STRATEGIC PLANNING AND DEVELOPMENT COMMITTEE MEETING

A meeting of the STRATEGIC PLANNING AND DEVELOPMENT COMMITTEE will be held at Waverley Council Chambers, Cnr Paul Street and Bondi Road, Bondi Junction at:

7.30 PM, TUESDAY 6 SEPTEMBER 2022

Emily Scott
General Manager

Waverley Council
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Bondi Junction NSW 1355
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E-mail: info@waverley.nsw.gov.au

Delegations of the Waverley Strategic Planning and Development Committee

On 10 October 2017, Waverley Council delegated to the Waverley Strategic Planning and Development Committee the authority to determine any matter **other than**:

1. Those activities designated under s 377(1) of the *Local Government Act* which are as follows:

    (a) The appointment of a general manager.
    (b) The making of a rate.
    (c) A determination under section 549 as to the levying of a rate.
    (d) The making of a charge.
    (e) The fixing of a fee
    (f) The borrowing of money.
    (g) The voting of money for expenditure on its works, services or operations.
    (h) The compulsory acquisition, purchase, sale, exchange or surrender of any land or other property (but not including the sale of items of plant or equipment).
    (i) The acceptance of tenders to provide services currently provided by members of staff of the council.
    (j) The adoption of an operational plan under section 405.
    (k) The adoption of a financial statement included in an annual financial report.
    (l) A decision to classify or reclassify public land under Division 1 of Part 2 of Chapter 6.
    (m) The fixing of an amount or rate for the carrying out by the council of work on private land.
    (n) The decision to carry out work on private land for an amount that is less than the amount or rate fixed by the council for the carrying out of any such work.
    (o) The review of a determination made by the council, and not by a delegate of the council, of an application for approval or an application that may be reviewed under section 82A of the *Environmental Planning and Assessment Act 1979*.
    (p) The power of the council to authorise the use of reasonable force for the purpose of gaining entry to premises under section 194.
    (q) A decision under section 356 to contribute money or otherwise grant financial assistance to persons,
    (r) A decision under section 234 to grant leave of absence to the holder of a civic office.
    (s) The making of an application, or the giving of a notice, to the Governor or Minister.
    (t) This power of delegation.
    (u) Any function under this or any other Act that is expressly required to be exercised by resolution of the council.

2. Despite clause 1(i) above, the Waverley Strategic Planning and Development Committee does not have delegated authority to accept any tenders.

3. The adoption of a Community Strategic Plan, Resourcing Strategy and Delivery Program as defined under sections 402, 403, and 404 of the *Local Government Act*.

Statement of Ethical Obligations

Councillors are reminded of their oath or affirmation of office made under section 233A of the Act and their obligations under Council's code of conduct to disclose and appropriately manage conflicts of interest.

Live Streaming of Meeting

This meeting is streamed live via the internet and an audio-visual recording of the meeting will be publicly available on Council's website.

By attending this meeting, you consent to your image and/or voice being live streamed and publicly available.

AGENDA

PRAYER AND ACKNOWLEDGEMENT OF INDIGENOUS HERITAGE

The Chair will read the following Opening Prayer and Acknowledgement of Indigenous Heritage:

God, we pray for wisdom to govern with justice and equity. That we may see clearly and speak the truth and that we work together in harmony and mutual respect. May our actions demonstrate courage and leadership so that in all our works thy will be done. Amen.

Waverley Council respectfully acknowledges our Indigenous heritage and recognises the ongoing Aboriginal traditional custodianship of the land which forms our Local Government Area.

1. Apologies/Leaves of Absence

2. Declarations of Pecuniary and Non-Pecuniary Interests

3. Addresses by Members of the Public

4. Confirmation of Minutes

5. Reports

6. Urgent Business

7. Meeting Closure

CONFIRMATION OF MINUTES
PD/4.1/22.09

Subject: **Confirmation of Minutes - Strategic Planning and Development Committee Meeting - 2 August 2022**

TRIM No: SF21/6065

Author: Natalie Kirkup, Governance Officer

RECOMMENDATION:

That the minutes of the Strategic Planning and Development Committee Meeting held on 2 August 2022 be received and noted, and that such minutes be confirmed as a true record of the proceedings of that meeting.

Introduction/Background

The minutes of Council meetings must be confirmed at a subsequent meeting of Council, in accordance with section 375 of the Local Government Act 1993.

Attachments

1. Strategic Planning and Development Committee Meeting Minutes - 2 August 2022 .

MINUTES OF THE STRATEGIC PLANNING AND DEVELOPMENT COMMITTEE MEETING HELD AT WAVERLEY COUNCIL CHAMBERS, CNR PAUL STREET AND BONDI ROAD, BONDI JUNCTION ON TUESDAY, 2 AUGUST 2022

Present:

Councillor Steven Lewis (Chair)	Hunter Ward
Councillor Ludovico Fabiano (Deputy Chair)	Waverley Ward
Councillor Paula Masselos (Mayor)	Lawson Ward
Councillor Elaine Keenan (Deputy Mayor)	Lawson Ward
Councillor Sally Betts	Hunter Ward
Councillor Leon Goltsman	Bondi Ward
Councillor Michelle Gray	Bondi Ward
Councillor Tony Kay	Waverley Ward
Councillor Tim Murray	Waverley Ward
Councillor Will Nemesh	Hunter Ward

Staff in attendance:

Emily Scott	General Manager
Sharon Cassidy	Acting Director, Assets and Operations
Meredith Graham	Acting Director, Community, Culture and Customer Experience
Mitchell Reid	Acting Director, Planning, Sustainability and Compliance
Richard Sheridan	Acting Director, Corporate Services

At the commencement of proceedings at 7.52 pm, those present were as listed above.

Crs Fabiano, Goltsman, Gray, Kay, Keenan and Nemesh attended the meeting by audio-visual link.

PRAYER AND ACKNOWLEDGEMENT OF INDIGENOUS HERITAGE

The General Manager read the following Opening Prayer and Acknowledgement of Indigenous Heritage:

God, we pray for wisdom to govern with justice and equity. That we may see clearly and speak the truth and that we work together in harmony and mutual respect. May our actions demonstrate courage and leadership so that in all our works thy will be done. Amen.

Waverley Council respectfully acknowledges our Indigenous heritage and recognises the ongoing Aboriginal traditional custodianship of the land which forms our Local Government Area.

1. Apologies

Apologies were received and accepted from Cr Angela Burrill and Cr Dominic Wy Kanak.

2. Declarations of Pecuniary and Non-Pecuniary Interest

The Chair called for declarations of interest and none were received.

3. Addresses by Members of the Public

There were no addresses by members of the public.

4. Confirmation of Minutes

PD/4.1/22.08 Confirmation of Minutes - Strategic Planning and Development Committee Meeting - 5 July 2022 (SF21/6065)

MOTION / UNANIMOUS DECISION

Mover: Cr Lewis
Seconder: Cr Keenan

That the minutes of the Strategic Planning and Development Committee meeting held on 5 July 2022 be received and noted, and that such minutes be confirmed as a true record of the proceedings of that meeting.

5. Reports

PD/5.1/22.08 Draft Waverley Development Control Plan 2022 - Exhibition (A22/0091)

MOTION Mover: Cr Masselos
Seconder: Cr Keenan

That Council:

1. Publicly exhibits the draft Waverley Development Control Plan 2022 attached to the report (Attachment 1) for a minimum period of 28 days, in accordance with section 3.43 and clause 5 of schedule 1 of the *Environmental Planning and Assessment Act 1979*.

2. Publicly exhibits the draft Waverley Inter-War Flat Building Heritage Design Guidelines attached to the report (Attachment 4) for a minimum period of 28 days.

THE MOVER OF THE MOTION THEN ACCEPTED AN AMENDMENT TO CLAUSE 1.

THE MOTION AS AMENDED WAS THEN PUT AND DECLARED CARRIED UNANIMOUSLY.

UNANIMOUS DECISION

That Council:

1. Publicly exhibits the draft Waverley Development Control Plan 2022 attached to the report (Attachment 1) for a minimum period of 28 days, in accordance with section 3.43 and clause 5 of schedule 1 of the *Environmental Planning and Assessment Act 1979*, subject to the following amendment:

    (a) Page 14 of the attachments under separate cover – Amend clause 1.1 (b) to read as follows: 'To maximise the re-use of clean excavated material, sandstone, concrete, bricks and timber.'

2. Publicly exhibits the draft Waverley Inter-War Flat Building Heritage Design Guidelines attached to the report (Attachment 4) for a minimum period of 28 days.

Division
For the Motion: Crs Betts, Fabiano, Goltsman, Gray, Kay, Keenan, Lewis, Masselos, Murray and Nemesh.
Against the Motion: Nil.

PD/5.2/22.08 Sustainability Expert Advisory Panel - Community Membership (A10/0022)

MOTION / UNANIMOUS DECISION Mover: Cr Keenan
Seconder: Cr Murray

That Council appoints the following community members to the Sustainability Expert Advisory Panel (SEAP) until the end of the Council term in September 2024:

1. Danny Cameron.

2. Stephanie Carrick.

3. Anthea Fawcett.

4. Corinne Mullet.

5. Robin Mellon.

6. Charles Scarf.

PD/5.3/22.08 Temporary Outdoor Dining - Review (A21/0513)

MOTION / UNANIMOUS DECISION Mover: Cr Gray
Seconder: Cr Fabiano

That Council:

1. Notes that the temporary alfresco dining measures trialled from 1 December 2021 to 18 April 2022 have concluded, with six applications received.

2. Does not implement the trial as a permanent measure.

3. Evaluates options for expanding its Parklet Program to provide additional public seating and/or outdoor dining opportunities in designated locations, with officers to prepare a report to Council.

PD/5.4/22.08 Curlewis Street Streetscape Upgrade - Consultation Outcomes (A21/0397)

MOTION Mover: Cr Masselos
Seconder: Cr Keenan

That Council:

1. Notes that 69% of respondents to the community consultation on the Curlewis Street Streetscape Upgrade were supportive of the overall proposal.

2. Endorses Option 1, as set out in the report, at the eastern end of the project, for the bike path to be located on the northern side of Curlewis Street between Gould Steet and Campbell Parade.

3. Endorses Option 1, as set out in the report, at the western end of the project, which includes the removal of the slip lane from Old South Head Road into Curlewis Street, subject to confirmation of the traffic impacts and support from Transport for NSW.

4. Progresses to detailed design, noting the following will be addressed in development of the design:

   (a) Continue to review the design to minimise impacts to parking loss, and where possible include offset parking on nearby streets.

   (b) Review the design to minimise shared paths where possible.

   (c) Advocate for improved connectivity of the bike path (e.g. onto Birriga Road and O'Sullivan Road) with both Transport for NSW and Woollahra Council.

(d) Review the number and extent of localised narrowings of the bike path surrounding retained trees.

(e) Continue to update key stakeholders of design changes as the detailed design phase progresses.

(f) Provide more information to the community about how and why Curlewis Street was selected for a two-way separated bike path.

5. Notes that traffic-related design elements will be developed further and presented to the Waverley Traffic Committee for review after completion of detailed design, with subsequent consideration by Council.

THE MOVER OF THE MOTION THEN ACCEPTED THE ADDITION OF NEW CLAUSES 4(g) AND (h).

THE MOTION AS AMENDED WAS THEN PUT AND DECLARED CARRIED UNANIMOUSLY.

UNANIMOUS DECISION

That Council:

1. Notes that 69% of respondents to the community consultation on the Curlewis Street Streetscape Upgrade were supportive of the overall proposal.

2. Endorses Option 1, as set out in the report, at the eastern end of the project, for the bike path to be located on the northern side of Curlewis Street between Gould Steet and Campbell Parade.

3. Endorses Option 1, as set out in the report, at the western end of the project, which includes the removal of the slip lane from Old South Head Road into Curlewis Street, subject to confirmation of the traffic impacts and support from Transport for NSW.

4. Progresses to detailed design, noting the following will be addressed in development of the design:

(a) Continue to review the design to minimise impacts to parking loss, and where possible include offset parking on nearby streets.

(b) Review the design to minimise shared paths where possible.

(c) Advocate for improved connectivity of the bike path (e.g. onto Birriga Road and O'Sullivan Road) with both Transport for NSW and Woollahra Council.

(d) Review the number and extent of localised narrowings of the bike path surrounding retained trees.

(e) Continue to update key stakeholders of design changes as the detailed design phase progresses.

(f) Provide more information to the community about how and why Curlewis Street was selected for a two-way separated bike path.

(g) Assesses the impact of the proposed Wellington Street pedestrian crossing on traffic movements and congestion in Wellington Street and Curlewis Street, especially at peak times.

(h) Considers the entry to Curlewis Street at Old South Head Road to ensure vehicular safety.

5. Notes that traffic-related design elements will be developed further and presented to the Waverley Traffic Committee for review after completion of detailed design, with subsequent consideration by Council.

PD/5.5/22.08 Off-leash Dog Area at Barracluff Park - Exhibition (A06/0357)

MOTION / UNANIMOUS DECISION

Mover: Cr Gray
Seconder: Cr Nemesh

That Council:

1. Publicly exhibits the Feasibility Study options and master plans for an off-leash dog area at Barracluff Park attached to the report (Attachments 1 and 2) for 28 days.

2. Officers prepare a report to Council following the exhibition period.

6. Urgent Business

There were no items of urgent business.

7. Meeting Closure

THE MEETING CLOSED AT 8.32 PM.

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SIGNED AND CONFIRMED
CHAIR
6 SEPTEMBER 2022

REPORT
PD/5.1/22.09

Subject: **Social Impact Assessment Guidelines - Adoption**

TRIM No: A20/0396

Author: Emma Rogerson, Acting Senior Strategic Planner

Director: Sam McGuinness, Acting Director, Planning, Sustainability and Compliance

RECOMMENDATION:

That Council:

1. Adopts the Social Impact Assessment Guidelines attached to the report (Attachment 1).

2. Amends the upcoming Waverley Development Control Plan 2022 (DCP) to integrate the Guidelines, including the DCP controls attached to the report (Attachment 2).

3. Officers prepare a report to Council evaluating the effectiveness and impact of the Guidelines in 12 months.

4. In accordance with section 610F of the *Local Government Act 1993*, publicly exhibits for 28 days the social impact statement peer review fee for proponent-led planning proposals, as set out in Table 1 of the report.

5. Officers prepare a report to Council following the exhibition period.

1. Executive Summary

The Social Impact Assessment Guidelines 2022 ('the Guidelines') is a standalone document that has been prepared with the input of the Strategic Town Planning, Development Assessment and Community Programs teams. These Guidelines have been prepared in response to a mayoral minute at the July 2020 Council meeting and have been publicly exhibited in accordance with a Council resolution made at the June 2021 Strategic Planning and Development Committee meeting. If adopted, the Waverley Development Control Plan 2012 will be amended to refer to the Guidelines.

The Guidelines have been informed by the existing NSW State Government and Local Government (Marrickville, Leichhardt, Parramatta, Liverpool and Lake Macquarie) Social Impact Assessment guidelines as precedent. The underlying future vision for the Waverley local government area, embodied within the Community Strategic Plan 2018-2029 (CSP) and Local Strategic Planning Statement 2020-2036 (LSPS), has also been considered.

Twenty-nine of the 32 submissions received during the public exhibition were supportive or somewhat supportive of the Guidelines, with the remaining three submissions 'neutral', 'somewhat unsupportive' and 'unsupportive' respectively. All submissions agreed that social impacts are an important consideration.

While the Guidelines highlight the importance of considering social impacts, the ability to reduce cumulative impacts in the development assessment process is currently limited due to the case-by-case nature of every development application, and the purpose of the guidelines being to manage impacts

rather than as a means to refuse developments. At this stage, the most meaningful thing that Council can do is ensure that submitted management plans are robust and adhered to. This is echoed by other Council's in NSW who have Social Impact Assessment Guidelines and have not found it possible to include many measurable outcomes or mandatory blanket controls.

There are also implementation concerns, including the lack of resources, time, and tailored training of Council staff, that may make the assessment of a project requiring a Social Impact Assessment difficult.

While there are expected limitations and challenges associated with incorporating Social Impact Assessment Guidelines into Council's planning and development assessment framework, feedback from the community is recommended that the Guidelines be supported. Council officers are supportive of the Guidelines being adopted by Council, acknowledging that all council policies are living documents and are constantly under review. Accordingly, there is opportunity to update the Guidelines as needed. A 12-month trial period will be carried out to monitor the resourcing requirements and any other process-based issues.

2. Introduction/Background

Section 4.15 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) requires consideration be taken of the social impact of any development application (DA). Social impact is a key consideration of the assessment of any DA in terms of the impact of the proposal on the social amenity of neighbouring properties and the locality. This can include consideration of the cumulative effect of similar types of developments, amongst other matters.

Premises such as short-stay backpacker-style accommodation options attract greater scrutiny of social impacts than other premises given their perceived potential to generate activity that could affect neighbours. The requirement for these types of applications to include plans of management that detail how these issues will be managed is a key tool currently used by Council to in addressing social and environmental impacts.

Council's Development Control Plan (DCP) does not currently have explicit references to how social impact considerations should be assessed and managed. It is noted that Inner West Council, City of Parramatta Council, Lake Macquarie Council and Liverpool City Council have a Social Impact Assessment Guide to provide guidance to applicants and the community on how these issues should be managed. These policies have been reviewed in the preparation of a similar document for inclusion in the new DCP currently under review.

3. Relevant Council Resolutions

Meeting and date	Item No.	Resolution
Strategic Planning and Development Committee 8 June 2021	PD/5.3/21.06	That Council: 1. Publicly exhibits the draft Social Impact Assessment Guidelines attached to the report for 28 days. 2. Notes that a further report will come back to Council summarising the outcomes of the public exhibition.
Council 21 July 2020	CM/6.1/20.07	That Council officers: 1. Investigate the preparation of Social Impact Assessment Guidelines for inclusion in the new Waverley Development Control Plan to provide advice and guidance to applicants submitting a development application on how to meet the requirements of section

		4.15 of the *Environmental Planning and Assessment Act 1979*. 2. Investigate whether the Local Environmental Plan template from the State Government allows for the making of social impact statements or assessments. 3. Report back to Council outlining the issues associated with social impact assessment.

4. Discussion

Preparation of Social Impact Assessment Guidelines for inclusion in the new Waverley Development Control Plan

An investigation into the preparation of Social Impact Assessment Guidelines for inclusion in the new DCP has been undertaken, with the input of Council's Strategic Town Planning, Development Assessment and Community Programs teams, and reference to the existing NSW State Government and Local Government (Marrickville, Leichhardt, Parramatta, Liverpool and Lake Macquarie) guidelines as precedent.

The Social Impact Assessment Guidelines from all identified Councils were similar in content and nature. Key commonalities include:

- Similar definition of what social impacts are and what positive social outcomes are.
- Flexible table with development types recommending the preparation and submission of a social impact assessment.
- Encouragement of conducting community consultation prior to development application lodgement.
- Requirement of SIA preparation by an experienced professional, without mention of strict mandatory qualifications.
- Lack of measurable and/or numerical outcomes.

Council officers have sought a response from all four Council's regarding the performance of their Social Impact Assessment guidelines. The information received was as follows:
Inner West Council (Leichhardt 2009 and Marrickville 2016 Guidelines)

Since Council amalgamation these guidelines have not yet been reviewed internally and there is no information available regarding any issues associated with how the guidelines are being implemented, whether there are any measurable improvements/outcomes and whether they have been tested in the Land and Environment Court.

City of Parramatta Council (2013 Guidelines)

The guidelines assist Council staff to ensure that development types which typically cause social impacts can require the submission of a social impact assessment. Their guidelines also ensure that these Assessment are prepared by a suitably qualified person and contain certain information.

Any development application containing a social impact assessment is referred to City of Parramatta ('Parramatta') Council's Social Outcomes team, who largely undertake a merit assessment regarding the expected impacts of the proposal and provide their feedback to the Assessing Officer. In this regard, the guidelines are less useful in providing measurable assessment criteria but rather more useful in ensuring that enough information is supplied that allows Council officers to review the proposal.

To date, the Parramatta Social Impact Assessment Guidelines do not assist to refuse development applications based on land use, but they do assist to manage the density and operations of that use where social impacts are found to be a concern.

While not within the Guidelines, the Acting Manager of the Social Outcomes team at Parramatta Council stated that it has been very helpful to recommend anyone lodging a development application for a typically socially impactful land use to conduct a Pre-development application meeting first. This has allowed Council to clarify the expectations of future social impact assessments and encourage particular pre-lodgement community consultation. As such, the addition of a Waverley DCP control to recommend any Boarding House and Childcare Centre development to undertake a Pre-development application meeting is proposed.

Liverpool City Council (2020 Guidelines)

No response was received when officers reached out to Liverpool City Council regarding the effectiveness and implementation of their Guidelines. The Acting Manager of the Social Outcomes team at Parramatta Council stated that they had assisted with the preparation of initial work on the Liverpool guidelines, so their comments are considered to reflect the findings of both Council's.

The Liverpool City Council Guidelines contain unique mention of requiring a social impact assessment submission alongside any planning proposal prior to Gateway, and for development applications that result in mixed tenure and/or a reduction of affordable housing. These requirements are considered to be relevant and useful in a Waverley Council context, where planning proposals typically cover numerous lots in dense areas and the lack of affordable housing is a significant challenge. As such, it is recommended that a social impact statement (SIS) be required for all complex proponent-lead planning proposals, and development applicants that result in mixed tenure, or a loss of affordable housing. This would require an update to the DCP and to Council's planning proposal application process.

Lake Macquarie Council (2014 Guidelines)

While not in a Greater Sydney or metropolitan context, Lake Macquarie Council has a social impact assessment Policy in force. Officers expressed that the typically controversial development types were similar to those at Waverley Council, namely boarding houses.

At Lake Macquarie Council, it is up to the discretion of Development Assessment planners to decide whether a social impact assessment is required, and whether the Assessment submitted is suitable. The Guidelines assist the officers to consider whether an SIA is required, but internal discussions inform the realistic outcome as consideration regarding who the applicant is (developer vs mum and dad) and what the likely expected social impact without a thorough assessment is.

Development applications requiring a social impact assessment are referred to Council's Social Planner for comment during the assessment period.

Precedent takeaways

Based on the precedent Guidelines from other local governments, a review of available literature and meetings with internal staff and key external stakeholders, Council officers have drafted the Waverley Social Impact Assessment Guidelines, and ancillary Waverley DCP recommendations. Refer to Attachment 1 for the draft Social Impact Assessment Guidelines 2022, and Attachment 2 for the DCP recommendations.

It was found that the preparation of a standalone document published on Waverley's website, which the new DCP can refer to, is the most effective form of possible Guideline implementation. This is because a standalone document can be more easily amended in the event of future changes being required, and it

will assist to reduce the complexity of the new DCP for development that is not subject to social impact assessment.

While the Guidelines highlight the importance of considering social impacts, their ability to impose change in the development assessment process is limited due to the case-by-case nature of every DA, and the purpose of the guidelines being to manage impacts rather than refuse developments. At this stage, the most meaningful thing that Council can do to manage social impacts is to ensure that submitted management plans are robust and adhered to.

The referral of a SIS submitted with a DA to an internal officer experienced and trained in the assessment of social planning outcomes is common; however, Development Assessment planners are also provided with opportunity to consider the suitability of any development application with regards to the social impacts.

Whether the Local Environmental Plan template from the State Government allows for the making of social impact statements or assessments

While not explicitly required for every DA, social impact assessments in the form of a SIS can be requested (from an applicant) if the additional material is considered necessary for the consent authority (Council) to adequately consider the social impacts, in accordance with section 4.15 of the EP&A Act.

Issues associated with social impact assessment

While the Guidelines highlight the importance of social impacts, their ability to impose change in the development assessment process is limited due to the case-by-case nature of every DA, and the purpose of the guidelines being to manage impacts rather than refuse developments.

There are also implementation concerns, including the lack of resources, time, and tailored training of Council staff, that would make the assessment of a social impact assessment difficult.

Waverley Development Application Guide

If the Social Impact Assessment Guidelines are adopted by Council, the Waverley Development Application Guide ('the DA Guide') will be adjusted to reflect the requirements to provide a SIS. The draft changes to the DA Guide are highlighted in Attachment 3 to this report for reference.

5. Financial impact statement/Resourcing and training/Time frame/Consultation

Financial impact

The introduction of Social Impact Assessment Guidelines, and the increased requirement for applicable DAs to provide a SIS, is expected to impose a financial cost on the applicants who will need to pay for a consultant to produce the additional material, and a fee to cover a peer review of the SIS submitted in the instance of a proponent-led planning proposal.

Community feedback received during the public exhibition period of the draft Guidelines showed not only support of, but a demand for, additional Council staff resourcing and training to address the need for social impact assessments in larger or more contentious development types.

An external consultant would be best suited to undertake a peer review of a SIS submitted by applicants. Informed by peer reviews of previous social and economic impact assessments, an external consultant will charge around $10,000 (excluding GST) for such a review. If a peer review was undertaken for every DA lodged in 2021 that required an SIS in accordance with Part C of the draft SIA Guidelines, the annual cost for an external consultant would be approximately $50,000–$100,000 (excluding GST). This figure would be

subject to change, as external factors including the market determine the types and numbers of development applications submitted.

Council officers considered whether or not the additional costs could be recuperated by charging an additional fee in Council's Fees and Charges to require the applicants to pay for the peer review of an SIS. With regards to SISs for DAs, Council sought advice from multiple stakeholders, including the Department of Planning and Environment (DPE), legal advice as well as internally from Governance. Advice provided considered Part 4 of the EP&A Act 1979, Part 13 of the EP&A Regulations 2021 and Part 10 of the *Local Government Act 1993* which stipulate what services and how fees associated with DAs can be charged. Officers concluded, based on the advice provided, that charging an additional fee for DAs is not appropriate, in accordance with the above legislation and regulation. As a result, a peer review will not be completed for DAs that submit an SIS. The Strategic Town Planning team will instead complete referrals internally reviewing the SIS submitted for such applications.

In the context of planning proposals, Council can levy additional service fees as required. Officers therefore recommend amending the Pricing Policy, Fees and Charges to add a social impact statement peer review fee for proponent-led planning proposals. This requires the proposed fee to be publicly exhibited, in accordance with section 610F of the *Local Government Act 1993*. The proposed fee is as follows:

Table 1. Proposed social impact statement peer review fee for proponent-led planning proposals.

Description	GST	Unit	2022–23 fee or charge $	Pricing policy
Social impact statement peer review for proponent-led planning proposals	Taxable	per item	5,000–10,000 (to be determined by market rates)	C

Resourcing and training

Community feedback received during the public exhibition period of the draft Guidelines showed not only support of, but a demand for, additional Council staff resourcing and training to address the need for social impact assessment. SIS reports submitted by applicants of DAs will be referred to the Strategic Town Planning team for review and comment.

Time frame

If the Social Impact Assessment Guidelines standalone document is supported, it has the capability to be implemented immediately.

The recommended DCP changes, if supported, would be integrated within the new comprehensive Development Control Plan 2022 which is expected to be finalised by the end of 2022.

The recommended amendment to the Pricing Policy, Fees and Charges, if supported, will need to be publicly exhibited for a minimum of 28 days. If supported after public exhibition, the amendment could be expected to be implemented by the end of 2022.

Consultation

It was agreed by Council and Council officers at the Strategic Planning and Development Committee on 8 June 2021, that feedback from the community was needed prior to establishing whether any changes should be made to the draft Guidelines prepared prior to finalisation. The draft Guidelines were thereafter publicly exhibited on Council's Have Your Say page from 29 July 2021 to 29 August 2021, with late submissions accepted until 7 September 2021.

A community webinar was scheduled for 6.30pm on 12 August 2021. However, due to only receiving three registrations the event was cancelled. Anyone who had registered to attend was contacted via email and offered opportunity to schedule a custom meeting with the Strategic Town Planning team. One registrant responded to this opportunity and met with two Council officers via Microsoft Teams on 13 August 2021. Their verbal feedback was noted and followed with written comments from the community member taken into account in this post-exhibition review.

A total of 30 survey submissions were received through the Have Your Say site. Of the survey submissions, respondents had the following response to the draft Guidelines:

- 76.6% (23 people) were 'supportive.'
- 13.3% (4 people) were 'somewhat supportive.'
- 0.03% (1 person) were 'neutral.'
- 0.03% (1 person) were 'somewhat unsupportive.
- 0.03% (1 person) were 'unsupportive.'

Two separate written submissions were additionally provided, which indicated an overall support for the guidelines, but asked for a greater influence.

Those who were 'supportive' also had the following comments:

- Good set of guidelines that can be understood by both residents and applicants.
- These guidelines seem to be a step in the right direction, and should be reviewed and incorporated ASAP.
- Great idea, but will need serious legislative backing for it to work.
- Stringent provisions in POM must aim at preventing these excesses.
- The community must have a say in the size and scope of developments in the Waverley area.
- Dwelling caps should be applied to development types to reduce additional dwellings.
- Heritage should be included, and more emphasis on the natural environment.
- I agree that incorporating the social impact of all development plans needs to be included and justified in nearly every development application. It would be a welcome addition to improve benefits to the community.
- Most developments cause some sort of disruption but this is rarely weighed up in the application. Adding scope for SIA can help this to be considered and hopefully managed better.

Those who were 'somewhat supportive' also had the following comments:

- Clearer guidelines regarding preservation of heritage of areas, discourage high density living, protect smaller streets and suburban pockets from traffic, discourage traffic in back streets, discourage renovations/demolition of perfectly good properties, greater attention to building debris and waste., development applications should have restricted height levels in conservation areas, greater attention to preservation of green corridors and mature trees.
- To predict and assess social impact some consideration should be given to the track record of the applicant. Any undertakings from an unreliable applicant should not be relied upon and may highlight the need for controls.
- An element of social baseline not mentioned separately is 'commercial variety and independence'. The social character of a neighbourhood is enhanced by a vibrant commercial precinct where locals converge.

The respondent who was 'neutral' also had the following comments:

- The criteria that are being used to assess cumulative impact needs to be clear and completely transparent.

- More clarity around who decides when an SIA is not required.
- The SIA should be conducted by an independent party unrelated to the LGA and the developer.
- Heritage should be included.
- Dwelling caps should be applied to development types to reduce additional dwellings.

The respondent who was 'somewhat unsupportive' also had the following comments:

- There are too many potential escape clauses in the wording of this document for it to have teeth or positive concrete results.
- There needs to be clear delineation about who decides a DA must have a social impact assessment (SIA) and whether it require a Social Impact Comment (SIC) or a Social Impact Statement (SIS).
- There needs to be an invigoration of the plans of management and the conditions of consent (COC) which mitigate the deleterious effects of approved DAs.
- SIC needs to be undertaken by a qualified town planner. This should be an independent practitioner chosen from outside the LGA by council staff. Under no circumstances should this person be selected by developer. Preferably this task should be undertaken by the commercial arm of a university.
- P4 clause 2: social baseline par 2. Are there baselines in existence? This should be undertaken now by Council, rather than doing one for each DA.
- 50 dwellings above shops are too many. Lower this number significantly. UNSW report says average size of boarding house room is 15.
- Boarding houses and hostels with more than 10 Rooms must have onsite full-time 24/7 supervision/staff.
- Item 3 DCP control: should be 5 km surrounding the proposed project.
- However, with this draft policy, Waverley seems to be significantly watering down even the State Government's guidelines.
- The methodology of how the involvement of locals should work is clearly laid out in the NSW State Government's guidelines for community interaction for major infrastructure projects.

The respondent who was 'unsupportive' only provided the following additional comment:

- 'The suburb is being stolen from us. The community is the prisoner of the Land and Environment Court.'

The following table contains a summary of the key written feedback, and how it has been addressed by Council officers:

Table 2. Summary of written feedback.

Community feedback	Officer comment
Great start but needs greater legislative backing to avoid becoming a 'tick box' matter.	Within the current NSW planning system legislative planning controls are best suited to long term, highly objective, widespread and numerically addressed matters. For example, the experience of bulk and scale, and overshadowing is a shared matter between neighbouring properties in any area, and directly related to the envelope of a building which floor space ratio and maximum building height development principles can successfully address. As social impacts are complex in nature, unique to particular areas, and subject to variation depending on numerous changing factors, the implementation of long-term legislative controls that have meaning is challenging. It is also important to note

	that the purpose of addressing social impacts is not to entirely maintain the current demographic and social standing of an area nor restrict future development. Given the unique nature of social factors under the context of the current NSW planning system, at this stage the most meaningful way of introducing greater consideration of social impacts is by way of requiring Social Impact Assessment at the development application stage for particular projects which Council officers deem to be likely to warrant further assessment scrutiny in accordance with these Guidelines. This experience is shared by other Councils in NSW who have already adopted their own Social Impact Assessment Guidelines. If adopted, Council officers will review the procedural impact of these Guidelines after 12-months and consider the need for, and ability to impose, legislative controls if the planning system at that time allows.
The community must have a say in the size and scope of developments in the Waverley area.	Whilst the public notification stage of the development application process provides opportunity for community members to have their opinion voiced and heard, feedback during the public exhibition period of a council's Local Environmental Plan has more of a meaningful impact on the size and scope of development permitted in Waverley. The current NSW planning system allows Councils to stipulate land use, building height and floor space ratio controls in the Local Environmental Plan (LEP). These three items largely outline the potential size and scope of development in any area - the maximum permissible building envelope for a structure on site is, and what the use of any particular site is. Once these items are adopted for a site, it is difficult to refuse a development at the development application stage based on size and scope alone if the project complies with the LEP controls.
Dwelling caps should be applied to development types to reduce additional dwellings.	The application of maximum dwelling density figures in the LGA conflicts with the strategic direction outlined within both local and state planning documents including but not limited to the Waverley Local Strategic Planning Statement (LSPS), the Greater Sydney Regional Plan and the Eastern City District Plan. A combination of planning controls including those that determine maximum building envelopes of proposed structures, and nation-wide NCC/BCA requirements that mandate minimum internal habitable room dimensions, assist to ensure that the number of dwellings proposed for a site is suitable for its size. Furthermore, the Waverley LGA is considered to be relatively well connected and serviced by urban infrastructure to accommodate developments that seek additional dwellings compliant with the existing planning controls at this stage.
More emphasis on heritage	Whilst it is acknowledged that there is crossover between social,

and the natural environment	economic and environmental impacts, heritage and natural environment matters are already considered within existing local and state planning controls as environmental and built form factors. Upcoming strategic policy reviews will investigate strengthening the consideration of heritage and natural environment matters.
The track record of the applicant should be considered.	The current planning system links development application and Planning Proposal approvals to the land, rather than the owner or applicant, limiting the consideration of the project suitability to the site rather than associated persons. Furthermore, the reliability of a party is subjective and cannot be assumed by the assessing authority at development application/Planning Proposal stage.
An element of social baseline not mentioned separately is 'commercial variety and independence'. The social character of a neighbourhood is enhanced by a vibrant commercial precinct where locals converge.	The market controls the extent of commercial variety that an area can have. Whilst the LEP and DCP can control and manage wider land use category permissible on a particular site, there is no realistic opportunity to mandate variety or independence under the NSW planning system at this time.
The criteria that is being used to assess cumulative impact needs to be clear and completely transparent.	Cumulative impact will vary on a case-by-case basis, rendering it difficult under the current planning system to introduce more specific and measurable cumulative impact assessment measures. The Guidelines ask that applicants and assessing officers use a merit assessment to consider cumulative impact, alongside other social impacts.
More clarity around who decides when an SIA is or is not required, and whether it is a SIC or SIS.	Part B of the Guidelines provide guidance for general triggers requiring the preparation of an SIA. Clarity has also been provided within the Guidelines to state that it is up to the discretion of assessing officers as to when an SIA is required or not, depending on the scope and scale of development and history of impact of similar development. The extent of anticipated impacts will determine whether an SIS is required. The Guidelines have been amended to provide assessing officers with the discretion to identify which type of SIA is required.
The suburb is being stolen from us. The community is the prisoner of the Land and Environment Court.	The Guidelines cannot alter the NSW LEC determination pathway.
SIC needs to be undertaken by a qualified town planner. This should be an independent practitioner chosen from	Without Council budget being assigned to fund any outsourced Social Impact Assessment, the developer is most suited to employ a person with the requested experience and qualification. A review of the SIA is to be undertaken by Council

outside the LGA by council staff. Under no circumstances should this person be selected by developer. Preferably this task should be undertaken by the commercial arm of a university.	officers for DAs and by an external independent consultant for proponent-led planning proposals.
A baseline analysis of the entire LGA should be prepared by Council. SIA can then provide additional detail.	Whilst Council could prepare a current baseline analysis of the entire LGA, it would be unlikely to have longevity as the configuration, demographic and values/needs of the wider community are constantly changing and a new social baseline analysis should be prepared each time an SIA is required. In addition, many areas of the LGA would require that a baseline analysis include areas within either Woollahra or Randwick LGAs. The Guidelines provide suggestions for appropriate sources and what should be included in the baseline.
50 dwellings above shops are too many. Lower this number significantly. UNSW report says average size of boarding house room is 15.	Under the proposed Guidelines, a boarding house of any size is required to provide an SIA.
Boarding houses and hostels with more than 10 Rooms must have onsite full-time 24/7 supervision/staff	This requirement has been included in the proposed associated DCP controls for co-living (new name for the previously defined boarding houses), with the 20 or more lodgers trigger to align with the previous ARH SEPP 2009 requirement.
Applicants must prepare a site plan identifying the number and size of the same development type/land use within a 5 km radius.	Given the relatively small area of the entire Waverley LGA and the reduction of impact risk that comes with two of the same use being located 5 km apart, a 3 km radius has been applied instead of 5 km proposed. The 3 km is still an increase compared to the 2 km radius suggested in the draft Guidelines on exhibition.
The draft Guidelines should better adhere to the NSW State Government Guidelines and the community consultation methodologies suggested for EIS-requiring projects (typically major infrastructure projects)	The Waverley Guidelines are not intended as a tool for development application refusal, nor intended as a financial and procedural burden for Council or applicants.
Once an SIA is required there should be mandatory consultation with the community – not just Have Your Say – there needs to be meaningful dialogue aligned to Council's Community Engagement/Participation	Meaningful consultation with the community pre-lodgement will be encouraged within the Guidelines, with reference to the IAP2 (International Association of Public Participation) participation best practice added into the Guidelines.

Strategy and CORE Principles ie Inform, Consult, Involve, Collaborate, Empower.	
Schools should require SIA.	New educational establishments have been added to Part B of the Guidelines.
Once an SIA is prepared Council should convene a panel to workshop/review the SIC and workshop SIMP and Plans of Management where applicable. SIC to be circulated for endorsement.	This feedback point will be noted for further consideration, noting the resourcing and timing implications.
Contact officers from other council's who have implemented their own Social Impact Assessment Guidelines, to learn from their experiences and implement mechanisms and processes that have been successful for them.	Other council have been contacted. See section 4 of this report for the findings.
In order to achieve success, we further suggest that Council consider an initial trial period of 12 months, both to reduce opposition and to allow for modifications and improvements to the processes.	A 12-month procedural trial is being recommended by Council officers within his report, providing opportunity to review and further enhance the Guidelines if adopted.
SIAs should be initiated at the very earliest stage of any development proposal, i.e., at a pre-DA meeting or even earlier.	Pre-lodgement community consultation is encouraged within the Guidelines.

6. Conclusion

Social Impact Assessment Guidelines can assist to highlight the importance of considering social impacts during the development application assessment process. The potential benefits relate to the ability to provide clear guidance around the requirements of Plans of Management, and to inform measures that minimise and mitigate any adverse impacts to a locality.

Whilst there are these expected limitations and challenges associated with incorporating Social Impact Assessment Guidelines into Council's planning and development assessment framework, feedback from the community recommends that the Guidelines be supported. Council officers are also supportive of the Guidelines being adopted by Council, acknowledging that there is opportunity to update the Guidelines as needed if a trial period of 12-months show that they are ineffective at enhancing positive social impacts

and mitigating negative ones, and if they are causing unnecessary problems for the Development Assessment team.

Given the additional budgeting implications for this process, it is recommended that should Council wish to proceed to implement this policy change, that the Pricing Policy, Fees and Charges be amended to require the applicant of a proponent-led planning proposal to pay the fee that Council will incur to have an external independent consultant review the SIS submitted.

7. Attachments

1. Draft Social Impact Assessment Guidelines ⇩
2. Social impact assessment DCP controls ⇩
3. Waverley Development Application Guide ⇩

WAVERLEY COUNCIL

WAVERLEY SOCIAL IMPACT ASSESSMENT GUIDELINES 2022

Waverley Council acknowledge the Bidjigal and Gadigal people, who traditionally occupied the Sydney coast.

Waverley Council also acknowledge Aboriginal Elders past, present and emerging.

CONTENTS

PART A: INTRODUCTION

CONTEXT

The future vision for the Waverley LGA is embodied in its Community Strategic Plan 2018-2029 (CSP) and Local Strategic Planning Statement 2020-2036 (LSPS).

Some key goals of the CSP are to *"create a resilient, caring and cohesive community"* and to *"strengthen people's inclusion in community life, promote diversity and celebrate Aboriginal and Torres Strait Islander culture past, present and future".* The LSPS includes a direction to be a *"city for people".*

Whilst **environmental** and **economic** impacts of a proposal must be assessed, in order to successfully achieve the goals of the CSP and the direction of the LSPS, social impacts must be properly considered as well in development and planning decisions. This can be done by way of undertaking a Social Impact Assessment (SIA).

Waverley Council is committed to the SIA process as a means of considering the potential social impacts of developments more comprehensively and consistently in planning and decision making. Not all development proposals will be required to provide an SIA because there are already development controls in Council's LEP and DCP that are designed to mitigate impacts.

Refer to Part B of this report for examples of desirable social outcomes.

SOCIAL IMPACT ASSESSMENT

Social Impact Assessments (SIA) are supposed to tell us *what* social impacts matter when it comes to proposed developments, *where* the impacts will be felt, by *whom* and *how*. SIA should also deal with *how* impacts will be managed, or, indeed, *if* they can be managed at all.

For example, SIAs can inform who and how people might be affected by a new boarding house nearby; if a new light rail corridor will benefit some whilst adversely impacting others; and what kinds of social benefits and impacts we can expect from a new school or hospital. It can provide information about the cumulative impacts of having many of the same types of developments in one area. Additionally it can indicate if there is a lack of certain types of uses (e.g. affordable housing or mechanics) in an area, where the loss of any more may not be in the public interest.

SIA provides an opportunity for the opinion of the local community to be considered in the DA assessment process. However, only justifed, concrete and evidence-based views surrounding likely effects of proposed develpment will be afforded weight in assessment.

KEY CONSIDERATION GROUPS

Given Waverley's diverse population, social impacts should be considered from the unique perspective of groups that makes up the larger community including those who are more vulnerable and/or minorities.

CUMULATIVE AND CONSEQUENTIAL IMPACTS

Social impacts can be cumulative, the result of more than one development or land use type in an area. This can become apparent over time, rather than being immediately perceptible or relatable to a specific development or development type.

An example being the difference between a quiet neighbourhood street with one boarding house which sits within the existing character and provides for housing diversity, versus a quiet neighbourhood street with 10 boarding houses that alters an established character and has the potential to cause ten times the impacts of one boarding house with increased noise and traffic.

An SIA can identify where an existing area may already effectively be saturated with a certain type of use (e.g. backpackers, pubs and clubs) and further instances will have a detrimental social impact on the neighbourhood.

The opposite may also be true. An SIA may identify where certain types of use are diminishing and are considered important to housing diversity and community satisfaction. For example, the loss of affordable housing or sporting and recreation land.

APPLICABLE DEVELOPMENT

An SIA will not be required for all development or land use types. It is not meant to be an onerous or unreasonable requirement on landowners. Development that may require a Social Impact Assessment will typically be:

- of a large and/or sensitive nature;
- in a sensitive or constrained setting; and/or
- likely to have an impact on the community that can't be mitigated by normal Development Application conditions.

Part C outlines a list of land uses which will require SIA. There may be instances where an SIA is not considered necessary in the circumstances of the particular case and others where the development is not in the table but the Council planners believe one should be supplied. The need for an SIA is up to the discretion of Council planners, based on the expected impact, scope and scale of development, and impact of similar development in the past.

SOCIAL IMPACT STATEMENT

A Social Impact Statement (SIS) is the name for the report assessing the social impacts of a Planning Proposal or Development Application.

An SIS is a comprehensive assessment typically required for developments where significant social impacts are anticipated. The SIS should form its own report and must be undertaken by someone with appropriate training and experience, particularly in using rigorous social science methodologies that are undertaken with public involvement.

Suitable persons will have a relevant tertiary qualification in social science, human geography or the like, have experience in community development (needs analysis, facility/service planning), in public participation, and in use of the types of statistical and qualitative information required for the SIS.

PART B: DESIRED SOCIAL OUTCOMES

Social impacts are a critical consideration when assessing the suitability of a proposal. Social impacts typically include changes to one or more of the following Social Impact categories. A list of desired social outcomes related to each social impact category is also provided. An SIS must demonstrate how the proposal achieves the desired social outcomes.

	Category description	Desired Social Outcome
Accessibility 	Includes how people access and use infrastructure, services, and facilities, whether provided by a public, private or not-for-profit organisation, facilitating or hindering universal access principles, affordability.	Infrastructure, services and facilities are safe and affordable, facilitating autonomy and independence for all residents. Key services (healthcare, recreation, and shops) are nearby.
Accommodation 	Includes affordable housing; displacement; housing choice, universal housing (housing for life).	Affordable housing and diverse housing mix options are available within accessible areas. Where a high number of small units are planned affordable collective washing and drying facilities are available onsite.
Community 	Includes composition, cohesion, stability, character, how the community functions and people's sense of place.	A diverse and cohesive community composition with a sense of place and inclusion is provided.
Health and wellbeing 	Includes physical, social, spiritual and mental health especially for people vulnerable to social exclusion or substantial change, psychological stress resulting from financial or other pressures, and changes to public health overall. Considers sense of belonging or being unwelcome; and social interaction/ isolation. Not merely the absence of disease or infirmity. Give consideration to creating or impacting spaces that enable people to recreate without having to enter a commercial premises.	The local area provides good access to facilities and activities promoting physical and mental, health & wellbeing and sense of belonging.
Safety & security 	Includes graffiti, vandalism & property damage, offensive language & behaviour, safety of women, young people and homeless people, substance consumption or abuse, and truancy. Also includes perceptions about safety, fears about the future of their community, and aspirations for their future and the future of their children.	The NSW Government's Crime Prevention and the Assessment of Development Applications Guidelines are successfully implemented, with consideration of potentially vulnerable population groups.

Surroundings	Includes ecosystem services such as shade, pollution control, and erosion control, public safety and security, access to and use of the natural and built environment, and aesthetic value and amenity. The quality of the air and water people use, the availability and quality of the food they eat, the level of hazard or risk, dust and noise they are exposed to, the adequacy of sanitation, their physical safety, and their access to and control over resources.	All groups have equitable access to high quality and safe surroundings. The natural, built environment and overall amenity of space is improved.

Our Liveable Places Centres Strategy

Waverley's *Our Liveable Places Centres Strategy* provides a vision and place-based objectives for each business centre in the LGA which development providing an SIS in any centre should consider as additional desired social outcomes.

PART C: APPLICABLE DEVELOPMENT

GENERAL TRIGGERS

A Social Impact Assessment is required for **all proponent-lead Planning Proposals,** and Development Applications that involve the following:

- Loss of low-rental dwellings (see *State Environmental Planning Policy Housing 2021* for definition)
- Strata subdivision of 4 or more lots
- $10,000,000 or greater construction cost
- Gross Floor Area of 3,000sqm or greater (see *Waverley Local Environmental Plan* for definition)
- Reduction in dwelling numbers on site

TRIGGERS BY LAND USE

In addition to the General Triggers for a SIA, development that requires a Social Impact Statement based on land use is outlined in Table 1 below.

Table 1 - Land Uses requiring a SIA

Land Use	Threshold
Shop top housing Residential flat buildings Build-to-Rent housing	SIS for more than 50 dwellings.
Boarding houses and hostels Co-living housing	SIS for new developments or major redevelopment.
Entertainment facilities	SIS for more than 100 persons.
Pubs, excluding a limited licence and a small bar. These are assessed in conjunction with local police.	SIS for new development.
Retail premises	SIS for more than 500sqm.
Tourist and visitor accommodation: • Backpackers' accommodation • Hotel or motel accommodation • Serviced apartments	SIS for new developments or major redevelopment.

PART D: SIA STRUCTURE

This Part details a recommended report structure and requirements for a typical Social Impact Assessment.

1. ASSESSMENT CATCHMENT

Identify and justify the physical catchment for the assessment. The area size will vary depending on the scale and nature of the project ranging from the individual street in which the development is proposed, to a wider area that has the same zoning. For example, if a new supermarket is proposed in an area where there are local small-scale suppliers of similar goods, the catchment should include these shops.

2. SOCIAL BASELINE

Identify a pre-development social baseline of the assessment area through a study describing the social context without the proposed development. It documents the existing social environment, conditions and trends relevant to the impacts identified.

The study is a benchmark against which direct, indirect and cumulative impacts can be predicted and analysed. Tailor the scope and content of the social baseline study to the project context using meaningful indicators and information.

Baseline data can be collected through primary research such as a representative survey from the community, and from secondary research using existing data sources such as the resources and references listed in **Part F** of these Guidelines, material from similar projects, published research, relevant local, State and Commonwealth strategic plans and policies, or the outcomes from previous community engagement.

The social baseline should at minimum consider:

Area Profile: What is the social, physical, cultural and economic profile? What is the current status of commercial variety and independence in the area?

Features: What features of the community, the social locality, and/or the landscape do people value – from urban areas, the sense of community or the accessibility of services, to natural and diverse environments or quiet/vibrant neighbourhoods? How do these features influence local people's or businesses' way of life, health or wellbeing?

Other social baseline considerations may include:

First Nations: What Aboriginal and Torres Strait Islander community past, present and future significance does the assessment area hold?

