

1. The development as a whole (not only the notifiable element) must be minor in nature, and
2. Will not unreasonably impact upon the owners or occupiers of land in the locality of the site.

An example of this is a Parapet wall which is 3.4m high on the boundary line for a length of 200mm. The impact of this section of the development is arguably minor, however the current legal advice/interpretation of the *minor* clause is that the whole development must be minor. Therefore, the dwelling is the development that must be considered minor in nature, not just the parapet section of the proposal, even though this is the portion that is triggering the notification.

4. What, if any, difficulties have you experienced as a consequence of the pathways for appeal in the Code? Please advise the Panel of your experience and provide evidence to demonstrate how you were adversely affected.

The ordinary layperson can't fathom why an application that was notified cannot be appealed to the ERD Court. It gives the impression that only developers matter and that the system is weighted in the developer's favour. From experience as a relevant authority, there is an expectation within the community for third party appeal rights. Third party appeal rights provide a healthy level of review and oversight over development decisions. It is recommended the current lack of third-party appeal rights for performance assessed development be reviewed.

5. Is an alternative planning review mechanism required? If so, what might that mechanism be (i.e. merit or process driven) and what principles should be considered in establishing that process (i.e. cost)?

Currently the Court provides a conferencing process, many applications are negotiated with a favourable outcome for both the relevant authority and applicant through this process.

Thinking of the conferencing process, there may be scope to look at the Assessment Manager review process. Currently, the Assessment Manager review process does not allow for negotiation of an assessment, it's only a review of a decision. There is potential to explore the Assessment Manager review that Council's Assessment Panel (CAP) undertakes to negotiate plans. West Torrens does not have any evidence at this time, to ascertain if this would be beneficial or not. However, there may be times were a few minor amendments may see the CAP make an alternative decision. The two Assessment Manager decisions reviewed by CAP resulted in the decision being affirmed. These two examples were not negotiable due to ANE Overlay provisions and the other being for a carport forward of the dwelling.

Another factor worth considering in any review process are the fees:

- Assessment manager review to CAP is $531,
- the ERDC appeal fees are $263 to lodge (applicant can self-represent or engage a consultant/legal at their own discretion)

When considering some of the options put forward by the discussion paper, it is clear that any alternative processes needs to be:

- easily and clearly understood,
- equitable for all, and
- impartial - this seems to be a key a feature of the ERDC.

General Comments

The discussion paper identifies instances where planning and building consent has been issued for a development application, but councils are refusing to accept the planning consent issued by the private accredited professional. The paper assumes the council as the *problem* and does not examine the reasons why the approval is not being issued by the council. The Act requires a council to check that the appropriate consents have been sought and obtained for a development application. This is an important mechanism that safeguards applicants / owners from commencing development with inconsistent consents. The absence of this important check is likely to result in non-compliances being identified during construction, leading to more significant and costly delays.

In many instances where development approval has not been issued, it is evident that some private accredited professionals have acted outside their powers under the Act. This issue is directly related to the accredited professional's incorrect assessment which missed key assessment criteria, including the application of Overlays such as the Historic Area Overlay. There are some examples of accredited professionals' interpretation being such that they have effectively undertaken a performance assessed development, including on notifiable development.

This issue is exacerbated with the ambiguity that is created by s106(2) of the Act in relation to minor variations. The Deemed to Satisfy (Minor variations) is subject to varying interpretations and has created uncertainty and delayed approvals, as identified by the Panel's discussion paper. This varying interpretation has resulted in poor outcomes for applicants. The difficultly with the interpretation was highlighted when a cross sector working group established by PLUS was unable to define what constitutes minor variations.

This legislative ambiguity is contributing to a tension between the practice of some private accredited professionals and council practitioners. There needs to be greater guidance/training for relevant authorities on respective roles and what constitutes a minor variation for Deemed to Satisfy developments to address the current inconsistent approach. This could be informed with clear parameters such as a minor variation may only be granted:

- by a council, or
- by private certifiers where there element does not have an impact beyond the site. For example excludes site area, frontage, setbacks, building heights, length on boundary and the like; and there is accountability / transparency with clearly documented justification for any minor variations.

Accredited Professionals

6. Is there an expectation that only planning certifiers assess applications for planning consent and only building certifiers assess applications for building consent?

Yes. There are a number of points raised on this matter, and they are as follows:

- Introducing the opportunity for building certifiers and surveyors to consider planning consents runs the risk of outcomes where planning policy can be misinterpreted and applied incorrectly.
- How has the accredited scheme addressed mutual recognition across the States? South Australia is the only place where Building Officers can issue Planning and Building Consent. There needs to be some review of the appropriateness of Building Certifiers issuing Planning Consent when they are from interstate (and possibly working from interstate with limited experience to the South Australian system).
- Audit statistic should be provided, currently there are no stats on the number of complaints made or the outcomes. Industry learning from complaints should be made public to ensure:
    - there is continuous improvement amongst the profession,
    - that identification of knowledge gaps is occurring and being appropriately addressed/managed.
- Learnings should be shared across the industry, currently there is no benefit seen from lodging a complaint or raising concerns about a practitioner.

Ultimately, community expectation is that only suitably qualified planning professionals issue Planning Consent.

7. What would be the implications of only planning certifiers issuing planning consent?

It is unclear what is meant by the term Planning Certifiers, whether this is encompassing all Planning Professionals or a subgroup of Planners. A benefit of Planning Professionals undertaking planning assessments only rather than enabling other professions to undertake planning assessment is greater consistency in policy application.

However, it is flagged that there is considerable inconsistency across the profession as to how minor variations are being considered. The easiest way to reduce inconsistency in policy application, would be to prohibit private accredited professionals accepting and making decisions on applications that do not fulfil the Deemed-to-Satisfy (DTS) criteria. Development applications that do not fulfil the DTS criteria should always default to performance assessed pathway.

8. Would there be any adverse effects to Building Accredited Professionals if they were no longer permitted to assess applications for planning consent?

The PDI Regulations allows for Level 1 Building Accredited Professionals (AP-BL1) to assess certain deemed-to-satisfied developments and issue Planning Consent however, for Council Building Accredited Professionals, they cannot act as a relevant authority so the assessment or issuing of planning consent doesn't affect Council Building Accredited staff.

The discussion papers also indicated that audit and investigations from the Department have shown numerous errors identified by AP-BL1.

Impact Assessed Development

9. What are the implications of the determination of an Impact Assessed (Declared) Development being subject to a whole-of-Government process?

West Torrens is supportive of ensuring that the State's Planning System is transparent and that decision making follows appropriate integrity and accountability measures. Whilst there may be more time involved up front in a whole-of-Government process in the determination of an Impact Assessed Development, reinstating this previous practice can be seen to provide appropriate awareness to all

Ministers of the development application and provide for a whole of Government determination rather than being reliant on only the Minister for Planning. This will likely save time in the long run, reducing the risk of review of the determination and also provide greater transparency and opportunity for a more considered assessment.

Infrastructure Schemes

10. What do you see as barriers in establishing an infrastructure scheme under the PDI Act?

There doesn't appear to be clarity as to who should apply for the scheme, nor any real benefit to developers to enter into an infrastructure scheme.

The benefits of the scheme would occur where multiple land owners are linking to facilitate a land rezoning or development over multiple sites, in order to share costs for infrastructure such as access roads etc. The likelihood of developers working together with land under different ownership is quite low, with a majority of developers providing services to their own sites to Council requirements but somewhat unwilling to undertake work which will assist in the development of a neighbouring site. The competitive nature of property development is a barrier which can be difficult to overcome without incentive.

11. What improvements would you like to see to the infrastructure scheme provisions in the PDI Act?

More structure to circumstances where the schemes are appropriate, and should be used. It seems as though they are optional should Council/developers wish to pursue them, however alternative, easier options which remove additional red tape are available.

12. Are there alternative mechanisms to the infrastructure schemes that facilitate growth and development with well-coordinated and efficiently delivered essential infrastructure?

The vast majority of the infrastructure is mandatory in order to provide required facilities for future land owners such as roads, electricity, communications etc. This all contributes to the allotment being fit for purpose. In the event that it is not, Council has capacity to not support the division.

In attempting to provide good outcomes for infrastructure which is not required to be provided in a particular way e.g. in the case of stormwater infrastructure, council has the ability to refuse to accept handover of the asset into council ownership in the event that it is sub-standard.

Some councils currently use Deeds, Infrastructure Agreements and Land Management Agreements (LMA) to provide quality outcomes for current and future ratepayers.

The current system in place within some council's is to enter into an individual infrastructure agreement with developers to provide infrastructure to a certain standard. For example, a reserve to be provided with specific assets in accordance with Council's open space/recreation area plans. This allows for the agreement to be specific to each individual allotment and for the developer to design appropriately. The infrastructure agreement is then linked to the land by a LMA.

This system is relatively fast, but requires collaboration between developers and Council to ensure that all information supplied in support of the application is appropriate and provides suitable infrastructure as required. Once this is finalised, the process of drafting up an infrastructure agreement and LMA can be completed and executed quickly. This system provides quality infrastructure outcomes which are relevant to individual developments.

An example of how this is undertaken at other councils has been that prior to large scale rezoning for residential purposes, a deed of agreement was required to be signed by land owners, linking the land to provision of funds to support development throughout the growth areas. This deed required financial contributions from land owners at certain trigger points (when subdivision occurs on the site, with money to be provided for Social, Stormwater and Transport Deeds). The deed allows for the council to facilitate outcomes which benefit the community as a whole, such as major road upgrades or social/community infrastructure. This coordinated approach seems to be providing quality outcomes for the council area, and has involved all of the main stakeholders in the process to ensure effective outcomes. Major infrastructure works are considered years in advance with this system which allows council to plan accordingly, and developers to know what their financial contribution to projects will be upfront.

The scheme does not appear to provide a useful mechanism for large scale brownfield sites where there seems to be a preference for doing deeds and LMAs as outlined above.

Local Heritage in the PDI Act

13. What would be the implications of having the heritage process managed by heritage experts through the Heritage Places Act (rather than planners under the PDI Act)?

West Torrens engages a heritage expert when required as part of the assessment of development applications that are Local Heritage Places, it is considered that this provides appropriate expert oversight over these assessments in a timely and on an as needed basis. .

There is a fair history regarding heritage in the planning system throughout the implementation of the new planning system. In December 2014 South Australia's Expert Panel on Planning Reform delivered their recommendations for a new planning system, including eight proposals designed to, in the words of the Panel, "place heritage on renewed foundations"

The reform proposals sought to consolidate and improve heritage policy and management, and increase the planning system's capacity to deal effectively and efficiently with Aboriginal and non-Aboriginal heritage in the context of broader planning and development objectives.

In March 2015 the South Australian Government officially responded to the Expert Panel's recommendations, supporting the proposed heritage reform in principle, and committing to further investigations.

The Minister for Planning released a Local Heritage Discussion Paper for public consultation in August 2016. The Discussion Paper identified opportunities for reform around listing of local heritage places, development assessment and terminology. Proposed reforms would be undertaken via the new *Planning Development and Infrastructure Act 2016* (the PDI Act), or non-legislative mechanisms. Currently, there is a need to consider what is outstanding from the initial Expert Panel on Planning

Reform and what needs adjusting in light of the new planning system and associated legislation. Councils have consistently identified that they held concern that local character, heritage and design policy would be watered down or lost and this remains as a relevant concern with the added uncertainty of elevating items or areas that display heritage or character attributes, particularly in light of requiring a 51% consensus for the consideration of certain heritage mechanisms.

14. What would be the implications of sections 67(4) and 67(5) of the PDI Act being commenced?

Properties within historic areas do have additional development considerations, notably demolition controls and stronger design criteria for new development. It is understandable that some property owners would feel strongly about a Code Amendment which proposes to introduce historic area designation. However, there are other planning policy mechanisms which have a similar or greater effect on development potential, such as minimum allotment sizes which prevent opportunities for subdivision or maximum building heights. No other planning policy mechanism is subject to 'popular vote' and it is not consistent with current planning processes to do so and potentially creates disharmony between intent to provide planning policy to support highly valued areas by community. The 51% rule would also be an administrative nightmare for Councils in managing who is eligible to vote from the affected properties. Councils supports the deletion of these clauses from the Act in preference for appropriate engagement and amendment through Code Amendment processes.

Deemed Consents

15. Do you feel the deemed consent provisions under the PDI Act are effective?

The need for an efficient and responsive development assessment process is supported. However, the Deemed Planning Consent provision is having extremely negative impacts on workplace culture, and contributing to staff leaving the Local Government sector. This, combined with very short assessment times for what can be quite complex matters, results in a greater likelihood of applications being refused, or substandard designs that don't meet the provisions well but are just good enough being approved to avoid a deemed consent rather than working with applicants to achieve a design that can be supported and better deliver the intent of the policy. This is considered to be inconsistent with the objects of the Act to promote *high standards for the built environment*. It is a severe penalty that does not adequately consider the consequences to community from development that may be inappropriate.

This approach does not provide a basis for collaborative relationships with applicants that in turn deliver more appropriate planning outcomes. This provision does not take into consideration the well documented shortage of professionals within the sector and the challenges in establishing a sustainable work environment for the relevant assessing officers where they can apply their skills to the deliver outcome that benefit all and in line with the relevant assessment policy.

The consequences of this provision is to extend the assessment times for simpler development applications, as greater attention is required on the more complex developments that have generally the same assessment times. Furthermore, this is leading to less capacity to provide preliminary advice to applicants which is a highly valuable non- statutory service to assists applicants.

It is noted in the jurisdictional comparison contained in the Panel's discussion paper, only Queensland utilises this mechanism and NSW has adopted a deemed refusal mechanism. Other jurisdictions such as Victoria, Western Australia and Tasmania have taken **a more balanced approach, whereby a review is undertaken by the respective courts on the facts and the court makes a considered and independent determination on the application**. This is considered to be a more equitable approach that would safeguard the community against potential poor development outcomes. Feedback from Planning Professional working within Local Government includes:

- The timeframes are unreasonable for planners to assess a development application. It is leading to rushed, poor decisions. Council has requested a review of the timeframes and what informed the timing of development applications.
- Applicants attempt to issue deemed consents, but the majority that try, do it incorrectly, which further complicates an already complicated and non-user friendly system.
- It is very risky allowing applicants to issue their own deemed consents. The system effectively allows applicants to issue their own consents under strict timeframes, noting that the DAP regularly experiences break down/down time.

West Torrens' experience with deemed consent outcomes on development applications that were not appropriate for consent has meant there is now budget required for legal expenditure to fight the deemed consent rather than the decision made and the development outcome. For the benefit of all parties, the Act needs to be refined to be clear that the deemed consent goes straight to a merits appeal rather than a question of the validity of a deemed consent. West Torrens can provide examples, but not via public submission due to confidentiality.

16. Are you supportive of any of the proposed alternative options to deemed consent provided in this Discussion Paper? If not, why not? If yes, which alternative (s) do you consider would be most effective?

Of the suggestions made in relation to deemed consents, preference is given to the review of assessment timeframes. This review is supported, the current timeframes do not adequately differentiate the work that is required to properly assess more complex assessments such as larger commercial and industrial type applications or more complex residential developments such residential flat buildings. It is recommended the assessment timeframes for complex development, not involving up to two (2) class 1 buildings or any class 10 buildings, should be 8 weeks as the current assessment timeframes are not adequate and do not facilitate the promotion of high standards for the built environment. It is not reasonable to expect an application for 19 plus dwellings or large scale warehousing to be assessed in 20 days, yet this is currently the case. The Panel may wish to also consider the gross time for the completion of assessments to gauge the overall impact of the new system and whether there are broader legislative / DAP enhancements that may be necessary.

The aim of a planning assessment is to get well thought out built form outcomes reflective of community aspiration, not rushed, influenced, poor outcomes. Other levers to relieve the pressure on the assessment process include investigating:

- Legislating against parties being able to contact the relevant authority assessment officers during the development assessment process. Mitigating interruptions would allow officers to work without undue pressure, it would allow officers the ability to better meet timeframes and

further reduce deemed consents, it would eliminate the officers being influenced by applicant or political agendas, and has the knock on effect of potentially reducing mental health issues and take away the applicants ability to potentially corrupt the process.

- Workload of planning staff and identifying recommended resourcing levels based on demand e.g. number and complexity of applications received. Particularly in light of limited opportunities to study and gain desired qualification and skills through South Australian universities.
- Applying to the court if an application has taken beyond the legislative timeframes to reach a decision.

Verification of development applications

17. What are the primary reasons for the delay in verification of an application?

Initially, the sheer number of applications coming in with limited resources and working through the internal process for verification was the primary reasons for delays in verification at West Torrens. This was a learning curve and internal processes have been improved.

Unlike the previous requirement under Development Act, the Verification process under the PDI Act is much more resource intensive. The increased requirements are not equally placed on an applicant to submit a complete development application, the DAP does not prevent incomplete applications from being submitted. Therefore, all the expectation is placed on the relevant authority. Furthermore, the resource intensive process is exacerbated when an applicant provides a partial response to a request for information to form a complete application. To illustrate this, a significant proportion of verifications are also required to be reviewed on a numerous occasions where the applicant fails to submit the requested information. It is advised that between 60-80% of development applications have the following information missing at time of lodgement:

- Scale and dimensions (including building height) not provided- often plans are not to a scale
- Site plans - no dimensions
- Setbacks not shown
- Site plan - notations do not confirm what is existing and what is proposed
- Materials and colours
- CT and deposited plan
- Rainwater specifications

This is double and triple handling of the application. The consequence is that greater attention is required on the more complex developments and simpler developments take longer to process creating a backlog of applications for verification.

Further to this, on some occasions, 5 business days for complex applications may not provide enough time for a detailed review of the planning documentation.

The planning team meets verification time due to improved internal procedures and experience with the system and there are limited exceptions to this.

18. Should there be consequences on a relevant authority if it fails to verify an application within the prescribed timeframe?

No, often the quality of plans is average to poor which requires sending out requests for the required information, creating a situation where not only do we have new applications to verify but previous applications that failed to meet the standard. If the quality of plans was lifted to a point where rarely

there was a need to send out a follow up letter, then perhaps. It is seen that 60-80% of the plans submitted fail to provide the provisions outlined in Schedule 8.

Other councils may not take a literal approach to schedule 8 requirements e.g. not requiring the information West Torrens does (even though it's in the schedule 8, they waive information we require). This means you can't compare councils exactly as they are not all requiring the same details in the plans.

19. Is there a particular type or class of application that seems to always take longer than the prescribed timeframe to verify?

The following development types have been identified:

- Commercial developments which may involve more complex elements, plans and items for consideration (various referrals, notification triggers, relevant authority etc.).
- Site contamination considerations can require a more detailed investigation to take place in order to determine the necessary information.
- New Dwellings and additions (Class 1), there is more information required in the schedule 8, they are a more intense application requiring more scrutiny and greater attention to detail

20. What would or could assist in ensuring that verification occurs within the prescribed timeframe?

All councils uniformly accepting a higher level quality of plans. This would eliminate inconsistency between councils and informs applicants exactly what is required in every application for every council.

Once that has become the norm and is consistent, we will receive better quality plans, meaning less applications requiring follow up and more applications passing through verification and reaching assessment more efficiently.

21. Would there be advantages in amending the scope of Schedule 8 of the PDI Regulations?

Yes, particularly for commercial developments and change in land use applications. The mandatory information for these types of applications may require a review to assist the process (i.e. a statement which identifies the core activities to occur on the land, details of the previous lawful land use to determine whether site contamination matters need to be considered, identify if there is to be tree damaging activity etc.).

There is also a request to include the new landscape guidelines being linked somehow into the Code in relevant sections and to include a landscape plan in schedule 8 with details of species etc.

Schedule 8 currently refers to areas of soft landscaping and it is a struggle to get applicants to lodge landscape plans.

Provision of Certificates of Titles in Schedule 8 is also recommended.

The portal is a user based system, so making people/developers aware of their requirements would make verification easier and more streamlined in process.

Consistency in plans being submitted/accepted for assessment across all councils is sought.

General Comments

It is appropriate to explore the data from the DAP in more detail to determine if the applications that fell outside the 5 days were verified on day 6 or 7; or was this an issue for a particular application type or region; or how affected where these authorities by Covid-19; or was the timeframe due to the poor quality information submitted with the application. A more complete understanding of the issues behind the headline metric is warranted. Furthermore, the Expert Panel is encouraged to consider training for all participants in the industry, education, and DAP system solutions, ahead of imposing penalties on a sector that is facing the same resourcing challenges as other sectors.

The proposal within the E-Planning System and the Plan SA website paper to explore combined verification and assessment processes and to remove Building Consent verification for simpler applications has merit and warrants further consideration.

Discussion Paper – Planning and Design Code Reform Options

Character and Heritage

1. In relation to prong two (2) pertaining to character area statements, in the current system, what is and is not working, and are there gaps and/or deficiencies?

The Code does not deliver the same level of detail or clarity as the former Development Plan. The former Desired Character Statements provided relevant contextual information on the history of the area and the desired future direction of development in the locality, which helped the interpretation of the Zone / Policy Area policy.

During consultation on the draft Code, Council recommended that the content omitted from the Desired Character Statements be included because it aided in providing context and clarity of the locality and it provided information that guided future development. The statements in the Code have caused issue when considering building height during assessment, as an example where the Development Plan may have considered a sympathetic second storey addition, the TNV would see an area where a discreet second storey addition as considered by the Development Plan have a 1 storey TNV applied to ensure that the relevant authority would be able to assess anything other as a performance assessed application.

Likewise, there are some areas within West Torrens that would benefit from a review to ensure that the correct level of protections are afforded to them and that the statements are adequate and appropriate, which is something that since the Code has been introduced has highlighted that there is a need for review.

An example is that in Novar Gardens Character Area states that there should be no front fences and side fences are no further forward than the building line. However, the PDI (General) Regulations exempt most front fences from requiring Development Approval. Therefore many new fences can be constructed without needed to obtain Development Approval. This is a contradiction of policy and regulation and would considerably alter the character of Novar Gardens.

2. Noting the Panel's recommendations to the Minister on prongs one (1) and two (2) of the Commission's proposal, are there additional approaches available for enhancing character areas?

As it currently stands, West Torrens has is proposing to review the heritage surveys undertaken in the mid 1990's with the aim of identifying the status of currently identified items (either to be kept as a heritage item, elevated or remove as required). The investigations are hoped to capture items and/or areas of character or heritage value. From this point of view, reform to establish new character areas is supported on the chance investigations undertaken highlight that there is sufficient merit in establishing new character areas.

Council's investigations that may provide insight into the need for a Code Amendment and reform that supports improvement to the protection of character and heritage is welcome, as is improvements and clearer guidance to this type of Code Amendment.

In addition to the above, guides, guidelines and policy contained in the Code that are easily understood by all stakeholders including why these places/items have additional protections, what is suitable development etc. would help manage expectations.

Prior to the new planning system, some Development Plans contained conservation design guidelines with diagrams that provided pertinent guidelines for various development types within their council area, these provided a valuable resource for both applicant and relevant authority.

3. What are your views on introducing a development assessment pathway to only allow for demolition of a building in a Character Area (and Historic Area) once a replacement building has been approved?

The inclusion of policy that supports approval of a suitable replacement building prior to demolition is supported, noting previously the West Torrens Development Plan had the following Objective and Principles of Development Control for Historic Conservation Areas, which speak to retention and conservation of contributory items (transitioned through the Code as Representative Buildings) and specifically PDC 5(c) identified that buildings should not be demolished in part or whole unless they are associated with a proposed development that supports the desired character for the Historic Conservation Area:

> *Objective:*
>
> *4 The **retention and conservation** of places such as **land, buildings, structures and landscape elements** that contribute positively to the historic character of the area.*
>
> *Principles of Development Control:*
>
> *2 Places such as land, buildings, structures and landscape elements that contribute to the historic character of the area identified on the Overlay Maps - Heritage and more specifically identified in the respective Table WeTo/3 - **Contributory Items, should be retained and conserved**.*
>
> *3 Development of a contributory item should:*
>
> > *(a) not compromise its value to the historic significance of the area*
> >
> > *(b) retain its present integrity or restore its original design features*
> >
> > *(c) maintain or enhance the prominence of the original street facade*
> >
> > *(d) ensure additions are screened by, and/or located to the rear of the building*
> >
> > *(e) ensure original unpainted plaster, brickwork, stonework, or other masonry is preserved, unpainted*
>
> *5 **Buildings and structures should not be demolished in whole or in part, unless they are:***
>
> *(a) structurally unsafe and/or unsound and cannot reasonably be rehabilitated*
>
> *(b) inconsistent with the desired character for the Historic Conservation Area*

(c) ***associated with a proposed development that supports the desired character for the Historic Conservation Area***

6 Development should ***take design cues from the existing historic built forms****. In doing this, it is not necessary to replicate historic detailing; however design elements for consideration should be compatible with building and streetscape character and should include but not be limited to:*

(a) scale and bulk

(b) width of frontage

(c) boundary setback patterns

(d) proportion and composition of design elements such as roof lines, pitches, openings, verandas, fencing and landscaping

(e) colour and texture of external materials

(f) visual interest.

7 New residential development should include landscaped front garden areas that complement the desired character.

This approach to seek an appropriate development proposal was evident in a number of Development Plans, including Port Adelaide Enfield Development Plan (PDC 5 for Historic Conservation Area), which provided the following PDC, highlighting that this was previously policy administered during development assessment:

5 A contributory item should not be demolished in whole or in part unless it is structurally unsafe and/or unsound such that it cannot reasonably be rehabilitated and the proposed demolition is associated with a replacement development that supports the desired character for the policy area.

4. What difficulties do you think this assessment pathway may pose? How could those difficulties be overcome?

West Torrens is supportive of policy that is dynamic and responsive to the community's aspirations. Heritage forms a strong theme for the community of West Torrens, policy review and reform of the nature identified (stronger controls, locally responsive design outcomes and demolition control) is greatly welcomed.

Trees

Native Vegetation

5. What are the issues being experienced in the interface between the removal of regulated trees and native vegetation?

Not applicable to West Torrens

6. Are there any other issues connecting native vegetation and planning policy?

Not applicable to West Torrens

Tree Canopy

7. What are the implications of master planned/greenfield development areas also being required to ensure at least one (1) tree is planted per new dwelling, in addition to the existing provision of public reserves/parks?

Some recurring issues being experienced including in master planned developments include:

- Open space is not always provided due to staging of the development to avoid open space trigger.
- Developers seeking 9% citing that as adequate open space, therefore limited open space is provided (noting a cash top up is provided).
- Provision of trees only in open space will not facilitate the dispersal of tree canopy amongst the development, open space tends to be consolidated.
- Open space is not only for tree planting, the function of the open space needs to be considered.
- Without trees planted on private land, targets will not be met.
- Verges need to be an appropriate size to accommodate tree planting and other competing uses e.g. waste collection, WSUD and allow for separation from dwelling. Design standards should capture all relevant elements.

Adelaide is vulnerable to changes in temperature, extreme weather events, sea level rise, and associated storm surges. Greater Adelaide's future prosperity and liveability will depend on how effectively we address and respond to the impacts of climate change. Policy that seeks to improve environmental quality, rather than increase pressure on public land to achieve all greening, cooling and sustainability targets would be detrimental. Climate resilience requires action from multiple stakeholders and through a number of measures.

8. If this policy was introduced, what are your thoughts relating to the potential requirement to plant a tree to the rear of a dwelling site as an option?

West Torrens is supportive of the requirement to include planting on private land in master planned/greenfield sites. Ultimately an increase in tree canopy is sought with appropriate tools/policy to enforce the tree planting and maintenance.

There is merit in seeking planting in the rear of the site particularly in zones where 0m or small front setback is sought. Another benefit to planting trees in the rear of small allotments in lieu of the front is to reduce conflict with council street tree plantings due to proximity.

The Adelaide Garden Guide for New Homes prepared by Green Adelaide in partnership with the State Planning Commission, PlanSA and the Office for Design and Architecture SA is a great resource, and provides an opportunity to also work up designs for smaller gardens that may be seen in master planned areas.

Tree Protections

The government's changes to the legislation, although required to balance development with canopy conservation, has now resulted in an ineffective framework to protect trees and with this, a wholesale removal of trees, some of which predate European settlement. These trees, once gone, cannot be replaced are an intergenerational asset, make regions desirable places to live and invest and provide important means of protection from habitat loss.

There is a large body of evidence based research demonstrating the loss of canopy cover and how this is now occurring at an alarming rate. A City of Burnside canopy study identified a 10% loss of Canopy cover over a 5 year period between 2010 and 2015 (https://www.burnside.sa.gov.au/Environment-Sustainability/Trees/Tree-Canopy-Report). From the body of research undertaken across metropolitan SA it is evident that most of the loss is occurring on private land. Should the rate of canopy loss trend continue, the Government's ability to maintain canopy cover or offset this loss on public land is unachievable. Effective legislation is therefore required to protect those trees on private land that significantly contribute canopy cover.

Since the introduction of Significant Tree Legislation those measures introduced to help protect trees have been eroded over time. Examples include those amendments in 2012 (Development Amendment Act – Regulated Tree Variation 2012) reducing the circumference to trigger protection from 2 metres to 3 metres, the exemption of species most commonly occurring on private land regardless of historic, amenity or environmental attributes, the exemption of all species within 10m of a property (excluding Eucalyptus and Agonis), the removal of all species within 20m of an asset in a bushfire prescribed area and the removal of those public owned trees occurring on public schools. These changes now make the Legislation valueless in its ability to protect trees, including those last remnant ingenious trees that predate European settlement, those trees that have significant cultural value and or those that protect against habitat loss.

The 30-yeart Plan for Greater Adelaide recognises the value and importance of Urban Green Cover setting the objective (Target 5) to maintain and increase canopy cover.

Considering loss of canopy cover is occurring on private land and recognising public land to offset this loss is limited, without changes to improve tree protection targets to increase tree canopy will be unachievable, particularly in established areas that currently already have canopy cover.

The introduction of the Planning and Design Code has seen the tone of development assessment provisions change from ensuring that development minimises impact on trees to the trees needing to demonstrate exceptional attributes in order to make them worthy of retention. For the Expert Panel's consideration are the former provisions contained in the West Torrens Development Plan:

Objectives:

> *2 Development in balance with preserving regulated trees that demonstrate one or more of the following attributes:*
> *(a) significantly contributes to the character or visual amenity of the locality*
> *(b) indigenous to the locality*
> *(c) a rare or endangered species*
> *(d) an important habitat for native fauna.*

Principles of Development Control

1 Development should have minimum adverse effects on regulated trees.

2 A regulated tree should not be removed or damaged other than where it can be demonstrated that one or more of the following apply:
(a) the tree is diseased and its life expectancy is short
(b) the tree represents a material risk to public or private safety
(c) the tree is causing damage to a building
(d) development that is reasonable and expected would not otherwise be possible
(e) the work is required for the removal of dead wood, treatment of disease, or is in the general interests of the health of the tree.

3 Tree damaging activity other than removal should seek to maintain the health, aesthetic appearance and structural integrity of the tree.

3 Significant trees should be preserved, and tree-damaging activity should not be undertaken, unless:
(a) in the case of tree removal, where at least one of the following apply:
(i) the tree is diseased and its life expectancy is short
(ii) the tree represents an unacceptable risk to public or private safety
(iii) the tree is within 20 metres of a residential, tourist accommodation or habitable building and is a bushfire hazard within a Bushfire Prone Area
(b) the tree is shown to be causing or threatening to cause substantial damage to a substantial building or structure of value
(c) all other reasonable remedial treatments and measures have been determined to be ineffective
(d) it is demonstrated that all reasonable alternative development options and design solutions have been considered to prevent substantial tree-damaging activity occurring
(e) in any other case, any of the following circumstances apply:
(i) the work is required for the removal of dead wood, treatment of disease, or is in the general interests of the health of the tree
(ii) the work is required due to unacceptable risk to public or private safety
(iii) the tree is shown to be causing or threatening to cause damage to a substantial building or structure of value
(iv) the aesthetic appearance and structural integrity of the tree is maintained
(v) it is demonstrated that all reasonable alternative development options and design solutions have been considered to prevent substantial tree-damaging activity occurring.

The Code is likely to support the removal of more trees.

9. What are the implications of reducing the minimum circumference for regulated and significant tree protections?

A number of exemptions were introduced in 2011 to the protections for regulated and significant trees noticeably it weakened and undermined the original intention of tree protections in South Australia - preventing unnecessary removals. While South Australia's tree laws have always focused on protecting individual large trees, interstate attention has turned to protecting the "urban forest".

As recommended by the Urban Tree Protection in Australia report from the University of Adelaide, change to the definition of a regulated tree to:

- Has a trunk circumference of 50cm or more measured 1m above the ground
- Or has a height of 6m or more
- Or has canopy of over 9sqm

There is a need to review the definition. If there parameters were to change away from a circumference from 2-3metres there would be more trees captured. Looking at the street trees within West Torrens and on public land only, if the following parameters were changed, then this many trees would potentially be protected under the definition above:

- 5-10m height- 17,278 street trees,
- 5-10m canopy- 17,982 street tree, and
- 5-10m height and 5-10m canopy- 10,971 street trees.

Currently, there are 2,094 street trees that have a circumference equal to or greater than 2m.

10. What are the implications of introducing a height protection threshold, to assist in meeting canopy targets?

Data capture and identification of canopy size may be an issue. Council has tree canopy mapping (Forestree), so that would likely assist in identifying tree canopy of street trees, however this may be difficult to gain data for privately owned trees. Although, Urban Heat and Tree Mapping Viewer (environment.sa.gov.au) has information of canopy and height (this is being revised over coming months but there may be issues with timing between mapping being captured, tree canopy brought over into the mapping).

Another implication would be ensuring that the community are aware of how to measure the canopy, and raising awareness of any policy change, it could be difficult to update people affected.

11. What are the implications of introducing a crown spread protection, to assist in meeting canopy targets?

West Torrens is supportive of crown spread protection and identifies the following:

- Remove the ability to prune up to 30% of a regulated / significant tree without requiring approval and implement a system that requires the use of the AS4373 Standard.
- 30% pruning of the canopy is a large amount, plus, to establish 30% removal, we need before photos and even then, the amount is subject to visual assessment only and difficult to prove from various angles. There continues to be the oversight that 30% could be removed today, a further 30% could be removed in 3 months' time and so on, until there is nothing left of the canopy (and tree).

West Torrens seeks evidence to be provided when applying for council rebates to help retain trees onsite. There is possibility to map the private trees on Forestree from this info being provided. It could be useful to implement a state wide tree portal.

12. What are the implications of introducing species-based tree protections?

A review and modification of the exemption list to better reflect the South Australian Environment and better protect non weed species trees is supported and recommended.

Distance from Development

13. Currently you can remove a protected tree (excluding Agonis flexuso (Willow Myrtle) or Eucalyptus (any tree of the genus) if it is within ten (10) metres of a dwelling or swimming pool. What are the implications of reducing this distance?

West Torrens wants to see more trees protected. Reducing the 10 metre distance appears to provide a mechanism to support trees growing closer to a building or structure of significance.
Consideration should be given to bringing this into line with other states e.g. 0m distance unless it has gone through an assessment process to demonstrate that the tree is causing damage.

However, if this policy were to be retained the following is sought:

- Clarity around where the measurement for the 10 metres is taken from e.g. pool coping, slab protruding past verandah posts, the post of the wall of the dwelling.
- Recognising the importance of balancing tree protection and development needs, there is a need for investigation into expanding the list of tree species that should be included within the Regulations (Part 2, 6A(5)(a)) in relation to trees that require development approval when located within 10 metres of an existing dwelling, or an existing in-ground swimming pool. This is to ensure and recognise that there are more trees of significance than only the two listed currently that are worthy of consideration for further protection.

14. What are the implications of revising the circumstances when it would be permissible to permit a protected tree to be removed (i.e. not only when it is within the proximity of a major structure, and/or poses a threat to safety and/or infrastructure)?

Some thoughts when considering this question include:

- Automatic approvals are not supported for the removal of trees that should be protected either currently or under revised legislation. An assessment is sought with a qualified professional making the recommendations (arborist, structural engineer)
- Increase the use of arborists to assess applications affecting regulated and significant trees and allow for streamlined approval process for applications to remove regulated and significant trees.
- In order to reduce conflicts of interest, do not allow the same company or arborist who makes an assessment for a regulated or significant tree removal to undertake the work. This would provide opportunity for the veracity of the assessing arborist's assessment to be seen.
- Mechanism to prevent tree removal if the development requiring the trees removal does not proceed, particularly in instances where the tree is in good health and not requiring removal other than to accommodate the development.
- Tree protections may limit a site's development potential just as other site constraints do so unless the tree is diseased with a short life expectancy then tree retention should be the aim.
- Qualify what is meant by the following terms to ensure consistency and clarity:
    - a major structure

    - what is the threat
    - what is perceived risk
    - potential for fail
- Restore the requirement for the Department of Infrastructure and Transport and the Department of Education to publicly consult and gain planning approval to remove regulated trees

Urban Tree Canopy Off Set Scheme

15. What are the implications of increasing the fee for payment into the Off-set scheme?

Some implications to increasing the fee for payment into the off-set scheme include:

- Money paid into the fund should be reflective of costs associated with tree removal, tree establishment and lifetime maintenance
- May motivate applicants to plant trees instead of paying
- There is a flaw in the policy. Applicant's currently don't need to demonstrate that they can't plant even though site may be large enough to accommodate
- The rationale for including the Housing Diversity Neighbourhood Zone in the off-set scheme is understood but is considered a flawed approach; areas with a high proportion of medium density development (typically multi-dwelling sites with small setbacks, high levels of hard surfaces and in some cases more 'affordable' housing options compared to lower density areas) are more likely to benefit from trees provided on site because this type of development is hotter than areas with landscaping.

16. If the fee was increased, what are your thoughts about aligning the fee with the actual cost to a council of delivering (and maintaining) a tree, noting that this would result in differing costs in different locations?

West Torrens is supportive of modifying the Urban Tree Canopy Offset Scheme to better reflect the value of trees to the community by increasing the offset fees to match the costs that are consequently passed on to Councils to plant, establish and maintain replacement trees. Money generated from the payment of any off-set scheme implemented should go to the affected council.

17. What are the implications of increasing the off-set fees for the removal of regulated or significant trees?

If the off-set fee for the removal of a regulated of significant tree was to be increased, clear and sound justification needs to be provided for the basis of the fee. Implications to increasing the fee may include increased replacement planting over financial contribution.

People paying into the fund may expect the tree/s to be planted near to their development. However, without other policy changes, it may be difficult to enact replacement tree plantings in close proximity to where the tree was removed. This is largely due to not planting replacement trees within 10 metres of building etc. This has had implications for tree planting on verges for West Torrens. Effectively it can be difficult to replant when meeting the 10 metres away from structure policy.

West Torrens is supportive of a review of the off-set fee and seeking a more realistic replacement and maintenance cost.

Public Realm Tree Planting

18. Should the criteria within the Planning and Development Fund application assessment process give greater weighting to the provision of increased tree canopy?

The Planning and Development Fund (the Fund) operates under the *Planning, Development and Infrastructure Act 2016* (the Act) and provides a means for open space and public realm investment across South Australia. The aim of the Fund is not to increase tree canopy per se. By all means canopy could form a component within the project assessment criteria e.g. how was canopy considered, are there opportunities to increase planting, could trees be retained. However, not all open space projects applied for will be suited as a rewilding project but may be open space for an oval for example. In some instances tree removal may be appropriate. The consideration of canopy would serve more to show how it was considered in a submission.

The risk could be that open space is not considered in all its varied purposes with preference provided to attainment of tree canopy as the main driver to the granting of funds at the expense of community needs.

General Comments (Trees)

For the Expert Panels consideration are the following comments as they relate to trees, these are other considerations that did not fit the line of questioning contained in the discussion paper:

- Incorporate Vegetation Overlays into the Planning and Design Code, similar to those used in Victoria, to better reflect the expectations of local communities by allowing for the protection of significant urban vegetation. Tree canopy could form an overlay within the Code.
- Consider increasing the number and size of trees required by the Code to be planted in new developments.
- Tree owners claim trees warrant removal due to falling limbs, which could be managed by periodic tree maintenance. An expert report could also help ensure that pruning is done to an acceptable standard.

  An expert report would also provide evidence on the current state of the tree which could be relied upon if legal action was to be taken later for tree damaging activity. There is concern however, that if maintenance of the tree becomes too difficult and/or expensive that people will remove the tree in preference to maintaining and retaining the tree.

- The Code should explore ways to retain mature vegetation and tree preservation. There is no policy on this in the Code unless significant or regulated.
- No reference to Regulated or Significant Trees is referred to for Accepted and Deemed to Satisfy Development within the Code. There is argument to say that a development cannot be an Accepted Development or Deemed to Satisfy Development if tree damaging activity will occur. However the following are not considered tree damaging activity:
  - Removal of up to 30% of the crown of the tree;
  - Construction within the critical root zone; and
  - Root damage.

  These types of activities can reduce the life span of the tree or increase its risk of causing damage to people and property. Both of these situations are likely to result in the removal of the tree. It is suggested that stipulating that development cannot be Deemed to Satisfy (DTS) or

Accepted when it is located within the Critical Root Zone of a Regulated or Significant tree to ensure that considerations on the impact of the tree are adequately considered.