Climate Change: The gradual rise in average temperature, reduced water availability and increased severity of storms experienced in Waverley due to Climate Change is resulting in less comfortable surroundings and a change in way of life (refer to *Social Impact Types*). Development should demonstrate resilience against these resultant social impacts and exhibit a design that provides social comfort and function in warmer decades to come without reliance on air-conditioning. Are there other prevalent Climate Change trends that produce social impacts in the assessment catchment?

Key Consideration Groups: How do the Key Consideration Groups currently sit within each Social Impact Type item goal? Refer to **Part B** for the Social Outcomes Matrix.

Vulnerable groups: What minority groups and vulnerable groups are present? What opportunities are present to increase their level of social inclusion, sense of belonging and cultural protection?

3. PREDICT AND ASSESS THE SOCIAL IMPACTS ON THE SOCIAL BASELINE

Critically assess the predicted impact of the development proposal against the social baseline. Describe and justify the methodologies used to predict and analyse social impacts, assumptions and projections as well as outcomes of the process. Consider the:

- Possible adverse social impacts; provide justification for why this is acceptable. How can the adverse impact be mitigated or removed? Although the project may deliver benefits in the longer term, how might the project be designed to avoid and minimise any short-term adverse impacts?
- Possible beneficial social impacts; provide a supported explanation for why this is produced. How can the possible impact be enhanced or introduced?
- Extent of the impact - immediate, longer term or cumulative; and
- Density and clustering of similar development.

Consider including a completed version of the **SIA Scoping Worksheet** provided in **Part G** of these Guidelines within the assessment.

4. MITIGATION MEASURES AND MONITORING VIA A PLAN OF MANAGEMENT (POM)

In order to mitigate negative social impacts and introduce and enhance beneficial ones identified within the Predict and Assess step, the proposal should be adjusted by way of design and/or operational improvement. Depending on the scale and controversy surrounding the proposal readjustment, additional community and stakeholder consultation may be required.

Developments with an SIS should establish a robust Plan of Management (POM) that clearly outlines potential real or perceived negative impacts and what measures will be incorporated to mitigate these.

Social impacts can be both positive and negative, and it may be possible to address any real or percieved negative impacts of a proposal by offering a community benefit or improvement within the POM that will reduce the negative impact. The following list provides some measures that can be considered to achieve a more positive social impact from a proposal, alongside those outlined as Desired Social Outcomes in **Part B**. Others not listed within Part B or below may also be considered by Council.

- Floor space, outdoor space, or a public facility for the purposes of a community use;
- Community development including financial & in-kind support for social, cultural or recreational initiatives such as public art, community safety, health & wellbeing projects, facilities/services or events for the general community or specific target groups, business development projects and the like; and
- Ongoing consultation & engagement.

Some of these can be designed into the development proposal or conditioned in the consent. Others may come within the ambit of a Voluntary Planning Agreement (s7.4 of the *Environmental Planning and Assessment Act 1979*). An applicant may voluntarily offer to make a planning agreement with Council.

Inclusion of positive impacts or community benefit does not mean that a proposed development will automatically be approved by Council. Similarly, a proposal will not automatically be refused if there are perceived negative social impacts. However, Council will endeavour to ensure that negative impacts are reduced, and positive impacts are introduced or enhanced.

UN Sustainable Development Goal 11
The targets of the United Nations Sustainable Development Goal 11 are also considered to be desired social outcomes.

PART E: CONSULTATION

It is best practice to consult with the community, and at minimum must be done when required by Council.

The purpose of consultation is to obtain perspectives from the local community who may be adversely impacted by a development rather than from just the applicant's perspective.

Consultation should occur early enough to be meaningful, preferably before the preparation of any concept design.

Effective early and quality engagement with the community on significant or sensitive planning and development proposals enables proponents to understand key areas of interest during the early planning phases before plans are finalised and an application is officially lodged. This should reduce the risk of unexpected or surprise objections from community during the public exhibition and project determination phase. It can also lead to faster determinations, better planning outcomes and reduced community opposition.

Consultation should be conducted by a neutral third-party community engagement specialist or consultant. This person or group should complete a stakeholder map of key groups and individuals who might be affected by the development, including their likely or anticpated concerns/areas of interest so that engagement with the stakeholder can be tailored to their interests.

Consultation will depend on the type of development proposed and types of stakeholders involved, and may include the following methods:

- Survey
- Focus Group
- Workshop
- Public Information Session

These engagement methods should be reasonably promoted to ensure relevant community members are adequately notified and able to participate. Communications can include:

- Letterbox drop within a reasonable radius of proposed development
- Notification to precinct committee members
- Advertisement in local paper such as Wentworth Courier
- Notices in nearby businesses/community organisations

The *Engaging with Aboriginal Communities NSW Government Practice Note* can help to guide culturally sensitive and responsive consultation with Aboriginal and Torres Strait Islander peoples as part of any SIA.

The information obtained from the consultation methods should actively and clearly inform changes to the proposal, however, only justified, concrete and rational views from stakeholders will be afforded weight.

Consultation should 'close the loop' by informing all participants of the outcome of their involvement and of the determination.

Refer to the *IAP2 Quality Assurance Standard for Community and Stakeholder Engagement* for best practice consultation.

PART F: RESOURCES & REFERENCES

In the preparation of a SIA, applicants may find it useful to draw upon some of Council's strategies and policies to help inform the Baseline section. The below is a non-exhaustive list of relevant documents available on Council's website.

Waverley Council

- Waverley Community Strategic Plan
- Waverley Disability Inclusion Action Plan 2017 - 2021
- Waverley Local Strategic Planning Statement
- Waverley Local Housing Strategy
- Waverley Our Liveable Places Centres Strategy
- Waverley Smart Cities Strategy
- Waverley Community Participation Plan
- Waverley Open Space and Recreation Strategy

Applicants may also wish to review simliar documents from neighbouring Woollahra and Randwick Councils, as well as the relevant Region and District Plan prepared by the NSW Government.

Other sources which may be of use to prepare a Baseline include:

- Australian Bureau of Statistics
- NSW Health Indicators
- Forecast population data (residents and workers)
- GIS / Google audits and mapping
- Arts National Participation Survey
- Aussports
- Greater Sydney Outdoors Survey
- Scanlon Social Cohesion Survey
- Heat Vulnerability Index and Climate Data
- BOSCAR

PART G: SIA SCOPING WORKSHEET

The below worksheet is provided to aid applicants in the preparation of an SIA, and to adequately present the full range of impacts to the community as part of any consultation program.

Consideration		Impact #1	Impact #2	Impact #3
What social impact categories could be affected?	*Refer to page 5. Create a new column for each.*			
Who are the individuals/groups who are expected to be affected?	*Use demographic information, consult with Council officers.*			
What are the likely positive outcomes?	*List all real and perceived positive outcomes of the development.*			
What are the likely negative impacts?	*List all real and perceived negative impacts of the development.*			
What concerns and /or aspirations have people expressed about the impact or outcome?	*Specify for each affected group and impact/ outcome.*			
What is the cumulative impact of this project?	*Identify potential cumulative impacts.*			
What is the duration, intensity, senstivity and level of concern of the impact/s?	*Describe the likely impacts and outcomes in detail.*			
What methods and data sources will be used to investigate this impact?	*Detail how the SIA will be informed, and how the impact will be monitored over time.*			
What mitigation/enhancement measures have been implemented post-investigation?	*Describe any measures taken to ameliorate impacts.*			

X.X SOCIAL IMPACT ASSESSMENT

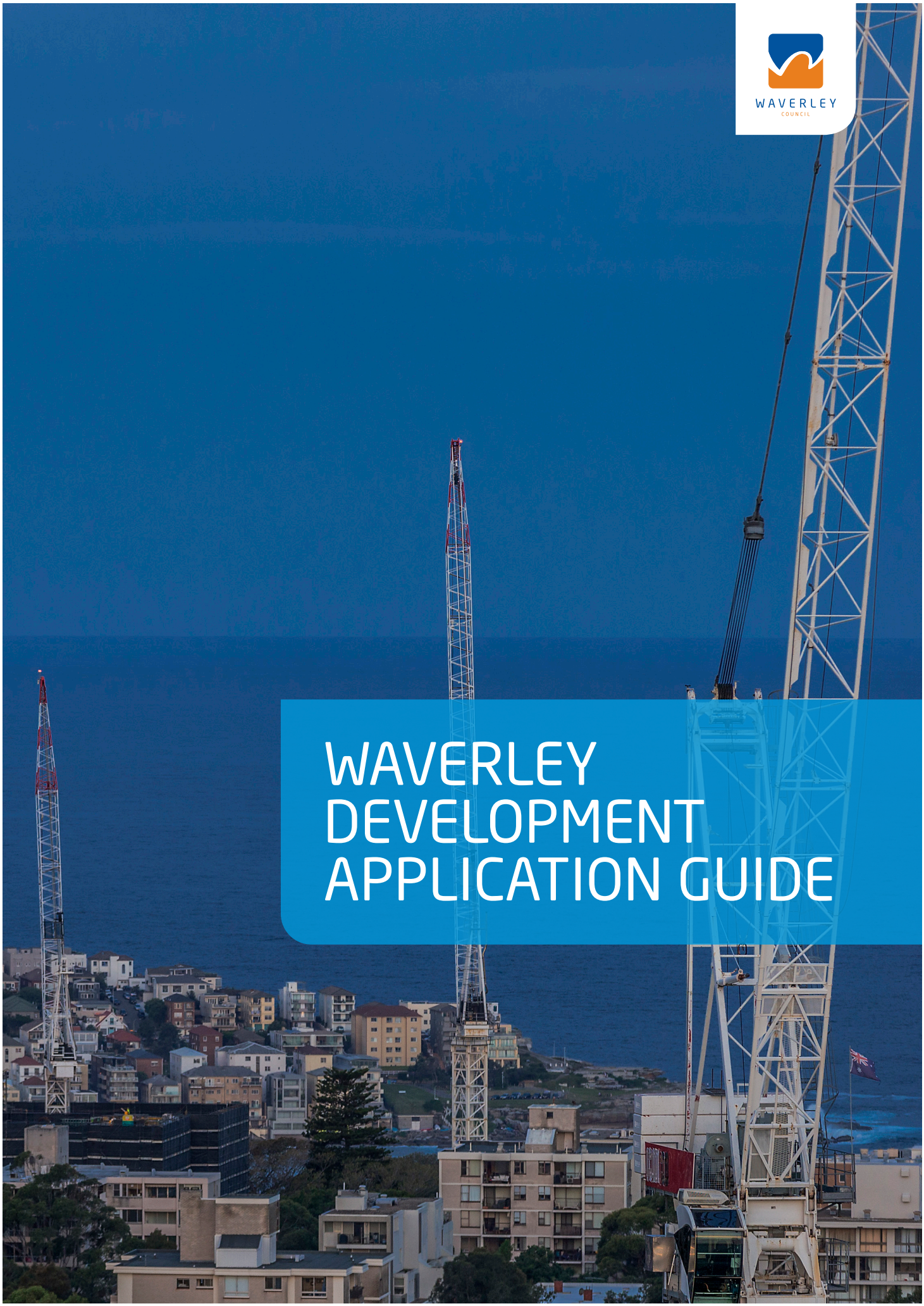
The *Waverley Social Impact Assessment Guidelines 2022* seek to highlight the importance of and guide the assessment of social impacts of proposed development. Applicants of all Development Applications should refer to the Guidelines to understand what Social Impact Assessment is and whether a Social Impact Statement is required for application lodgement.

Objectives

(a) To encourage positive social impacts and mitigate negative social impacts, and increase the validity and reliability of the Social Impact Assessment,
(b) To maximise community benefits and encourage appropriate behaviours.
(c) To reduce cumulative impact of development and ensure diversity in housing.
(d) To ensure that the local community has input into the Social Impact Assessment.
(e) To reduce interaction between children/students/sensitive beliefs and restricted premises/sex service patrons.
(f) To increase access to public open space.
(g) To identify preferred community consultation methods and key planning matters early.

Controls

(a) A Social Impact Statement (SIS) should be prepared if the proposed development is indicated to require one under Part C of the *Waverley Social Impact Assessment Guidelines 2022*. Council officers may request SIS for development not included within the Guidelines at their discretion.
(b) Plan of Management documents prepared as required by the Waverley Development Application Guide should be robust and adhered to.
(c) Co-living development with the capacity to accommodate **20 or more lodgers** must have a full-time on-site manager accommodated within the premises.
(d) Applicants must prepare a locality plan identifying the number and size of the same development type/land use within a **3km** radius, and justify how the addition of a development requiring an SIA will not produce an adverse cumulative impact given the context. This applies to the following development types:
    - Boarding house accommodation
    - Backpacker's accommodation
    - Pubs/registered clubs


WAVERLEY
COUNCIL
WAVERLEY
DEVELOPMENT
APPLICATION GUIDE

Version	Changes	Date
01	New DA Guide prepared to replace DCP Part A2	September 2018
02	Updates to DEAP and WLPP information throughout	March 2020
03	Updates to Public Art and Context Plan criteria	April 2020
04	Updates to model requirements, structural engineers report, shadow diagrams, SEPP updates	June 2022
05	Introduction of Social Impact Assessment Guidelines and Energy Assessment Report requirements	July 2022

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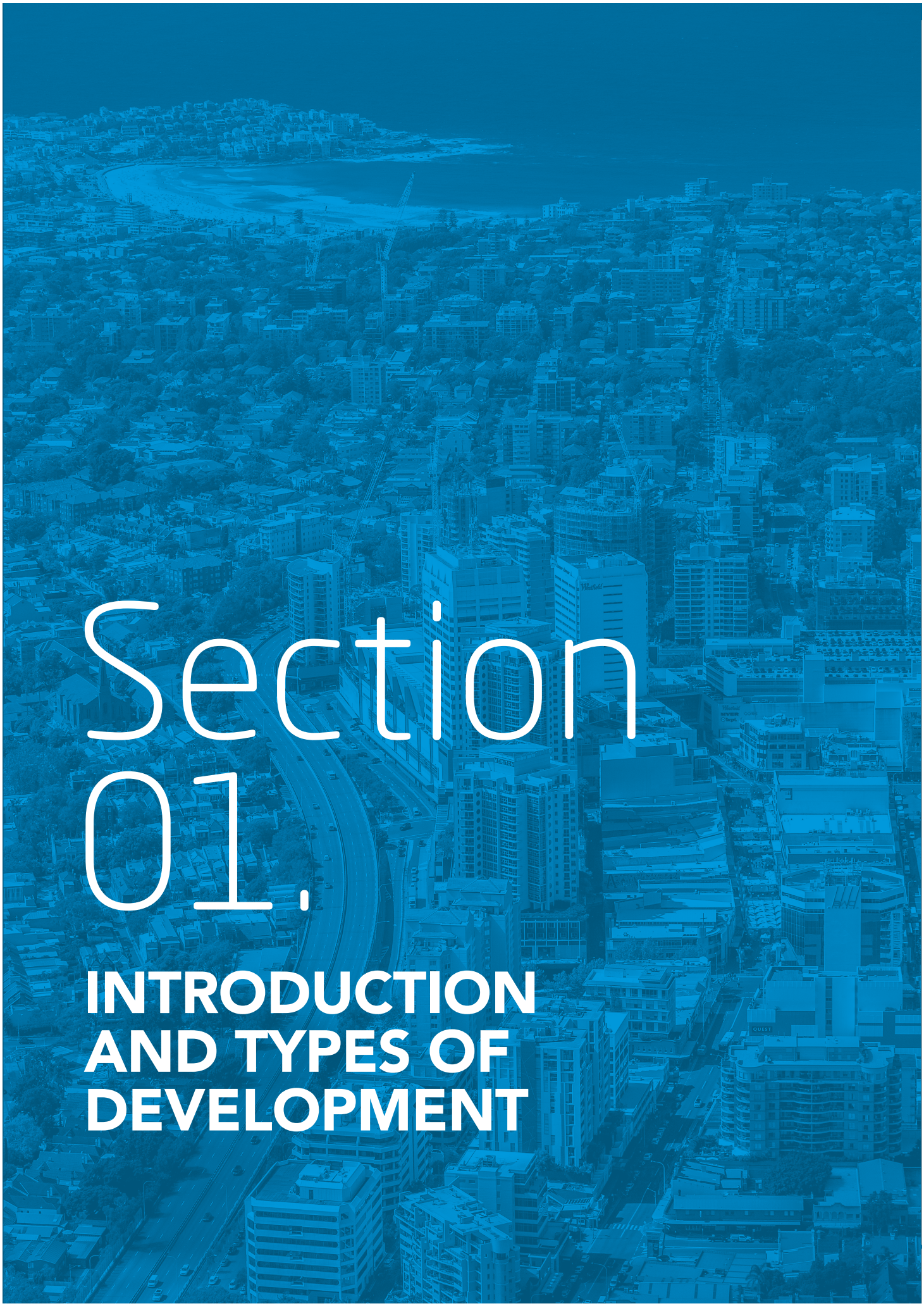


Section 01.

INTRODUCTION AND TYPES OF DEVELOPMENT

INTRODUCTION AND PURPOSE OF THIS DOCUMENT

This guide has been prepared to provide information to applicants regarding Development Applications. Further information regarding the Development Assessment process can be found on Council's website.

The guide is to be read in conjunction with the Waverley Development Control Plan 2012 (WDCP2012), and the Waverley Local Environmental Plan 2012 (WLEP2012).

WHAT IS A DEVELOPMENT APPLICATION

A Development Application (DA) is an application made to Council seeking consent to carry out a proposed development. The development standards and controls for a DA are largely set by Council as well as the NSW Government. Certain requirements can be varied if it results in a development which achieves the objectives of the controls and an improved outcome for a site.

A Complying Development Certificate (CDC) is a fast-tracked approval process that can be used for straightforward developments which have minor environmental impacts. If an application meets specific CDC criteria, it can be determined by Council or an accredited certifier. Requirements for CDCs are set by the NSW Government and apply across the state. These requirements cannot be amended for individual developments.

Exempt development involves minor development that, subject to certain criteria, does not require any approvals. This criteria is also set by the NSW Government and applies across the state.

Applicants are advised to engage an urban planner and architectural professional to provide advice on:

- Whether the proposed development is permissible in the zone;
- Whether a DA is required, or if it the proposal may be 'exempt' or 'complying' development instead; and
- Whether the proposal will meet Waverley's plans, codes and policies.

WHEN IS A DEVELOPMENT APPLICATION REQUIRED

A DA is required for most development within the Waverley Local Government Area. The Environmental Planning and Assessment Act 1979 (EP&A Act 1979) defines development as:

- Demolishing a building or structure;
- Building a residential, commercial or industrial building;
- Making an alteration or addition to a residential, commercial or industrial property;
- Subdivision; or
- Changing the use of a building.

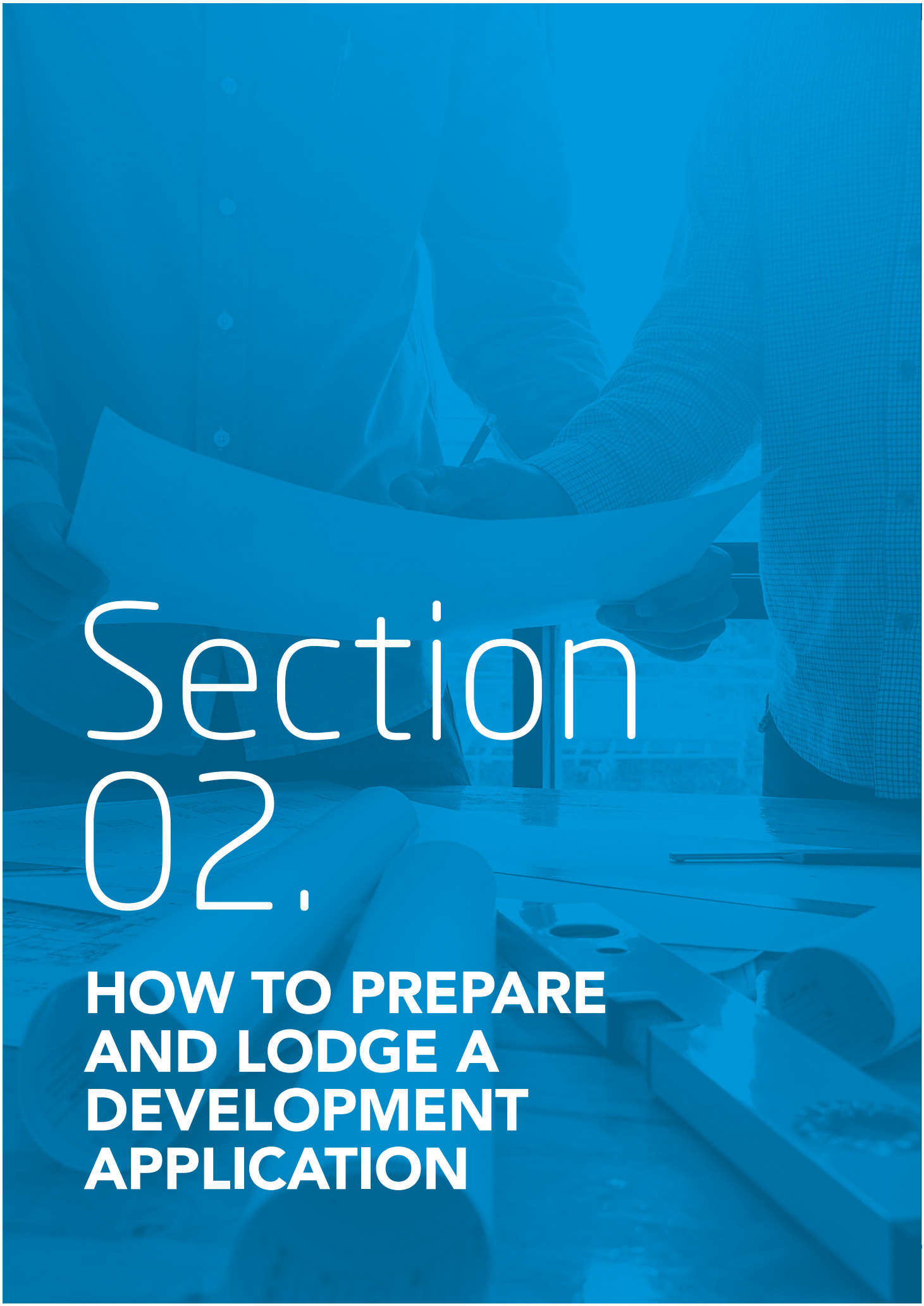
It is the applicant's responsibility to ensure that the relevant planning controls and policies have been identified and satisfied. A DA can be approved by the Waverley Local Planning Panel, the Sydney Eastern City Planning Panel, or the NSW Government, and is assessed in accordance with the development standards established by Council and the NSW Government. If Council, or another determining body, is satisfied with the proposal, development consent for the DA may be granted.

Applicants can obtain a Development Application Pack from Council's Customer Service Centre or alternatively, all relevant forms are available via Council's Website. Council's Customer Service Centre can provide information on DA fees payable, either in person or over the phone.

INTEGRATED DEVELOPMENT

Some development requires approval from another government agency. This is referred to as 'integrated development.' The DA application form lists different activities that may be integrated development.

Please refer to Section 4.46 of the EP&A Act 1979 for more information.



Section 02.

HOW TO PREPARE AND LODGE A DEVELOPMENT APPLICATION

The following process should be followed when preparing and lodging a DA:

1. SEEK ADVICE AND INFORMATION

Council's Duty Planning Officer can provide information on how to locate the planning policies and procedures that may be relevant to a development, however they will not provide design or planning advice, as there is a separate formal process for this (explained below). To contact Council's Duty Planning Officer, call 9083 8484 or email your detailed enquiry to duty.planner@waverley.nsw.gov.au.

Applicants are encouraged to seek planning and design advice from an architectural or planning professional to understand the suitability of the proposal for the site.

2. HAVE A PRE-LODGEMENT MEETING

Some large, complex or sensitive developments may benefit from a pre-DA meeting to discuss likely issues and impacts of the proposed development prior to the assessment of the proposal.

This type of application requires less documentation and supporting information than a DA and provides written advice, identifying issues and a preliminary opinion on the merits of a proposal from senior development assessment staff. This is usually only necessary for significant development proposals or where substantial variations from development controls are being sought or for complex development sites.

Pre-DA consultations cannot determine the outcome of an application and do not bind Council to the advice given. However they do provide useful early advice regarding a proposal and can help in determining whether to proceed with an application. This service is available subject to a fee.

3. PREPARE DA DOCUMENTATION

Your application documentation should include:

- Administrative information including application forms and DA checklist available from Council's website.
- Drawings, models and diagrams to communicate the proposed development.
- A Statement of Environmental Effects.
- Additional supplementary reports and documentation as outlined in Documentation Requirements listed later in this guide

4. LODGEMENT REQUIREMENTS

- As of 1 January 2021, Waverley Council can only accept Development Applications via the NSW Planning Portal. This can be done from your home or office, or the computer available at Council's Customer Service Centre for you to use the online service.
- Contact Service NSW on 1300 305 695 if you need assistance using the online NSW Planning Portal service.
- An invoice for DA fees will be emailed to the applicant once the application has been checked for completeness. Call Council's Planning Counter (9083 8000) to request a fee quote.
- Customer Service Centre: 55 Spring Street, Bondi Junction Mon – Fri, 8.30am-1pm and 2pm– 4pm. (02) 9083 8000

POLICIES AND PLANNING CONTROLS

After determining whether a DA is required, the second step is to find out what policies and planning controls apply to the development.

ENVIRONMENTAL PLANNING INSTRUMENTS

Environmental Planning Instruments are statutory plans made under Part 3 of the Environmental Planning and Assessment Act 1979 that guide development and land use. The two main instruments used in the assessment of development applications are: the Local Environmental Plans (LEP) and a range of State Environmental Planning Policies (SEPPs).

State Environmental Planning Policies (SEPP)

State Environmental Planning Policies (SEPPs) are prepared by the state government and specify planning controls for certain areas and/or types of development. The NSW Legislation website provides a list of SEPPs that may be applicable to development within the Waverley Local Government Area. These policies typically override the provisions in an LEP.

Waverley Local Environmental Plan (WLEP)

This is the principal legal document controlling development within the Waverley Council Local Government Area. It contains information on how land is zoned, what uses are permissible in the zone, and development standards to regulate the extent of development. The WLEP also includes provisions to conserve heritage and the natural environment.

WAVERLEY DEVELOPMENT CONTROL PLAN

The Waverley Development Control Plan (DCP) is prepared by Council and provides information and controls relating to the design and planning of developments. The DCP provisions are structured into two components: objectives and controls. The objectives provide the framework for assessment under each control and outline key outcomes that a development is expected to achieve. The controls contain both quantitative and qualitative provisions. All DA proposals are required to address both the relevant objectives and controls.

GUIDELINES AND COUNCIL POLICIES

There are various guidelines and policies that are appropriate for different types of development available on Council's website including:

- Developer Contributions Plan 2006
- Planning Agreement Policy 2014
- Coastal Risk Management Policy
- Tree Management Policy
- Public Art in the Private Domain
- Waverley Heritage Policy
- Inter-War Factsheets
- Public Domain Technical Manual 2017
- Creative Lighting Strategy
- Water Management Technical Manual
- Social Impact Assessment Guidelines 2022

OTHER STANDARDS AND LEGISLATION

All DAs are expected to comply with:

- Any legislation relevant to the application, for example the Disability Discrimination Act 1992;
- Roads Act 1993;
- The Building Code of Australia (BCA) and National Construction Code (NCC); and
- Relevant Australian Standards (AS).

PLANNING CERTIFICATES

A Planning Certificate (issued under Section 10.7 of the EP&A Act 1979) provides information including land zoning and development standards and controls applicable to a site. Planning certificates can be obtained through Council.

10 ADVISORY AND DETERMINATION PANEL

A DA may be submitted to a range of panels for either advice or determination.

DESIGN EXCELLENCE ADVISORY PANEL

The Waverley Design Excellence Advisory Panel undertakes reviews of development applications (DA's) and Pre-DA's and provide advice to Council staff and the determining authority (Waverley Local Planning Panel or Sydney Planning Panel).

The Design Excellence Advisory Panel is made up of a pool of professionals, independent of Council, with expertise in architecture, landscape architecture, urban design and heritage. Not all applications will be referred to the advisory panel, but the following applications will generally be referred;

- Applications required to be assessed against SEPP 65.
- Significant developments (developments with a value of $20m +).
- New multi dwelling housing, residential flat buildings and other residential buildings (including but not limited to boarding houses, student housing and serviced apartments), mixed use developments, commercial and retail buildings and institutional buildings;
- Significant alterations and additions to buildings in the B1 (Neighbourhood centre), B3 (Commercial core) and B4 (Mixed Use) zones
- Site specific development control plans, master plans for large or major sites and planning proposals.
- Other matters deemed suitable by Council's senior planning staff and managers.

Applications which are referred to the Design Excellence Advisory Panel incur an additional fee. Additional copies of plans will be required to be submitted for the Panel for review. Please refer to the DA checklist for submission requirements.

WAVERLEY LOCAL PLANNING PANEL

The Waverley Local Planning Panel determines significant DAs as stipulated by the criteria set by the Minister for Planning.

The Panel is made up of a pool of planning experts, independent of Council, who meet monthly. Councillors are no longer be involved in the decision-making process for determining those DAs, allowing them more time to focus on strategic planning issues, such as the planning controls that underpin DA decisions.

The following matters will be referred to the Waverley Local Planning Panel for determination:

1. DA that receives 10 or more unique objections or
2. Development that contravenes a development standard imposed by a planning instrument by:
   - more than 10% or
   - non–numerical development standards.
3. Designated development
4. Residential Flat Building, 3 or more storeys in height
5. Demolition of a heritage item
6. Development for the purposes of new premises that will require:
   - a club licence or
   - a hotel (general bar) licence or
   - an on–premises licence for public entertainment venues
7. Development for the purpose of sex services premises and restricted premises
8. DAs for which the developer has offered to enter into a planning agreement.
9. Development for which the applicant or landowner is:
   - the council
   - a councillor
   - a member of staff who is principally involved in the exercise of council's functions under the EP&A Act
   - a member of Parliament or
   - a relative of one of the above.
10. Development Applications that, in the opinion of the General Manager or Director Waverley Futures or delegate should be determined by the Panel for public interest reasons.
11. Applications for review of a decision or modification of a condition made by the Development and Building Unit (DBU) where the DBU does not support the application.

12. Applications for review of decisions or modification of a condition made by the Panel where:
    a. In the case of Section 8.2 reviews of refusals, all applications determined by the Panel or Development Control Committee; and
    b. In the case of Section 4.55 modifications of conditions of a determination made by the Panel or Development Control Committee, where the condition required a design or other change relating to a development standard or unresolved objection.

SYDNEY EASTERN CITY PLANNING PANEL

The Sydney Eastern City Planning Panel:

- determines regionally significant DAs, certain other DAs and s4.55(2) and s4.56 modification applications.
- acts as the Planning Proposal Authority (PPA) when directed.
- undertakes rezoning reviews.
- provides advice on other planning and development matters when requested.
- determines site compatibility certificates under the State Environmental Planning Policy (Housing) 2021
- determines regional development, as outlined in Schedule 6 of the State Environmental Planning Policy (Planning Systems) 2021
- determines development with a capital investment value (CIV)* over $30 million
- determines development with a CIV* over $5 million which is:
    - council related
    - lodged by or on behalf of the Crown (State of NSW)
    - private infrastructure and community facilities (including but not limited to: affordable housing, child care centres, community facilities, correctional centres, educational establishments, group homes, health services facilities or places of public worship)
    - eco-tourist facilities
    - extractive industries, waste facilities and marinas that are designated development,
    - certain coastal subdivisions
    - development with a CIV* between $10 million and $30 million which is referred to the Planning Panel by the applicant after 120 days.

* Capital investment value (CIV) is calculated at the time of lodgement of the DA for the purpose of determining whether an application should go to a Planning Panel - refer to Planning Circular PS 10-008.

Developments which meet State Significant Development criteria are not determined by the Sydney and Regional Planning Panels.

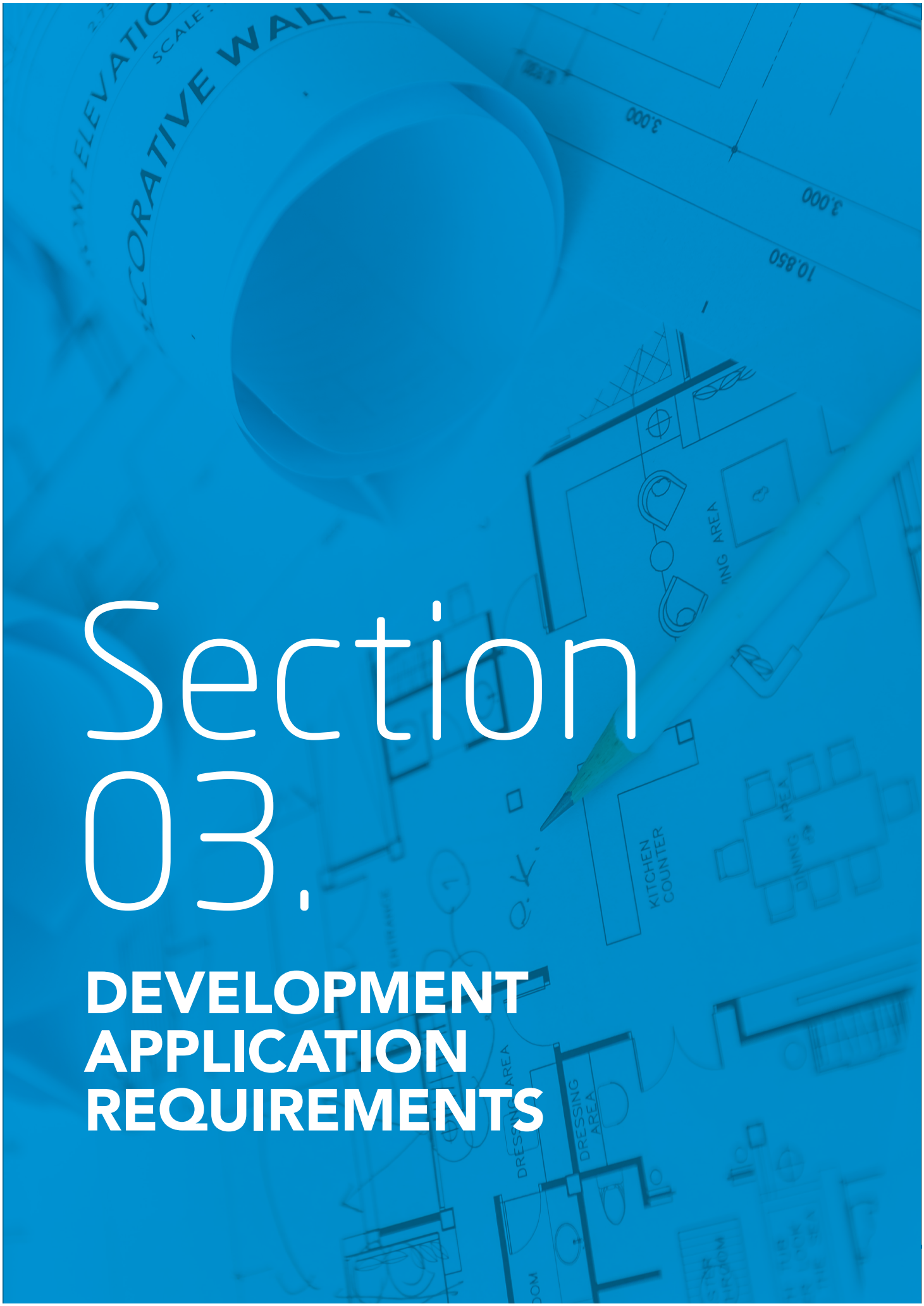
It is the responsibility of council to carry out a proper and professional assessment of a proposal for a Panel's determination of a relevant DA. This will include the public exhibition of the application and assessment of submissions received.

The public panel meeting is an important part of the determination process for a DA. The purpose of the meeting is for the panel to hear those who wish to express their view on a DA before a decision is made.

The Planning Panel's Operational Procedures provide more detail the role of councils and the panel.

NSW GOVERNMENT

The Minister for Planning is the consent authority for State Significant Development (SSD) applications. SSD applications are assessed by the Department of Planning and Environment. In some cases, the Minister may delegate the decision making function to Department staff.
In addition, if an SSD proposal is not supported by the relevant local council(s), or the Department has received more than 25 public objections, the Department's recommendation is referred to the independent Planning and Assessment Commission (PAC) for determination.



Section 03.

DEVELOPMENT APPLICATION REQUIREMENTS

INTRODUCTION

The statutory requirements for supporting information to accompany a Development Application (DA) are established in Schedule 1, Part 1 of the Environmental Planning and Assessment Regulation 2000 (the Regulation). The additional information outlined below ensures the level of detail provided is adequate to assess each DA and will not lead to delays in the processing of an application.

It is recommended that applicants seek the services of professional architectural and urban planning consultants for guidance and assistance. The required skills and expertise will vary depending on the nature and scale of a development.

In some circumstances it may be appropriate to seek advice before lodging a DA through Council's formal Pre-DA process, the requirements of which have been explained earlier in this guide.

This section details all the documentation requirements for each type of development application.

MAPPING INFORMATION

Council provides an Online Mapping Tool - Planning Map available at:

http://www.waverley.nsw.gov.au/building/planning_a_development/online_maps

The tool enables users to gather planning related information about their property, using various 'layers.' The tool has multiple layers that can be applied, to provide information about a property. Where a layer is to be used to determine whether a Documentation Requirement applies, the layer is entitled 'OMT Layer: Layer Name.'

Where this tool is relevant to development controls, the map and layer is identified throughout the WDCP2012 in the format of the box shown below.

Waverley Online Mapping Tool	
planning.waverley.nsw.gov.au/connect/analyst	
Layer	Geotechnical Hazard
	Coastal Inundation

Note: Council aims to ensure that the data on the Online Mapping Tool is correct and up to date at all times. In the case of a discrepancy between the WLEP2012 or another Environmental Planning Instrument and the Online Mapping Tool, the WLEP2012 or Environmental Planning Instrument available on the NSW Legislation website is to take precedence.

DOCUMENTATION DETAILS

The following information is required on all drawings:

- Title Block showing:
  - Name of Architect or Draftsman
  - Plan/Drawing number and date
  - Amendment number and date (where relevant)
  - Applicant's name
  - Address of property
- Orientation – Include a north point (true north) on plans.
- Scale – Show a ration and bar scale. Use a standard scale of 1:50 or 1:100 when printed on A3. A scale of 1:200 may be used for the site plan, and 1:500 for the site context.
- Levels – Plans and elevations must show levels relative to Australian Height Datum (AHD)
- BASIX requirements
- Colours – Differentiate proposed alterations and additions from the existing building and any demolition.

All other documents must provide the following information:

- Author of document
- Professional qualifications to prepare the document (where relevant)
- Preparation date
- Amendment number and date (where relevant)
- Applicant's name
- Address of property

DOCUMENTATION REQUIREMENTS

The following table identifies the documentation requirements for all types of DAs. The level of detail included depends upon the size of the proposal and the likely environmental impacts. Where the proposal raises particular issues, it may only be necessary to submit details relevant to those issues. After receiving a DA, an applicant may be requested to provide additional information if necessary for the determination of the application.

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DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
All forms and checklists are available at **waverley.nsw.gov.au**		
DA Form & Checklist	All Development Applications	Requires owners consent (and the owners corporation seal where applicable) and brief description of the proposal.
Political Donations and Gifts Disclosure Statement	As required under Section 10.4(4) of the EP&A Act 1979.	Provides for the disclosure of relevant political donations or gifts as per Section 10.4(4) of the EP&A Act 1979. See: **legislation.nsw.gov.au**
Form for Non-Residential Development	All new or change of use for non-residential development.	Prompts what additional information is required regarding the management of the proposed use.
Compulsory Documentation		
Survey Plan	All development excluding minor alterations and additions.	Survey to be prepared by a Registered Surveyor to AHD and to show existing natural ground level, levels of existing building including roof/roof eaves, levels of window sills, and the level of adjoining roof/roof eaves. The survey should also show the location and levels of any existing buildings and on adjoining sites.
Site Plan	All development applications. The level of detail included in the plan will be dependent on the scale of the proposed works.	A Site Plan must be at a scale of not less than 1:200 and include: • The location, boundary dimensions, site area and north point of the land; • Existing levels of the land in relation to buildings and roads to Australian Height Datum; • Existing vegetation and trees (including their botanic name and size) of trees proposed to be removed and retained; • Proposed private open spaces and landscaped areas; • The location of other natural features on the site e.g. rock/ sandstone outcrops, watercourses; • The location and levels of existing buildings, fences and other structures; • The location and levels of any proposed new buildings or alterations and additions to existing buildings; • The location, levels and uses of buildings (including location of windows) on the adjoining land; • Waste bin storage and collection areas; and • Location of easements and services on the site and immediately adjoining the site.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Site Analysis Plan	All Development	The Site Analysis can be demonstrated by plan at an appropriate scale, and shall include, but is not limited to: • Property details including site boundaries, dimensions and area. • Encumbrances such as easements or rights of way. • Orientation, aspect, views and microclimate. • Existing noise sources, light spillage and overshadowing. • Landform including contours or spot levels, areas of landfill. • Landscape including existing trees, vegetation and natural features. • Services and infrastructure including stormwater drainage. • Access and street features including roads, poles, footpaths, driveways. • Predominant front and rear setbacks. • Existing development including buildings, fences, driveways. • Existing heritage or archaeological features on or adjoining the site. • Existing land and development adjoining the site. • Proposed development. In addition, submit a written statement in the Statement of Environmental Effects, supported by photographs, demonstrating how the proposed design responds to the constraints and opportunities identified in the site analysis.
Context Analysis	All development within a Heritage Conservation Area. All development of Heritage Items, Multi Residential Development, and Mixed Use Developments. Places of public worship. Development located in a B1, B3 or B4 zone.	Submit a written document describing how the design proposal has considered and responded to the surrounding context. This document should include photos, illustrations and descriptions of: • Existing buildings and uses • Neighbouring buildings and uses • Streetscape and heritage characteristics • Business / local centre characteristics • Stormwater and drainage • Trees and landscaping • Views • Privacy • Traffic, transport and parking • Access • Sunlight • Ventilation For more information refer to WDCP2012 Part B12 Design Excellence Section 12.2 Context and Site Analysis. The site analysis should detail how the proposed development or change of use will affect the site, the streetscape and surrounding properties, and also analyse the existing conditions of the site to identify the opportunities and constraints. The Context Analysis is to include a written statement describing: • How the design proposal has considered and responded to the context; and • The nature and degree of consistency of the built form and character within the streetscape.

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DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Streetscape Analysis	Development that proposes a new vehicle crossing (driveway).	A Streetscape Analysis must: • Provide a comparison between the current and proposed on-street parking provision and layout; • Provide an analysis of the character of the street and whether vehicular access will adversely impact the streetscape; and • Demonstrate how pedestrian and cyclist accessibility and safety is maintained.
Floor, Elevation, Roof Plans and Sections	All development applications involving building work and change of use.	Floor Plans must be at a scale not less than 1:100 and include: • Existing and proposed works on each floor including roof plans; • Calculable GFA for proposal; • Room sizes and intended uses/works; • Ventilation systems, air conditioning, solar panels and satellite dishes; • Setbacks from boundaries and adjoining buildings including window openings, doors and external living areas; • Outdoor spaces, such as balconies with dimensions and any ancillary structures; • Details of any devices/measures to address amenity issues e.g. screening, window details; • Fencing or retaining walls; • Swimming pools/spas and associated works including the location of the pool filter and pool motor; RLs of the pool coping in relation to the existing ground levels of the subject premises and adjoining premises; and • External lighting. The Roof Plan must be at a scale not less than 1:100 and include: • All ventilation systems, air conditioning, satellite dishes and screening. Elevation Plans must be at a scale not less than 1:100 and include: • Outline of existing buildings; • Elevations of all sides of the building or structure; • Materials and external finishes; • Location of adjoining buildings showing height and setback; • Proposed window details; • Chimney, lift motor rooms, air conditioning units, solar panels, satellite dishes, and other structure associated with the roof. Section Plans must be must be at a scale not less than 1:100 and include: • Appropriate number and location of each section; • Section line; • Room names; • Areas of cut/and or fill; • Finished ground levels, floor levels, roof line levels and driveway grade; • Location of existing trees; and • Ground level from survey.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Shadow Diagrams	All development applications for dwelling houses or dual occupancies. All development applications for Multi Residential Development, Mixed Use Development and Commercial Development greater than 1 storey in height. In both cases above, there may be exceptions where the Council officer considers otherwise in regards to the circumstances of the case.	Shadow diagrams must be at a scale not less than 1:100. Where a proposal exceeds the height control in the DCP or LEP a diagram is to be provided which compares a compliant height to the proposed height to determine the additional shadow impacts and be demonstrated as a view from the sun diagram. Shadow diagrams should include: • North point (true north); • Position of existing and proposed buildings and fences; • Position of buildings on adjoining land including windows to living areas; private outdoor open space; swimming pools and solar panels; • Shadows cast during the winter solstice for 9am, 12 noon and 3pm (show altitude and azimuth angles); • Change(s) in shadows from existing development to proposed development; and • If the proposal is likely to overshadow, the windows of adjoining building(s), provide an elevation to show shadow impacts.
Landscape Plan – Low Density Residential	Alterations and additions to development to which WDCP2012 Part C2 - Low Density Residential applies.	The plan must demonstrate an understanding of the site and its context having regard to the coastal location and sandy soil. The plan is to be prepared in accordance with Part B3 Landscaping and Biodiversity. The Plan is to include a plant species list, showing the botanical and common names of plants, pot size of plants, number of plants and the area of origin of the plant material. For properties containing or adjoining remnant vegetation, habitat corridors or recognised habitat, (See Part B3 - Landscaping and Biodiversity) the landscape plan should be consistent with the relevant section of the Biodiversity Action Plans – Remnant Sites or Habitat Corridors. The Plan must include all proposed changes to landscaped space including: • Existing levels and finished levels (indicating the extent of cut and fill) • Provision of deep soil areas (deeper than 400mm); • Any landscaping to be retained; • Any trees to be removed; • Proposed new planting (species, pot size, mature height and quantity); and Proposed surface treatments (e.g. turf, paving, etc.)

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DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Landscape Plan – All Other Development	All new developments excluding development in Business Centres. In cases where additions to existing buildings include alterations to landscaped open space. Landscape works.	Landscape Plan must be prepared by a suitably qualified and experienced landscape architect or landscape designer (minimum of Diploma, and eligibility for membership with AILA or AILDM). The plan must demonstrate an understanding of the site and its context having regard to the coastal location and sandy soil. The plan is to be at a scale not less than 1:100. The plan is to be prepared in accordance with Part B3 Landscaping and Biodiversity. The Plan is to include a plant species list, showing the botanical and common names of plants, pot size of plants, number of plants and the area of origin of the plant material. For properties containing or adjoining remnant vegetation, habitat corridors or recognised habitat, (See Part B3 - Landscaping and Biodiversity) the landscape plan should be consistent with the relevant section of the Biodiversity Action Plans – Remnant Sites or Habitat Corridors The plan must include all proposed changes to landscaped space including: • Existing levels and finished levels (indicating the extent of cut and fill) • Provision of deep soil areas (deeper than 400mm); • Any landscaping to be retained; • Any trees to be removed; • Proposed new planting (species, pot size, mature height and quantity); and Proposed surface treatments (e.g. turf, paving, etc.)
Water Management Site Plan	All development applications except for internal works.	Plans are to be in accordance with the Waverley Water Management Technical Guidelines.
Stormwater Management Plan	All development (excluding minor alterations and additions) on land identified as, or land adjacent to, remnant vegetation in the Terrestrial Biodiversity Maps in WLEP2012. Also identifiable on OMT Layer: Biodiversity.	A stormwater management plan must be submitted with the development application that demonstrates the proposed measures that will be adopted to ensure no adverse environmental impact is imposed on any remnant vegetation. Such measures could include sediment fencing to retain stockpiles on site or geotechnical fabric to protect stormwater drains.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Subdivision / Strata Plan	All development applications proposing to torrens subdivide or strata subdivide land.	The Plan is to include: • Existing and proposed subdivision boundaries; • The number of lots; • Any easements or encumbrances; • Lot areas in square metres; • Lot and deposited plan numbers; and • Proposed common property and private property for strata plans.
Statement of Environmental Effects (SEE)	All development applications.	An SEE outlines the proposal and addresses all issues for consideration and assessment. The SEE must outline: • The details of the proposal; • The suitability of the site for the proposed development; • Explain how the proposal has resolved the relevant matters contained within Section 4.15 of the EP&A Act 1979; • Compliance with any relevant Environmental Planning Instruments including SEPPs, and the WLEP2012 and WDCP2012; • Where any relevant controls are not satisfied justification for the non-compliance must be provided; • The likely environmental impacts of the development on the natural and built environment; • The steps to be taken to protect the environment or to lessen the expected harm to the environment; • Any likely social or economic impacts from the development; • If the non-compliance relates to a development standard in WLEP 2012 (e.g. Lot size, building height and floor space ratio), a statement addressing Clause 4.6 of the WLEP2012 must be provided for consideration. • The existing and proposed bedroom and unit numbers for boarding house and residential flat building development
Cost Report	All development applications	Costs <$500,000, a detailed cost report is required prepared by a suitably qualified person. For development costs ≥ $500,000, a Registered Quantity Surveyor's detailed cost report is required. Council reserves the right to verify the accuracy of any cost report and may adjust DA Application Fees and Development Contributions accordingly.
BASIX Certificate	As required by State Environmental Planning Policy (BASIX Sustainability Index) 2007.	Certification is to be submitted to ensure the development satisfies suitability targets prescribed by the NSW Government. Site, floor elevation and landscape plans must identify BASIX commitments. If a swimming pool is proposed, the BASIX pool requirements must be shown on the plans. See: **basix.nsw.gov.au**

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DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Development Specific Documentation		
Arborist Report	Where a development has any potential impact on existing trees an arborist report must be submitted. A report may be required where a tree is: • Listed on the significant tree register or heritage listed. • Considered hazardous or dangerous. • Council considers prominent due to age, amenity, size or habitat and likely to be affected by a proposed development; or • Council considers the submitted information is insufficient and further information/clarification is required.	The report must: • Be in accordance with the Australian Standard 4970 – 2099 - Protection of Trees on Development Sites; • Include recommendations for minimising loss of landscape amenity; • Be thorough, balanced and objective in assessing the impact on a tree/s health and condition; • Be written by a qualified arborist with the minimum qualification of Level 5 AQF (Australian Qualification Framework) or equivalent; • Identify each tree with reference to the survey plan; and • Meet the criteria as outlined in Council's Tree Management Policy Appendices.
Archaeological Assessment	Applications involving development on land identified as Archaeological in the WLEP 2012 Heritage Maps.	See: **heritage.nsw.gov.au**
Access Report	Where disabled access is required under the Disability Discrimination Act 1992.	To be prepared by a suitably qualified professional. If claiming exceptional circumstances as reasons for a proposal not complying with the requirements of the Disability Discrimination Act 1992, the application must be addressed in the access report. For more information please refer to **humanrights.gov.au**
Adaptable Housing Plans	All new development with 3 or more habitable storeys or 10 or more units.	Adaptable units must be identified on all floorplans as 'adaptable housing units'. A plan is to be included for each dwelling type that demonstrates the layout before and after adaptation.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Acoustic Report	Mixed Use Development comprising non-residential uses and residential uses, or Commercial and Retail development within a residential area. Child care centres. Council may request an acoustic report on any DA as deemed reasonable, necessary and appropriate to the assessment of the proposal. Development involving: • extension of trading hours; • a review of trial period is sought; and • a live entertainment venue.	The acoustic report must include, but is not limited to: • Identification of sensitive noise receivers potentially impacted by the proposal; • Quantification of the existing acoustic environment at the receiver locations (measurement techniques and assessment period should be fully justified and in accordance with relevant Australian Standards and NSW Environmental Protection Authority (EPA) requirements; • Formation of a suitable assessment criteria having regard to the guidelines contained in the NSW EPA Industrial Noise Policy; • Identification of operational noise producing facets of the proposal and the subsequent predictions of resultant noise at the identified sensitive receiver locations from the operation of the use. Where appropriate the prediction procedures must be justified and include an evaluation of prevailing atmospheric conditions that may promote noise propagation; and/or • A recommendations statement indicating the development/use will comply with the relevant criteria together with details of acoustic control measures incorporated into the development/use so that there will not be adverse noise impacts to surrounding development.
Advertising and Signage Documentation	All applications for advertising or signage.	All applications for advertising and signage are to include sections and elevations. • Details of all advertising proposed for the site, including: • Number of signs proposed • Location and size of signs proposed • Lettering content for each sign • Colours to be used • Information about electronic, illuminated or animated signage • Plans drawn to an appropriate scale showing the location and size of all proposed advertising on the building. Photographs detailing the site and the relationship of the proposed advertising to that on adjoining buildings and the streetscape.
Car Share Letter of Support	All development proposing car share spaces.	A letter from a commercial car share operator is to be provided confirming their intention to place one of more car share vehicles within the development.

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DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Crime Risk Assessment	Applications for new residential development comprising of 50 or more dwellings.	A crime risk assessment is to be prepared in accordance with the Crime Prevention Principles outlined in the 'Crime Prevention and the assessment of development applications' Guidelines under Section 4.15 of the EP&A Act 1979.
Coastal Risk Assessment	All development on land identified on the Waverley Online Mapping Tool on layers: *OMT Layer: Coastal Inundation*	A Coastal Risk Assessment must be prepared by a suitable qualified expert in accordance with the Waverley Coastal Risk Management Policy.
Digital 3D Model	Any development that proposes to make amendments to a building's existing envelope within the B3 Commercial Core or B4 Mixed Use Zone. For all other zones - Any development that proposes to make amendments to a building's existing envelope, which will result in a building height of 12 metres or more.	A 3D digital model of the building must be generated at a scale of 1:1 with units of measurement in metres and include the following: • a building envelope which includes all elements affecting shadow analysis; • accurate placement of glazing, balconies, roof pitches, terraces, roof services and any other prominent external design features; • neighbouring dwellings impacted by the proposal (for sites outside the Bondi Junction B3 Commercial Core or B4 Mixed Use Zone); • ground level terrain showing accurate RLs extending to site boundaries; • internal floor plate of each level showing accurate RLs. All models must be generated in accordance with Council's Requirements for Submitting a Digital 3D Model. Any future modifications (under Section 4.55 of the EP& A Act 1979) that affect the external configuration of building (from the ground level and up) require an amended model to be submitted. See: **waverley.nsw.gov.au**
Electric Vehicle Charging Point Locations	All commercial developments. All mixed use and multi-residential developments with more than 5 dwellings.	Charging point locations and details are to be identified on DA Plans.
Energy Assessment Committment	New mixed use and commercial development with a cost of works of $3 million or greater. Not required for residential-only development.	Applicants are to demonstrate a commitment to achieving the reduced operational energy use and greenhouse gas emissions as outlined in Section B2.5 Energy Assessment. This can be demonstrated via an intended sketch and draft outline of measures, and evidence that a suitably qualified professional has been engaged for the process. A detailed Energy Assessment Report will be required as a condition of consent.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Fire Safety Upgrade Report	For all major alterations and additions to Multi Residential Development, Mixed Use Development, and Commercial buildings or where required by Council's Fire Safety Officer.	The fire safety upgrade report is to be prepared by a suitably qualified surveyor/accredited certifier which outlines an assessment of the levels of fire and life safety within the existing and proposed development and proving appropriate recommendations for its upgrade.
Flood Risk Assessment and Risk Management Plan	All new buildings and significant alterations and additions in 'flood planning areas' as identified in the *WLEP 2012 Flood Planning Map.*	Risk Assessment and Risk Management Plan is to be in accordance with the Waverley Water Management Technical Guidelines.
Geotechnical Report	All development on land identified on the Online Mapping Tool layers: OMT Layer: Geotechnical Hazard OMT Layer: Coastal Inundation Also required where excavation is: • proposed for development at or near cliff faces; • greater than 2m; and/or • on sites that have a slope of 25% or more. If Council deems appropriate a report may be requested.	A geotechnical report must be prepared by a suitably qualified geotechnical engineer addressing the stability of the site and surrounding properties. Where excavation is close to a boundary the report must address how the works will be undertaken so as not to adversely affect surrounding properties. If the property is identified on the Geotechnical Hazard or Coastal Inundation layers refer to the Waverley Coastal Risk Management Policy.
Green Travel Plan or Workplace Travel Plan	A Green Travel Plan or Workplace Travel Plan is mandatory for all developments: • With over 2,500m² for office / commercial/ retail land uses; • Including 15 dwellings or more; • Where 50 or more employees are proposed; • Places of public worship; or • As deemed necessary by Council.	A travel plan must include: • Targets – this typically includes the reduction of a single occupant car trips to the site for the journey to work and the reduction of business travel. • Travel data – an initial estimate of the number of trips to the site by mode is required. • Measures – a list of specific tools or actions to support and achieve the targets. See **pcal.nsw.gov.au** and **travelsmart.gov.au**

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DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Green Roof/ Wall Design Statement	All green roof or green wall works. Refer to *WDCP2012 Part B3 Landscaping and Biodiversity Section 3.1.3 Green Roofs and Walls.*	The Green Roof/Wall Design Statement must include: • The anticipated load of the green roof or wall, by a structural engineer. • Evidence the green roof or wall has been assessed as part of the structural certification for the building. • Evidence the green roof or green wall has been assessed as part of the waterproofing certification for the building. • A cross-sectional diagram that details all the components of the green roof or green wall. • The location of existing and proposed structures • Drainage, irrigation and waterproofing, and overflow provisions. • Earthworks and mounding and retaining walls and planter boxes (if applicable). • The proposed growing medium, with soil types and depth • The location, species and numbers of plants likely to be used. • Safety features such as balustrades and maintenance hooks (if applicable). • The parts of the green roof that are accessible and inaccessible. • How a green wall is attached or fastened to the wall. A maintenance plan detailing arrangements for inspection and maintenance, including waterproofing membrane, drainage and irrigation.
Heritage Conservation Management Plan	Applications involving: - a change of use of a heritage item of State heritage significance; - any alteration to the fabric or setting of a heritage item of State heritage significance which requires consent; or - substantial alterations and or additions to a heritage item considered by the Council to be of high local significance, unless the consent authority determines that it is not required.	See: **heritage.nsw.gov.au** The conservation management plan is to include: • the investigation of the physical and documentary evidence of the heritage item; • a comparative analysis and curtilage assessment; • assessment of the significance of the heritage item; • the investigation of the constraints and opportunities for the item including the owner's needs and resources, and external constraints; • conservation policies which address the following: i. conservation of the fabric and setting of the heritage item; ii. appropriate uses of the heritage item; iii. appropriate ways to interpret the significance of the heritage item; iv. management of the heritage item; v. guidelines for future development; and • priorities for instigation of conservation policies.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Heritage Conservation Management Strategy	May be applicable in place of a Conservation Management Plan for heritage items of local significance.	A conservation management strategy is to be prepared in accordance with the guidelines available from the Office of Environment and Heritage.
Heritage Impact Statement	Applications relating to a heritage item, sites within a heritage conservation area, or on sites within the vicinity of a heritage items.	A Heritage Impact Statement is to be prepared by a qualified heritage architect/planner (in accordance with the NSW Heritage Manual and the Burra Charter) and include: • An assessment of the impact of works on the site, item and/ or conservation area; • Include a history of the property; and • Before and after photos. Council may also require the submission of a Heritage Conservation Management Plan.
Housing Report	Applications which may result in the loss of affordable housing in accordance with State Environmental Planning Policy (Housing) 2021. This includes: • Applications to strata subdivide an existing building with multi dwelling housing (aka. residential flat building), • Or an application for the demolition of a building with multi dwelling housing, • Or significant alterations and additions to a multi dwelling housing which is not strata titled.	The report is to address all relevant provisions of the Housing SEPP including Chapter 2 Part 3 Retention of existing affordable rental housing. The report must assess whether the proposal will result in a loss of affordable housing in accordance with the Housing SEPP due to the proposed development (including strata subdivision). Please refer to the Housing SEPP for further information. See: **legislation.nsw.gov.au**
Integrated or Designated Development	All integrated or designated development.	An application for integrated or designated development must include: • sufficient information for the approval body to make an assessment of the application; • additional copies of the plans as determined by the consent authority; and • an additional fee for each approval body and administrative fee to Council.
Loading Vehicles Plan of Management	Applications for development as identified in *WDCP2012 Part B8 Section 8.3 – Loading Facilities.*	The Loading Vehicles Plan of Management is to be submitted when a development proposes less loading spaces than required by Table 4 in *WDCP2012 Part B8 Section 8.3 – Loading Facilities.*

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DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Photo-montages	Photomontage is required for: • SEPP 65 applications • Multi-residential development • Mixed use development • Development subject to Part E of the WDCP • New dwellings Council may require a photomontage for smaller scale development than those listed.	A Photomontage should: • Be a three-dimensional perspective of the proposal in relation to the existing streetscape; and • Include at least 2 sites on either side of the subject site.
Open Space Plan	Places of Public Worship Educational Establishment	The Open Space Plan is to: • identify the amount of open space area to be provided; • identify the types of open space area to be provided, including indoor and outdoor recreation facilities; • identify any potential opportunities for public access to the open space when not in use by the place of worship; and • identify the likely effects of the use of open space areas on the amenity of nearby residents (including how often and the type of activities to occur) and measures to mitigate and manage the impacts of noise on adjoining properties.
Planning Agreement	Where a Planning Agreement is being offered.	Applications are to be submitted in accordance with the Waverley Planning Agreement Policy.
Preliminary Contamination Report	Applications on land that is or may be potentially contaminated.	Applications are to address State Environmental Planning Policy (Resilience and Hazards) 2021 See: **legislation.nsw.gov.au**
Public Art Plan	For developments located in a B1, B3 or B4 zone with a construction value exceeding $10 million. Any DA's proposing public art. For more information, refer to *WDCP2012 Part B11 Public Art,* and Council's *Public Art in the Private Domain Policy.*	Developments located in a B1, B3 or B4 zone and with a construction value exceeding $10 million are required to integrate a public artwork into the development to a minimum value of 1% of the construction costs (excluding administration and associated costs). Submissions are to be in accordance with Council's Public Art in the Private Domain Policy and include: • Description of art; • Budget and cost summary; • Timeframe and staging; • Personnel; • Concept scaled drawings, samples and finishes; and • A plan of implementation and the ongoing management of the artworks.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Plan of Management	Development of: • Shared Accommodation • Tourist and Visitor Accommodation including Hotel or Motel Accomodation • Child Care Centres • Late Night Traders • Licensed Premises • Restricted Premises • Tattoo Parlours/Studios • Places of Public Worship • Boarding House Accommodation In situations where a building is unable to provide access as per the Disability Discrimination Act 1992 due to unjustifiable hardship. As deemed reasonable, necessary and appropriate to the assessment of the proposal by Council. Where a premise applies for: • an extension of trading hours; • a review of trial period; • is proposing live entertainment; or • is in the opinion of Council to have the potential to create an acoustic impact a Plan of Management is to be submitted with the DA.	A Plan of Management is to include at minimum: • Description of the proposal; • Proposed management; • Hours of operation; • Set out measures taken to mitigate any likely adverse environmental or social impact including but not limited to: control of users/patrons/ residents entering and exiting premises, use of common areas, on-site staff and/or security measures, user/patron/resident parking arrangements, external lighting arrangeemnts and waste management. • Proposed vehicles ingress and egress, the adequacy of any loading, unloading, turning or parking facilities; • Existing and likely future amenity of the neighbourhood; • Traffic likely to be generated and the adequacy of existing roads and present volume of traffic carried; • Whether public transport will be necessary to serve the development, availability and adequacy of public transport; • Social and economic effects of the development on the community, including the loss of affordable housing; • How complaints will be handled. • Any special circumstances relating to the site or the locality; and Additional requirements as specified within the WDCP.
Reflectivity Report	Applications for buildings which incorporate large areas of glazing (either clear or highly reflective) in external surfaces above ground floor level. Refer to *WDCP2012 Part B16 Public Domain Section 16.4 Reflectivity.*	Solar reflectivity report prepared by a suitably qualified consultant. Report must document whether luminance intensity of 500 candelas / m2 (as calculated by Holladay formula) will be exceeded. Alternatively specify the limiting reflectivity such that luminance intensity of 500 candelas / m2 is not exceeded. Report is to propose measures to reduce potentially undesirable / hazardous solar reflections.
Schedule of external finishes	For all new development. For significant alterations and additions to existing buildings. In all other cases materials and finishes are to be indicated on illustrated elevations and plans.	Details of all external finishes proposed is to be submitted.

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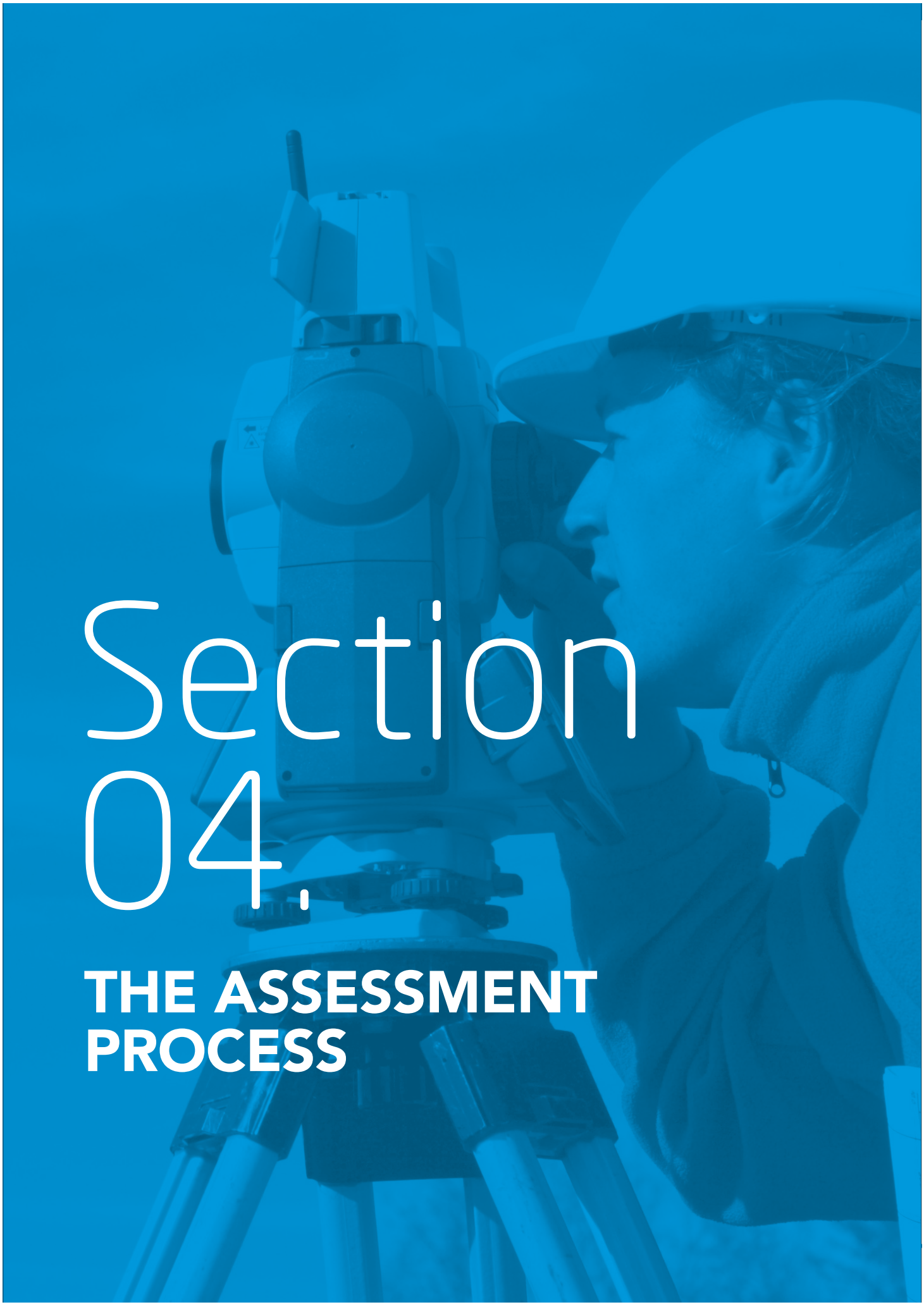
DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
SEPP 65 Assessment and Design Verification Statement	Applications to which State Environmental Planning Policy No 65 – Design Quality of Residential Flat Development	Requirements include: • An explanation of the design in terms of the design quality principles set out in Part 2 of State Environmental Planning Policy No 65 – Design Quality of Residential Flat Development; • Photomontages or photos of the model of the proposed development in the context of surrounding development; • A design verification statement by a registered architect; and • Applicable fee for referral. Please refer to the Apartment Design Guide to confirm submission requirements.
Site Compatibility Certificate	Applications in accordance with: • State Environmental Planning Policy (Housing) 2021 • State Environmental Planning Policy (Transport and Infrastructure) 2021	Certificates are to be in accordance with the relevant SEPP. See: **legislation.nsw.gov.au**
Site Waste & Recycling Management Plan	**All development** excluding minor internal alterations.	A Site Waste & Recycling Management Plan must be completed and submitted with applications. See: **waverley.nsw.gov.au**
Structural Engineers Report	Applications which propose a substantial amount of the existing building (i.e. more than 50% of the original building).	The report is to be prepared by an appropriately qualified structural engineer and is to determine whether the existing building fabric will be able to remain standing with the proposed demolition works; and provide recommendations to ensure that the remaining fabric will remain in place during construction. Should the report not be able to conclude this, then the application is to be submitted as a DA for a new building and will be assessed as such against the DCP and BASIX requirements.
Social Impact Statement	Applications in accordance with the Waverley Social Impact Assessment Guidelines 2022, and where requested by Council Assessment Officers.	**Requirements include:** • Identification of existing social baseline; • Assessment of change to social baseline by proposal; and • Identification of negative social impact mitigation measures and positive social impact enhancement measures. Additional requirements as specified within the Waverley Social Impact Assessment Guideline 2022.

DEVELOPMENT APPLICATION REQUIREMENTS

Plan / Document	When Required	Information
Traffic and Transport Management Plan	Applications for development as identified in *WDCP2012 Section B8 Transport: 8.6 Traffic and Transport Management Plans.*	The plan should provide an assessment of the traffic and parking impacts the development proposal may have on the surrounding road network and must address matters such as: • Current on street parking restrictions and availability; • Current traffic conditions; • The likely impact of the proposed development on existing traffic flows, the surrounding street system and on street parking availability; • Safety of pedestrian and vehicular movements in and around the centre; • How impacts of drop-off and pick up will be accommodated; • Proposed Travel Plan; and • Encouraging active transport.
View Loss Analysis	Applications that may result in significant view loss. As requested by Council.	A detailed view loss analysis should include an accurate 'before' and 'after' photomontage or set of architectural drawings demonstrating the position of the proposed development within the view or views to be impacted. The analysis should be prepared by an architect, draftsman or suitably qualified expert and should be to scale where possible.
Wind Environment Statement	Development over 5 storeys in height but not more than 9 storeys provided a Wind Tunnel Study is not required. Refer to *WDCP2012 Part E1.20 Wind Mitigation.*	Wind environment statement is to be prepared by a suitably qualified wind consultant providing evaluation of the wind conditions occurring on the various outdoor spaces within and around the development. The assessment is based on an understanding of the local wind climate, a site inspection, as well as an inspection of the proposed design. If any areas within or around the development are likely to be adversely affected then in-principle recommendations should be made to address these wind effects.
Wind Tunnel Study	Applications for any buildings over 9 storeys in height or is considered exposed. Refer to *WDCP2012 Part E1 Bondi Junction Section 1.20 Wind Mitigation.*	Wind Tunnel Study must: • Assess the likely wind effects of the development; • If the wind conditions in any of the areas surrounding the site exceed the relevant criteria then model the existing wind conditions to accurately quantify the impact; and Recommend measures required to improve adverse wind conditions created by the proposal and demonstrate that the recommended measures will be effective in mitigating the adverse wind effects.



Section 04.

THE ASSESSMENT PROCESS

This section outlines the Development Application assessment process.

1. INITIAL PROCESSING

Once a DA has been lodged, the initial processing takes place. This includes generating a unique application number for your reference and an acknowledgement letter sent to the applicant. Referrals are also provided to relevant internal council officers, external agencies and government departments for review and comment on the proposal where required.

2. PUBLIC CONSULTATION

Council is required to notify adjoining and neighbouring owners that may be affected by a development proposal unless the proposal is of a minor nature. Council will send out notification letters to persons or organisations that may wish to comment on or object to the proposed development. Council may also advertise certain applications in the local newspaper. Please refer to the *Waverley Community Participation Plan* for more information.
The issues raised in submissions will be considered by the planner and discussed in the assessment report.

3. ASSESSMENT

The assigned Assessment Officer undertakes a detailed assessment of the application in accordance with Section 4.15 of the EP&A Act 1979. This involves considering all relevant environmental planning instruments, development control plans, council policies, the likely impacts of the development, the suitability of the site for the proposed development and any submissions received. The assessment process may include a site inspection and we may need to gain access to your property.
The Assessment Officer may require additional information about an application to complete the assessment. This information may be required after the DA lodgment.

If required an application may be referred to the Design Excellence Advisory Panel to review and provide advice to Council's planners. The advice from the panel and internal Council experts, and any relevant external referrals will be considered by the planner and included in the assessment report.

4. DECISION

Once the Assessment Officer has assessed the application, a report is prepared to be determined by one of the following groups or persons:

- Staff Delegation
- Development Building Unit (Development Assessment Area Managers)
- Waverley Local Planning Panel (An Independent Hearing and Assessment Panel)
- Sydney Eastern City Planning Panel
- NSW State Government

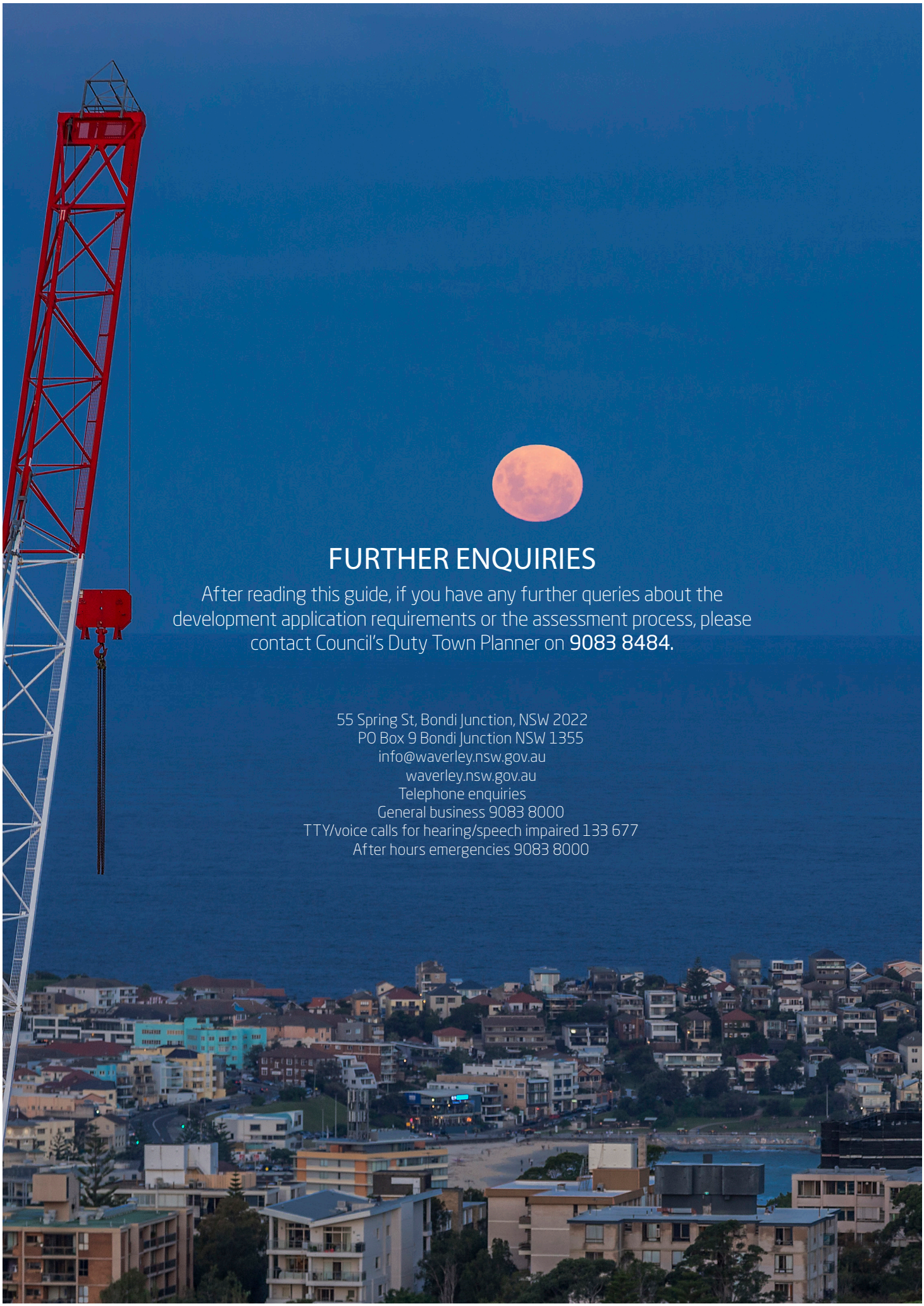
Please refer to page 10 for more information about which determining authority will be appropriate in the circumstances of the application.

5. POST DETERMINATION PROCESS

After an application has been determined, a Notice of Determination of Development Application will be sent to the nominated applicant, and will detail whether the application has been approved or refused. As approved DA usually has a number of conditions that must be satisfied. These are included in the Notice of Determination. If an application is refused, reasons why it has been refused are included in the Notice of Determination.
You can appeal against Council's decision in the Land and Environment Court within six (6) months of the date of the Determination Notice. Alternatively, you can seek a Review of Determination by Council under Section 8.2 of the EP&A Act 1979. Alternatively, If you are dissatisfied with a condition of the consent, you may apply to Council under Section 4.55 of the EP&A Act 1979 to have the condition removed or varied. You need to give reasons or supply such additional information that supports your application.
You can discuss this with the Assessment Officer.

6. CONDITIONS OF APPROVAL

Development consents are generally valid for five years unless a condition of your consent specifies that it lasts for a shorter time. All development consents will have a number of conditions attached and it is important that you read and understand all of them.
For more information, or direction on how to address conditions of consent, refer to **Council's website.**
If you fail to comply with any requirements, your development may be stopped and/or fines imposed. If you have any queries about any conditions please contact the Assessment Officer whose name appears near the end of the consent notice.



FURTHER ENQUIRIES

After reading this guide, if you have any further queries about the development application requirements or the assessment process, please contact Council's Duty Town Planner on **9083 8484**.

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PO Box 9 Bondi Junction NSW 1355
info@waverley.nsw.gov.au
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Telephone enquiries
General business 9083 8000
TTY/voice calls for hearing/speech impaired 133 677
After hours emergencies 9083 8000

REPORT
PD/5.2/22.09

Subject: **Transport for NSW Shared E-Scooter Trial**

TRIM No: A11/0612

Author: Clint Yabuka, Manager, Strategic Transport

Director: Sam McGuinness, Acting Director, Planning, Sustainability and Compliance

RECOMMENDATION:

That Council:

1. Authorises the General Manager to enter into negotiations with e-scooter operators for a 12-month e-scooter trial in the Bondi Basin.

2. Officers prepare a report to Council on the outcome of the negotiations, including recommended conditions for approval of the 12-month trial.

1. Executive Summary

The Transport for NSW (TfNSW) shared e-scooter trial follows the introduction of e-scooters into all other states in Australia and many other cities globally. The TfNSW trial borrows many of its parameters from current shared e-scooter trials in Victoria and London. TfNSW has provided parameters and then requires that Councils negotiate with shared e-scooter operators to develop their own trial proposals including area of operation for approval by TfNSW (see Attachment 1). Councils can negotiate additional parameters with operators as part of a proposal.

Among the TfNSW parameters are the exclusion of footpath riding that will require both a management solution from operators in addition to enforcement by Police, a maximum speed of 20 km/h on roads and 10 km/h on shared paths. TfNSW is recommending the use of designated parking locations for shared e-scooters to reduce clutter and improve safety. There are a range of potential infringements that can be issued by Police whilst Councils are limited to application of the *Impounding Act* and the *Public Spaces Act* to manage parked e-scooters in the public domain.

There is potential benefit to the introduction of shared e-scooters as a last mile connection to local destinations and public transport that could provide extra mobility and relief to parking and congestion pressures. At the time of preparing this report there were no trials announced within local or town centre environments and this could have potential visitation benefits for a proposed destination.

2. Relevant Council Resolutions

Meeting and date	Item No.	Resolution
Council 19 July 2022	CM/8.2/22.07	That Council: 1. Defers this item to seek further information from Council officers on: (a) What enforcement and fining powers Council has

		where e-scooter riders are contravening the parameters of the trial. (b) Potential terms of operation between Council and interested e-scooter companies including: (i) Terms and conditions for operation, including management of e-scooters and their placement, collection, maintenance and safety. (ii) Termination/withdrawal of participation, including identification of potential ramifications such as incurring fines. (iii) Responsibility for monitoring, compliance and insurance. (c) What additional State Government and non-governmental organisation stakeholders will be involved in the trial and their roles and responsibilities, such as NSW Police and Transport for NSW. (d) Any other relevant information, with reference to the parameters of the e-scooter trial published by the NSW Government. 2. Receives a report addressing the above for the August Council meeting.

3. Discussion

Introduction

Shared e-scooters have become a part of inner-cities globally since 2018. While this has much in common with bike sharing that began in 2016 there are significant differences for shared e-scooter schemes whose operation is more regulated due to e-scooters being a new transport mode.

All other Australian capital cities and many regional cities outside of NSW now have a shared e-scooter scheme in operation. These sharing schemes have potential to provide a beneficial 'last mile' connection to transport, local shops or local destinations such as parks or beaches and thereby reducing car parking challenges and motor vehicle congestion. However, as many cities have learnt when there is insufficient regulation and control of e-scooters then the benefits can be overshadowed by inconsiderate parking clutter and safety concerns.

The NSW shared e-scooter trial proposed by Transport for New South Wales (TfNSW) has borrowed elements of current shared e-scooter trials in Victoria and London where private e-scooters are still illegal. Shared e-scooters mean that e-scooters are necessarily available in the public domain. This introduces challenges around their management in the public domain however there are many precedents that can be observed and applied for local benefit.

Safety concerns exist for both people walking on footpaths and e-scooter riders on some roads. To manage this, footpath riding is subject to fines and can be controlled by technology on the e-scooters. Similarly unsuitable road environments can be excluded from access. As e-scooters are a novelty in NSW it means that many users would inevitably be novices who may be riding an e-scooter for the first time.

This report responds to Council resolution CM/8.2/22.07 regarding the operation of a shared e-scooter trial and identifies how these concerns have been addressed elsewhere.

Background

Shared e-scooter schemes are more numerous than shared e-bike schemes in both Australia and internationally. Except for NSW, all capital cities and many larger regional cities in Australia currently have shared e-scooters as either trials or established schemes.

Victorian trial

Many elements of the current Victorian Trial have been adopted by TfNSW, including no riding on footpaths or roads with speed limits over 50 km/h, limited to 'geofenced' areas, e-scooters limited to 20 km/h, and no private e-scooters.

There are three local government areas that form a contiguous area, this is beneficial to assess the use of e-scooters as a transport mode. There are also no-parking areas and preferred parking areas shown in the operator's apps.

Fines are imposed by Victorian Police for a range of related offences including footpath riding or on a road with a speed limit of or over 50kmh, using a privately owned scooter, being underage, using a mobile phone whilst riding, riding whilst intoxicated and others with fines ranging from $182 to $909.

Queensland scheme

Brisbane City Council began shared e-scooter trial in late 2018. In July 2019 Lime and Neuron were appointed for a three-year term. A subsequent three-year term appointed Neuron and Beam who currently operate shared e-scooters and shared e-bikes in Brisbane.

To address concerns around e-scooter use the Queensland Department of Transport and Main Roads has released a Personal Mobility Device Action Plan that identifies improvements to the management and operating environment surrounding e-mobility including e-scooters. This strategy includes designated parking, improved data and incident reporting, improved geofencing for high activity or unsafe areas, reduced speeds on footpaths, partnering with police to improve enforcement awareness, and developing awareness campaigns for rules and safe use.

In Queensland e-scooters are permitted to ride on footpaths and this is a significant source of conflict. While speed on footpaths is limited to 12 km/h, this is not electronically controlled and only enforced by Police.

Western Australia

The West Australian regulations for 'e-rideables' allows use on footpaths (but only legally at 10 km/h) or roads signposted for 50 km/h or less at a maximum speed of 25 km/h. The use of e-scooters on footpaths has increased the risk of injury to pedestrians and e-scooter users travelling above 10 km/h is typically a contributing factor to these incidents.

Shared e-Bikes

Share bikes have been in Sydney and Waverley since early 2017 when there were too many bikes from too many competing operators. At this time, the bikes were poorly managed by the providers and poorly treated by people who vandalised and created nuisance with the bikes. Thankfully, this speculative business model which was based on growth of membership at all costs has passed although it has created a legacy that is no longer reflective of the current shared bike operators.

In 2018, the NSW *Impounding Act* was amended placing obligation upon operators to manage their fleets with the potential for impounding if timeframes for management are not met. Since then, it has not been necessary for Council to use these powers. From late 2018 to early 2020, one operator had bikes in Waverley (Lime). From late 2020 Lime used new red bikes and Beam began (purple bikes), and from early 2022 Neuron (orange bikes) began operation in Waverley and Sydney. All use electric assist bikes, which means they are attended to regularly.

In Sydney each of the three operators have a similar area of operation, which includes Waverley, the northern part of Randwick, Woollahra, the City and Inner West. There are no shared e-bikes operating north of the harbour, west of Ashfield or south of Coogee. Within this operating domain the fleet numbers are Lime - 300 bikes, Beam – 400 bikes, Neuron 250 bikes. These bikes can float across the operating domain, with use concentrated from Green Square to the southern parts of the Sydney CBD and the Bondi Basin.

Figure 1. A heat map of shared e-bike use in Sydney, August 2022.

Privately owned e-Scooters in NSW

NSW and Victoria are the only jurisdictions in Australia that do not allow private e-scooters to be used in the public domain. In the NSW *Road Rules,* a traditional unpowered kick scooter is considered a 'wheeled recreational device' (if it doesn't have a motor) or 'wheeled toy' (toy if used by someone under 12 years of age and doesn't have a motor) and are excluded from the definition of vehicle so cannot be used on a road. In NSW, a person using a 'wheeled recreational device' or 'wheeled toy' is included in the definition of a 'pedestrian' and therefore may use a footpath.

These definitions create a problem for e-scooters as the only reference to powered devices is for 'mobility aids' (electric wheelchairs) that can be used up to 10 km/h on a footpath although most travel faster. There is no restriction upon the sale of e-scooters and there are increasing numbers of private e-scooters being used in the public domain in NSW. Such devices are commonly observed in Waverley.

Global approaches to shared e-scooter parking

Globally there are various strategies to manage the placement of shared e-scooters in the public domain. Increasingly cities are providing dedicated spaces on footpaths or in parking lanes whilst some cities allow uncontrolled parking resulting in footpath clutter and pedestrian safety obstacles.

New York shared e-scooter trial

New York City is currently conducting a trial in the East Bronx (NYC) that identifies high pedestrian activity areas (shown in orange below) where e-scooters are required to be parked in dedicated corrals identified with a 'P' on the map and painted lines of the footpath. The purple identifies predominantly residential areas with free-floating parking and red areas are no parking and no riding zones. This parking is controlled by agreement with operators and a geo-fence (a virtual and geo-located permission controlled via operator app) is established to remove ability to park a scooter contrary to the areas of this map.

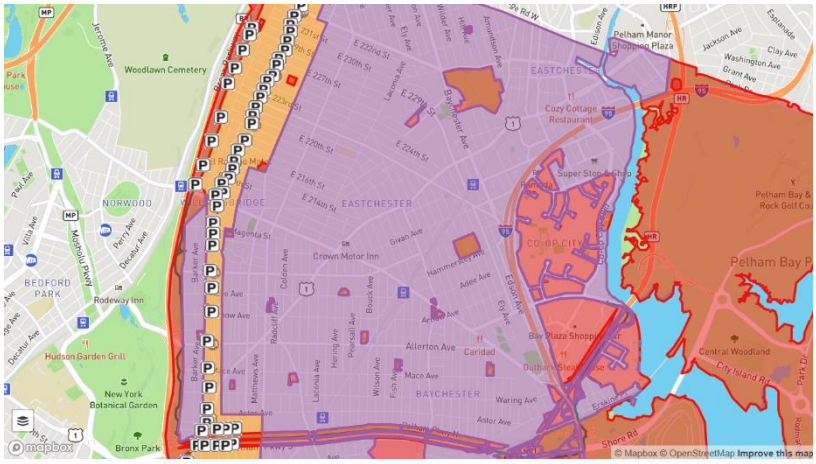

Figure 2. Map of East Bronx 2022 with geo-fenced zones.

Figure 3. Example of an e-scooter parking corral on Bronxdale Road, The Bronx.

London shared e-scooter trial

Transport for London (TfL) has a current trial of shared e-scooters with ten London boroughs and three e-scooter operators. The trial conditions are similar to the NSW trial. However, it restricts parking to dedicated parking spaces that are typically on-street in central London. These are not as numerous as the spaces provided in NYC. Such parking spaces are consistent with TfL's approach to bicycle parking spaces that are provided on road.

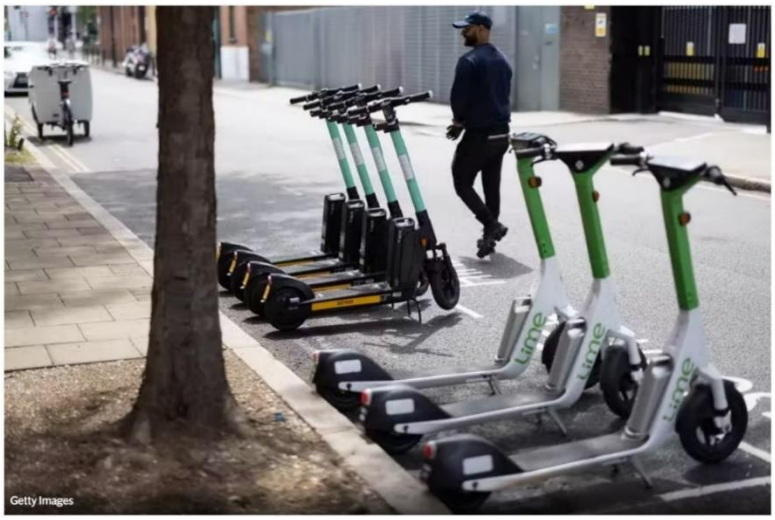

Figure 4. Typical dedicated e-scooter parking central London.

Paris e-scooter parking

Paris began a trial of shared e-scooters in 2018 and this quickly led to concerns about parking. In response the city has introduced a large number of designated parking spots that are typically on road and no more than a two-minute walk apart (approximately 160 m maximum spacing), excluding no-ride zones and other restricted areas.

Figure 5. Typical dedicated e-scooter parking central Paris

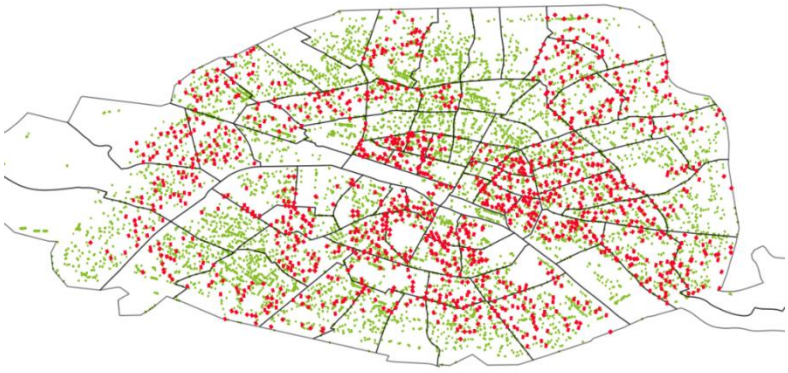

Figure 6: Map of Paris – Green dots are existing motorcycle and bicycle parking, red dots are new e-scooter parking on road.

Waverley shared e-bike precedent

In January 202, in response to the return of Lime and arrival of Beam a number of trial shared e-bike parking locations were installed around Bondi Beach and Bondi Junction using temporary paint. These locations were agreed with Lime and Beam and both offer incentives to users in the form of a discount on future rides if they park in these locations after use. These locations have proved beneficial and Neuron has requested the reinstatement of the now faded line-marking, as users have difficulty identifying the locations.

Although there is no requirement for either operators or riders to park in these locations this trial has proved useful in creating both predictability and order to the placement of shared bikes in the public domain. TfNSW has not included any such parking requirement in the e-scooter trial however there is potential for Councils to require the use of such parking locations under the TfNSW trials through negotiation with operators.

Figure 7. Trial share bike parking Oxford Street, January 2021.

Figure 8. Trial share bike parking Campbell Parade, January 2021.

Enforcement of trial conditions

Council enforcement of e-scooters during a trial is limited to the *Impounding Act 1993* (NSW) and the NSW *Public Spaces (Unattended Property) Act 2021* (NSW) that allows for removal of shared e-scooters or bicycles that are either parked inappropriately or parked in one location for longer than the allowed time. All other enforcement of rider behaviour including riding on a footpath is a Police matter however there are some methods of restricting riders from using footpaths as discussed below.

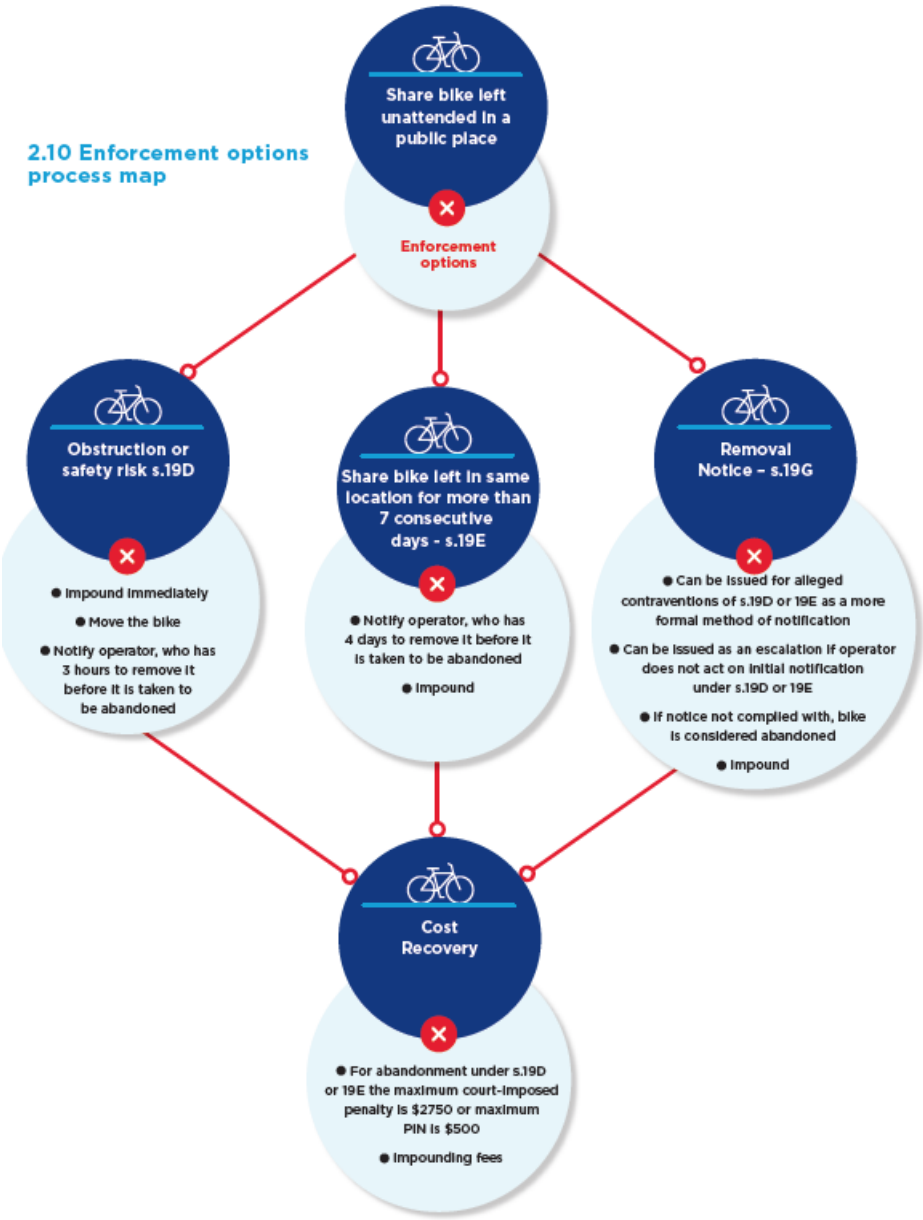

Figure 9. NSW Impounding Act – Share bike enforcement process map from the Office of Local Government's Shared Bicycle Management Guideline 2018.

Shared e-scooters in NSW

Currently in NSW there are two recently established shared e-scooter trial areas: one Western Sydney Parklands only on shared paths and another at Australian Botanic Gardens only on roads.

Compared to shared e-bikes, shared e-scooter operations are more regulated, it is typical to have only two permitted e-scooter operators, a cap on the number of e-scooters and requirements for redistribution to avoid clustering.

Whilst the three operators with shared e-bikes currently in operation in Sydney would be expected to be interested in an e-scooter trial there are also other operators that have expressed interest. TfNSW has limited the number of operators to a pre-vetted group of five. Councils can negotiate the trial conditions and propose a 12-month trial to TfNSW for endorsement from this group of operators.

Management

The TfNSW e-scooter trial includes a number of non-negotiable parameters (listed below TfNSW Trial Parameters). See Attachment 2 for details. it is also possible for Councils to negotiate their own additional requirements that would address specific local concerns (listed below Potential additional requirements in Waverley).

TfNSW Trial Parameters

Operating domain:

- Bicycle paths.
- Shared paths.
- Roads not more than 50 km/h.
- Not used on footpaths.

Trial boundaries and go-slow zones:

- Prescribed ‘geo-fenced’ areas via the app and controlled by data signal
- Go-slow zones such as shared paths (10 km/h)

Night use:

- TfNSW prohibition 12 am to 5 am.
- Could be extended to late evening.

Two wheeled scooters only:

- Limited to 20 km/h by motor or electronic brake.
- Single person only.
- Started by pushing foot against ground.
- No seat or saddle.
- Must have a horn or bell.
- Must have front and rear lights.
- Must have reflectors.
- Clearly visible id number.
- Tracked by operator.

No privately owned e-scooters:

- Only vehicles that are rented from a company approved by TfNSW and Council.
- Private e-scooters will remain illegal and subject to fines.

User requirements:

- Must be 16 years old.
- Not required to have a driver's licence.

Fines and penalties:

- Non-compliant riders will be subject to fines.
- Helmets will be required to be supplied.
- Wearing the supplied or personal helmet is mandatory.
- No handheld use of phone whilst using scooter.
- No passengers.
- Negligent, dangerous, reckless or furious riding not permitted.
- Blood Alcohol Concentration (BAC) of 0.05g for all users (subject to RBT).

Insurance:

- Public liability and third-party insurance to be held by shared scheme providers.

Potential additional requirements in Waverley

As any trial needs to be agreed between Council and operators then approved by TfNSW it is possible to negotiate additional parameters to meet local requirements. These could include:

- First three rides at a capped reduced speed.

  It is possible for operators to speed limit an e-scooter for the riders first 3 rides (NYC Trial). This would restrict novice riders to a safer speed as they learn how to ride.

- Geofenced parking in busy locations or all locations.

  In high pedestrian activity areas parking can be restricted and only possible in designated spaces (NYC trial) or this could be in all areas of operation (London trial).