- Members of the CAP have identified that a particular challenge over the past twelve months has been the assessment of a number of complex significant tree applications which have involved multiple and competing professional opinions from arborists. There is benefit in encouraging the State Government to invest in the development of a consistent tree risk assessment methodology/standard to support a greater level of consistency in the professional advice provided by arborists in support of these applications.

General Comments (Climate Resilience)

For the Expert Panels consideration are the following comments as they relate to climate resilience. It was noted that this is an extremely important consideration in development assessment that appeared to be missing from the discussion papers, related questions posed and Code policy. Climate resilience could be brought into the Code as a stronger element of assessment relatively easily and help form the basis of achieving the targets contained in *The 30 Year plan for Greater Adelaide*.

For context, heatwaves and higher temperatures experienced in summer impact community health, which often results in increased mortality, medical needs and hospital admissions. In particular, higher temperatures impact members of the community who have pre-existing conditions relating to heart, renal and mental health. The City of West Torrens and Western Adelaide Region which forms part of AdaptWest have higher rates of pre-existing medical conditions within the community, putting them at greater risk of the impacts from heat. Results from the initial urban heat mapping in 2017 showed that around 31% (11.5km^2) in our council area had areas of high heat or 'hot spots' which predominately occurred east of Adelaide Airport in Netley, as well as the eastern edge of the council boundary in Keswick, Ashford, Mile End South and Thebarton. The Western Adelaide Urban Heat Mapping report (2017) also explored case studies of how heat is impacted by material choice and green infrastructure, with the impact of roof colour being explored in case studies on page 30 and 31 (see attached Western Adelaide Urban Heat Mapping Project Report).

Suggested improvements to better assess and recognise climate resilience and address it during the development assessment process include:

- Inclusion of performance based standards and associated tools to assess applications at planning stage for energy efficiency and other measures aimed at improving climate resilience and cost of living outcomes. This would also be consistent with other states including Victoria and New South Wales and would seek to upfront these considerations at the beginning of the assessment rather than leaving it till the building rules assessment, when opportunity to make substantive changes to the design are generally harder to implement.
- Integrated hazard overlays – primarily a heat hazard overlay that builds on the investment that Adelaide metro councils have made in heat mapping and LiDAR data. The overlay would need performance outcomes that seek to mitigate the *further* creation of heat islands and the associated hazards in the urban environment. The easiest metric that this could initially tackle would be roof colour and material selection.

Infill

Design Guidelines

19. Do you think the existing design guidelines for infill development are sufficient? Why or why not?

CAP has identified that they have assessed and approved applications that would have been unlikely to have received approval under council's previous Development Plan, which is indicative of how the transition to the code has not been a 'like for like' transition. Overdevelopment of sites, lack of private open space, insufficient landscaping, lack of car parking, insufficient space for vehicle movements and poor design overall remain since the introduction of the Planning and Design Code.
Another issue impacting development is that although a development may meet all the quantitative standards, the design, living and amenity outcomes can be far from ideal and these need to be given greater attention by the Planning and Design Code. It is sought that the Code significantly improve design standards for medium and high density residential development, including consideration for the following specific policy outcomes:

- Developments of certain size and site coverage be required to incorporate sustainability initiatives in the design e.g. passive solar design, cross ventilation, resilient landscaping that requires less water usage, inverter air-conditioning units, colour of roofing materials that reduce radiant heat to residences, impervious areas that allow infiltration of stormwater onsite, and reduce runoff, etc.
- A more considered and minimum requirement on building height where greater heights are allowed would certainly contribute to increased landscape provision, less covered area reducing the impact of compressed development hard surfaces, easier vehicle movements and better defined entrances to each dwelling.
- Consideration of secondary frontages / elevations of dwellings similarly as important as primary frontages to incorporate meaningful articulation, materiality contributing to the design outcome of the development.
- Seek to increase the effectiveness of the affordable housing policies in the Planning and Design Code, including the consideration of limiting the concentration of affordable housing within a single site, and to strengthen policies for affordable housing supply particularly in higher density zones.
- Bin enclosures in multiple dwelling applications to be appropriately sited (e.g. not to be located adjacent to private open space rear yard of any dwelling, nor alongside a dwelling or front boundary of a property) to minimise any adverse impacts on the amenity of the dwelling occupants or community.
- Address development of existing laneways in established suburbs e.g. Mile End, so that each application contributes financially or through design criteria and surface treatments to driveways / cross overs. This is important to ensure that new laneway development contributes to the improvement of the urban design of the lane, helping to create safe shared pedestrian and vehicle zones with sound passive surveillance principles and landscaped solutions.
- Review of required car parking and garaging (width and depth) dimensions to mitigate the potential for garaging not accommodating residents' vehicles, and avoid putting additional pressure to on street car parking. This concern is raised by most representors heard by CAP on medium density applications. It is suggested that the Expert Panel recommend that the Australian Standard for garage sizes be reviewed to reflect modern vehicle sizes and this also be conveyed in the Planning and Design Code.
- Require applicants to provide an inspection report prior to construction from a qualified arborist that:

- the tree protection measures have been installed in accordance with the conditioned approval prior to site works commencing;
- trenching activities have not breached root zones before they are covered up; and
- a sufficient impervious perimeter to tree drip zone has been provided to limit hard surfaces compromising trees' ability to maintain good health.

Other suggestions/comments that have emerged through from working with the Code for assessment include:

- The West Torrens Development Plan had dispensation for allotment sizes in close proximity to centres. This incentivised development close to locations with good access to shops, services and public transport. This should be reintroduced so that higher density infill is concentrated near transport corridors and centres which (in theory) reduces car dependence. But in saying this, a review of the current policy needs to be undertaken to make it clear that when the measures for dispensation aren't met that the minimums sought by the Code are to remain relevant. Where zones have a range of densities allowable, maximum densities should be concentrated close to centres and the remainder of the zone should reflect lower densities.
- A review of General Neighbourhood Zones which are resulting in loss of character in areas of considerable former amenity should be undertaken as a matter of urgency. Policy change to retain these neighbourhoods through transition to Established Neighbourhood Zone should be facilitated.
- Double garages are still dominant on narrow blocks, even for two storey dwellings which the Code allows. Greater consideration of double garages needs to be given and the impact on streetscape and accumulative impact of driveways on the street verge, this may require an increase width of site frontage.
- Urban Corridor Zones are quite vague on setbacks and cause conflict with established residential areas.
- There is a conflict between Urban Corridor Zones and Aircraft Noise Exposure Overlay, with the Aircraft Noise Overlay seeking no increase in density to protect the operations of the Airport (which is of State significance).
- No requirement to prove that trees are being planted or rainwater tank installed. Consider requirement for applicant to upload photos to the portal after 12 months to demonstrate compliance.
- Design guidelines are generally acceptable but represent best case scenarios within literature produced by the Department. On the ground, design outcomes could be better, still end up with dwellings with dominant parapet walls and no eaves which don't look great and don't perform the best they could from a sustainability perspective.
- DTS setback criteria in Established Neighbourhood Zone generally a lot smaller than the prevailing character, should be increased to reflect the character, this could be captured by reinstating the character statements.
- Site area and frontage not reflective of prevailing character in some character areas, e.g. Western half of Cowandilla/Mile End West is more in line with Torrensville Character area, character of Ashford has been significantly eroded and in need of review.
- More guidelines for infill development on laneways is sought.

Allotments of 150m^2 or less in established areas be reviewed to ensure that the site area minimums are appropriate and the new infill development on smaller allotments does not create poor design outcomes that are at odds with existing established character. Where appropriate, increase allotment

sizes to ensure that development can adequately meet all relevant provisions of the Code whilst being sympathetic with surrounding development.

20. Do you think there would be benefit in exploring alternative forms of infill development? If not, why not? If yes, what types of infill development do you think would be suitable in South Australia?

In principle, yes further exploration of alternative forms of infill is supported, particularly with the view of infill development that it is complimentary to existing development such as that being explored in the Future Living Code Amendment or looking at locations best suited to higher densities such due to achieving walking distance to everyday facilities, mass transit and open space/recreation. Other comments based on working with the Code include:

- More work is needed on the definition of ancillary accommodation, greater guidance on the assessment of granny flats. Often it is a fine line between granny flat and dwelling which is confusing for planners and for applicants.
- Definition of multiple dwelling was removed from PDI Act. Consider reintroducing and providing guidelines for services/amenities and car parking required. Could also look more into student accommodation and supported accommodation.

West Torrens would gladly welcome the Expert Panel to visit sites where infill development within the city to showcase what is and isn't working well for infill development.

Strategic Planning

21. What are the best mechanisms for ensuring good strategic alignment between regional plans and how the policies of the Code are applied spatially?

Under the new planning system, the private sector is dominating the Code Amendment program. This results in a Code Amendment program which is not driven by strategic outcomes or policy improvements by the State or Local Governments.

Government agencies aren't sufficiently resourced to progress important Code Amendments and Councils are unable to influence the Code without first getting all other affected Councils to agree on and advocate for the change to the Commission or Minister.

There is a need for an agreed program or framework between State and Local Governments which details how and when Code Amendments occur, ideally, after the development of Regional Plans.

Specific, clear and instructive strategic planning is more important than ever in light of the generic wording of Code policies and private Code Amendments which can lead to ad-hoc, opportunistic and non-strategic rezoning of land. In some cases, private rezoning can occur without sufficient supporting infrastructure or logical connections to complementary zoned land. Managing the impacts of, and providing coordinated services for, substantial developments on isolated properties presents a bigger challenge and less efficiency than managing these services on a precinct or nodal basis. Rezoning isolated sites also provides less certainty and clarity for the community, particularly where the proposed intensity is substantially at odds with the surrounding locality. It is unfortunate that the new regional plans were not updated prior to the development of the Code and subsequent private Code Amendments, as this would have been the logical order in establishing the new planning system.

22. What should the different roles and responsibilities of State and local government and the private sector be in undertaking strategic planning?

Strategic planning should be undertaken by both State and Local Government (either collaboratively or in consultation) depending on the scale and spatial application of the document. For example, councils should have the ability to lead or substantially contribute to subregional plans and/or more local strategic plans which guide land use distribution and the provision of local infrastructure and services. While all stakeholders (including the private sector) should be included in consultation on strategic planning documents, it is the State and Local governments which have a responsibility to represent the interests of the general public and to provide the services and infrastructure required to facilitate increased populations and changing land use distribution.

West Torrens has previously raised concern with the Code Amendment process (see Attachment 3: Letter to former Minister for Planning and Local Government dated 13 July 2021). Whilst it is acknowledged that the private proponent process presents an opportunity for agile consideration of changing demand and landscapes in a timely matter that there are some issues with the process:

- Insufficient requirements for investigations to be undertaken to inform suitable policy application.
- Inherent conflict of interest during consultation with community and stakeholders (both pre-initiation and post) for the designated entity.
- Capacity for inappropriate development occurring during parliamentary scrutiny process.

West Torrens has been subject to a number of private proponent Code Amendments including:

- 65-73 Mooringe Avenue Plympton Code Amendment (Finalised)
- Lockleys Code Amendment (Pending a decision)
- 107 Port Road Thebarton (Thebarton Brewery Precinct) Code Amendment (Initiated)

The 65-73 Mooringe Ave Plympton Code Amendment demonstrated that the provisions relating to Code Amendments which are derived from the *Development Act 1993* appear to be misaligned given they do not adequately respond to the introduction of private proponent led Code Amendments. One such example, identified in Attachment 3, is that planning policy can be enacted and used prior to being subjected to parliamentary scrutiny in a timely manner. Surprisingly, parliamentary scrutiny of the Mooringe Code Amendment has extended beyond that usually anticipated by the PDI Act due to the ERDC not sitting over December and January and subsequent caretaker period earlier in 2022, meaning parliamentary scrutiny was increased from the 56 days to be lodged and reviewed, to approximately 6 months.

During this time development applications were able be submitted and approved and these applications will remain valid irrespective of any changes that may be proposed by the Committee and then implemented. It is acknowledged that changes or the overturning of a Development Plan Amendment, under the Development Act, was unusual given that Act did not allow for Private Proponent Code Amendments.

Following Parliamentary review, the ERDC wrote to Minister Nick Champion on 21 June 2022 recommending that the policy enacted be amended to an alternate zone. This was refuted by Minister

Nick Champion on the basis the suggested zone identified by the ERDC would be an underutilization of the site, although the proposed zone presented an upscale of the existing and surrounding zoning. The Minister also cited:

> *I am concerned that making such a substantial change to zoning through the Parliamentary process with no consultation with the land owner may create uncertainty for entities when proposing Code Amendments.*

The ERDC responded to the Minister to advise that the ERDC resolved that it does not object to the Code Amendment as originally made. With the ERDC's acceptance the Code Amendment is sustained and there is no need for the Code Amendment to be laid before both Houses of Parliament.

Furthermore, the introduction of Private Proponent Code Amendments allows for private commercial gain to be a driving factor which may give rise to tension between the Private Proponent and other interested parties including the surrounding community, resulting in a requirement for greater scrutiny of the engagement process and final Code Amendment presented to the ERDC (perhaps prior to approval).

Another issue highlighted during the Code Amendment process, considerations of infrastructure (including road networks, open space, opportunities to improve connectivity) are a matter for discussion post Code Amendment adoption and during the development assessment. The downside to waylaying these discussion is that it can be trickier when land has changed ownership and possibly into multiple owners, or if Council were managing the Code Amendment may incorporate concept plans to accommodate infrastructure delivery and siting with a whole of community lens.

Carparking

Code Policy

23. What are the specific car parking challenges that you are experiencing in your locality? Is this street specific and if so, can you please advise what street and suburb.

The following points identify car parking challenges that West Torrens are experiencing:

- Areas with high on-street parking demand already, e.g. Thebarton area. New developments exacerbate this demand, as do all day parkers wanting to park close to the CBD and then commute from there.
- Some forms of residential dwellings that take away on-street parking (e.g. row dwellings with narrow frontages).
- Interpreting the parking rates for Designated Areas where a range is given is challenging at times. Specifically, Table 2 – Off-Street Car Parking Requirements in Designated Areas provides as parking rate range of 3 to 6 spaces per 100m2 gross leasable floor area, or 3 to 5 spaces per 100m2 gross leasable floor area. Developers tend to keep to the lowest number, this causes conflict during assessment.
  West Torrens are increasingly seeing developments in Designated Areas where the proposed land use has a parking rate that is lower than that anticipated in **Table 2 – Off-Street Car Parking Requirements in Designated Areas** (where the minimum rate is 3 per 100m2), for example 'store' type land uses. There should be clarification or direction provided in **Table 2 – Off-Street Car Parking Requirements in Designated Areas** to consider a lower parking rate than specified under these circumstances.

- The rate of change seen in Kurralta Park (and other areas of growth through infill) creating increased demand for on-street parking which is now having impacts on traffic flow.
- Diagrams in Code are a misrepresentation of the how a driveway actually is constructed. The diagrams do not have flare but are depicted as being straight which is not in accurate for functionality of the driveway.
- The Code needs to consider the width of road, the flare needed on the driveway and then the impact of site width. Some developers are interpreting the diagrams in the Code literally. Driveway splays are typically required to assist with manoeuvres but some of the diagrams in the Code do not show these splays. This error should be corrected or further 'qualifications' added to the diagrams.
- The Code has reduced the on street parking rate from what was previously contained in the Development Plan from 1 on-street car park per 2 dwellings to 1 on street park per 3 dwellings.

24. Should car parking rates be spatially applied based on proximity to the CBD, employment centres and/or public transport corridors? If not, why not? If yes, how do you think this could be effectively applied?

As a principle, agree parking rates should be spatially applied (as in the current Zone approach). Hence alternative **Table 1 – General Off-Street Car Parking Requirements** and **Table 2 – Off-Street Car Parking Requirements in Designated Areas** is a good approach. The CBD should be a special case.

Only issue is **Table 2 – Off-Street Car Parking Requirements in Designated Areas,** where a (wide) range of parking is specified, it becomes a bit more problematic to use and subject to arguments and disputes with developers.

25. Should the Code offer greater car parking rate dispensation based on proximity to public transport or employment centres? If not, why not? If yes, what level of dispensation do you think is appropriate?

Yes, because proximity to centres and public transport means that walking, cycling and use of other modes of transport is encouraged and it is more likely to influence vehicle ownership. Of note, the State Planning Policies and *30 Year Plan* anticipate better integration of transport and land use planning, so it is important for designated areas to be located in areas where this desired integration can be achieved.

Dispensations in employment centres are not supported but activity centres would be more appropriate where you have a range of services present that encourages lower vehicle ownership.

Council (in consultation with specialist advice) has typically applied a 10% discount to the parking requirement for development sites that are close to public transport services, particularly high frequency GO ZONE routes. At locations where there are multi-modes of public transport available, e.g. Jetty St Glenelg, Council's traffic consultant has advised that they have previously applied a higher discount rate of 20% and SCAP had not expressed concern about this.

To illustrate this, when considering two sites, one of which is located close to an activity centre and with multiple high frequency public transport and one located on the main road only, the former should have a higher level of dispensation than the latter.

One of the commonly referenced parking guidelines by traffic engineers is '*Parking spaces for urban places: Car parking study – Guideline for Greater Adelaide*' which provides recommendations on maximum allowable discounts for proximity to various alternative modes of transport (see

attachments). This guideline provides examples of dispensation to encourage non-car modes of transport.

In addition, PO 5.1 does not list this as one of the factors for consideration. **Table 2 – Off-Street Car Parking Requirements in Designated Areas** does not apply to zones not in a Designated Area. Need to include the discounting aspect into PO 5.1 as an 'accepted' principle (as below).

Transport, Access and Parking

PO 5.1	DTS/DPF 5.1
Sufficient on-site vehicle parking and specifically marked accessible car parking places are provided to meet the needs of the development or land use having regard to factors that may support a reduced on-site rate such as: (a) availability of on-street car parking (b) shared use of other parking areas (c) in relation to a mixed-use development, where the hours of operation of commercial activities complement the residential use of the site, the provision of vehicle parking may be shared (d) the adaptive reuse of a State or Local Heritage Place.	Development provides a number of car parking spaces on-site at a rate no less than the amount calculated using one of the following, whichever is relevant: (a) Transport, Access and Parking Table 1 - General Off-Street Car Parking Requirements (b) Transport, Access and Parking Table 2 - Off-Street Vehicle Parking Requirements in Designated Areas (c) if located in an area where a lawfully established carparking fund operates, the number of spaces calculated under (a) or (b) less the number of spaces offset by contribution to the fund.

26. What are the implications of reviewing carparking rates against contemporary data (2021 Census and ABS data), with a focus on only meeting average expected demand rather than peak demand?

The parking requirement is not necessarily based on 'peak' demand. For example, parking data from the very high Easter and Christmas trading periods are generally not used.

It is probably more useful to specify a 'peak' number and then consider factors or arguments put forward on why it should be reduced, i.e. have a clearer understanding of the proposal, rather than a blanket use of an 'average'. This approach seems to be working well from an assessment perspective.

Regular updates of parking rates is useful, particularly in relation to car ownership data for dwellings.

Dwelling developments are the most frequent developments in West Torrens and have the greatest impacts on on-street parking. There is a perception that parking ownership is not as low as specified in Table 2.

Data would be useful in identifying how many spaces within a development could be reduced in size to accommodate small cars where there is shared car parking (e.g. shopping centres etc.) it is seen that small car parks are provided when space is compromised for parking and data would help identify the need/demand for EV charging parks.

27. Is it still necessary for the Code to seek the provision of at least one (1) covered carpark when two (2) on-site car parks are required?

From a parking assessment perspective it is not necessary to provide covered space. Manoeuvring into a covered space is harder than an open space so there is an advantage in not requiring a covered space for dwellings.

Open parks would mean that parking spaces being used as storage would be easier to monitor.

Of concern would be the impact on streetscapes. Inevitably, residents seek security and cover for their cars, if no undercover park is provided at time of dwelling assessment, there may be limited options to retrofit with a carport or garage at a later date. This will likely lead to an influx of applications seeking

carports forward of the dwelling ultimately interfering with front setbacks, reduction of passive surveillance, and reduction in amenity of the streetscape, therefore the removal of covered carparking is not supported.

Design Guidelines

28. What are the implications of developing a design guideline or fact sheet related to off-street car parking?

This would be a very useful approach to assist those who are not as familiar with the design aspect, compared to other regular developers. The design guideline or fact sheet does need to provide flexibility to accommodate unusual situations, however, common issues could be addressed e.g. flare, extract of parking standards, minimums could be identified and use of diagrams.

The fact sheet or design guideline could also be useful in demonstrating how landscaping could be incorporated in line with Code minimums and use of materials to get better environmental outcomes e.g. permeable paving.

Electric Vehicles

29. EV charging stations are not specifically identified as a form of development in the PDI Act. Should this change, or should the installation of EV charging stations remain unregulated, thereby allowing installation in any location?

From experience, developers only put in charging stations if they perceive a demand for it or as a marketing point. In an overall parking context, if considered as a reserved space (not resident space), the low number of EV spaces is not likely to be significant in terms of freely accessible parking for a development.

EV spaces have accompanying charging structures that may affect the design layout. Most developments we see have maxed-out areas to accommodate parking only. EV charging stations are expected to increase throughout the state and their location should be appropriately co-located with other parking areas. If unregulated, there is a high chance of EV charging stations being located in inappropriate and visually dominant locations. These devices commonly include third party advertising to help fund any associated costs and can significantly impact streetscapes. Some of these matters do trigger development and The Code should provide policies to assist in their assessment including:

- traffic management (e.g. safe and convenient access for cars using the chargers, impacts on car parking provision etc.);
- design and appearance of the infrastructure; and
- buildings being appropriately designed to accommodate EV charging stations

In addition to EV charging stations, the following is highlighted as more critical space-specific issues within carparks currently:

- small car park space allocations (approximately 10% of car parks), and
- car share schemes (which seek parking dispensation)

Currently there is no guidance on these issues.

30. If EV charging stations became a form a development, there are currently no dedicated policies within the Code that seek to guide the design of residential or commercial car parking arrangements in relation to EV charging infrastructure. Should dedicated policies be developed to guide the design of EV charging infrastructure?

Yes, consideration should be given to the following:

- Co-located with existing car parking areas/spaces
- Should not include third party advertising
- Should be designed in a way which does not dominate the streetscape
- Lighting/glare policies

Car Parking Off-Set Schemes

31. What are the implications of car parking fund being used for projects other than centrally located car parking in Activity Centres (such as a retail precinct)?

Without understanding in more detail through appropriate investigations the initial thought is it would detract from the primary purpose of the fund which is to provide parking. It is queried why a developer, thinking that they have paid into the fund to provide more parking for their customers find that the fund has gone to greening projects or something that does not increase parking or reduce demand for parking.

There is also an expectation that car parking should be in the vicinity of the development to reduce low parking implications on site which would be felt by others in vicinity like residents of the area. There would be an expectation that the parking be provided to address the parking issues of those that have paid into the fund.

Lastly, offsets should also accurately reflect the cost to provide parking. The fees set often don't reflect the cost. At this time West Torrens does not have a carparking off-set fund. Money generated from the payment of any off-set scheme implemented should go to the affected council.

32. What types of projects and/or initiatives would you support the car parking funds being used for, if not only for the establishment of centrally located car parking?

Currently support would be for the:

- Purchase of land for car parking.
- Use of funds to build the car park.
- Use of funds to develop consolidated parking for multiple properties to increase efficiency.

Commission Prepared Design Standards

33. Do you think there would be benefit from the Commission preparing local road Design Standards?

This would be very difficult to standardise, different councils have their own public realm requirements to reflect character and standards that are able to be maintained by the respective council. There are already design guidelines available including Council's own public realm design manuals and there are DIT guidelines that help with this. Rather than one size fits all, this should be left to each council to decide.

When looking at local road design, it has been viewed that bin placement and collection is a driving force in design often at the expense of greening/tree planting and on street parking. A more considered approach that considers:

- footpaths and shared paths within street verges that are uninterrupted, even and uncluttered
- pedestrian crossing points
- footpath widths for universal accessibility
- inclusion of shelter, rest areas, lighting, vegetation and street trees
- efficient and sustainable stormwater management
- coordinated placement of trees and infrastructure.

There is concern that minimums could be captured in a standardised design that may not be reflective of many situations.

General Comments:

Other general comments relating to car parking include:

- There appears to be an opportunity to review the parking rates for a range of land uses captured in the Code.
- From a Code usability perspective, the inclusion of the meaning of the land use term being inserted alongside each of the land use categories in Table 1- General Off-Street Car Parking Requirements would be welcomed.
- Domestic storage in garages is taking up parking spaces and effectively reducing onsite parking creating further demand for on-street parking.
- Minimum garage standards contained in the Code are not adequate. The length is too short at 5.4m, this does not provide for clearance once park is enclosed. Some Development Plans provided alternative dimensions with greater length.
- Turning paths should be provided at lodgement for certain development types and captured within Schedule 8 of the *Planning, Development and Infrastructure (General) Regulations 2017*.

Discussion Paper – e-Planning System and the PlanSA website Reform Options

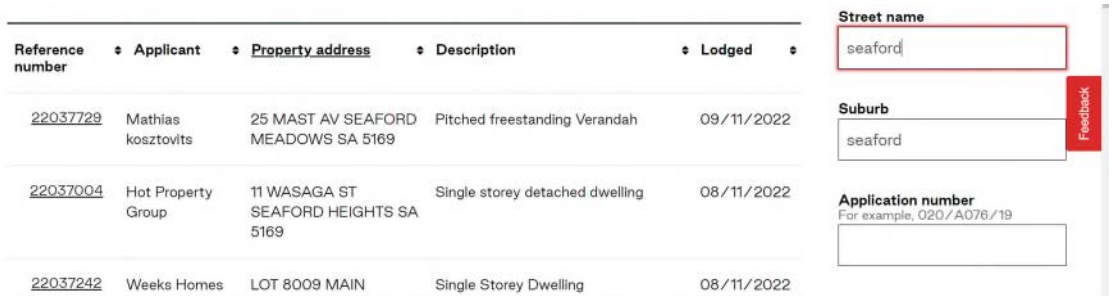
User Experience Questions

Website Re-Design

1. Is the PlanSA website easy to use?

The website is not easy to use, there is a lot of information available and may benefit from a review targeting key information to key stakeholder groups. Some quick issues to highlight from a precursory look at the website are provided below, this is by no means an exhaustive review:

- Searching the development register, the search is not intuitive. The screen flicks up to top and user is then required to scroll down again.
- When entering details into the development register such as street name, the search results do not reflect the search criteria. See image below, Seaford was entered into the street name field, however results returned reflect suburbs with Seaford contained in its name.

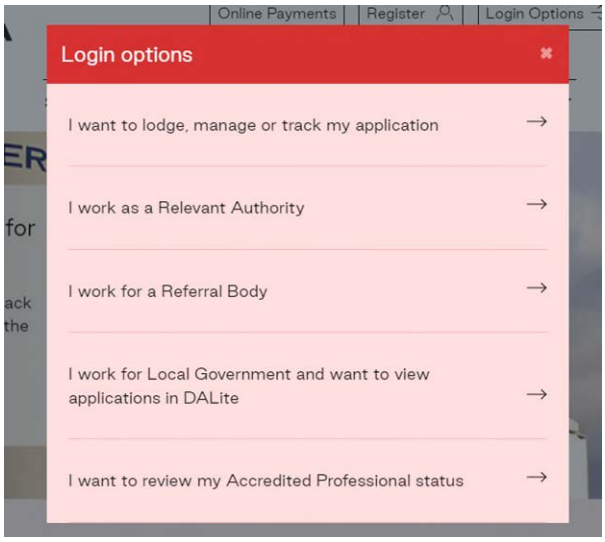


Reference number	Applicant	Property address	Description	Lodged
22037729	Mathias kosztovits	25 MAST AV SEAFORD MEADOWS SA 5169	Pitched freestanding Verandah	09/11/2022
22037004	Hot Property Group	11 WASAGA ST SEAFORD HEIGHTS SA 5169	Single storey detached dwelling	08/11/2022
22037242	Weeks Homes	LOT 8009 MAIN	Single Storey Dwelling	08/11/2022

  A suggested improvement would enable search by map and prefill addresses as you type.
- Planned system maintenance times, it is suggested these occur after midnight. The current times interfere with applicant and private workers

> From 6:30pm to 11:59pm Thursday 10 November 2022
>
> Due to planned system maintenance some pages on the portal may be affected.

- Too many login options, suggest separating the login screen. This is too confusing for short term users.



2. What improvements to the PlanSA design would you make to enhance its usability?

Suggestions to improve the design and enhance usability include:

- Ensuring it is exemplar in accessibility. Given the move towards providing an online tool a review and update to community should be provided to ensure that the site is inclusive.
- Reduce content on pages, currently requires too much scrolling on landing page
- Improve searching function to find relevant information.
- Work with key stakeholders to better understanding what the users want e.g. lodge, pay, track (neighbours development application or their own Development Application). Other users may want to access predominately policy related information. Use of hamburger menus to save space.

Mobile Application for Submission of Building Notifications and Inspections

3. Would submitting building notifications and inspections via a mobile device make these processes more efficient?

Feedback from industry as to the reason for the limited uptake in logging building notifications directly on the portal should be sought and survey users to ensure any changes are fit for purpose.

West Torrens is in support of mandating that all building notifications are through the PlanSA portal, considering that this would be a more efficient process for council's administration.

From an IT perspective every website should be mobile centric. In order for there to be uptake the process has to be easy and able to be done on the spot. Consider having a shortcut available on phone, this process would help streamline and avoid people moving the request to others within their organisations to upload e.g. builder on site being able to upload inspection request rather than forwarding a task- would provide for better workflow capacity.

The notifications need to be visible in real time to enable council's to enact expediently. Notification data submitted by users (those who notify) needs to be clearly timestamped, uneditable (but still capable of additional information being inputted) by the user, this would enable use for enforcement and clear record keeping

4. Where relevant, would you use a mobile submission function or are you more likely to continue to use a desktop?

As a council, a number of tasks including lodgement would remain desktop focussed primarily because the role of council and need to clearly see detail is better suited to a larger screen and often multiple screens.

However, there is value in being able to track and add correspondence via mobile device.

This question is more likely relevant to those who are also on site more often and would benefit from targeted consultation to ensure that best platform and functionality for those users is targeted.

Online Submission Forms

5. Is there benefit to simplifying the submission process so that a PlanSA login is not required?

This is not a priority when considering other portal issues, although simplifying the process would be beneficial particularly for one time users. However, the applicant will still need to be able to access the plans, if a hardcopy fee hasn't been paid as hardcopies will not be provided. Council needs to be able to communicate and for the applicant to be able to access documents.

It is also raised that there is a risk of creating duplicates of the same person (where they have more than one email address) making tracking applications difficult. Guest logins may cause issues / frustration for applicants, where they make multiple submissions, to find their applications easily. Emphasis should be on trying making a one stop shop for an applicant to see all their applications.

6. Does requiring the creation of a PlanSA login negatively impact user experience?

This seems to be the norm, people are used to logins for different services. People should feel that their data is safe with Plan SA, so authenticated logins can provide that environment.

7. What challenges, if any, may result from an applicant not having a login with PlanSA?

Further testing refinement and consultation with appropriate user groups. Potentially not having a profile maybe harder to track their applications and also would an applicant get their plans. Anyone with the email address may be able to download or access information.

Increase Relevant Authority Data Management

8. What would be the advantages of increasing relevant authorities' data management capabilities?

The discussion paper speaks to process management and ensuring it is accurate e.g. description, application type and relevant authority being able to update without going through PlanSA. PlanSA has no statutory authority under current legislation to act as gatekeeper, to maintain and amend applications. Therefore PlanSA are acting outside of their scope.

An issue with limiting a relevant authorities data management capabilities occurred for West Torrens, when the Court made a determination to issue additional days for an assessment and PlanSA took 10

days to reactivate, which due to the wording from the Courts eroded the council's time to undertake the assessment by 10 days, which is a significant flaw in the system and serves to disadvantage the relevant authority and applicant.

Relevant authorities need to act nimbly to undertake concurrent assessment, the DAP limits a relevant authorities' ability to do this. For example, when an application is on hold, referrals cannot be undertaken, there is nothing in the legislation to prevent this, and the portal is limiting assessment by being linear rather than agile. Relevant legislation empowers the relevant authority to undertake multiple processes, however the DAP limits this.

Data management from relevant authorities perspective also includes being able to pull metrics such as a dataset file of all applications approved within West Torrens to then be able to manipulate the data as necessary for bespoke reporting. More autonomy over DAP functionality is supported.

More consultation with users to determine what data they need and how they want to view it is required. Some items for the expert panel's consideration when it comes to reporting and access to data include:

- Councils are unable to report on statutory obligations (timeframes, achieving inspection practice direction).
- Reporting is not set up to be used by individual officers, lack of access to the data makes it hard to monitor workloads
- Post decision reporting and information which would be shared across council departments to assets, strategy, and waste (for example to identify private waste services) which allow for business planning. Including dilapidation report of council infrastructure e.g. kerbs, Council cannot extract useful reports for this work to occur, being left with damaged assets and no recourse to identify who has caused it. The lack of data (planning centric) isn't being able to be used efficiently to manage council business.

Appropriate access to data enables Local Government to undertake their function under the LG Act, PDI Act and enables data analysis on services they provide, to future plan e.g. waste, staffing requirements for planning/building team

The DAP should offer "full" API Based Product Integration (open data) so that authorities and other relevant stakeholders can move towards business to business transactions. This will facilitate innovation as it will incentivise authorities to evolve their business processes and the learning can be shared across all stakeholders. Enabling all stakeholders to shape direction and priorities of the core DAP functionality, together with the full API based Product Integration the DAP could realise its full potential as a digital platform.

9. What concerns, if any, do you have about enabling relevant authorities to 'self-service' changes to development applications in the DAP?

A relevant authority does not present major concerns, relevant authorities did this prior to the DAP being implemented. Some suggestions to ensure appropriate auditing can occur include:

- Needs to be auditable, it needs to be visible who has made the change e.g. renaming an incorrectly name plan.
- It should be restricted to certain persons (role based security permissions) e.g. what changes can be made and who is authorised to make those changes. An example might be that a planner can alter things during the planning assessment but not building.

Inspection Clocks

10. What are the advantages of introducing inspection clock functionality?

Inspection clocks will assist council in managing inspections, in particular, Practice Direction 8 as council must carry out pool safety barrier inspections within 10 business days of being notified of completion. The inspection clocks can assist with monitoring where council decides to carry out inspection, following receipt of a Statement of Compliance under Practice Direction 9 within 2 business days.

With inspection clocks, it would be beneficial where a function exists for council officers to monitor a countdown clock of unsatisfactory inspections. Council will send out correspondence or instructions for rectification/remediation to a builder/owner for action following an unsatisfactory inspection. Having this function, officers will be able to monitor their overdue inspections which can also be used for tracking/reminders.

Generally, the reporting needs to significantly improve, inspection clocks would be inaccurate because the data introduced in the notifications is insufficient. Significant consultation would need to occur with councils to make sure functionality improvements are fit for purpose, including parameters and definitions to get a consistent understanding.

11. What concerns, if any, would you have about clock functionality linked to inspections?

The clock function should only be visible to the council administration.

12. What, if any, impact would enabling clock functionality on inspections be likely to have on relevant authorities and builders?

It would depend how the clock functionality would be setup. For example, if the tool only enables council's administration to see when an inspection is due, the impact would be for the relevant authority to mandate. Councils undertake audit inspection and inspections are chosen based on the matters set out under Practice Direction 9. The clock function should not be accessible to include other stakeholders i.e. builders/applications/owners.

Council does not support clock functionality where all stakeholders are be able access/view the clock.

Collection of lodgement fee at submission

13. Would you be supportive of the lodgement fee being paid on application, with planning consent fees to follow verification?

Case law identifies that receipt of a lodgement fee equates to the commencement of assessment, this would need to change.

Furthermore, payment of the fee would likely add additional pressure to relevant authorities on the basis that applicant's assume that once the fee is paid that the assessment will have commenced yet experience has shown 60-80% of lodgements are falling short on providing all relevant information.

It's possible that applicants will submit an application with the lodgement fee and minimal information in order to get an application lodged under the current version of the Code, particularly in advance of an unfavourable upcoming Code Amendment.

14. What challenges, if any, would arise as a consequence of 'locking in' the Code provisions at lodgement? How could those challenges be overcome?

A consequence of locking in Code provisions and accepting payment at lodgement is that the assessment clock would start immediately, without assessment staff having had any opportunity to review the application. If the timeframes were to commence at payment of the lodgement fee this would reduce time for assessment and result in an already strained process becoming more difficult to achieve outcomes.

As an aside, allowing increased timeframes for assessment would likely result in improved outcomes, both for staff retention in local government and in built form on the ground. Staff are currently under enormous strain to quickly assess, resulting in sub-standard assessment in some cases and poor built form outcomes. Removal of the Deemed Consent would also assist in reducing this strain.

Previously highlighted, applications are submitted without the relevant information, sitting with locked in Code policy could be an issues where significant policy changes have been introduced e.g. Code Amendment

Another concern is that the Code can't extract the relevant provisions if the applicant has identified the wrong elements/ missed elements. Can only get Code extract at the time it is lodged.

Combined Verification and Assessment Processes

15. What are the current system obstacles that prevent relevant authorities from making decisions on DTS and Performance Assessed applications quickly?

There are a number of current system obstacles the prevent work flow being more efficient:

- Relevant Authorities can't open the assessment tab until the fees are paid. Why doesn't the portal enable that so that once fees are paid the assessment can be issued or enable pre-population of conditions and notes whilst in abeyance of fee payment?
- Not being able to add in or take out any elements that differ from what the applicant has applied for (e.g.: land division) without the application having to be withdrawn and a new application lodged. The DAP portal functionality should reflect all actions the PDI Act & Regulations enable Relevant Authorities, applicants and referral authorities to undertake.
- Undertaking assessment of the proposal at verification to determine the correct assessment pathway, whether public notification or referrals required and the relevant authority and then again during preparation of the assessment report is inefficient. It would be good to generate one (1) report in the combined verification / assessment process to start the assessment and populate based on submitted plans.

- The Plan SA website checklist: https://plan.sa.gov.au/__data/assets/pdf_file/0006/685536/Fact_Sheet_-_Development_application_checklist.pdf for development applications not correlating with Schedule 8 of the PDI Regulations which results in applicants not submitting plans in accordance with Schedule 8 and numerous iterations of plans being reviewed and submitted.
- Schedule 8 of the PDI Regulations:
    - Being overly onerous in some instances (e.g.: If plans drawn to scale and a ratio scale is included a bar scale isn't necessary, nor are dimensions of windows, doors etc. as they can be scaled from the plans). It is however acknowledged the relevant authority has the ability to waive information not required for verification.
    - Not including information to assess relevant criteria applicable to an application in other instances (e.g.: outbuilding accepted and DTS criteria refer to non-reflective or painted cladding, but Schedule 8 only refer to colours, not materials of construction). A full review of DTS/DPF and accepted criteria should be undertaken and Schedule 8 updated to correlate with the criteria with the lens of what information is necessary to determine if accepted criteria or DTS/DPF met?

16. What would be the advantages of implementing a streamlined assessment process of this nature?

Possible advantages would include:

- Only (1) assessment undertaken at verification to be used for final assessment, or amended as relevant if amended plans received, will make the process more efficient and less time taken undertaking the assessment more than once. This would only work if assessment report is generated at lodgement stage.
- Efficiency, reduces double handling

17. What, if any, impact would a streamlined assessment process have for non-council relevant authorities?

There would be limited impacts to non-Council relevant authorities, other than for DTS applications which rely on information sometimes not readily available which may impact application timeframes. For example DTS criteria may require the finished floor level of a development to be at least 300mm above the height of a 1% AEP flood event and flood level information is not available on the SAPPA or Council's website which creates delays in verifying and assessing the application.

Automatic Issue of Decision Notification Form

18. What are the advantages of the e-Planning system being able to automatically issue a Decision Notification Form?

The generating of automatic DNF would be good, as it could help improve timeframes. This in association with the integration work recently approved by the Heads of Planning to stamp plans in the portal, rather than requiring download, stamp and upload into portal will also improve work flows.

Opportunities to identify priority improvements to the DAP is sought for all users and particularly those users with financial interest.

19. What do you consider would be the key challenges of implementing an automatic system of this nature?

Not sure.

20. If this was to be implemented, should there be any limitations attached to the functionality (i.e., a timeframe for payment of fees or the determination will lapse)?

A time limit for payment of fees. Perhaps consider in line with the assessment time e.g. 20 day assessment = 20 days to pick up credit card and provide payment. A time limit is sought, there are current examples where fees have remained unpaid for many months and the application is unable to progress.

Concern is raised around potential for an alternate application and/or conflicting application being lodged and need to review how application in abeyance and subsequent application interact. How would a situation likes there be considered with an automatic system.

Building Notification through PlanSA

21. Would you be supportive of mandating building notifications be submitted through PlanSA?

Yes supportive of mandating building notifications. These are submitted by people working in the industry and not the general population. The user group are a professional user group and would have level of understanding of this.

22. What challenges, if any, would arise as a consequence of removing the ability for building notifications to be received by telephone or in writing to a relevant council? How could those challenges be overcome?

In lieu of looking at the consequences of removing the ability of building notifications by telephone or in writing, we should be looking at the benefits of mandating the building notifications through the Portal. Similar to electronic lodgement, the front end users are accustomed to online lodgement of new applications, while building contractors (generally post approval) have not needed to use the portal, it is a new concept to submit notifications through PlanSA. Lodging building notifications directly on the portal is not cumbersome. Plans SA should consult with industry, to seek why building contractors are not willing to lodge notification on the Portal.

One of the benefits of mandating building notifications through the Portal would be building notifications are invalid, unless a certificate of builders indemnity insurance is supplied, where a builder has been engaged to undertake the work (and not provided at the time of the Building Consent). Council receives enormous amount of Building Consents with building condition/s attached to the DNF requiring the builder to supply the indemnity insurance prior to commencement. This places a vast amount of work on the council administration to follow up. The onus should be on the builder/certifier to adhere to their condition e.g. being the relevant authority that has issued the consent, on the basis that the condition is met and the builder provides the indemnity certificate prior to commencement. The placement of this condition is beyond council's control, however the council administration has to follow the condition during the notification.

As building contractors are provided with alternatives, the challenge would be to find the reasons for the lack of lodging notifications on the portal and/or make changes to the system/Portal that is partially centred based on their feedback.

23. Would this amendment provide efficiencies to relevant authorities?

Yes, further to the previous response, another efficiency would include enabling council staff to see what notifications are coming whilst on the road rather than needing to look into what is being received e.g. a central point that is accessible online. If notification is not efficient the staff can't undertake efficiently.

The Planning System Implementation review should also consider bringing this forward to a medium term (6-12 Months) improvement in lieu of a long term improvement for the reform options.

Remove Building Consent Verification

24. Would you be supportive of removing the requirement to verify an application for building consent?

Administration are supportive of removing the requirements to verify a building consent application. In most instances, the proposed site plan, floor plan etc. has been submitted and accepted under the Planning Consent. The exception may be the technical specifications/information may have not be submitted initially at lodgement. This information can be requested from a building RFI, along with any other technical information that may be specific to the application. Removing the requirement to verify a building consent application will also remove some of the administrative burden on the council administration (in contrast to the planning stage).

25. What challenges, if any, would arise as a consequence of removing building consent verification? How could those challenges be overcome?

The challenges pf removing the building consent verification may be not all of the technical specification/information are submitted during the building rules assessment lodgement. An alternative may be to consider having a "checklist/tick box" at lodgement where applicants fill out to confirm/verify that the required documents has been submitted at building rules assessment lodgement.

Concurrent Planning and Building Assessment

26. What would be the implications of enabling multiple consents to be assessed at the same time?

Some implications of enabling multiple consents to be assessed at the same time include:

- Should there be inconsistencies between Planning and Building consents, either one of the consents may need to reapply i.e. a variation It is noted under PDI Act section 57 - *(3) If an inconsistency exists between the Planning Rules and the Building Rules, the Building Rules prevail and the Planning Rules do not apply to the extent of the inconsistency*
- Building assessments are generally efficient in comparison to planning assessment/process, due to the assessment category for Planning Consent. I.e. public notifications, referrals to agencies etc. This can be an implication to the Building Consent, as Planning Consent permits additional

time (dependant on the assessment pathway), the consent clock differs and cannot be granted close to or the same time. *Noting the requirements under PDI Regulations 53 - Time within which decision must be made, where additional time may apply to performance assessed developments and restricted developments.*

- It is also noted that Building Consent may require referrals to prescribed bodies, however preliminary discussions with referrals agencies have occurred prior and are not generally an issue or have time delays (as referral agencies can have set timelines to provide comments).

General Comments

Given the critical role of the DAP in the system, the Expert Panel is requested to review the governance and resourcing that is necessary to sustain the DAP. There appears to be an inherent limitation with the current governance model of PlanSA determining & progressing enhancements. While there have been many enhancements, acknowledging the efforts of the department to address what they can, there remain many more that are outstanding. As the current governance model requires all ideas to be funnelled through PlanSA and prioritisation of enhancements need to fit within the available resources and understanding of the issues by the department, the most common problems are the focus, not innovation.

Furthermore, the following concerns are raised for the Expert Panel's consideration:

- Assessment timeframes do not accurately capture when a request for information has been made – the DAP should accurately measure the assessment time.
- The system does not have a robust document management system, the current approach is convoluted and complicated. A contemporary document management system should be adopted for the DAP to reduce the administrative burden for all users. This should include generating adhoc emails within the DAP, which should be an expectation of a contemporary digital solution.
- Dashboards to monitor volumes of work are not working and cannot be readily relied upon. Dashboards should be provided to readily monitor and track development applications, without having to generate a PowerBI reports which are not reporting live data.
- A large number of development applications are not progressing past the submit stage, as information has not been submitted and this is contributing to unnecessary applications in the system. Overdue development applications, where information has not be submitted, should be lapsed and applicant should relodge when ready to proceed.

Lastly, West Torrens recently received feedback from a user undergoing public notification. This resident is currently building a new house in West Torrens and their proposal triggered public notification. Letters that were sent to the neighbours contain the applicant's name and current address (different to the development site) which lead to some of neighbours attending the applicant's house with questions and concerns about the house they had applied for. The applicant was upset about it and did not understand why their name and address had to be on the letter since the idea behind a public notification is that the neighbours have a chance to represent themselves during a CAP meeting. Could the letters sent through this process only contain instructions on how to lodge a representation, and not personal information of the applicant?

Innovation

Automatic Assessment Checks for DTS Applications

1. What do you consider would be the key benefits of implementing an automatic system of this nature?

More information is needed and should also be provided to all vendors who have assessment software e.g. release the Code API to all vendors to enable product development to the benefit all users of these software.

2. What do you consider would be the key challenges of implementing an automatic system of this nature?

Auditing to make sure accurate

Who is responsible for inputting code changes (Code Amendments?)

Who is inputting the data (software vendor or PlanSA) and how is it available e.g. API

How are the plans being read via relevant authority's software, through the portal or on premise?

Need better concept of the vision and responsibilities of each entity

3. Would you be supportive of the Government investing in developing this technology so that it may integrate with the e-Planning system?

After the basics are fixed and there is general acceptance of the portal of planning and building users. Currently, pursuing this would be at the expense of other efficiencies and innovations that are not being remedied or explored. PlanSA are acting as the gatekeeper of the Portal and councils have no ability to see what the innovations are or flexibility to pursue their own.

An example of how long it is taking to get relatively minor Portal enhancements (or minor from a user perspective) that make a big difference to the efficiency of the system for council undertaking an assessment. Administration wanted to add a file note, after DA was issued to help with managing correspondence relating to notifications, inspections, or recording further contact with the applicant or other people (such as comments from neighbours). The enhancement was requested via email to PlanSA on 24 January 2022 and enacted on 30 September 2022.

3D Modelling for Development Application Tracker and Public Notification

4. What do you consider would be the key benefits of the e-Planning system being able to display 3D models of proposed developments?

This could be useful but is not a high priority.

5. Do you support requiring certain development applications to provide 3D modelling in the future? If not, why not? If yes, what types of applications would you support being required to provide 3D modelling?

There may be instances when this would be useful for example in the City, or with development of a certain threshold e.g. master planned areas, during code amendment to demonstrate change in building

height TNV, or for large industrial or commercial development when close to residential. Although it is worth noting that 3D models can sometimes misrepresent the details of a proposal.

6. Would you be supportive of the Government investing in developing this technology so that it may integrate with the e-Planning system?

These are fantastic initiatives, but should not be prioritised over more urgent or practical system improvements.

Augmented Reality Mobile Application

7. Would you be supportive of the Government investing in developing this technology so that it may integrate with the e-Planning system?

This should not be prioritised over more urgent or practical system improvements.

Accessibility through Mobile Applications

8. Do you think there is benefit in the e-Planning system being mobile friendly, or do you think using it only on a computer is appropriate?

Supportive of this but also ensuring that the e-Planning system is accessible for everyone e.g. colours, read text out loud etc.

Also noting that not all features of the Portal will be easily used on a mobile device e.g. SAPPPA. Whilst on the subject of SAPPA it would be appreciated if users could turn on individual zone layers, as opposed to a cluster of zones that are often indiscernible due to colour selection.

9. Would you be supportive of the Government investing in developing this technology so that the PlanSA website and the e-Planning system is functional on mobile?

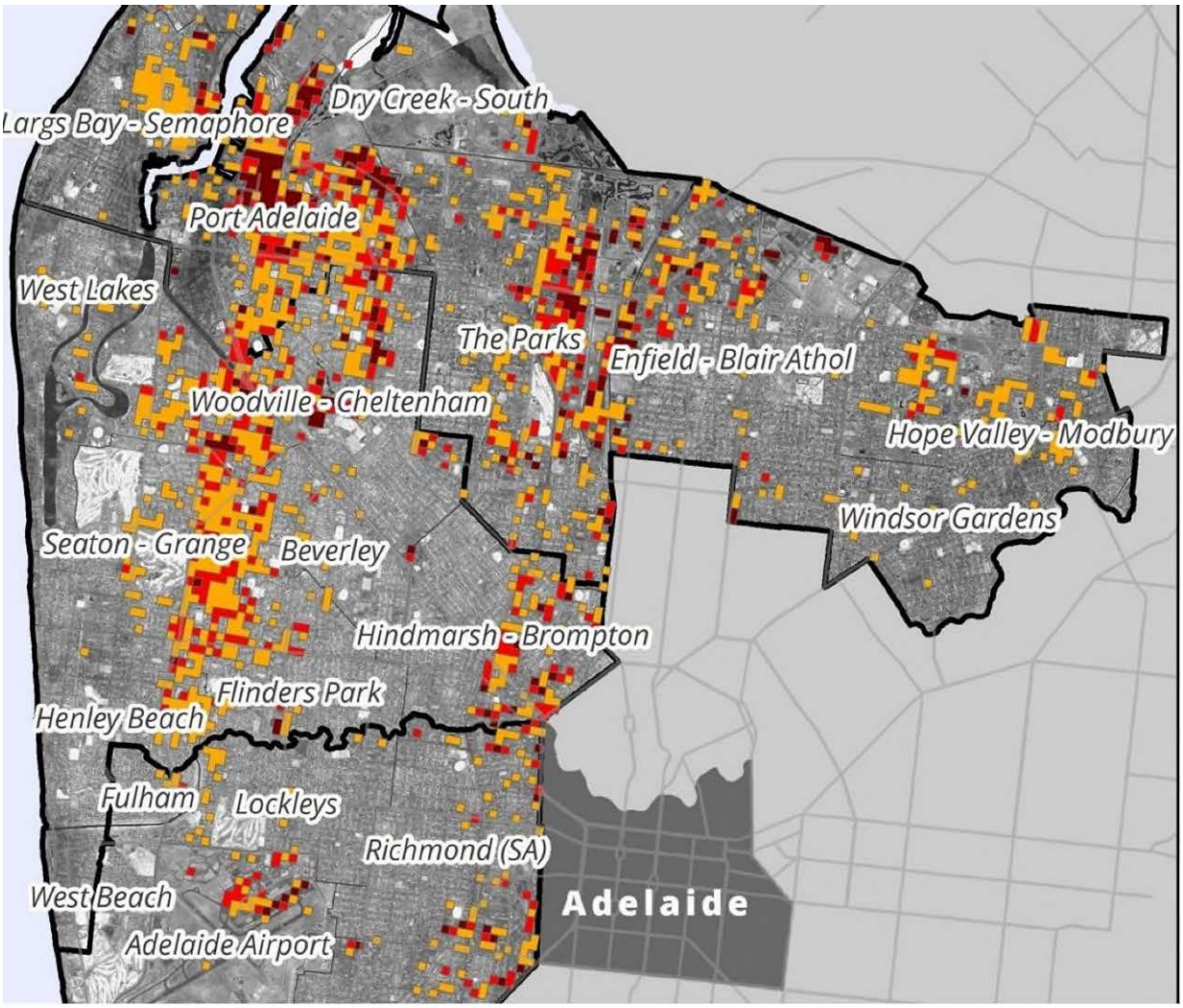
Yes, West Torrens is supportive of the ongoing and constant development of the e-Planning system. Where possible it should be mobile friendly, and staff should be able to assess on a tablet if needed.

General Comments

DA Lite is not in real time causing information delays. Council does not know who has access to DA Lite only however they can see who has user access in the Portal so user access cannot be managed easily and users are being maintained on a spreadsheet. Council cannot easily manage access including limiting access or rescind when a person leaves council (important in instances where former staff may access the site externally). This needs to be further considered from a security point of view.

Attachments

Attachment One: Western Adelaide Urban Heat mapping Project Report



Western Adelaide
Urban Heat Mapping Project

Report

August 2017

Western Adelaide
Urban Heat Mapping Project Report

prepared for the Cities of West Torrens, Charles Sturt and Port Adelaide Enfield, and the Adelaide Mount Lofty Ranges Natural Resources Management Board

Prepared by:
Seed Consulting Services
106 Gilles Street, Adelaide, South Australia 5000
P. +61 8 8232 4823
W. www.seedcs.com.au

In collaboration with:
Airborne Research Australia and EnDev Geographic

Document Control

Document information

Information	
Document Owner	City of West Torrens
Project ID	705 CWT UHM
Last Saved Date	27 August 2017
File Name	DRAFT Western Adelaide region heat mapping report v4

Document history

Version	Issue date	Changes
Draft V1	25 April 2017	First draft for comment
Draft V2	28 June 2017	Second draft for comment
Draft V3	14 August 2017	Third draft for comment
Final	27 August 2017	

Document approvals

Version	Issue date	Changes
Project Director	Mark Siebentritt	27 August 2017
Written	Mark Siebentritt (Seed), Justin VanderBerg (EnDev)	27 August 2017
Edited	Mark Siebentritt (Seed), Justin VanderBerg (EnDev)	27 August 2017

Contents

seed
consulting services

Executive summary

Extreme heat impacts the health and wellbeing of the community, the environment, and economic performance. The accumulation of heat in urban areas can result in urban heat islands, which experience temperatures higher than the surrounding landscape. Under climate change, the impact of higher temperatures will become more evident in these areas.

To ensure the Western Adelaide Region can respond positively to the opportunities and challenges of a changing climate, the three Western Adelaide councils are implementing a range of adaptation projects under the AdaptWest Climate Change Adaptation Plan. Given the rising incidence of extreme heat under climate change and projected housing infill trends which could exacerbate the urban heat island effect, the Cities of West Torrens, Charles Sturt and Port Adelaide Enfield, in conjunction with the Adelaide Mount Lofty Ranges Natural Resources Management Board, engaged Seed Consulting Services, EnDev Geographic and Airborne Research Australia to investigate the impact of neighbourhood urban form on its microclimate to enable more effective planning for community health and wellbeing across the region.

To better understand the location of urban heat islands and the factors that influence their occurrence, day and night heat (thermal) data was collected using a specialist remote sensing aircraft across 110 suburbs in Western Adelaide. The data were collected on 9 February 2017, which at 39.2°C was the fourth hottest day and second warmest night (25.2°C) of the 2016/2017 summer. This followed days of 31°C and 42°C, meaning that heat had accumulated in the landscape.

All councils had hot spots present, covering approximately one third of each council area. There were two north-south bands of heat islands, running from Dry Creek South to Henley Beach in the west of the region and from Wingfield to Brompton in the centre of the region. The highest rates of residents living within heat islands occurred in the City of Charles Sturt and City of Port Adelaide Enfield with 20.1% and 17.2% of their population, respectively, compared with only 5.6% of residents in the City of West Torrens.

The warmest suburbs by council area were:

- City of Charles Sturt - Ridleyton, Hindmarsh, Bowden, Brompton, Renown Park;
- City of Port Adelaide Enfield - Walkley Heights, Hillcrest, Enfield, Sefton Park, Northgate; and
- City of West Torrens - Ashford, Keswick, Kurralta Park, Mile End South, Thebarton.

Comparison of low, medium and high density residential developments suggest that the goal of the 30-Year Plan for Greater Adelaide, which is to increase infill across Metropolitan Adelaide, will exacerbate the development of heat islands if sufficient mitigation strategies are not implemented.

A number of suburbs were identified that contain urban heat islands and that also have a high degree of social vulnerability. Heat islands in Fulham Gardens had the highest degree of social vulnerability within the City of Charles Sturt and overall, while heat islands in Oakden and Lockleys had the highest degree of social vulnerability in Port Adelaide Enfield and West Torrens, respectively. Other suburbs that had high social vulnerability and exist within heat islands include parts of Albert Park, Seaton and Findon. Understanding the drivers of social vulnerability (e.g. age versus need for assistance with core activities) will be important in designing mitigation strategies for assisting the community to prepare and respond to extreme heat.

Land use and building materials have a significant impact on surface temperatures. As demonstrated by a series of case studies, land use decisions and material selection in Western Adelaide can cause at least a 7°C difference in surface temperature. For example, major roads averaged 3°C above the surrounding landscape and minor roads and parking lots 1.6°C warmer. Dark roofs were 2.9°C above the region average whereas light roofs were 2.3°C cooler. Temperatures were, on average, 2.8°C lower over green infrastructure, with irrigation creating an additional cooling effect of 1.7°C compared with non-irrigated open space.

The day-night time data comparison revealed that although many residential areas heated up during the day, they also cooled during the evening, with heat islands less evident at night for the region. Despite this, the impact of major roads was still a source of heat during the evening.

The thermal data collected for this study provides a comprehensive illustration of hot spots and urban heat islands and can help guide development and implementation of mitigation strategies. Based on the findings of this study and general strategies for mitigating urban heat islands it is recommended that:

1. despite the pressure from infill, the amount of green space and tree cover should at least be maintained, and preferably increased to provide cooling benefits;

2. green infrastructure such as trees, grass and raingardens should be used alongside or to shade bitumen covered surfaces such as major and minor roads, bikeways and footpaths. Where feasible, this green infrastructure should be irrigated in order to maximise its cooling effect;

3. where feasible the carriage way for main roads should be narrowed, stormwater treatment devices installed, and road pavement changed to lighter coloured materials;

4. councils maximise the cooling benefit from existing green cover by ensuring sufficient irrigation is provided to urban forests and other green infrastructure networks where available, such as from recycled stormwater;

5. light coloured roofs be encouraged in residential and industrial areas rather than using dark coloured roofs;

6. material selection is carefully considered in the design of recreation areas for the young and elderly, with substrates such as artificial turf and rubber softfall covering used only after consideration is given to how heat absorption can be offset e.g. through the use of shade sails;

7. guidelines be developed for the amount of green space and landscaping required and building materials to be used in medium and high density developments, noting their potential to develop into significant heat islands; and

8. planning, development and infrastructure be supported with a strong focus on design and build quality for dwelling comfort and liveability.

There is a range of additional analyses that can further assist in developing heat mitigation strategies for Western Adelaide, including:

- **targeting analysis,** which integrates numerous variables to identify project-specific priorities that will provide the greatest relief;

- **prioritising green infrastructure to mitigate high temperatures,** which focuses on determining which streets in particular in the region should be the target for greening strategies;

- **targeting delivery of community services,** which would use data generated for this study to target the delivery of community services to suburbs where heat exposure and social vulnerability intersect;

- **further comparison of materials and surface types** across the region to understand how land surface types can differ in their thermal performance (e.g. roof types and colours); and

- **exploring the relationship between surface and air temperature**, focusing on sites with a mix of surface types and materials.

The data collected and analysed during this study has been provided to the councils as spatial layers to inform future decision making for the region. Detailed heat maps are provided as annexes to this report.

1 Introduction

1.1 Context

The Western Adelaide regions lies in the northern western corner of Metropolitan Adelaide, covering the City of Charles Sturt, the City of Port Adelaide Enfield and the City of West Torrens. A common strategic objective for the three councils in the region is to improve the liveability and health and well being of residents. The Western Adelaide Region is characterised by different areas of social vulnerability such as:

- a high proportion of residents who are susceptible to heatwaves (elderly, existing health risk factors);
- a diverse community with English as a second language, complicating the councils' capacity to communicate with people at risk;
- areas of low income experiencing reduced capacity to pay energy bills; and
- corridor development, infill development and proposed higher densities that will further intensify the urban heat effect.

Globally, extreme heat events have led to high rates of mortality and morbidity in cities, having a major impact on the health and well being of the community. They also result in increased electricity consumption which in turn increases the release of greenhouse gases. Heat impacts are greatest in urban heat islands, which are areas where the average temperature is above that of the surrounding urban landscape. Urban heat islands tend to occur where buildings, roads and pavements associated with urban development have largely replaced trees and green space.

Warming associated with urban development will be exacerbated in future years by temperature increases due to climate change (Norton, et al., 2015). This was highlighted by the findings of the recent regional AdaptWest Climate Change Adaptation Plan, which found that the average temperature in Western Adelaide will continue to rise over the century, which will in turn exacerbate the impact of the urban heat island effect.

Without mitigation strategies, the urban heat island effect will be further enhanced by urban in-fill. The 30-Year Plan for Greater Adelaide, which is the strategic land-use plan that guides the long-term growth of Adelaide and its surrounds, has an objective of 85% of new dwellings in the form of infill. This will result in a higher population across Western Adelaide and drive a more compact and dense urban form.

Recent experience has shown that gradual infill across the region is occurring in the form of one into two developments (i.e. one larger single block with a home divided in two blocks with a home on each). This style of development generally results in the loss of tree canopy cover,

which has an impact on the State Government's tree canopy targets and the cooling effect which trees have on the local environment and streetscape.

Early identification of areas at high risk from extreme heat due to the urban heat island effect can help to target investment in heat mitigation activities, such as green infrastructure like trees, irrigated open space, green walls and green roofs, and guide the selection of building and construction materials that result in less heat accumulation in the urban environment.

1.2 Objectives

To ensure the Western Adelaide Region can respond positively to the opportunities and challenges of a changing climate, the three Western Adelaide councils are implementing a range of adaptation projects which are driven by the regional AdaptWest Climate Change Adaptation Plan.

Given the rising occurrence of extreme heat under climate change and projected housing infill trends, the Cities of West Torrens, Charles Sturt and Port Adelaide Enfield, in conjunction with the Adelaide Mount Lofty Ranges Natural Resources Management Board, engaged Seed Consulting Services, EnDev Geographic and Airborne Research Australia to investigate the impact of neighbourhood urban form on its microclimate in order to enable more effective planning for community health and wellbeing across the Western Adelaide Region.

The key objectives of the project were to:

- undertake detailed urban heat mapping across the Western Adelaide Region to identify the location and characteristics of urban heat;
- obtain data which will provide a better understanding of how the Western Adelaide Region is currently affected by urban heat; and
- identify key factors which influence temperatures across a city at the local scale, such as urban design and spatial geometry.

These objectives were addressed by conducting a flyover in February 2017 to collect data to generate urban heat maps, followed by analysis to identify patterns and relationships to inform decision making. This report provides the results of the analysis and a discussion of mitigation strategies and recommendations. A description of the methodology for conducting the flyover along with additional maps and data are provided in the following annexures:

- Annex 1: Council thermal maps;
- Annex 2: Thermal map profiles;
- Annex 3: Normalized Difference Vegetation Index (NDVI) maps;
- Annex 4: Suburb analysis tables; and
- Annex 5: Instrumentation, data collection and analysis.

2 Responding to urban heat

2.1 Urban heat island and hot spot identification

Heat maps were generated from data collected during a flyover at 3,000 m with a purpose-built aircraft, fitted with a thermal imager and other supporting instrumentation. The trigger for undertaking the flight was two or more consecutive days with the average temperature greater than or equal to 33°C. This occurred on 9 February 2017 and the surveys were flown around solar noon from approximately 11 am to 4 pm, and from approximately 11 pm to 3 am (i.e. 10 February 2017).

Thermal patterns in the urban landscape can be viewed as *heat islands* (areas at least 125 m x 125 m) and localised *hot spots* (areas at least 2 m x 2 m). Heat islands reveal where heat has built up and what features of the urban setting are most severely affected. Hot spots display intricate patterns of heat and allow for exploration of how different surfaces contribute to heat build-up.

For this project, the processes of identifying and analysing urban heat islands and hot spots were applied to both day and night time thermal data, resulting in day and night urban heat island and hot spot maps. Different thermal patterns emerge in the day and night time thermal maps. A spatial comparative analysis was applied to assess where and why these patterns vary. Comparing warm areas that persist into the night with those that cool rapidly identifies *high intensity* and *low intensity* heat islands each of which require different strategies for remediation and have different implications for planning.

2.2 Understanding urban heat in Western Adelaide

The data collected describes the land surface temperature of the study area which directly influences air temperature. Air temperature, however, is also influenced by local wind patterns, proximity to water, and other local weather conditions that affect the interaction between land surfaces and air. For instance, wind increases circulation which limits the time that any individual column of air is in contact with a hot surface thus weakening the influence of surface heat on air temperature; on calm days surface heat translates more directly into warmer air temperature. This report discusses impacts of land use on land surface temperature and methods for reducing the disproportionate build-up of surface heat.

The varying influence of surface heat on air temperature is governed by local conditions known as micro-climates. In addition to surface heat, many local factors affect air temperature including building shadows, urban wind-tunnelling, and fountains which have a cooling effect, and air conditioners, traffic exhaust, and other sources of waste heat which have a warming effect.

Surface temperature is the main influence on general air temperature, but understanding the balance between these additional, local factors requires a detailed micro-climate model.

While land surface temperature and air temperature are clearly different, mitigating high surface temperatures in cities is an appropriate target, as these reflect locations where both air temperature and absorbance of solar radiation is high, which impacts directly on human thermal comfort (Matzarakis, et al., 2007 in Norton, et al., 2015). Therefore, and notwithstanding that micro-climate modelling has not been undertaken, for the purposes of this study, surface temperature provides an appropriate and sufficiently reliable indicator on which to base conclusions and recommendations.

2.3 Framework for identifying priority urban heat mitigation areas

Specific locations can be identified for heat mitigation activities by identifying areas with the largest numbers of people that may be exposed and/or are vulnerable to excessive urban heat. A priority neighbourhoods framework (Norton, et al., 2015) has been adapted to structure the presentation of results for this analysis. Summarised in Figure 1, this framework seeks to identify areas of heat exposure, behavioural exposure and social vulnerability, and where they intersect, to determine the location of priority neighbourhoods.

This study provides quantitative data to inform identification of areas of heat exposure and social vulnerability, and their overlap. In contrast, behavioural exposure is considered qualitatively by describing areas of outdoor activity in the land use management and building material selection section e.g. playgrounds, bikeways, sporting fields, pedestrian thoroughfares.

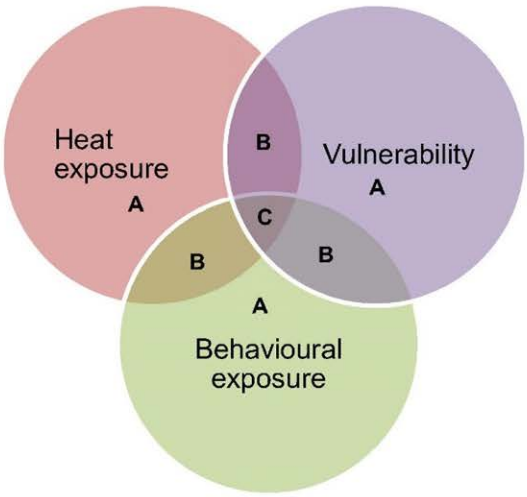


Figure 1. Framework to identify priority neighbourhoods for heat mitigation activities. Factors required to of high (C), medium (B) and moderate (A) priority for Urban Green Infrastructure (UGI) implementation for surface temperature heat mitigation. The key factors are high daytime surface temperatures (Heat exposure) intersecting with areas with more vulnerable sections of society (Vulnerability) and identifying the zones of high activity (Behavioural exposure) with this area. (Norton, et al., 2015)

3 Identifying priority areas

NB. While not referred to specifically through the text in this section, the analysis presented is also supported by a range of additional maps (A3) and data provided in Annexes 1-4.

3.1 Heat exposure

3.1.1 Temperature during flyover

On 9 February 2017, temperatures at the Adelaide Airport weather station reached 39.2°C, making it the fourth hottest day of the 2016/2017 summer. Of the three councils analysed, the City of Port Adelaide Enfield was the warmest with a mean surface temperature of 38.9°C, more than 1.3°C warmer than the mean temperature of the City of West Torrens. During the evening of 9 February 2017, night time temperatures at the Adelaide Airport reached a minimum of 25.2°C, the second warmest night of the 2016/2017 summer.

3.1.2 Hot spots and thermal analysis

The thermal data collected for this project reveals that 34.9% (63.7km2) of Western Adelaide classifies as a daytime hotspot, measuring warmer than 2°C above average temperature (Figure 2). Day time temperatures ranged from 10°C to 80°C, with 95% of the landscape measuring between 31°C and 42°C. Extreme temperatures over 65°C were driven by highly localised manufacturing processes, with the maximum temperature of 80°C occurring at Adelaide Brighton Cement.

The City of Charles Sturt received the highest percentage of hot spots of the three councils within the study region with hotspots covering 36.8% (20.1 km^2) of its land, mainly in the areas between Tapleys Hill and Findon Roads, and east of South Road, concentrated within the suburbs of Hendon, Woodville, Brompton, Bowden, and Hindmarsh (Table 1). The coolest areas within the council were found near West Lakes, around the golf courses in Grange and Seaton, and generally along the coast.

The City of Port Adelaide Enfield had 35.1% (32.1 km^2) of its land classified as a hotspot, mainly concentrated in the heavily industrialized areas in the north and central areas within the city. The largest and most intense hot spots occur within the suburbs of Port Adelaide, Dry Creek, and Gepps Cross, however, none of these rank in the ten warmest City of Port Adelaide Enfield suburbs as these industrial suburbs also contain substantial wetlands which lower the overall average temperature of the suburb (Table 2).

The City of West Torrens had the fewest hot spots with 31.2% (11.5 km^2) of its land meeting the hot spot criteria, mainly east of the airport in Netley, as well as along the eastern edge of the council in Keswick, Ashford, Mile End South, and Thebarton.

Council	Rank	Suburb	Mean Day Surface Temp (C°)
Charles Sturt	1	Ridleyton	40.97
	2	Hindmarsh	40.63
	3	Bowden	40.46
	4	Brompton	40.35
	5	Renown Park	40.34
	6	Albert Park	40.15
	7	Ovingham	40.12
	8	Pennington	39.54
	9	Hendon	39.47
	10	Cheltenham	39.45

Table 1. Ten hottest suburbs for the City of Charles Sturt.

Council	Rank	Suburb	Mean Day Surface Temp (C°)
Port Adelaide Enfield	1	Walkley Heights	42.95
	2	Hillcrest	41.02
	3	Enfield	40.88
	4	Sefton Park	40.88
	5	Northgate	40.84
	6	Gilles Plains	40.80
	7	Hampstead Gardens	40.79
	8	Kilburn	40.62
	9	Broadview	40.59
	10	Greenacres	40.47

Table 2. Ten hottest suburbs for the City of Port Adelaide Enfield.

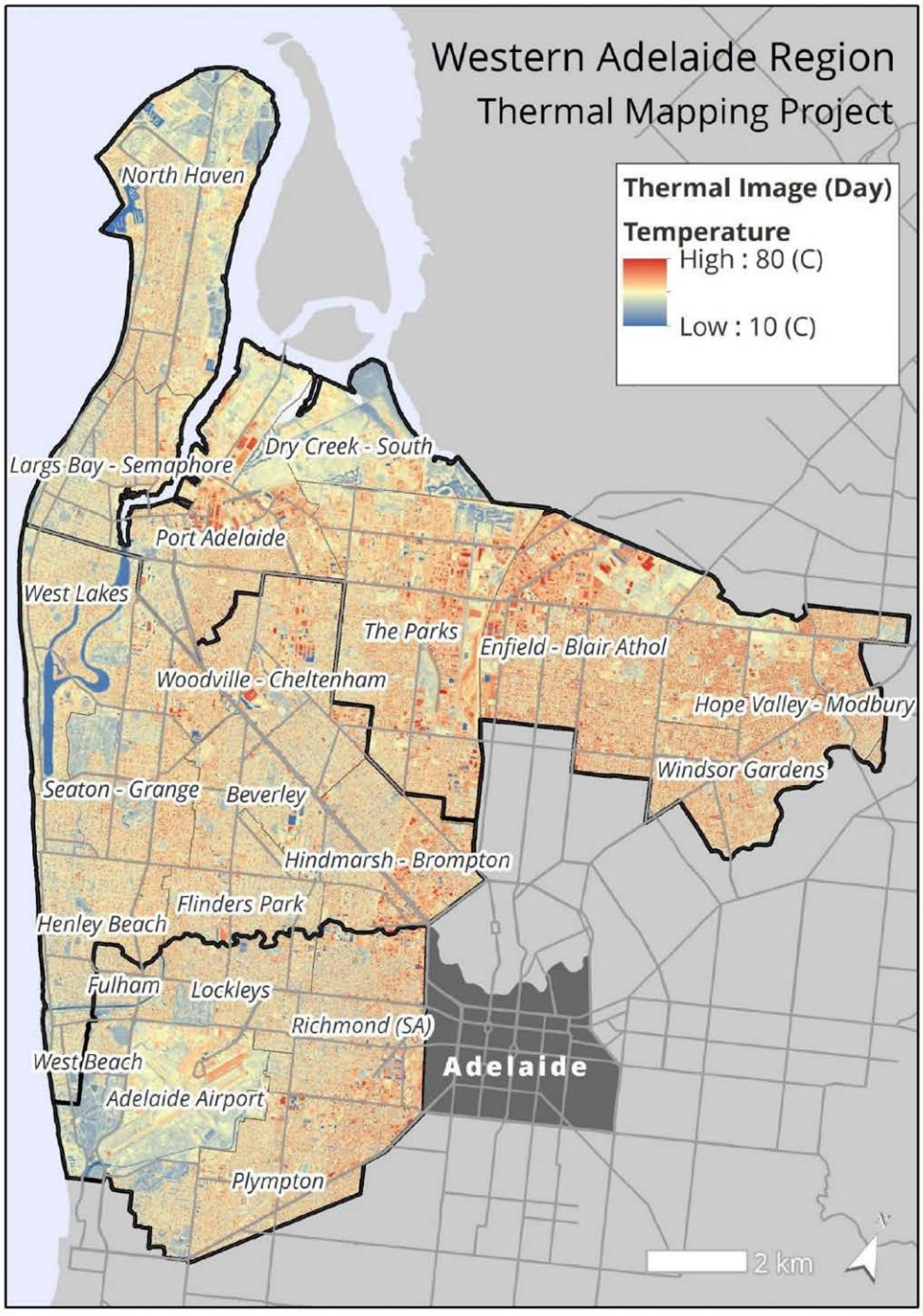


Figure 2. Day time thermal map showing the surface temperature for different features in the landscape at 2 m x 2 m resolution.

The Adelaide Airport provides a day time cooling effect, ranking this area as the third coolest (compared to surrounding suburbs) within the City of West Torrens. The City of West Torrens has a large portion of residential areas that encompass a wide variety of land uses. The mixed land covers within residential areas result in a more moderate thermal signal.

These results change significantly when considering night time thermal data (Figure 3). Night time temperatures range from 5°C to 70°C with 95% of values measuring between 21°C to 29°C. The highest temperatures are driven by heat-intensive manufacturing processes, with the maximum temperature recorded at I-O Glass Manufacturing within the City of Charles Sturt. In the evening, the overall hotspot percentage drops to 18.8% (34.4 km^2), and the order reverses with the City of West Torrens having the highest percentage of evening hotspots with 19.98% (7.4 km^2), and the City of Port Adelaide Enfield dropping to 17.9% (16.3 km^2).

Council	Rank	Suburb	Mean Day Surface Temp (C°)
West Torrens	1	Ashford	40.18
	2	Keswick	39.98
	3	Kurralta Park	39.80
	4	Mile End South	39.77
	5	Thebarton	39.64
	6	Glandore	39.26
	7	Marleston	39.23
	8	Richmond	38.94
	9	Mile End	38.91
	10	North Plympton	38.67

Table 3. Ten hottest suburbs for the City of West Torrens.

The ranking reversal of councils between day and night time is highly illustrative of the different sources of day and night heat. As shown in Section 3.2, during the day, buildings and bitumen are the dominant drivers of urban hot spots. In the evening, buildings cool rapidly compared to bitumen, leaving paved, hard surfaces as the dominant contributor of night time heat. The City of Port Adelaide Enfield has a high number of buildings particularly along Perkins Drive that are hot during the day but that cool during the evening, whereas the City of West Torrens has a higher proportion of bitumen (due in large part to the airport) which takes longer to cool.

Buildings can be seen as *low-intensity* hot spots (warm during the day but cool down during the night) whereas bitumen can be considered a *high-intensity* hot spot (warm during the day and retain heat during the night) as the higher heat capacity of paved surfaces means they continue to emit heat longer after sundown.

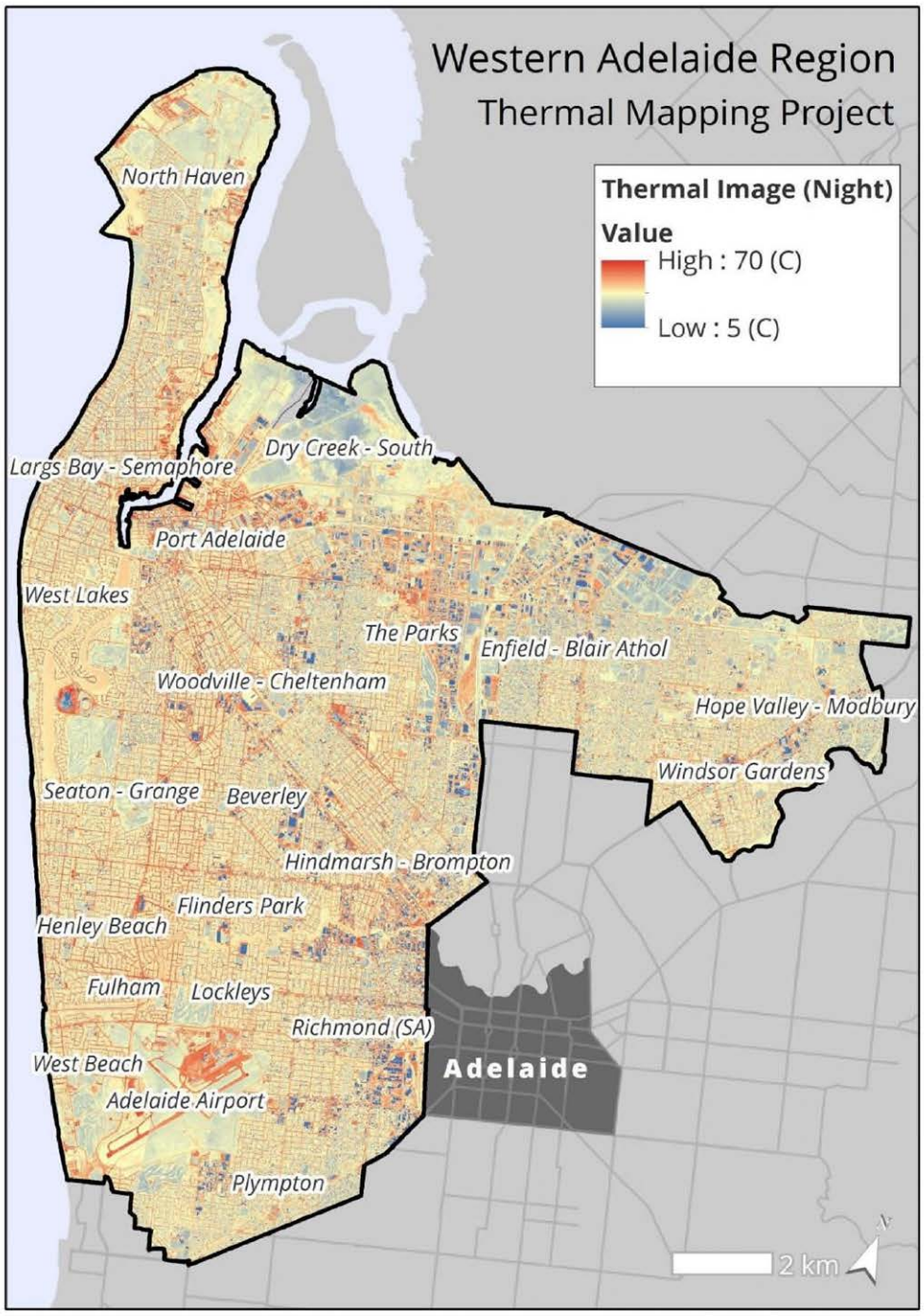


Figure 3. Night time thermal map showing the surface temperature for different features in the landscape at 2 m resolution for the Western Adelaide Region.

3.1.3 Urban heat island analysis

Excess urban heat becomes most problematic when it concentrates into larger urban heat islands. Thermal data aggregated to 125 m^2 resolution for the urban heat island analysis found that 15.9% (26.9 km^2) of the Western Adelaide Region falls within an urban heat island, 1.9% of which falls within a severe heat island (>4°C above the average surface temperature on the day of the flyover) (Figure 4).