- Data from operators.

  Anonymised usage and trip data can be shared by operators, which is useful to understand the most ridden routes and destinations for the purpose of ongoing evaluation.

- Fee structure.

  It is possible to charge a fee based on number of scooters, or number of trips, or number of kilometres travelled. This is unlikely to be substantial however could be used to fund designated parking spot allocation.

- Operational standards.

  Requirements for attending to poorly parked scooters and responding to complaints could be more stringent than *Impounding Act* or *Public Spaces Act* requirements but would require Council staff time and resources to manage.

- Potential additional technical requirements.

It is possible for e-scooters to make noise when being ridden to alert pedestrians to their presence, there are also sensors that alerts the operator when an e-scooter has fallen over. There are also technical solutions to footpath riding described below.

Placement and parking of e-scooters

There are various methods currently used globally for managing parking of shared e-scooters. The NYC trial uses a geo-fence to define where parking is unrestricted or limited, as described above. The London trial has a limited number of on-street parking spaces that are managed by the 10 participating inner London Boroughs. It is a requirement to begin and end an e-scooter journey in one of these dedicated spaces and fines are imposed on operators if this is not done.

Collection

The current generation of e-scooters have swappable batteries for recharging. This is beneficial as recharging of the e-scooter fleet does not require the use of a large vehicle to collect the scooters daily although scooters would still be collected for maintenance and repositioning as required. Repositioning can also be managed via discounts to users to ride a scooter to a preferred location.

Maintenance

Appropriate maintenance of the e-scooters is a condition of the trial. The maintenance of e-scooters can be separated into a few factors; vandalism, wear and tear and longevity:

- Vandalism of shared e-scooters is relatively common and often requires significant repair or replacement of the scooter.
- Wear and tear is an ongoing fleet management issue and has resulted in multiple iterations of e-scooter design and engineering to improve durability and reliability.
- Longevity has been a major factor affecting shared e-scooters this has improved with recent designs iterations however this is still around six months. The short lifecycle benefits inclusion of improved safety and management features.

Safety

There are two key concerns regarding safety and e-scooters. The safety of people walking on paths and the safety of e-scooter riders on roads. These are related as e-scooter riders generally use paths when they don't feel safe on the road, and this creates a risk to people walking.

In other places concerns for the safety of people walking is linked to the permitted use of e-scooters on footpaths, with Brisbane and Perth as examples. To address this, the TfNSW trial has excluded footpath riding, which will require management by operators and, if necessary, enforcement by Police.

As footpath riding is a concern everywhere operators have developed different ways to restrict riding on footpaths. One option is an on-board camera that can distinguish between a road or a footpath, or through the use of enhanced 'geo-location' (via mobile data).

The camera-based technology uses an on-board camera and processor with image recognition software to determine if the e-scooter is on a road or a footpath (see Lime and Beam camera vision as shown below). Standard geo-location has a low accuracy of around 7 meters. However, some operators are now able to achieve 10-20 cm through the installation of base stations. An example of this is Neuron's High Accuracy Location technology (HALT) shown below.

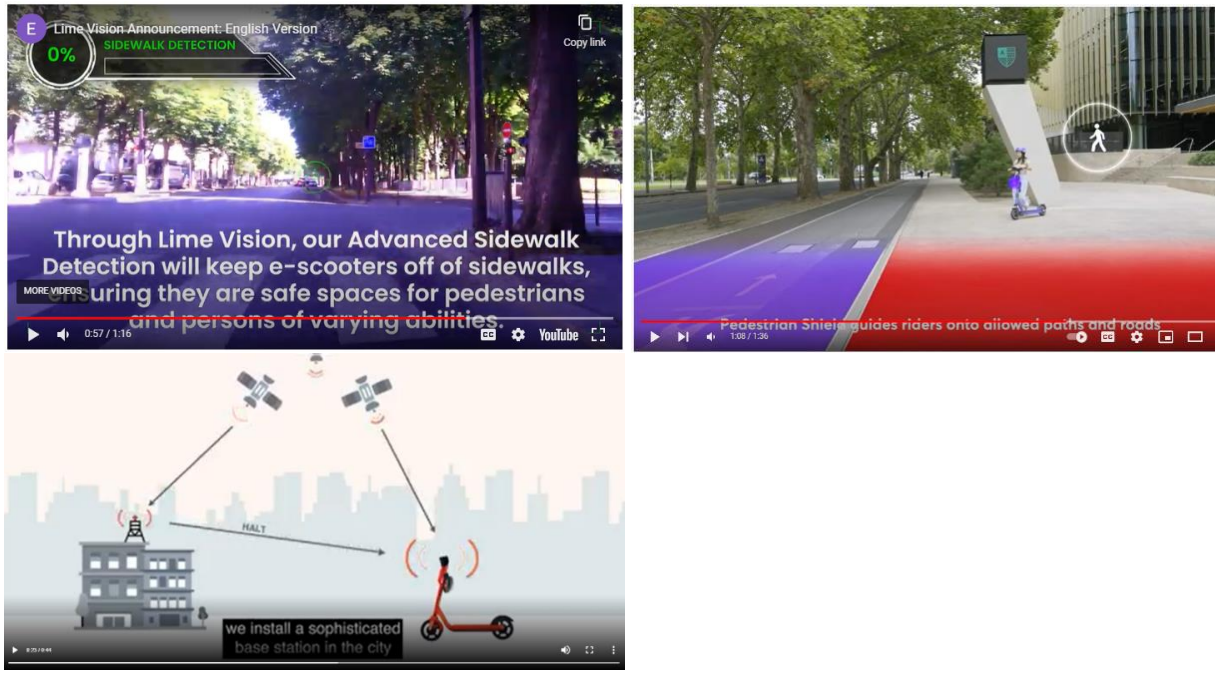

Figure 10. Realtime camera detection – Lime Vision (from Lime) Pedestrian Shield (from Beam) and HALT (from Neuron)

In the TfNSW trial e-scooters are allowed on shared paths but only at a reduced speed of 10kmh. This could be controlled by either an onboard camera or accurate location systems as described above.

The TfNSW trial gives the opportunity to limit the permissible area of the trial which means that roads or locations that meet the requirements of the trial can still be excluded if they are considered inappropriate. For example, although Old South Head Rd or Bondi Rd meet trial requirements, neither are considered safe enough to identify as bicycle routes and they are arguably less safe for e-scooter riders, particularly if they are inexperienced.

Termination of a trial and fines

The TfNSW e-scooter trial is for a period of 12 months. TfNSW have stated that they would work with Councils if there is a need to cancel a trial. As agreements with operators are negotiated by Councils there is potential to include terms that would identify grounds for termination. Key considerations could include the parking of e-scooters and footpath riding. There has not been any information provided about fines to operators.

The NSW Centre for Road Safety has published the list of infringements that could be issued to riders of e-scooters as below. Some of these infringements such as riding outside the trial area or on a road with a speed of greater than 50 km/h would be restricted by the operator's speed governors or geo-fence. Other infringements would be imposed by Police.

Electric scooter offences

The offences and fines are set out in the table below.

Table 1. Electric scooter offences (source: https://roadsafety.transport.nsw.gov.au/stayingsafe/e-scooters/index.html)

Offence	Fine
Ride a privately owned e-scooter on road or related area	Penalties may apply for being an unregistered, uninsured and unlicensed motor vehicle
Ride an e-scooter hired through a share scheme outside trial area	$120
Ride on road with speed limit greater than 50km/h	$120
Ride on footpath	$120
Ride an e-scooter not in single file on roads	$120
Ride e-scooter whilst under minimum age of 16 years	$120
Exceed maximum operating speed limit of 20 km/h	$120
Carry passengers	$120
Riding whilst under the influence of alcohol	The same penalty regime that applies to motorists applies to e-scooter riders during the trial. Find drink driving and drug driving penalties on the NSW Government website.
Riding whilst under the influence of a drug (other than alcohol)	The same penalty regime that applies to motorists applies to e-scooter riders during the trial. Find drink driving and drug driving penalties on the NSW Government website.
Use mobile phone whilst riding	$362
Fail to wear helmet	$362
Ride at night without appropriate lights and reflector	$120
Drivers failing to leave 1m passing distance	$352 plus 2 demerit points

Monitoring and compliance

TfNSW have provided the Management Model below that describes the responsibilities for TfNSW, Council and operators. In this model compliance relates to trial parameters and would include: managing the geofenced area, restricting footpath riding, the number of e-scooters, and any other concern that can be managed through the app and user interface. Whilst there is some overlap of these issues with enforcement it is not expected that operators would identify users who breach road rules. Operators can restrict parking to designated locations and require users to photograph the e-scooter when parked.

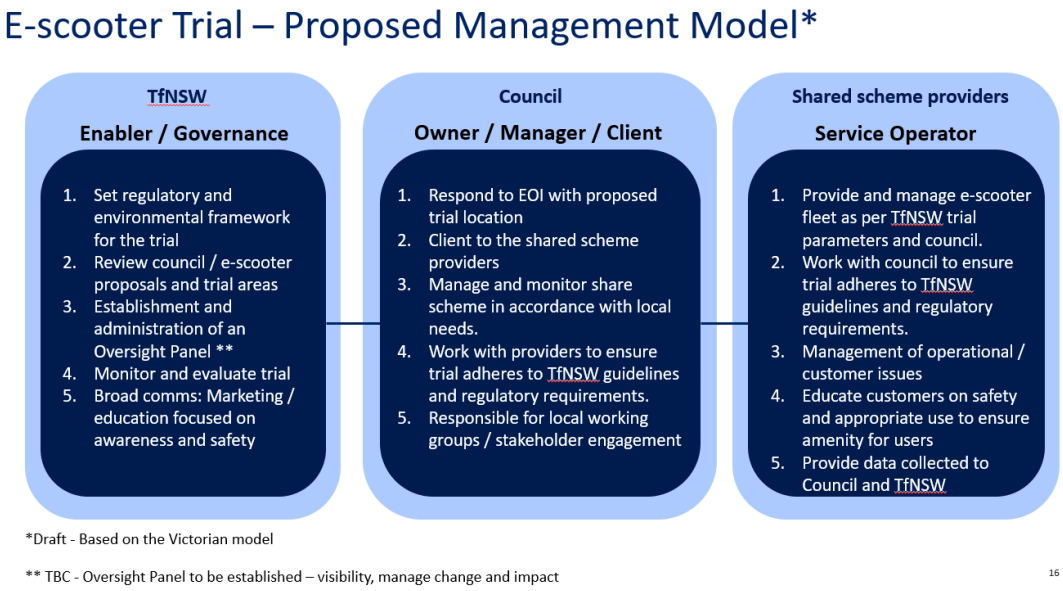

Figure 11. TfNSW e-scooter trial management framework.

Potential trial configuration in Waverley

The Bondi Basin is currently a high usage area for shared bicycles. It can be expected that this area would also be successful for shared e-scooters. Whilst there would ideally be a connection to Bondi Junction there is not currently an adequate or safe bicycle connection and neither Bondi Rd nor Old South Head Rd are considered suitable for e-scooters. There is potential to provide improved access for residents in this area to public transport, local shops and the beach thereby fulfilling the trial objective of testing e-scooters as a transport mode.

The areas shown below can be geo-fenced to exclude Bondi Road and Old South Head Road and as most streets in the Bondi Basin area are a relatively calm traffic environment this will be an incentive for to users to remain on the road rather than footpath although operator camera or geo-location restrictions would be required.

It would be possible to determine locations for e-scooter parking at approximately a two-minute walk with approximately 20 designated parking locations. The location of these designated spaces is ideally adjacent to existing bike routes and could provide access to bus routes and local shops and amenities.

As the area is limited to approximately 1.8 km2 the number of e-scooters could be limited to 40 for each of the two operators as proposed by the TfNSW trial parameters providing a total of 80 e-scooters. This would result in approximately four e-scooters being parked in each of the 20 designated parking locations. Such a density could be sufficient for availability and with adequate redistribution capacity for operators to avoid clustering in peak periods at the beach during warm weather. Subject to investigation, e-scooter parking spaces could be located in or adjacent to No Stopping zones or off road in less busy areas as appropriate.

Figure 12: 160 m radius (two-minute walk) around potential dedicated e-scooter parking locations with bus and bike routes

4. Financial impact statement/Time frame/Consultation

Financial impact statement

It is possible to negotiate a fee from operators that could be used to fund designated parking spot allocation and monitoring and compliance costs to Council. Such a fee is charged in some US and European locations and could be based on either the number of scooters, number of trips, or number of kilometres travelled.

Time frame

Once negotiated with operators and approved by TfNSW, a trial would operate for 12 months.

Consultation

Council could choose to consult with the community prior to beginning or during the trial. Consultation as part of a trial would permit evaluation of the trial's performance.

As identified in the TfNSW management model it would be necessary to provide an awareness and public education about a trial and its parameters. This would necessarily involve NSW Police and the development of strategies to oversee the trial.

5. Conclusion

The TfNSW shared e-scooter trial benefits from the learnings of other cities and borrows many of its parameters from current shared e-scooter trials in Victoria and London. TfNSW has provided a set of key parameters and then requires that Councils and operators negotiate their own trial proposals for approval by TfNSW. Councils can negotiate additional parameters with operators as part of a proposal.

The exclusion of footpath riding is a key parameter that will require both a management solution from operators in addition to enforcement by Police. All shared e-scooter operators have developed their own software solution (either camera recognition or enhanced positioning) to limit their users riding on footpaths. TfNSW have stated that they are working closely with Police regarding enforcement.

Enforcement of rider behaviour is the responsibility of Police, while Councils are limited to application of the *Impounding Act* and the *Public Spaces Act* to require management of parked e-scooters.

The introduction of e-scooters to NSW follows the rest of Australia and many cities internationally. With consideration of their use and management in the public domain there is benefit to their introduction as a last mile connection to local destinations and public transport with potential relief to parking and congestion pressures.

6. Attachments

1. NSW E-Scooter Shared Scheme Trial - Guide for Councils and providers - August 2022 ⇩
2. NSW E-Scooter Shared Scheme Trial - Key trial parameters ⇩

NSW E-scooter Shared Scheme Trial

Guide

transport.nsw.gov.au

August 2022

A guide for councils and providers interested in participating in the NSW E-scooter Shared Scheme Trial

Working together with local councils, e-scooter shared scheme providers, and Transport for NSW (Transport), we have an opportunity to trial a new way of getting around our metropolitan and regional communities in NSW.

This guide sets out Transport's requirements and recommendations to councils and providers interested in participating in the trial.

This guide has been developed to help councils determine the suitability of proposed trial location(s) in their community and nominate e-scooter shared scheme provider(s) before making a submission to Transport to be considered for the trial.

The guide is recommended to be used in:

- Investigations of potential trial locations
- Investigating local community interest
- Conversations with potential service providers
- Preparing Request to Participate submission documentation.

Transport requires councils and their nominated provider(s) to respond to the requirements listed in this guide in their Request to Participate submission to be considered for the trial.

This guide should be read in conjunction with the E-scooters Shared Scheme Proposed Trial Parameters (and E-Scooter Trial regulations, when made).

NSW GOVERNMENT

1. Trial locations

a. Transport requires council(s) and their nominated provider(s) to put forward trial locations that support safe and connected movement on roads and paths, consistent with the proposed trial parameters. At selected trial locations, escooters users can only travel on:
   i. bicycle paths
   ii. shared paths
   iii. roads (including bicycle lanes) on which the speed-limit is up to 50 kilometres per hour. (an e-scooter will be prohibited from travelling in a bicycle lane if the road has a speed limit of greater than 50 kilometres per hour).

b. Transport requires council(s) and their nominated provider(s) to outline how they will clearly mark trial locations for customers and the community. This includes signage important information and safety messaging to riders and the public.

c. Transport recommends council(s) and their nominated provider(s) put forward trial locations that safely integrate into and support the existing network and do not impact key public transport corridors or high traffic roads.

d. Transport recommends council(s) and their nominated provider(s) consider designated scooter parking, that is safely integrated with the existing environment and appropriate to the surrounding amenity (eg – limit obstruction and clutter on pathways and public spaces).

e. Transport recommends that roads and bicycle/shared paths with steep gradients may not be appropriate for inclusion in the trial.

f. Transport requires council(s) and their nominated provider(s) to engage a practicing professional registered on the Transport's Register of Road Safety Auditors to conduct Road Safety Audits on all bicycle paths/lanes, shared paths, and roads that are part of a proposed trial location. Road Safety Audits must be in line with NSW Centre for Road Safety Guidelines for Road Safety. Audit Practices and Austroads Guide to Road Safety: Part 6 Road Safety Audit. Completed audits should be submitted to Transport along with responses and mitigation measures that remove or reduce the highlighted road safety risk so far as is reasonably practicable. Transport recommends that a Transport representative is included as part of any Road Safety Audit as an observer.

2. Customer journeys and network connectivity

a. Transport recommends council(s) and their nominated provider(s) consider how e-scooter shared schemes could facilitate end-to-end journeys to local centres/services, neighbourhoods or strategic centres (eg – employment hubs, hospitals, universities/TAFEs).

b. Transport recommends that council(s) and their nominated provider(s) consider how e-scooter shared schemes could facilitate 'first and last' kilometre journeys to and from transport interchanges or where there are current transport service gaps.

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c. Transport recommends council(s) and their nominated provider(s) consider how e-scooter shared schemes could facilitate recreational journeys to/in areas of cultural and social significance.

3. Community needs / interests

a. Transport recommends council(s) and their nominated provider(s) consider existing community needs / interests for increased sustainable transport options and interests in smart technology and the share economy

4. E-scooter and safety equipment specifications

a. Transport requires council(s) to nominate provider(s) who will provide e-scooters that meet the definition of an e-scooter in the proposed trial parameters.

b. Transport requires council(s) to nominate provider(s) who will provide a description of the types of e-scooters to be used in each trial location.

c. Transport recommends that council(s) nominate provider(s) who have e-scooters that comply with the following weight and dimensions: not more than 1,250 millimetres in length by 700 millimetres in width by 1,350 millimetres in height and, when the device is not carrying a person or other load, 25 kilograms in weight.

   If council(s) and their nominated provider(s) propose to provide an e-scooter that does not meet these requirements, information provided about the e-scooter will be considered in the context of use in the trial location.

d. Transport requires council(s) to nominate provider(s) who can ensure that each e-scooter in their fleet includes:
   i. Bells, horns or other similar warning devices
   ii. Functional kick stands
   iii. Speedometer
   iv. iv. White front light and red rear lights and a red rear reflector.

e. Transport requires to council(s) nominate providers who can ensure e-scooters cannot exceed maximum speed limit of 20 kilometres per hour as set out in the proposed trial parameters. During the trial maximum speed limits are as follows:
   i. 20 kilometres per hour on bicycle paths/lanes and roads.
   ii. 10 kilometres per hour on shared paths.

f. Transport requires council(s) to nominate provider(s) who can ensure all e-scooters are equipped with approved helmets, as riders must wear an approved bicycle helmet.

g. Transport recommends council(s) nominate provider(s) who have a system to ensure helmets are available for all users and have measures in place to ensure they are not lost (eg – helmet locks).

h. Transport requires council(s) to nominate provider(s) who can ensure their fleet in the public domain is clearly identifiable for customers, the community, and the NSW Police.

i. Transport recommends council(s) nominate provider(s) who can ensure that each e-scooter in their fleet displays a unique identification number that is clearly visible from at least 5 metres away from and that is fixed to the e-scooter.

j. Transport recommends council(s) nominate provider(s) who can ensure that each e-scooter in their fleet displays contact information for the provider including a phone number.

k. Transport recommends council(s) nominate provider(s) who can ensure that each e-scooter in their fleet is fitted with GPS tracking.

l. Transport recommends council(s) nominate provider(s) who can ensure that their e-scooters do not contain any third-party advertising.

m. Transport requires council(s) to nominate provider(s) who will ensure e-scooters are locked from starting a new trip between the hours of 12am to 5am, unless the trial has been approved to operate at these times by Transport.

5. Insurances

This section of the Guide sets out the minimum insurance requirements that providers must hold. Council(s) should consider what insurance they require and confirm any additional requirements with providers prior to considering any proposals.

a. Transport requires council(s) nominate provider(s) who have insurance to protect the public, riders and council in the event of serious injury, death, or property damage that results from the use of its e-scooters.

b. Transport requires council(s) to nominate provider(s) who hold a current public liability insurance policy with coverage for injury or damage to third parties as a result of an occurrence in connection with the business of the provider or that may result from use of its e-scooters.

c. Transport requires council(s) to ensure the public liability policy extends to cover each of the council(s) in respect to claims for personal injury or property damage arising out of the negligence of the provider(s). Council's interests should be noted on the insurance policy and Council should consider whether it requires a provider to name council on that policy.

d. Transport requires the sum insured on the public liability policy to be no less than $20,000,000.

e. Transport requires council(s) to nominate provider(s) who have appropriate third-party rider liability insurance to cover for injury and property damage for third party claims against a rider. Third party claims include claims by pedestrians, other road users and property owners.

f. Transport requires council(s) to nominate provider(s) who have appropriate personal accident insurance to cover injury loss and damage suffered by riders as a result of the use of the e-scooter.

g. Transport recommends council(s) ask their nominated provider(s) to provide evidence of the relevant insurance policies to Council at the commencement of the agreement and each year upon renewal of the insurance policy within 30 days.

6. Management and operation of e-scooters

a. Transport requires that council(s) establish an agreement with nominated provider(s) to offer members of the public e-scooters for hire on a commercial basis as only riders of e-scooters under such an agreement will be able to legally ride on NSW roads. This agreement may incorporate a financial arrangement negotiated between council(s) and provider(s).

b. Transport recommends that council(s) nominate provider(s) who have a fleet management system that includes:
   i. Safety / slow down / stop
   ii. No go / exclusion zones
   iii. Cleaning iv. Maintenance
   v. Operational expertise (on the ground team)
   vi. Collection of dumped or abandoned e-scooters.

c. Transport recommends that council(s) nominate provider(s) who will take responsibility for parking management of e-scooters in their fleet, including adequate guidance / incentives to e-scooter users to ensure e-scooters are parked within designated parking zones.

d. Transport requires council(s) nominate provider(s) who have a system for reporting, escalating and mitigating safety incidents (ie - crashes and injuries) and will share information about incidents with councils and Transport in the format required by Transport and in a timely manner.

e. Transport recommends council(s) nominate provider(s) who have a system for the timely reporting and resolution of safety issues, including placement and condition of e-scooters.

f. Transport recommends council(s) nominate provider(s) who have a system that ensures the timely resolution of customer and community complaints.

g. Transport requires council(s) to nominate provider(s) who will provide educational information / programs to e-scooter shared scheme users about how to use the e-scooter; safety; user responsibilities; considerations for other users of bicycle path/lanes, shared paths, road users; and provider's terms of use.

h. Transport recommends council(s) nominate provider(s) who have a system for managing customers who repeatedly fail to comply with the terms of the trial and terms of use of their e-scooters.

i. Transport recommends council(s) nominate provider(s) who have sound fire prevention / safety practices in place to ensure fire hazard is managed in the operation and maintenance of the e-scooter fleet. This includes ensuring that the fire risks associated with batteries is managed.

j. Transport requires that council(s) and their nominated provider(s) prepare a Safety Management Plan hazard and risk management relating to the trial operation and management.

k. Transport requires council(s) and their nominated provider(s) establish a local working group with membership of local stakeholders such as Local Police Area Command, Local Health District, council, e-scooter provider, and Transport to monitor, manage the e-scooter trial, and provide regular updates to Transport.

l. Transport requires council(s) and their nominated provider(s) to work collaboratively with council(s) and Transport in management of media related to the trial.

7. Data Collection and Reporting

a. Transport recommends council(s) nominate provider(s) who are prepared to provide regular reports and share information such as trip data and customers insights with councils and Transport in the format required by Transport.

b. Transport recommends council(s) nominate provider(s) whose terms and conditions for customers cover how the data will be stored, used and shared, and importantly gives permission for Transport and councils to use deidentified data insights to improve transport services and place outcomes.

c. Transport requires council(s) to nominate provider(s) who will a enter into an approved data sharing agreement with Transport.

d. Transport requires council(s) nominate provider(s) who either:

   i. comply with the Australian Privacy Principles in the *Privacy Act 1988* (Cth), or

   ii. if they are not subject to the *Privacy Act 1988* (Cth), agree to comply with the *Privacy and Personal Information Protection Act 1988* (NSW) and the *Health Records and Information Privacy Act 2002* (NSW) as if they were a public agency.

8. Demonstrated capability

a. Transport recommends council(s) nominate provider(s) who have demonstrated experience in managing e-scooter shared scheme trials in Australian jurisdictions. This may include asking providers to submit testimonials from councils they have worked with.

9. Sustainability and social equity

a. Transport recommends council(s) consider provider(s) who can provide information about their sustainability goals and programs, including demonstrated outcomes.

b. Transport recommends council(s) consider provider(s) who can provide information about their social equity goals and programs, including demonstrated outcomes.

NSW E-scooter Shared Scheme Trial

Summary: Key Trial Parameters

transport.nsw.gov.au

August 2022

NSW GOVERNMENT

Please Note: This is a summary of the key trial parameters for shared e-scooter use in trial areas only. For further details of the Road Rules applicable to e-scooters, please see NSW Road Rules (https://legislation.nsw.gov.au/view/html/inforce/current/sl-2014-0758). Further information and requirements that apply to the trials can also be found in the Guidelines (Guide for councils and providers interested in participating in the NSW E-scooter Shared Scheme Trial).

Operating Environment	Requirement	Explanation
Operating Domain	E-scooter users can travel on: • bicycle paths • shared paths • roads (including bicycle lanes) on which the speed-limit is up to 50 kilometres per hour. E-scooter users cannot travel on footpaths.	These requirements balance the opportunity for e-scooters to be trialed as a mobility solution with the safety risks for its users, pedestrians, and other road users. An e-scooter is prohibited from travelling in a bicycle lane if the road has a speed limit of greater than 50 kilometres per hour
Trial boundaries / No-go and slow speed zones	Trial boundaries to be prescribed and clearly marked. No-go and (potentially) slow speed zones (areas with a 10 kilometres per hour speed limit) to be identified and signposted.	It is a specific offence for a person to use an e-scooter outside the trial area or in an area (within the trial area) where signs indicate bicycles are prohibited (penalties apply).
Use at night	The use of e-scooters will be prohibited between 12am to 5am with an option to enable a 24 hour location if appropriate and approved by TfNSW. If e-scooters are used at night or in hazardous conditions, they must display a front white light and a rear red light, as well as a red reflector visible from the rear.	The risks associated with the use of e-scooters, including lower visibility to other motorists, as well as antisocial behaviour and riding under the influence of drugs or alcohol, increases at night. It is considered that by prohibiting the use of e-scooters between midnight and 5am except where otherwise agreed some of these risks may be mitigated.

Vehicle Requirements	Requirement	Explanation
Vehicle Design Requirements	Only two-wheeled e-scooters provided by a share scheme permitted.	To be permitted for use an e-scooter must meet the following definition: (a) has a footboard supported by two wheels aligned one in front of the other, and (b) is steered by handlebars that control the front wheel, and (c) is designed to be used by a single person, and (d) is propelled by an electric motor or motors, and (e) may also be propelled by — (i) gravity, or (ii) the user pushing one foot against the ground, and (f) when propelled only by the motor or motors, is not capable of going faster than 20 kilometres per hour on level ground, and (g) is fitted with an effective stopping system controlled by using brakes, gears or motor control, and (h) does not have a seat or saddle. E-scooters must have a bell, horn, or similar warning device, in working order. If used at night or in hazardous conditions, they must display lights visible from the front and rear, as well as a red reflector visible from the rear.
Maximum operating speed	• 20 kilometres per hour on bicycle paths/lanes and roads. • 10 kilometres per hour on shared paths	The maximum speed is consistent with the maximum speed permitted in the Victorian e-scooter trial. It is considered these maximum speeds appropriately balance the safety of pedestrians and other road users with the convenience and useability of e-scooters.
Privately owned e-scooters	Privately owned e-scooters are not permitted to be used. Significant fines continue to apply to persons who use privately owned e-scooter in public areas or on a road or road related area in NSW, both within and outside trial areas.	E-scooters that are not hired from a commercially operated shared scheme that is approved by the relevant local council are not permitted to be used. E-scooters hired from an approved commercially operated shared scheme must be speed limited and can be geo-fenced to prevent use in higher risk areas. In addition, shared scheme e-scooters required to be clearly identifiable to the community and NSW Police. This will help prevent the misuse of the e-scooter.

User Requirements	Requirement	Explanation
Driver Licence	Not required.	A person is not required to hold a driver licence to ride an e-scooter in the trial. This will support the primary objective of the trial, which is to provide a new mobility option.
Minimum age	Minimum age of users is 16 years old.	16 years is seen as appropriate and allows more young people to participate in, and benefit from, the trial. It is considered that this will support the overall mobility aims of the trial.
Mobile phone use	Handheld use not permitted.	This is a key safety consideration.
Helmet use	Required at all times (approved bicycle helmet).	This is a key safety consideration.
Passengers	Not permitted.	This is a key safety consideration.
Dangerous/ negligent/furious /reckless/riding	Offences apply to e-scooter riders who ride their e-scooter in a dangerous, negligent, furious or reckless manner.	Given the safety risks posed by e-scooters, it is important to have offences in place for e-scooter users who ride in this manner.
Impaired riding	Prescribed concentration of alcohol (PCA) offences and drug-driving offences apply to e-scooter users. The Blood Alcohol Concentration (BAC) limit is 0.05 grams for all e-scooter users.	To reduce the risk of impaired riding, NSW Police will be able to conduct breath and drug testing of riders, as they would the driver of any other motor vehicle. Drink and drug driving offences, that carry significant penalties, will continue to apply for unsafe behaviour.

Insurances	Requirement	Explanation
Public liability insurance, third-party	Required to be held by e-scooter shared scheme providers.	To protect the public, riders and council in the event of serious injuries, death, or property damage.

insurance, and personal accident insurance		

REPORT
PD/5.3/22.09

Subject: **Boot Factory - Operational and Programming Model**

TRIM No: A21/0456

Author: John Coudounaris, Manager, Economic Development
Alistair Graham, Operational Readiness Lead, Bondi Pavilion and Boot Factory

Director: Meredith Graham, Acting Director, Community, Culture and Customer Experience

RECOMMENDATION:

That Council:

1. Approves the high-level operational and programming model for the Boot Factory as set out in the report, including a Thinker-In-Residence pilot program, precinct program and venue hire.

2. Calls for expressions of interest from suitable individuals or organisations for the Thinker-In-Residence.

1. Executive Summary

The Boot Factory restoration project provides an opportunity for Waverley Council to create a knowledge and innovation precinct in Bondi Junction through the establishment of an Innovation Civic Hall.

In July 2021, Council endorsed the preferred operating model whereby the Boot Factory remains Council-owned, managing its own activities with some services co-delivered through partnerships. This option allows Council to retain ultimate control over operations and programming, leveraging existing Council resources to deliver services while gaining access to partner networks to increase opportunities and engagement.

In response a high level operational and programming model has been developed by a cross-Council Programming Working Group to deliver the preferred operating model while upholding the focus on innovation and creating a multi-function community space.

2. Introduction/Background

The Boot Factory in Bondi Junction is currently undergoing major restoration works that are due for completion in November 2022. The opportunity centres on the adaptive re-use of the heritage building as an Innovation Civic Hall and its potential to complement existing facilities, such as Waverley Library, to create a Bondi Junction-based knowledge and innovation precinct.

To be reoccupied for the first time in over a decade, the building will offer multi-purpose spaces that prioritise community outcomes alongside the opportunity to generate revenue to contribute to operational costs. Also being upgraded is the adjoining Mill Hill Centre and Norman Lee Place.

Council previously approved the following option for the operational model of the Boot Factory: 'The Boot Factory remains Council-owned, managing its own activities with some services co-delivered through partnerships.'

This option allows Council to retain ultimate control over operations and programming, leveraging existing Council resources to deliver services while gaining access to partner networks to increase opportunities and engagement.

As part of the Boot Factory Operational Readiness Steering Committee, a Programming Working Group has drafted an operational and programming approach to activate the building and precinct in support of the Innovation Civic Hall model.

Innovation represents one of the four pillars of Council's Community Strategic Plan 2032 that underpin the themes, objectives and strategies of the plan. The Innovation pillar aims to ensure the community embraces new ideas and positions Waverley as a knowledge-driven, innovative and digitally connected community.

3. Relevant Council Resolutions

Meeting and date	Item No.	Resolution
Council 20 July 2021	CM/7.9/21.07	That Council: 1. Council approves the implementation of operating model Option 3 for the Boot Factory, as detailed in the report. 2. Council investigates alternative larger venues for the Innovation Civic Hall to ensure the operating model's financial sustainability. 3. Council notes that, if Council approves the recommended operating models, implementation will commence immediately to ensure operational readiness of the Bondi Pavilion and Boot Factory in early 2022.
Council 15 September 2020	CM/7.3/20.09	That Council: 1. Notes the completion of the investigation of a Knowledge and Innovation Hub precinct within the Waverley local government area, as defined by the Council resolution in October 2017. 2. Notes the four-stage process that has been undertaken to complete the investigation including research and community consultation, options analysis, a facilitated workshop with the Council established Steering Committee, and a final business case on the preferred model. 3. Thanks the Knowledge and Innovation Hub working group participants, including Sarah Martin, Anton Nemme, Liane Rossler and James Zaki, for their contribution through this multi-year project. 4. Receives and notes the Business Case to Reboot the Boot Factory by Establishing an Innovation Civic Hall prepared by Asset Technologies Pacific in March 2020 (Attachment 1). 5. Endorses the preferred option of the Innovation Civic Hall (ICH) for the Boot Factory, and the design of fit-out of the

		building on the basis. 6. Officers proceed to work on the future operational management model for the ICH, with report to come back to Council on final costings, programming, sponsorship and staffing. 7. Notes that the operational model should be considered in the context of the operational management model of Bondi Pavilion currently being prepared in order to explore and realise any operational advantages and desirable efficiencies possible. 8. Further investigates a maker space at Waverley Library, with a report to come back to Council on viability.
Operations and Community Services Committee 7 November 2017	OC/5.3/17.11	That Council: 1. Adopts the Waverley Innovation and Knowledge Hub Steering Group charter attached to this report. 2. Agrees to seek nominations from community members and industry experts to join the Waverley Innovation and Knowledge Hub Steering Group, noting that nominees will be appointed following a separate report to Council as soon as practicable. 3. Supports the primary objectives of the Waverley Innovation and Knowledge Hub Project as: (a) Adaptive reuse of the heritage-listed Boot Factory suitable for an innovation hub. (b) Establishing an innovation and knowledge hub at the Boot Factory and Waverley Library. (c) Involvement of the local community in decision-making processes. (d) Building partnerships and supporting local creative, professional, science and technology industries. (e) Establish a place function around the Boot Factory and Waverley Library in accordance with place-making principles.

4. Discussion

A high-level programming approach has been drafted to deliver the preferred operating model while upholding the focus on innovation and creating a multi-function community space. The proposed program is made up of three parts:

- Part 1: Thinker-in-Residence program.
- Part 2: Precinct program.

- Part 3: Venue hire.

Part 1 – Thinker-in-Residence program

A Thinker-In-Residence program represents a core function of the Innovation Civic Hall model. The program was identified as a priority for the community and supported by the Innovation Steering Committee as a preferred option. A review of other Thinker-In-Residence programs in Adelaide, Perth and Brisbane showed a varied approach. They shared similar characteristics including having a partner organisation, a single subject matter expert recognised from either academia and/or industry with a focus on a subject that aligns with the host organisation and community. In many instances, these programs rotated the subject area and/or thinker every 12 months.

Waverley's initial Thinker-In-Residence program is intended to be piloted in partnership with an individual or external organisation over a period of 12 months. The program is proposed to focus on a single topic, the first of which being sustainability, climate resilience or circular economy. This subject area aligns with objectives of the Community Strategic Plan 2032 and intersect with multiple goals of the Environmental Action Plan.

The thinker would be a leader in their field and support the delivery of initiatives including talks, exhibitions, workshops and more. The outcomes for the program would work towards overcoming future challenges in Waverley and inform future thinking and policy direction. It would also help other communities and demonstrate Waverley's leadership across NSW and Australia.

An expression of interest (EOI) will be prepared and circulated to possible industry leaders and partner organisations. The EOI will include the following guiding objectives:

1. Delivering a curated program of initiatives, that link subject matter experts with local change-makers, to enable the exchange of knowledge, ideas and creativity, and inspire solutions in the local and broader community.
2. Creating a dynamic environment with dedicated physical and digital spaces, that attract and connect a diversity of people and activities.
3. Establishing an identity for the Boot Factory and precinct as a place of innovation and excellence, shared between Government, academia, industry and the community.

The EOI is expected to be released in October to enable a selection process to take place along with initial programming to commence in February 2023. An update on the final Thinker-in-Residence partner and program details will be provided to Council prior to launch.

Part 2 – Precinct program

A precinct program is planned to be delivered by Council staff across the Boot Factory, Mill Hill Centre and Norman Lee place over a period of 12 months. The program seeks to activate the precinct through a range of programmed activities that support the Boot Factory identity, while also complementing the Thinker-In-Residence program.

A range of creative activities have been identified to engage the community. For example, at the Boot Factory and Mill Hill Centre, there could be talks, panel discussions and idea sessions – exploring best practice approaches across sustainability, creativity, health and wellbeing, technology etc. This could include skills exchange and mentoring opportunities for students and start-ups, business forums, networking events and exhibitions. Norman Lee Place also has the opportunity to host public performances, such as live music, and visual and performing arts. There is also scope to integrate Waverley Library programming at later date.

Objectives are outlined below to support decision making on programming. These are based on feedback already received by Council. They include:

1. Establishing the identity of the precinct that incorporates the Boot Factory, Mill Hill Centre and Norman Lee Place.
2. Delivering programming that aligns with the needs and expectations of a diverse range of stakeholders.
3. Developing a program the effectively utilises the physical spaces within the Boot Factory and offers digital access to engage the broader community.

A draft precinct program will be prepared and provided to Council prior to launch.

Part 3 – Venue hire

Multi-purpose spaces will enable a range of uses within the Boot Factory and Mill Hill Centre. They include meeting rooms for hire by local businesses and community groups, educational uses, exhibition space and event hire. Users include Council in the delivery of programming, the community and fee-paying hirers.

Venue usage guidelines will define agreed types of hirers and uses to ensure alignment with the Boot Factory goals and support the intent of the precinct. Objectives include:

2. Ensuring the building/s (Boot Factory and Mill Hill Centre) are well utilised, well managed, well maintained and financially sustainable.
3. Ensuring use of the venue spaces align with the civic innovation aims and objectives.

A key outcome of the Boot Factory is to encourage use by the community, which will be supported through Community Venues longstanding EOI process for regular hirers. The Pricing Policy, Fees and Charges 2022–2023 includes fees and charges for the Boot Factory.

The availability of venue hire, particularly in the short term, will also be determined by Council's plans to temporarily occupy the second floor of the Boot Factory during the refurbishment of Council Chambers. However, the ground and first floors will remain available for use and hire.

5. Financial impact statement/Time frame/Consultation

Budget has been allocated for both the Thinker-In-Residence pilot program and precinct program. A more detailed analysis will be outlined in a subsequent report to Council, prior to launch. A tentative time frame has been outlined below. It relies on the completion of the Boot Factory precinct by November 2022, with an official launch to occur in February 2023.

Table 1. Time frame.

Action	Timing
Boot Factory precinct site handover	November 2022
Boot factory official opening	February 2023
Part 1 – Thinker-in-Residence program (pilot)	
Thinker-In-Residence EOI released	October 2022
Thinker-In-Residence pilot program commences	February 2023
Part 2 – Precinct program	
Programming commences	February 2023

Part 3 – Venue hire	
Venue hire commences	February 2023

Ongoing development and implementation of the operational and programming model relies on multiple teams across Council engaged through the Boot Factory Operational Readiness Steering Committee.

6. Conclusion

The proposed model represents a simplified approach for the operation of the Boot Factory. The objectives reflect Council input to date and informs the range of activities proposed in the operational and programming approach, which upholds the focus on innovation and the availability of multi-purpose community space. Final programming details will be provided to Council prior to launch in February 2023.

7. Attachments

Nil.

REPORT
PD/5.4/22.09

Subject: **Synthetic Sports Surface Investigation**

TRIM No: A22/0068

Author: Neal Ames, Recreation and Open Space Planner
Carl Nugent, Senior Landscape Architect

Director: Sharon Cassidy, Director, Assets and Operations

RECOMMENDATION:

That Council:

1. Notes the *Synthetic Turf Study in Public Open Space* commissioned by the Department of Planning and Environment attached to the report (Attachment 1).

2. Notes that synthetic sports surfaces may be considered as a viable option in the future planning of upgrades to existing and new sports fields within Waverley, with any proposed change to come to Council for consideration.

3. Allows the FIFA Quality certification for Waverley #2 synthetic field to lapse in order to extend the life span of the existing surface.

1. Executive Summary

This report provides responses to concerns raised relating to synthetic sports surfaces and the key findings from the *Synthetic Turf Study in Public Open Space* (Study) commissioned by the Department of Planning and Environment.

Council officers were on the steering committee for the development of the *Synthetic Turf Study in Public Open Space* (Attachment 1). The report findings that are applicable to the notice of motion were considered and addressed in this report and further operational guidance will be provided in the Synthetic Surface Guidelines which DPE are developing.

Based on the outcomes of the Study and the Guidelines being developed it is appropriate that use of synthetic sports surfaces fields be considered within the Waverley local government to allow future planning and consideration of best practices in upgrades of existing and new sports fields.

2. Introduction/Background

In May 2021, Council passed a resolution noting a number of concerns and possible issues in relation to the existing synthetic sports field, Waverley #2, at Waverley Park. These issues related to the potential for particulate pollution from the synthetic system making its way into the natural environment. Council officers were directed to investigate the potential impacts of the use of synthetic turf in the future and report findings back to Council.

Council provides and maintains a great variety of facilities to cater for the recreational and play pursuits of the community. Council's commitment to the community is to provide affordable recreation and play

opportunities through the provision of high-quality infrastructure that will increase participation and enhance the physical activity undertaken by the community.

Council is also committed to the sustainable management of Waverley's open spaces. Both environmental and cultural character and values are protected within our open spaces. Council acknowledges the value that traditional owners bring to our open spaces and is committed to promoting and protecting traditional owner engagement and values.

Council's Community Strategic Plan 2018-2029 details the following goals for our open spaces:

- 3.1. Improve health and quality of life through a range of recreational opportunities and quality open spaces.
- 3.2. Expand the network of parks and open spaces, sporting and recreational facilities

Council's Open Space & Recreation Strategy (OSRS) sets out the vision for Waverley open spaces:

> *Waverley's parks and reserves are available to everyone, supporting healthy and active lifestyles. Our parks provide a green sanctuary, protecting and supporting biodiversity and provide an opportunity to implement the ongoing Aboriginal and traditional custodianship of land which forms our local government area. Park design responds to the community's recreation and social aspirations while telling the story of the place, of today's generation and those before ours. Spaces are welcoming, safe and well cared for. A sustainable approach to management allows future generations to enjoy these spaces.*

The OSRS highlights the shortage of sports fields in Waverley, and the demand from the public for sports fields. Waverley #2 was constructed in 2016 to increase the carrying capacity of the overall sports field provision in Waverley. Therefore, the synthetic field is important in terms of being able to provide enough field time for sports clubs to cater for the high community demand and offers an all-weather surface. It is noted that the weekly usage, the carrying capacity of the surface, increases from 22.5 hours per week for natural turf to 60 hours per week for synthetic.

3. Relevant Council Resolutions

Meeting and date	Item No.	Resolution
Operations and Community Services Committee 12 October 2021	OC/5.2/21.10	That Council: 1. Continues with stage 1 consultation on the Waverley Park Plan of Management for a minimum 28 days, including specific consultation on the play space, fitness station (excluding the smaller fitness pods) and indoor cricket nets training facility: (a) Noting that additional information will be provided on Council's website to support the Have Your Say website survey, including elements from Council resolution PD/5.3/20.11 concerning the indoor cricket nets training facility, provision of amenities and layout and location of the commercial café (b) Subject to not considering alternative surfaces such as hybrids or synthetics. 2. Notes that an email update on consultation outcomes for the

		Waverley Park Plan of Management, play space, fitness station and indoor cricket nets training facility will be provided to Councillors in November 2021. 3. Subject to consultation outcomes, prepares a concept design for the play space and fitness station, with a report to Council in February 2022. 4. Officers prepare a report to Council following the stage 1 consultation, summarising the consultation outcomes and presenting the draft Plan of Management for public exhibition. 5. Notes that the time frame for endorsing a new Waverley Park Plan of Management has been extended and the expected timing for commencing construction of the indoor cricket nets is 2023 at the earliest. 6. Investigates options to prioritise the following works, with a report to be prepared to Council detailing the scope and funding required: (a) Combining and better configuring the two change rooms (Sports Court and Away Team/Visitors) to the immediate south of the centre stairwell of the Margaret Whitlam Recreation Centre at the level of the playing field, subject to consultation with the Eastern Suburbs Cricket Club and other regular users of the facility. (b) Removing the non-structural blade wall at the northern end of the Margaret Whitlam Recreation Centre on the eastern side of Waverley Oval at the level of the playing field to provide much improved amenity and line of sight to the playing area.
Council 25 May 2021	CM/8.3/21.05	That Council: 1. Notes: (a) The preliminary research by Dr Scott Wilson from Macquarie University and the Australian Microplastics Assessment Project (AUSMAP) conducted for the Northern Beaches Council AUSMAP survey that synthetic turf is a source of microplastics in waterways and bushland. (b) The concern among the local community about the detrimental environmental impacts of plastics in our oceans. (c) The Departmental Inquiry initiated by NSW Planning Minister Rob Stokes 'to investigate sustainable alternatives to synthetic grass amid growing concerns about its environmental and health impacts' referred to in the Sydney Morning Herald on 14 March 2021.

		2. Prepares a report that identifies: (a) The amount of annual refill (replacement of crumbed rubber layer) that is required for the synthetic grass on Waverley Oval. (b) Whether stormwater runoff is being monitored for leaching of microplastics near the field. (c) The effects of the heat impacts of the synthetic turf on Waverley Oval during the hot summer months. 3. Places a moratorium on synthetic grass for any new sporting field within the Waverley local government area until the report is presented to Council and Minister Stokes Departmental report is finalised.

4. Discussion

Resolution CM/8.3/21.05 contained a number of questions. Each question is addressed as follows:

2(a) The amount of annual refill (replacement of crumbed rubber layer) that is required for the synthetic grass on Waverley Oval.

Approximately 100 tonnes of infill were installed in the initial build and fill of the field. The field has had one top-up of infill rubber since the initial construction in 2016. This was undertaken in 2021. This top-up was approximately 30 tonnes. This loss of infill occurs for a number of reasons, including a slow breakdown in the mass of the material, displacement outside the field into the surrounds, and most of which taken from the field in players shoes.

There is no need to do annual top-ups, but rather on an as needed basis. In a recommended maintenance schedule the infill rubber is 'raked' back into place in areas of high use, such as goal mouths where it is displaced from continuous action in the same place, such as goal kicking practice. Waverley Council commissioned a regular maintenance program for the field from its installation. This maintenance program significantly reduces the amount of infill replacement required over the lifetime of the synthetic system.

2(b) Whether stormwater runoff is being monitored for leaching of microplastics near the field.

Water that falls on to or flows across the synthetic surface goes through the main stormwater outlet in the south-eastern corner of the park. It then flows down to the Tamarama outlet station, where all overland flows in this area are out-letted. Monitoring of all waste is conducted at the outlet site. However, at this point micro-plastics are not looked for. If specific monitoring for micro-plastics was to be undertaken it would not provide information on where it came from.

2(c) The effects of the heat impacts of the synthetic turf on Waverley Oval during the hot summer months.

Synthetic sports fields reflect heat. On very hot days they can be up to 48 degrees up to knee level. This issue is highlighted in the DPE report, however no design or technology solutions have been identified. Therefore, addressing the heat effect from synthetic surfaces is a management issue. Management strategies such as directing sports clubs to monitor ambient temperature and closing the field on very hot

days is the best management approach. This approach would mean that synthetic fields are useable for most days of year.

3. Places a moratorium on synthetic grass for any new sporting field within the Waverley local government area until the report is presented to Council and Minister Stokes Departmental report is finalised

The previous Planning Minister, Rob Stokes, MP, through the Department of Planning, Industry & Environment completed and released its study *Synthetic Turf Study in Public Open Space* (Attachment 1) in October 2021.

The terms of reference and outcomes for the report are:

> *The Study aims to provide the NSW Department of Planning, Industry and Environment (the Department) with a better understanding of the potential social, environmental, and economic impacts, benefits, and limitations of using synthetic turf as a replacement for natural grass in public open space across NSW, and to identify areas for further investigation and consideration.*
>
> *The use of synthetic turf as a replacement for natural grass has attracted high levels of interest from a wide range of stakeholder and community groups. Concerns include impacts on the local environment, loss of open space and impacts on the amenity of the local community. Conversely, sports groups and users see the value of synthetic surfaces in meeting growing sporting needs and offering more consistent surfaces to play on.*

The report made a number of key findings (Attachment 2). Those that directly relate to the motion are:

- Advances in technology have reduced environmental issues.
- Planning and siting of synthetic fields reduces environmental issues.
- Synthetic sports fields are critical in addressing carrying capacity and provision.
- Natural turf fields are the preferred option but need to be better maintained.
- Environmental concerns are valid, however can be mitigated and overcome.

NSW DPE - Synthetic Turf Study Report - Key recommendations

The following report recommendations relate to the purpose of this Council report:

- The benefits of providing consistent state-wide guidance to Local Authorities on key considerations or criteria when proposing to provide new synthetic turf surfaces.
- Potential adaptations to state planning policy to require that appropriate and meaningful community consultation informs decisions around the use of synthetic versus natural turf surfaces.
- Further primary, evidence-based research into the human health and natural environmental impacts of synthetic turf use, in particular:
    - The impact of heat on larger fields, and the potential for higher UV reflectivity of synthetic turf.
    - The appropriateness of natural vs synthetic in bushfire prone areas.
    - The impact of synthetic materials on human health.
    - The health and social implications of reduced accessibility for informal and passive enjoyment of public open space associated with synthetic turf usage
- Further consideration of the potential benefits and impacts of the emerging technologies of hybrid and ‘fourth generation or 4G’ synthetic technology within an Australian context.

Alternative management practices

The report highlights alternative management practices to alleviate issues with synthetic sports surfaces:

- Improvements to natural turf design: natural turf fields can be designed and managed to withstand more use, drain more effectively, reduce reliance on water for irrigation, and be available during or immediately after bad weather.
- Improved data collection and analysis for facility owners: new technologies and approaches are offering facility owners improved data on the status and usage of sports fields, enabling councils to better target maintenance, manage peak use and quiet periods, scheduling, and planning for use.
- Managing use: local government, state agency stakeholders and sporting associations have identified innovative approaches to managing usage and reducing pressure on high-wear areas of a natural turf field, including around the goal mouths.
- Hybrid turf options: Some hybrid turf options that may offer alternative solutions to enhancing sports field capacity and durability this includes profile reinforcement to increase the durability of the root zone, integrating synthetic turf blades into natural grass, and selectively using synthetic turf in high wear areas.
- Advancements in synthetic design: Alternative construction materials and methods, hybrid sports surfaces, and the use of organic infill layers have the potential to mitigate against some of the challenges traditionally faced by adopters of synthetic surfaces.
- Utilisation of spaces and siting considerations: siting considerations exist for both synthetic and natural turf fields. Greater consideration of the whole open space network when selecting suitable sites for field upgrades is required to improve the quality and availability of public open spaces in NSW.

Major findings analysis

As detailed in the data above the report highlighted a number of issues with synthetic surfaces. However, it also noted that the value of synthetic surfaces for community sport services, especially in high demand areas, should not be discounted.

The report found that in more modern systems, such as Waverley #2 has, the drainage system is fully contained and there is no, or very limited ‘escape’ of microplastics from the system. When the surface mat of Waverley #2 needs to be replaced, generation 4 of synthetic surfaces will be well proven, and these systems use a natural sand-based infill, or no infill at all. Gen 4 synthetic systems, because they use natural infills, such as sand, also greatly reduce the heat reflected from the system.

Overall, the report found that where possible natural turf fields, that are well maintained, and for which there is managed usage, are the best option. However, if these conditions are not available then a modern synthetic with at least a Gen 3 or 4 system is a viable, ecologically neutral system.

For a full analysis of the findings it is recommended that the attached be studied.

Synthetic Surface Guidelines

Following the production of the *Synthetic Turf Study in Public Open Space* the Department is now developing a set of guidelines for synthetic surfaces. To facilitate this they have formed a steering committee for their development. Waverley Council is represented on this steering committee. These guidelines will provide guidance for land managers that are seeking to install synthetic surfaces. Both the *Synthetic Turf Study in Public Open Space* and the future guidelines will support synthetic surface installation, as well as providing a framework for their facilitation and management.

The NSW Government has directed the NSW Chief Scientist & Engineers, along with UNSW environmental experts to provide input into the guidelines. Their terms of reference include providing scientific support to the guidelines through specific university researchers. In addition, the Chief Scientist & Engineers is also conducting field studies and have approached a select group of NSW local government authorities to provide test cases to study. Waverley Council was approached by the Chief Scientist & Engineers and the Open Space team has provided support to the Chief Scientist in their guideline development.

It is anticipated that the Chief Scientists report, and the final guidelines will be completed in mid-2023.

Monitoring

As detailed above monitoring of micro-plastics is not currently being undertaken, either at the Waverley Park outlet, or at the Tamarama outlet. The value of specific monitoring for micro-plastics at the Tamarama outlet site is questionable, as it would be impossible to discern where the micro-plastic had come from. It would also be difficult to capture any micro-plastics that came through the outlet.

It would be more beneficial for monitoring of micro-plastics to occur at the main outlet of the park. Council officers have been working with consultants from UNSW who have stated that this would be the best option to ascertain micro-plastic loss from the synthetic field. Once again the capture of any micro-plastics would be another step above monitoring.

Design is critical

The issue of microplastic leakage from synthetic facilities has become a mainstream issue in both facility planning and facility maintenance over the last five years. Manufacturing of the products used has become the main strategy for dealing with microplastics. Third generation synthetic surfaces, which Waverley #2 is an earlier version of, have now reached the point where the material used in the mat and infill has significantly improved and provides the primary strategy for containment within the synthetic system.

With the new AS Standard on the production of microplastics and the additional requirements being included by facility designers, migration of infill across the field, and containment strategies have now reduced microplastics displacement by 95%. For the remaining 5% underground drainage, lips on the fence to keep the microplastics in the field and dual yarn systems that stop ball splash now give 100% containment in the synthetic system. All of these improvements will be available when the surface is replaced in the next four to five years.

Waverley #2 – FIFA accreditation

Waverley's one synthetic field, Waverley #2, was constructed in 2016. On completion of construction, it was awarded a FIFA Quality (One Star) accreditation for football (soccer). In addition, a similar accreditation was obtained for rugby. These accreditations recognise that the facility has been built to a standard that meets international football standards. Periodically this accreditation is renewed through facility inspections, primarily the condition of the synthetic mat and its systems. The FIFA Quality (One Star) accreditation is next due for renewal in 2024. It is anticipated that the mat will be a standard by then that will not meet accreditation.

At that point Council will need to decide on two possible options, one being to replace the synthetic mat, at a cost of $860,000, which will renew the accreditation. Alternatively, Council can choose to allow the accreditation to lapse, and maintain the existing synthetic mat until it reaches a point where the condition of the mat will necessitate its replacement. It is expected that this will occur in 2026.

The replacement of the synthetic mat presents an opportunity for Council to install improvements to the system to minimise or eradicate movement of micro-plastics. These improvements could include using

organic infills, such as coconut husk, which will remove the issue. If the replacement involved plastic or rubber infill then the installation of drainage ports, that capture all micro-plastics could be considered.

5. Financial impact statement/Time frame/Consultation

Consideration of options for future sports field upgrades would include financial and program constraints. Before any upgrade project proceeding would go ahead, Council would undertake community and stakeholder consultation in accordance with our Community Consultation Policy and Strategy seeking endorsement from Council and reporting findings as required.

6. Conclusion

The DPE has identified a number of outcomes, issues and key findings from the provision of synthetic surfaces. These are highlighted in the *Synthetic Turf Study in Public Open Space*. The DPE is also completing the Synthetic Guidelines, which provide guidance to synthetic field managers. Council should use both these documents to guide planning and maintenance of synthetic fields in Waverley.

Future planning for Waverley's sports fields should consider all best practice options available, including synthetic surfaces. to allow planning to be undertaken considering all viable options.

7. Attachments

1. Synthetic Turf Study in Public Open Space ⇩
2. Synthetic Turf Study in Public Open Space - Key findings ⇩

ETHOS URBAN

OTIUM Planning group SPORT + LEISURE

SYNTHETIC TURF STUDY IN PUBLIC OPEN SPACE

Report

Prepared for the Department of Planning, Industry and Environment

August 2021 | 2210189

Image source: https://www.pexels.com/

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Contents

1.0 Executive Summary

"The Study aims to provide the NSW Department of Planning, Industry and Environment with a better understanding of the potential social, environmental, and economic impacts, benefits, and limitations of using synthetic turf as a replacement for natural grass across NSW and to identify areas for further consideration.

1.1 Overview

Ethos Urban, in collaboration with Otium Planning Group, was commissioned to undertake a preliminary study (the Study) into the use of synthetic alternatives to natural turf in NSW community sports fields.

The Study aims to provide the NSW Department of Planning, Industry and Environment (the Department) with a better understanding of the potential social, environmental, and economic impacts, benefits, and limitations of using synthetic turf as a replacement for natural grass in public open space across NSW, and to identify areas for further investigation and consideration.

The use of synthetic turf as a replacement for natural grass has attracted high levels of interest from a wide range of stakeholder and community groups. Concerns include impacts on the local environment, loss of open space and impacts on the amenity of the local community. Conversely, sports groups and users see the value of synthetic surfaces in meeting growing sporting needs and offering more consistent surfaces to play on.

This Study has been informed by consultation with stakeholders and communities potentially impacted by the issue as well as by a review of relevant published research and technical studies.

This report provides a summary of the key findings of the Study and identifies alternative approaches and practices as well as opportunities for future investigation.

Image source: https://www.pexels.com/

1.2 Key Findings

A summary of the key findings related to the application of synthetic turf as an alternative to natural grass turf is provided below. This summary draws upon the findings uncovered across the Study, which included community feedback, stakeholder workshops, case studies, and a literature review.

Theme	Issues
Best practice natural turf management can improve field capacity	• Best practice natural turf design and maintenance has the potential to improve the capacity of existing natural turf fields to support increased sporting use. • Lack of available information on best practice construction and maintenance of natural turf fields influences and constrains council decision making. • Information about recent innovations and best practice for natural turf are not well known or commonly used. • Advances in technology are enabling more targeted maintenance and management of natural turf to reduce energy consumption and costs and maintain capacity.
Partial/hybrid use of synthetic grass can increase durability	• Hybrid turf combines blades of synthetic grass with natural grass to increase durability of fields while reducing use of synthetic materials. • Synthetic materials can be incorporated in the root zone to reinforce the soil profile. • Synthetic turf can be used selectively in high wear areas of a sports field such as the goal area.
Synthetic turf design is evolving	• Recent technological advances in synthetic design address some of the environmental impacts associated with earlier generations of synthetic turf. • Replacing rubber infill with cork granules is an environmentally friendly option however it is more costly and deteriorates faster.
Innovative management practices can support greater use	• Strategic lighting to encourage evening use of particular areas of fields and shifting line markings are an effective way to distribute usage across a playing field surface. • New technologies and approaches are offering facility owners improved data on the status and usage of sports fields, enabling councils to better target maintenance, manage peak use and quiet periods, scheduling, and planning for use.
Sports field planning and siting	• Siting considerations exist for both natural and synthetic turf. For example, many issues that constrain optimal utilisation of natural turf fields are intensified when they are located in poor drainage or flood prone areas, ex landfill sites, or where they have a dual purpose as stormwater retention basins. • Where synthetic or natural turf fields are located in areas prone to flooding, or subject to overland flows during extreme weather, there can also be issues related to pollution of local waterways or bushland with infill materials or pesticides. Further discussion of potential pollution arising from both natural and turf fields, and the contamination of the surrounding local environment, is discussed below. • Better consideration of siting and planning for the whole open space network can alleviate some pressure on the network, including sharing of facilities (across LGA boundaries and with different land uses such as schools), purpose-built facilities and siting synthetic fields in non-environmentally sensitive areas.
Constrained supply of sports fields	• The existing network of sporting facilities is perceived by some stakeholders as unable to meet growing demand and some clubs turn away potential participants due to a lack of capacity. • Existing fields in densely populated areas, with high levels of sporting participation may not have the capacity to meet very high levels of demand, regardless of the quality of the field. • It can be challenging to acquire new land for sportsfields due to development pressure and lack of available space (particularly in inner city areas). Some councils therefore choose to increase local capacity by converting natural turf sportsfields to synthetic turf.

Theme	Issues
Poor quality of existing sporting facilities	• Poorly maintained and constructed natural turf sports fields can struggle to support high levels of use due to poor condition and inadequate drainage, which limits their available hours of use for sport. • Many natural turf fields are perceived to be in poor condition with inadequate drainage, poor construction and maintenance regimes resulting in low field capacity. Well-engineered natural fields maintained in good condition can provide significantly higher levels of utilisation than poor condition ones.
Sporting facility demand, supply and capacity is complex and contextual	• Natural turf fields cater for more diverse uses that includes organised sporting activities and passive recreation activities such as picnicking, walking, jogging, dog walking and more. • The carrying capacity (calculated as hours of organised sports use per week) of synthetic surfaces is higher than natural turf and as such field operators can allocate more users to a synthetic field for organised sport training and competition. • The use of sports field can be concentrated to specific days and certain times of day for training and competition. Implementation of synthetic turf surfaces can offer higher levels of participation during peak periods. • Actual demand for sports use is not always modelled or well understood by authorities when considering converting surfaces to synthetic. The theoretical capacity provided by a synthetic surface may not be required to support actual demand for sports participation. • Synthetic turf can improve the reliability and surface quality for sport use during wet and winter weather compared to natural turf. However, during summer, matches on synthetic turf sports fields may need to be cancelled due to heat more frequently than natural surface fields. • Hybrid surfaces are an emerging response to improving field capacity and combining the advantages and limiting the disadvantages of both pure natural and synthetic.
Amenity and enjoyment for informal users of public open space	• Synthetic fields are generally subject to higher ambient temperatures than natural turf on hot days. • The aesthetic of synthetic turf is very different to and perceived as much less attractive to natural turf. • Synthetic turf does not provide the same benefits of connection to nature compared to natural turf open spaces. • Natural surfaces provide greater levels of noise abatement, glare reduction and UV reflectivity. • Fenced synthetic fields reduce informal use of open spaces while prioritising sporting use.
Impacts from the increased utilisation enabled by the use of synthetic surfaces	• Due to having an increased carrying capacity, synthetic fields can have: - Increased impact on surrounding residents from duration of field lighting at night - Congestion and pressure on parking and increases to local traffic. - Increased impact and duration of noise due to greater intensity of use. - Elevated synthetic fields can impact on perceived privacy for adjacent residents.
Concerns associated with environmental impacts	• **Pollution:** Air and water pollution caused by synthetic turf materials (i.e., rubber crumb) is well documented in academic research. Pollution, particularly of waterways and bushland, was a key concern raised by community representatives. • **Chemical use:** Pesticides and fertilisers are typically used for natural turf fields, while pesticides and fungicides are typically required for synthetic fields. • **Waste:** Environmental and financial challenge of disposing synthetic turf at the end of its 8–10-year life cycle. • **Heat:** Heat impacts to the surrounding environment caused by synthetic turf absorbing heat rather than reflection.

Theme	Issues
Concerns associated with environmental impacts continued	• **Carbon emissions:** Synthetic fields contribute to heightened CO2 emissions due to lack of carbon absorption associated with natural turf. • **Soil sterilisation:** Sterilisation of soil beneath the synthetic turf has an impact on ecosystems. Synthetic surfaces inhibit living systems. • **Water Usage:** Water consumption and irrigation requirements are lower for synthetic turf making it generally more suitable for drought and dry conditions (due to reduced water requirements). • **Variability:** Environmental impacts of synthetic fields vary substantially depending on what type they are. Older synthetic fields (generation 2 and 3) are associated with significantly higher radiant heat and environmental pollution. • **Wildlife:** While natural turf sportsfields have limited biodiversity value, they do provide some habitat for local flora and fauna that synthetic turf does not. • It is noted that design of synthetic surfaces is technologically advancing in response to some of the impacts created by synthetic turf, e.g., microplastic pollution.
Potential human health impacts	• Heat stress and the impact on player and user comfort associated with playing on synthetic fields in hot weather. • Some generations of synthetic turf (typically 1st, 2nd and 3rd) have a greater risk of abrasiveness on skin and higher injury rates. • Research has suggested that biological pathogens, toxic chemicals, and micro-plastic ingestion are all risks to human health that are associated with synthetic materials.
Cost and economic factors are not transparent	• High initial capital cost of synthetic turf can be perceived as a barrier to installation. • Synthetic playing fields have traditionally been perceived as requiring lower maintenance and hence lower operating costs compared to natural turf. However, synthetic surfaces have a prescriptive maintenance regime, and there is indication from recent studies in other jurisdictions, including New Zealand and Western Australia, that in practice synthetic turf can have reoccurring maintenance costs for repairs and cleaning of surfaces that can be comparable to that of natural turf. • Long term maintenance of natural turf surfaces is often underfunded which can result in deteriorating condition facilities and limited capacity. • Renewal costs associated with the disposal and replacement of synthetic fields at the end of their life cycle is not always adequately considered. • Best practice natural turf has ongoing maintenance requirements to maintain high levels of performance for all users, such as mowing, “resting”, and re-surfacing the field.

1.3 Preliminary Recommendations for Consideration

Consultation undertaken in preparation of this Study has demonstrated that there are often conflicting views between local authorities, user groups and the wider community over the suitability and benefits of synthetic turf as an alternative to natural turf.

While it is clear that both types of surfaces can provide positive outcomes in terms of access to public open space and participation in recreation and sporting activities, the absence of consistent guidelines, consultation with communities and transparent consideration of potential alternatives has led to distrust and concern over decisions to implement synthetic sporting fields.

To potentially address this conflict, the Department may reflect on the following opportunities that are identified for further consideration:

- The benefits of providing consistent state-wide guidance to Local Authorities on key considerations or criteria when proposing to provide new synthetic turf surfaces;
- Potential adaptations to state planning policy to require that appropriate and meaningful community consultation informs decisions around the use of synthetic versus natural turf surfaces;
- Further primary, evidence-based research into the human health and natural environmental impacts of synthetic turf use, in particular:
  - The impact of heat on larger fields, and the potential for higher UV reflectivity of synthetic turf
  - The appropriateness of natural vs synthetic in bushfire prone areas
  - The impact of synthetic materials on human health
  - The health and social implications of reduced accessibility for informal and passive enjoyment of public open space associated with synthetic turf usage
- Further consideration of the potential benefits and impacts of the emerging technologies of hybrid and 'fourth generation or 4G' synthetic technology within an Australian context.
- Undertake research to understand barriers to implementing best practice natural turf fields.

The above recommendations have been further explored within **section 5.0** of this report.

1.4 Alternative Approaches

A number of alternative approaches to mitigating the impacts of using synthetic turf were identified during the study. These are:

- **Improvements to Natural Turf Design:** Natural turf fields can be designed and managed to withstand more use, drain more effectively, reduce reliance on water for irrigation, and be available during or immediately after bad weather.
- **Improved Data Collection and Analysis for Facility Owners:** New technologies and approaches are offering facility owners improved data on the status and usage of sports fields, enabling councils to better target maintenance, manage peak use and quiet periods, scheduling, and planning for use.
- **Managing use:** Local government, state agency stakeholders and sporting associations have identified innovative approaches to managing usage and reducing pressure on high-wear areas of a natural turf field, including around the goal mouths.
- **Hybrid Turf Options:** Some hybrid turf options that may offer alternative solutions to enhancing sports field capacity and durability this includes profile reinforcement to increase the durability of the root zone, integrating synthetic turf blades into natural grass, and selectively using dynthetic turf in high wear areas.
- **Advancements in Synthetic Design:** Alternative construction materials and methods, hybrid sports surfaces, and the use of organic infill layers have the potential to mitigate against some of the challenges traditionally faced by adopters of synthetic surfaces.
- **Utilisation of Spaces and Siting Considerations:** Siting considerations exist for both synthetic and natural turf fields. Greater consideration of the whole open space network when selecting suitable sites for field upgrades is required to improve the quality and availability of public open spaces in NSW.

2.0 Introduction

2.1 Project Background

From opportunities to participate in active recreation, a space to socialise with friends and family, or connect with nature, access to public open space provides a diverse range of opportunities and benefits to communities.

The NSW Government is seeking to increase access to public open space to help support the health and wellbeing of individuals, social cohesion in communities, and thriving local economies[1]. However, there are areas across NSW, particularly in inner urban areas, where demand for public open space is not being met by the current supply.

The factors that have contributed to a widening gap between supply and demand for public open space in some areas include growing use of public open space for sport and recreation, rising land prices, projected population growth, declining land availability, climate pressures, and a diversification of community needs. The growing demand for flexible and available public open space has been observed during the COVID-19 pandemic when community of open space increased significantly.

To help address the growing demand for multi-functional and flexible public open spaces, councils, state agencies, and sporting bodies are exploring different options to increase the capacity of the public open space network. These different options include upgrading the surface type, either by converting to synthetic turf or replacing with a higher grade of natural turf, improving the management of existing turf and modifying games times and traditional days of play.

Synthetic turf has become an attractive option to respond to this growing demand for sports fields due to its ability to support greater levels of use, particularly for sports, than most natural turf surfaces, as well as:

- The perceived reduction in ongoing maintenance requirements
- The reduction in irrigation requirements
- The ability to support more intensive use
- High durability, reliability, and consistency in all weather conditions.

As a result, there has recently been a higher rate of adoption of synthetic surface types, with more than 35 synthetic fields installed in NSW over the last five years alone[2].

However, there has been a growing number of concerns raised by local communities and stakeholders about the impacts of synthetic field including, but not limited to:

- Lack of community consultation on proposed conversion of natural turf to synthetic turf
- Loss of existing public open spaces that are flexible and readily available to the community
- Suitability of location and proximity to residential dwellings, natural waterways, and bushland
- Increased air and water pollution due to rubber and microplastic particles within synthetic turf materials
- Increased surface temperatures during warm weather and the adverse effects on thermal comfort
- Restriction of access for informal and passive recreation activities due to exclusivity of use (either perceived or real) and advance booking of facilities

1 *NSW Government 2021, Premier's Priorities: Greener Public Spaces, NSW Government, accessed 17 May 2021 < https://www.nsw.gov.au/premiers-priorities/greener-public-spaces>*

2 *Football NSW, Synthetic fields continues to grow across NSW, https://footballnsw.com.au/2021/03/24/synthetic-fields-continues-to-grow-across-nsw/.*

- Health concerns about chemicals used in synthetic grass and toxicity of crumb rubber
- Detrimental impact of synthetic fields to local wildlife and ecosystem
- Detrimental impact to local amenity (i.e., light and noise pollution at night, additional local traffic) due to extended hours of use and intensity of use.

Ethos Urban, in collaboration with Otium Planning Group, was commissioned to undertake a study (the Study) into the use of synthetic alternatives to natural turf in public open spaces. The Study has been requested by the Department to develop a greater understanding of the social, environmental, and economic impacts, benefits, and limitations of using synthetic turf as a replacement for natural grass in public open spaces across NSW.

2.2 Purpose of this Report

The purpose of the Report is to provide a summary of the findings from the Study, including community feedback, stakeholder workshops, case studies and literature review, and to highlight further areas for consideration and research.

The Report provides a summary of the key findings of the Study and identifies opportunities for future investigation and seeks to:

- Provide an overview of the social, economic, and environmental impacts, benefits, and limitations of using synthetic turf as a replacement for natural grass fields in public open spaces across NSW
- Identify alternative turf technological solutions and management techniques which allow for increased use of sports fields
- Evaluate the management approaches (for natural, synthetic, and alternative turf) identified in relation to the social, economic, and environmental impacts
- Identify issues that influence the decision-making process for local sports facilities.

It is important to note that while the Report draws on information from existing academic and industry research, it does not represent primary research or seek to duplicate existing technical information on synthetic and natural turf construction that is readily available.

Furthermore, whilst acknowledging that sporting clubs and associations are the predominant users of formal sporting fields, it is important to note that the Study was not limited to that of organised sport. Sports fields form part of a broader public open space network that is used by a wide section of the community for outdoor recreation. This includes exercising, walking, relaxing, gathering for picnics, dog walking, play, community events, formal and informal sport.

While the findings may be relevant, the role of synthetic fields in supporting elite level sport or its use outside of public non-community sports fields (i.e., Department of Education or Transport for NSW) was not included within the scope of the Study and has therefore not been referenced within the Report.

2.3 Context

2.3.1 Value of Public Open Spaces in NSW

Public open space is considered critical environmental and social infrastructure that is integral to the character and public life of NSW communities. Access to high quality public open spaces will become even more critical as communities continue to densify in response to NSW's sustained population growth.

Quality public open spaces make for liveable, sustainable, and healthy neighbourhoods. Public open spaces include parks, gardens, play spaces, public beaches, riverbanks, waterfronts, publicly accessible bushland and outdoor playing fields and courts. They provide us with places to exercise, play, rest, participate in social activities, and contribute to healthy, happy, and resilient communities. The social, environmental, and economic benefits of access to green open space are well established, and include:

- **Encouraging physical activity:** Public open space helps people to maintain healthy lifestyles by providing spaces that encourage physical activity, children's play, participation in sport and active transport. Public open space users are more likely to meet recommended levels of physical activity, and park amenities and improvements can increase park use and rates of physical activity[3]. Inactivity is less common among residents of greener neighbourhoods[4].
- **Social connection:** Public open spaces are the living rooms of cities, places where people of all ages, cultures, abilities, and socio-economic backgrounds come together. Sharing these spaces, including through participation in sport, promotes social interaction, connection, and cohesion. Socially cohesive communities provide support and practical help to each other, and a sense of belonging and community.
- **Enabling participation in sport:** Public open spaces also play an important role in supporting participation in sport. In NSW, many people participate in sport to improve their health and wellbeing, connect with others, including positive role-models, and build their physical and mental resilience[5]. The 2020 Ausplay survey[6] identified that 61.1% of NSW residents participate in sport-related activities.
- **Connection to nature:** Access to the natural environment is good for physical and mental health, but is increasingly difficult to maintain in high density, urbanised environments. Natural landscapes and semi-natural systems such as parks, rivers, bushland, and private gardens, are essential 'green infrastructure' that support quality of life in an urban environment[7].
- **Mental health and restoration:** Even brief contact with nature can improve emotional wellbeing and reduce psychological stress.
- **Place identity:** Public open spaces, including sports fields, can strengthen attachment to place and a sense of community, which is strongly associated with improving mental health. Feelings of disconnection, and the experience of loss of place can have significant psychological impacts.
- **Reduced urban heat:** Natural green spaces and canopy cover reduce urban heat by contributing to shade and evapotranspiration (the process by which the suns energy is used to transfer water from plants into the atmosphere)[8]. They also provide cooling relief on hot days, enabling people to relax and interact with the public realm[9].

3 *NSW Health 2020, Healthy Built Environments Checklist, p.36 <https://www.health.nsw.gov.au/urbanhealth/Publications/healthy-built-enviro-check.pdf>.*
4 *NSW Health 2020, Healthy Built Environments Checklist, p.56 <https://www.health.nsw.gov.au/urbanhealth/Publications/healthy-built-enviro-check.pdf>.*
5 *May, C 2021, "Physical activity," Clearinghouse for Sport < https://www.clearinghouseforsport.gov.au/kb/physical-activity>*
6 *Clearinghouse for Sport 2021 Ausplay results, NSW data tables – January 2020 to December 2020, released 30 April 2021 < https://www.clearinghouseforsport.gov.au/__data/assets/excel_doc/0005/1004576/AusPlay-NSW-data-tables-30-April-2021_Final.xlsx>.*
7 *NSW Health 2020, Healthy Built Environments Checklist, p.56 <https://www.health.nsw.gov.au/urbanhealth/Publications/healthy-built-enviro-check.pdf>.*
8 *Scott, C 2015, A brief guide to the benefits of urban green spaces, p.6 < https://leaf.leeds.ac.uk/wp-content/uploads/sites/86/2015/10/LEAF_benefits_of_urban_green_space_2015_upd.pdf>.*
9 *WSROC 2018, Turn down the heat: Strategy and action plan, p.28, 55 < https://wsroc.com.au/media-a-resources/reports/send/3-reports/286-turn-down-the-heat-strategy-and-action-plan-2018>.*

"With the increase of population, this is becoming much harder for many sports who are struggling to find sufficient grounds.

The best way to counter this is to convert selected turf fields into synthetic as this enables grounds to be utilised more and increase the number of people using it."

- Online submission.

- **Climate change resilience:** Public open space can improve resilience to extreme weather events, such as bushfires, floods and heatwaves, by improving air quality and reducing temperatures and flood risk in urban areas, while sequestering carbon dioxide from the atmosphere[10].
- **Supporting ecosystems:** Public open space can contribute to biodiversity conservation by providing habitats for flora and fauna[11], enhancing micro-climates, as well as other ecosystem benefits such as stormwater management, temperature regulation (e.g., via shade, reduction in wind capacity) and urban heat island mitigation and biodiversity[12].
- **Economic benefits:** Well maintained and high amenity public open space may raise the prices of adjacent properties and stimulate economic activities in nearby businesses[13]. *"The creation, maintenance and management of green space also generates employment opportunities and may have indirect benefits to local economies by encouraging further investment and property development in the area."*

2.3.2 Growing Demand for Public Open Space

Through a combination of busy lives and increasingly denser urban areas, access to public open spaces that enable multi-functional recreation (i.e., walking, cycling, dog-walking or formal or informal sport), becomes very valuable to local communities. An ever-increasing demand for public open space in NSW is driven by:

- **Population growth:** The population of NSW is forecast to reach 8.9 million by 2030-31, an increase of 9% on 2021 levels[14]. Population growth is placing pressure on existing public open spaces which need to accommodate increased levels of demand and more diverse community aspirations. In inner city areas, population growth is occurring within areas already lacking adequate levels of public open space. Ongoing growth will require improvement to the quantity, diversity, quality, and capacity of public open space to meet the needs of the NSW population.
- **Increasing urban density:** Access to high quality public open space is becoming increasingly important as towns and cities in NSW become denser, and dwellings becomes smaller – and increasingly without access to private open space, such as backyards. Increasing urban densities is resulting in more people needing to use public open space to maintain their physical and mental health and wellbeing.
- **Increasing diversity of participants in sport and outdoor recreation:** The profile of participants in organised sport is also changing. AFL, soccer, and rugby, once considered male-dominated sports, are seeing an increase in the number of female participants, with more participation from people over the age of 35. Furthermore, the increasing cultural diversity of NSW communities has also driven a change in community preferences and demand for public open space.

10 *GANSW 2017, Greener Places – draft for discussion, p.16 < https://www.governmentarchitect.nsw.gov.au/resources/ga/media/files/ga/discussion-papers/greener-places-discussion-draft-2017-11.pdf>.*
11 *GANSW 2017, Greener Places – draft for discussion, p.16 < https://www.governmentarchitect.nsw.gov.au/resources/ga/media/files/ga/discussion-papers/greener-places-discussion-draft-2017-11.pdf>.*
12 *Ives et al 2014, Planning for green open space in urbanising landscapes, final report prepared for Australian Government Department of Recreation, Natural Environment Research Program, Environmental Decisions Hub, RMIT, p.7 < https://www.environment.gov.au/system/files/pages/25570c73-a276-4efb-82f4-16f802320e62/files/planning-green-open-space-report.pdf>.*
13 *Ives et al 2014, Planning for green open space in urbanising landscapes, final report prepared for Australian Government Department of Recreation, Natural Environment Research Program, Environmental Decisions Hub, RMIT, p.82 < https://www.environment.gov.au/system/files/pages/25570c73-a276-4efb-82f4-16f802320e62/files/planning-green-open-space-report.pdf>.*
14 *DPIE 2021, projections adjusted for the impact of the COVID-19 pandemic.*

2.3.3 Sports fields and ovals

Open space, including sports fields and ovals, are in high demand in many areas across NSW. In some areas, such as Greater Sydney, there are limited opportunities to provide new public open spaces in response to population growth.

Where land for additional public open space is difficult for councils to acquire, alternative solutions and practices are increasingly required to increase the capacity of existing public open space to meet community needs. This can include improved maintenance or selection of natural turf type, better design of sports fields, more durable and higher quality materials, better lighting, and the introduction of synthetic or hybrid playing surfaces, especially where there is demand for 'elite level' competitions or codes with a preference for synthetic playing fields (such as Hockey, Tennis, and to an extent Football).

The following section provides an overview of the different surface materials for public open space, including:

- Natural turf
- Synthetic turf
- Hybrid technologies.

Each of these surface materials has a complex and diverse range of designs and configurations appropriate for different uses. The performance and user experience of each surface type is also strongly influenced by the maintenance regime and funding levels allocated to upkeep.

The literature review undertaken for this report identified that most existing analysis on the subject tends to evaluate different surface materials from the perspective of sports users. As we heard from community and stakeholder engagement, public open spaces also support important community and informal uses, in additional to formal sporting participation.

Acknowledging the complexity of different surface materials for public open space, this section provides a brief definition of the main types of surface materials. Further discussion of the history, construction and design of different surface types is included in **Appendix D**.

Natural turf

The construction of natural turf varies considerably and has significantly evolved over time to enhance the capacity and durability of natural turf-based playing surfaces. Since the 1920s, research has investigated ways to improve the performance of natural turf playing fields, which has resulted, "almost universally" in the use of coarse-grained, quick-draining materials, such as sand being used to construct natural turf sportsfields[15].

The construction options for natural turf range from a basic soil-based grass field to a high-quality engineered sand-based field with profile reinforcement. The design of a high quality (engineered) natural turf playing surface sand profile typically consists of a natural turf surface layer, rootzone sand layer and gravel drainage layer.

SportEng, an engineering firm specialising in "fields of play," states that natural turf fields are becoming increasingly complex and designed to:

- Drain more effectively while maintaining sufficient moisture content
- Reduce reliance on water for irrigation
- Tolerate more use
- Be available during or immediately after bad weather[16].

15 *SportEng 2021, "What is natural turf?" SportEng, blog post dated 25 March 2021 <https://blog.sporteng.com.au/what-is-natural-turf>.*
16 *SportEng 2021, "What is natural turf?" SportEng, blog post dated 25 March 2021 <https://blog.sporteng.com.au/what-is-natural-turf>*

Natural turf, like other surfaces, has significant maintenance requirements to maintain high levels of performance for all users, such as mowing, "resting" and re-surfacing the field. '

However, councils, community groups and sporting association stakeholders consulted to inform this Study noted that many fields across NSW are not allocated adequate budgets to enable them to perform at high levels of performance, particularly after heavy winter use or wet weather. As a result, facility owners consider replacing natural turf fields with synthetic turf, when instead performance issues may be addressed upon examination of maintenance requirements, turf type, design, or location.

Synthetic turf

Synthetic turf is being adopted by some community sports facility owners for a range of reasons as outlined in **section 2.2.3**, particularly to enable increased use for formalised sport.

The major components of contemporary synthetic turf construction include a pavement base, shock pad to reduce the risk of injury, turf carpet made of artificial grass blades (composed of polyethylene or polypropylene) stitched through a woven mat and infill, which helps keep the blades upright, improves grip and drainage. Common types of infill include crumbed rubber, sand, and cork.

There are a diverse range of synthetic surfaces and construction methods used in public open spaces across NSW. Synthetic turf has been through four generations and continues to evolve with new solutions and applications emerging as the industry matures. Fourth generation (4G) synthetic turf designs are currently emerging and being considered by councils. This generation is characterised by diversified construction materials and methods, including the removal of infill layers (see **section 4.3.3**).

Councils and sporting association stakeholders consulted as part of the Study indicated that the most common type of synthetic turf in NSW is third generation, which is characterised by shock pads and rubber, cork, or sand infill. This type of surface is acceptable for sports including football, AFL, and rugby.

Hybrid turf

There are a range of emerging hybrid turf systems, including:

- **Hybrid turf profile:** This system combines blades of synthetic grass with natural turf to provide a consistent playing surface, improved surface durability and stability[17]. The hybrid system is still relatively new to Australia with only a few installations of this type, including the Melbourne City Football Club training facility and Harrie Denning Football Centre in Kareela, NSW. The hybrid system has become a popular option for international sporting codes such as the English Premier League and National Football League. This system is more durable than natural turf, due to the presence of synthetic grass fibres that provide traction even if natural grass is worn. However, hybrid turf can impede typical maintenance practices required for natural turf (i.e., deep aeration/ decompaction), and further research is required to understand maximum carrying capacity of hybrid playing fields.
- **Profile reinforcement:** In addition to hybrid systems, it is possible to incorporate synthetic elements within the soil or rootzone layer to improve the durability and stability of natural turf and reduce divoting (i.e., holes made in grass by sports activities, e.g., rugby scrums), examples include[18]:
  - Fibre system, whereby various types of synthetic fibre are mixed into the soil or sand into which natural grass is grown, improving root stability.
  - Mesh-based system, where either a mesh or shredded mesh is mixed into the root zone area to stabilise the natural grass fibres.

17 *SportEng 2018, SportEng Field of Play Surface Profiles.*
18 *Smart Connection Consultancy 2019, The Smart Guide to Synthetic Sports Surfaces: Volume 2: Football Turf – Synthetic and Hybrid Technology,*

- **Combining natural and synthetic turf:** Stakeholders consulted during this Study noted that some councils are exploring options to combine some high use areas of natural turf fields (e.g., cricket wicket at the centre of an oval and around goal mouths) with synthetic turf, or a blend of both natural and synthetic, to improve durability without needing to convert the entire field.

This approach is also used in elite facilities, for example the playing surface at Bankwest Stadium in Parramatta consists of a high-quality natural turf pitch, but synthetic grass is used around the pitch to maximise the extent of vehicular traffic without damaging the natural turf surface. Council representatives who participated in the consultation process noted that Liverpool City Council has recently installed hybrid turf alongside natural fields and is monitoring the outcome.

2.3.4 Sporting Demand for Synthetic Fields

The growing demand for synthetic surfaces as an alternative to natural turf fields is predominantly due to two key drivers: increasing demand for access to sporting fields and a decreasing supply of available land and cost to acquire lands to develop new fields.

Other factors driving the demand for synthetic fields within the sporting community include:

- **Increasing participation in sport and outdoor recreation activities:** Population growth is increasing participation in sport and other outdoor recreation activities, even as participation in some forms of sport is declining (e.g., hockey and rugby union). For example, the 2019 (pre-Covid-19) AusPlay data indicates that there are more than 516,000 football participants across NSW. Football NSW in the same year cited an 11% growth in winter participants across the previous five years[19]. The NSW Office of Sport also noted that there has been an increase in non-organised or time-flexible pursuits, such as fitness classes or running, alongside continuing high levels of participation in organised sport. The combination of these formal and informal uses continues to drive a strong demand for active public open space, with most metropolitan councils reporting an increased pressure on community fields during consultation.
- **Shortfall of public open space:** Population growth, especially within cities, and the increasing residential densities resulting from infill development in established areas, have resulted in significant pressure on existing public open space networks for both formal sporting use and general recreation. However, finding and acquiring land suitable for sporting use (i.e., large flat areas) is an increasingly difficult challenge. In some areas of higher density growth, councils can struggle just to achieve sufficient parkland for recreation.
- **Greater resiliency in all-weather conditions:** Responding to changing climate conditions is another driver to the provision of synthetic sport field surfaces. The loss of playable hours on natural turf playing fields due to wet weather is often cited as a key reason for pursuing synthetic playing fields, ensuring consistent sport participation during the winter season when demand is typically at its highest (especially for football, rugby and AFL). Conversely, in drought-prone areas, the use of synthetics means that a lack of water will not impact on the playing surface quality. It should also be note that hot weather can impact user safety and comfort on synthetic fields.
- **Higher return on investment:** Synthetic surfaces are also perceived to have a greater ability to attract a higher return on investment than natural turf playing fields through user chargers. The ability to charge increased hire costs, the number of hours a field can be hired, and the ability to plan and fund refurbishment are attractive to facility owners or operators. However, this is seen by the community as privatisation of public open space.

For some sporting codes (i.e., football, AFL, hockey, and rugby union) there has been substantial research and investment in the development of standards around synthetic surfaces to assist in deploying this solution. For many facility owners, the investment in a synthetic surface meets the sporting needs of the local clubs, is favoured by them, and provides a known outcome in terms of capacity and reliability.

19 *https://footballnsw.com.au/2019/11/07/football-remains-number-one-in-nsw/.*


Image source: https://www.twenty20.com/

"To date, the decision has been presented as a very binary one – either we keep the natural turf and have to deal with reduced playing time with ever increasing demand from sports team or install synthetic turf."

- Online submission.

2.3.5 Community Sentiment

The installation of synthetic turf fields, particularly the replacement of natural turf fields with synthetic turf, is attracting high levels of interest from communities in NSW.

There is strong support among participants of specific sporting codes (i.e., football, AFL, hockey) for the installation of synthetic fields due to the increase in capacity of playing fields. This increased capacity is seen to help address the growing demand for playing space and participation rates with some of these sports.

Conversely, it was noted in the stakeholder workshops that for some sporting codes (i.e., cricket and rugby league) the introduction synthetic fields have not been welcomed by their local clubs and associations due to the playing surface not being conducive their style of game (i.e., tackling, and impact to fielding side). However, in the example of rugby league, it was noted during the consultation process that there was an openness for synthetic from the less contact forms of their game, including Touch Football and OzTag.

Feedback from other stakeholders, including community groups, environmental groups, academics, and other sporting codes spoke about their concern about the potential social, environmental, and economic impacts of synthetic turf. Within local government areas (LGA) across Greater Sydney have formed action groups in response to the conversion of natural turf fields into synthetic turf fields within their community

Throughout the consultation process, it was clear that there is strong support for increased participation in recreation and improved access to high quality public spaces – including from community members, council representatives, sporting groups and industry experts.

The differences of opinions were associated with the potential solutions to addressing the competing needs and growing demand for green open spaces, noting the challenges of sharing field space with sporting codes and informal uses in any given facility.

There was however consensus amongst different community groups (i.e., resident action groups and sporting clubs) on the need to identify alternative solutions to ensure the best outcome for the community, from a social, economic, and environmental perspective.

This included a strong recognition of the need for consultation, possibly achieved through modification to the ISEPP (see **section 1.3**).

"This is not about balancing competing open space needs – it's about making available space usable for all potential users."

- Online community workshop participant, 25 May 2021

3.0 Methodology

3.1 Developing the Study

The following section outlines the methodology developed by the Department and Ethos Urban in conducting this Study.

3.2 Literature Review

A literature review was undertaken to identify key existing academic and industry research from an Australian and international context. This literature review was guided by two primary inquiries:

- What are the established social, economic, and environmental impacts associated with the process of replacing natural turf with synthetic surfaces?
- What is the status and best practice of synthetic turf installation and use in NSW?

The review followed a two-step process:

1. Ethos Urban conducted key word searches to identify potentially relevant material published in English. The search included any study that referred to the social, environmental, and economic impacts of synthetic turf, with priority given to Australian studies. Ethos Urban also obtained additional relevant studies from the reference lists of identified articles, industry documentation, as well as from participants in the stakeholder and community workshops.
2. Ethos Urban screened all identified references to compile key findings and perspectives, and to identify potential gaps in research and areas for deeper inquiry.

This literature review identified that:

- Most existing analysis on the subject tends to evaluate different surface materials from the perspective of sports users, rather than informal community users.
- There are few Australian-specific studies on key issues, including heat, UV, injury, chemical leeching, and comprehensive economic and carbon life cycle analyses[20].
- There are currently no NSW-specific guidelines for decision makers considering the implementation of synthetic turf. However, there are discussion papers and guidelines from other jurisdictions, such as Victoria and Western Australia.
- The social impact of synthetic turf is under-researched, compared to the more extensive environmental and economic analysis conducted overseas. Therefore, this report has drawn from the findings of community and stakeholder consultation to explore social impacts of this issue within the NSW context.

The key findings and perspectives from this literature review have been incorporated throughout this report.

20 *See, however: Football NSW n.d., Increasing capacity with synthetics: The impact of investing in synthetic pitches on the operation of a club, provided to NSW DPIE during stakeholder workshops; GHD for Horticulture Innovation Australia Limited 2020, Living turf fire benefits study – Literature review, April 2020 < https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/tu17008-literature-review-living-turf-fire-benefits-study.pdf>; Lamble, P & Battam, M n.d., "Creating sustainable open spaces – using compost to deliver liveability, sustainability and economic outcomes," technical paper prepared for OzWater; Smart Connection Consultancy 2017, The Smart Guide to Synthetic sports Fields Rubber Infill; Smart Connection Consultancy 2019, The Smart Guide to Synthetic Sports Surfaces: Volume 3: Environmental and sustainability considerations, accessed 17 May 2021 < https://www.smartconnection.net.au/wp-content/uploads/2019/11/Vol-3-Envirnmental-and-Sustainability-Considerations-v1.01.pdf>; WA Department of Local Government, Sport and Cultural Industries nd., Natural Grass vs Synthetic Turf Study Report, < https://www.dlgsc.wa.gov.au/department/publications/publication/natural-grass-vs-synthetic-turf-study-report>.*

3.3 Consultation Process

The Department recognised that consultation with key stakeholders including the local community was essential to ensuring this Study was considerate of the diverse perspectives of those involved in the use and decision-making process in the application of synthetic surfaces.

Throughout May 2021, the Department and Ethos Urban held a series of in-person and online workshops, including three stakeholder workshops and two community workshops on the following dates:

- **Stakeholder Workshop 1:** Tuesday 4 May (in-person).
- **Stakeholder Workshop 2:** Wednesday 5 May (in-person).
- **Stakeholder Workshop 3:** Thursday 6 May (online).
- **Community Workshop 1:** Tuesday 25 May (online).
- **Community Workshop 2:** Thursday 27 May (in-person).

A mixture of both in-person and online sessions were held to ensure representatives from across NSW could also participate in the consultation process. Each workshop ran for approximately two hours with approximately 12–15 participants in attendance at each workshop.

Image source: https://www.twenty20.com/

3.3.1 Workshop Format

The purpose of both the stakeholder and community workshops was to obtain feedback from participants on the social, environmental, and economic impacts and benefits of synthetic turf.

To help ensure participants had the opportunity to share their views and experiences, larger workshops (over 15 participants) were divided into two groups with time at the end of the workshop allocated for a report back to the wider group.

Approximately 90 minutes of the two-hour workshops were allocated to a roundtable discussion where participants were able to share their feedback on a series of questions that had been developed in response to the key requirements of the project brief. Workshop materials (i.e., meeting agenda and sample presentation have been included under **Appendix E**).

It was recognised that to ensure the diverse range of perspectives could be considered, workshop questions needed to be similar for both the stakeholder and community workshops; however, some targeted questions were included in recognition of the representatives in attendance.

Workshop Questions

- How are your local fields used? Is there a mixture of formalised and informal recreation and cultural uses? What are the positive / negative aspects?
- What impact has the increased adoption of synthetic turf fields had within your community?
  - Environmental
  - Social
  - Economic.
- What factors inform Council's decision-making process on upgrading and/or selecting a surface type?*
- How can we better balance competing open space needs for different community groups?^
- What practices are currently in place to manage fields within your local area? Could these be improved and if so, how?
- Are there any alternative turf technological solutions and/or management techniques available that enable an increase in usage? If so, where are these, what have been the benefits / outcomes?

**Stakeholder workshop only*
^Community workshop only

To help understand the effectiveness of the workshop facilitation as well as capture any additional feedback from participants, a post-workshop survey was emailed to each stakeholder participant. Due to time constraints, a post-workshop survey was not issued to those who attended the community workshops; however, the participants were encouraged to provide follow up feedback via the online comment box or by directly emailing the Department's Open Spaces team.

As survey participation varied across each of the three stakeholder workshops, the results collected are not considered to be statistically significant. However, further feedback on the workshop questions has been incorporated into this report.

3.3.2 Stakeholder Consultation

Recognising the need to hear from a balanced and diverse range of perspectives on synthetic, natural and hybrid surfaces for public open spaces across NSW, the Department identified a broad representation of stakeholder groups to participate in the three stakeholder workshops.

The Department cross pollinated the selection across various sectors and subject matter experts to ensure this Study was considerate of those involved in the decision-making process in the application of synthetic surfaces.

Stakeholder groups invited to participate included:

Table 1 – Stakeholder Groups Invited

Type	Stakeholder groups
Local Councils	• Selected Metropolitan councils, including infill and greenfield councils • Selected Regional councils
State agencies	• Sports • Environment • Health • Public Spaces • Infrastructure and Place
Peak sporting associations	• AFL • Hockey • Cricket • Rugby League • Football
Academics & Research	• Environment • Health
Industry Peak Bodies	• Planning • Environmental Protection • Landscape and Design
Turf specialists and consultants	• Natural • Synthetic

A full list of the organisations who participated in the stakeholder workshops has been included in **Appendix F**.

3.3.3 Community Consultation

Understanding that the Study would attract high levels of interest from different groups within the community, it was important that community groups had the opportunity to share their experiences and perspectives. Due to the limited timeframes, participants in the stakeholder workshops, including councils and peak associations, were asked to help identify community groups and representatives for the community workshops. This was in addition to the Department's own knowledge of key community groups.

Interested community members were also invited to submit an Expression of Interest to the Department's Open Space Team, which was advertised on the Department's website. All applications received were invited to participate in either the online or in-person workshop. Participants in the community workshop ranged from:

- Residents from areas undergoing the installation or planning of a new synthetic turf field (i.e., Banksia, Lane Cove, Ku-ring-gai, Northern Beaches)
- Community groups (i.e., resident action groups, environmental protection groups)
- Peak bodies
- Community sporting clubs and associations.

A list of the community groups and organisations who participated in the two workshops has been included in the appendices of this report.

Whilst this Study was not formally exhibited for public comment, community groups or representatives were also able to provide online submissions via an online comment box on a Department webpage created specifically for this project.

The online submission process was open between 21 May and 4 June 2021 and the feedback received has been incorporated into the findings of this Study. A summary of the organisations and groups who made submissions has been appended to this report.

A total of 46 online comments, emails and written submissions were received during this period. The feedback received has been incorporated into the findings outlined in **section 4.0**.

4.0 Study Findings

The following section provides an overview of the key themes and issues uncovered as part of the Study and is structured into the following parts:

- Understanding the social, environmental, and economic issues
- Understanding the decision-making process, including planning policy issues
- Alternative turf technological solutions and management techniques
- Evaluation of management approaches/alternate practices.

Themes and issues identified through the desktop research and consultation process are supported by case studies.

4.1 Understanding the Social, Environmental, and Economic issues

This section draws on the outcomes of the literature review, as well as the consultation process, and provides an overview of the key social, environmental, and economic benefits and impacts of using synthetic turf as a replacement for natural grass.

4.1.1 Social Dimensions

As identified through the consultation process, natural turf fields are considered an integral part of a local community's public open space network due to their ability to support a diverse range of recreation uses. Examples include, dog walking, running, socialising, local community and cultural events, and participation in formal or informal sports. In contrast to environmental and economic impacts, the social dimensions of synthetic turf are under-researched; however, the stakeholder and community consultation process has highlighted a range of social impacts as summarised in detail below.