The City of Port Adelaide Enfield has the highest proportion of urban heat islands with 19.9% (16.6 km^2) of its land falling into this category, of which 2.7% is classified as a severe heat island. The largest and most severe heat island falls within the suburb of Port Adelaide. This major industrial zone contains large areas of severe heat, and although very few people reside in this area it contains many businesses that operate during the daytime. Regency Park also has a concentration of medium and severe heat islands due to the rail infrastructure and associated industry. There also exists small (125 to 250 m^2), localised heat islands scattered throughout North Haven and Outer Harbor driven by interspersed industry and impervious surfaces.

The City of Charles Sturt has the second highest level of urban heat islands encompassing 13.6% (7.0 km^2) of its land with the highest concentration lying immediately east of Tapleys Hill Road in Hendon, Seaton and Albert Park. A second concentration of urban heat islands occurs in the eastern areas of the council, namely within Ridleyton, Brompton, Bowden, Hindmarsh, and Thebarton. The most severe of these urban heat islands are in Brompton, Hindmarsh, Albert Park, and Hendon.

The City of West Torrens has 9.6% (3.3 km^2) of its land covered by heat islands, much of which are centred on the terminal of the Adelaide Airport. This low proportion of heat islands is likely to be a product of large residential areas with mixed land uses, as well as extensive green space and proximity to the sea.

Night-time urban heat island distribution reveals a starkly different pattern, which with the exception of the Adelaide Airport, mainly consists of a few, small (< 1 km^2) heat islands (Figure 5). There are several drivers of this pattern. First, night-time heat is caused primarily by paved roads which are relatively narrow features compared to the 125 m^2 resolution of the urban heat island analysis; roads are too narrow to be picked up by this analysis. Second, evening temperatures tend to have a narrower range and therefore less area meets the 2°C threshold for an urban heat island.

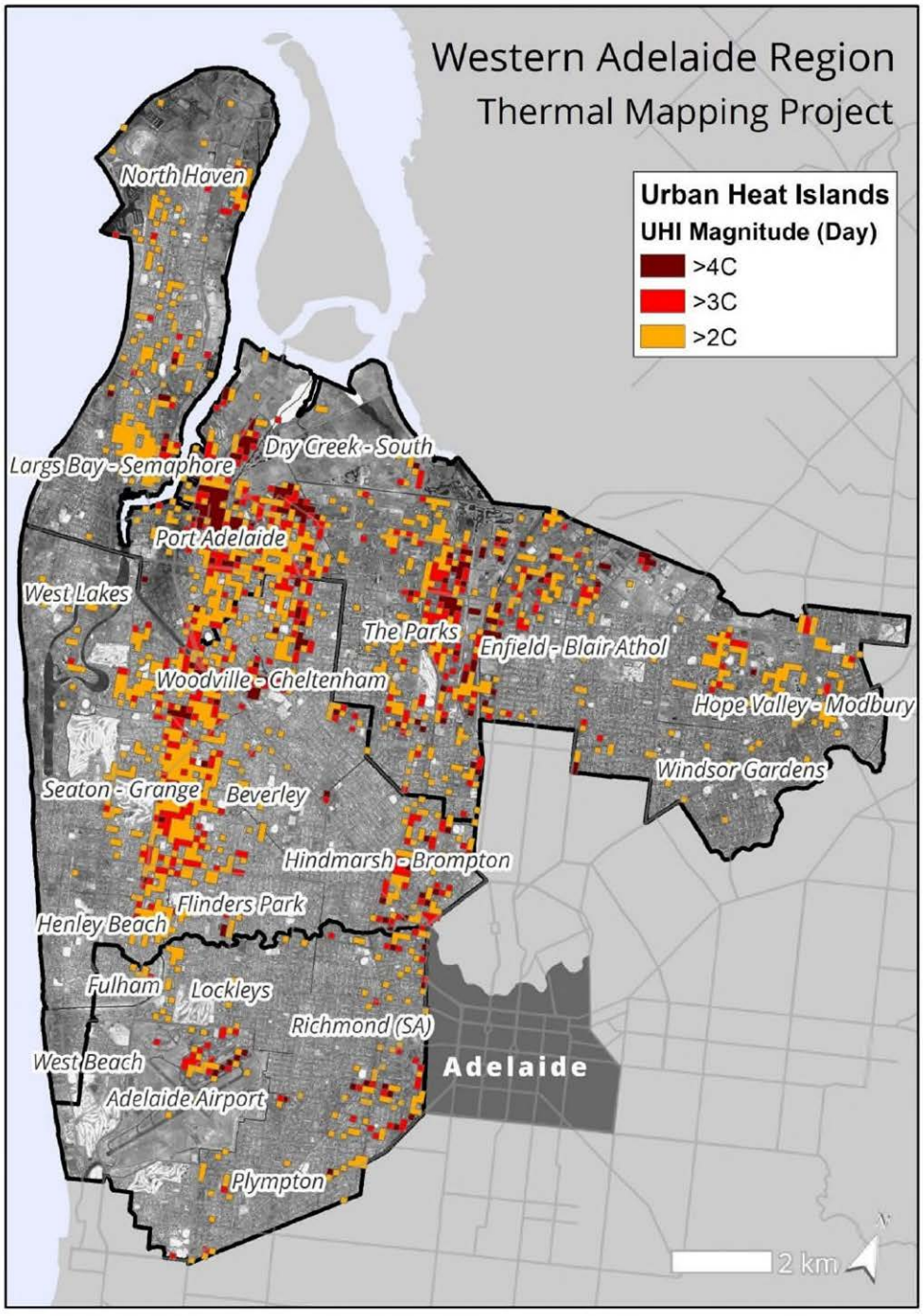


Figure 4. Daytime urban heat islands present in the Western Adelaide Region on 9 February 2017. Areas of built-up heat were identified as exhibiting a temperature greater than 2°C, 3°C or 4°C above the local mean temperature at the time of measurement.

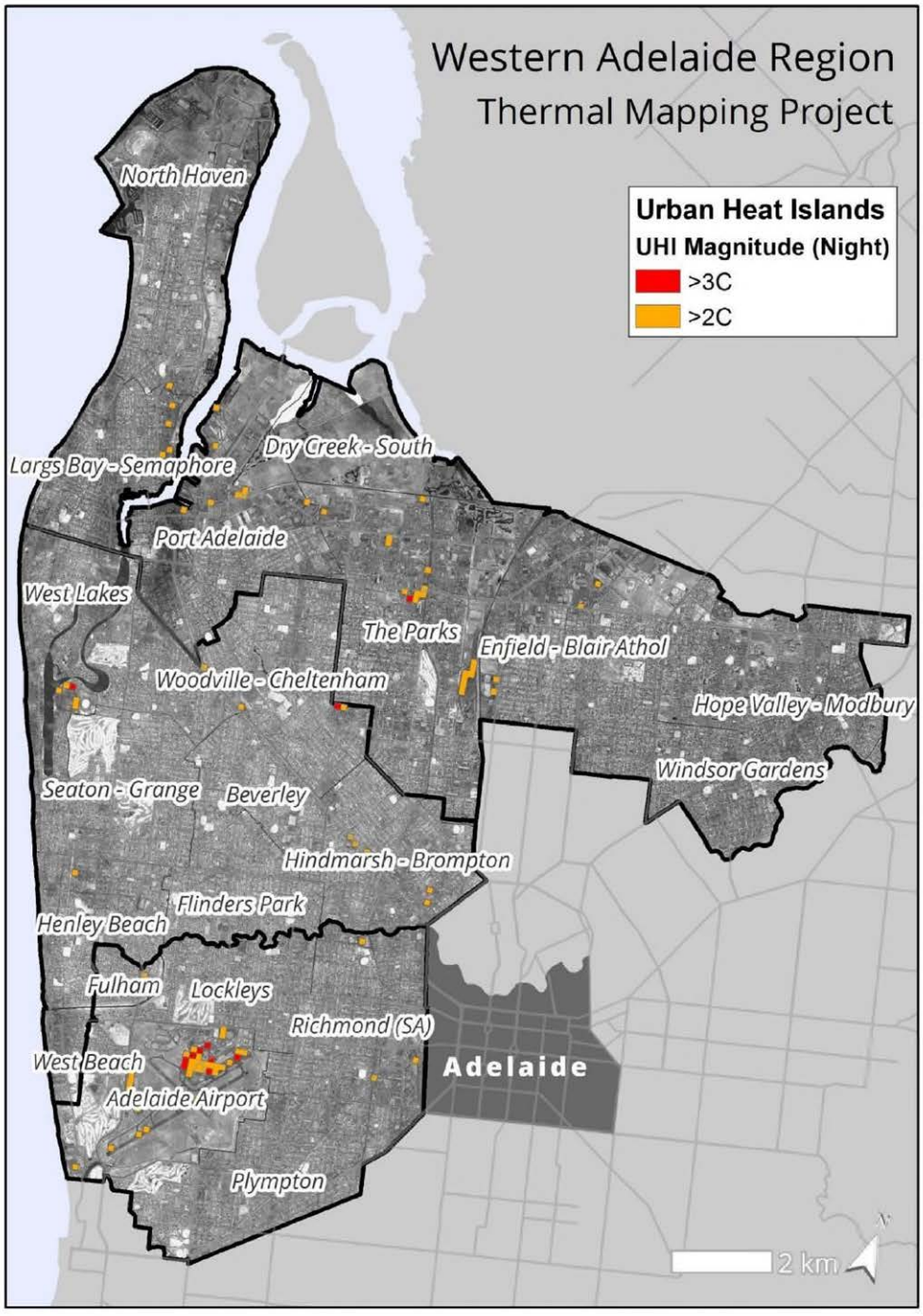


Figure 5. Night-time Urban Heat Islands present in the Western Adelaide Region on 9 February 2017. Areas of built-up heat were identified as exhibiting a temperature greater than 2°C or 3°C above the local mean temperature at the time of measurement.

3.2 Vulnerability analysis

The vulnerability analysis focused on identifying where urban heat islands intersect with areas in which vulnerable members of the community live. In Western Adelaide, 17.1% of residents (43,442) live within a day time urban heat island (Table 4). The highest rates of residents living within heat islands occurs in the City of Charles Sturt and City of Port Adelaide Enfield with 20.1% (20,908) and 17.2% (19,470), respectively. Only 5.6% of residents (3,065) live in heat islands in the City of West Torrens.

For people over 75, 22.3% of City of Charles Sturt elderly population lives within an urban heat island, well above the regional average of 14.5%. The City of Charles Sturt heat islands also contain the highest rate and number of people in need of assistance due to disabilities and people who speak English as a second language, giving the City of Charles Sturt the highest rate of vulnerability across three of the five metrics assessed. The City of West Torrens has the highest Socio Economic Index For Areas (SEIFA) score indicating higher levels of economic disadvantage, but higher median rent for areas within heat islands.

Across the three councils, five indicators of social vulnerability were investigated and only weak correlations were found between temperature and social vulnerability with the greatest correlation being English as a second language and people needing assistance due to disabilities (Table 5). These weak correlations suggest that heat islands are distributed across areas with differing levels of social vulnerability. Figure 6 shows the social vulnerability index for each day time heat island within Western Adelaide. More detailed displays of the location and magnitude of heat islands in relation to social vulnerability are provided in Annex 1.

Within the City of Port Adelaide Enfield, the Peterhead and Alberton urban heat islands have a high degree of social vulnerability, whereas the more severe urban heat islands in the suburb of Port Adelaide have relatively low residential densities and therefore less social vulnerability. The City of Charles Sturt has several large urban heat islands with high social vulnerability.

The largest urban heat island in the City of West Torrens is at the Adelaide Airport. While there are no residents and therefore no social vulnerability, there a large number of ground crew who work outdoors at the airport for whom heat mitigation should be considered. Most other heat islands in the City of West Torrens have moderate social vulnerability.

Social Vulnerability Within UHIs	Port Adelaide Enfield	Charles Sturt	West Torrens	Western Adelaide Region
Population	19,470 (17.1%)	20,908 (20.1%)	3,065 (5.5%)	43,442 (15.1%)
Number of Households	8,472 (19.0%)	9,509 (22.7%)	1,503 (6.4%)	19,484 (16.0%)
Age (Median)	39.7 (38.4)	41.1 (40.8)	36.9 (17.8)	39.9 (39.0)
Rent (Median)	242 (227)	227 (239)	256 (241)	237 (236)
SEIFA Score	921 (922)	945 (947)	994 (967)	941 (945)
Ederly Population (>75)	1,368 (15.4%)	2,322 (22.3%)	328 (5.8%)	4,019 (14.5%)
Population in Need of Assistance	1,220 (16.5%)	1,592 (23.9%)	170 (5.3%)	2,983 (15.2%)
Population who speak English as a Second Language	940 (16.6%)	1,159 (24.9%)	112 (5.0%)	2,211 (15.5%)

Table 4. Social vulnerability analysis showing the statistics of who lives within urban heat islands for each council compared with council averages provided in brackets. For population comparisons, the percentage of that group that lives in an urban heat island is given. For all others, median council values are provided.

Variable Relationship	Correlation Coefficient
ESL-Temperature	0.25
Needs Assist-Temp.	0.20
Elderly-Temperature	0.17
Rent-Temperature	0.15
SIEFA-Temperature	0.11

Table 5. Coefficients showing relationship between social vulnerability indicators and temperature.

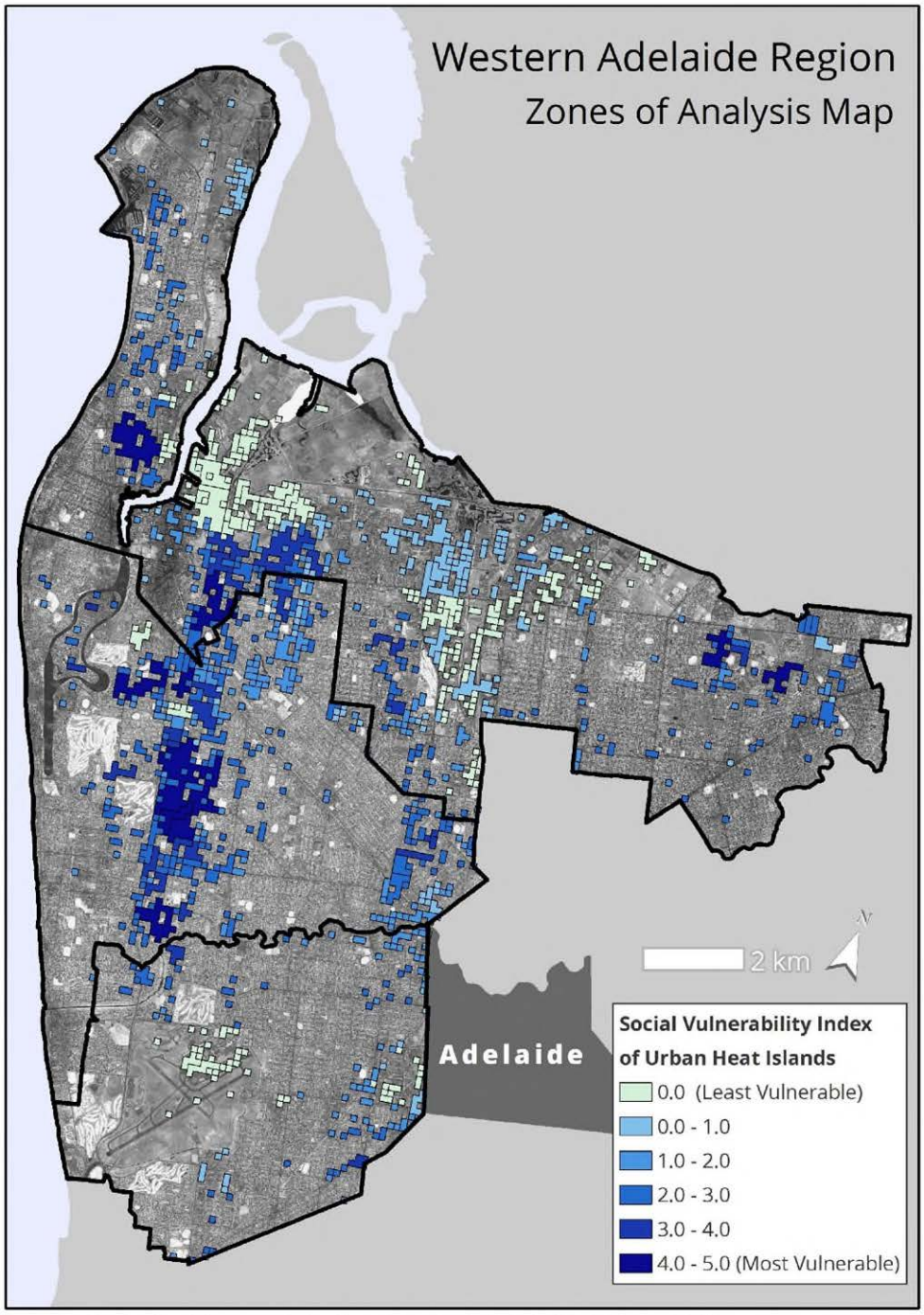


Figure 6. Social vulnerability index score calculated for each day time heat island within the Western Adelaide.

3.3 Factors that influence temperature at a local scale

This project used land use analysis to show how surface temperatures vary between areas where people are active outdoors and how management of urban areas and material selection for built assets can influence surface temperatures. The results of this analysis are discussed first from the perspective of general relationships, and second through the use of case studies, which have been designed to demonstrate key features of interest in Western Adelaide.

3.3.1 General relationships

There are clear relationships between surface temperature and material type and urban form in Western Adelaide (Figure 7). This demonstrates that management of these factors can impact the development of hotspots and urban heat islands and hence the impact of extreme heat on residents.

During the day, paved surfaces experienced the largest warming with major roads measuring 3.0°C above average surface temperatures. Minor roads and parking lots had a less pronounced warming of 1.6°C, likely due to lighter coloured concrete used in some parking lots.

Green infrastructure produced a large cooling signal, lowering temperatures by 2.8°C compared with the average. Irrigated open space had the largest impact, cooling land surfaces by 4.0°C. While all green infrastructure was shown to have a large cooling effect, irrigation cooled areas by an additional 1.7°C.

The effect of green infrastructure on temperature was further analysed through the use of Normalized Difference Vegetation Index (NDVI) data. NDVI identifies the amount of healthy vegetation present at any given location. NDVI maps for each council are provided in Annex 3. Comparing NDVI values with temperature data at the land-use analysis points[1] revealed a correlation coefficient of 0.88, indicating a very strong relationship between vegetation and cooling. This supports the case for using green infrastructure as a means for combating urban heat islands.

The thermal impact of buildings varied widely with dark roofs creating a warming of 2.9°C and light roofs creating a cooling of 2.3°C. Therefore, roofing choices have a major impact on surface temperatures, alter the temperature by 5.2°C.

[1] See Annex 5 for description of the land-use analysis points methodology.

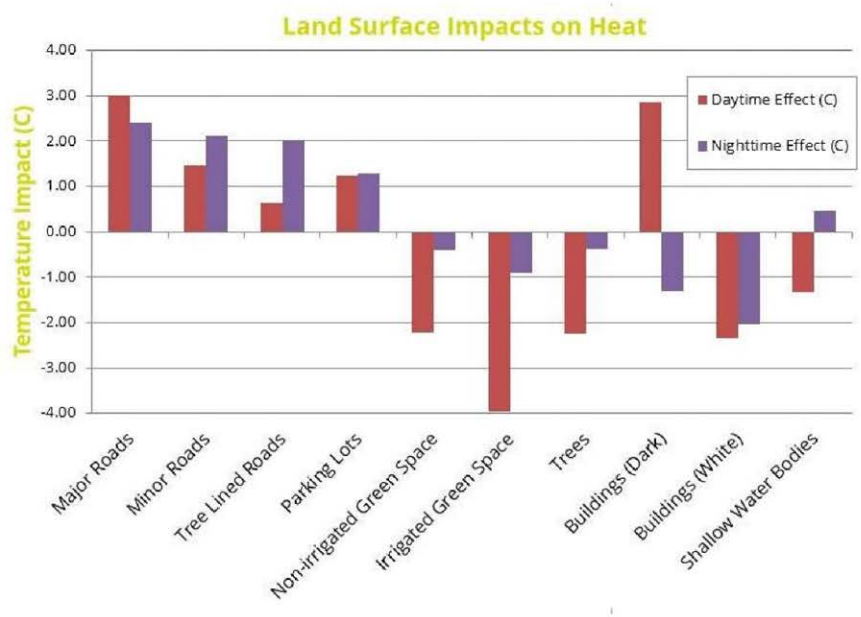


Figure 7. Heat effect of different land surfaces during the day and night.

3.3.2 Case studies

The case studies presented below are as follows:

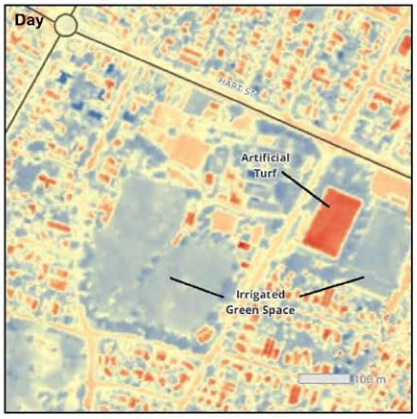
- Case study 1 – Irrigated vs non-irrigated open space;
- Case study 2 – Impact of artificial turf;
- Case study 3 – Water sensitive urban design along a roadside;
- Case study 4 – Playgrounds;
- Case study 5 – Tree lined streets vs non-tree lined streets;
- Case study 6 – Major versus minor road;
- Case study 7 – Parking surface materials;
- Case study 8 – Roof colour;
- Case study 9 – Combination of roof colour and green space;
- Case study 10 – Bikeways; and
- Case study 11 – Water bodies.

Case study 1 - Irrigated vs non-irrigated open space

- Santos Stadium in Mile End South highlights the thermal differences between irrigated and non-irrigated green space.
- The irrigated sports field inside the stadium displays a cooler, medium blue colour whereas the non-irrigated green space to the north east of the stadium displays a warmer light blue-yellow. Notably, some of the non-irrigated open space areas in the far right of the image (to the east of the Stadium) show as much warmer yellow to red.
- Both surfaces, irrigated and non-irrigated green space, produce cooler than average temperatures across the whole of the study area with non-irrigated areas having a cooling effect of 2.2°C and irrigated areas showing 4.0°C of cooling.

Case study 2 – Impact of artificial turf

- Artificial versus natural turf sporting field surfaces show a large difference in temperature.
- The Port Adelaide Hockey Club in Ethelton provides a clear example of this pattern with the artificial turf surface measured at 8.1°C warmer than average surface temperature across the region. Conversely, the surrounding irrigated natural turf surfaces measured 14°C cooler than the artificial turf at the time of data collection.
- Overall, analysis of four large artificial turf surfaces across the study area revealed an average warming of 5.5°C above the average surface temperature.

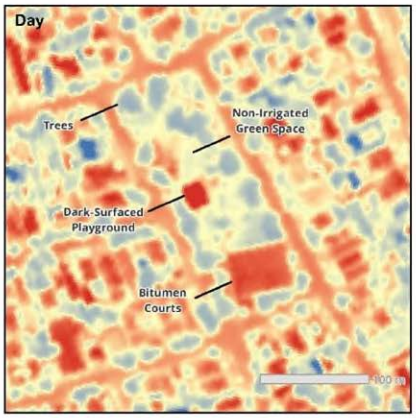


Case study 3 – Water sensitive urban design along a roadside

- Water sensitive urban design features such as raingardens are an important landscaping tool with the dual benefits of allowing rainwater to percolate into the soil while expanding green space along the road corridor. One of several examples that exist across the study area lies along Kingston Avenue, Richmond.
- The impact of the two raingardens is visible in the thermal imagery showing two semi-circle shaped cool areas jutting into Kingston Avenue matching the geometry and location of raingardens. Temperatures within these two raingardens measured 36.2°C, while neighbouring kerb areas without raingardens measured on average 42.3°C, suggesting that raingardens may have up to a 6°C cooling effect.
- Further investigations can help to verify the exact magnitude of the cooling effect from water sensitive urban design features.

Case study 4 – Playgrounds

- Failing to account for heat can expose vulnerable members of the community such as young children to significant danger.
- Company Square Reserve in Alberton consists of a mixture of open space, playground and tennis/netball courts. The dark-surfaced playground area is covered in rubber softfall surfacing and registered over 52°C, more than 4°C hotter than the nearby bitumen tennis/netball courts, and more than 15°C hotter than the surrounding non-irrigated open space.
- This case study demonstrates that construction material choices affect comfort and safety.

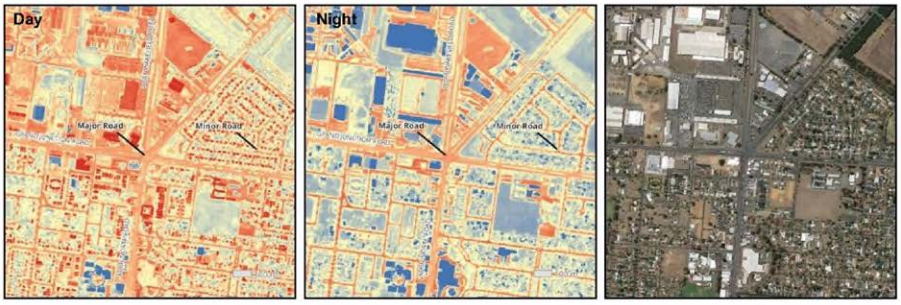


Case study 5 - Tree lined streets vs non-tree lined streets

- Large, exposed tracts of bitumen are one of the warmest urban surfaces absorbing heat during the day and holding that heat well into the night. However, tree-lined streets present a powerful mitigation approach.
- North Street in Henley Beach is one of the most heavily tree-lined streets in the study area. Its measured day time temperatures were 34°C while neighbouring exposed streets measured upwards of 42°C.
- Shading during the day means there is less heat to re-emit at night leading to cooler temperatures both day and night.

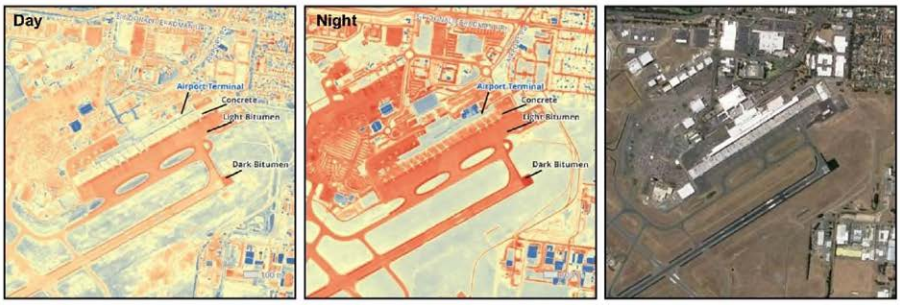
Case study 6 - Major versus minor road

- Gepps Cross, one of the largest intersections in the study area, illustrates the warming caused by large tracts of exposed bitumen.
- Across the whole of the study area, major roads averaged over 3°C above mean temperature while minor roads were typically 1.5°C warmer than average.
- Roads are major drivers of not only day time hotspots but also night time hot spots as their high heat capacity means they emit a strong warming signal well into the night.



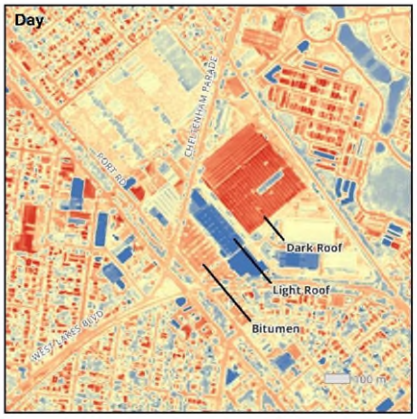
Case study 7 – Parking surface materials

- The choice of materials for constructing roads and car parks can have a major effect on landscape heat.
- The Adelaide Airport has many types of hard surfaces creating a natural case study for exploring their impacts on heat absorption during the day and re-emission during the night.
- Surface temperatures varied by up to 3°C between dark coloured bitumen and light coloured bitumen, and by up to 7°C between dark coloured bitumen and concrete.



Case study 8 – Roof colour

- Building roofs represent one of the most dynamic surface classes as measured by the range of measured temperatures.
- Buildings at the intersection of Port and Cheltenham Roads, Woodville West, illustrate this by showing the very cool (blue) light roof of a large retail hardware store contrasted with the very dark roofs of surrounding industries.
- Across the study area, dark roofs were 2.8°C above the average surface temperature while light roofs were 2.3°C cooler, equating to substantially less heat absorbed. This demonstrates that material choices can drastically effect thermal impacts.



Case study 9 – Combination of roof colour and green space

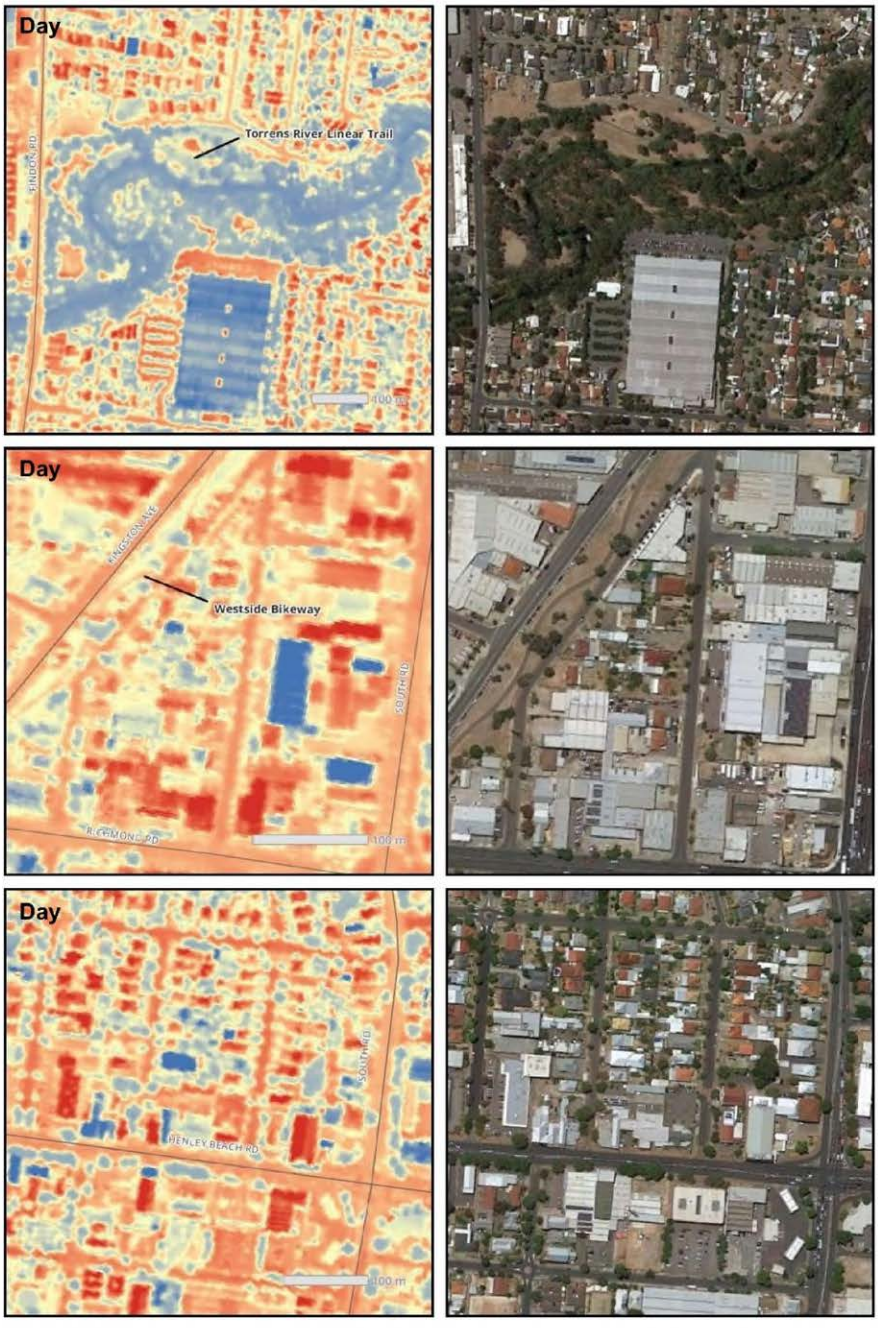
- Not all areas in Western Adelaide were hot, with some cool areas providing useful lessons on how to mitigate heat.
- Dark roofs are one of the largest contributors to hotspots and heat islands. Communities that choose lighter coloured roofing materials, such as this area in Seaton, are exercising a simple choice that can dramatically affect liveability.
- The area with predominately white roofs form a cool island exhibiting consistently below-average temperatures while surrounded by a heat island - an area consistently more than 2°C above average.

Case study 10 - Transport corridor

- Cool space, open space, and roads all exhibit significantly different temperature impacts meaning that human thermal comfort can differ significantly depending on the surrounding urban form. One implication of this is that bike route location can influence how many days may be bikeable.

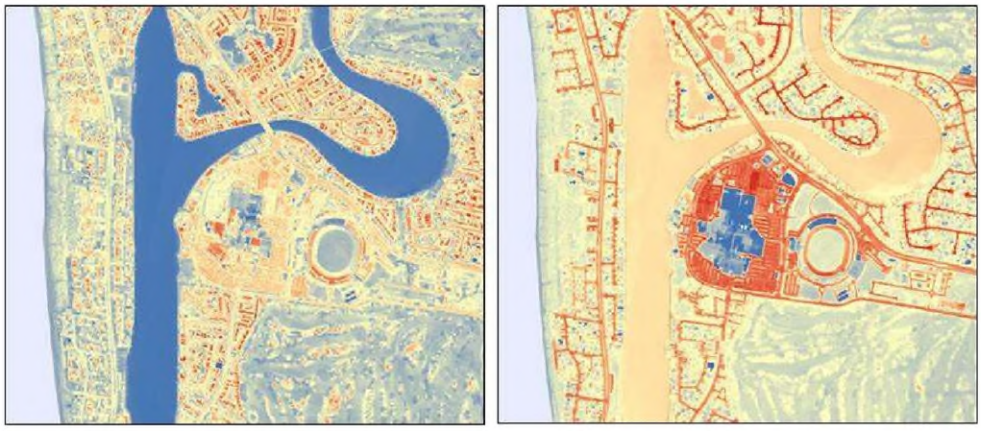
- The River Torrens Linear Trail was as much as 5°C cooler on the day of the flyover compared with average surface temperatures. Road corridors, in addition to being crowded and noisy, are hot, with bike lanes on Henley Beach Road being more than 3°C above average. Open spaces with limited shading, such as the Westside Bikeway, provide some relief compared to exposed roads but are still about 1°C above average surface temperatures.

- A more detailed investigation covering the full length of these and other bike routes would provide more detailed information to help planners and cyclists choose the paths that are safer and more comfortable to use during periods of extreme heat.


Day
Torrens River Linear Trail
FINDON RD
100 m
Day
KINGSTON AVE
Westside Bikeway
SOUTH RD
RICHMOND RD
100 m
Day
SOUTH RD
HENLEY BEACH RD
100 m

Case study 11 – Water bodies

- Water exhibited some unexpected temperature patterns between day and night. During the day, water provided a strong cooling effect due to its high heat capacity. However, as high heat capacity means it is slow to warm, water was also slow to cool, causing it to shift to warmer colours on the night time thermal map.
- This is most important for shallow bodies of water as prolonged warm periods may cause them to warm significantly above the baseline temperature and become a contributor to evening heat islands.
- The West Lakes region provided a clear example of this process. The extent to which the regular flushing of the lake reduces this effect may require additional investigation.



4 Drivers of future heat impacts

4.1 Potential impact from climate change

In Western Adelaide, climate change will lead to higher temperatures, reduced rainfall and longer, more severe, and more frequent heat waves. Urban areas already suffering from the heat island effect will bear the brunt of these harsher heat events. Materials identified in this study as absorbing large amounts of heat, such as roads, parking lots, dark coloured roofs, pavements, artificial turf and rubber softfall surfacing, will all absorb even more heat in the future.

Based on the AdaptWest Climate Change Adaptation Plan (City of Port Adelaide Enfield, 2016), specific climate change impacts relevant to heat accumulation and the condition of green cover include the following[2]:

- Average temperature (Summer – Autumn) - An increase in average annual temperatures of up to 2°C is projected in summer-autumn across the region by 2070;
- Average rainfall (Winter-Spring) - Average winter rainfall is predicted to decrease by up to 20% and spring rainfall by up to 20% below 1990 levels by 2070; and
- Extreme heat - Sequences of three or more consecutive days with average temperatures of at least 32°C are projected to increase from 1 in 20 years to one in every 3-5 years under a low emissions scenario in 2070 and every year under a high emissions scenario by 2070.

Given that urban heat island identification is based on a relative assessment (i.e. surface temperature of a given location compared with the average for the region), it is possible that under climate change the urban heat islands will become hotter, but not necessarily expand. One factor that would lead climate change to alter the pattern of urban heat islands are if changing temperature and rainfall lead to large scale changes in the condition and extent of green space, especially in areas that are not able to be managed by council. Scenario testing and modelling approaches could be used to explore this impact.

Given the magnitude of difference in temperature between some materials (e.g. dark roofs versus light coloured roofs, artificial turf versus irrigated turf), climate change impacts of 2°C on surface temperatures could theoretically be more than offset by materials selection and greater use of green infrastructure in some areas.

[2] Further, more detailed information about climate change projections for Western Adelaide are contained in the AdaptWest Climate Change Adaptation Plan. This includes an explanation of the impact of climate models and emissions scenario choice on projections.

4.2 Density of development

A target of the South Australian Government's 30 Year Plan for Greater Adelaide is "Containing our urban footprint and protecting our resources". This in part will be achieved through infill by ensuring that 85% of all new housing in metropolitan Adelaide is built in established urban areas by 2045.

Infill will result in transition of low density developments toward middle and high density developments. A consequence of the current approach to infill is a more compact urban form, increasing area of impervious surfaces and loss of green space and tree canopy.

Future potential impacts of infill can be assessed using the current heat mapping data by comparing surface temperatures in low, medium and high density residential zones (Figure 8). Areas with a low density of dwellings, such as Fulham, have more room for green space which can offset the warming impact of impervious driveways, roads, and dark roofs. Medium density residential areas, such as West Croydon, have less room and fewer options for mitigation but still preserve some landscape for open space providing some relief from heat. High density residential areas, such as areas within Northgate, have limited open space and few options for heat mitigation.

Comparing temperatures across different density development zones, high density areas of Northgate were found to be 2.9°C warmer than the low density areas of Fulham. The high density and predominately dark roofs create a heat island for the residents in this area of Northgate raising their temperatures more than 2°C above average, whereas the low and medium density areas of Fulham and West Croydon exhibit a slight cooling effect of 0.3°C and 0.9°C, respectively.

At a suburb a scale, these findings suggest that the density of development can have at least as great an effect on temperature as climate change. In order to reduce this impact, careful consideration needs to be given to material selection in higher density developments and how to encourage green space, such as through green roofs and green walls.

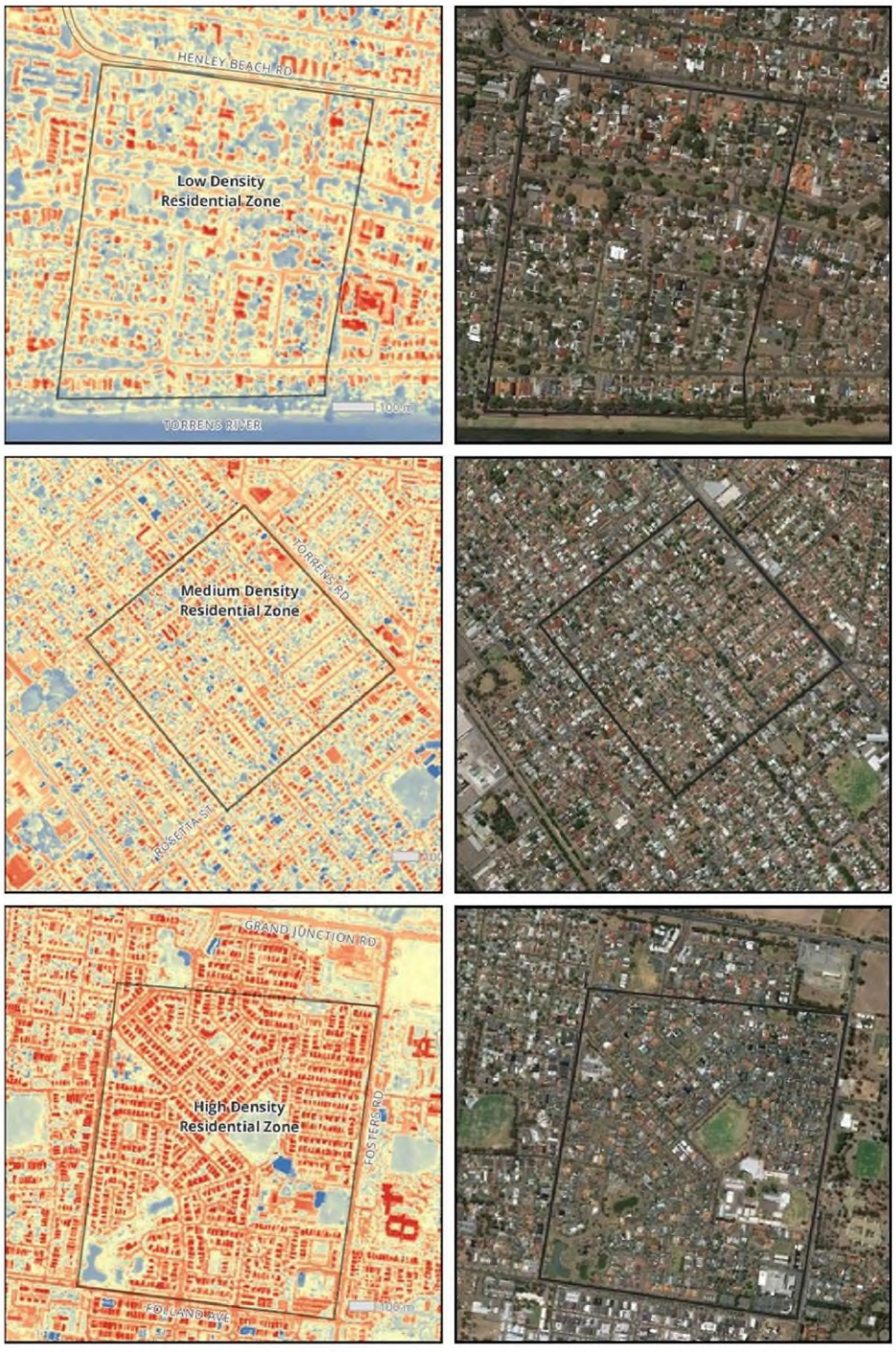


Figure 8. Surface temperatures in low (Fullham), medium (West Croydon) and high (Northgate) density residential zones.

5 Responding to urban heat risks

5.1 Priority areas for heat mitigation

Hot spots and urban heat islands are widespread across Western Adelaide. Without due consideration of planning, design, material selection and provision of green space, urban infill as forecast in the 30-Year Plan for Greater Adelaide will lead to an expansion in urban heat islands over the next 20 years due to increases in higher density living and loss of green cover. Urban areas already suffering from the heat island effect will bear the brunt of more frequent and intense extreme heat events under climate change.

While the City of Charles Sturt had the highest percentage of hot spots of the three councils at 36.8% (20.1 km^2) of its land area, the percentage of land covered by hotspots is broadly similar (31 to 37%). In contrast, 20% of the City of Port Adelaide Enfield falls within an urban heat island compared to 16% for the City of Charles Sturt and 10% for the City of West Torrens.

The results of the analysis clearly identified suburbs located within heat islands that can provide a focus for future management activities. There were also two north south bands of heat islands, running from Dry Creek South to Henley Beach in the west of the region and from Wingfield to Brompton in the centre of the region. The extent to which this is due to warm air moving south from hotter industrialised areas in the region requires further investigation.

Most of the heat islands evident during the day were found to diminish during the evening, with concentrations of heat less noticeable at night. While there were still concentrations of heat during the evening in surfaces such as roads, these were largely road and pavement surfaces and were not evident at the spatial scale of a heat island (i.e. 125 m x 125 m).

While hot spots and heat islands provide general indication of priority areas for heat mitigation, this can be further refined by identifying where they intersect with areas of social vulnerability and where large numbers of people are active outdoors (Norton, et al., 2015).

At a whole of region scale, 15% of people live within an urban heat island, which includes 4,019 people aged over 75 years and nearly 3,000 who require assistance for day to day activities, both being key indicators of social vulnerability.

There are a number of specific suburbs that contain urban heat islands and that have a high degree of social vulnerability. For example, heat islands in Fulham Gardens had the highest degree of social vulnerability within the City of Charles Sturt and overall, while heat islands in Oakden and Lockleys had the highest degree of social vulnerability in Port Adelaide Enfield and West Torrens, respectively. Other suburbs that had high social vulnerability and exist within heat islands include parts of Albert Park, Seaton and Findon.

Understanding the drivers of social vulnerability (e.g. age versus need for assistance with core activities) across suburbs will be important in designing mitigation strategies for assisting the community to prepare and respond to extreme heat. This may also provide information for councils to work with community service providers to target assistance during periods of extreme heat.

While an explicit analysis of behavioural exposure was not undertaken, the case studies used to identify the impact of surface type and land use characteristics do provide insights. For example, playgrounds with rubber softfall covering where children congregate and sporting fields with artificial turf, used as a low maintenance alternative to grass on lawn bowls greens, present substantially warmer than average surfaces than nearby areas of open space. Furthermore, bikeways and pedestrian thoroughfares with predominantly bitumen surfaces are much warmer than equivalent areas with a combination of hard surfaces and green space.

5.2 Mitigating urban heat islands

Urban heat islands can be mitigated by understanding the factors that influence temperatures at a local scale, such as land use management decisions and building material selection.

This study reveals that land use decisions and material selection in Western Adelaide can cause at least a 7°C difference in surface temperature, as illustrated by the case studies presented in Section 3 and 4. Key features to note for the region are that:

- during the day, major roads had the largest warming impact (3.0°C) followed by minor roads and parking lots (1.6°C above average). Both surfaces retain more heat during the evening than most other surface materials in the region;
- green infrastructure leads to cooler temperatures in general, ranging from 2.2 to 4.0°C below the average depending on the extent of irrigation;
- roof colour has a major impact on surface temperature, with a 5.2°C difference between light and dark roofs.

These temperature differentials provide a strong case for using green infrastructure and encouraging light coloured roofing materials as a means for combating urban heat islands. The tangible benefits of tree for example are demonstrated by Case study 5, which showed a difference of 8°C between a street with and without trees in Henley Beach. The combination of roof colour and green space is also demonstrated by Case study 9, which shows an area in Seaton with light coloured roofs and green space which is noticeably cooler than surrounding streets and suburbs. Both case studies indicate that greening and irrigation type treatments at the street level are very likely to make a difference to street level thermal comfort.

Patterns of where heat persisted from day into night also provide information useful for planning and decision making. Most importantly, comparing day and night-time thermal data helps to identify *low-intensity* (heat up during the day but cool down during the night) vs. *high-intensity* hot spots (heat up during the day and retain heat during the night), and revealed several key patterns:

- roads and paved surfaces were the strongest contributor to night-time heat;
- dark roofs, while hot during the day, quickly dissipated heat after sundown; and
- shallow/closed bodies of water, which provided cooling during the day, emerged as warm-spots at night. This is due to the high heat capacity of water.

The observations from this study into the land use types and materials that influence cooler surface temperatures align well with general strategies for heat island cooling (Table xxx). Based on the findings of this study and general strategies for mitigating urban heat islands it is recommended that:

1. despite the pressure from infill, the amount of green space and tree cover should at least be maintained, and preferably increased to provide cooling benefits;

2. green infrastructure such as trees, grass and raingardens should be used to shade bitumen covered surfaces such as major and minor roads, bikeways and footpaths. Where feasible, this green infrastructure should be irrigated in order to maximise its cooling effect;

3. where feasible the carriage way for main roads should be narrowed, stormwater treatment devices installed, and road pavement changed to lighter materials;

4. councils maximise the cooling benefit from existing green cover by ensuring sufficient irrigation is provided to urban forests and other green infrastructure networks where available, such as from recycled stormwater;

5. light coloured roofs be encouraged in residential and industrial areas over dark coloured roofs;

6. material selection is carefully considered in the design of recreation areas for the young and elderly, with substrates such as artificial turf and rubber softfall covering used only after consideration of how heat absorption can be offset e.g. through the use of shade sails;

7. guidelines be developed for the amount of green space and landscaping required and building materials to be used in medium and high density developments, noting their potential to develop into significant heat islands; and

8. planning, development and infrastructure be supported with a strong focus on design and build quality for dwelling comfort and liveability.

Strategies and Technologies	Description
Trees and Vegetation	Increasing tree and vegetation cover lowers surface and air temperatures by providing shade and cooling through evapotranspiration. Trees and vegetation can also reduce stormwater runoff and protect against erosion.
Green Roofs	Growing a vegetative layer (plants, shrubs, grasses, and/or trees) on a rooftop reduces temperatures of the roof surface and the surrounding air and improves stormwater management. Also called "rooftop gardens" or "eco-roofs," green roofs achieve these benefits by providing shade and removing heat from the air through evapotranspiration.
Cool Roofs	Installing a cool roof – one made of materials or coatings that significantly reflect sunlight and heat away from a building – reduces roof temperatures, increases the comfort of occupants, and lowers energy demand.
Smart Growth	These practices cover a range of development and conservation strategies that help protect the natural environment and at the same time make our communities more attractive, economically stronger, and more livable. Smart Growth principles include: • Mix land uses, such as residential, commercial, and recreational uses; • Take advantage of compact building design; • Create a range of housing opportunities and choices; • Create walkable neighborhoods; • Foster distinctive, attractive communities with a strong sense of place; • Preserve open space, farmland, natural beauty, and critical environmental areas; • Strengthen and direct development towards existing communities; • Provide a variety of transportation choices; • Make development decisions predictable, fair, and cost effective; and • Encourage community and stakeholder collaboration in development decisions.

Table 6. Broad strategies for reducing the impact of urban heat islands. Adapted from (U.S. Environmental Protection Agency, 2008).

5.3 Decision mapping

The collection and analysis of data to inform the development of heat maps generates significant quantities of spatial information. While this data can generate a broad range of mapping outputs, without tailoring the maps or conducting further analysis and modelling, the data is unlikely to directly inform decision making.

To help guide the ongoing use of the data generated for this project a decision map is provided in Figure 9. This recognises that initially the objective of generating heat mapping information is to build capacity amongst decision makers. This is followed by identifying specific areas of risk and finally, implementing projects that reduce a specific risk.

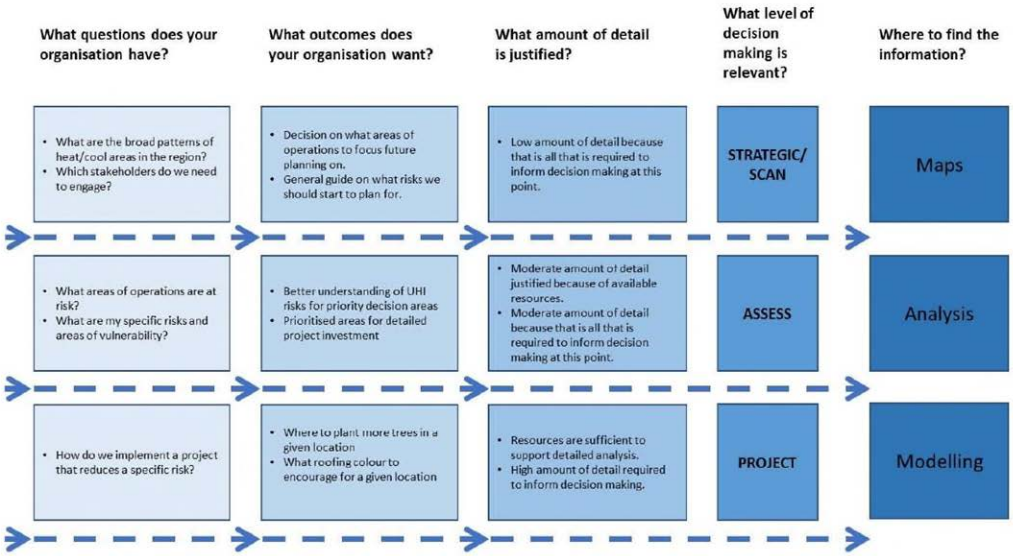
It is recommended that the decision map is used before any additional analysis or use of the data occur, and that consideration be given to the following four questions:

- What questions does your organisation have?
- What outcomes does your organisation want?
- What amount of detail is justified?
- What level of decision making is relevant?

Depending on the responses to the questions, decision makers may choose to:

- refer to the maps provided in the annexes of this report;
- consider the results of the analysis presented, such as the relationship between land surface types and materials and temperatures; and
- conduct modelling to estimate the impact of different heat mitigation strategies for a given location.

Figure 9. Decision map to assist with determining what heat mapping information is required to inform decision making. Working left to right, the decision map can be used to determine which series of responses to the four questions are most relevant to your current key area for decision making and therefore whether you require maps, analysis or modelling information.



5.4 Future directions

5.4.1 Targeting analysis

Thermal data can help prioritise problem areas. For instance, investigating the parklands within the suburbs of Alberton and Rosewater reveals that two local parks are warmer than average, and of those two, one is particularly hot. If a council looks to develop its parks as a reprieve from summer heat, prioritised Parks 1 and 2 (Figure 10) should be targeted for mitigation, with Park 1 taking priority for first actions as its mean temperature is the highest of the five. Targeting analyses can integrate numerous variables to identify project-specific priorities. Targeting analysis provides quantitative rationale for where efforts will provide the greatest relief.

Figure 10. Examples of parks prioritised for heat mitigation strategies based on their current surface temperature.

5.4.2 Prescriptive analysis

With priority targets identified, the impacts of specific mitigation options can be evaluated using prescriptive analyses. For example, within Priority Park 1, maximum temperatures of 56°C occur over the dark-surfaced playground area which makes up a small portion (200 m^2, <2%) of the park's total land surface (10,500 m^2) but substantially alters the park's thermal landscape, specifically within a high-use area for children (Figure 11). Prescriptive analysis demonstrates that resurfacing the playground with a lighter-coloured material or a sunshade of average surface temperature would reduce the playground temperature by 18°C at the hottest places and lower the park's overall mean temperature by 1.5°C, making the park a local cool spot offering relief to residents.

Figure 11. Results of prescriptive analysis for a playground where dark-surface covering is replaced in the thermal data set with a proposed sunshade.

5.4.3 Prioritising green infrastructure to mitigate high temperatures

One central strategy for mitigating urban heat islands is to increase the area of urban green infrastructure (UGI). Prioritising green infrastructure to mitigate high temperatures in urban landscapes can be done using a framework developed by Norton et al. (2015), which has the following five steps:

- Step 1 - Identify priority urban neighbourhoods;
- Step 2 - Characterise green infrastructure and grey infrastructure;
- Step 3 - Maximise the cooling benefit from existing green infrastructure;
- Step 4 - Develop a hierarchy of streets for new green infrastructure integration; and
- Step 5 - Select new UGI based on site characteristics and cooling potential.

Step 1 has mostly been competed during this study by the identification of areas of heat exposure and social vulnerability. Step 2 has also been mostly addressed through the provision of NDVI maps identifying the extent of vegetation and its relative condition. In order to complete Step 2, work is required to characterise street width and building height to determine street openness to solar radiation, and self-shading by buildings.

5.4.4 Targeting delivery of community services

The data generated for this study provides insights into where social vulnerability intersects with heat exposure. This information can be used to target the delivery of community services during periods of extreme heat. For example, the Red Cross Telecross service makes daily welfare calls to people who are frail and aged, have a disability, are housebound and/or are recovering from an illness or accident. This includes phone calls during period of extreme heat. Western Adelaide region councils can work with the Red Cross and other providers to identify suburbs where community services are most required during periods of extreme heat.

5.4.5 Further comparison of materials and surface types across the region

This study provides broad comparisons of the surface temperature of different material types e.g. irrigated versus non-irrigated sporting fields and green space, dark versus light coloured roofs. Further comparison should be conducted to determine how materials and design features generate different heat profiles for the same elements across the region. This would require on ground verification of the difference in material types, for example whether a roof is made from shingles, tin, asbestos sheeting, or different shades of colour.

5.4.6 Relationship between surface and air temperature

The thermal data collected and the analyses performed are based on surface temperature, which directly influences but is not the only control of ambient air temperature. While airborne

remote sensing measurements remain the best method for capturing city-scale temperature, minor local variations potentially driven by local wind patterns and other factors, may be missed.

Establishing the relationship between air temperature and surface types in the region requires further investigation. This should focus on the air temperature at sites with a mix of surface materials with contrasting surface temperatures e.g. retail precincts with light coloured roofs alongside large areas of open bitumen, major roads fringed by trees and raingardens.

References

City of Port Adelaide Enfield, 2016. *AdaptWest Climate Change Adaptation Plan,* Prepared for the City of Port Adelaide Enfield by URPS in collaboration with Seed Consulting Services and AECOM.

Matzarakis, A., Rutz, F. & Mayer, H., 2007. Modelling radiation fluxes in simple and complex environments - Application of the RayMan model. *International Journal of Biometeorology,* 51(4), pp. 323-334.

Norton, B. A. et al., 2015. Planning for cooler cities: A framework to prioritise green infrastructure to mitigate high temperatures in urban landscapes. *Landscape and Urban Planning,* Volume 134, pp. 127-138.

U.S. Environmental Protection Agency, 2008. *Reducing urban heat islands: Compendium of strategies. Draft.*

Annex 1: Council thermal maps

This Annex provides day and night heat maps for each Council. It should be noted that these are a clipped map from the whole of region heat maps.

The six maps are organised in the following order:

1. City of Charles Sturt (Figure A1.1)
2. City of Charles Sturt (Figure A1.2)
3. City of Port Adelaide Enfield Day (Figure A1.3)
4. City of Port Adelaide Enfield Night (Figure A1.4)
5. City of West Torrens (Figure A1.5)
6. City of West Torrens (Figure A1.6)

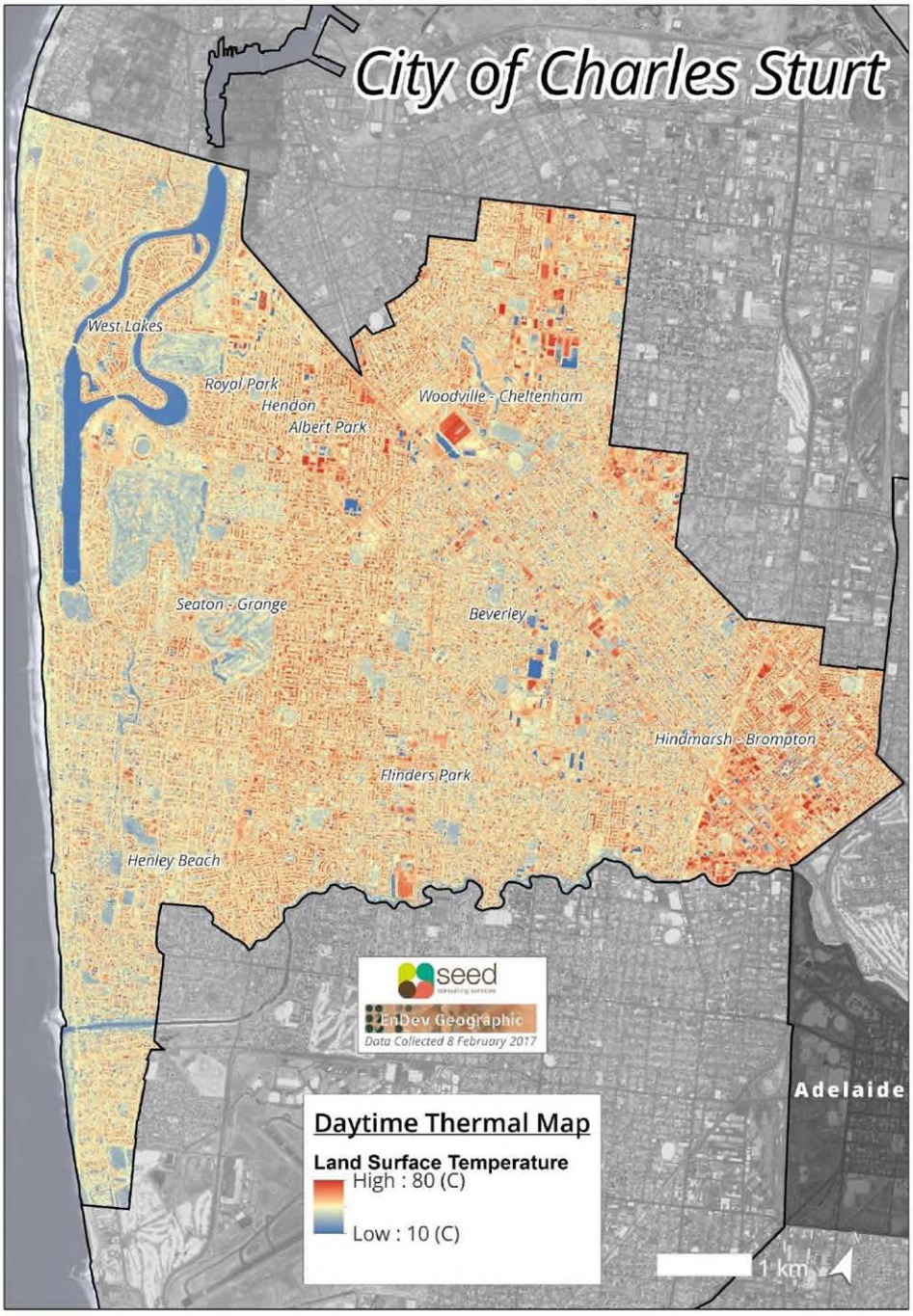


Figure A1.1. Day time thermal map for the City of Charles Sturt.

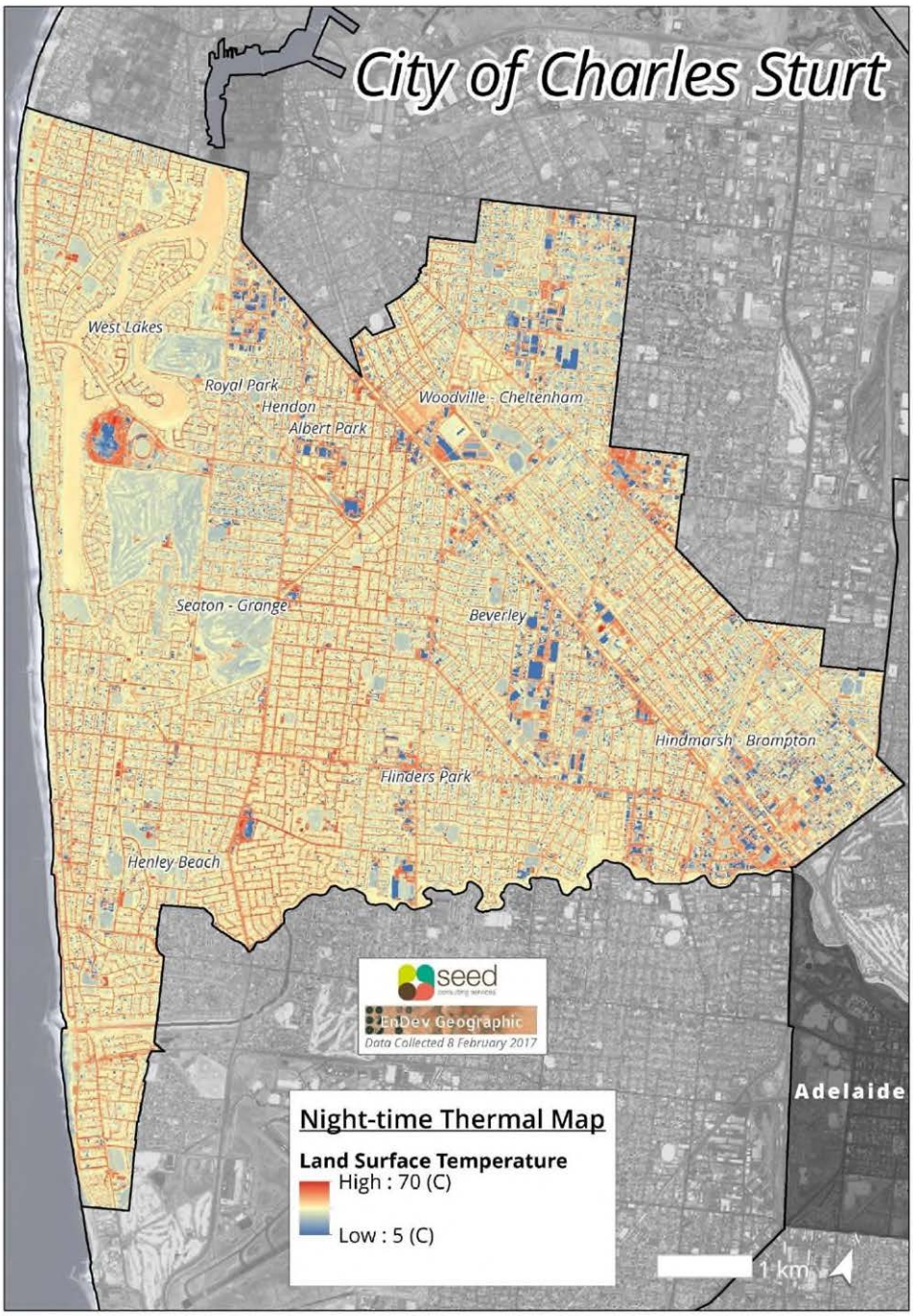


Figure A1.2. Night time thermal map for the City of Charles Sturt.

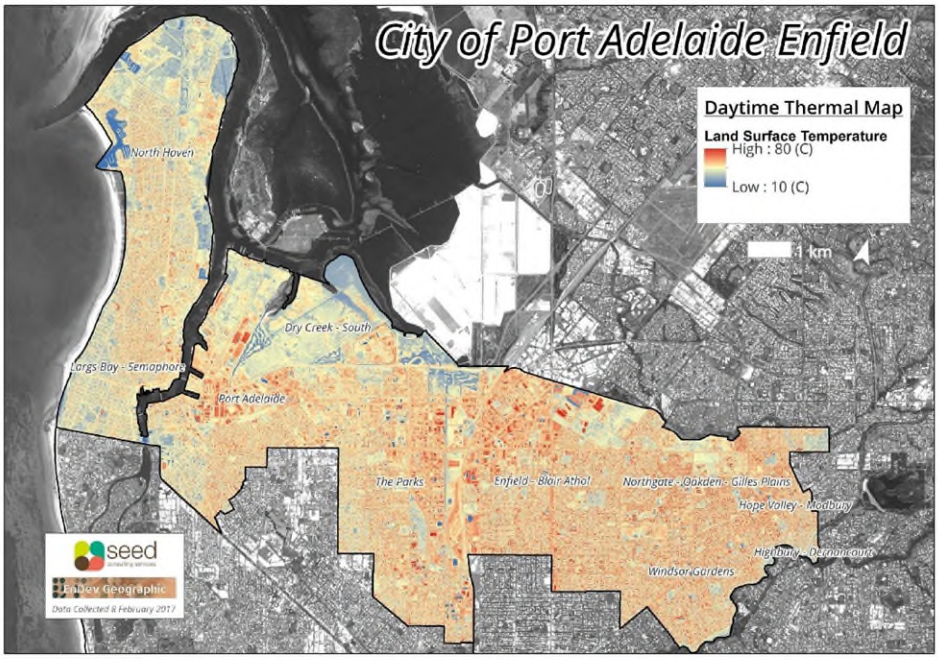


Figure A1.3. Day time thermal map for the City of Port Adelaide Enfield.

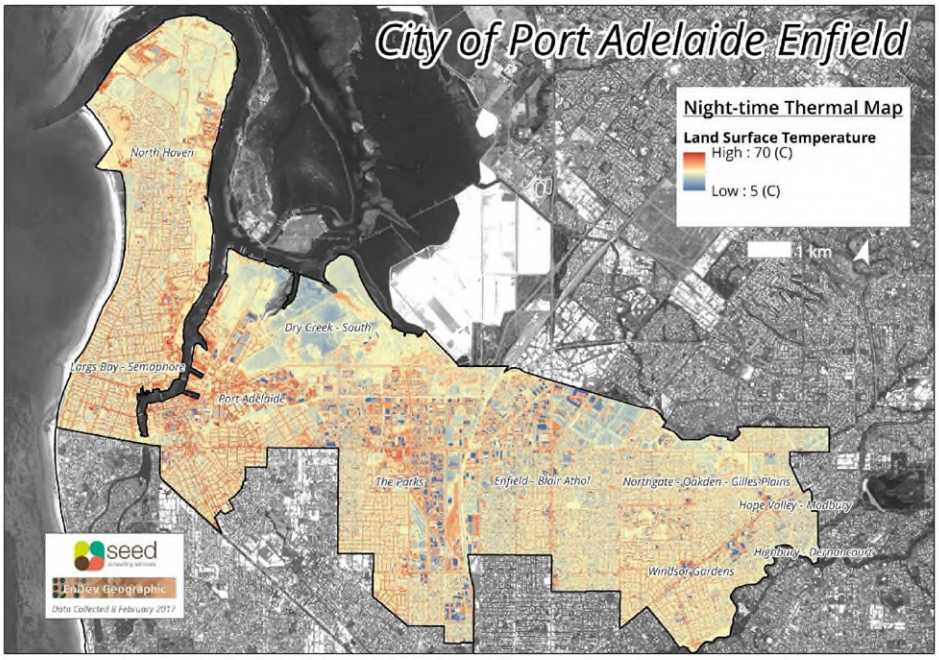


Figure A1.4. Night time thermal map for the City of Port Adelaide Enfield.

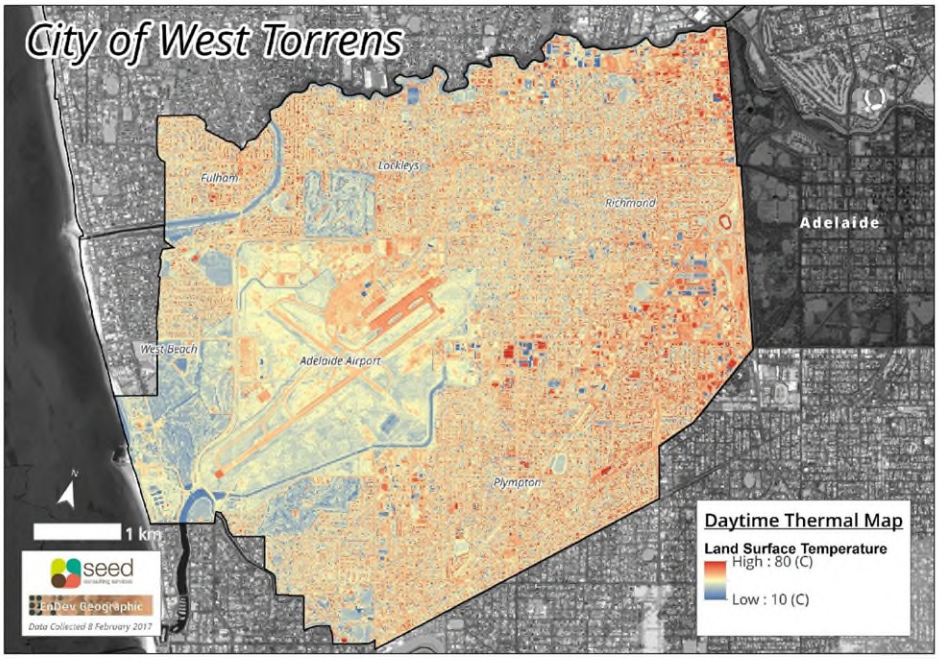


Figure A1.5. Day time thermal map for the City of West Torrens.

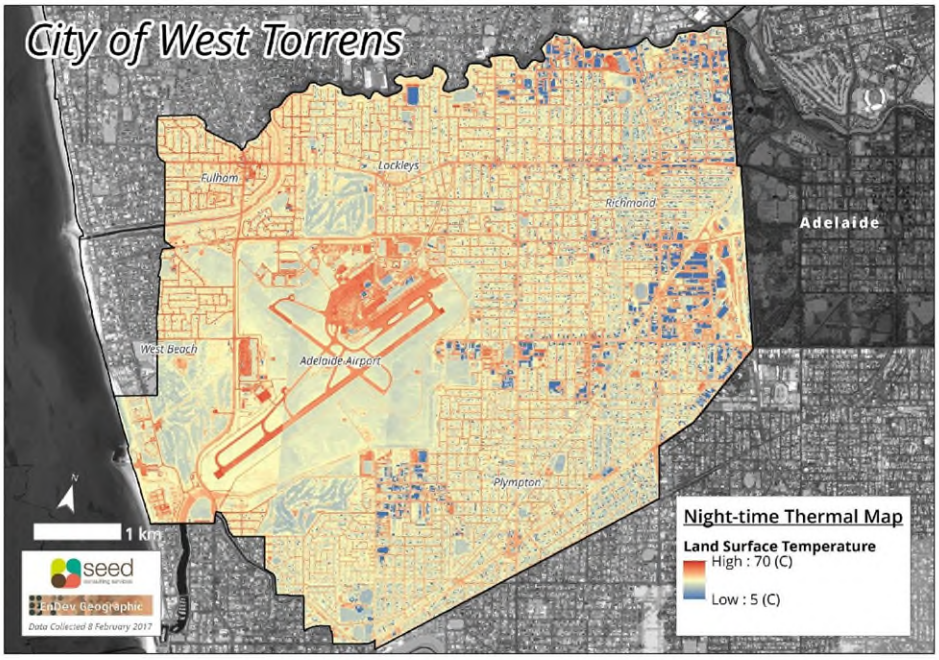


Figure A1.6. Night time thermal map for the City of West Torrens.

Annex 2: Thermal map profiles

Due to the detail of the data and complexity of the analysis, additional results are presented in an indexed series of eight map panels. The following index map (Figure A2.1) shows the location of each map within the study area. Each map panel contains:

- Day-Time Thermal Map (top left)
- Night-Time Thermal Map (top right)
- Day-Time UHI and Social Vulnerability Map (bottom left)
- Night-Time UHI and Social Vulnerability Map (bottom right)

The eights maps are organised in the following order:

1. Port Adelaide Enfield North (Figure A2.1)
2. Port Adelaide Enfield South (Figure A2.2)
3. Port Adelaide Enfield Central (Figure A2.3)
4. Port Adelaide Enfield East (Figure A2.4)
5. Charles Sturt West (Figure A2.5)
6. Charles Sturt East (Figure A2.6)
7. West Torrens East (Figure A2.7)
8. West Torrens West (Figure A2.8)

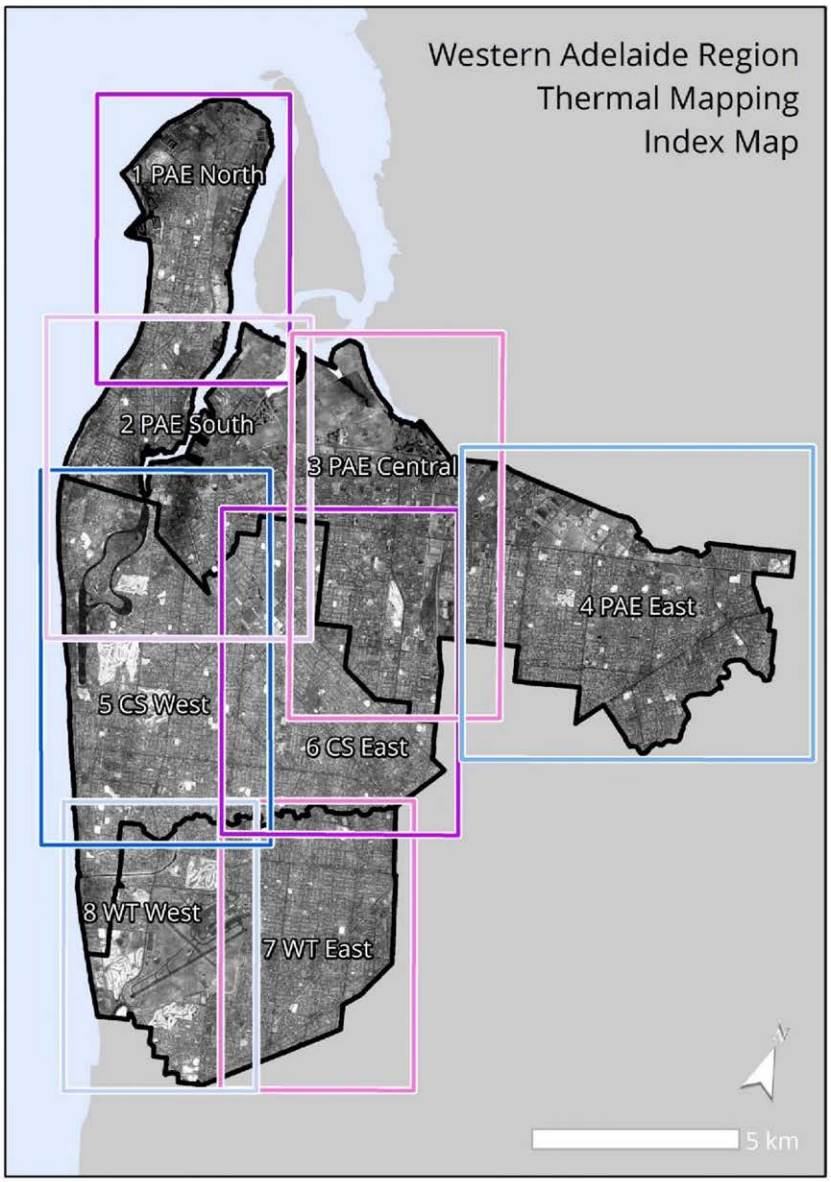


Figure A2.1. Index map

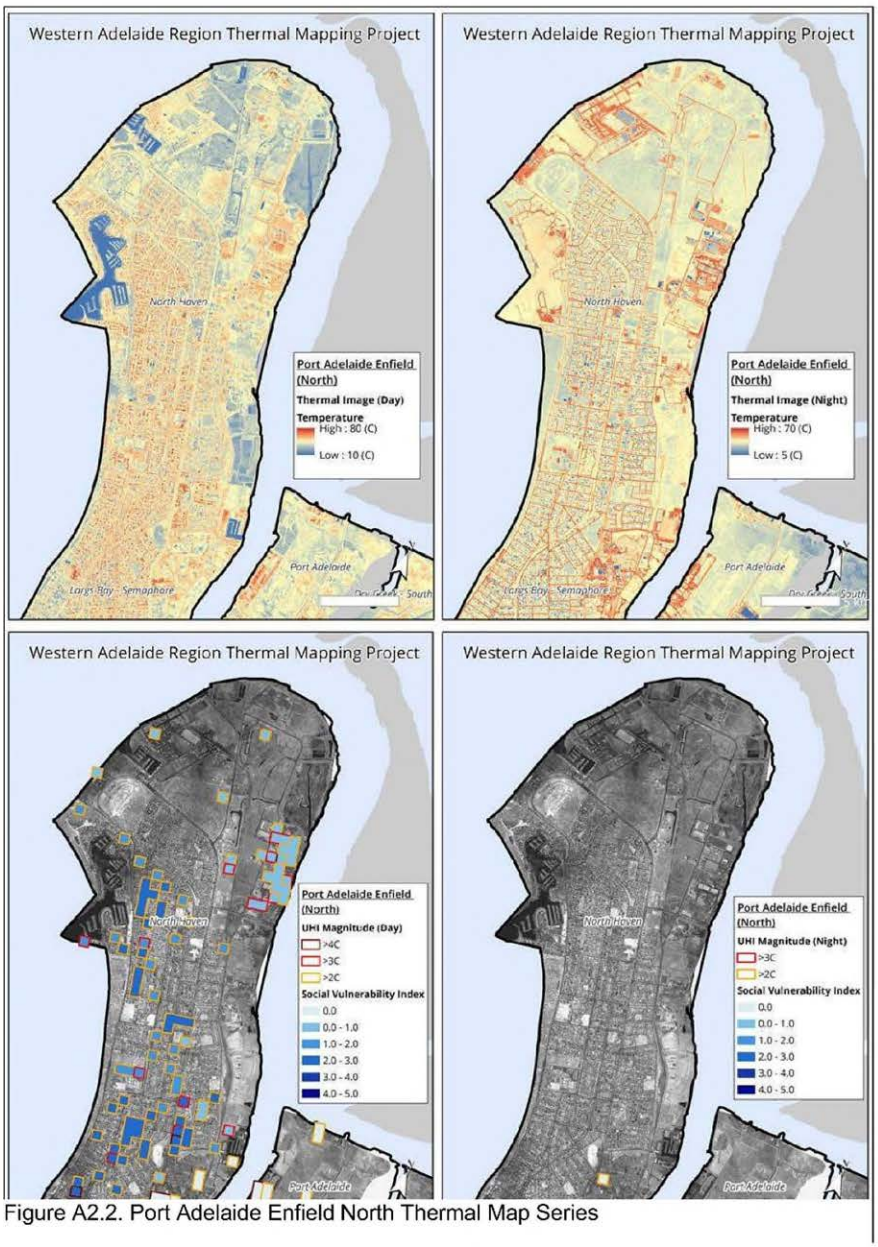


Figure A2.2. Port Adelaide Enfield North Thermal Map Series

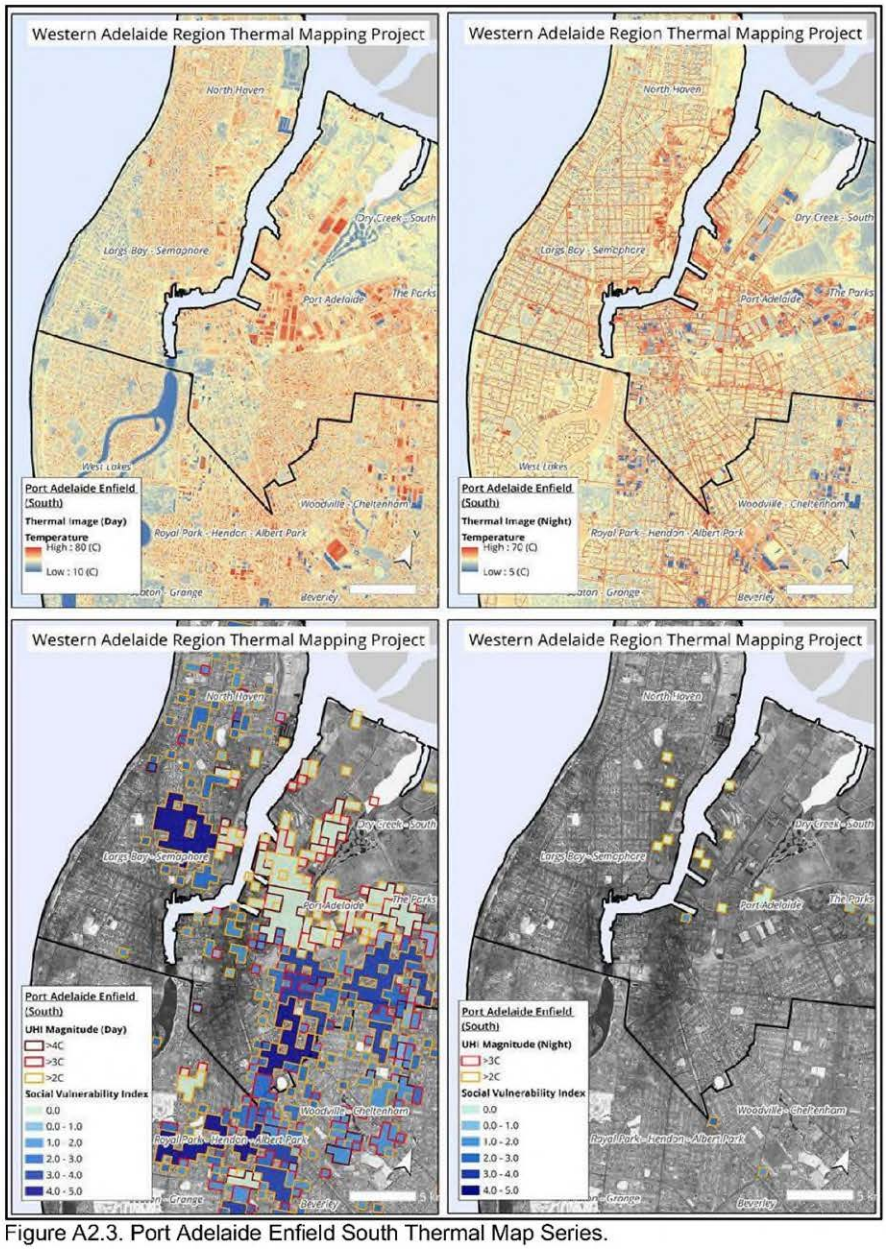


Figure A2.3. Port Adelaide Enfield South Thermal Map Series.