Community Concern Over the Loss of Access to Public Open Space

While the potential for synthetic surfaces to increase the capacity of fields for sporting uses is generally accepted, stakeholders and representatives from community action groups expressed their concern over the loss of access to open space when a natural turf field is converted into synthetic. Through the workshop and online submission process, it was noted that the conversion can lead to informal community uses, such as dog walking and self-organised ball games, being displaced in favour of formalised sporting uses.

Arguments in favour of synthetic surfaces tend to focus on their ability to increase the capacity of existing open space for sporting activities; however, it was noted several times that communities also value the opportunity to participate in a diverse range of recreational activities outside a formal sporting context. For example, the Greater Sydney Outdoor Study found that many people prefer spaces that require no membership or schedule for use and enable a range of recreation opportunities[21].

It was evident during consultation undertaken for this Study that some community groups consider the installation of synthetic fields as a reduction in access to green open spaces that are already under pressure from densification, or even as a loss of open space.

21 *Greater Sydney Outdoors Study, Department of Planning and Environment, June 2019, 0. 7*

"Socially, synthetic surfaces are unwelcoming and limiting.

Through restricting or limiting use, such surfaces effectively reduce open space as a community or social asset."

- Online submission (resident).

While synthetic fields can often accommodate increased usage and greater intensity of formalised sporting use, they can displace informal users of natural turf fields, for the following reasons:

- **Protection of the playing surface:** A synthetic field is a significant capital investment, and as a high value asset there is an increased focus on protecting that asset for its primary purpose. Often there is a need to manage use, preventing dogs from accessing the space and ensuring players clean boots to protect the surface and avoid contamination of the infill.
- **Restrictions on informal access:** As synthetic playing surfaces are generally installed to enable formal sporting use, facility owners may restrict the use of the field outside of organised sporting activities, including by fencing the field. However, several council representatives who participated in the consultation process noted that in some cases, synthetic fields are not fenced, and informal community use (of synthetic fields) does occur. However, there is clearly a perception within the community that the space is not available for informal or non-sporting use. Furthermore, the high frequency of formal sporting games and training, often results in little downtime for others to use the space.
- **Inappropriate for community events:** Synthetic turf cannot generally be used for community events, as these require marquees and other temporary infrastructure that can damage the underlying carpet of synthetic turf.
- **Reduced amenity:** Synthetic turf has reduced amenity for informal recreation and socialising (due to the touch and feel of the surface type, increased heat load and glare) which may discourage use of the field for alternate purposes even when access is not restricted.
- **Designed for specific codes or groups of codes:** Synthetic fields are usually managed for formal sporting use and therefore have less flexibility to accommodate informal and recreation use as they cannot easily be reconfigured to accommodate different types of use, such as an emerging code or different sport. Line markings on synthetic fields are often more permanent and the pile height and other features are specifically designed for a specific code or group of codes. There are several products of synthetic turf which are more general use and can accommodate a range of large ball sports; however, AFL, football and rugby all have specified performance features to certify synthetic turf as suitable for their sport.

Image source: https://www.twenty20.com/

Changes to Amenity

The conversion of natural turf fields into synthetic fields can impact the amenity and place characteristics of a local area. Whilst limited academic research has been completed on the diverse values communities assign to public open space, Ives et al (2014) noted that values can include aesthetic/scenic value, access to nature and native plants and animals, health and therapeutic values and social interaction[22]. Changes to local amenity are a key social consideration that was frequently raised by community members during workshops and in online submissions.

It was noted in the literature, as well as in the stakeholder and community workshops, and the online submissions that the amenity and aesthetics of a public open space can be negatively affected by the conversion of natural grass to synthetic turf. Examples noted include:

- **Heat:** Unlike natural turf, which mitigates urban heat island and provides a relatively cool surface for users, particularly in summer, synthetic turf generally absorbs, rather than reflects sunlight, causing the emission of heat. This can reduce the amenity of a public open space for all users, including sporting players and informal users of the site. This was a core concern raised by stakeholders and community representatives during workshops and in online submissions, who also raised that hot synthetic turf can be unpleasant for dogs and their owners when on walks, as well as small children. Heat is a particular concern in the Australian climate, where summer days regularly exceed 30 degrees – however, there is limited existing academic research on the Australian-specific heat impacts of synthetic turf.
- **Aesthetic considerations:** Synthetic turf fields provide a consistent green surface, while natural turf open spaces can be of variable quality depending on their construction and maintenance regime. However, as recent media coverage on synthetic turf fields has highlighted, communities typically prefer the visual appeal of natural turf compared to "fake grass[23]."
- **Connection to nature:** Spending time in nature is proven to reduce symptoms of stress, anger, depression, and fatigue, and lead to increases in happiness. Exposure to nature is linked to improved wellbeing by helping to restore attention and break routine in daily life, and by promoting recovery from stress. Emotional responses to aesthetically pleasing stimuli, such as green spaces, also tend to decrease physiological arousal, thus making us feel relaxed[24]. Replacing natural grass with synthetic materials reduces connection to nature, and the associated feelings of relaxation and restoration.
- **Noise abatement, glare reduction and UV reflectivity:** Natural grass also reduces noise and glare when compared with synthetic turf, which can affect sports participants, other site users and neighbouring uses[25].

22 *Ives et al 2014, Planning for green open space in urbanising landscapes, final report prepared for Australian Government Department of Recreation, Natural Environment Research Program, Environmental Decisions Hub, RMIT, p.7 < https://www.environment.gov.au/system/files/pages/25570c73-a276-4efb-82f4-16f802320e62/files/planning-green-open-space-report.pdf>*

23 *Sydney Morning Herald 'Fake grass may be greener, but much hotter and less friendly to environment'https://www.smh.com.au/national/nsw/fake-grass-may-be-greener-but-much-hotter-and-less-friendly-to-environment-20210312-p57a95.html*

24 *Bhullar, N 2019, "We know contact with nature makes you feel better. Can virtual contact do the same?" The Conversation, 19 June 2019, accessed 16 May 2021 < https://theconversation.com/we-know-contact-with-nature-makes-you-feel-better-can-virtual-contact-do-the-same-111752>*

25 *WA Department of Local Government, Sport and Cultural Industries, Natural Grass vs Synthetic Turf Study Report, < https://www.dlgsc.wa.gov.au/department/publications/publication/natural-grass-vs-synthetic-turf-study-report>*

Community Concern Over Increased Utilisation of Existing Fields

Council and community representatives raised concerns over the perceived amenity impacts for local neighbourhoods associated with installing new synthetic turf sports fields. As synthetic turf can enable longer and more intense periods of use for sport, there can be amenity impacts for local neighbours, including:

- Increased lighting at night (however, local government stakeholders noted that recent improvements to lighting technology have significantly reduced light spillage associated with sporting facilities)
- Increased congestion and pressure on parking and local traffic associated with players and their families accessing sports fields for training and games. This theme was reaffirmed through many of the online community submissions
- Increased noise due to greater intensity of use by sporting clubs and associations.

Sporting and council stakeholders suggested that the conversion of natural turf playing fields to synthetics may be less disruptive to local communities if the existing field is already used intensively for sportsground use, and increased utilisation is unlikely to significantly change the impact on neighbours.

4.1.2 Demand Capacity

Public open space and recreation areas contribute to making the cities and towns of NSW attractive, healthy and liveable. Providing social infrastructure, particularly public open space and recreation areas, will be critical in continuing to meet the needs and to support the health and wellbeing of the State.

To ensure liveability, one of the greatest challenges will be to provide high quality public open spaces that are equitable, flexible, accessible, well-connected, and diverse. Planning for recreation is influenced by the provision and quality of public open space and this interrelationship is complex and it is vital that recreation planning is cognisant of the type and size of public open space and facilities that meets the needs of the community.

High quality and accessible public open space are associated with higher levels of physical activity and spaces with high-quality options or activities are more likely to encourage physical activity more than the number of open spaces available. This is applicable to both active, passive, organised or unstructured recreation activities.

The demand on the public open space network is growing as with that comes the need for public open space to be multifunctional, flexible, and designed to offer the community with a diversity of recreational offerings.

The key driver for replacing natural grass with synthetic turf is the perception that it is an effective way to increase the capacity of existing playing surfaces, improve surface durability during wet weather, for sports participants. This is based on assumptions that synthetic surfaces can accommodate greater hours of intensive use when compared with natural turf.

This section explores the relationship between user demand and field capacity, including the diverse users and demand for public open space and considerations for modelling demand and capacity.

Diverse Users and Demand for Public Open Space

The shared use of public open space and the increasing use of public open space for a diverse recreation offering (not just formalised sport) should be factored into any consideration when choosing surface type.

A conversion of natural turf to a synthetic playing field needs to consider the impact on other users in the community (see **section 4.1.1**) and should be factored into the investigation of the costs and benefits of design options.

"Passive recreation and access to green space is critical to the health and wellbeing of the wider community.

Sporting groups only make up a small proportion of the total potential users [of a sporting field]."

- Online community workshop participant, 25 May 2021.

Most natural turf fields are for club and community level sport and are open to other users and informal access when not booked for formal sporting use. When these facilities are modified to have a synthetic surface, access limitations can be imposed, such as fencing and restricted access to clubs and fee-paying users.

While fencing and other use restrictions may not actually reduce public accessibility of playing surfaces, they can create restricted access. It is important to note that very high-quality natural turf fields designed and managed for sporting use (such as national level sport clubs) can also have restricted use (e.g., fences) to protect the playing surface.

Due to the growing demand on the public open space network, managers look to find solutions that offer a balance between flexibility and multi-functionality. Natural turf fields offer flexibility as they can be readily reconfigured as demand changes, are generally easier to repair or mitigate damage, and can be more easily used informally. Alternatively, synthetic playing surfaces offer the opportunity to accommodate a higher carrying capacity, allowing more people to play however limit the multifunctionally and flexibility of the space.

Image source: https://www.pexels.com/

CASE STUDY 1: Henson Oval, Marrickville

Figure 1. Henson Oval, Marrickville
Source: pupsy.com

Henson Park is a multi-purpose sporting ground with one natural turf pitch and floodlights, as well as a designated off-leash dog area. This site is a valued local facility within the Inner West LGA, an area which has relatively low levels of public open space per person, compared to other areas of NSW. Henson Park is one of few large public parks within the Inner West LGA, and experiences high levels of use from local rugby league (Newtown Jets) and AFL teams, supports community recreation activities such as dog walking, walking, running, and socialising and also hosts local community events including the Beer, Footy and Food Festival and the Reclink Community Cup. Strategic planning for public open space, undertaken by Council in 2018, has highlighted a need to maximise the recreational use of the site to support population growth[26].

The oval is located on an ex-brick pit with a sinkhole in the middle and poor drainage and was assessed by Inner West Council as a potential location for a synthetic playing surface[27]. However, the facility has instead been retained as a natural turf playing surface by upgrading the turf and underlay soil, installing a new drainage system, rearranging the stormwater drainage network across and upstream of the field, upgrading the irrigation system and rectifying the long-term sinkhole in the centre of the field[28]. This upgrade was completed in 2021 at a cost of $2.6 million, and has been well received by local sports clubs[29].

Henson Oval demonstrates the importance of high quality public open spaces that successfully balance the needs of all users. Upgrading existing natural turf fields can increase capacity for sporting use without alienating other uses.

26 *Cred 2018, Recreation Needs Study – A Healthier Inner West, p.28, accessed 22 June 2021 < https://www.innerwest.nsw.gov.au/about/policies-plans-and-regulations/park-plans-of-management-and-studies/recreation-studies-and-plans>*

27 *Inner West Council 2019, Synthetic sporting grounds to increase sport participation, Inner West, accessed 22 June 2021 < https://www.innerwest.nsw.gov.au/about/news/media-releases/2019-media-releases/synthetic-sporting-grounds-to-increase-sport-participation>*

28 *Inner West Council 2021, Henson Park Upgrade, Inner West, accessed 16 May 2021 < https://www.innerwest.nsw.gov.au/develop/council-run-works-and-projects/park-building-and-streetscape-projects/upcoming-and-ongoing-projects/henson-park-upgrade>*

29 *Newtown Jets 2019, "The Future of Henson Park has been secured," Newtown Jets, accessed 22 June 2021 <https://www.newtownjets.com/the-future-of-henson-park-has-been-secured/>*

Growing Sporting Demand

Engagement with council stakeholders, community representatives and sporting bodies has highlighted that the installation of synthetic surfaces in NSW is generally a strategy to increase capacity for sports participation.

In 2016, approximately 3.7 million adults (59%) in NSW participated in sport or physical activity at least three times a week[30]. Nearly 300,000 (21%) of NSW children aged 0-14 years participated in organised sport or physical activity outside of school hours (including games, training, practice) at least three times a week.

As previously outlined, community participation in sport in NSW is driven by:

- Population growth
- Diversifying participation patterns

Ongoing community participation in sport is driving increased demand for access to sports fields and sports spaces. Many local governments are using their existing natural turf fields to their perceived capacity (approximately 30 hours a week).

One of the few available solutions to address unmet demand is to increase the capacity of existing assets. This increased capacity requires a combination of lights (extending the hours of use) and upgrading the playing surface, either by conversion to synthetic turf or redevelopment as a high grade "engineered" natural turf sports field.

Some of the key drivers of increased adoption of synthetic turf for sports users include:

- **Hours of use:** Synthetic turf is capable of supporting a high number of hours of use. A higher investment in maintenance costs for natural turf will be required to support higher hours of use on well-designed natural turf fields without displacing other users.
- **Consistency and quality of play:** Synthetic surfaces when maintained correctly, can provide a consistent and usable surface all year round for sport and physical activity. It should be noted that well maintained natural turf fields will also offer a more consistent and usable surface thought the year.
- **All-weather suitability:** The loss of playable hours on natural turf playing fields due to wet weather is often cited as a key reason for pursuing synthetic playing fields, ensuring consistent sport participation during the winter season when demand is typically at its highest. However, as will be discussed below, synthetic fields are significantly hotter during summer.
- **Sporting code preferences:** Some sporting codes (e.g., hockey) have a strong preference for synthetic fields compared to natural turf, as it supports improved performance. Some sporting governing bodies (i.e., International Athletic Associations Federation with Athletics, Federation of International Hockey with Hockey fields etc.) prescribe that if a particular level of game is to be played, there has to be access to an "all weather surface".

30 *Office of Sport, Participation https://www.sport.nsw.gov.au/sectordevelopment/participation.*

Modelling Capacity vs Actual Demand

It is important to understand the actual demand of an open space or by a specific sport that aims to be accommodated and to consider what might be the most cost-effective response to meeting that demand. When undertaken in the early planning stages of facility upgrade, this assessment should inform the scope of improvements to facilities (surface change, lighting improvements etc.) but also be broadened to consider the impact of meeting this demand on the wider use of the public open space.

Council stakeholders identified that high demand for sporting participation tends to be Councils' highest priority when making decisions regarding whether to replace existing natural turf with synthetic surfaces. This is particularly important for local councils where high land values make it challenging to acquire new land for open space, and synthetic playing surfaces are often seen as the only option to maximise existing sporting capacity. This is exemplified by the case study of Gunyama Park, Zetland (**Case Study 2**).

As noted by council and state agency representatives during the stakeholder workshops, a cost-benefit analysis or business case undertaken for a proposed conversion to a synthetic surface compares the capital and operating cost (or life cycle cost) of a playing field against the sporting user hours to be accommodated. As identified above, the impact on non-sporting users and the "disbenefit" or cost of reducing multiple use and community access for other recreation use, is not often considered, or factored into the decision.

The capacity of synthetic fields to accommodate significantly increased sporting use, compared with natural turf, is commonly cited as a key advantage of synthetics over natural turf.

When considering demand, it is important to understand the real, not perceived, level of demand when considering what sporting field surface to use. Local government, sporting association stakeholders and community groups noted in the workshops that at a local level, the decision to install synthetic turf is generally driven by demand and lobbying from sporting clubs.

However, sports fields are not always used for formalised sport. They are also places that the community use for dog walking, exercise and fitness, informal sports such as casual sport and many more activities.

Formalised sporting demand for access to sports fields is underpinned by current and projected participation numbers and a club's programming for training and competition needs. Through the literature review it was noted that the peak demand for sporting use is predominantly after school hours and on the weekends. Without lights, field usage would stop at 6:00pm or earlier during winter months. With lights, usage might continue to 8:00pm or later and competition use might also extend further use on Friday evenings. Weekend demand can be across both days and may be as high as 8 hours per day.

Level of wear also depends on:

- Type of sport, e.g. rugby union can have a high impact due to scrums, while cricket has a relatively low impact
- Age of players, i.e. young children have reduced impact on turf
- Number of players
- Programming by clubs[31].

Battam and Lamble[32] provide an analysis of field use in NSW and suggest that if there is sufficient demand from sporting groups then a likely level of demand for approximately 90% of fields during the winter peak season (generally 25 weeks long) is less than 45 hours per week. Therefore, actual demand for sporting use could be met through delivering a well-designed natural turf field.

31 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presented at PLA NSW, presentation provided to NSW DPIE.*
32 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presented at PLA NSW, presentation provided to NSW DPIE.*

Local government and state agency stakeholders noted that some facilities may have increased demand for daytime use from schools, especially those without access to public open space as part of their grounds. The declining levels of provision of sporting space in schools is transferring curricula driven demand to public sporting facilities.

If a field is supporting daytime use, such as for schools, then there may be additional hours of demand for some days of the week – most likely between 10am and 2pm. In addition, fields in city centres or places with high daytime populations may have demand for social sport or organised activity during lunch hours or before or after work.

Image source: https://www.twenty20.com/

CASE STUDY 2: Gunyama Park, Zetland

City of Sydney has recently constructed a new synthetic sportsfield in the high-density urban renewal area of Green Square. Gunyama Park opened in 2021 and accommodates both formal sports competitions as well as social and accessible sports.

A needs analysis completed to inform the planning for this field identified *"there are benefits of providing a synthetic field in this instance, largely due to the high level of demand every day from different type of users, the small space available as well as the ability to use such a field up to 15 hours per day*[33]*."*

There has been little community opposition to this synthetic turf field, or the site location. This may be because this synthetic field is located within a "brownfield" or formerly industrial area, is not close to any environmentally sensitive areas (e.g. local waterways, national parks) and is not does not replace an existing natural turf space, displacing other users of the field.

City of Sydney are also investigating opportunities for five other synthetic fields within the LGA to meet the community needs for longer playing hours, as identified in Council's Open space, recreation, and sports needs analysis.

"Wet weather, uneven and hard playing surfaces, lack of turf growth, as well as field closures due to re-turfing, significantly impacts our sporting groups and field operations. High quality synthetic sports fields can be used by a greater range of sports year-round. They are less impacted by weather, less prone to closure and there is no annual need for returfing... For every synthetic field we install, we're able to retain two other similarly sized fields for passive and active recreation, while meeting the sporting needs of our growing community."
- City of Sydney website[34].

Turruwul Park in Rosebery[35], a short distance from Gunyama Park, is also currently being considered for a potential synthetic surface by the City of Sydney. In contrast to Gunyama Park, there has been some community opposition to the proposal as it replaces an existing well-valued green space, which is used for sporting and informal use, and an annual Christmas concert. Council is currently considering potential future options for this park.

Figure 2. Gunyama Park multiuse field, Zetland
Source: City of Sydney.

33 *@Leisure Planners 2015, Gunyama Park and Green SquareAquatic Centre Recreation and Park UsesStudy, Revision 5, prepared for City of Sydney < http://www.atleisure.com.au/files/kmfptfkijn/@leisure-Gunyama-Park-Uses-Study-Revision-5-10-7-15.pdf>.*
34 *City of Sydney 2021, "More synthetic sports fields for longer playing hours," City of Sydney News < https://news.cityofsydney.nsw.gov.au/articles/more-synthetic-sports-fields-for-longer-playing-hours>.*
35 *Rosebery Community News 2021, Save Turruwul Park from Synthetic Grass! Rosebery Community News, 20 April 2021 < https://roseberycommunitynews.medium.com/save-turruwull-park-from-synthetic-grass-ae2a1a4725df>.*

"Soccer clubs would love to have natural grass ovals, but we can't get the hours we need out of them... and we don't have anywhere to put an extra field."

- Workshop participant, 27 May 2021.

Comparing and Questioning Capacity

Capacity is often measured in "field hours". That is, the number of hours a field can be used before it degrades and becomes unsafe or unusable. All fields, regardless of construction, require time for maintenance and most facility managers will "block out" periods to allow for this[36].

There is significant debate within the existing literature about the "field hours" supported by different surface types. Commonly cited comparisons of capacity suggest natural turf supports around 20–30 hours per week of sporting use, and synthetic turf at 60+ hours per week[37, 38]. Hybrid turf may be used 30–40 hours a week, depending on the system[39]. Sports NZ cite high use hours for a 25-week winter period on sand based natural turf fields as around 25 hours per week, and synthetic surfaces at 40–70 hours per week[40].

Recent research by social and turf scientists Dr Mick Battam and Dr Paul Lamble has challenged past assumptions on the relatively low capacity of natural turf fields[41]. Using several NSW case studies where fields have been redeveloped and constructed appropriately, and maintained well, the authors demonstrated much higher capacity (40–65 hours per week) than previously assumed for natural turf fields. They highlighted that:

- Poor construction and poor choice of soils has a significant impact on capacity
- Good maintenance and management practice will significantly increase resilience and capacity for use
- The use and capacity of a field is impacted by more than just "hours" of use, with type of sport, age of players, number of players, intensity of use, size of the field, ability to spread wear, and climate, all have an impact.

Furthermore, Battam and Lamble's research has significantly challenged the notion that a synthetic field has the best lifecycle cost per hour of use (this is explored further in **section 4.1.5**).

Feedback during the community workshops and noted in the online submissions highlighted that there is a high degree of community acceptance around well-designed natural turf fields. Middle Head Oval, Mosman (**Case Study 3**) is a frequently cited example of a best-practice natural turf field.

Some council and sporting association representatives consulted during this Study spoke about synthetic turf as having higher capacity for sporting use, and better resilience to intensity of use in a range of climate conditions (except where there are high day time temperatures and the heat load from a synthetic surface is much higher than natural grass).

However, synthetic fields have a significantly higher capital cost compared to most natural turf fields. Feedback provided during the stakeholder workshops noted that well-engineered natural turf fields or a hybrid solution can deliver sufficient capacity to meet required demand at a lower cost, while also being more flexible for a broader range of users.

36 *Synthetics need to be swept, cleaned and the infill layer needs to levelled and topped up, whereas natural turf needs mowing, irrigation, management of compaction, remarking and pesticide/herbicide use. See: WA Department of Local Government, Sport and Cultural Industries, Natural Grass vs Synthetic Turf Study Report, < https://www.dlgsc.wa.gov.au/department/publications/publication/natural-grass-vs-synthetic-turf-study-report>.*

37 *Smart Connection Consultant 2019, The smart guide to synthetic sports surfaces: Volume 1: Surfaces and standards, p.8 < https://www.smartconnection.net.au/wp-content/uploads/2019/11/Vol-1-Surfaces-and-Standards-v1.01.pdf>.*

38 *Football NSW, 2017, Synthetic fields: A guide to synthetic surfaces for football, accessed 17 May 2021 < https://footballfacilities.com.au/wp-content/uploads/sites/11/2018/10/SyntheticFields-v2-2017.pdf>.*

39 *SportEng 2018, SportEng Field of Play Surface Profiles.*

40 *Sports NZ and Jacobs 2019, Guidance document for sports field development, December 2019 < https://sportnz.org.nz/media/1409/sports-field-development-guide-final-2020-1-22.pdf> These figures are based on use analysis undertaken in 2013, and may not reflect the advances in natural turf field construction that has occurred since then.*

41 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presented at PLA NSW, presentation provided to NSW DPIE.*

CASE STUDY 3: Middle Head Oval, Mosman

Figure 3. Middle Head Oval, Mosman
Source: Headland Preservation Group, 2017 <https://www.hpg.org.au/blog/2017/council-motion-synthetic-turf-middle-head-oval>

Middle Head Oval is a sporting field in Mosman, used for formal sport and informal community uses but was considered to perform poorly and required extensive re-surfacing each year[42].

Mosman Football Club and Mosman Swans lobbied Mosman Council to have Middle Head Oval replaced with a synthetic surface[43] to expand their programs and enable playing in all weather conditions. A recreation needs analysis undertaken by Council also identified a need to increase sportsfield capacity at this site by changing surface types. This caused significant resistance from local environmental groups, including Headland Preservation Group (HPG) and Mosman Parks and Bushland Association. The oval is located in a sensitive harbour foreshore environment and close to bushland, and these groups were concerned about the impact of micro plastic pollution on local waterways and within the food chain, and other environmental impacts[44]. These groups also opposed the loss of public access to Middle Head Oval.

In response to community opposition, Mosman Council subsequently rejected a Development Application for synthetic turf at the oval, instead investing in complete turf redevelopment of the oval in 2018, at a cost of less than $500,000. The upgraded turf field receives 49-55 hours per week of sporting use during winter, as well as informal community use throughout the year, without significant loss of surface quality.

Middle Head Oval is considered a best practice natural turf oval[45]. Given it has only recently been constructed, its ability to withstand longer term use has not been tested.

HPG remains concerned that "increased usage and new/additional lighting puts this substantial investment at risk and raises the prospects of renewed calls for plastic grass let alone likely traffic congestion[46]".

42 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presentation provided to NSW DPIE.*
43 *Mosman Football Club 2019, "Improving Infrastructure for Football," Mosman Football Club, access.*
44 *Tang, C 2017, "Mosman Council turfs idea for artificial grass at Middle Head Oval," The Daily Telegraph, 14 December, 2017 < https://www.dailytelegraph.com.au/newslocal/mosman-daily/mosman-council-turfs-idea-for-artificial-grass-at-middle-head-oval/news-story/2d3ee1d6676e3df3cb9b2cfe5000da4b>.*
45 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presentation provided to NSW DPIE.*
46 *Headland Preservation Group n.d., The Trust considered a proposal for plastic grass on Middle Head Oval. HPG opposed this.*

Local government and various community group representatives within the stakeholder and community workshops noted there are other considerations that impact the level of demand and the capacity of field and should be considered when investigation options of upgrading the capacity of an existing field.

These include:

- **Lighting:** Field lighting is essential to allow extended hours of use. The capital cost of installing a synthetic field or a high-quality natural turf field, should include lights if the benefit of increased capacity for use is to be realised.
- **Scheduling issues vs available capacity:** Clubs or user groups may favour specific time slots, such as Tuesdays and Thursdays for training and Friday night for competition. Different communities will have different needs, and in some regional or rural communities there are often preferred nights for different sports to allow residents to participate in multiple codes. This can mean that actual demand is concentrated on a few nights only. As such, providing increased capacity via a synthetic field will not necessarily solve a demand issue as it can sometimes be a scheduling challenge.
- **Alternatives to concentrating use:** As sporting demand is more of an LGA wide issue, the level of investment proposed to install a synthetic field should be compared with alternative strategies. The capital expenditure associated with synthetic turf installation could potentially provide a greater benefit across a number of locations by increasing capacity through lighting and upgrading natural turf surfaces. This can disperse rather than concentrate use and can reduce impacts on local residents through loss of open space, increased traffic and other impacts.
- **Opportunities to "unlock" other potential open spaces:** Community representatives repeatedly raised their frustration with the conversion of natural turf to synthetic surfaces when it was felt there were under-utilised open spaces nearby, such as sporting fields owned by local public and private schools, which could potentially be "unlocked" to meet needs from sporting organisations.

4.1.3 Environmental Considerations

There are many environmental issues that need to be considered when assessing the benefits and limitations of synthetic turf fields. There is a significant amount of academic research on the environmental impacts of synthetic turf fields, and environmental issues were also highlighted as a key concern by stakeholder and community groups.

As there is no peak body in Australia responsible for independently regulating and reporting on the environmental impacts of synthetic turf, facility owners are responsible for ensuring that the relevant environmental standards have been met. Environmental and health impacts associated with synthetic turf should be appropriately acknowledged and mitigated against at both the feasibility, design, construction, and operational stages.

While synthetic turf products vary significantly, and reducing environmental impact is an increasing design consideration as the technology matures, the potential negative impacts of synthetic turf need to be factored in when considering the environmental impacts of different playing surfaces. This section provides a brief outline of key environmental issues, including heat, pollution, water, waste, and local climate considerations.

Heat

One of the biggest concerns highlighted in research and stakeholder and community consultation about the conversion to synthetic turf is its associated heat impacts.

Natural turf is known to mitigate urban heat island effect and provides a relatively cool and absorbent surface for users. *"Natural grass plays an important role in controlling climate,"* states the WA Department of Local Government, Sport and Cultural Industries:

> *"Natural grass is one of the best exterior solar radiation control ground covers, because it absorbs radiation and converts it to food for growth through photosynthesis. Natural grass surfaces reduce temperature extremes by absorbing the sun's heat during the day and releasing it slowly in the evening[47]."*

Unlike natural grass, synthetic turf generally absorbs, rather than reflects sunlight, causing the emission of heat. While different synthetic turf products are associated with different heat impacts, and further research is needed to evaluate the impact of heat on larger fields and the potential higher UV reflectivity of synthetic turf, generally, studies have concluded that third generation[48] synthetic turf fields can be between 1.3–1.81 times hotter than its natural turf equivalent[49]. Research undertaken into heat in outdoor school environments found that unshaded synthetic turf reached higher temperatures than bare soil or asphalt during normal, hot and extreme air temperature days. The report recommended that synthetic turf not be used in unshaded areas in school environments, due to the heat impacts on children, who are particularly vulnerable to heat stress[50].

Some synthetic turf, particularly those with non-organic infill (e.g. rubber) can also lead to higher temperatures near fields on hot days, by contributing to the urban heat island effect. Urban heat is increased when natural grass and trees are replaced by impervious surfaces which absorb heat, such as roads, footpaths and other built elements. Urban heat increases demand for energy (particularly air conditioning), intensifies air pollution, and increases heat-related health problems, particularly for children, older people and people with chronic health conditions[51]. Climate change has led to an increase in the frequency and intensity of hot days, and longer summers, and therefore mitigating urban heat through environmental design is a major concern[52].

Community representatives raised significant concerns in both the workshops and through the online submission process about the heat impacts of synthetic turf, noting that the higher temperatures made synthetic turf fields unusable for casual community use (e.g. dog walking and picnics), and could lead to cancelled games for sporting groups.

Bushfire considerations

Within bushfire-prone areas, the nature of vegetation surrounding houses and buildings has a very strong influence on the degree of bushfire damage/loss risk to which a building is exposed[53]. It was noted in the community workshops that the presence of combustible materials or exposure to high radiant heat levels, such as those involved in the construction of synthetic fields, could increase the risk of adjacent housing or buildings to be ignited in a bushfire. As such, for regional and bushfire prone communities where the local oval is often a muster point, these bushfire considerations need to be considered if adopting a synthetic surface material.

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47 *WA Department of Local Government, Sport and Cultural Industries, Natural Grass vs Synthetic Turf Study Report, < https://www.dlgsc.wa.gov.au/department/publications/publication/natural-grass-vs-synthetic-turf-study-report>.*

48 *The most commonly installed fields in NSW, these are characterised by taller pile heights, shock pad and are generally dressed with sand or rubber granules to improve stability, see Appendix C for more detail.*

49 *Artificial Grass for Sport, Victoria Department of Planning and Community Development, 53.*

50 *Pfautsch S., Rouillard S., Wujeska-Krause A., Bae A., Vu L., Manea A., Tabassum S., Staas, L., Ossola A., Holmes, K. and Leishman M 2020, 'School Microclimates', Western Sydney University,p.3.*

51 *See Center for Sports Surface Research 2012. Synthetic Turf Heat Evaluation: Progress Report, University Park, PA: Center for Sports Surface Research, Pennsylvania State University.*

52 *See WSROC 2018, Turn down the heat: Strategy and action plan < https://wsroc.com.au/media-a-resources/reports/send/3-reports/286-turn-down-the-heat-strategy-and-action-plan-2018>*

53 *GHD for Horticulture Innovation Australia Limited, Living turf fire benefits study – Literature review, April 2020 < https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/tu17008-literature-review-living-turf-fire-benefits-study.pdf>*

Pollution

It was noted in both the research and consultation with subject matter experts that both natural and synthetic turf fields have issues associated with pollution, impacts on the environment and human health. Pollution was also identified as a significant concern in community workshops.

Synthetic turf playing surfaces can generate pollution in the form of rubber crumb (i.e., the recycled rubber infill commonly used for the base of synthetic turf fields) and microplastics from synthetic turf fibres. These pollutants can be ingested by players and run off into waterways and soils in the surrounding area[54]. Mitigating pollution impacts was a significant priority for local community representatives consulted for this Study. The industrial processes used to manufacture and dispose of synthetic turf are further polluting source in local environments, as is the synthetic turf itself, which needs to be disposed of at the end of its economic life (see **Waste** section below).

Furthermore, consultation undertaken to inform the Study highlighted that many existing sports fields in NSW have been delivered on flood prone land, and during extreme wet weather, can be flooded. When a synthetic turf field is flooded, microplastics and rubber crumb can leach into the surrounding area in high concentrations. The synthetic field can be rendered unusable from flood impact as well and a major refurbishment may be needed to restore infill to the field (see **Water** section and **Siting considerations – stormwater, flooding, and overland flows** section for further discussion).

Natural alternatives for infill, including cork, have been implemented successfully to help mitigate against the run-off issues noted for synthetic turf[55]. At the design stage, the type and source of infill should be carefully considered to ensure safety for players and minimal impact on local environments. Turf specialists and consultants noted in the stakeholder workshops that some synthetic fields are designed with a "lip" to collect synthetic materials before they can enter local surroundings, and decontamination stations can be used to remove polluting matter from players' shoes when they leave the field.

Natural turf also requires the use of toxic plant protection products (i.e. herbicides and pesticides), and these chemicals can leach into the surrounding environment, including waterways where they can encourage algal growth. While some use of these chemicals is needed in synthetic surfaces to mitigate weed growth, it is far less of a consideration.

More conclusive research on pollution impacts associated with synthetic turf is currently undergoing peer review in Australia following community concern, particularly in the Northern Beaches LGA.

54 *Verschoor, A.J., van Gelderen, A. & Hofstra, U. Fate of recycled tyre granulate used on artificial turf. Environ Sci Eur 33, 27 (2021). https://doi.org/10.1186/s12302-021-00459-1*

55 *Smart Connections. The Smart Guide to Synthetic ports Fields Rubber Infill, 2017, Page 15. Available from: https://www.kennisbanksportenbewegen.nl/?file=7504&m=1484649736&action=file.download.*

CASE STUDY 4: ELS Hall Park, North Ryde

ELS Hall Park (and adjacent Greenwood Park and Booth Reserve) are part of a large (15.1 hectares) public open space area within Ryde LGA. This area provides formal sports facilities, open grassed areas, playground, picnic facilities and an indoor sports centre – as well as a local waterway/riparian corridor and native vegetation (including Sydney Turpentine-Ironbark Forest). It is also located very close to Lane Cove National Park. City of Ryde's Sport and Recreation Strategy identified ELS Hall Park as a "premier active area" which supports higher level sporting competition. The site is close to Macquarie Park commercial centre and train station, and is an important thoroughfare for commuters, as well as residents and workers who use the facility for active and passive recreation.

To support increased population in Ryde and changing recreation preferences, Council identified ELS Hall Park as a potential location for a new synthetic turf field. The existing sportsfields at ELS Hall Park were accommodating high levels of use (i.e. between 37-42 hours a week), and a Synthetic Surface Action Plan prepared by identified this site as an appropriate location for a new synthetic turf field[56]. This a direction supported by sporting stakeholders consulted, including AFL NSW and NSW Football[57].

In 2017, one of the three sportsfields in ELS Hall was converted to a multi-purpose synthetic field, replacing an existing natural turf field in 2017, at a cost of $3 million. It was the first synthetic field in Australia to utilise cork instead of rubber for its infill.

Commonly cited as an innovative response to some key social and environmental issues associated with synthetic turf, the use of cork reduces the microplastic pollution in local waterways by removing rubber crumb as a key material and reduces the field's heat retention. A representative of City of Ryde Council identified that ELS Hall was the site of a major infill 'evacuation event' following flooding and extreme rain, and the use of cork instead of rubber mitigated against some of the devastating impacts an extreme weather event could have had on surrounding ecosystems and waterways.

A media scan and consultation with City of Ryde Council has identified there was limited community opposition to the conversion of natural turf to synthetic turf at this site. This may be attributable to:

- Use of cork infill, rather than rubber crumb; which reduces potential pollution impacts to surrounding local waterways and Lane Cove National Park
- Continued access to two other natural turf sportsfields and other public open space amenities at the site, ensuring that non-sporting users are not displaced from ELS Hall Park.
- Extensive strategic planning for ELS Hall Park and the broader sportsfield network, including community consultation while the *Sports and Recreation Strategy 2016–2026* and *Synthetic Surfaces Action Plan 2016–2026* were on public exhibition.

Figure 4. ELS Hall Park, North Ryde
Source: City of Ryde.

56 *City of Ryde 2016, Sport and Recreation Strategy 2016-2026: Synthetic Surface Action Plan 2016-2026, adopted 25 July 2017 <https://www.ryde.nsw.gov.au/files/assets/public/publications/parks-open-space/synthetic-surface-action-plan-2016-2026.pdf>*

57 *City of Ryde 2016, Sport and Recreation Strategy 2016-20266, adopted 25 July 2017 < https://www.ryde.nsw.gov.au/files/assets/public/publications/parks-open-space/sport-and-recreation-strategy-2016-2026.pdf>*

"At this point, they [Councils] cannot adequately mitigate the impact of waste disposal when the surface of synthetic fields needs to be replaced, every 7-10 years,"

- Online submission.

Water

Water consumption

Water use is a key consideration for the implementation of synthetic turf in dry and drought-prone climates. In 2011, Sydney Water found that *"irrigation of open space turf areas accounts for over half of the water used by local councils. Council reserves and sports fields in Sydney use over eight million litres of water a day for irrigation*[58]*."*

Some solutions have been suggested for both synthetic and natural turf fields which involve the collection of rain and stormwater in storage tanks for recycling and re-use in on-site field irrigation and other local uses. For example, the State Netball Hockey Centre in Parkville, Victoria uses 45 kilolitre underground tanks to store and use water, irrigating both the surrounding landscape and the synthetic pitches themselves, reducing water use by 80 per cent[59]. Water retention systems are also used in best practice natural turf fields, such as Henson Park.

While there was support for these systems amongst community representatives in the workshops, it should be noted that these systems can be expensive to implement, and are inconsistently utilised in natural turf fields because of the significant cost to retro-fit improved drainage and stormwater retention, compared to building a new field.

Local government stakeholders and community sporting group representatives noted that synthetic turf has been associated with some water savings, as it does not require the extent of irrigation that natural turf does.

Siting considerations – stormwater, flooding, and overland flows

Many sports fields in NSW are located on constrained sites, such as flood plains, low lying areas or near estuaries (i.e. not appropriate to be built on). As a result, they are often subject to tidal inundation or flooding during periods of heavy rainfall.

Sports fields are also frequently adjacent to large impermeable surfaces such as car parks, and therefore experience flooding from run-off. Some open space turf areas are also designed as flood detention basins, meaning they are designed to temporarily store excess stormwater so it can drain into the stormwater system or natural creek[60].

The location of the green open space is important to consider for both natural and synthetic turf fields.

Poorly located natural turf fields may become waterlogged and unusable during wet weather, although upgrades to the field (e.g., introduction of sand slit drains, grass swales to divert upstream runoff) can reduce the impact of excess rainfall on turf performance[61].

While synthetic turf fields can generally be played on during wet weather, turf specialists, subject matter academics, environmental and community groups noted in the workshops the issues related to synthetic turf fields subject to overland flows or designed as flood basins.

For example, if a synthetic turf field floods, the infill on the field (e.g., rubber crumb, cork granules), which is generally lighter than water, can float and be blown around the field[62], which causes a maintenance issue, or results in infill materials being washed into local waterways and bushland - becoming a source of pollution for local ecosystems.

58 *Sydney Water 2011, Best practice guide for holistic open space turf management in Sydney, p.7 <https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdq1/~edisp/dd_045253.pdf>.*

59 *WA Department of Local Government, Sport and Cultural Industries, Natural Grass vs Synthetic Turf Study Report, < https://www.dlgsc.wa.gov.au/department/publications/publication/natural-grass-vs-synthetic-turf-study-report>*

60 *Sydney Water 2011, Best practice guide for holistic open space turf management in Sydney, p.60-61 <https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdq1/~edisp/dd_045253.pdf>*

61 *Sydney Water 2011, Best practice guide for holistic open space turf management in Sydney, p.62 <https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdq1/~edisp/dd_045253.pdf>*

62 *Smart Connection Consultancy, 2019, The smart guide to synthetic sports surfaces: Volume 3: Environmental and sustainability considerations, p.19, accessed 17 May 2021 < https://www.smartconnection.net.au/wp-content/uploads/2019/11/Vol-3-Envirnmental-and-Sustainability-Considerations-v1.01.pdf>*

"Artificial grass doesn't absorb CO2 or release Oxygen. It also doesn't provide a habitat for living creatures that need real lawns in order to thrive.

Although this will mean you'll have no problem with pests and unwanted insects in your artificial grass, it could cause a huge problem for the other wildlife in your garden, especially those that feed on bugs,"

- Online submission.

This can be somewhat mitigated by raising the field and developing a retention base under the field[63] (e.g., Gore Hill Oval, St Leonards) or delivering a "lip" around the perimeter of the field. However, it was noted by subject matter experts that data compiled from recent surveys illustrates that despite these mitigation measures, infill is still being discovered in surrounding environmental areas.

Drought resistance and dry conditions

Drought and water restrictions can make it difficult to provide a safe and suitable natural grass surface for the community.

Most synthetics (some surfaces require watering before use) usually require less irrigation than natural turf fields, and some local government and state agency stakeholders suggested that synthetic fields may be an attractive option for councils in regional areas affected by drought to enable continued participation in sport. In our conversations with regional councils, it became apparent that most of the open spaces were natural turf fields.

Waste

The disposal of synthetic turf at the end of its useful life presents an additional environmental (and financial) challenge. Concerns around end-of-life issues was raised by several community groups through both the workshops and online submission process.

Synthetic turf has a life cycle of approximately 8-10 years, requiring a disposal of materials (mostly the carpet) when refurbishment is due. It is purposefully designed to not breakdown quickly, and when it is disposed of it has the potential to stay in landfill for long periods.

One proposed solution to address the issue of waste is the recycling of synthetic materials. In Europe, a circular economy within the synthetic turf industry has been created, and an industry stakeholder (Smart Connections) consulted for the Study stated there were plans to create specialised processing plants in Australia for synthetic turf. However, this can be expensive, and is not factored into the life cycle costs quoted by many synthetic turf providers. While design excellence and good maintenance practices can increase the lifespan of these products, thus reducing waste produced; end of life disposal is a key issue for synthetic turf which must be considered and mitigated against if implemented.

Natural grass surfaces on the other hand have no end-of-life cost as they are naturally renewing and regenerating[64].

Climate

Replacing natural grass with synthetic turf can have significant effects on the local environment and contribute to heightened CO_2 emissions.

Over the lifecycle, natural turf is more carbon friendly as it actively pulling carbon out of the air through sequestration, requires less overall carbon use to produce and maintain. While natural grass still contributes CO2 through mowing and construction/maintenance, overall emissions are considerably less than synthetic turf. There has been some suggestion that natural turf releases carbon through tilling and resodding, and cellular respiration[65], but this is mitigated by natural grass' role as a carbon sink.

63 *Smart Connection Consultancy, 2019, The smart guide to synthetic sports surfaces: Volume 3: Environmental and sustainability considerations, p.19, accessed 17 May 2021 < https://www.smartconnection.net.au/wp-content/uploads/2019/11/Vol-3-Envirnmental-and-Sustainability-Considerations-v1.01.pdf>.*

64 *WA Department of Local Government, Sport and Cultural Industries, Natural Grass vs Synthetic Turf Study Report, < https://www.dlgsc.wa.gov.au/department/publications/publication/natural-grass-vs-synthetic-turf-study-report>.*

65 *Smart Connections. The Smart Guide to Synthetic sports Fields Rubber Infill, 2017. Available from: https://www.kennisbanksportenbewegen.nl/?file=7504&m=1484649736&action=file.download, p. 16.*

Furthermore, there are carbon emissions associated with the production, transportation, disposal of, and maintenance of synthetic turf[66]. However, a BACF Corporation Eco-Efficiency Analysis in 2010 found that synthetic fields were 15 per cent lower in life cycle energy and raw materials and generation of solid waste over a 20 years average life cycle of natural grass fields[67]. Ultimately, more complete lifecycle assessments comparing natural turf with the many synthetic options available is needed before any conclusions on carbon can be drawn.

Biodiversity

It was noted by environmental groups and natural turf peak bodies, that while a somewhat monocultural environment, natural turf is still home to local ecosystems and small-scale biodiversity, and community stakeholders identified that these spaces support local fauna and flora in the area.

Light pollution

Light pollution is a cause for concern due to its effect on local ecosystems, including migration and breeding habits. It should be noted that light pollution is a concern for both natural and synthetic turf fields, which require significant lighting to enable night-time use and increase capacity for sporting use. Some mitigation techniques were raised during consultation, including directed light placements to prevent spillage into neighbouring bushland, and the use of environmentally sensitive lighting technology.

4.1.4 Health Dimensions

As identified through the literature review and raised during the consultation process, it was noted that there are several human health impacts associated with synthetic turf including heat, pollutants, and injury risk:

- **Heat stress:** The higher heat load associated with most types of synthetic grass has the potential to impact on player and user comfort. The impact of higher heat on players and informal users can be severe[68], with children more at risk than adults for developing heat stress and skin injuries (blisters and burns)[69]. This issue was raised multiple times by community representatives as a key concern. The "all weather" nature of synthetics (i.e., durability during wet weather) is frequently used as an argument in favour of synthetics – however, the heat load associated with synthetic grass may make it unusable during very hot weather.
- **Injury:** There is no consensus on whether there is a higher risk of injury on natural turf or synthetic turf. While second generation synthetic fields had a greater risk of abrasiveness on skin and a higher injury rate, there is insufficient evidence on current generation fields to draw such conclusions. There is a difference in injury patterns between natural and synthetic turf, but no overall difference in injury rate. Given the multi-factorial nature of injuries, further studies are needed.

  Injuries associated with synthetic turf were a major focus of community consultation, however, council stakeholders noted that community perceptions of synthetic turf (as poor amenity, abrasive, and polluting) do not necessarily reflect significant improvements to the quality and environmental sustainability of new synthetic turf options.

66 *14; citing Sahu R, 2008. 'Technical Assessment of the Carbon Sequestration Potential of Managed Turfgrass in the United States. Research Report, USA.*
67 *Smart Connections. The Smart Guide to Synthetic ports Fields Rubber Infill, 2017. Available from: https://www.kennisbanksportenbewegen.nl/?file=7504&m=1484649736&action=file.download. p. 16.*
68 *Center for Sports Surface Research. 2012. Synthetic Turf Heat Evaluation: Progress Report. University Park, PA: Center for Sports Surface Research, Pennsylvania State University.*
69 *Artificial Grass for Sport, Victoria Department of Planning and Community Development, 53.*

- **Pollutants** are also a considerable risk factor associated with synthetic surfaces. Biological pathogens, toxic chemicals, and micro-plastic ingestion are all risks associated with synthetic materials. The Synthetic Turf Council has acknowledged the concern but not found any link between the recycled rubber infill and cancer or any other human health risk[70]. More research must be done to make conclusive statements on the presence and extent of this risk. The uncertainty around this area is cause for concern, particularly for community perception of safety.

  Appropriate cleaning regimes[71], the use of alternative infill material for recycled or virgin rubber, and the sourcing of recycled tyres for infill from countries with high pollutant standards have been suggested as methods to reduce this risk. The impacts of pollutants from synthetic turf on human health was a key concern for community representatives.

4.1.5 Cost and Economic Considerations

The cost of different playing surface materials is a key consideration for local governments, sporting organisations and other facility owners. To understand the true cost of a synthetic turf sporting field, an understanding of life cycle costs is required.

"Lifecycle costs" takes into account the "whole of life" financial implications of the decision to install a synthetic turf field, including planning, acquiring, operating, maintaining, and disposing of an asset. Research and available industry papers as well as feedback received during the consultation process noted the following:

- **Capital/construction costs:** The high initial capital cost of synthetic turf is often seen as a barrier to installation. While the capital costs associated with a synthetic turf field can vary depending on site establishment requirements, facility size and specification such as provision of a shock pad and supporting infrastructure such drainage systems, player dugouts, spectator fencing, security fencing and lighting, synthetic playing fields are typically more than three times higher when compared with natural turf[72]. A 2019 study[73] that investigated the use of compost amended soils to enhance playing field outcomes suggested that the indicative cost to construct a "well-built" natural turf field was in the order of $370,000 per hectare compared to $1,850,000 per hectare for synthetic fields.
- **Operational/maintenance costs:** There is a common perception that synthetic playing fields are "set and forget," requiring limited maintenance and hence lower operating costs. However, this is often not the case. Many synthetic playing fields require significant levels of maintenance to achieve optimum performance and full lifespan. Stakeholder feedback noted that natural turf is frequently managed on "austerity budgets" where reduced expenditure in managing sporting fields leading to eventual decline in the surface is seen as an acceptable risk. Poor maintenance practices also reduce the capacity of turf fields to accommodate use[74].
- **Renewal costs:** Unlike natural grass, synthetic turf must be replaced at the end of its natural life. As a guide, synthetic playing fields require replacement every 8 to 10 years with the shock pad requiring replacement approximately every 20 to 25 years. As of 2021, the cost to remove and dispose of the existing synthetic surface (carpet) and replace with new is approximately $390,000 for a football (soccer) field or approximately $52per sqm. Shock pad replacement costs approximately $180,000[75].

Other economic considerations may include the value of lost playing hours due to extreme weather, and the potential improved revenue performance of synthetic fields.