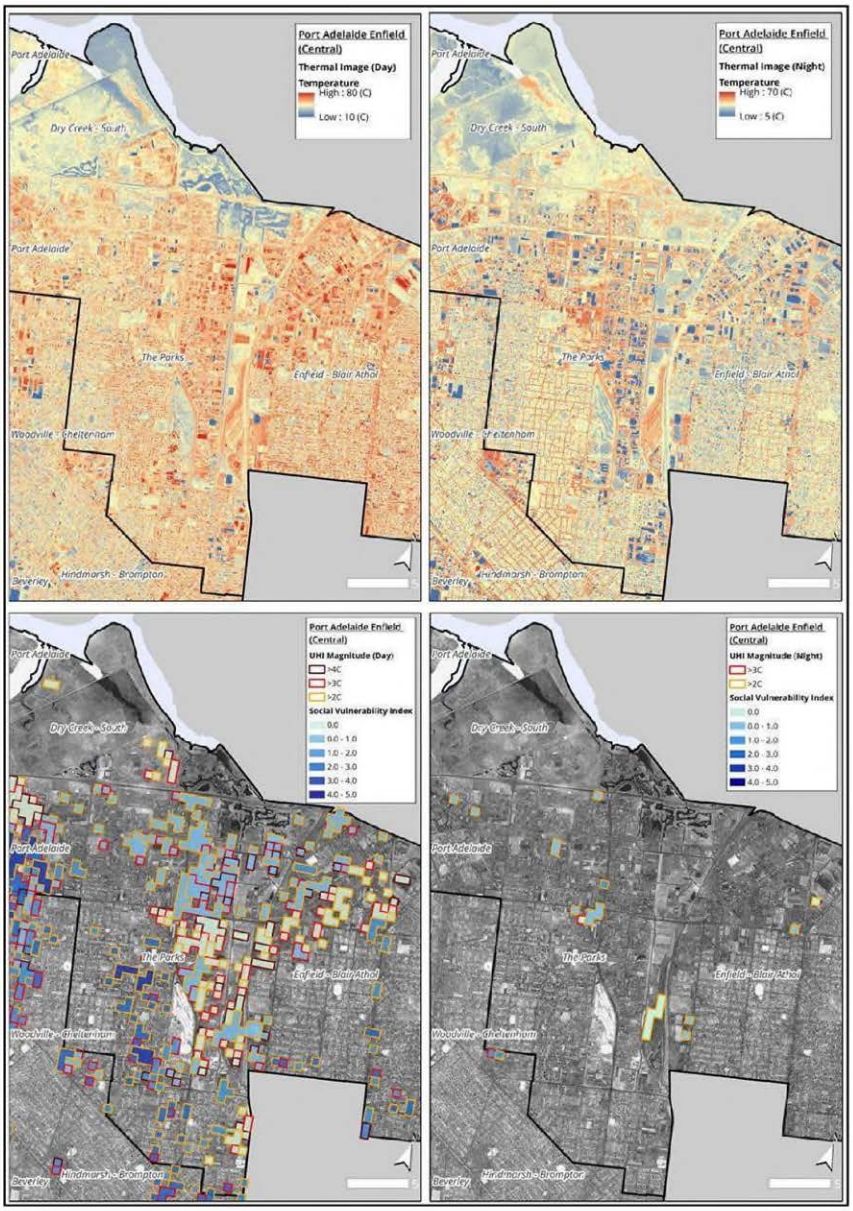


Figure A2.4. Port Adelaide Enfield Central Thermal Map Series.

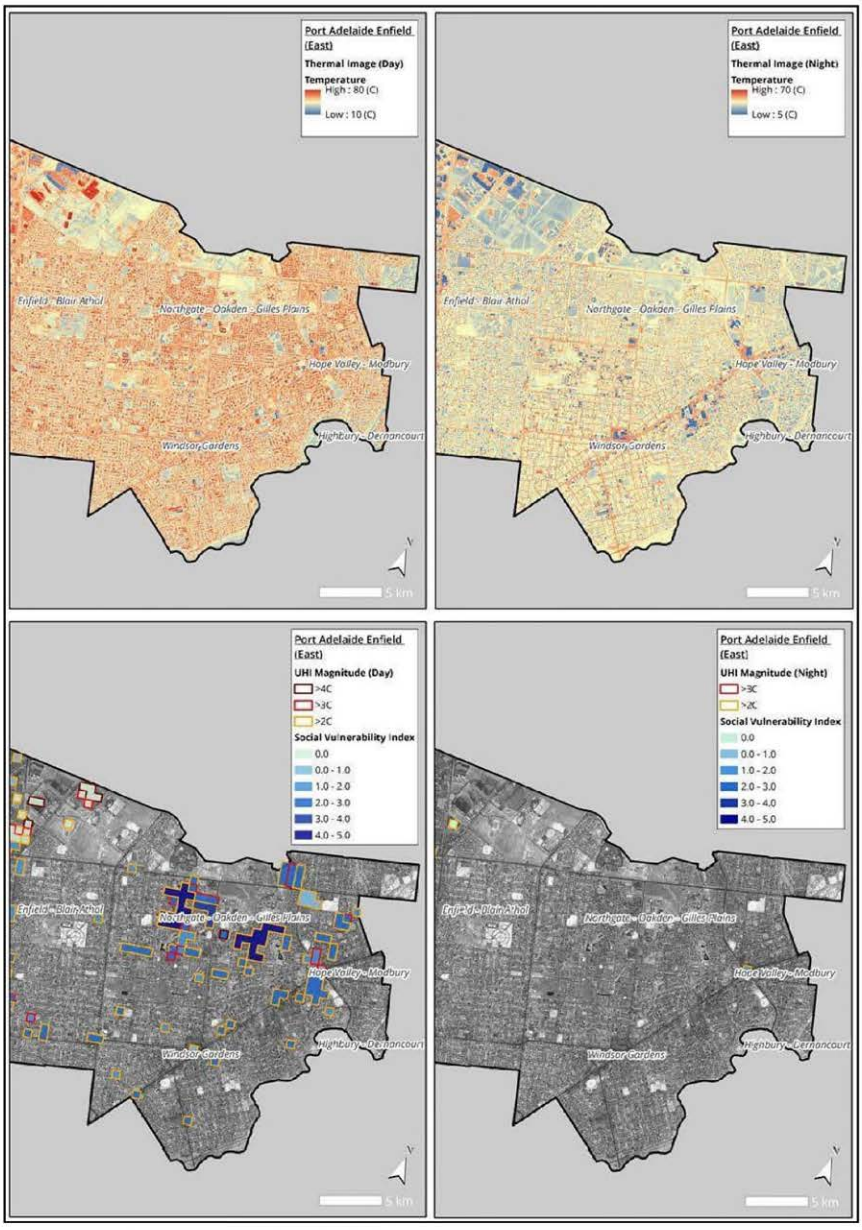


Figure A2.5. Port Adelaide Enfield East Thermal Map Series.

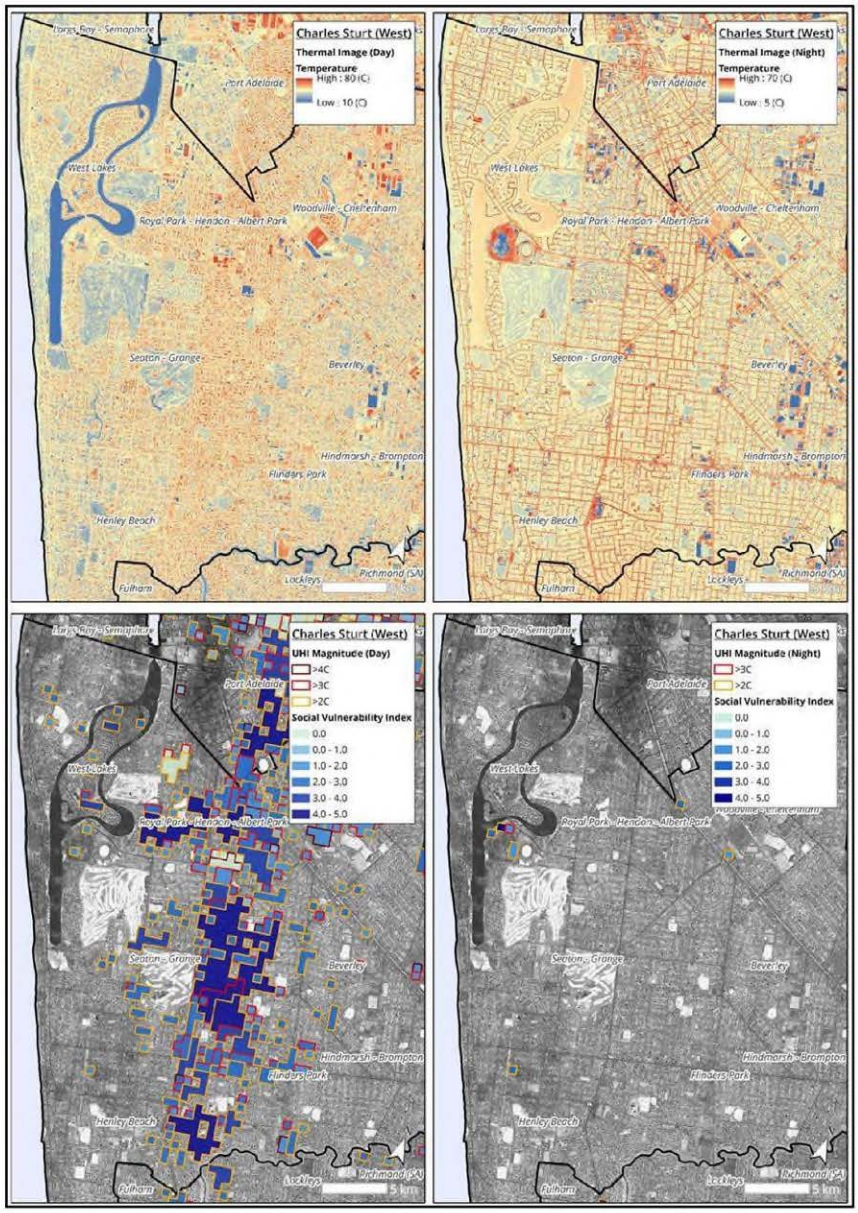


Figure A2.6. Charles Sturt West Thermal Map Series.

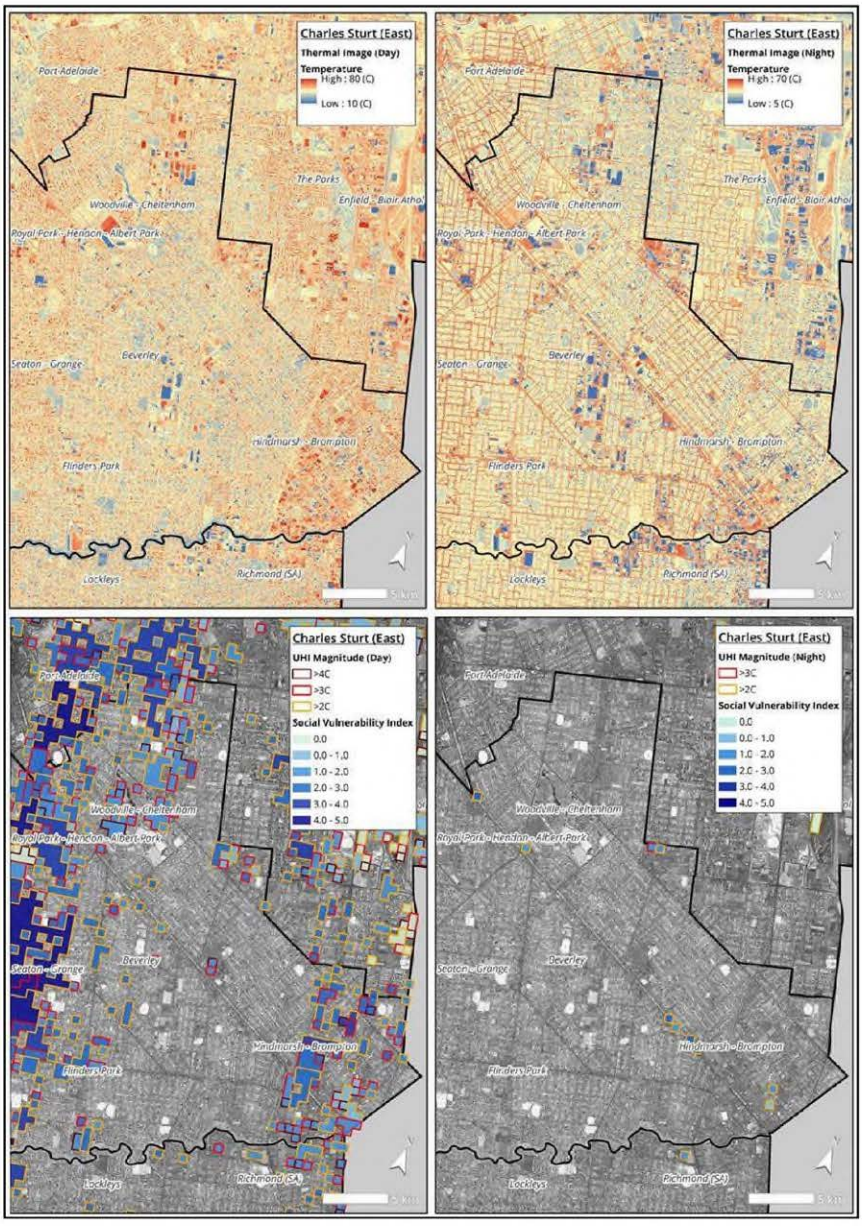


Figure A2.7. Charles Sturt East Thermal Map Series.

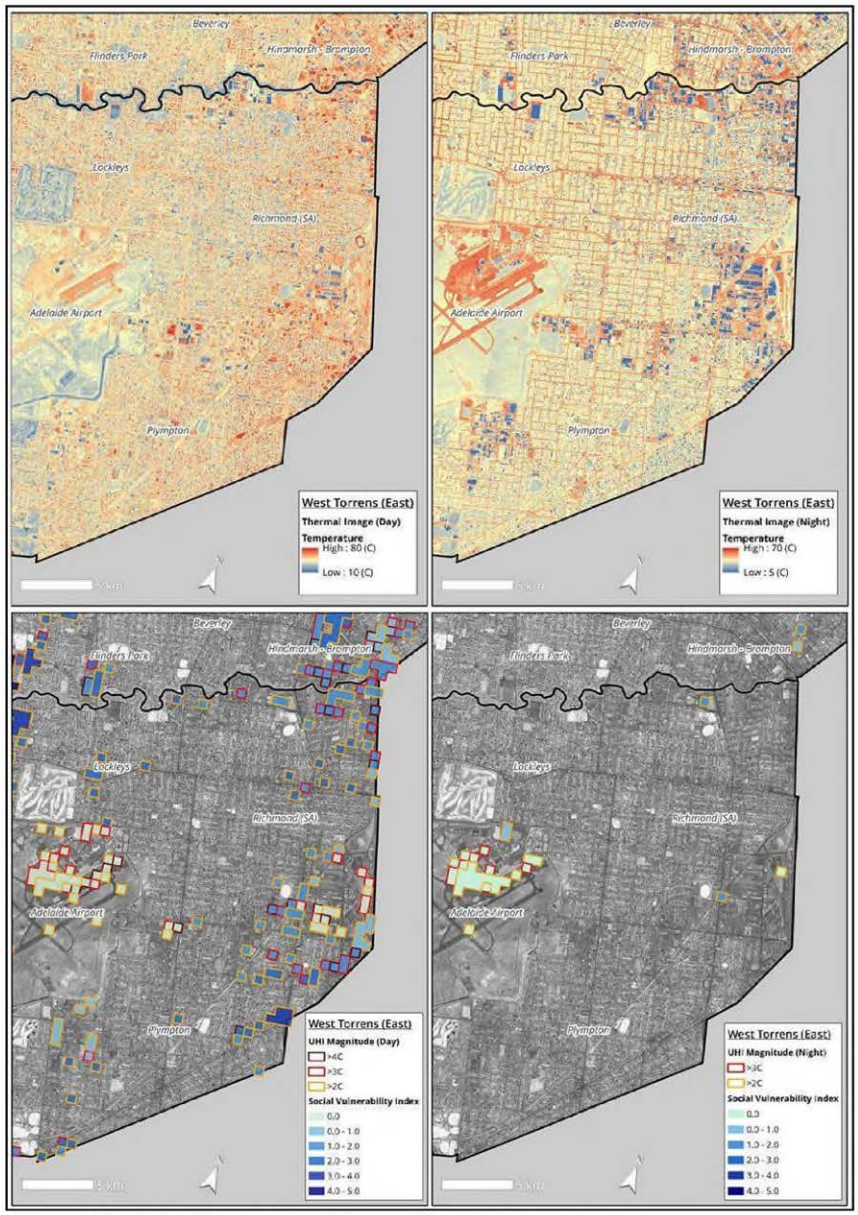


Figure A2.8. West Torrens East Thermal Map Series.

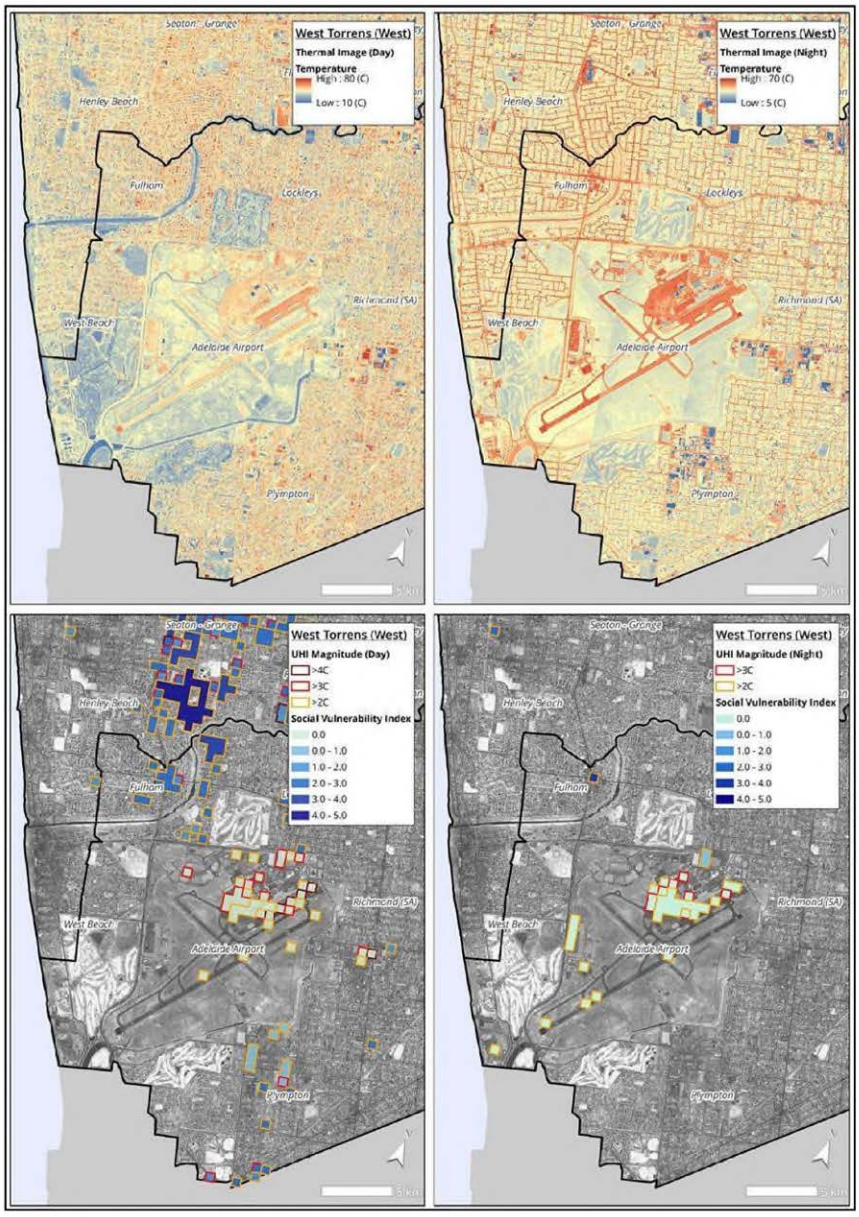


Figure A2.9. West Torrens East Thermal Map Series.

Annex 3: NDVI maps

Normalized Difference Vegetation Index (NDVI) data identifies the amount of healthy vegetation present at any given location. For the purpose of this study, the effect of green infrastructure on temperature has been analysed by comparing NDVI values with temperature data at land-use analysis points.

The following three council scale NDVI maps are provided:

1. City of Charles Sturt (Figure A3.1)
2. City of Port Adelaide Enfield (Figure A3.2)
3. City of West Torrens (Figure A3.3)

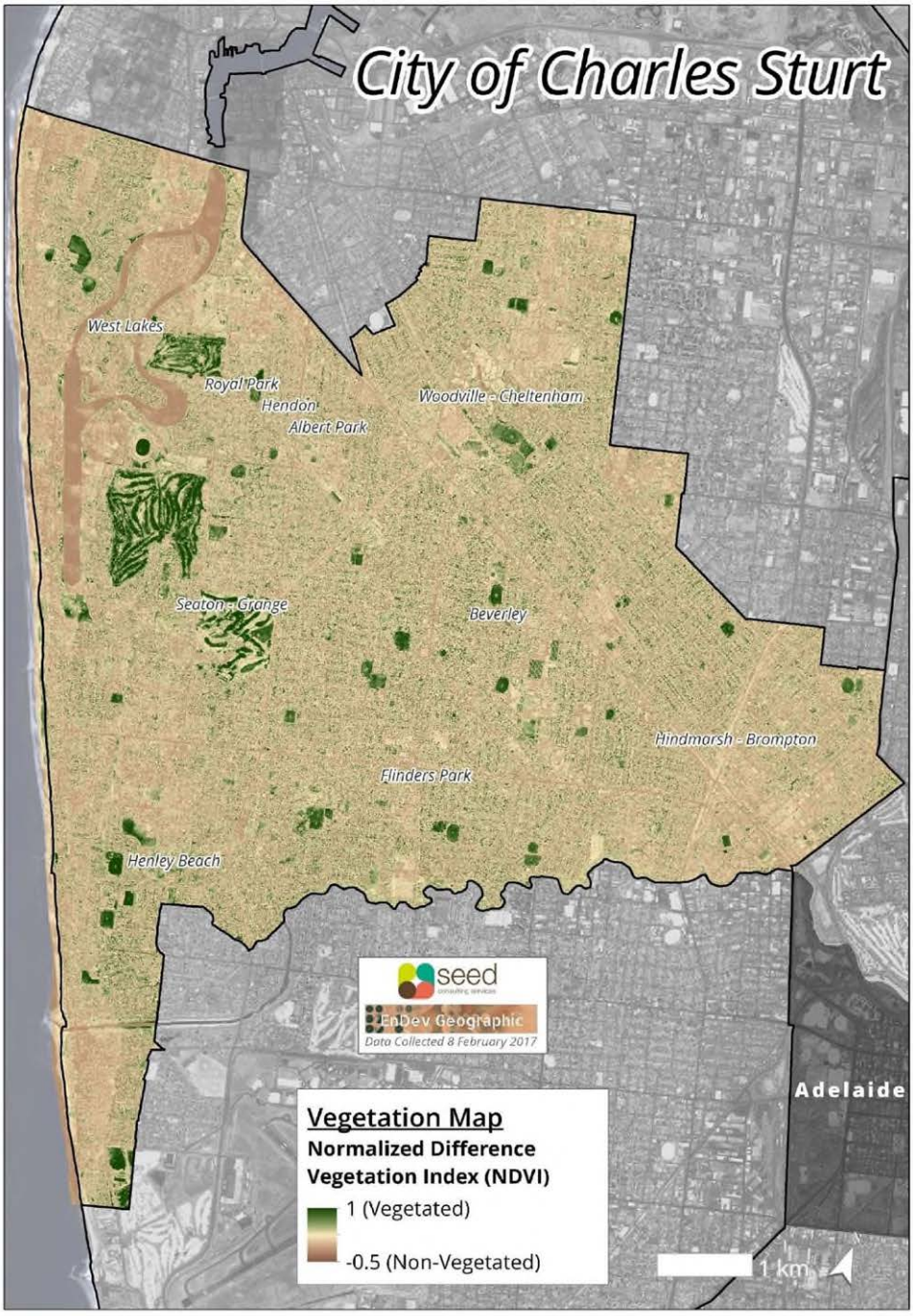


Figure A3.1. NDVI map for the City of Charles Sturt.

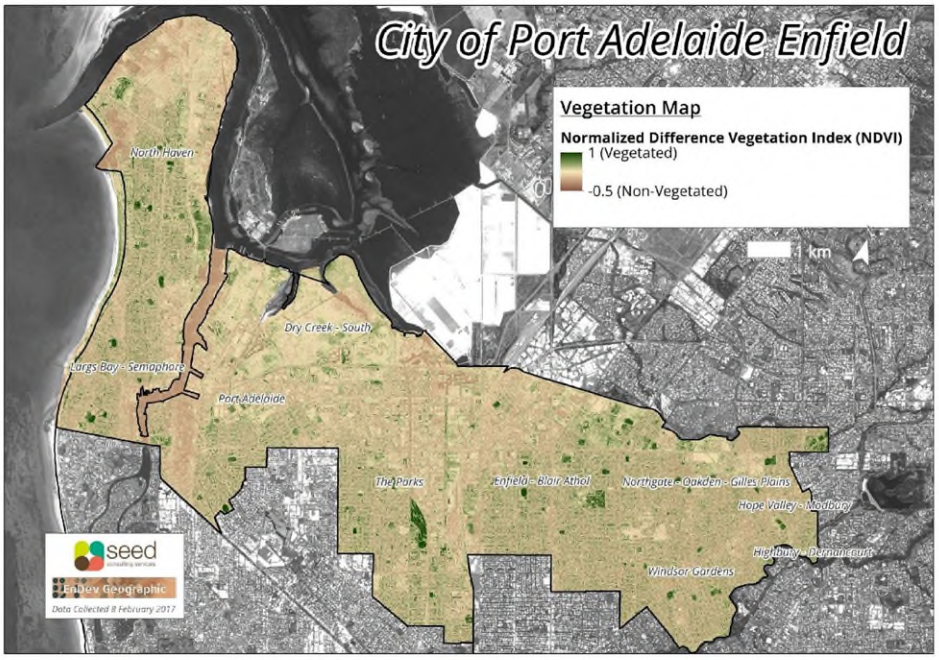


Figure A3.2. NDVI map for the City of Port Adelaide Enfield.

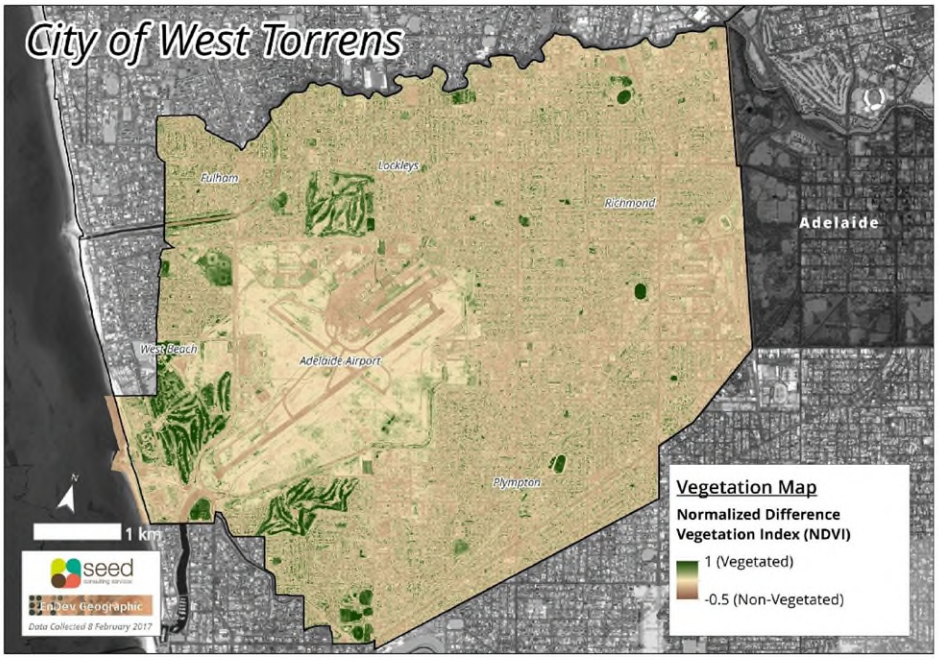


Figure A3.3. NDVI map for the City of West Torrens.

Annex 4: Suburb analysis tables

The tables in this Annex provide further information about the social vulnerability of the suburbs considered in this analysis.

Suburb Name	LGA	Population	Population over 75	Dwellings	English Second Language	Needs Assistance (Persons)	SEIFA Score	Age (Median)	Weekly Rent (Median)	Weekly Income (Individual)	Temperature (Day, Mean)	Temperature (Night, Mean)
Council Averages		53152	5405	22362	2228	3041	903	34	222	505	38	24
Adelaide Airport	WTC	0	0	0	0	0	0	0	0	0	36.78	24.94
Ashford (SA)	WTC	835	99	381	21	33	1019	37	248	648	40.18	24.20
Brooklyn Park	WTC	4515	382	1942	184	196	955	36	226	534	38.19	25.06
Camden Park (SA)	WTC	3060	302	1427	82	124	976	37	237	622	38.46	24.32
Cowandilla	WTC	1359	174	532	89	169	934	37	234	497	37.51	24.74
Fulham (SA)	WTC	2588	492	1075	75	188	1013	46	235	534	37.66	25.70
Glandore	WTC	1192	79	507	29	50	1006	39	204	591	39.26	23.86
Glenelg North	WTC	978	69	361	0	22	1063	36	323	728	36.53	24.93
Hilton (SA)	WTC	835	64	349	50	45	983	34	236	521	38.31	24.11
Keswick	WTC	680	25	302	42	24	981	32	240	609	39.98	23.72
Kurralta Park	WTC	2569	148	1117	114	99	983	32	247	558	39.80	24.23
Lockleys	WTC	5450	612	2146	110	276	1041	42	291	592	37.02	24.85
Marleston	WTC	1666	223	711	97	161	954	37	222	540	39.23	24.44
Mile End	WTC	4415	255	1808	302	274	981	35	249	542	38.91	24.22
Mile End South	WTC	0	0	0	0	0	0	0	0	0	39.77	24.13
Netley	WTC	1741	294	737	57	119	968	36	212	376	38.36	24.51
North Plympton	WTC	3005	674	1216	100	440	974	46	219	541	38.67	24.66
Novar Gardens	WTC	2323	210	949	64	99	1022	38	209	442	35.71	24.22
Plympton	WTC	4503	326	1990	153	163	987	36	255	587	38.50	24.49
Richmond (SA)	WTC	3073	276	1344	153	128	966	35	241	547	38.94	24.54
Thebarton	WTC	1321	129	579	85	81	967	38	237	523	39.64	23.86
Torrensville	WTC	3863	311	1593	283	205	976	38	257	509	37.69	24.45
Underdale	WTC	2260	185	921	100	93	997	35	288	564	37.98	24.89
West Richmond	WTC	921	76	375	38	53	938	37	214	515	37.31	24.68

Table A4.1. City of West Torrens suburb-level data of social vulnerability indicators and temperature measurements.

Suburb Name	LGA	Population	Population over 75	Dwellings	English Second Language	Needs Assistance (Persons)	SEIFA Score	Age (Median)	Weekly Rent (Median)	Weekly Income (Individual)	Temperature (Day, Mean)	Temperature (Night, Mean)
Council Averages		**106688**	**10629**	**43003**	**4672**	**6644**	**965**	**40**	**237**	**540**	**38.47**	**24.79**
Albert Park (SA)	CSC	1474	131	597	59	101	924	39	211	494	40.15	25.33
Allenby Gardens	CSC	1891	96	739	40	73	1017	38	270	626	38.04	24.93
Athol Park	CSC	1670	88	560	230	100	850	33	235	414	39.38	24.15
Beverley (SA)	CSC	1419	75	565	60	87	933	37	220	520	37.52	24.14
Bowden	CSC	618	33	303	24	45	901	40	141	500	40.46	24.45
Brompton	CSC	2931	283	1215	239	321	977	37	257	617	40.35	24.17
Cheltenham (SA)	CSC	2133	153	851	52	110	972	41	206	567	39.45	25.00
Croydon (SA)	CSC	1399	110	544	106	73	973	38	232	525	38.60	24.78
Findon	CSC	5711	694	2292	341	446	919	39	221	439	38.64	25.00
Flinders Park	CSC	4631	454	1816	192	210	987	40	267	508	37.72	24.89
Fulham Gardens	CSC	5875	604	2270	247	247	1009	44	283	503	38.90	25.45
Grange (SA)	CSC	5855	782	2339	65	485	1031	45	265	569	36.80	24.59
Hendon (SA)	CSC	1365	236	561	85	189	914	28	121	321	39.47	24.89
Henley Beach	CSC	5553	419	2314	75	189	1041	41	249	674	36.93	25.02
Henley Beach South	CSC	2493	210	1010	24	90	1034	39	240	707	36.43	25.20
Hindmarsh (SA)	CSC	158	14	66	3	9	955	34	305	700	40.63	24.75
Kidman Park	CSC	3327	354	1295	136	128	1003	47	283	516	38.46	25.05
Kilkenny	CSC	1631	207	634	127	103	929	46	246	472	39.25	24.95
Ovingham	CSC	514	15	233	16	18	959	34	220	580	40.12	24.73
Pennington	CSC	3649	344	1340	304	306	866	39	167	403	39.54	24.59
Renown Park	CSC	1586	146	716	126	102	893	38	156	431	40.34	24.48
Ridleyton	CSC	1070	54	482	57	56	944	36	197	550	40.97	24.64
Royal Park	CSC	2862	278	1199	154	196	919	40	194	596	38.97	24.55
Seaton (SA)	CSC	9849	1150	4154	566	836	916	40	220	450	38.82	24.93
Semaphore Park	CSC	4223	530	1897	48	334	926	46	206	523	36.61	24.94
Tennyson (SA)	CSC	1117	89	480	10	23	1090	48	310	771	35.59	24.59
Welland	CSC	841	58	344	67	47	947	40	214	470	38.38	24.96
West Beach (SA)	CSC	4484	428	1850	45	198	1046	41	229	592	35.10	24.85
West Croydon	CSC	4072	315	1483	252	282	987	37	277	548	38.20	24.84
West Hindmarsh	CSC	1571	99	663	79	75	959	35	263	514	38.44	25.19
West Lakes	CSC	5710	793	2381	126	234	1045	53	336	589	35.36	25.09
West Lakes Shore	CSC	2984	279	1180	33	102	1047	47	307	635	37.57	24.94
Woodville (SA)	CSC	2198	176	851	91	151	989	37	251	577	38.41	24.77
Woodville North	CSC	2307	198	902	269	119	889	37	200	424	38.84	24.08
Woodville Park	CSC	1718	102	630	82	81	978	37	261	552	37.81	24.34
Woodville South	CSC	2958	300	1132	120	241	990	40	268	581	38.11	24.81
Woodville West	CSC	2841	332	1115	122	237	938	39	225	535	39.00	25.05

Table A4.2. City of Charles Sturt suburb-level data of social vulnerability indicators and temperature measurements.

Suburb Name	LGA	Population	Population over 75	Dwellings	English Second Language	Needs Assistance (Persons)	SEIFA Score	Age (Median)	Weekly Rent (Median)	Weekly Income (Individual)	Temperature (Day, Mean)	Temperature (Night, Mean)
Council Averages		112921	8996	44620	5643	7300	909	36	203	493	39.25	24.47
Alberton (SA)	PAE	1915	148	819	53	85	954	41	219	559	39.12	25.22
Angle Park	PAE	1468	168	508	166	214	875	41	65	647	39.84	25.07
Birkenhead	PAE	1715	110	686	25	78	964	38	238	630	39.29	25.07
Blair Athol (SA)	PAE	4366	372	1597	340	267	878	33	218	415	40.32	24.27
Broadview	PAE	2224	231	939	73	110	974	36	231	555	40.59	24.08
Clearview	PAE	3452	327	1371	167	178	909	30	208	419	39.95	24.03
Croydon Park (SA)	PAE	4000	429	1525	477	279	879	37	206	378	39.70	24.61
Dernancourt	PAE	226	14	76	0	12	1076	43	295	657	37.27	23.97
Devon Park (SA)	PAE	901	69	427	37	58	928	38	188	473	39.80	23.96
Dry Creek (SA)	PAE	197	9	88	23	18	845	20	115	254	37.08	23.65
Dudley Park (SA)	PAE	399	34	186	21	45	781	20	109	187	39.72	23.42
Enfield (SA)	PAE	4901	597	1893	273	443	914	37	225	456	40.88	24.23
Ethelton	PAE	1200	64	506	17	43	930	40	250	519	37.27	24.67
Exeter (SA)	PAE	1100	73	503	0	56	948	41	193	586	38.28	24.70
Ferryden Park	PAE	4105	233	1473	512	253	883	36	159	395	40.25	24.90
Gepps Cross	PAE	593	31	207	34	20	900	13	87	153	39.81	23.38
Gilles Plains	PAE	1961	140	782	86	160	886	35	181	439	40.80	23.93
Glanville	PAE	678	40	302	15	27	912	41	228	528	37.35	25.01
Greenacres	PAE	2412	171	1005	87	122	939	34	216	478	40.47	24.55
Hampstead Garden	PAE	1363	114	561	74	67	944	35	238	485	40.79	24.79
Hillcrest (SA)	PAE	3087	241	1237	106	173	954	34	226	546	41.02	24.44
Holden Hill	PAE	575	32	257	20	34	888	35	204	456	40.28	23.76
Kilburn	PAE	5099	356	2017	511	451	797	31	142	362	40.62	23.76
Klemzig	PAE	5601	619	2423	229	382	970	38	221	506	39.88	24.55
Largs Bay	PAE	3956	426	1504	32	315	1009	40	252	558	38.27	25.11
Largs North	PAE	3268	414	1307	7	223	969	37	213	491	38.52	24.88
Manningham	PAE	1302	110	492	7	35	1058	39	274	665	40.24	24.75
Mansfield Park	PAE	3360	218	1169	507	216	852	33	181	390	39.41	24.34
New Port	PAE	898	19	402	15	6	1025	21	205	586	37.56	25.61
North Haven (SA)	PAE	5804	384	2242	22	205	1015	46	288	640	36.69	24.65
Northfield	PAE	3870	280	1283	143	190	879	37	193	391	39.79	24.07
Northgate (SA)	PAE	3579	58	1189	85	185	1089	33	317	814	40.84	24.34
Oakden	PAE	3673	264	1375	137	347	989	40	196	532	40.25	24.30
Osborne (SA)	PAE	1837	149	755	9	127	899	41	207	455	38.14	24.25
Ottoway	PAE	2416	182	944	255	175	850	38	200	392	39.92	24.57
Outer Harbor	PAE	24	0	13	0	4	866	55	0	460	35.84	24.51
Peterhead	PAE	1142	84	529	10	48	912	40	228	606	39.89	25.01
Port Adelaide	PAE	1292	63	600	38	82	897	43	140	651	38.65	24.84
Queenstown (SA)	PAE	1804	190	838	73	152	885	43	193	453	37.65	24.96
Regency Park	PAE	176	65	0	31	64	0	13	0	159	40.06	24.11
Rosewater	PAE	3342	231	1410	163	195	890	40	206	496	39.94	25.29
Sefton Park	PAE	723	77	315	28	35	976	37	227	532	40.88	24.08
Semaphore	PAE	2823	208	1062	26	234	1004	43	237	617	36.17	24.81
Semaphore South	PAE	982	94	430	6	53	1011	40	268	623	35.75	24.72
Taperoo	PAE	3130	187	1320	43	241	821	40	178	412	38.17	24.48
Valley View	PAE	1939	157	742	49	150	961	44	272	476	39.18	23.93
Walkley Heights	PAE	366	4	129	8	12	1070	34	310	704	42.95	24.59
Windsor Gardens	PAE	4824	320	2071	146	239	971	38	235	518	39.81	23.97
Wingfield	PAE	473	24	205	62	30	810	41	308	591	39.22	24.39
Woodville Gardens	PAE	2380	166	905	395	164	803	34	149	345	38.29	24.54

Table A4.3. City of Port Adelaide Enfield suburb-level data of social vulnerability indicators and temperature measurements.

Annex 5: Instrumentation, data collection and analysis

Instrumentation

Instrumentation specifications are provided here for the thermal camera, precision navigation units and aircraft. Further information on other instruments can be provided by Airborne Research Australia on request.

Thermal camera

The thermal camera used for this project was a FLIR model A615. The camera was controlled via a gigabit ethernet interface using Airborne Research Australia-developed software running on the aircraft's main on-board computer, communicating across the aircraft's local network. The images were time-stamped, and recorded to a solid-state hard drive in the main science computer.

Superior to the older-generation camera used by Airborne Research Australia until 2013, the A615 has a 640 by 480-pixel uncooled micro-bolometer array giving a thermometric resolution of approximately 50mK (one twentieth of a degree C). The camera's internal control electronics monitor the thermal stability of the system and periodically switches a blackbody calibration target into the optical path for a short period (~0.5s) to recalibrate the sensor.

This camera was mounted in a wing-mounted insulated enclosure along with one of the precision navigation units (each instrument mounting location on the aircraft requires its own navigation unit to accurately record the instrument's position and orientation). The thermal stability offered by this insulated enclosure, and by a period of temperature stabilisation flying at a constant altitude before the imaging flight lines (approximately 20 minutes), minimise field-dependent temperature sensing offsets caused by drifts in the physical temperature of the camera (and more particularly, of the embedded detector array).

Instrument settings, controlled by the mission scientist aboard the aircraft during the survey via the operating/logging software, optimise the thermometric resolution, camera focus and data capture rate for the survey conditions.

OxTS RT4003 IMU

A precision navigation unit is required for each instrument station. There being two instrument stations employed, two RT-4003 units from Oxford Technical Solutions were used. These units incorporate a dual-GPS system, accelerometers and gyroscopes to form a full IMU (Inertial Measurement Unit) and were mounted to the same rigid structure as the camera to allow accurate measurement of the position and orientation of the camera.

Before each measurement flight, the IMU/GPS systems were dynamically initialised by taxiing in a straight line at a speed higher than the set threshold speed as set in the configuration of the units (usually 5m/s).

Raw IMU and GPS data were logged internally in the RT4003 units, allowing the most accurate post-processing analysis to provide the best possible position data.

Airborne platform

VH-EOS, one of Airborne Research Australia 's two Diamond Aircraft HK36TTC ECO-Dimonas was used as the airborne platform for the survey. This aircraft type was designed specifically as an environmental sensing platform. The pilot had considerable expertise in carrying out such operations in complex airspace and fully understood the subsequent data processing and interpretation and could therefore factor this into the flight considerations and procedures. The mission scientist/instrument operator was also a pilot, and subsequently carried out the bulk of the data processing.

The ECO-Dimonas have safety features which are unmatched by standard single-engine survey aircraft, the most relevant of them being their extended glide ration (1:25) in the case of engine failure. From the proposed flying altitude of 3,000 m, the aircraft would have been able to glide back to Parafield Airport (without use of the engine) from anywhere within the survey area.

Airborne Research Australia 's aircraft were also equipped with live Internet connection at all times, as well as a traffic avoidance system showing the relative position of other aircraft around it on a dedicated display.

Flyover

Data collection plan

To produce the specified imagery, Airborne Research Australia used one of its purpose-built ECO-Dimona aircraft, fitted with a thermal imager for the heat mapping. Supporting instrumentation and infrastructure was also carried, producing supporting datasets.

To achieve the required imagery spatial sampling intervals (GSD), the aircraft was planned to be flown at a nominal height of 3,000 m above ground. This altitude was selected on the basis of matching the required on-ground resolution for the various instrumentation (primarily the thermal imagery), while completing the survey in the minimum time, and simultaneously avoiding delays due to conflicting commercial air traffic to and from Adelaide Airport. A series of parallel, overlapping flight lines were flown to ensure full coverage of the required areas.

The image swath of the FLIR thermal imager (narrowest field-of-view instrument here) was approximately 1,200 m, and so a 600 m line-spacing was planned to give suitable cross track overlap.

The daytime flights were conducted in a north-south direction to minimise cross-track BRDF (Bidirectional Reflectance Distribution Function) effects for the multispectral and panchromatic imagers. The nighttime flights followed the same ground tracks for convenience.

In addition to the primary thermal imaging instrumentation, the aircraft carried other instruments for supporting measurements. Notably, a DSLR camera was carried and operated for conventional RGB (red green blue) aerial photography, a panchromatic linescanner for broad-band imaging suitable for deriving an albedo product, multispectral imagers collecting bands suitable for deriving an NDVI product and a visible and near-infrared (VNIR) hyperspectral linescanner (~200 bands spanning 400 to 1000 nm). These instruments are likely to yield valuable additional data for urban heat island analysis, and resultant products are also project deliverables.

Instrument	**Data**	**Pixel size @3000m**
Thermal imager (FLIR A615)	At-sensor brightness temperature	2 m
DSLR (Canon 1D)	Aerial photography	<1 m
Runner linescanner (panchromatic)	Brightness image – for albedo	1 m
CIR imager (modified Canon 6D	G-R-NIR image: for NDVI	<1 m
Specim AISA Eagle-2	VNIR hyperspectral imaging, 400 to 1000 nm in ~200 bands	2 m

Table A5.1. Instrumentation and sampling specifications. Note: Runner, Eagle and DSLRs only used for daytime flights.

Timing

The trigger for undertaking the flight as agreed with the City of West Torrens was two or more consecutive days with the average temperature greater than or equal to 33°C. An extended effort was made to collect data in suitable meteorological conditions. The aircraft and crew remained on standby through most of December 2016 and January 2017 awaiting suitable weather. The summer turned out to be unseasonably wet and several hot spells

were rejected as unrepresentative of the desired measurement conditions due to excessive soil moisture, which would have affected the partitioning of energy and hence the surface temperature distribution.

It became apparent in the first week of February that a suitable period of weather was approaching, and the surveys were flown around solar noon of 9 February 2017 from approximately 11am to 4pm, and on that night, from approximately 11pm to 3am (i.e. 10 February 2017). The actual flight paths are shown in Figure A5.1, which consisted of an array of 31 north-south parallel flight lines.

Data processing

It is normal with scientific remote sensing that the total effort is dominated by the data processing and analysis, with the field work being a relatively small component. Data processing commenced on the survey day immediately post-flight, with data download, backup and preliminary quality assurance. The volume of data collected for the proposed survey meant the data download alone took longer than the flights themselves.

After duplicate off-aircraft raw data backups were complete, the raw data was subject to an initial inspection, and preliminary processing of the recorded navigation data. This confirmed there were no fundamental issues such as instrument misbehavior, navigation problems, missed portions of the imaged area, or environmental issues reducing data quality (e.g. excessive cloud shading of the surface). In fact, there was a thin layer of broken cloud casting shadows across the imaged ground for approximately the first 30 minutes of the daytime part of the survey, however, this was not significant for the thermal imaging or NDVI derivation, and only has a minor effect on the retrieved albedo, and not much effect on any of the other data. It is concluded that the survey took place on the most suitable day of the season.

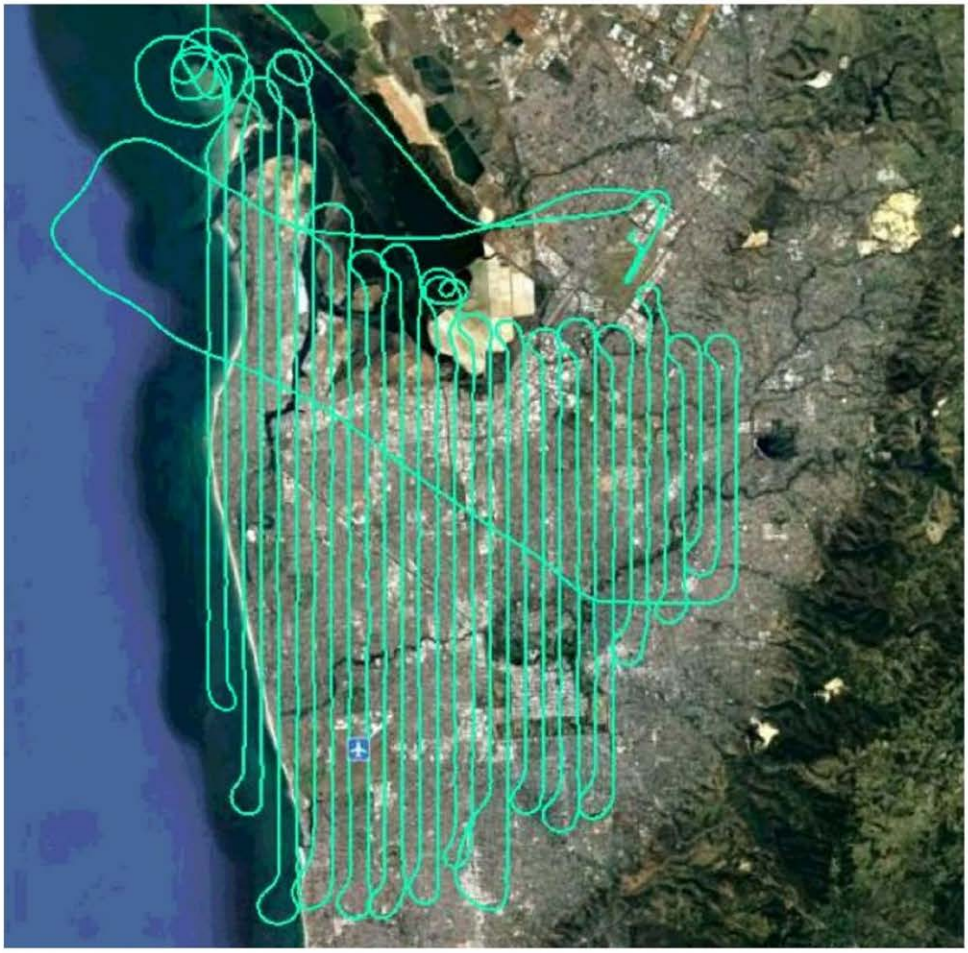


Figure A5.1. Flight paths flown over the study area from the daytime part of the survey. The westernmost lines were flown first, heading south before turning anti-clockwise and travelling north. Successive lines were flown sequentially from west to east. The circular pattern in the top left of the image shows where the plane rose to its target altitude before conducting the survey.

Geo-rectification of any of the imagery requires precise knowledge of the location and orientation of the sensor for each raw image collected, and so each instrument is rigidly coupled to an accurate IMU, and the data from these navigation units was processed extremely carefully to achieve the best possible instrument navigation data. This required substantial post-processing effort, which incorporated data from GPS base stations and precision GPS satellite orbital ephemeris data which was only available about a week after the event.

FLIR[3], Runner and multispectral data was radiometrically and geometrically processed to give radiometric data in geotiff form, from which were derived the deliverable products (heat map from the FLIR data, albedo map from the Runner and NDVI map from the multispectral data), to the agreed data collection specifications.

Urban heat island and hot spot identification

Underlying each heat island is a mixture of landscapes, land-uses, and land-covers resulting in different characteristics of each heat island. Analysing social vulnerability within heat islands reveals who lives within these areas, identifies social groups that are disproportionately affected by heat, and helps prioritise which areas of heat are most in need of remediation. How to cool heat islands depends on what lies within heat islands. Landscape analysis investigates various land cover types to identify their impact as a basis for developing heat reduction strategies for effective land use planning.

Urban heat islands and hot spots occur at any location where the built environment causes the temperature to be warmer than it would have been in its natural state. With no way of knowing the natural temperature of an area without the built environment, baseline temperatures are taken as the average temperature of the local area and hot spots are identified as exceedingly warm areas compared to this baseline. Urban heat islands and hot spots are defined for this project as any location where the temperature exceeds 2°C above the mean temperature of the local area. To account for surface warming during the data collection process, a moving average threshold was used to establish the expected mean temperature for four zones (Figure A5.2). Areas of built-up heat were identified as exhibiting a temperature greater than 2°C, 3°C or 4°C above the local mean temperature at the time of measurement.

As urban heat islands typically have larger diffuse effects, the analysis aggregated thermal data from 2 m to 125 m resolution to identify general areas of built up heat and to understand how they relate to the people who live in those areas. Hot spot analyses use 2 m resolution thermal data to explore thermal impacts of specific land-uses.

[3] FLIR is a commercial company specialising in the production of thermal imaging cameras, components and imaging sensors.

Land use analysis

To explore the relationship between land use and heat, ten predominant land surface types were chosen across four categories: impervious surfaces, green infrastructure, buildings, and water. For each of the ten surface types, 45 to 96 points were selected (depending on prominence of each surface in the landscape) that represented clear examples of each surface type. Day temperature, night temperature, and NDVI values were calculated for each point.

An average of 70 points were analysed for each land-surface category to understand the mean temperatures of surface over the whole of the study area, providing broader, more robust results to supplement and contextualize the individual case studies. The combined land use-case study investigations illustrate local examples with robust analysis to reveal patterns of urban heat, quantify the magnitude of those patterns, and highlight effective lessons for urban heat management.

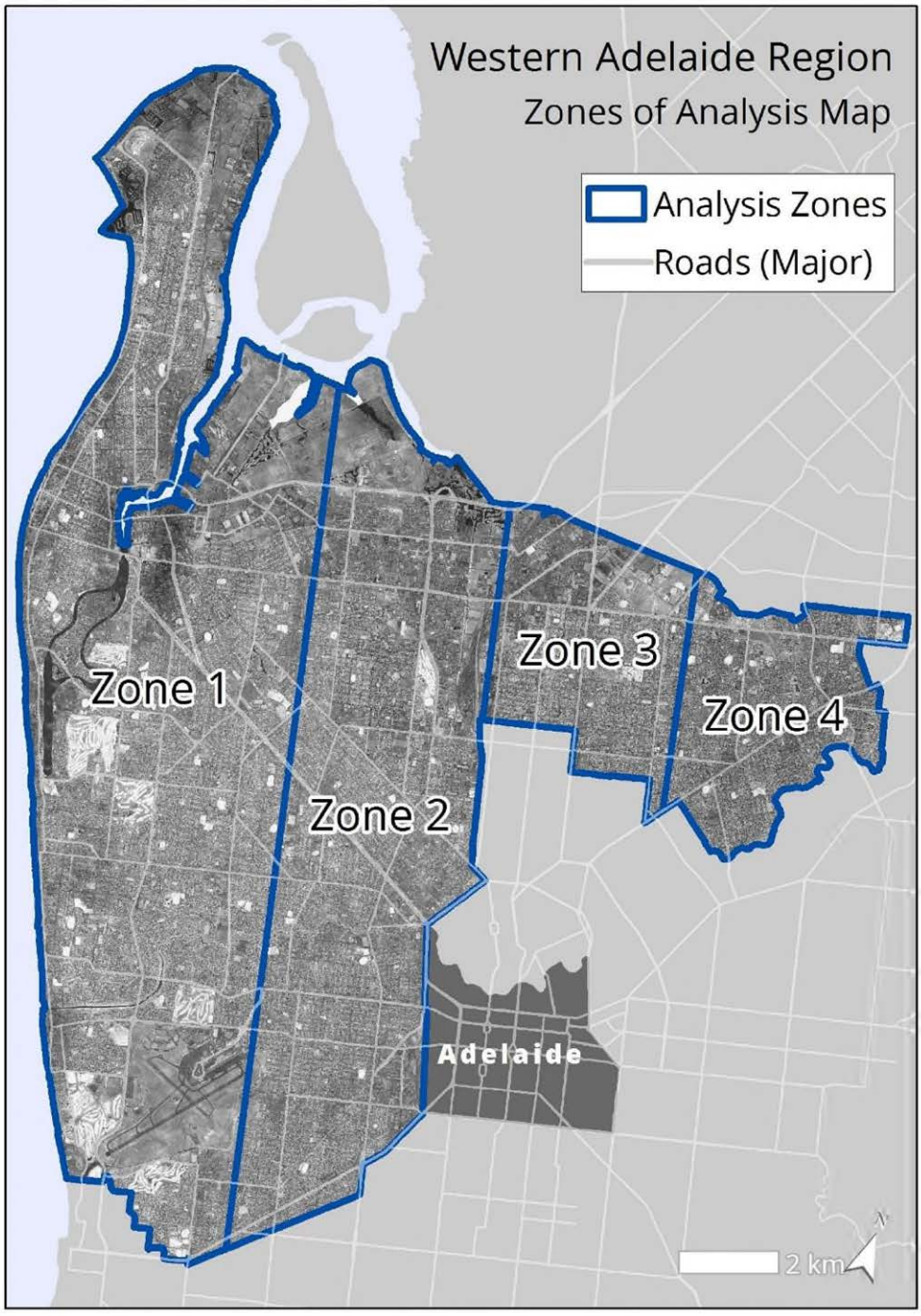


Figure A5.2. The four zones of analysis used in calculating baseline temperatures for each area.

Social vulnerability analysis

The tools for mitigating urban heat (proximity to water, green infrastructure, white roofing) generally come at additional costs, which tends to result in heat islands having a more pronounced effect upon residents of lesser means. To assess whether heat disproportionately affects any particular groups within the Western Adelaide Region, social vulnerability data was acquired from the 2011 census. Building upon the Western Adelaide Region's AdaptWest Climate Change Adaptation Plan, key social vulnerability indicators were identified as:

- elderly population (>75 years old);
- people who need assistance due to disabilities;
- people who speak English as a second language not well or not at all;
- median rent paid by residents; and
- Socio-Economic Indexes for Areas of Disadvantage (SEIFA Score).

Data were acquired from the 2011 Census at the Statistical Area Level 1 (SA1). These data were used to create a simple Social Vulnerability Index (SVI), normalizing each dataset from 0 to 1 and summing the results to give an index value of 0 to 5 representing low to high vulnerability. The SVI was calculated for each urban heat island informing where heat and vulnerability co-exist.

Data outputs

All collected and processed data was provided as part of this project in geodatabase format, with an individual geodatabase provided for each council. All data are spatially referenced to Geocentric Datum of Australia 1994 Map Grid of Australia Zone 54. Each geodatabase contains the following data:

- day-time thermal data (2 m x 2m);
- day-time hotspot layer showing all areas warmer than 2°C above average (2 m x 2m);
- day-time heat island layer showing all large areas (125 m x 125 m) and warmer than 2°C above average and associated social vulnerability indicators (provided as vector data);
- night-time thermal data (2 m x 2m);
- night-time hotspot layer showing all areas warmer than 2°C above average (2 m x 2 m);
- night-time heat island layer showing all large areas (125 m x 125 m) and warmer than 2°C above average and associated social vulnerability indicators (provided as vector data); and
- summary results table.

Limitations

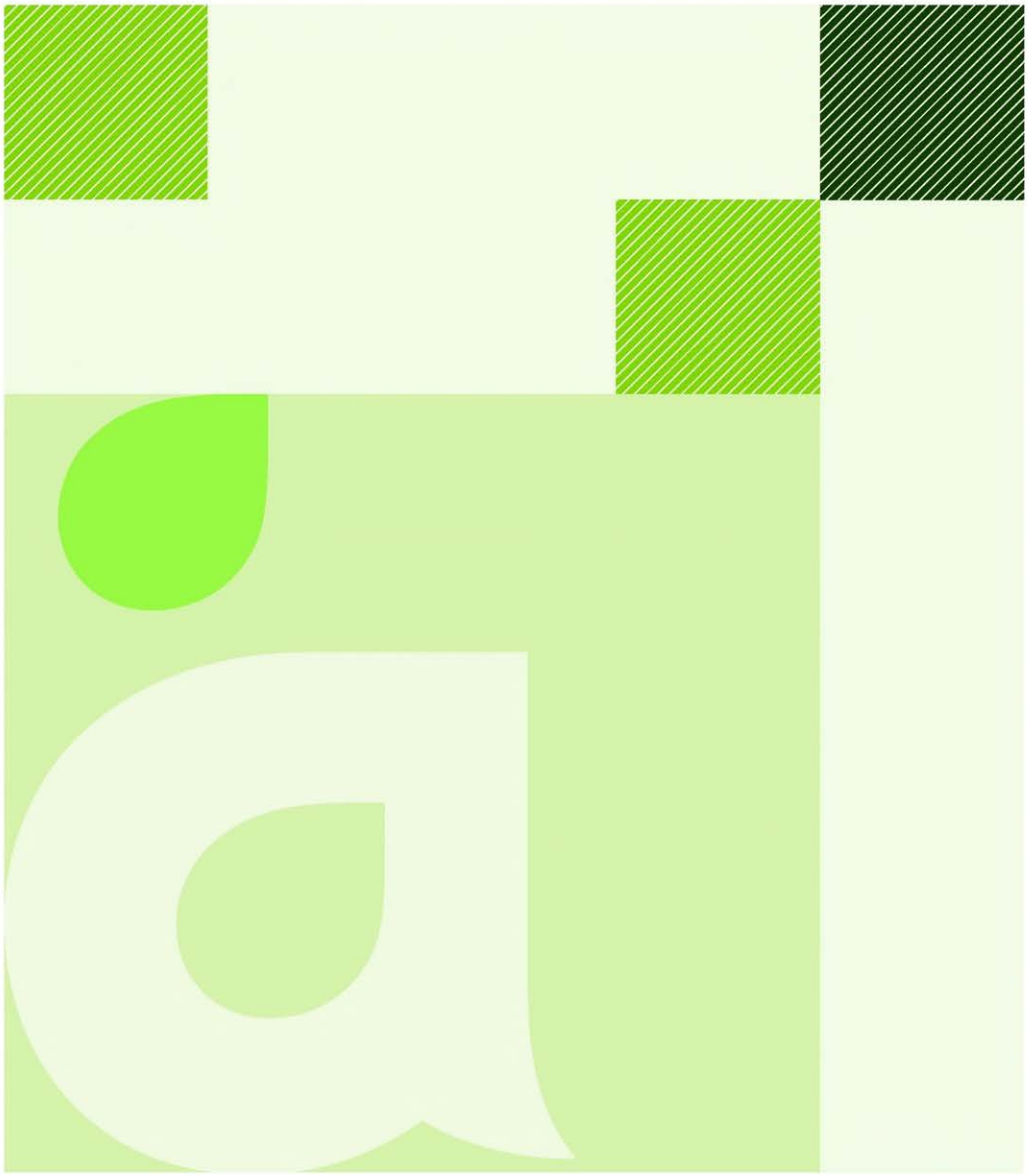
Limitations of this analysis that should be noted when interpreting the results are as follows:

- While the urban heat island is a large-scale phenomenon, the effects of the heat island manifest in highly localised temperature variation. The scale of urban heat islands in this analysis ($125m^2$) intentionally overlooks highly localised detail. This scale especially affects night urban heat island mapping as important linear features such as roads exist below this resolution, suggesting that hot spot analysis is a vital supplement.

- The rolling average method of determining baseline temperatures was necessary due to the several hours that lapsed between the beginning and end of each data acquisition. During this time, ambient temperatures likely varied. The four-zone rolling average method attempted to minimize the influence of time-temperature variation. An improved result may be attained from creating more analysis zones, potentially calculating the mean baseline temperature for each individual image, however this approach may be skewed by having dominant hot or cold landscapes within a single image. The four-zone method provides improved but imperfect temporal accuracy while maintaining significant spatial coverage.

- Social vulnerability data were downscaled to spatially represent each indicator. These values were then re-summed to calculate the social vulnerability for each urban heat island. The method has a 3.5% margin of error between actual and estimate values. More accurate approximations could be provided with more detailed data.

Attachments 2: Parking spaces for urban places: Car parking study – Guideline for Greater Adelaide



aurecon

Project: Parking Spaces for Urban Places: Car Parking Study

Guideline for Greater Adelaide

Reference: 230825

Prepared for: City of Port Adelaide Enfield

Revision: 3

28 October 2013

This project has been assisted by the Local Government Research & Development Scheme

Leading. Vibrant. Global.
www.aurecongroup.com

Document Control Record

Document prepared by:

Aurecon Australia Pty Ltd
ABN 54 005 139 873
55 Grenfell Street
Adelaide SA 5000
Australia

T +61 8 8237 9777
F +61 8 8237 9778
E adelaide@aurecongroup.com
W aurecongroup.com

Document control						aurecon
Report Title		Guideline for Greater Adelaide				
Document ID			**Project Number**		230825	
File Path		P:\230825\Eng Calcs and Analysis\Traffic\Rates Review - August 2013\Revised Final Issue_2013.10.23\230825_Guideline_Final_Rev3.docx				
Client		City of Port Adelaide Enfield	**Client Contact**		Rosa Gagetti	
Rev	**Date**	**Revision Details/Status**	**Prepared by**	**Author**	**Verifier**	**Approver**
0	19 December 2012	DRAFT ISSUE	MH	MH	RS	RH
1	22 February 2013	ISSUED FOR REVIEW	MH	MH		RH
2	3 October 2013	FINAL ISSUE		MH	RH	SC
3	28 October 2013	REVISED FINAL ISSUE		MH	RH	SC
Current Revision		**3**				

Contents

Index of Figures

Index of Tables

1 Introduction

1.1 Background

The provision of car parking is a fundamental component of all urban developments. Insufficient car parking provision can lead to congested, unsafe traffic conditions or result in illegal parking and may impact on the commercial viability of businesses. Conversely, an over-provision of car parking spaces may encourage car use and is an uneconomical use of urban land. Achieving the right balance is the aim of this Guideline.

In October 2001, Planning SA released the *Planning Bulletin: Parking Provisions for Selected Land Uses (Suburban Metropolitan Adelaide)*. Many councils' car parking rates are still based on the recommended rates stated in this document. Given the changes in urban form, land use and transport policy and transport characteristics over the intervening years, this Bulletin is mostly out of date.

This *Parking Spaces for Urban Places Car Parking Guideline* aims to update the Planning Bulletin's recommended car parking rates and summarises the detailed analysis and research outcomes of the *Parking Spaces for Urban Places Technical Report*.

Note that accessible car parking (car parking for people with disabilities) was not considered as part of the research conducted and is subject to the Building Code of Australia.

1.2 Parking Spaces for Urban Places Car Parking Study

In 2011, the City of Port Adelaide Enfield was awarded funding from the Local Government Association (LGA) Research and Development Scheme for the purposes of completing a study of car parking rates.

Additional funds or technical assistance (through a Reference Group consisting of State Government and Local Government membership) were also committed towards the project by:

- The Department of Planning, Transport and Infrastructure – Planning Division
- City of Port Adelaide Enfield.
- City of Holdfast Bay.
- City of Marion.
- Rural City of Murray Bridge.
- City of Playford.
- City of Tea Tree Gully.
- City of Charles Sturt.

Aurecon was engaged by the City of Port Adelaide Enfield to undertake this study with particular consideration to be given to the following trends characterising urban development:

- The strategic policy objectives of The 30 Year Plan for Greater Adelaide, including the encouragement of increased housing densities along key transit corridors and reduced reliance on the private car.
- Impacts of high-density residential developments.
- The evolution of retail shopping trends (e.g. extended hours of trade, e-commerce, growing retail role of petrol stations etc.) changing the nature of peak shopping times and associated car parking demand.
- The continued consolidation and growth of schools, creating increased car parking and traffic congestion, particularly during pick-up and drop-off times.

1.3 Benefits of the Project to Local Government

A factor in the success of a development or activity centre is the level of transport access and parking provided. Developers and business operators often consider it a necessity that adequate car parking spaces are provided to meet demand and assist with the commercial viability of their businesses. Inadequate parking provision can result in overspill parking on residential streets, generating on-street congestion and creating potential adverse economic impacts on relevant businesses.

However, the following aspects are also relevant when determining the appropriate anticipated parking demand:

- The parking requirement may burden businesses where land value is high.
- Car parking is considered free by users, but the construction and maintenance costs are passed on through other means such as property prices or the cost of goods / services.
- Land used for parking could instead be developed and generate additional employment or income opportunities.
- Free and available parking encourages the choice of the car as the preferred transport mode.

A suitable balance between satisfying the anticipated demand for parking, and the benefits of utilising the least land possible for parking is the ideal.

As such, this study has reviewed and assessed car parking rates and policies for all land uses (as data allows) from recent development applications, information provided by the Property Council, interstate resources (particularly the Victorian Planning Provisions and the New Zealand Trips Database Bureau) and Aurecon's own extensive data library.

The study is intended to benefit the wider local government community by providing updated car parking rates that can be incorporated into councils' Development Plans. While councils may choose to use the car parking study as a guide in car parking planning/management, the study remains a consultant's report that has not been formally adopted by the State Government or incorporated into the South Australian Planning Policy Library. Notwithstanding, in some instances, it may reduce the level of negotiation between councils and developers, thereby streamlining the assessment process. It will also provide guidance with regards to car parking provision for emerging urban forms, such as high density residential development and developments around transit nodes. This will be particularly useful for councils who have not yet experienced this type of development, but are likely to, in accordance with the aims of *the 30-Year Plan for Greater Adelaide.*

1.4 Economic Impact

A number of reports and research papers have been written on the economic impacts of parking policy, in particular, on parking restraint measures that are designed to reduce car use within town centres.

The use of a parking fee and the subsequent system of pricing is considered to be the most effective parking management tool and, as such, the majority of the papers investigating the economics of

parking are concerned with the use of and the structure of parking fees. No data can be found on the economic effects of reducing the supply of parking other than how this increases the price of parking (where parking fees are used).

A car parking fee or levy, maximum parking rates or substantial changes to current parking restrictions are considered as parking restraints. The level of fee or levy needs to be considered in the context of the current 'market', being dependent on the current price of alternative transport modes and available alternative parking facilities.

Research indicates that the economic impact of introducing parking restraints is dependent on the effect of the restraint being directly felt by the motorist, and may be dependent on whether adequate alternative transport modes are available, whether drivers have an alternate destination option or if the area has a unique and attractive characteristic that the community or visitors consider desirable to preserve.

Smaller centres are unlikely to have alternative transport modes in place or unique and attractive elements that would overcome the negative effects of a restrained parking policy and as such a negative economic impact would be expected. For larger centres, especially city centres, negative economic effects of parking restraint measures are likely to be minimal or neutral.

To avoid adverse economic impacts, parking restraint measures should generally be applied where adequate alternative transport modes are available or in larger centres and city centres.

Interestingly, a change in the historical approach to parking provision was identified in the Victoria Planning Provisions and the New South Wales Government Transport Roads & Maritime Services guidelines, which both proposed rates that do not reflect the actual parking demand. However, this approach is not thought to be appropriate within the Greater Adelaide context due to the more dispersed nature of the urban form and less extensive public transport system and use, thereby creating a greater dependency on the private car and associated car parking supply.

2 Strategic Setting

2.1 State Government's Directions

The South Australian Government released *The 30 Year Plan for Greater Adelaide* in 2010. This document forms part of the Government's Planning Strategy for the State and identifies objectives for the future provision of housing, open spaces, employment and infrastructure.

One tool for implementing the Government's 'vision' for the State as outlined in the 30 Year Plan is the *South Australian Planning Policy Library*. The library provides a suite of up-to-date and 'best practice' policies to guide development. Both the Minister for Planning and councils draw upon these policies when updating council Development Plans.

2.1.1 The 30-Year Plan for Greater Adelaide

One of the main aims of *The 30 Year Plan for Greater Adelaide* is to outline how the State Government proposes to balance population and economic growth with the need to preserve the environment of Greater Adelaide over the next 30 years, amongst other considerations.

The Plan responds to a number of challenges faced by the Greater Adelaide region, including:

- Population growth and change.
- A growing and changing economy.
- Housing affordability.
- Transport and infrastructure.

The Plan therefore calls for a fundamental change to the way land use is managed in the Greater Adelaide region and specifically that a more compact and better designed urban form is pursued to meet the needs of a growing and changing population and economy.

The Plan recognises that:

> *"The long-term success of the Plan will be driven by a large part by the effectiveness of governance and implementation arrangements. To achieve the Plan's objectives and principles, several issues need to be managed over the next 30 years. These include capacity to regularly update policies and targets, an ability to execute the Plan across local government and all state agencies, and an implementation approach that recognises that different land-use solutions are needed in different parts of Greater Adelaide" (p. 15).*

The Plan's policies and targets envisage the following urban form characteristics:

- Concentration of new housing in existing urban areas to contain the growth of residential and industrial and commercial activity to areas suitable for urban development.

- Location of new housing and new jobs in designated transit corridors to promote easy access to jobs and services and reduce the reliance on cars.
- Diversification of dwelling types and housing choice across Greater Adelaide and increase in the supply of smaller accommodation.
- Increase in housing densities around railway and tram stations and transport interchanges such as major bus interchanges.
- Creation of mixed-use precincts, including housing, jobs, and services, around transport networks and interchanges.

The Plan also recognises that car dependency needs to be reduced to achieve environmental and health outcomes and reduce congestion on metropolitan roads (which negatively impacts on productivity). The strategic objective of reducing car use is reflected in the car parking rates recommended in this Guideline via the potential for discounted rates (refer Sections 4 and 5).

2.1.2 South Australian Planning Policy Library Version 6

Version 6 of *the South Australian Planning Policy Library* released in September 2011 introduced new zone modules to allow councils to align their development plans with the vision of *The 30-Year Plan for Greater Adelaide*.

To encourage the growth of new neighbourhoods and promote infill development in transport corridors and activity centres, the Planning Policy Library includes several new zone modules that councils will be encouraged to adopt in their future rezoning exercises. These zones aim to facilitate access to alternative modes of transport and high public realm standards, with the effect of encouraging commuters and residents to choose a mode of transport other than the car. As such, the car parking rates for land uses in these zones have been reduced.

The car parking rates for dwellings in the new zones can be further reduced by meeting the requirements of various incentives, such as a 30% reduction in car parking provision if 15% of dwellings are classed as affordable housing. The percentage reduction, depending on incentives achieved, can be accumulated to a maximum of 30%.

The State Government based the discounted car parking rates on research that included consideration of car parking rates used for the Subiaco Central development in Perth, the draft Victorian car parking rates for Activity Centres and the policies in the City of Sydney and City of North Sydney Development Control Plans. Notwithstanding the above, version 6 of the Planning Policy Library does not provide an updated suite of land-use based car parking rates for use across all zones by all councils.

3 Car Parking Trends

3.1 Trends in Urban Form, Public Transport Use and Car Usage that affect Car Parking Requirements

The ABS Census data for 2011 and 2006 has been collated[1] for the Greater Adelaide area, and compared to aggregated data from greater metropolitan areas of the five most populous Australian cities[2] to gauge the national and local trends that affect car parking supply and demand. Following is a brief summary of the trends found.

3.1.1 Dwelling Structure by Car Ownership

The numbers of motor vehicles per dwelling type are provided in Figures 1 to 4.

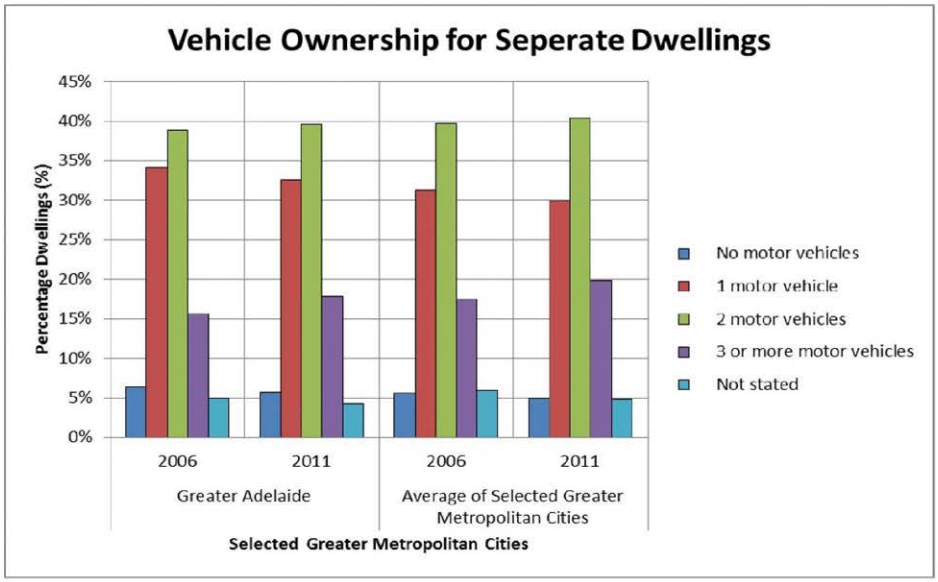


Figure 1 – Vehicle Ownership for Separate Dwellings (Data Source: ABS, 2012)

[1] ABS Census data collated using the ABS Table Builder Facility.
[2] Average of Selected Greater Metropolitan Cities' refers to the average of the greater metropolitan areas of Sydney, Brisbane, Melbourne, Perth and Adelaide.

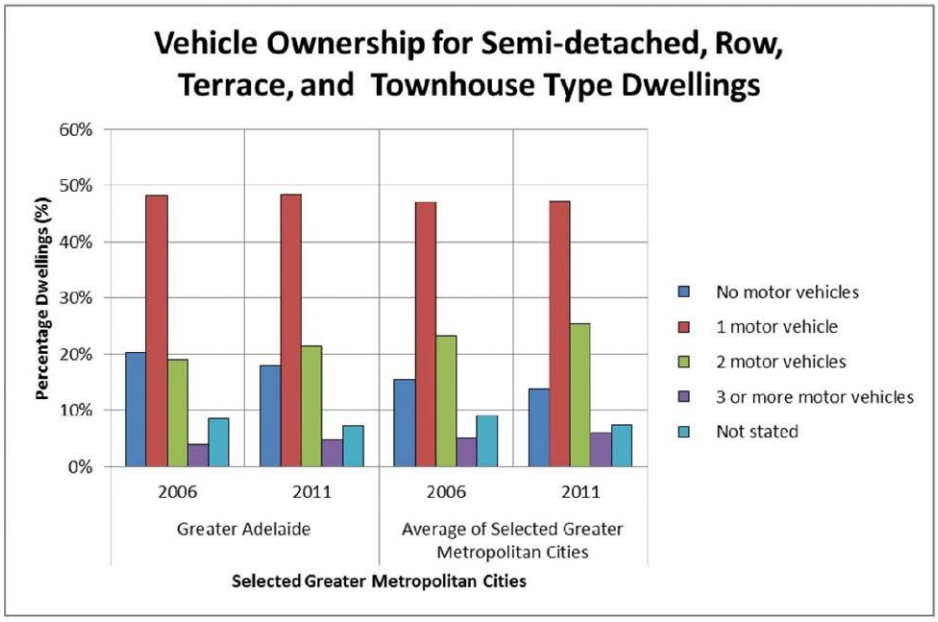


Figure 2 – Vehicle Ownership for Semi-detached, Row or Terrace House, Townhouse Dwellings (Data Source: ABS, 2012)

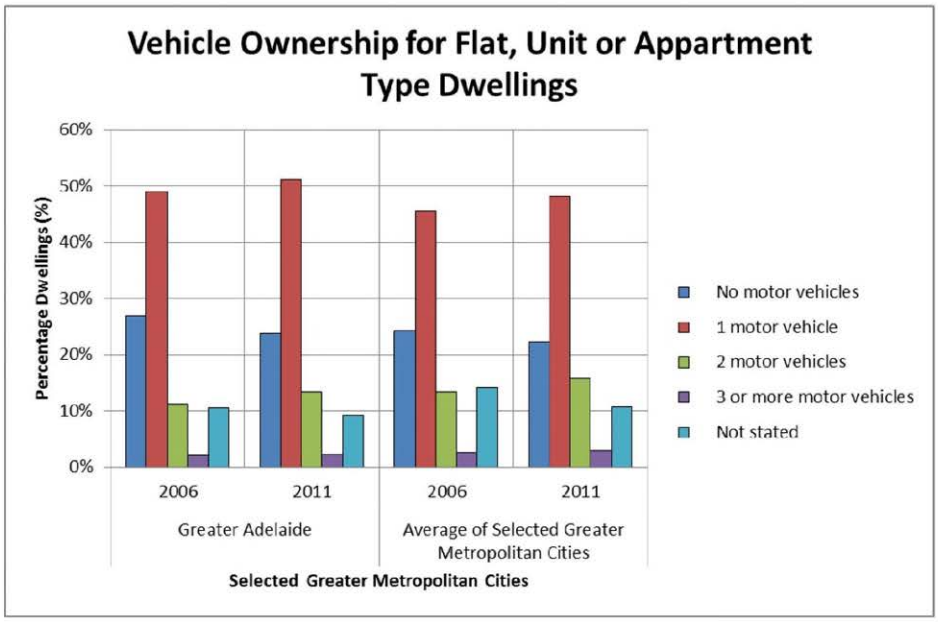


Figure 3 – Vehicle Ownership for Flat, Unit or Apartment Type Dwellings (Data Source: ABS, 2012)

Similar trends are observed within the Greater Adelaide area and the average of other capital cities in Australia.