70 *Synthetic Turf Council , Executive Summary Catalogue of Available Recycled Rubber Research (march 3, 2016) http://c.ymcdn.com/sites/www.syntheticturfcouncil.org/resource/resmgr/docs/st c_cri_execsummary2016-0303.pdf*
71 *Artificial Grass for Sport, Victoria Department of Planning and Community Development, 40.*
72 *WA Department of Local Government, Sport and Cultural Industries, Natural Grass vs Synthetic Turf Study Report, < https://www.dlgsc.wa.gov.au/department/publications/publication/natural-grass-vs-synthetic-turf-study-report>*
73 *Creating Sustainable Open Spaces – Using Compost to Deliver Liveability, Sustainability, Recreation and Economic Outcomes; Battmam.M & Lamlble.P.*
74 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presented at PLA NSW, presentation provided to NSW DPIE.*
75 *Adapted from the Smart Guide to Synthetic Sports Surfaces, 2019. Smart Connection.*

Although synthetic surfaces have a high construction cost, their increased playing capacity and perceived lower maintenance cost is often the economic basis for the implementation of synthetic fields. The comparison of options is based on assumptions about the user hours that different surfaces can accommodate.

As discussed above, a more detailed analysis of actual demand and recent research regarding increased capacity of natural turf may change some of the assumptions which have been used to support the economic rationale for synthetic turf implementation.

Typically cost benefit and business case assessments do not include a consideration or valuation of the disbenefit generated by converting natural grass to synthetic. While there are no currently accepted frameworks for valuing this "cost", local government stakeholders and recent media articles[76] have raised the following as impacts that should be included in any review of options:

- Loss of locally accessible open space
- Loss of amenity in the local open space network
- Synthetic surfaces acting as a disincentive for informal active and recreation use.

Furthermore, it was noted in the online submissions that the issue of cost also becomes contentious amongst community groups if ongoing maintenance of and the eventual disposal of a synthetic field falls to the wider community instead of the perceived principal beneficiary.

4.1.6 Key Findings

A summary the key findings related to the application synthetic turf as an alternative to natural grass turf is provided below. This summary draws upon the findings uncovered across the Study, which included community feedback, stakeholder workshops, case studies, and a literature review.

Table 2 – Key Findings

Theme	Issues
Constrained supply of sports fields	• The existing network of sporting facilities is perceived by some stakeholders as unable to meet growing demand and some clubs turn away potential participants due to a lack of capacity. • Existing fields in densely populated areas, with high levels of sporting participation may not have the capacity to meet very high levels of demand, regardless of the quality of the field. • It can be challenging to acquire new land for sportsfields due to development pressure and lack of available space (particularly in inner city areas). Some councils therefore choose to increase local capacity by converting natural turf sportsfields to synthetic turf.
Poor quality of existing sporting facilities	• Poorly maintained and constructed natural turf sports fields can struggle to support high levels of use due to poor condition and inadequate drainage, which limits their available hours of use for sport. • Many natural turf fields are perceived to be in poor condition with inadequate drainage, poor construction and maintenance regimes resulting in low field capacity. Well-engineered natural fields maintained in good condition can provide significantly higher levels of utilisation than poor condition ones.

76 *Power, J 2021, "Fake grass may be greener, but much hotter and less friendly to environment," The Sydney Morning Herald, 14 March 2021, accessed 17 May 2021 < https://www.smh.com.au/national/nsw/fake-grass-may-be-greener-but-much-hotter-and-less-friendly-to-environment-20210312-p57a95.html>*

Theme	Issues
Sporting facility demand, supply and capacity is complex and contextual	• Natural turf fields cater for more diverse uses that includes organised sporting activities and passive recreation activities such as picnicking, walking, jogging, dog walking and more. • The carrying capacity (calculated as hours of organised sports use per week) of synthetic surfaces is higher than natural turf and as such field operators can allocate more users to a synthetic field for organised sport training and competition. • The use of sports field can be concentrated to specific days and certain times of day for training and competition. Implementation of synthetic turf surfaces can offer higher levels of participation during peak periods. • Actual demand for sports use is not always modelled or well understood by authorities when considering converting surfaces to synthetic. The theoretical capacity provided by a synthetic surface may not be required to support actual demand for sports participation. • Synthetic turf can improve the reliability and surface quality for sport use during wet and winter weather compared to natural turf. However, during summer, matches on synthetic turf sports fields may need to be cancelled due to heat more frequently than natural surface fields. • Hybrid surfaces are an emerging response to improving field capacity and combining the advantages and limiting the disadvantages of both pure natural and synthetic.
Amenity and enjoyment for informal users of public open space	• Synthetic fields are generally subject to higher ambient temperatures than natural turf on hot days. • The aesthetic of synthetic turf is very different to and perceived as much less attractive to natural turf. • Synthetic turf does not provide the same benefits of connection to nature compared to natural turf open spaces. • Natural surfaces provide greater levels of noise abatement, glare reduction and UV reflectivity • Fenced synthetic fields reduce informal use of open spaces while prioritising sporting use.
Impacts from the increased utilisation enabled by the use of synthetic surfaces	• Due to having an increased carrying capacity, synthetic field can have - Increased impact on surrounding residents from duration of field lighting at night - Congestion and pressure on parking and increases to local traffic. - Increased impact and duration of noise due to greater intensity of use. - Elevated synthetic fields can impact on perceived privacy for adjacent residents.
Sports field planning and siting	• Siting considerations exist for both natural and synthetic turf. For example, many issues that constrain optimal utilisation of natural turf fields are intensified when they are located in poor drainage or flood prone areas, ex landfill sites, or where they have a dual purpose as stormwater retention basins. • Where synthetic or natural turf fields are located in areas prone to flooding, or subject to overland flows during extreme weather, there can also be issues related to pollution of local waterways or bushland with infill materials or pesticides. Further discussion of potential pollution arising from both natural and turf fields, and the contamination of the surrounding local environment, is discussed below. • Better consideration of siting and planning for the whole open space network can alleviate some pressure on the network, including sharing of facilities (across LGA boundaries and with different land uses such as schools), purpose-built facilities and siting synthetic fields in non-environmentally sensitive areas.

Theme	Issues
Concerns associated with environmental impacts	• **Pollution:** Air and water pollution caused by synthetic turf materials (i.e., rubber crumb) is well documented in academic research. Pollution, particularly of waterways and bushland, was a key concern raised by community representatives. • **Chemical use:** Pesticides and fertilisers are typically used for natural turf fields, while pesticides and fungicides are typically required for synthetic fields. • **Waste:** Environmental and financial challenge of disposing synthetic turf at the end of its 8–10-year life cycle. • **Heat:** Heat impacts to the surrounding environment caused by synthetic turf absorbing heat rather than reflection. • **Carbon emissions:** Synthetic fields contribute to heightened CO2 emissions due to lack of carbon absorption associated with natural turf. • **Soil sterilisation:** Sterilisation of soil beneath the synthetic turf has an impact on ecosystems. Synthetic surfaces inhibit living systems. • **Water Usage:** Water consumption and irrigation requirements are lower for synthetic turf making it generally more suitable for drought and dry conditions (due to reduced water requirements). • **Variability:** Environmental impacts of synthetic fields vary substantially depending on what type they are. Older synthetic fields (generation 2 and 3) are associated with significantly higher radiant heat and environmental pollution. • **Wildlife:** While natural turf sportsfields have limited biodiversity value, they do provide some habitat for local flora and fauna that synthetic turf does not. • It is noted that design of synthetic surfaces is technologically advancing in response to some of the impacts created by synthetic turf, e.g., microplastic pollution.
Potential human health impacts	• Heat stress and the impact on player and user comfort associated with playing on synthetic fields in hot weather. • Some generations of synthetic turf (typically 1st, 2nd and 3rd) have a greater risk of abrasiveness on skin and higher injury rates. • Research has suggested that biological pathogens, toxic chemicals, and micro-plastic ingestion are all risks to human health that are associated with synthetic materials.
Cost and economic factors are not transparent	• High initial capital cost of synthetic turf can be perceived as a barrier to installation. • Synthetic playing fields have traditionally been perceived as requiring lower maintenance and hence lower operating costs compared to natural turf. However, synthetic surfaces have a prescriptive maintenance regime, and there is indication from recent studies in other jurisdictions, including New Zealand and Western Australia, that in practice synthetic turf can have reoccurring maintenance costs for repairs and cleaning of surfaces that can be comparable to that of natural turf. • Long term maintenance of natural turf surfaces is often underfunded which can result in deteriorating condition facilities and limited capacity. • Renewal costs associated with the disposal and replacement of synthetic fields at the end of their life cycle is not always adequately considered. • Best practice natural turf has ongoing maintenance requirements to maintain high levels of performance for all users, such as mowing, “resting”, and re-surfacing the field.
Lack of community consultation	• Current planning pathways can constrain formal requirements for community consultation – the current planning pathway (i.e., Infrastructure SEPP) used by local government has no legislative requirement for community consultation. • Some local governments provide opportunities for community consultation regarding synthetic surfaces, including during public exhibition of open space and recreation strategies and plans of management. • The perceived lack of meaningful community consultation on decisions on utilising synthetic turf has at times created division within the community, particularly between organised sports clubs and more informal users of open space.

Theme	Issues
Best practice natural turf management	• Lack of available information on best practice construction and maintenance of natural turf fields influences and constrains council decision making. • Best practice natural turf design and maintenance has the potential to improve the capacity of existing natural turf fields to support increased sporting use. • Information about recent innovations and best practice for natural turf are not well known or commonly used. • Innovative methods exist to manage usage and reduce pressure on high wear areas of natural turf. • Advances in technology are enabling more targeted maintenance and management of natural turf to reduce energy consumption and costs and maintain capacity.
Funding programs	• Synthetic fields are perceived as more likely to be funded through one-off grants which cover the capital cost of the field but do not necessarily cover the upkeep and maintenance costs. Councils may also choose to invest in synthetic fields due to the perceived lower maintenance costs. However, as discussed above, synthetic and natural turf fields both have extensive maintenance protocols with similar costs. • High capital cost of synthetic turf fields may make it challenging for Councils to cover the cost of fields without support from grant funding. • Structure of grant funding may contribute to grants being spent on new facilities, rather than contributing to increasing the capacity of the broader network. • Effective fundraising by local sporting clubs: Sporting clubs with capacity and leadership can secure grants and funding from state, federal and local government, or peak sporting bodies.
Perceived stakeholder influence on decision-making	• There is a perception that well-organised advocacy in favour of synthetic turf from industry and sporting bodies leads to a disproportionate priority over natural turf. • Comparatively, support for natural turf solutions is perceived to be less well organised, clear, and consistent in the overall benefits of selection. • Local sporting organisations and clubs are perceived to have significant influence on local decision-makers as a result of large local memberships.

4.2 Understanding the Decision-making Process

The decision to use natural turf, synthetic turf, or a hybrid, is driven by a complex range of factors, including local conditions, current and projected community needs, sporting preferences, and financial capacity of local councils and sporting organisations.

The following section considers the issues that influence the local decision-making process to replace natural turf with synthetic playing surfaces.

4.2.1 Strategic Planning

To identify challenges and opportunities to meet growing and diversifying demand for open space, including sporting facilities, councils undertake strategic planning for open space and recreation at both a local level and precinct scale.

Through the literature review and as articulated by some local government representatives in the workshops, a council's decision to install synthetic playing surfaces is often driven and supported by detailed recreation, open space and sporting needs analysis undertaken for their local areas. For example:

- **Northern Beaches Council:** Northern Beaches Council has installed several synthetic turf fields, these include Lionel Watts Reserve, Cromer Park, Narrabeen Sports High and Melwood Oval. This investment has been driven by Council's adopted Sportsgrounds Strategy (July 2017) which recognised there was a significant undersupply of sporting fields across the LGA, and recommended building new fields, enabling use of school fields, and installing synthetic fields to meet growing need for sportsfields. Community engagement was undertaken to inform the development of Sportsgrounds Strategy and found that 62% of respondents to a phone survey, 81% of respondents to an online survey and 35% of written submissions were supportive of converting more sports fields to synthetic[77].
- **City of Sydney:** This inner-city Council is currently considering developing five new synthetic sportsfields to meet an identified gap in sportsfields provision. This strategy is driven by a detailed Open space, sports and recreation needs study undertaken by Council in 2016[78], which identified a significant shortfall in available sportsfields to meet community demand. Council is currently seeking community feedback on the delivery of synthetic fields at Turruwul Park (Rosebery), The Crescent (Annandale) and Perry Park (Alexandria).

However, some community representatives consulted for this Study had a perception that not all Councils undertake the appropriate upfront strategic analysis and planning to support the decision to install synthetic fields, and that it was instead an opportunistic decision. This statement has not been tested with local government stakeholders.

77 *Northern Beaches Council 2017, Northern Beaches Sportsground Strategy, adopted July 2017, p.15 < https://files.northernbeaches.nsw.gov.au/sites/default/files/documents/policies-register/recreation-strategies/recreation-strategies/sportsgrounds-strategy-july2017.pdf>*

78 *City of Sydney 2016, Open space, sports and recreation needs study 2016, November 2016 < https://www.cityofsydney.nsw.gov.au/surveys-case-studies-reports/open-space-sport-recreation-needs-study-2016>*

"Sporting clubs are very organised, and good at advocating.

Informal users, or any non-sporting use, are not as organised or well-represented – we don't have a voice in the conversation."

- Community workshop participant, 27 May 2021.

Community representatives and some industry experts also identified that there was a lack of understanding within councils about innovation in natural turf design and management, and the actual capacity of a well-designed turf field to provide up to 50 playing hours a week. The NSW Environment Protection Authority has commissioned case study research into natural turf fields, which will be released in 2021 and may contribute towards improved understanding of best practice natural turf[79].

It was noted in the consultation process that the decision to convert a natural turf field to synthetic is perceived by communities to be driven by effective lobbying from vocal sporting groups (discussed further below) and by the nature of grant funding, which prioritises upgrades to single fields in dense areas, rather than upgrades to increase the capacity of the broader sporting network.

During the community workshops and as outlined in an online submission, a resident action group in Banksia felt that Bayside Council had not undertaken appropriate analysis of the broader network of sporting facilities across the LGA when identifying which existing natural turf fields would be converted to synthetic. In response, this group asked Council to produce a recreation and community facilities study for all of the LGA that provided clear evidence and direction on how to best allocate funds to meet the growing needs of the whole community, including sports clubs.

Furthermore, online submissions and community resident groups perceive there is often a contradiction between a council's stated environmental objectives (generally included in environmental or sustainability policies) and the installation of synthetic turf (which has a range of negative environmental impacts).

To improve strategic planning for sports fields, communities suggested the following measures:

- Improved measurement of actual and projected utilisation of fields, and types of usage to inform the decision to install synthetic fields
- Prioritisation of brownfield sites for the provision of synthetics
- Ensuring at greenfield sites the provision of natural grass sportsfields
- Exploring opportunities for Councils to partner with surrounding local governments to coordinate delivery of new fields that are accessible to residents of both LGAs.

4.2.2 Current Planning Pathway Reduces Opportunities for Community Consultation

The current planning pathway used by local governments to convert existing natural turf fields to synthetic playing surfaces (i.e. State Environmental Planning Policy (Infrastructure) 2007) does not require a Development Application to be prepared and does not need to be placed on public exhibition – meaning that there is no legislative requirement for community consultation.

Some councils, such as the City of Sydney, do undertake targeted consultation with their communities regarding the installation of synthetic turf, and others provide opportunities for community feedback on the issue during the public exhibition of recreation and open space strategies and plans of management for local parks. However, many of the resident action groups that have formed in response to the installation of new synthetic turf fields noted that one of their biggest issues was the lack of consultation by their council on this issue.

Resident action groups from local government areas such as Bayside, Ku-ring-gai, and Lane Cove, also felt that they were left out of the decision-making process and there was no consultation with the non-sporting groups (e.g., informal users of local sportsfields) regarding the impacts of the decision.

79 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presented at PLA NSW, presentation provided to NSW DPIE.*

Some community representatives noted that early, transparent, and mandatory consultation, including engagement with a broader range of open space users and stakeholders, would somewhat address their concerns about the current planning process.

4.2.3 Economic Factors

Consultation with community and industry stakeholders also highlighted the role of financial and economic factors in driving the delivery of synthetic turf fields.

Funding availability through grants

Community representatives, industry experts and local government stakeholders noted throughout the workshops that most synthetic fields are funded through one-off grants which cover the capital cost of the field but do not necessarily cover the upkeep and ongoing maintenance costs.

In addition, the structure and criteria of these grant programs require funding to be spent on a particular facility or within a precinct, rather than to enhance the broader sporting and open space network, which community stakeholders felt would contribute more effectively towards meeting demand for "field hours".

The following grant schemes are available to Councils to assist in synthetic turf delivery:

- **Greater Cities and Regional Sports Facilities Fund:** This $100 million fund aims to assist eligible organisations to develop quality core sport infrastructure that will meet the current and future needs of the community over a two year period.
- **Precinct Support Scheme:** This $100 million local infrastructure grants program aims to "*support urban renewal and sustainable growth in planned precincts by providing, on average, up to $5 million per precinct to local councils and selected agencies*[80]." Precinct Support Scheme grants may be used to enable the delivery of open space projects.
- **NSW Asian Cup 2015 Legacy Fund:** This is an initiative of the NSW Government, Football NSW, and Northern NSW Football to provide funding assistance to community football clubs to partner with local stakeholders to improve the quality, availability, and standard of their facilities in order to develop and promote participation in football. This grant scheme has been used to partly fund the proposed installation of a synthetic turf field at Norman Griffiths Oval in West Pymble, which has been highly controversial in the local community. Detailed planning for this facility is currently underway.

Local government stakeholders identified that it would be challenging for councils to fund synthetic turf fields without grants. There was also concern among community representatives that funding for the delivery of new synthetic turf fields covered capital costs, but not ongoing maintenance costs, leading councils to regularly "overspend" on synthetic fields.

Conversely, community representatives suggested that the development of a grants scheme specifically promoting the use of best practice natural turf fields could "pique" Councils interests and drive increased adoption of best practice natural turf fields.

80 *NSW Government 2021, Precinct Support Scheme, NSW Government, accessed 10 June 2021 <https://www.planning.nsw.gov.au/Plans-for-your-area/Infrastructure-funding/Precinct-Support-Scheme*

CASE STUDY 5: Bernie Mullane Sports Complex, Kellyville

Bernie Mullane Sports Complex large sporting facility, including four natural turf sportsfields, in Sydney's growing north-west. The fields were used by local Kellyville Kolts Soccer Club, Dural Rugby Club, Hills Football Association and Kellyville Cricket Club but with growing membership, local sports clubs struggled to access some pitches that needed to undergo maintenance, or during wet weather, and there was a need to access additional field capacity. As a result, some fields were being used 40-50 hours a week

In 2018, two of the natural turf sportsfields at Bernie Mullane Sports Complex were converted to synthetic turf. This decision was driven by the need to increase the capacity of this facility to support increased sporting participation, while delivering an all-weather field which reduced games cancelled due to wet weather.

To deliver this facility, Hills Shire Council invested $3 million into the sporting complex, and Kellyville Kolts Soccer Club was awarded a $127,000 through the Asian Cup Legacy Fund to upgrade the storage facility and build a new training facility at the complex, which enhanced the pitches and contributed to increased membership of the Club[81]. Football NSW has noted that this case study highlights the need for Clubs to ensure that they have a business plan that addresses the increased cost to Council associated with installing a synthetic field[82]. The increased capacity of the fields has enabled the Club to train prior to the beginning of the season, opportunities for grading days and trial matches.

Local residents and other stakeholders were able to provide comment on the proposed synthetic turf when the overall master plan for the Bernie Mullane Sports Complex was placed on public exhibition in 2016, however, a media scan identified limited negative responses from local communities.

Figure 5. Bernie Mullane Sports Complex
Source: Hills Shire Council.

81 *Football NSW n.d., Increasing capacity with synthetics: The impact of investing in synthetic pitches on the operation of a club, provided to NSW DPIE during stakeholder workshops.*

82 *Football NSW n.d., Increasing capacity with synthetics: The impact of investing in synthetic pitches on the operation of a club, provided to NSW DPIE during stakeholder workshops.*

Limited Funds for Long Term Maintenance for Natural Turf

A recurring theme of community and stakeholder consultation was the lack of funding for the ongoing maintenance of natural turf fields and the difference in standards of maintenance across natural turf fields in NSW.

Local government and industry stakeholders noted that natural turf is frequently managed on "austerity budgets" – where reduced expenditure in managing sporting fields leading to eventual decline in the surface is seen as an acceptable risk. Battam and Lamble note that poor maintenance practices also reduce the capacity of natural turf fields to accommodate increased use[83].

Industry experts also noted that the delivery of best practice natural turf fields requires specialised knowledge of turf and soil – which very few Councils have in-house or the financial capacity to resource. Therefore, Council staff rely on external contractors, who may not have the skills to deliver a high-quality field.

Grant funding is also used to enable Councils and local sports clubs to upgrade natural turf ovals; however, Battam and Lamble argue that *"the grants programs should provide funding so clubs [can] obtain advice from an independent, qualified expert that does not provide conflicted advice[84]".*

Image source: https://www.twenty20.com/

83 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presented at PLA NSW, presentation provided to NSW DPIE.*
84 *Battam, M & Lamble, P 2021, Best Practice Natural Turf Fields, presented at PLA NSW, presentation provided to NSW DPIE.*

4.2.4 Perceived stakeholder influence on decision-making

For facility owners, the decision to convert a natural turf field to synthetic turf involves balancing the views and demands of various stakeholder groups. Attendees at the stakeholder and community workshops, identified a perception that well-organised advocacy in favour of synthetic turf from industry and sporting bodies leads to a disproportionate priority over natural turf. Comparatively, support for natural turf solutions is perceived to be less well organised, clear, and consistent in the overall benefits of selection.

- **Local sporting organisations and clubs are perceived to have significant influence on local decision-makers as a result of large local memberships:** Sporting clubs can be major community organisations within a local area and local government representatives noted that clubs can have strong bases for lobbying local Councillors to upgrade fields. In contrast, informal users of a green open space may not be understood or analysed, and non-sporting users' perspectives may not be considered as part of the consultation process. Commitments made in political realms can include promises to sporting groups seeking a synthetic field. In these scenarios, investigation of alternative options may not be part of project considerations. Community representatives from Lane Cove, West Pymble, Hunters Hill, and Banksia acknowledged the important social role of sporting clubs in local areas but were concerned about the perceived disproportionate influence of these clubs in localised decision-making.
- **Effective fundraising by local sporting clubs:** Sporting clubs with capacity and leadership can secure grants and funding from state, federal and local government or peak sporting bodies, and may come to councils with proposals to part-fund the conversion of a struggling natural turf field to a synthetic playing field. This may drive adoption of synthetic turf fields within a local area. For example, the multi-purpose synthetic field delivered in North Epping by North Epping Rangers Sports Club was jointly funded by the Club ($111,000), Federal Government ($50,000), NSW Government ($14,000), Bendigo Bank ($75,000). Hornsby Shire Council also contributed $150,000 via a conditional loan[85].
- **Partnering with sporting peak bodies:** Representatives from sporting peak bodies also noted that local sporting clubs regularly approach them for assistance in approaching local governments to deliver synthetic fields. Sporting bodies also work with complementary sports to proactively identify opportunities to enhance playing surfaces to support multiple codes, including through delivering synthetic fields.
- **Support for natural turf solutions is perceived to be less well organised, clear, and consistent in the overall benefits of selection:** In contrast, local government representatives noted that community groups, local environmental groups and experts in natural turf are comparatively less effective at lobbying councils in favour of natural alternatives, with some notable exceptions (e.g. Middle Head Oval, where a campaign against synthetic turf was led by the well-established and experienced Headland Preservation Group). This may change as the potential social, environmental, and economic impacts of synthetic turf become better known.

85 *Football NSW nd., Multi-sport facility: A win for football: How working with multiple sports has provided positive outcomes for all involved," provided to NSW DPIE.*

CASE STUDY 6: Weston Bears Park, Weston

Cessnock City Council has recently (September 2020) adopted a masterplan to replace the existing main turf football field at Weston Bears Park with a synthetic turf surface[86].

Weston Bears Football Club, a growing football club with many members, is the major user of this field and has a desire to enhance the capacity of the existing field and attract A-league games to the field, which would require access to an all-weather field. It will be the first synthetic field in the region. Another local club, Weston Junior Football Club, is planned to be moved from their home ground at Varty Park in Weston to the upgraded Weston Bears Park.

"The all-weather playing surface means we can open up the ground to other sports and teams. Our current playing surface, while good, has required a lot of maintenance which has meant we've had to be selective about when we use it... It will be a great facility for this area, which is growing and has a lot of junior teams."
- Weston Bears president, Rod Henderson, quoted in The Maitland Mercury[87].

For the Study, Ethos Urban also spoke with Dr Paul Lamble (Peak Water Consulting), who noted that this facility is a low use natural turf field which, with appropriate upgrades, would be able to support increased field hours, without needing to convert the field to synthetic turf.

The decision to convert this field to synthetic may reflect the priorities of the local football club (i.e. improved consistency and quality of the field for sports use, reduced cancellation of games due to wet weather, desire to participate in/attract higher level competition to the region), rather than rigorous economic, social, and environmental analysis.

In addition, there has been significant community opposition to the proposed rezoning of Varty Park (currently the home ground of the Weston Junior Football Club) to enable future medium density residential development once the Club has been moved to Weston Bears Park. Club members are concerned that there will not be adequate space at the upgraded Park to support the growth of the Club[88].

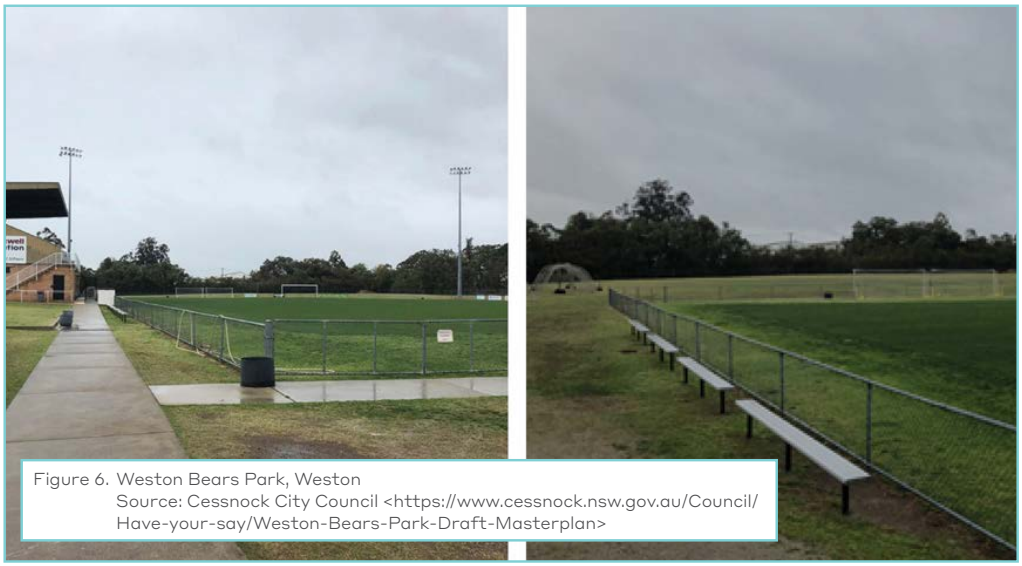

Figure 6. Weston Bears Park, Weston
Source: Cessnock City Council <https://www.cessnock.nsw.gov.au/Council/Have-your-say/Weston-Bears-Park-Draft-Masterplan>

86 *Cessnock City Council 2020, Weston Bears Park Draft Masterplan, Cessnock City Council < https://www.cessnock.nsw.gov.au/Council/Have-your-say/Weston-Bears-Park-Draft-Masterplan>*
87 *The Maitland Mercury 2020, "Weston Bears to break new ground: first football club in region with synthetic playing surface," The Maitland Mercury, May 29 2020 < https://www.maitlandmercury.com.au/story/6774283/weston-bears-go-synthetic-as-major-ground-overhaul-on-horizon/>*
88 *Weston Juniors Football Club 2021, Facebook post – 24 May, accessed 23 June 2021 <https://www.facebook.com/westonjfc/posts/4051057651646894>*

4.2.5 Key Findings

The following table summarises the key findings arising from the above analysis of key factors in the decision-making process underpinning the delivery of synthetic turf playing fields in NSW.

Theme	Issues
Lack of community consultation	• Current planning pathways can constrain formal requirements for community consultation – the current planning pathway (i.e., Infrastructure SEPP) used by local government has no legislative requirement for community consultation. • Some local governments provide opportunities for community consultation regarding synthetic surfaces, including during public exhibition of open space and recreation strategies and plans of management. • The perceived lack of meaningful community consultation on decisions on utilising synthetic turf has at times created division within the community, particularly between organised sports clubs and more informal users of open space.
Best practice natural turf management	• Lack of available information on best practice construction and maintenance of natural turf fields influences and constrains council decision making. • Best practice natural turf design and maintenance has the potential to improve the capacity of existing natural turf fields to support increased sporting use. • Information about recent innovations and best practice for natural turf are not well known or commonly used. • Innovative methods exist to manage usage and reduce pressure on high wear areas of natural turf. • Advances in technology are enabling more targeted maintenance and management of natural turf to reduce energy consumption and costs and maintain capacity.
Funding programs	• Synthetic fields are perceived as more likely to be funded through one-off grants which cover the capital cost of the field but do not necessarily cover the upkeep and maintenance costs. Councils may also choose to invest in synthetic fields due to the perceived lower maintenance costs. However, as discussed above, synthetic and natural turf fields both have extensive maintenance protocols with similar costs. • High capital cost of synthetic turf fields may make it challenging for Councils to cover the cost of fields without support from grant funding. • Structure of grant funding may contribute to grants being spent on new facilities, rather than contributing to increasing the capacity of the broader network. • Effective fundraising by local sporting clubs: Sporting clubs with capacity and leadership can secure grants and funding from state, federal and local government, or peak sporting bodies.
Perceived stakeholder influence on decision-making	• There is a perception that well-organised advocacy in favour of synthetic turf from industry and sporting bodies leads to a disproportionate priority over natural turf. • Comparatively, support for natural turf solutions is perceived to be less well organised, clear, and consistent in the overall benefits of selection. • Local sporting organisations and clubs are perceived to have significant influence on local decision-makers as a result of large local memberships.

4.3 Alternative Turf Technological Solutions and Management Techniques

This section considers alternative turf technological solutions and management techniques that allow for increased capacity of sporting fields, including a discussion of the benefits and outcomes of selected case studies. It has been informed by feedback received during the consultation process as well as information outlined in current academic and industry studies.

4.3.1 Improvements to Natural Turf Design

SportEng, an engineering firm specialising in "fields of play," states that natural turf fields are becoming increasingly complex and designed to withstand more use, drain more effectively, reduce reliance on water for irrigation, and be available during or immediately after bad weather[89].

To respond to these requirements, the designs of natural turf fields are becoming more complex with highly specified materials and engineering solutions, for example, amending soil with compost to improve its strength and durability[90]. Scientists and engineers consulted to prepare this Report argued that high quality natural turf fields can accommodate the same levels of use as synthetic turf fields.

Natural turf, like other surfaces, has significant maintenance requirements to maintain high levels of performance for all users, such as mowing, "resting" and re-surfacing the field.

However, stakeholders consulted noted that many fields across NSW are not allocated adequate budgets to enable them to perform at appropriate levels, particularly after heavy winter use or wet weather – which can prompt facility owners to consider replacing fields with synthetic turf, when performance issues may be related to poor field siting, turf type, design or maintenance.

Case studies of best practice natural turf fields are found throughout this report, including Middle Head Oval (**Case Study 3**) and Henson Oval (**Case Study 1**).

In addition, Bexley Oval is an example of technology and innovation improving the quality and reducing the cost of maintaining natural turf fields. Using Cloudmaster technology, Council is able to maximise watering usage and moderate expenditure on watering and lighting remotely, while maintaining a high-quality playing surface. Named ground of the year in 2020, the oval demonstrates the alternatives available for councils considering the upgrade of their pitches to world class standards.

89 *SportEng 2021, "What is natural turf?" SportEng, blog post dated 25 March 2021 <https://blog.sporteng.com.au/what-is-natural-turf>*
90 *Lamble, P & Battam, M n.d., "Creating sustainable open spaces – using compost to deliver liveability, sustainability and economic outcomes," technical paper prepared for OzWater.*

4.3.2 Hybrid Turf Options

Some hybrid turf options that may offer alternative solutions to enhancing sportsfield capacity include:

- **Hybrid turf:** This system combines blades of synthetic grass with natural turf to provide a consistent playing surface, improved surface durability and stability[91]. The hybrid system is still relatively new to Australia with only a few installations of a system including by Melbourne City Football Club training facility. The system has become a popular option for international sporting codes such as the English Premier League and National Football League. This system is more durable than natural turf, due to the presence of synthetic grass fibres that provide traction even if natural grass is worn. However, hybrid turf can impede typical maintenance practices required for natural turf (in particular deep aeration/ decompaction), and further research is required to understand maximum carrying capacity of hybrid playing fields.
- **Profile reinforcement:** In addition to hybrid systems, it is possible to incorporate synthetic elements within the soil or rootzone layer to improve the durability and stability of natural turf and reduce divoting (i.e., holes made in grass by sports activities, e.g., rugby scrums) Examples include[92]:
  - Fibre system, whereby various types of synthetic fibre are mixed into the soil or sand into which natural grass is grown, improving root stability.
  - Mesh-based system, where either a mesh or shredded mesh is mixed into the root zone area to stabilise the natural grass fibres.
- **Combining natural and synthetic turf:** The selective use of synthetic or hybrid turf in high-wear areas of a field (e.g., cricket wicket at the centre of an oval, goal mouths on a soccer pitch) has been used by some councils to improve durability and therefore field capacity without needing to convert an entire field. This approach is also used in elite facilities, for example the playing surface at Bankwest Stadium in Parramatta consists of a high-quality natural turf pitch, but synthetic grass is used around the pitch to maximise the extent of vehicular traffic without damaging the natural turf surface. A case study of combining natural and hybrid turf is discussed below.

91 *SportEng 2018, SportEng Field of Play Surface Profiles.*
92 *Smart Connection Consultancy 2019, The Smart Guide to Synthetic Sports Surfaces: Volume 2: Football Turf – Synthetic and Hybrid Technology*

CASE STUDY 7: South Park Oval, Chipping Norton

In the Liverpool LGA, one of the fastest-growing local government areas in NSW, there are several council-owned football pitches with clubs exceeding 400 players who utilise the fields across seven days. Council found at the start of 2021's winter season, that pitch surfaces were showing significant signs of wear, which was worsened following the substantial impact experienced a significant flood events in March 2021 (which washed away the soil which had been added to the field to restore it).

To improve playing quality in time for the winter season, Liverpool City Council is trialling the installation of hybrid turf sections in the high use sections of the goal mouths of the fields (i.e. South Park Oval, in Chipping Norton).

Council chose this option due to its relative cost effectiveness ($14,000 to install, compared with the high cost associated with full synthetic installation) and the fast turnaround of installation – the hybrid turf patches were installed over two days, and the pitch was playable the following weekend.

Council representatives stated that the response from the local soccer association has been positive because of the increased consistency in playing surface quality, and other local clubs have begun lobbying Council to introduce more hybrid options.

Given the relative ease of provision and low costs, and the reduced environmental and social impacts, this strategy could be an option for local Councils looking to meet growing demand while minimising associated impacts has been heralded as a solution to the challenges facing the provision of public open space in NSW.

A representative from Council stated that they were not currently exploring synthetic turf fields for the LGA, due to their high capital cost. Across Liverpool LGA, there are multiple urban renewal and greenfield development sites requiring increased open space and sporting facilities to meet increased population demand – and it would be cost-prohibitive to deliver synthetic turf fields across all of these areas.

Figure 7. Before (L) and after (R) hybrid patching at South Park Oval, aerial view
Source: Nearmap.com, Liverpool City Council

"[on Lane Cove Council's announcement to use 4G technology at Bob Campbell Oval] I commend Lane Cove Council and Mayor Pam Palmer for diligently investigating how they can create a best practice field that services the community and mitigates the environmental concerns,"

- Northern Suburbs Football Association quoted in The Weekly Times, 26 May 2021.

4.3.3 Advancements in Synthetic Design

Often described as the "fourth generation" or 4G synthetic turf, recent technological advancements in synthetic design and materials have diversified options and addressed some of the known environmental impacts arising from earlier generations of synthetic turf.

Alternative construction materials and methods, hybrid sports surfaces, and the removal of infill layers have the potential to mitigate against some of the challenges traditionally faced by adopters of synthetic surfaces.

For example, the use of cork granules is increasingly adopted as a potential infill for artificial turf, as it is a natural, environmentally friendly alternative. However, cork granules are generally more expensive and tend to deteriorate at a faster rate than rubber. This highlights the complexity of adopting new technology without up-to-date research and consideration of the benefits and trade-offs.

While sporting and local government stakeholders were generally supportive and enthusiastic about the possibilities of "fourth generation" synthetic turf fields, local community representatives were generally sceptical about the environmental performance of these designs.

Representatives from the Greenwich Community Association noted that 4G's ability to reduce fragmentation of the playing surface and release of plastics into the environment was yet to be proven in an Australian setting.

4.3.4 Improved Data Collection and Analysis for Facility Owners

New technologies and approaches are offering facility owners improved data on the status and usage of sports fields, enabling councils to better target maintenance, manage peak use and quiet periods, scheduling, and planning for use.

The following technologies were raised by stakeholders during the consultation process and some are being adopted by councils such as Penrith City Council:

- **Intelligent Play:** Local government and sporting association stakeholders supported the implementation of Intelligent Play, a system from the UK that uses machine learning and artificial intelligence to monitor sports field use. The system works by mounting sensors above the perimeter of the sports field to capture any usage of the field, and provide in-depth data about the status of the field, including the numbers of players using the field, which areas have been used, and how this translates to maintenance requirements[93]. Sporting association stakeholders recognised the value of this system for maximising the value and managing the use of both natural and synthetic sports fields, but noted that it was generally too expensive for local clubs and facility owners to implement. Intelligent Play claims to be the only system of its type.
- **Telstra usage data:** Some local government stakeholders have partnered with Telstra to understand open space use, by installing sensors in open spaces which "ping" when people with mobile phones enter the space. This data can help to provide a more holistic picture of usage on a field, to better target maintenance or plan future upgrades, as well as to understand the diversity of uses on a field – other than organised sport, where clubs maintain registers of users.
- **Improved booking systems:** Local government and community representatives were supportive of improved transparency around booking systems, which has the potential to increase the accessibility of local fields for a broader range of community members – while also tracking the actual utilisation of sportsfields.

93 *Intelligent Play n.d., FAQs, Intelligent Play, accessed 16 May 2021 <https://www.intelligent-play.com/faqs/>*

4.3.5 Managing Usage

Local government, state agency stakeholders and sporting associations also identified innovative approaches to managing usage and reducing pressure on high-wear areas of a natural turf field, including around the goal mouths.

Some approaches identified by stakeholders included:

- Strategically lighting the field at night and in the evening, to draw users away from areas of the field that require rest. For example, lighting the perimeter of a field to enable low-impact activities such as jogging or dog-walking along the edges, while discouraging use of the centre of a field for informal games.
- Shifting the location of the pitch through changing line markings. A representative from the NSW Office of Sport noted that sports fields are frequently surrounded by additional space, used for spectators, kiosks and other game-related uses, and that fields can be re-marked to shift the area of play and help rotate high-wear areas.
- Smart scheduling and hire agreements can also manage usage by effectively balancing diverse users of the field to reduce the intensity of the use of the field.
- Stakeholders raised the standardisation of maintenance practises as a key improvement to ensuring that both natural and synthetic fields are kept to a high surface standard, are usable for the maximum extent of their typical life cycle, and to allow for best practice knowledge sharing.

4.3.6 Utilisation of Spaces and Siting Considerations

Stakeholders and community submissions raised a number of siting and planning considerations to alleviate pressures on existing fields and improve the quality and availability of public open spaces in NSW. These include:

- Sharing of funds to mitigate the anomalies associated with council boundaries impacting best case siting for synthetic fields
- Limiting the over-concentration of synthetic fields in specific areas to ensure that all residents have access to a natural open space close to where they live while also providing sufficient opportunities for formal sport
- Consider the potential for greenfield sites to support increased provision of natural fields
- Consider the potential for brownfield sites to support the provision of synthetic fields
- Construct synthetic fields away from waterways and sensitive natural areas
- Reconsider private and education uses of open spaces, such as public and private schools, and golf courses, to allow community use and maximise existing natural surface options
- Concentration of synthetics in purpose built, regional scale facilities to maximise usage and ensure adequate supporting infrastructure.

4.3.7 Key Findings

The following table summarises the key findings arising from the above analysis of alternative turf technological solutions and management techniques.

Table 3 – Key findings

Theme	Issues
Best practice natural turf management can improve field capacity	• Best practice natural turf design and maintenance has the potential to improve the capacity of existing natural turf fields to support increased sporting use. • Lack of available information on best practice construction and maintenance of natural turf fields influences and constrains council decision making. • Information about recent innovations and best practice for natural turf are not well known or commonly used. • Advances in technology are enabling more targeted maintenance and management of natural turf to reduce energy consumption and costs and maintain capacity.
Partial/hybrid use of synthetic grass can increase durability	• Hybrid turf combines blades of synthetic grass with natural grass to increase durability of fields while reducing use of synthetic materials. • Synthetic materials can be incorporated in the root zone to reinforce the soil profile. • Synthetic turf can be used selectively in high wear areas of a sports field such as the goal area.
Synthetic turf design is evolving	• Recent technological advances in synthetic design address some of the environmental impacts associated with earlier generations of synthetic turf. • Replacing rubber infill with cork granules is an environmentally friendly option however it is more costly and deteriorates faster.
Innovative management practices can support greater use	• Strategic lighting to encourage evening use of particular areas of fields and shifting line markings are an effective way to distribute usage across a playing field surface. • New technologies and approaches are offering facility owners improved data on the status and usage of sports fields, enabling councils to better target maintenance, manage peak use and quiet periods, scheduling, and planning for use.

Theme	Issues
Sports field planning and siting	• Siting considerations exist for both natural and synthetic turf. For example, many issues that constrain optimal utilisation of natural turf fields are intensified when they are located in poor drainage or flood prone areas, ex landfill sites, or where they have a dual purpose as stormwater retention basins. • Where synthetic or natural turf fields are located in areas prone to flooding, or subject to overland flows during extreme weather, there can also be issues related to pollution of local waterways or bushland with infill materials or pesticides. Further discussion of potential pollution arising from both natural and turf fields, and the contamination of the surrounding local environment, is discussed below. • Better consideration of siting and planning for the whole open space network can alleviate some pressure on the network, including sharing of facilities (across LGA boundaries and with different land uses such as schools), purpose-built facilities and siting synthetic fields in non-environmentally sensitive areas.

4.4 Evaluation of Management Approaches and Alternate Practices

The following table synthesises the alternate management approaches, policy directions and best practice technological solutions to some of the key social, economic, and environmental issues identified from the consultation process and literature review.

Table 4 – Evaluation of Management Approaches and Alternate Practices

Issue raised through study	Potential alternate practices and approaches
Durability and consistency of surface material – wear and tear comprising the use of fields for sporting	• Hybrid turf options may enhance the durability of playing surfaces, including in high use areas – at a relatively low cost compared to full synthetic replacement. • Best practice natural turf – a well-designed natural turf field can deliver approximately 40-50 "field hours" per week, equal to the actual use of synthetic field. However, there is a lack of knowledge about best practice natural turf approaches – and soil and turf selection and management requires specialist knowledge. • Many existing natural turf fields are managed with inadequate budgets, and the durability, capacity and consistency of the playing surface could be significantly improved through enhanced maintenance. In contrast, synthetic turf fields frequently have prescriptive and rigorous maintenance regimes which are adequately funded to extend the economic life of these assets. • Recent innovation in natural grass species has can be used to create natural turf surfaces that are more durable and with lower water requirements, and improvements to water retention and recycling can irrigate natural fields at a lower cost to facility owners.
Increase field capacity in a local area	• Implement best practice natural, synthetic, and/or hybrid surfaces on existing sports fields to increase their durability and capacity to support sporting and other use. • Local and state governments can undertake strategic planning across open space networks to identify underutilised open spaces close to the site, or unlocking existing playing fields through partnerships with other asset owners (e.g. government and private schools). • Facility owners can identify innovative siting locations for synthetic fields, such as brownfields sites, or areas that are contaminated and require capping, rooftops and car parks. Consultation with community representatives has highlighted there may be less opposition to synthetic turf fields in areas of low environmental sensitivity, and where synthetic turf fields do not replace existing natural turf fields. • Local governments and other stakeholders involved in precinct planning can identify and secure land for new open space through proactive precinct planning, including through reclaiming golf course land. • Facility owners can undertake analysis to understand the actual and diverse demand for sporting fields – that is, is a synthetic field required to meet demand? or would a best-practice natural turf field better meet community need? What informal uses of open space would a synthetic field potentially displace?
Costs	• Partial installation/combined natural and synthetic turf can reduce the cost of delivery of synthetic surfaces. • The lifecycle costs of synthetic and natural turf fields should be considered when deciding on surface type – is there enough funding for maintenance? • Grant funding generally concentrates on upgrading a single facility – is there a way to provide funding to enhance the field capacity of a region as a whole? Are there opportunities to use grant funding to explore opportunities to deliver best practice natural turf fields? • Higher performing natural turf fields require more maintenance which needs to be planned for by local governments and facility owners.

Issue raised through study	Potential alternate practices and approaches
'All-weather' surfaces, during wet and hot weather	• Best practice natural turf can recover more quickly than standard natural turf fields after major rain events, however, there will be some playing hours lost. • Hybrid turf and synthetic turf with organic infill (e.g., cork) can provide more playing hours during wet weather but there is a need to reduce the risk of infill and other synthetic fibres washing into local waterways during wet weather events. • Synthetic turf can lose playing hours during summer due to extreme heat, while natural turf playing fields can be more comfortable during hot weather.
Heat load	• Best practice natural turf absorbs rather than reflects heat and is more comfortable for players to use during high summer temperatures. • Hybrid turf/profile reinforcement/combined hybrid and natural turf can reduce the heat load of fully synthetic turf; however, these have not been adequately tested in an Australian context.
Pollution	• There are opportunities to ensure more consistent management and mitigation techniques for synthetic turf through clearer policy and design guidelines at NSW Government level, such as decontamination stations for players, or delivering a "lip" which will collect loose infill. Appropriate policy and design standards will need to be explored for the Australian context in more detail. • Synthetic turf with organic infill (e.g., cork) can reduce the incidence of rubber crumb and other synthetic materials leaching into the surrounding environment.
Reduce maintenance costs and improve maintenance quality	• Improved data collection technologies to enable more strategic maintenance practices of natural turf fields, and for facility owners to target maintenance to reduce costs and improve durability of natural turf playing surfaces. • Facility owners can implement strategic lighting solutions to manage use at night. For example, moving lighting across fields during mid-week training periods can direct sporting users to certain field areas, giving other, high use parts of the field opportunities to "rest." This can help to maintain the quality of turf in high use areas such as goal mouths. • Similarly, it is possible to manage use of natural turf fields by shifting / rotating fields by re-line marking fields to move high use areas around and allow them to "rest". • Increase knowledge sharing and education between Councils, particularly around natural turf maintenance and delivery – which requires specialist turf, soil and drainage knowledge, which Councils rarely have access to in-house. • Conduct lifecycle cost analysis for the specific site, including comparing best practice synthetic and best practice natural turf life cycle costs. There is currently a lack of research comparing these costs, and further case study examples are required to explore actual costs.
Reduced water consumption	• Natural turf requires more watering, but this can be reduced through designing fields with stormwater retention tanks and appropriate drainage. • Improved data collection technologies, such as Cloudmaster to assist in 'smart' watering.
Lack of consultation on decision making for synthetic turf	• Consider revising the planning pathways for synthetic turf upgrades so they require community consultation. Specifically, consider including synthetic fields in ISEPP in Division 12 'Parks and other public reserves', Clause 65, Development without consent provisions. This inclusion should also trigger community consultation, adherence to best practice management guidelines and reporting of environmental factors. • Undertaking targeted community consultation on synthetic turf installation on a site-by-site basis, including proactive engagement with neighbouring residents, sporting clubs and informal users of existing fields (e.g., dogwalkers, joggers, picnickers). • Local governments can provide opportunities for community feedback outside the site-specific planning process by undertaking consultation on strategic recreation and open space plans and plans of management of open spaces.

5.0 Preliminary Recommendations for Consideration

5.1 Preliminary Recommendations

The research undertaken to prepare this Study has demonstrated that there are often conflicting views between local authorities, user groups and the wider community over the suitability and benefits of synthetic turf as an alternative to natural turf.

While it is clear that both types of surfaces can provide positive outcomes in terms of access to public open space and participation in recreation and sporting activities, the absence of consistent guidelines, consultation with communities and transparent consideration of potential alternatives has led to distrust and concern over decisions to implement synthetic rather than natural turf sporting fields.

To potentially address this conflict, and to further understand the environmental, social and economic impacts of synthetic turf in an Australian context, the Department may consider the following preliminary recommendations:

- **Provide consistent state-wide guidance to local authorities on key considerations or criteria when proposing to provide new synthetic turf surfaces:** Although there is significant emerging research on the environmental impacts of synthetic turf, and studies from other jurisdictions (including Western Australia and Victoria) that consider potential impacts of installing synthetic turf surfaces, there is no consistent state-wide guidance in NSW for the delivery of synthetic surfaces. This research is generally undertaken by local council staff and facility owners, who may have limited resources to deeply engage with the field of research. State-wide guidance could help to clarify some recurring questions around impacts of synthetic surfaces.
- **Adapt planning pathways for synthetic turf fields to increase opportunities for community consultation:** The current planning pathway used by local governments to convert existing natural turf fields to synthetic playing surfaces does not require a Development Application to be prepared and does not need to be placed on public exhibition – meaning that there is no legislative requirement for community consultation. Identifying opportunities to adapt the planning pathways (including potential changes to the Infrastructure SEPP) to require early, transparent, and meaningful community consultation to inform decisions around the use of synthetic versus natural turf surfaces may address community concerns about the current planning process. There may also be scope to include mitigation measures in relevant planning instruments applicable to synthetic turf proposals.
- **Undertake further research into the health and environmental impacts of synthetic turf use in an Australian context:** While there is some existing Australian-specific research about the health impacts of synthetic turf on children, much of the existing academic research on the topic comes from areas with different climates, where extreme heat not as prevalent a community concern. In addition, further research is needed into the appropriateness of synthetic turf in bushfire prone areas, where synthetic turf may contribute to bushfire risk. Additional research into the impact of synthetic materials on human health, including for sports users and nearby residents, is also needed to clarify impacts. Longer term, this could lead to guidelines aimed at mitigating environmental and human health risks, including consideration of best management practices (e.g., construction, maintenance, disposal, community consultation), for use by local councils and agencies with responsibility for community sports fields.
- **Further analysis of the health and social implications of reduced accessibility for informal and passive enjoyment of open space associated with synthetic turf usage:** In contrast to environmental and economic impacts, the social dimensions of synthetic turf are under-researched. While the stakeholder and community consultation process for this study highlighted a range of social impacts, including community concern over the loss of access to open space, displacement of non-sporting users and changes to local amenity, further analysis is required to understand these implications more broadly and in a range of contexts.
- **Further consideration of the potential benefits and impacts of the emerging technologies of hybrid and 'fourth generation or 4G' synthetic technology within an Australian context:** New generations of synthetic and hybrid playing surfaces are relatively new to Australia, and their implications have not been researched in an Australian context.