Separate dwellings have the greatest vehicle ownership (over 50% have two or more vehicles), although little change is observed between 2006 and 2011. Semi-detached, row or terrace house, and townhouse style dwellings, and flat, unit or apartment style dwellings appear to have a smaller reliance on the use of vehicles with most dwellings only owning one vehicle (approximately 50% for all categories considered), which could partially be attributed to these dwelling types often being located closer to city CBDs or other key centres, where a high level of services exist (e.g. shops and public transport).

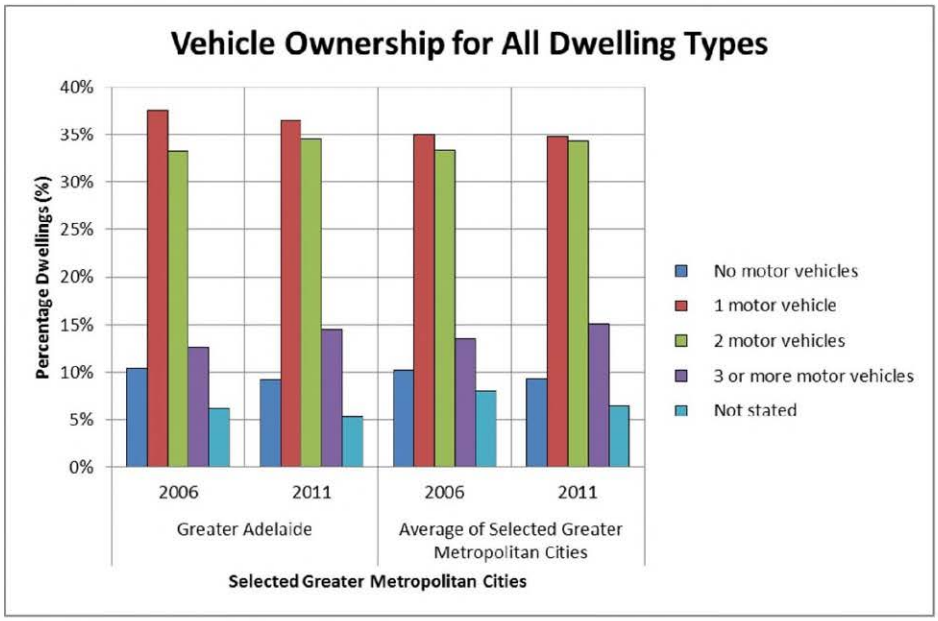


Figure 4 –Vehicle Ownership for All Dwelling Types (Data Source: ABS, 2012)

A marginal increase in the number of vehicles per household is observed between 2006 and 2011 across all dwelling types.

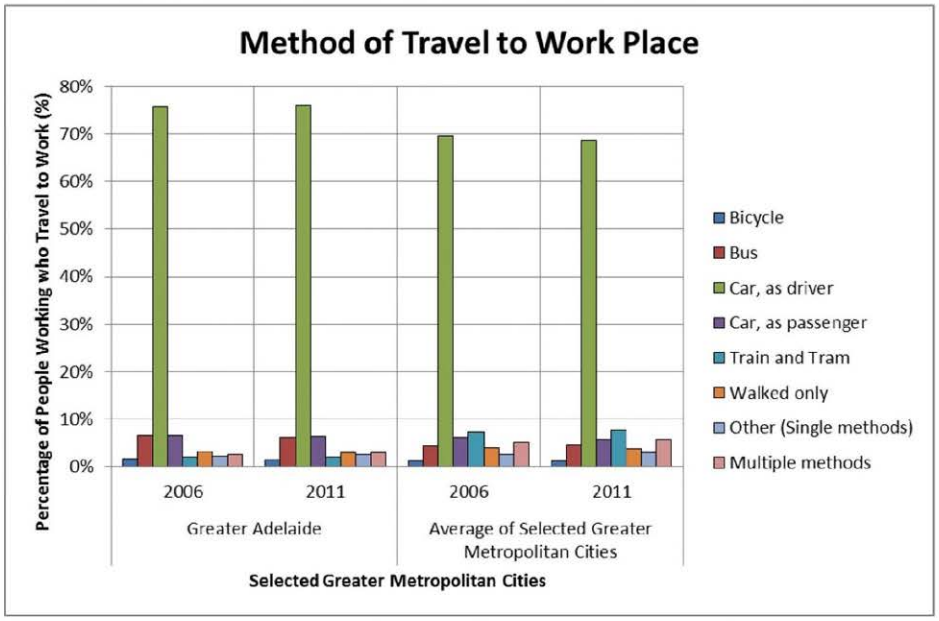
3.1.2 Motor Vehicle Census

According to the ABS Motor Vehicle Census Data, there were 16.7 million motor vehicles registered in Australia at the 2012 Motor Vehicle Census, representing a 13.3% increase from 2007.

The Motor Vehicle Census reveals that the passenger vehicle fleet (defined as vehicles constructed primarily for the carriage of persons and containing up to nine seats) has grown by 10.9% over the five year period; this is slightly higher than the population growth of 8% over the same period. However, passenger vehicles, as a proportion of the vehicle fleet, dropped by approximately 2% likely due to the growth in other vehicle categories such as motorcycles, which experienced a growth of 38.5%.

3.1.3 Method of Journey to Work

Figure 5 below indicates there is still a great reliance on cars, with minor change in behaviour between the years and capital cities that were analysed. Approximately 75% of people within the Greater Adelaide area who travel away from home to the work place travel as the sole occupant of a car, which is approximately 5% higher than other capital cities. Between 2006 and 2011, the Greater Adelaide area demonstrated a minor increase in the number of people travelling to work as the driver of a car, while other capital cities have shown a small decline. Note that Adelaide typically has lower densities, a more dispersed urban area, and a less congested road network when compared to other greater capital city areas, accounting for its higher reliance on private car usage.



** 'Percentage of People Working who Travel to Work' includes those working who must travel away from home to the work place*

Figure 5 – Method of Travel to Work Place (Data Source: ABS, 2012)

3.1.4 Internet Connection

Over the last five years, ABS data indicates a significant increase in households with an internet connection (increase of 15%).

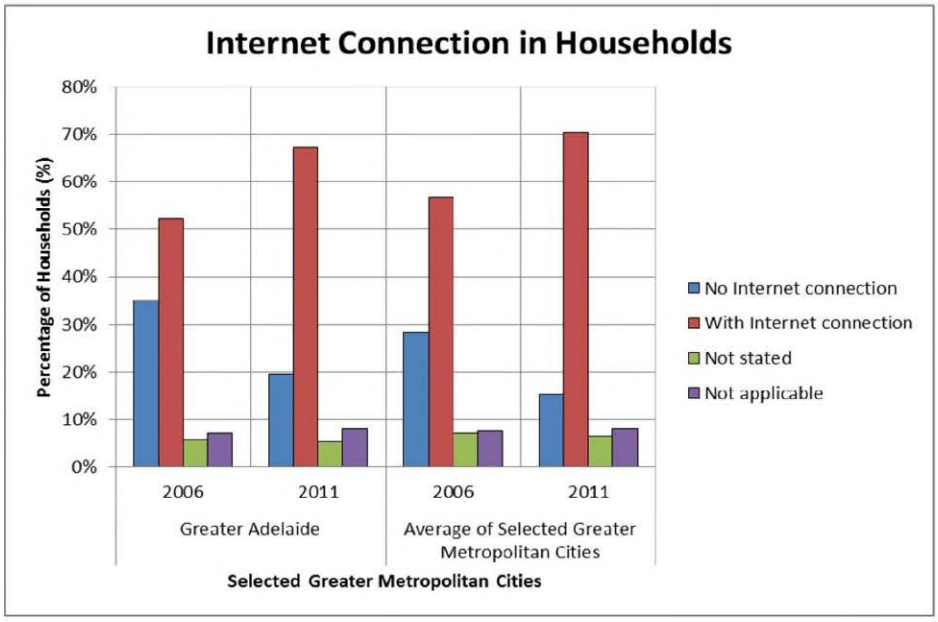


Figure 6 – Internet Connections in Households (Data Source: ABS, 2012)

The on-going rollout of the National Broadband Network (NBN) is anticipated to have a high proportion of the population connected to high speed broadband when completed, although this is currently under review pending the introduction of new Commonwealth Government policy. With the connection of more dwellings to the internet the potential exists for an increased reliance on online services, potentially resulting in:

- Increased online shopping, reducing visitor numbers to shops.
- An increase in the number of people working from home, reducing business travel and employee car parking requirements as well as potentially reducing dwelling parking demand as households will require fewer commuting vehicles. The Federal Government has a target of 12% of employees having a teleworking arrangement with their employee by 2020.
- Increased access to medical care by internet consultations ('telemedicine'), potentially reducing parking demand at medical facilities, particularly in remote areas.
- Reduction in cinema and other entertainment attendance due to increases in television streaming, video on demand, online gaming and high quality video calling.

Notwithstanding the above predictions, the direct correlation between the increase of internet connections in the home, and the effect this may have on travel behaviour (i.e. reliance on cars to travel to work, shops etc.) cannot be confirmed.

3.2 Incorporation of Trends into New Car Parking Rates

The analysis of recent ABS Census data regarding vehicle ownership, journey to work methods and internet connection suggest the following broad trends:

- Australians and especially South Australians are still heavily reliant on the private vehicle as a preferred method of travel.
- There is a tendency for detached dwelling households to own more vehicles than smaller dwelling types such as flats or apartments.
- There is an increasing reliance on the internet for work (e.g. for shopping, medical and entertainment purposes).

Given the above trends, it may be inferred that whilst more activities are (and will increasingly) occur in the home, thereby reducing the need for travel, when people do travel they prefer to rely on the private car. Additionally, greater flexibility in working arrangements, changes to entertainment preferences and shopping hours may reduce 'peak' traffic conditions. However, any benefits in reduced traffic congestion or peak car parking demands that these trends may generate are likely to be offset by the overall increase in registered vehicles on the road as evidenced by the growth of the passenger vehicle fleet (10.9%) compared with the population growth (8%) as recorded by the 2012 ABS Motor Vehicle Census.

The South Australian Government's objectives for increasing housing densities around transit corridors and key activity centres is likely to reduce car dependency to some degree. However outside of these development scenarios, the status quo is likely to be maintained. As such, a relatively conservative approach has been taken to the recommended land-use car parking rates provided in this Guideline. However, to acknowledge developments which are proximate to transport links, a discounted rate is available where certain criteria can be met, as set out in the Table 2, Section 5.

4 The Car Parking Rates Table

The recommended parking rate takes the form of an individual rate or a range of parking rates, with a defined recommended rate (upper) and minimum discounted rate (refer Figure 7 below).

Depending on meeting the conditions of the Suggested Parking Discounts Table, defined in *Section 5 - Car Parking Discount*, a discount can be applied to the recommended parking rate until the maximum allowable discount is reached. The maximum discount should not be breached unless a strong case can be demonstrated.

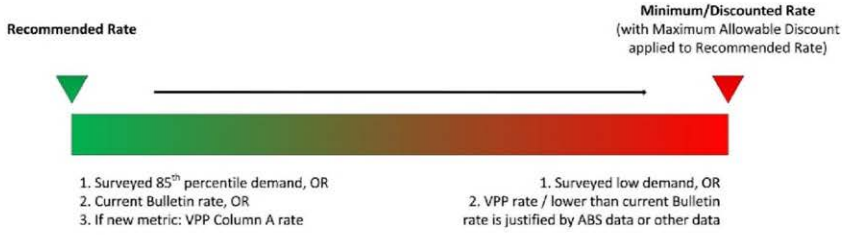


Figure 7 – Method of Discount to the Recommended Car Parking Rate

The available data was prioritised (refer Figure 7 above), with survey data given the highest priority and if survey data was not available, other data sources were utilised. Where survey data was available, the recommended rate was established by the 85th percentile surveyed demand and the minimum rate by the lowest surveyed demand.

Where previous experience has indicated that a measurement metric (i.e. the number of spaces to be provided per floor square/number of seats/patrons etc.) may be difficult to use or result in an inappropriate number of required car parking spaces, an alternative metric has been suggested.

Some land-use terms have been changed to align with the South Australian *Planning Policy Library Terminology List* and where appropriate the creation of new land-use categories have been introduced.

A summary of the initial research conducted for each land use is provided in the detailed Technical Report.

Table 1 lists the recommended rates, maximum allowable discount (to be used in conjunction with Table 2 in *Section 5 – Car Parking Discount*), and change (if any) from the Planning SA *Planning*

Bulletin: Parking Provisions for Selected Land Uses (Suburban Metropolitan Adelaide) (2001) for each land use considered.

Recommended rates are subject to the notes following Table 1. Eligible discounts are subject to the application of Table 2, however must not exceed the maximum allowable discount stipulated in Table 1 for each land use type.

Table 1 – Recommended Car Parking Provision for All Land Use Types

Land Use Type	Recommended Rate	Max Allowable Discount	Summary of Change *(from Planning SA Planning Bulletin, 2001)*
Recreation			
Amusement Machine Centre	7 per 100 sq m TFA	N/A	No change
Bowling Club	10 per bowling green	N/A	No change
Cinema Complex	0.33 per seat	25%	No change
Concert Hall / Theatre	0.33 per seat	25%	No change
Conference Facility	Assess on needs basis	N/A	No change
Entertainment Multiplex	Assess on needs basis	N/A	No change
Exhibition Hall	Assess on needs basis	N/A	No change
Gymnasium	7 per 100 sq m GFA	55%	New entry
Hotels & Taverns	11 per 100 sq m GLFA	25%	New measurement unit and maximum discount rate introduced
Indoor Recreation (formerly Indoor Recreation / Gymnasium)	Assess on needs basis	N/A	Change entry title
Night Clubs & Late Night Venues	Assess on needs basis	N/A	No change
Non-residential club	Assess on needs basis	N/A	No change
Restaurant (traditional)	0.4 per seat	25%	Maximum discount rate introduced
Restaurant (fast food / family / convenience restaurant)	0.55 per seat **PLUS** 12 vehicle queuing area if a drive through	35% N/A	Maximum discount rate introduced
Squash / Tennis Courts	4 per court	25%	Maximum discount rate introduced
TAB Facility	8 per 100 sq m GFA	15%	Maximum discount rate introduced
Medical			
Consulting Room	4 per consulting room	10%	New measurement unit and maximum discount rate introduced
Hospital	4 per bed	30%	Higher with maximum discount rate introduced
Supported Accommodation (formerly Nursing Home)	0.3 per lodging room	15%	Re-titled, higher, with maximum discount rate introduced

Table 1 – Recommended Car Parking Provision for All Land Use Types (cont.)

Land Use Type	Recommended Rate	Max Allowable Discount	Summary of Change *(from Planning SA Planning Bulletin, 2001)*
Industry & Warehouse			
Industry	**If employee numbers known:** 0.75 per employee **OR** **If employee numbers unknown:** 2 per 100 sq m GFA, for non-office component up to 200 sq m **PLUS** 1.33 per 100 sq m GFA, for non-office component between 200 sq m and 2,000 sq m **PLUS** 0.67 per 100 sq m GFA, for non-office component greater than 2,000 sq m Whichever produces the greater number of car parking spaces; and with a minimum of 2 spaces provided per premises	20% 20% 20% 20%	New entry
Warehouse	**If employee numbers known:** 0.38 per employee **OR** **If employee numbers unknown:** 2 for non-office component up to 200 sq m **PLUS** 0.67 per 100 sq m GFA, for non-office component between 200 sq m and 2,000 sq m **PLUS** 0.34 per 100 sq m GFA, for non-office component greater than 2,000 sq m Whichever produces the greater number of car parking spaces; and with a minimum of 2 spaces provided per premises	20% 20% 20% 20%	New entry
Community / Civic			
Child Care Centre / Educational Establishment: Pre-school (formerly Child Care Centre)	1 per employee **PLUS EITHER** 0.25 per child (drop-off / pick-up bays) **OR** An area wide traffic management plan to accommodate the drop-off / pick-up demand at 0.25 spaces per child	10% 10% N/A	Re-titled, new measurement unit, drop-off / pick-up requirement

Table 1 – Recommended Car Parking Provision for All Land Use Types (cont.)

Land Use Type	Recommended Rate		Max Allowable Discount	Summary of Change *(from Planning SA Planning Bulletin, 2001)*
Community / Civic (cont.)				
Community Centre	10	per 100 sq m TFA	N/A	No change
Educational Establishment: Primary School	1	per full time equivalent employee	N/A	New measurement unit introduced PLUS drop-off / pick-up
		PLUS		
	0.1	per full time equivalent employee for visitors (with a minimum 5 spaces per premises)	N/A	
		PLUS EITHER		
	0.25	per student	N/A	
		OR		
	An area wide traffic management plan to accommodate the drop-off / pick-up demand at 0.25 spaces per child		N/A	
Educational Establishment: Secondary School	1	per full time equivalent employee	N/A	New measurement unit introduced PLUS drop-off / pick-up
		PLUS		
	0.1	per full time equivalent employee for visitors (with a minimum 5 spaces per premises)	N/A	
		PLUS EITHER		
	0.16	per student	N/A	
		OR		
	An area wide traffic management plan to accommodate the drop-off / pick-up demand at 0.16 spaces per child		N/A	
Educational Establishment: Tertiary Education	0.8	per student that is part of the maximum number of students on the site at any time	60%	New measurement unit and maximum discount rate introduced
Library	4	per 100 sq m GFA	50%	Maximum discount rate introduced
Meeting Hall	0.2	per seat	N/A	No change
Place of Worship	0.33	per seat	25%	No change
Commercial				
Auction Depot	1	per 100 sq m TFA	10%	Maximum discount rate introduced
		PLUS		
	2 spaces		N/A	
Call Centre	8	per 100 sq m GFA	25%	Maximum discount rate introduced
Bulky Goods Outlet or Retail Showroom (formerly Hardware and other retail showrooms)	3	per 100 sq m GLFA	40%	Re-titled, lower rate and maximum discount rate introduced

Table 1 – Recommended Car Parking Provision for All Land Use Types (cont.)

Land Use Type	Recommended Rate		Max Allowable Discount	Summary of Change *(from Planning SA Planning Bulletin, 2001)*
Commercial (cont.)				
Motor Repair Station	3 **PLUS** 1	per 100 sq m GLFA for each vehicle being serviced, repaired or fitted with accessories, including vehicles waiting to be repaired, fitted with accessories or collected by owners	N/A	New measurement unit
Office	4	per 100 sq m GFA	25%	Maximum discount rate introduced
Petrol Filling Station: Service Bays and Retail Floor Space	6 **PLUS** 50% of the calculated parking demand of any ancillary land use	per bay	N/A N/A	New measurement unit
Service Trade Premises	4	per 100 sq m GLFA	50%	No change
Shop (not within a shopping centre) (formerly Shop (not within a centre))	7	per 100 sq m GLFA	55%	Maximum discount rate introduced
Shop within a shopping centre	6	per 100 sq m GLFA	25%	New entry
Accommodation				
Retirement Village (formerly Aged Care Retirement Homes)	1 **PLUS** 2 **PLUS** 1 **PLUS** 1	per one or two bedroom dwelling per three or more bedroom dwelling per five dwellings for visitors per full time equivalent staff employed	15% 10% N/A N/A	Re-titled, higher, new measurement unit, and maximum discount rate introduced
Display Home	5.5 **PLUS** 2.5	per dwelling for five or fewer contiguous dwellings per additional contiguous dwelling	10% 10%	Maximum discount rate introduced

Table 1 – Recommended Car Parking Provision for All Land Use Types (cont.)

Land Use Type	Recommended Rate		Max Allowable Discount	Summary of Change *(from Planning SA Planning Bulletin, 2001)*
Accommodation (cont.)				
Multiple Dwelling Developments	1.25	per one bedroom dwelling	20%	New entry
		PLUS		
	1.75	per two bedroom dwelling	30%	
		PLUS		
	2.5	per three or more bedroom dwelling	30%	
		PLUS		
	0.5	per dwelling for independently accessible parking for visitors	50%	
Single Dwelling	1	per one bedroom dwelling	N/A	New entry
		OR		
	2	per two or three bedroom dwelling	N/A	
		OR		
	3	per four or more bedroom dwelling	N/A	
Motel	1	per room	N/A	Additional measurement unit
		PLUS		
	1	per employee	N/A	
		PLUS		
	50% of the calculated parking demand of any ancillary land use except a hotel. 100% of parking requirement of an associated hotel		N/A	
Tourist Accommodation (formerly Tourist Accommodation (bed & breakfast))	1	per room	N/A	Additional measurement unit, and maximum discount rate introduced
		PLUS		
	1	per employee	50%	
		PLUS		
	50% of the calculated parking demand of any ancillary land use except a hotel. 100% of parking requirement of an associated hotel		N/A	
Mixed-use / TOD				
Mixed-use / TOD - Residential	0.75	per one bedroom dwelling	N/A	New entry
		PLUS		
	1	per two bedroom dwelling	N/A	
		PLUS		
	1.25	per three or more bedroom dwelling	N/A	
		PLUS		
	0.25	per dwelling for visitors	N/A	

Table 1 – Recommended Car Parking Provision for All Land Use Types (cont.)

Land Use Type	Recommended Rate		Max Allowable Discount	Summary of Change *(from Planning SA Planning Bulletin, 2001)*
Mixed-use / TOD (cont.)				
Mixed-use / TOD - Non-residential and non-tourist	3	per 100 sq m GLFA	N/A	New entry
Mixed-use / TOD - Tourist Accommodation	0.25	per bedroom	N/A	New entry
Other				
Funeral Parlour	0.3	per patron catered for	N/A	New measurement unit introduced
Public Transport Interchange (formerly Interchange / Transport Station)	Assess on needs basis		N/A	Re-titled
Radio Studio or Television Studio (formerly Radio & TV Studio)	5	per 100 sq m GFA	20%	Maximum discount rate introduced

Table Notes:

- *Parking rate:*
  - *Recommended rates typically represent the surveyed 85th percentile parking demand, current Planning SA Planning Bulletin rate or Victorian Planning Provisions rate.*
  - *For developments comprising more than one land use type (e.g. warehouses with an office component), the total parking provision for the development shall be the sum of the parking provision applicable for each land use component.*
  - *Developments may attract a car parking discount (as a percentage) in accordance with the criteria stipulated in the Suggested Parking Discounts Table. Developments may be eligible to attract discounts against multiple criteria. However, the percentage discounted cannot exceed the maximum allowable discount as defined in the Recommended Car Parking Provision for All Land Uses Table.*
- *The parking discount criteria are defined in the Suggested Parking Discounts Table*
- *Acronyms and abbreviations:*
  - *Planning SA Planning Bulletin – Planning Bulletin: Parking provisions for selected land uses (Suburban Metropolitan Adelaide).*
  - *TFA – Total Floor Area.*
  - *GFA – Gross Floor Area.*
  - *GLFA – Gross Leasable Floor Area.*
  - *TOD - Transit-oriented development*
- *Definitions:*
  - *Transit-oriented developments comprise mixed-use, higher density development centred on a major public transport access point. They accommodate residential, high-order retail services and employment activities as well as open space. They will be attractive and walkable places for people to live, work, shop, and recreate in an accessible and self-contained community. [Definition cited in 30 Year Plan for Greater Adelaide]*
  - *Mixed-uses include a combination of major land-use types, such as residential, retail, office, commercial, civic and light industrial. The mixture of uses can be both vertical and horizontal, but not necessarily in the same building or site. Activity centres, transit nodes the areas surrounding major employment nodes and parts of the city centre, and urban regeneration areas are considered to be ideal locations for mixed-use development. [Definition cited in 30 Year Plan for Greater Adelaide]*

5 Car Parking Discount

Parking rates have typically been based on historic peak parking surveys which informed the basis of minimum car parking rates. However, parking surveys are often conducted in suburban locations with low density development and limited alternative transport modes available.

It is common practice for a required parking rate to be reduced during the development assessment process in acknowledgement of the unique character of a development and its proximity to alternative transport modes. These circumstances vary considerably throughout the State, from isolated developments in rural areas to high density developments in regional centres.

Accordingly, research conducted as part of this study, combined with feedback received from the Reference Group has resulted in a conservative approach to the recommended car parking rates provided in Section 4. However, a quantifiable car parking discount system (i.e. the *Suggested Parking Discounts Table*) will provide for flexibility within the development assessment process that recognises the wide range of locations and development circumstances that can occur. Moreover, the provision of a clear framework for discounting car parking rates may reduce the need for lengthy negotiations during the development application process.

From these requirements the following principles were established:

- Fixed upper limit – a recommended rate representing the unconstrained parking demand of a land use.
- Discounted rate – where certain conditions are met the recommended rate can be reduced to a discounted rate. Each land use has a defined maximum discount that can be applied, as some land uses have more scope for reducing parking demand than others.
- Discounts justified by meeting clearly defined criteria.

Figure 8 – Application of Discounts to the Recommended Rate

This is similar to the approach used in *Version 6* of the *South Australian Planning Policy Library*, where a parking discount can be accrued, but to a maximum 30%.

Feedback received from the Reference Group indicated that the discount categories defined below could be used to form the Suggested Parking Discounts Table, with discount possibilities available with respect to:

- Accessibility Discount – allows the recommended rate to be discounted due to proximity to public transport, cycling and walking facilities.
- Shared Use Discount – allows the recommended rate to be discounted where a development shares a common car parking facility or a public car parking facility is within the locality.
- Improved Planning Outcome Discount – allows the recommended rate to be discounted where developers provide a higher quality walking environment or improved visual amenity within the urban environment than would otherwise be required.
- Planning Constraint Discount (within a Historic Conservation Area or revitalisation precinct) – allows the recommended rate to be discounted for an area where development is being encouraged, or in a historic area that provides limited opportunity to provide on-site car parking in a cost-effective manner.

A paid parking discount was also discussed by the Reference Group but there was concern that it could result in additional car parking on the street, thereby creating a different set of issues. As such, paid parking was not included in the discount table.

The Reference Group also expressed that councils should be free to tailor discounts to reflect local conditions, policies and or objectives. In particular, criteria that does not directly reduce the demand for car parking (such as the criteria relating to 'improved planning outcome') may, for example, be utilised by councils as part of an incentives scheme for a precinct requiring rejuvenation.

The above mentioned discount categories and associated discount percentages, based on specific criteria, are provided in Table 2, but should be reviewed following application of these new rates. This particular method permits the application of one discount percentage per category only; the sum of percentages can only be applied up to the maximum allowable discount permitted for the land-use type considered, and as such requires use in conjunction with Table 1.

For details on how these discount percentages were obtained, and other possible alternative discounts considered by the Reference Group, refer to the Technical Report.

The Suggested Parking Discounts Table will need to form part of a parking rate package with the recommended parking rates as a means of justifying why a discount is warranted and to what degree.

Recommended rates are subject to the notes following the Table 1. Maximum allowable discounts are subject to the notes following Table 2.

Table 2 – Suggested Parking Discounts

Category	Discount Permitted	Insert Total Eligible Discounts
Discounts that directly reduce parking demand		
Accessibility		
Located within 200m of a train station, tram station, a bus stop with five or more public transport routes, or a bus stop within a 'Go Zone'.	20%	
Located within 400m of a train station, tram station, a bus stop with five or more public transport routes, or a bus stop within a 'Go Zone'.	10%	
Located within 200m of a dedicated off-road or on-road bicycle path or bicycle lane.	5%	
Shared Parking		
Development has a shared parking area used by three or more land uses with differing peak parking times. Shared car parking must be reflected on relevant Certificates of Title in the form of 'right of way access' or similar.	15%	
Development has a shared parking area used by two land uses with differing peak parking times. Shared car parking must be reflected on relevant Certificates of Title in the form of 'right of way access' or similar.	10%	
Development is within 200 m walking distance of one or more existing off-street public car parking places with a combined total of 100 car parking spaces or more.	10%	
Development is within 400 m walking distance of one or more existing off-street public car parking places with a combined total of 100 car parking spaces or more.	5%	
Bonus Discounts that do not directly reduce parking demand		
Improved Outcome		
All parking is contained in an undercroft parking area.	10%	
Two or more pedestrian footpaths, with designated crossing points where applicable, are provided through the main car parking area and are located and designed to the satisfaction of the assessing authority.	5%	
Planning Constraint (within Historic Conservation Area or revitalisation precinct)		
Where a change of use or a small extension is a development envisaged in the Development Plan and it can be demonstrated that providing the calculated number of parking spaces is physically prohibitive.	10% to 30% (Subject to negotiation)	
Total Warranted Discount (sum of Total Eligible Discounts)		
Maximum Allowable Discount (as stipulated in Recommended Car Parking Provision for All Land Use Types Table)		
Discount to be applied to the Recommended Parking Rate (the Recommended Parking Rate cannot be reduced beyond the Maximum Allowable Discount)		

Table Notes:

- *Parking rate:*
  - *Car parking rates are stated in the Recommended Car Parking Provision for All Land Use Types Table. Car parking rates typically represent the surveyed 85th percentile parking demand, current (2001) Planning SA Planning Bulletin rate or Victorian Planning Provisions rate.*
  - *Developments may attract a car parking discount (as a percentage) in accordance with the criteria stipulated in the Suggested Parking Discounts Table. Developments may be eligible to attract discounts against multiple criteria. However, the percentage discounted cannot exceed the maximum allowable discount as defined in the Recommended Car Parking Provisions for All Land Use Types Table.*
  - *The Suggested Parking Discounts Table permits the application of one discount percentage per category only; the sum of percentages can only be applied up to the maximum allowable discount permitted for the land-use type.*
- *Definitions:*
  - *A 'Go Zone' is a zone that offers bus services approximately every 15 minutes between 7.30am and 6.30pm Monday to Friday and every 30 minutes at night, Saturday, Sunday and public holidays until 10pm*. [Refer to Adelaide Metro website for further details]*

6 Application of Rates and Discounts

This document is intended as a guideline only and therefore allows some scope for amendments to suit individual local government circumstances. For example, some councils may choose not to adopt the discount table. In particular, councils in rural areas with reduced access to public transport services and a reliance on private vehicles due to distances between homes and services may find the discount table unsuitable or unlikely to be triggered by most development scenarios.

Metropolitan councils may choose to amend the maximum allowable discount attributed to each land use or only adopt certain aspects of the discount table that are applicable to individual urban scenarios. There is also scope to adopt some discounts for particular areas. For example, the *Planning Constraint (within designated Historic Conservation Area or revitalisation precinct)* may be applied to a particular geographic area within council, such as a Regional Centre Zone undergoing a revitalisation process.

It is important to recognise that the maximum discount attributed to each land-use rate can also represent a lower rate range. As such, some councils, such as the City of Adelaide, may choose to adopt the maximum discount rate as the default/standard rate, given that majority of land-uses will be proximate to high frequency public transport, bicycle linkages etc. and be eligible for rate discounts. Or it could be determined that the Mixed-use/TOD rates are better suited to a CBD context than rates based upon individual land-uses.

The Guideline aims to avoid a 'one size fits all' approach which has traditionally been applied to land-use based car parking rates.

7 Conclusion and Next Steps

The *Parking Spaces for Urban Places Car Parking Study* has assessed the parking rates contained in the *Planning Bulletin: Parking provisions for selected land uses (Suburban Metropolitan Adelaide)* (2001) using information that was readily available; mostly from the Aurecon data bank, the Victoria Planning Provisions and the New Zealand Trips Database Bureau.

The Reference Group highlighted the need for South Australian parking rates to be set at a level that would accommodate the anticipated current parking demand of a development but, with the flexibility to be reduced as the State Government and councils' sustainable transport policies take effect.

To meet this aim, a recommended parking rate has been defined (where data was available) which represents the current parking demand of a development (refer *Section 4 – The Car Parking Rates Table*). This recommended rate can be reduced by applying a series of discounts; each discount has a set value that represents the anticipated reduction in car use that comes from the increased use of transport modes other than the private car (refer *Section 5 – Car Parking Discount*).

Also, further discounts to the recommended rate (that will not directly reduce the car parking demand) are provided as options to councils in exchange for public realm improvements or as part of development incentive schemes. The Reference Group preferred that individual councils define their own discounts to suit their individual objectives, especially for unique development precincts.

The recommended car parking rates outlined in this Guideline represents a summary of the parking data available without commissioning extensive and costly parking demand surveys. As such, it is recommended that further research be conducted with a view to testing the recommended parking rates of this study via case studies and ongoing data collection for increased robustness and confidence in results.

8 References

The following references listed were sourced in the production of this guideline.

- Aurecon Australia Pty. Ltd. (2013), *Parking Spaces for Urban Places: Car Parking Study - Technical Report*, Aurecon Australia Pty. Ltd., Adelaide, South Australia
- Australian Bureau of Statistics (2012), *2006 Census Data,* Australian Government, Australia.
- Australian Bureau of Statistics (2012), *2011 Census Data,* Australian Government, Australia.
- Department of Planning and Local Government (2010), *The 30-Year Plan for Greater Adelaide*, Government of South Australia, South Australia
- Department of Planning and Local Government (2011), *South Australian Planning Policy Library, Version 6*, Government of South Australia, South Australia
- Planning SA (2001), *Planning Bulletin: Parking provisions for selected land uses (Suburban Metropolitan Adelaide)*, Department for Transport, Urban Planning and the Arts, Government of South Australia, South Australia

aurecon

Aurecon Australia Pty Ltd
ABN 54 005 139 873
55 Grenfell Street
Adelaide SA 5000
Australia

T +61 8 8237 9777
F +61 8 8237 9778
E adelaide@aurecongroup.com
W aurecongroup.com

Aurecon offices are located in:
Angola, Australia, Botswana, China, Ethiopia, Hong Kong, Indonesia, Lesotho, Libya, Malawi, Mozambique, Namibia, New Zealand, Nigeria, Philippines, Singapore, South Africa, Swaziland, Tanzania, Thailand, Uganda, United Arab Emirates, Vietnam.

Attachments 3: CEO (City of West Torrens) Letter to Minister Chapman regarding Private Proponent Code Amendments dated 13 July 2021

Civic Centre
165 Sir Donald Bradman Drive
Hilton, SA 5033
Tel 08 8416 6333
Fax 08 8443 5709
Email: csu@wtcc.sa.gov.au
Web: westtorrens.sa.gov.au

City of West Torrens
Between the City and the Sea

13 July 2021

The Hon Vickie Chapman MP,
Deputy Premier, Minister for Planning and Local Government
GPO Box 464
Adelaide SA 5001
DX 336

Dear Minister Chapman,

RE: Private Proponent Planning and Design Code Amendments

At its meeting held on 6 July 2021, Council passed the following resolution that it:

> *1. Seeks a review of the private proponent led Planning and Design Code Amendment process to ensure appropriate rigour, checks and balance are in place; and; reduce the potential for errors and poorly informed policy changes that may have long term impacts on West Torrens and its community;*
>
> *2. Requests that Code Amendments be put on hold pending the outcome of this review.*

The introduction of the private proponent led Planning and Design Code Amendment process presents an opportunity for agile consideration of how Code Amendments respond to changing demand and landscapes in a timely manner. However, this process should not be without clear guidance for all stakeholders with regard to their roles, opportunities to participate and capacity for review and/or recourse.

West Torrens Council recently received advice of two separate private proponent led Code Amendments, each to be run by a respective privately appointed designated entity.

This experience has identified that the reality of the requirements for private proponent led Code Amendment lacks rigour, integrity and probity and so gives rise to concern regarding the eventual outcomes and potential long term impact on the West Torrens Council (infrastructure and resourcing) and its community.

Despite refinement to *Practice Direction 2 - Preparation and Amendment of Designated Instruments* and evolving toolkits, the following risks that have been identified with the process, remain problematic:

- Insufficient requirements for investigations to be undertaken to inform suitable policy application.
- Inherent *conflict of interest* during consultation with community and stakeholders (both pre-initiation and post) for the designated entity.
- Capacity for inappropriate development occurring during parliamentary scrutiny process.

Planning policy amendments were previously carried out by public officers (whether Local Government or State Government). The transition to a process that enables *private proponents* to undertake what was previously a public administration function necessitates additional checks and balances in the legislation and process.

This is particularly important when a person who has an interest in the land (private proponent) is able to engage a private and paid planning professional as the designated entity to:

- Initiate the Code amendment, including pre-consultation, identify and undertake investigations;
- Undertake community engagement and consultation (without the need to have the engagement plan approved by Minister, SPC or AGD) and then self-report on the effectiveness of the engagement they developed and undertook;

and, of particular concern;

- The *same designated entity/ies* (generally planning consultancies) can subsequently lodge a development application as soon as the Code amendment is released on the portal ***during, and prior to completion of,*** the parliamentary scrutiny phase.

As such, the designated entity may be perceived as having a vested interest in the consultation process outcomes which could lead to the process being open to criticism due to a perceived lack of independence.

It is the view of West Torrens Council that **current, and additional private proponent Code Amendments should be put on hold** pending review of the private proponent led Code Amendment process to ensure there are adequate processes and legislation in place that promotes trust and transparency in the process.

The review should address the following:

1. Accreditation requirements for planning professionals who can be engaged to act as a designated entity for the purpose of Code amendments or advise on Code amendments rather than stating that *equivalent experience* is required. Currently the legislation states that a person with qualifications and experience that is equivalent to an Accredited Professional - Planning Level 1 under the Act may fulfil this role (i.e. not that they must *actually be accredited* as per the Accredited Professionals Scheme).

2. Amendments required to the existing Code of Conduct so that planning professionals undertaking functions associated with a Code Amendment are required to abide by it.

3. Implementation of *Regulation 30 PDI (Accredited Professionals Scheme) Regulation 2019, Circumstances in which an accredited professional may not act* (as provided below) so that it extends to planning professionals performing/functioning for the purpose of a private proponent led Code Amendment:

    - An accredited professional must not perform any function of an accredited professional in relation to a development—

    (a) if the accredited professional has been involved in any aspect of the planning or design of the development (other than through the provision of preliminary advice of a routine or general nature); or

(b) if the accredited professional has a direct or indirect pecuniary interest in any aspect of the development or any body associated with any aspect of the development; or

(c) if the accredited professional is employed by any person or body associated with any aspect of the development.

4. Identification of minimum timeframes for engagement associated with a Code Amendment.

5. The way in which engagement responses are captured, shared and responded to.

6. The process for third party review of the Code Amendment process for private proponents.

7. In instances where a Code Amendment necessitates new infrastructure (e.g. road/s, open space, stormwater) that will be vested to a council, that a private proponent Code Amendment require more extensive engagement and/or partnership with the relevant council.

8. Consideration of when a Code Amendment becomes active and exploration of this occurring ***after*** parliamentary scrutiny, particularly in relation to private proponent led Code Amendments.

It is imperative that Council stakeholders are consulted on any suggested improvements resulting from the review **prior to** any formal decisions being made. It is requested that such a review occur as a matter of urgency and **prior to** accepting the initiation of any new private proponent Code Amendments, to ensure clear guidance for all stakeholders with respect to their roles, opportunities to participate and capacity for review and/or recourse.

Council strongly reinforces the suggestion that current, and additional private proponent Code Amendments be **put on hold** pending review of the private proponent led Code Amendment process to ensure there are adequate processes and legislation in place that promote trust, transparency and confidence in the process.

Should you require further information or would like to discuss this matter further, please contact Sue Curran, Manager Business and Strategy on [redacted] or [redacted]

Yours sincerely

Terry Buss PSM
Chief Executive Officer
City of West Torrens

cc
Anita Allen, Planning and Land Use Services
Stephen Smith, Local Government Association of SA