While there is potential that these technologies may reduce environmental impacts associated with other forms of synthetic turf, further research is required to understand their broader impacts.

- **Undertake research to understand barriers to implementing best practice design management of natural turf fields:** Natural turf fields are becoming increasingly complex and designed to withstand more use, drain more effectively, reduce reliance on water for irrigation, and be available during or immediately after bad weather. Community and industry representatives were supportive of redesigning natural turf fields to increase capacity, but currently there is a lack of knowledge and financial resources to implement best practice for natural turf fields. Further research to understand and address these barriers may increase adoption of best practice natural turf fields.

Image source: https://www.pexels.com/

Appendix A – Considering the options

The decision of whether to use natural turf, synthetic turf, or an alternative for use on public open spaces, is complex and should be assessed on a case-by-case basis.

The following table outlines the key considerations for local facility owners when deciding what material to use for public open spaces, including site suitability, community values, broader open space access and amenity, actual user demand and required surface capacity, economic, environmental, and social impacts and consideration of alternatives.

It is important to note that this table is in draft and will be subject to a whole of government process to consider the implications of implementation.

Table 5 – *Considering the options*

Question	Key considerations
Site suitability *Where is the public open space located?*	• Is the site integral to a local drainage system? • Is the site located on a former landfill? Or in a flood prone area? • Is the site suitable for lighting, and does it have appropriate vehicle access to accommodate increased use? • Is the site appropriate for increased intensity and frequency of use? • Is the site of significant local heritage and importance? • Is there the potential for cooperation with neighbouring councils to provide the field in the most appropriate location? • Is the site located in a bushfire-prone region, or a community marshalling location for emergencies? • Is the site currently, or likely to be, overshadowed by tall buildings in high density areas?
Community values *How is the conversion of this public open space perceived by the broader community – not just sporting groups?*	• Has appropriate consultation been undertaken with relevant members of the community, including community groups, sporting associations, environmental groups and informal users of public open spaces, to understand: - Existing uses of the open space, including uses that may not be regularly measured/monitored, e.g., dog walking, self-organised sports games - Community values, narratives and aspirations associated with the open space - Whether any users will be displaced by the decision to convert the field to synthetic turf, and whether these users can access alternative open space areas - Potential changes to amenity for surrounding residents/users • Have potential alternative options been explored in consultation with relevant community groups? • Will this site alienate existing formal and informal users? • Will this conversion create tension and discord between different users at the site and in the community more broadly?
Open space access and amenity *What are the current uses of the public open space?*	• Is this public open space already highly utilised for formal sport? • Is there adequate open space locally to mitigate the loss of natural grass at this location? • Is there an adequate variety of different field types in the vicinity?

Question	Key considerations
User demand and surface capacity *What is the actual demand for hours of play on this public open space?*	• Consider the type of use, population growth, sports participation trends and intensity of use? • What are the alternative solutions to meeting increased demand and improving field capacity? • Consider actual hours of use, peak use times and the needs of the user groups?
Investigation of Options and Implications *Have alternative options to increase capacity been explored?*	• Compare the costs of natural turf field upgrades with synthetic solutions. • Has the costing considered the need for lighting and other ancillary investment? • Are there unknown site costs associated with installing a synthetic field? • Are there scheduling solutions which can spread demand and reduce peaks? • Are there alternative greenfield or brownfield sites, or underutilised existing open spaces including schools and golf courses?
Lifecycle cost *Compare the different options. How cost effective will this decision be?*	• Need to consider the lifecycle cost of synthetic turf against the likely level of use (rather than theoretical maximum capacity) • Include all costs (including waste disposal, purchase of equipment, ancillary investment needs) in the cost benefit analysis. • Consider the player/ sport benefits in terms of open space resilience and consistency. • Compare maintenance costs accurately - consider the cost of effective maintenance of a turf field with that of synthetics (as opposed to existing budget costs which maybe inadequate) • If the capital investment is used to upgrade a number of turf fields to increase capacity will that deliver a more effective outcome than providing only one synthetic field?
Health Impacts *Have the health impacts been considered?*	• Have the potential impacts from micro plastics, volatile gases and infill compounds been considered? • Are there positive public health benefits from increased sporting participation? • Have the impacts from increased heat loads on users (due to synthetic surfaces) been considered? Will this increase over time or limit operating hours? • Are there impacts on local resident's access to space for exercise? • Have the negative mental health and wellbeing impacts been considered? • Will the conversion increase contagion risk through viral load retention?
Local climate/environmental conditions *What is the local climate surrounding the site?*	• Is this area prone to high levels of prolonged heat? • Will this field have an effect on urban heat loads? • Is this area subject to prolonged rain? • Does this area experience drought conditions? • Does the existing natural turf open space have significant lost use hours due to poor weather impacts? • Will this field negatively impact local wildlife and biodiversity?

Question	Key considerations
Environmental impacts (e.g., pollution, waste, carbon) *What are the likely and potential environmental impacts of a synthetic turf facility? Can these impacts be effectively mitigated for a reasonable cost?*	• What is the likely impact of this field on carbon emissions? • Can potential pollution issues be mitigated? What is the cost of managing potential pollutant issues from synthetic fields vs. natural turf? • Have the potential impacts and mitigation costs of microplastics been considered? • Does the facility owner have enough information now to understand the potential impacts in 10 years' time? • How will the facility owner dispose of synthetic turf carpet at the end of life (can it be recycled)?
Sports-specific priorities *What kind of sports will use these public open spaces? What are their surface preferences?*	• Will synthetic turf installed at this location be able to be used by a broad variety of sports? • If the synthetic turf is specific to a sport - is this use an ongoing and 10 year+ demand?
Planning pathway and funding options *What planning pathway will be used to seek an approval for this development? How will it be funded?*	• Does the planning pathway for this proposal enable adequate community consultation? Will a diverse range of viewpoints be sought – consider local residents, sporting associations and informal park users? • How will this proposal be funded? Could the funding be better spent to upgrade the whole network rather than focusing on a single facility?

Appendix B – Glossary

Demand / User Demand

This is the assessment of the actual hours of use likely to form the demand for a field or sporting space. The actual hours of demand may vary considerably from the modelled capacity and should be considered when comparing the cost benefits of different options.

Engineered Natural Turf

Refers to natural turf fields which have been designed as a high quality and high resilience surface. This includes a complex mix of profiling, growing media, sand, soil, aggregate, sub soil drainage and turf species selection along with sophisticated management regimes.

Field Capacity / Modelled Capacity

Is the theoretical higher limit of use hours a field can tolerate or is likely to sustain. In the case of synthetic surfaces modelled capacity of 60–70 hours per week is often compared with natural turf fields which can sustain 25–30 hours per week before significant surface degradation.

Hybrid Surface

Is a combination of synthetic fibres and natural grass. This has a higher resilience than natural turf, but does not have the capacity of a synthetic surface and is likely to be more expensive to maintain.

Infill

Is the fine granular material that sits on top of the synthetic carpet but at the base of the fibres. It is a critical part of the functioning of the surface and requires regular maintenance. Infill can be comprised of a range of natural and artificial materials.

Natural Turf and Grass

Refers to those sporting fields and courts that are constructed of natural materials and have a covering of selected grass species.

Grass refers to the plant species, while turf means the whole surface including grass, root mat and soil/sand.

Sporting Spaces, Sports Fields, Field of Play

Refers to those areas designed for specific formal sport training and competition and includes line marking, goals and sideline areas needed for the conduct of outdoor sport.

Synthetic Surface / Synthetic Turf

Is the combination of artificial fibres stitched into a carpet that is laid on an engineered constructed base including a “hard” base layer and shock pad. Synthetic fields usually have infill materials which help keep the fibres upright and functioning properly.

Appendix C – References

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Appendix D – Supplementary information (i.e., technical information)

The following section provides an overview of different surface materials for open space, including natural turf, synthetic turf and hybrid technologies. Each of these surface materials has a complex and diverse range of types and configurations, appropriate for different uses.

The literature review undertaken for the Final Report identified that most existing analysis on the subject tends to evaluate different surface materials from the perspective of sports users. As we heard from our workshops, open spaces in NSW support important community and informal uses, as well as formal sporting participation.

Natural turf

The construction of natural turf varies considerably and has significantly evolved over time to enhance the capacity and durability of natural turf-based playing surfaces. Since the 1920s, research has investigated ways to improve the performance of natural turf playing fields, which has resulted, "almost universally" in the use of coarse-grained, quick-draining materials, such as sand being used to construction natural turf sportsfields[94].

Local government stakeholders and facility owners noted during consultation that many existing open spaces in NSW are built on reclaimed landfill sites, which can have issues related to decontamination and subsidence, or on flood prone land with overland flow issues in heavy rainfall.

The siting of natural turf fields can affect performance and resilience, but it is challenging to acquire land to deliver open space due to high land values on sites that are not flood-affected or prone to subsidence.

The construction options for natural turf range from a basic soil-based grass field to a high-quality engineered sand-based field with profile reinforcement.

The design of a high quality (engineered) natural turf playing surface sand profile typically consists of:

- Natural turf surface layer: Comprising a layer of soil (e.g., sand, loamy sand, sandy loam, loam and clay) and grass.
  - Grass/turf: The species of natural turf has a bearing on its performance[95]. Some of the most common types include couch/Bermuda grass, kikuyu and rye. Consultation with local government stakeholders and experts as part of our workshops highlighted that some local governments are exploring different breeds of grass in their local open spaces, identifying new options with improved durability and reduced irrigation requirements (e.g. sea isle turf can be watered with saline canal water). Natural turf experts and social scientists consulted for this Study emphasised the importance of selecting appropriate grass species and soil (e.g. compost amended soils have lower water demand while supporting more tolerant turf growth)[96], as well as the importance of management.
  - Soil: Healthy soil is one of the most important aspects of open space management. The characteristics of soil affect the watering requirements, turf growth and drainage on the surface, and influence the incidence of weeds, pests and diseases. "Current practices in turf management focus on irrigation or fertilising schedules," state Sydney Water. "These are necessary, but irrigation and fertiliser can be minimised if the soil texture is appropriate to the purpose of the open space turf area[97]."
- Rootzone sand layer: Provision of a homogeneous rootzone sand layer provide enough porosity to enable rainfall infiltration and moisture retention to promote strong root growth, and reduces risk of compaction.
- Gravel blanket: Provision of a gravel drainage layer to convey infiltration to the drainage system.

94 *SportEng 2021, "What is natural turf?" SportEng, blog post dated 25 March 2021 <https://blog.sporteng.com.au/what-is-natural-turf>.*
95 *Tafe NSW, Turf Types, accessed 14th May 2021 from common turf species (tafensw.edu.au).*
96 *Lamble, P & Battam, M n.d., "Creating sustainable open spaces – using compost to deliver liveability, sustainability and economic outcomes," technical paper prepared for OzWater.*
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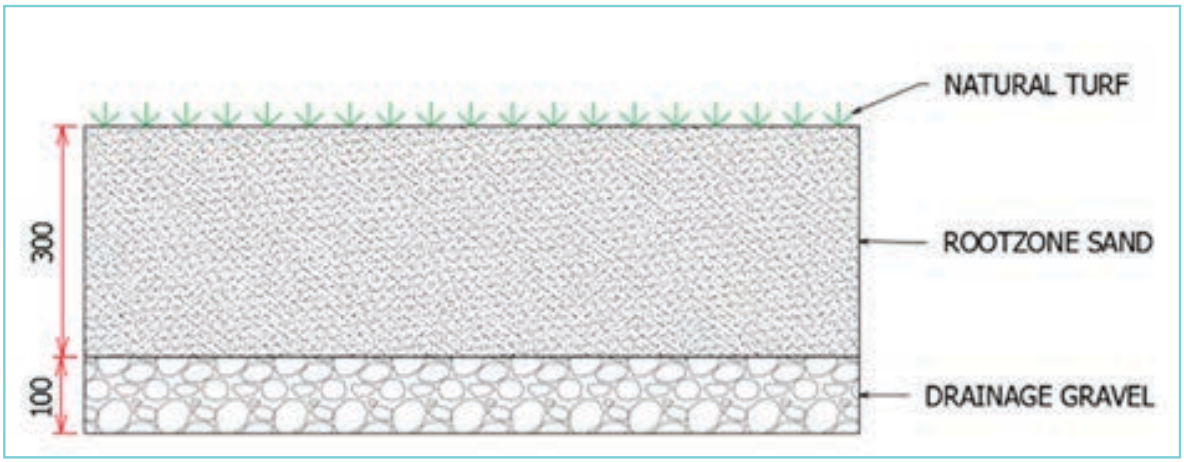


SportEng, an engineering firm specialising in "fields of play," states that natural turf fields are becoming increasingly complex and designed to:

- Drain more effectively while maintaining sufficient moisture content;
- Reduce reliance on water for irrigation;
- Tolerate more use; and
- Be available during or immediately after bad weather[98].

To respond to these requirements, the designs of natural turf fields are becoming more complex with highly specified materials and engineering solutions. Scientists and engineers consulted to prepare this Study argued that high quality natural turf fields can accommodate the same levels of use as synthetic turf fields.

Natural turf, like other surfaces, has significant maintenance requirements to maintain high levels of performance for all users, such as mowing, "resting" and re-surfacing the field. However, stakeholders consulted noted that many fields across NSW are not allocated adequate budgets to enable them to perform at appropriate levels, particularly after heavy winter use or wet weather – which can prompt facility owners to consider replacing fields with synthetic turf, when performance issues may be related to poor field siting, turf type, design or maintenance.

Synthetic turf

Enhancing existing open space assets is an important response to the rising demand for open space. Some facility owners are adopting synthetic turf to achieve this, particularly to enable increased use for formalised sport.

Synthetic surfaces have been considered by most major field sporting codes in NSW, with sports such as Football, AFL and Hockey seeing increased use and acceptance for these surfaces. Sporting codes and councils alike have developed "performance criteria" for these surfaces to meet appropriate standards, targeted to the dominant use of a field.

The type of synthetic turf installed will depend on the use it is intended for. For example, hockey specifies a sand-dressed pitch, while football and rugby require infill and a longer pile height. It should also be noted that some regional and remote councils will only have one field that is used for all codes, so further consideration of the optimal construction method that caters for a variety of uses is required.

98 *SportEng 2021, "What is natural turf?" SportEng, blog post dated 25 March 2021 <https://blog.sporteng.com.au/what-is-natural-turf>.*

There are a diverse range of synthetic surfaces and construction methods used in open spaces across NSW. Synthetic turf has been through several generations and continues to evolve with new solutions and applications emerging as the industry matures. The history and development of synthetic turf options is summarised in Table over page.

Local government stakeholders during the workshops noted that when undertaking community consultation regarding replacing natural turf with synthetic surfaces, many community members have misconceptions regarding the quality and amenity of synthetic turf – which date from experiences with second and third generation synthetic surfaces. Contemporary synthetic turf options can be designed to reduce some of these impacts while maintaining durability and consistency as a playing surface.

Table 6 – Summary of evolution of synthetic turf options

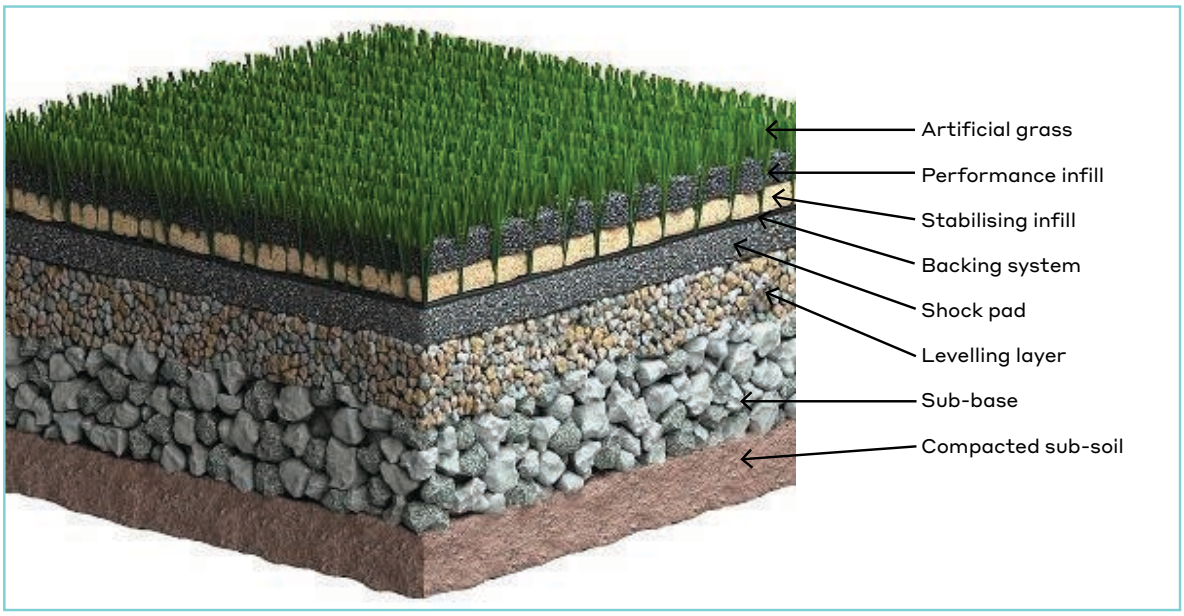
	History	Users
First generation (1960s-70s)	• Conceived in the 1960s by the Monsanto company • Simple artificial short-piled turf, high density knitted nylon; first generation synthetic pitches were coarse, capable of causing friction burns and wounds unless played on wet. • Installed in the indoor Houston Astrodome due to failure of natural grass to grow under the stadium's translucent growth. Other USA stadiums also tried artificial grass but returned to natural turf as synthetics were not popular with baseball players or spectators.	• Baseball • Hockey
Second generation (1980s)	• Versatile and durable pitches based on medium pile height, reduced density of fibres, and filled with sand to provide stability and improved control of ball bounce. • Adopted by English soccer clubs in the 1980s. Initially successful for community and elite level soccer, but were eventually rejected by elite soccer as ball bounced too high on synthetic turf and player footing was not reliable enough on synthetics. • First generation fields continue to be used for hockey.	• Schools • Hockey • Tennis • Soccer – community and professional
Third generation (late 1990s)	• Development of third generation synthetic carpets, which were a very acceptable surface for sports including soccer and rugby union. • Characterised by taller pile height, underlying shock pads and generally dressed with sand or rubber granules to improve stability of fibres. • Most common type of turf installed in Australian community fields	• Community • Football/Soccer • Rugby • AFL/Cricket
Fourth generation (2000s-now)	• Diversified synthetic turf carpet systems, typically used for soccer, rugby, hockey, athletics and tennis. • Alternative construction materials and methods, hybrid sports surface, removal of infill layers	• Professional level codes • Advanced community use

Source: Victoria Department of Planning and Community Development, Artificial Grass for Sport Guide, 2011 < https://sport.vic.gov.au/__data/assets/pdf_file/0025/55591/download.pdf>

The major components of contemporary synthetic turf construction are:

- Pavement: This is the foundation or base and requires engineered design to ensure both appropriate drainage and a stable surface for the playing surface;
- Shock pad: Different sports require different levels of performance for shock pads, to reduce the risk of injury in sports where players fall, slide or land from a height. Materials are commonly rubber and/or polymer based with examples of recycled natural or synthetic rubbers used by different manufacturers;
- Turf carpet or mat: This woven mat product has artificial grass blades stitched or tufted through which are normally made of polyethylene or polypropylene. The balance between the thickness and height of the fibre and the softness is key in creating surfaces that are safe and comfortable to play on, and reducing the risk of friction burns and abrasions;
- Infill: This is the material that helps replicate a more natural surface and keeps the blades upright, provides for grip and give and assists with drainage. The infill is usually chosen carefully to match both the length of the synthetic "blades" and the proposed uses of the surface. Infill can be comprised of many different organic and inorganic materials. These different layers and products are used to achieve particular performance outcomes. The most common types of infill include:
  - Crumbed/shredded rubber made from recycled end of life tires are the most widely used and one of the cheapest infills available. Purpose manufactured plastics or "artificial rubber" are also used;
  - Sand, usually a silica sand which has a rounder grain, is chemically stable and non-toxic; and
  - Cork granules are increasingly adopted being explored as a potential infill for artificial turf, as it is a natural, environmentally friendly alternative. Cork granules are generally more expensive and tend to deteriorate at a faster rate than rubber, requiring more frequent replacement.

Figure 10 is an outline of the construction method and materials in a typical third generation synthetic turf.



Appendix E – Workshop materials

ETHOS URBAN

Agenda

Meeting Subject:	Open Space and Synthetic Surfaces Workshop		
Location:	DPIE Office, 4 Parramatta Square, 12 Darcy Street, Parramatta		
Date:	Thursday 27th May	**Time:**	6:00pm – 8:00pm
Facilitator:	Nina Macken, Associate Director – Engagement, Ethos Urban		

ITEMS:

Item	Description	Timing	Resp.
1.	Welcome, Acknowledgement of Country	5 mins	Facilitator
2.	Meeting Overview & Introductions	15 mins	Facilitator
3.	Project and Engagement Context	5 mins	Public Spaces Division
4.	The following questions have been developed to help understand the experiences of community groups and identify case studies to include in the Final Report: • How are your local fields used? Is there a mixture of formalised and informal recreation and cultural uses? What are the positive / negative aspects? • Are your local fields accessed by all members of the community? How are they managed? – Natural – Synthetic – Alternative Turf • What impact has the increased adoption of synthetic turf fields had within your community? – Environmental – Social – Economic • How could facility owners better balance competing open space needs for different community groups? • Are there any alternative turf technological solutions and/or management techniques available that enable an increase in usage? If so, where are these, what have been the benefits / outcomes?	90 mins	ALL led by Facilitator
5.	Meeting Wrap Up	5 mins	Facilitator

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ETHOS
URBAN

OPEN SPACE AND SYNTHETIC SURFACES WORKSHOP

COMMUNITY CONSULTATION

Thursday 27th May

1.0

WELCOME AND ACKNOWLEDGEMENT OF COUNTRY


We wish to acknowledge Australia's First Nations Peoples as the Traditional Owners and Custodians of the land and give respect to the Elders – past and present – and through them to all Aboriginal and Torres Strait Islander peoples.

2.0

MEETING OVERVIEW AND INTRODUCTIONS

Agenda

1. Welcome and Acknowledgement of Country
2. Meeting Overview and Introductions
3. Project and Engagement Context
4. Roundtable Discussion
5. Meeting Wrap Up

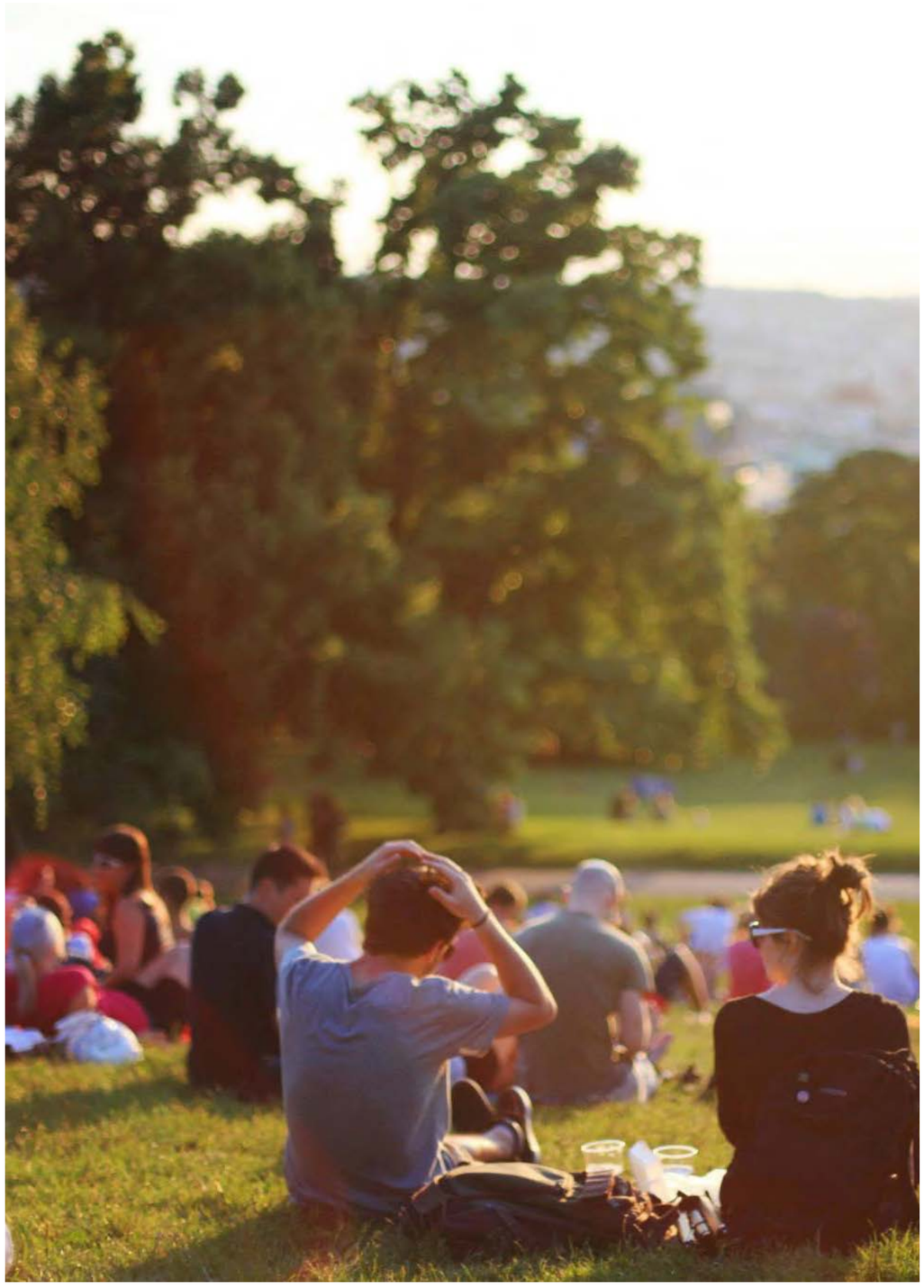
3.0

PROJECT AND ENGAGEMENT CONTEXT

Synthetic Turf Study

Minister Stokes recognises the need for greater understanding of the social, environmental, and economic impacts, benefits and limitations of using synthetic turf as a replacement for natural grass across NSW.

This study seeks to understand the use of synthetic alternatives to natural turf in public open spaces.



Engagement Context

Literature review → Stakeholder workshops → Community consultation → Final Report

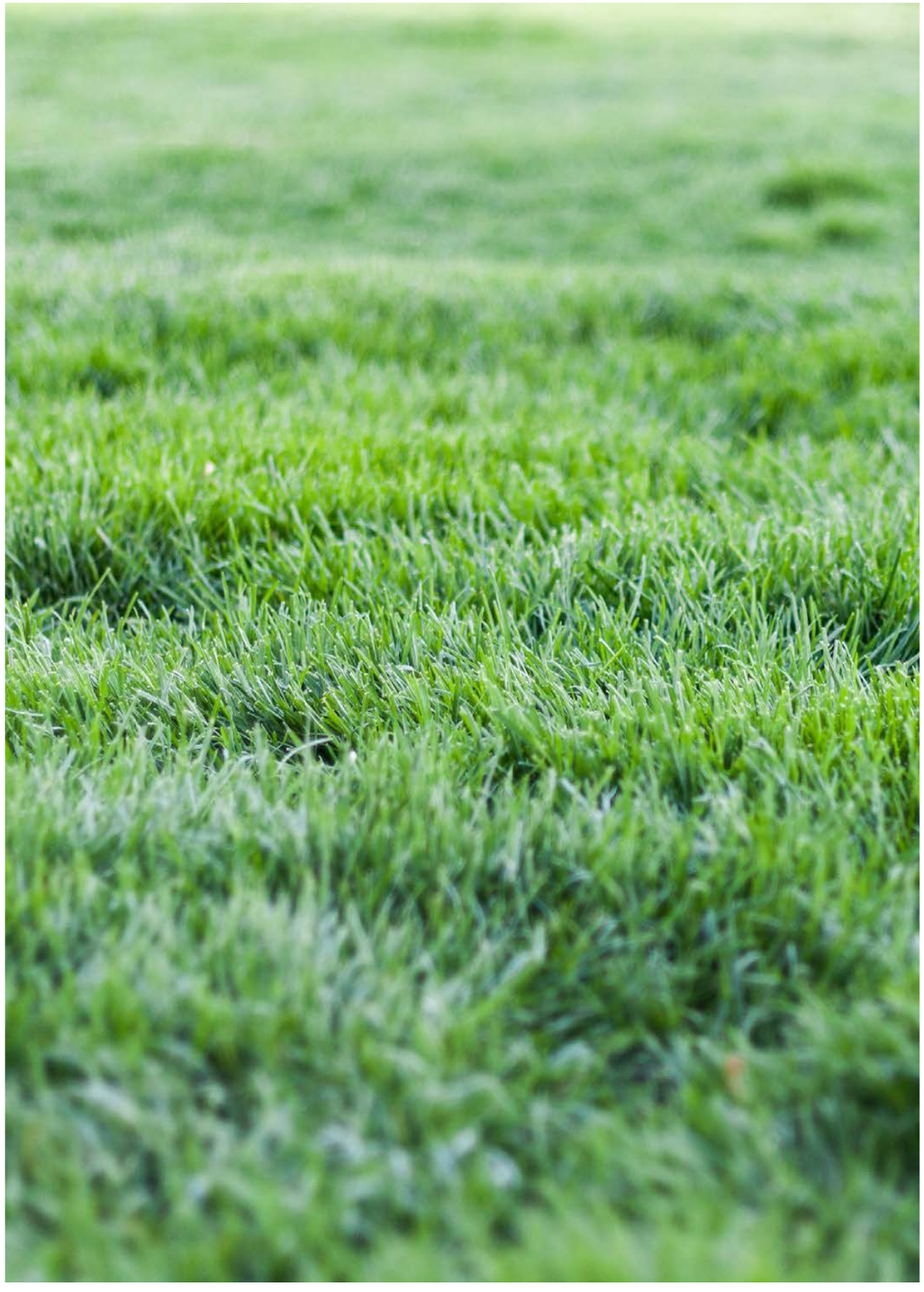
Who We've Met With

Stakeholder Workshops

- Metropolitan and regional councils
- State Agencies
- Peak Sporting Associations
- Industry Peak Bodies
- Academics (i.e., environmental, health)
- Turf Specialists and Consultants

Community Consultation

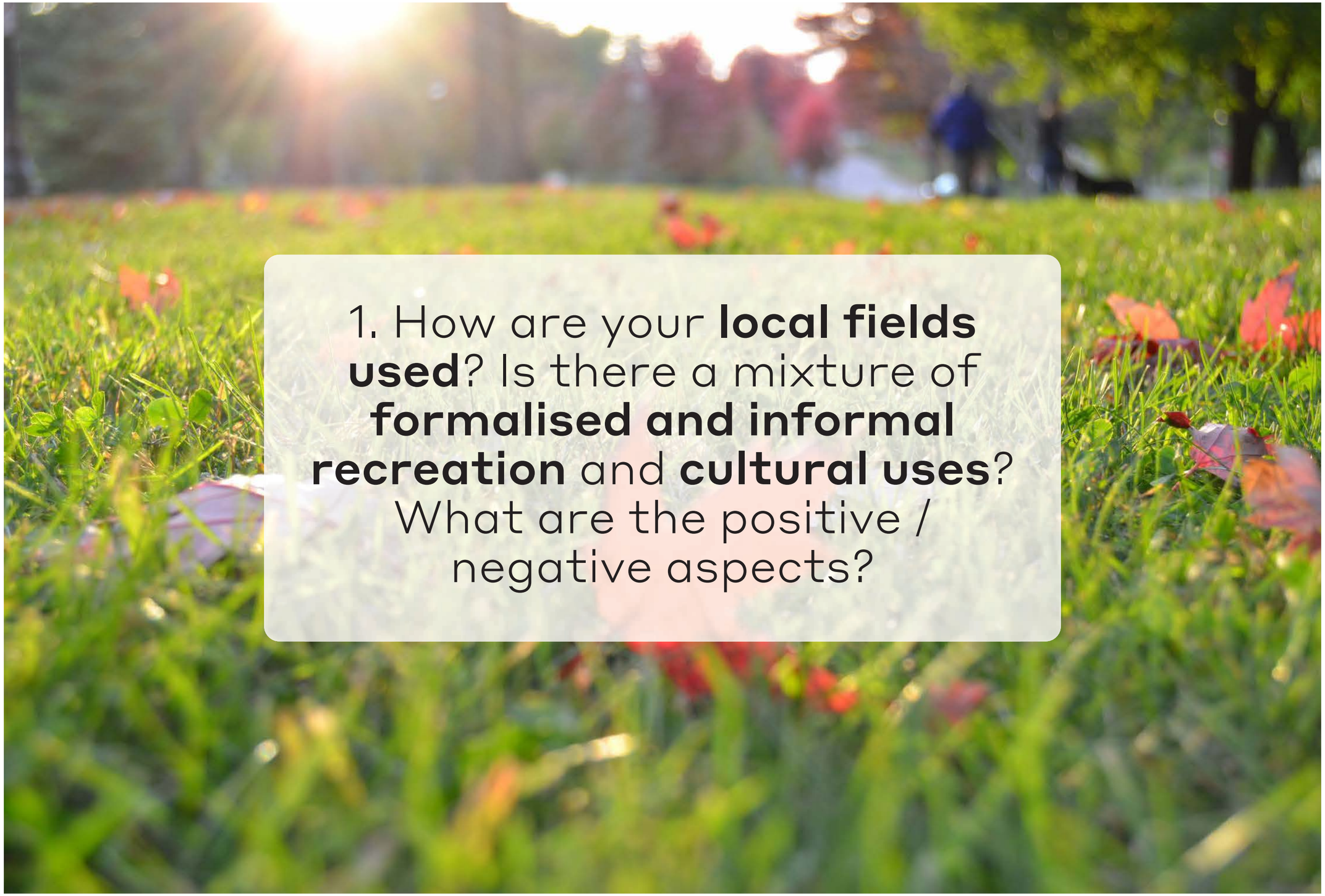
- Local residents
- Community groups (i.e., resident groups, environmental protection)
- Peak bodies
- Community sporting clubs and associations



Open Space and Synthetic Surfaces Workshop

4.0

ROUNDTABLE DISCUSSION


1. How are your **local fields used**? Is there a mixture of **formalised and informal recreation** and **cultural uses**? What are the positive / negative aspects?


2. What **impact** has the **increased adoption of synthetic turf** fields had within your community?


3. How can we better balance **competing open space** needs for **different community groups**?


4. What **practices** are currently in place to **manage fields** within your local area? Could these be **improved** and if so, how?


5. Are there any **alternative turf technological solutions** and/or **management techniques** available that enable an **increase in usage?** If so, where are these, what have been the benefits / outcomes?

5.0

MEETING WRAP UP

Meeting Wrap Up

Final Report

- Collation of community feedback to help inform the development of a Final Report

Appendix F – Stakeholder and Community Participants

Thank you to the following organisations that took the time to attend our community and stakeholder workshops. There were eight individuals who also participated (not listed here) - and we thank them too.

Table 7 – Stakeholder and Community Participants

Stakeholder Group	Organisations
Local and regional councils	• Albury Council • Bayside Council • Bega Valley Shire Council • Blacktown City Council • Campbelltown City Council • Canterbury-Bankstown Council • City of Parramatta • City of Ryde • Fairfield City Council • Inner West Council • Ku-ring-gai Council • Liverpool Council • Northern Beaches Council • Penrith City Council
Peak and professional bodies	• AFL NSW • Australian Institute of Landscape Architects • Cricket NSW • Football NSW • Hockey NSW • Planning Institute of Australia • Rugby League NSW
NSW Government Agencies	• Environment Protection Authority • Infrastructure and Place, DPIE • NSW Environment, Energy and Science • NSW Health • Office of Local Government • Office of Sport • Place Team (PDPS), DPIE • Schools Infrastructure

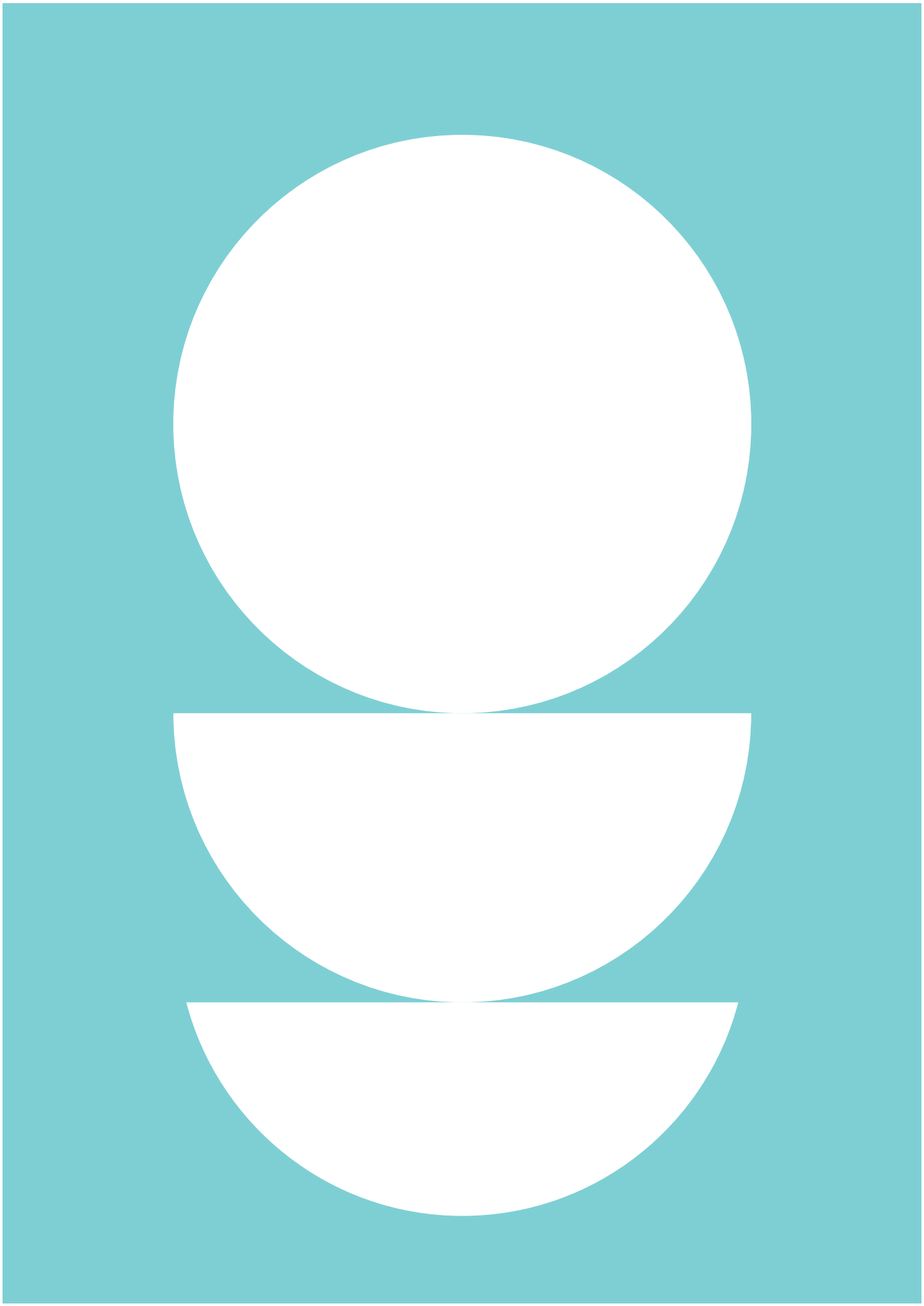
Stakeholder Group	Organisations
Community Groups	• All Saints Hunters Hill Football Club • Better Planning Network • Friends of Gardiner Park • Friends of Ku-ring-gai Environment Inc. • Friends of Norman Griffiths Oval • Galston Area Residents' Association Inc • Manly Warringah Football Association • Natural Turf Alliance • Neighbourhood Forum 5 • Northbridge Football Club • Northern Suburbs Football Association • Northern Sydney & Beaches Hockey Association • Northwood Community Resident Group • Oatley Flora and Fauna Conservation Society Inc • Paramatta River Catchment Group • ParraParents • Protecting Your Suburban Environment Inc • STEP Inc • Willoughby Environment Protection Association Inc
Subject Matter Experts	• AUSMAP • Macquarie University • UNSW • Western Sydney University
Turf Specialists and Consultants	• Jiwah • Smart Connection Consultancy • Turf Australia

Appendix G – Online Submissions

Thank you to the following community and resident groups that submitted their feedback and comments in response to the Synthetic Turf study. Responses were also received from six individuals (not listed here) – and we thank them too.

Table 8 – Community and resident groups who provided an online submission

Stakeholder Group	Organisations
Sporting groups	• Greenwich Sports Club • Northbridge Football Club • Northern Suburbs Football Association • St Ives Football Club • West Pymble Football Club
Residents and community groups	• Greens on Council • Greenwich Community Association Inc • ParraParents • West Pennant Hills Valley Progress Association • Friends of Gardiner Park
Environment	• Climate Action Moreland • Paramatta River Catchment Group • Natural Turf Alliance • STEP Inc • Willoughby Environment Protection Association Inc • Hunter's Hill Flora and Fauna Preservation Society
Industry and Manufacturers	• APT Asia Pacific Pty Ltd • Hector Abrahams Architects



DPIE Synthetic Turf Study Final Report
Key Findings

List below are the key findings from the NSW Government DPIE Synthetic Turf Study Final Report. Those findings highlighted in yellow are those directly related to the Council motion.

Themes	Issues
Best practice natural turf management can improve field capacity	• Best practice natural turf design and maintenance has the potential to improve the capacity of existing natural turf fields to support increased sporting use. • Lack of available information on best practice construction and maintenance of natural turf fields influences and constrains council decision making. • Information about recent innovations and best practice for natural turf are not well known or commonly used. • Advances in technology are enabling more targeted maintenance and management of natural turf to reduce energy consumption and costs and maintain capacity.
Partial/hybrid use of synthetic grass can increase durability	• Hybrid turf combines blades of synthetic grass with natural grass to increase durability of fields while reducing use of synthetic materials. • Synthetic materials can be incorporated in the root zone to reinforce the soil profile. • Synthetic turf can be used selectively in high wear areas of a sports field such as the goal area.
Synthetic turf design is evolving	• Recent technological advances in synthetic design address some of the environmental impacts associated with earlier generations of synthetic turf. • Replacing rubber infill with cork granules is an environmentally friendly option however it is more costly and deteriorates faster.
Innovative management practices can support greater use	• Strategic lighting to encourage evening use of particular areas of fields and shifting line markings are an effective way to distribute usage across a playing field surface. • New technologies and approaches are offering facility owners improved data on the status and usage of sports fields, enabling councils to better target maintenance, manage peak use and quiet periods, scheduling, and planning for use.
Sports field planning and siting	• Siting considerations exist for both natural and synthetic turf. For example, many issues that constrain optimal utilisation of natural turf fields are intensified when they are located in poor drainage or flood prone areas, ex landfill sites, or where they have a dual purpose as stormwater retention basins. • Where synthetic or natural turf fields are located in areas prone to flooding, or subject to overland flows during extreme weather, there can also be issues related to pollution of local waterways or bushland with infill materials or pesticides. Further discussion of potential pollution arising from both natural and turf fields, and the contamination of the surrounding local environment, is discussed below.

	• Better consideration of siting and planning for the whole open space network can alleviate some pressure on the network, including sharing of facilities (across LGA boundaries and with different land uses such as schools), purpose-built facilities and siting synthetic fields in non-environmentally sensitive areas.
Constrained supply of sports fields	• The existing network of sporting facilities is perceived by some stakeholders as unable to meet growing demand and some clubs turn away potential participants due to a lack of capacity. • Existing fields in densely populated areas, with high levels of sporting participation may not have the capacity to meet very high levels of demand, regardless of the quality of the field. • It can be challenging to acquire new land for sportsfields due to development pressure and lack of available space (particularly in inner city areas). Some councils therefore choose to increase local capacity by converting natural turf sportsfields to synthetic turf.
Poor quality of existing sporting facilities	• Poorly maintained and constructed natural turf sports fields can struggle to support high levels of use due to poor condition and inadequate drainage, which limits their available hours of use for sport. • Many natural turf fields are perceived to be in poor condition with inadequate drainage, poor construction and maintenance regimes resulting in low field capacity. Well-engineered natural fields maintained in good condition can provide significantly higher levels of utilisation than poor condition ones
Sporting facility demand, supply and capacity is complex and contextual	• Natural turf fields cater for more diverse uses that includes organised sporting activities and passive recreation activities such as picnicking, walking, jogging, dog walking and more. • The carrying capacity (calculated as hours of organised sports use per week) of synthetic surfaces is higher than natural turf and as such field operators can allocate more users to a synthetic field for organised sport training and competition. • The use of sports field can be concentrated to specific days and certain times of day for training and competition. Implementation of synthetic turf surfaces can offer higher levels of participation during peak periods. • Actual demand for sports use is not always modelled or well understood by authorities when considering converting surfaces to synthetic. The theoretical capacity provided by a synthetic surface may not be required to support actual demand for sports participation. • Synthetic turf can improve the reliability and surface quality for sport use during wet and winter weather compared to natural turf. However, during summer, matches on synthetic turf sports fields may need to be cancelled due to heat more frequently than natural surface fields.

	• Hybrid surfaces are an emerging response to improving field capacity and combining the advantages and limiting the disadvantages of both pure natural and synthetic.
Amenity and enjoyment for informal users of public open space	• Synthetic fields are generally subject to higher ambient temperatures than natural turf on hot days. • The aesthetic of synthetic turf is very different to and perceived as much less attractive to natural turf. • Synthetic turf does not provide the same benefits of connection to nature compared to natural turf open spaces. • Natural surfaces provide greater levels of noise abatement, glare reduction and UV reflectivity. • Fenced synthetic fields reduce informal use of open spaces while prioritising sporting use.
Impacts from the increased utilisation enabled by the use of synthetic surfaces	• Due to having an increased carrying capacity, synthetic fields can have: - Increased impact on surrounding residents from duration of field lighting at night - Congestion and pressure on parking and increases to local traffic. - Increased impact and duration of noise due to greater intensity of use. - Elevated synthetic fields can impact on perceived privacy for adjacent residents.
Concerns associated with environmental impacts continued	• Pollution: Air and water pollution caused by synthetic turf materials (i.e., rubber crumb) is well documented in academic research. Pollution, particularly of waterways and bushland, was a key concern raised by community representatives. • Chemical use: Pesticides and fertilisers are typically used for natural turf fields, while pesticides and fungicides are typically required for synthetic fields. • Waste: Environmental and financial challenge of disposing synthetic turf at the end of its 8–10-year life cycle. • Heat: Heat impacts to the surrounding environment caused by synthetic turf absorbing heat rather than reflection. • Carbon emissions: Synthetic fields contribute to heightened CO2 emissions due to lack of carbon absorption associated with natural turf. • Soil sterilisation: Sterilisation of soil beneath the synthetic turf has an impact on ecosystems. Synthetic surfaces inhibit living systems. • Water Usage: Water consumption and irrigation requirements are lower for synthetic turf making it generally more suitable for drought and dry conditions (due to reduced water requirements). • Variability: Environmental impacts of synthetic fields vary substantially depending on what type they are. Older synthetic fields (generation 2 and 3) are associated with significantly higher radiant heat and environmental pollution.

	• Wildlife: While natural turf sportsfields have limited biodiversity value, they do provide some habitat for local flora and fauna that synthetic turf does not. • It is noted that design of synthetic surfaces is technologically advancing in response to some of the impacts created by synthetic turf, e.g., microplastic pollution.
Potential human health impacts	• Heat stress and the impact on player and user comfort associated with playing on synthetic fields in hot weather. • Some generations of synthetic turf (typically 1st, 2nd and 3rd) have a greater risk of abrasiveness on skin and higher injury rates. • Research has suggested that biological pathogens, toxic chemicals, and micro-plastic ingestion are all risks to human health that are associated with synthetic materials.
Cost and economic factors are not transparent	• High initial capital cost of synthetic turf can be perceived as a barrier to installation. • Synthetic playing fields have traditionally been perceived as requiring lower maintenance and hence lower operating costs compared to natural turf. However, synthetic surfaces have a prescriptive maintenance regime, and there is indication from recent studies in other jurisdictions, including New Zealand and Western Australia, that in practice synthetic turf can have reoccurring maintenance costs for repairs and cleaning of surfaces that can be comparable to that of natural turf. • Long term maintenance of natural turf surfaces is often underfunded which can result in deteriorating condition facilities and limited capacity. • Renewal costs associated with the disposal and replacement of synthetic fields at the end of their life cycle is not always adequately considered. • Best practice natural turf has ongoing maintenance requirements to maintain high levels of performance for all users, such as mowing, “resting”, and re-surfacing the field.