



**ATTACHMENTS
UNDER SEPARATE COVER**

**ORDINARY MEETING
27 FEBRUARY 2024**

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EXHIBITION OF PROPOSED VOLUNTARY PLANNING AGREEMENT - RECREATION FACILITIES - GILLIESTON HEIGHTS SOUTH - WALKER CORPORATION

Draft Voluntary Planning Agreement – Walker Corporation – Cessnock Road Gillieston Heights (Under Separate Cover)

Meeting Date: 27 February 2024

Attachment No: 2

Number of Pages: 69



Deed

**Walker Gillieston Heights South
Planning Agreement**

Under s7.4 of the *Environmental Planning and Assessment Act 1979*

**Maitland City Council
Walker Gillieston Heights Pty Limited**

Date:

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Regulatory Compliance Tables

Table 1 – Provisions of Act

Act Provision	Requirement	Compliance
S.7.4(1)	'Planning Authority'	Maitland City Council
	'Developer'	Walker Gillieston Heights Pty Limited
	Development Application / Modification Application	See definitions of 'Development Application' and 'Modification Application' in clause 1.1 and Item 4.a and 4.b of the VPA Particulars
	Development Contributions	See Part 2 and Development Contributions Table
S.7.4(1), (2)	Public Purpose	See Column 2 of the Development Contributions Table
S.7.4(3)(a)	Land	See Definition of 'Land' in clause 1.1 and Item 1 of the VPA Particulars
S.7.4(3)(b)(i)	Instrument Change	See definition of 'Instrument Change' in clause 1.1 and Item 3 of the VPA Particulars
S.7.4(3)(b)(ii)	Development	See definition of 'Development' in clause 1.1 and Item 2 of the VPA Particulars
S.7.4(3)(c)	Details of Developer's Provision	See Development Contributions Table
S.7.4(3)(d)	Whether s7.11, s7.12 and Subdivision 4 of Division 7.1 of the Act Apply to the Development	See clauses 8.1, 8.3 and 8.3 and Item 7.a, 7.c and 7.d VPA Particulars
S.7.4(3)(e)	Whether benefits under Deed are or are not to be taken into consideration in determining a Development Contribution under s7.11	See clause 8.2 and Item 7.b of the VPA Particulars

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S.7.4(3)(f)	Mechanism for the Resolution of Disputes	See Part 3
S.7.4(3)(g)	Enforcement of the Agreement by a Suitable Means in the Event of Breach by the Developer	See Part 4 and Items 16–20 of the VPA Particulars
S.7.4 (10)	Conformity of Agreement with Act, Environmental Planning Instruments, & Development Consents Applying to the Land	Yes
S.7.5	Public Notice & Public Inspection of Draft Agreement	Yes
S.7.6	Registration	See Part 5
S.6.15(1)(d)	If the Development involves the subdivision of land, does this Agreement impose requirements that are required to be complied with before a subdivision certificate is issued?	Yes

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Table 2 – Provisions of Regulation

Regulation Provision	Requirement	Compliance
Environmental Planning and Assessment Regulation 2021		
S.203(1)	Form & Subject-Matter	Yes
S.203(7)	Secretary's Practice Note	Yes
S.204	Public Notice & Public Inspection of Draft Agreement	Yes
S.205	Explanatory Note	See Appendix
Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021		
Ss.21, 34	If the Development involves building work or subdivision work, does the Agreement specify requirements that are required to be complied with before a construction certificate for the work is issued?	Yes, see: <ul style="list-style-type: none"> • clauses 18.3 and 18.4,

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Parties

Council **Maitland City Council** ABN 11 596 310 805 of 285-287 High Street, Maitland NSW 2320

Developer **Walker Gillieston Heights Pty Limited** ABN 30 077 152
848 of Governor Macquarie Tower, Level 21 1 Farrer Place, Sydney
NSW 2000

Background

- A The Developer owns the Land.
- B The Developer has lodged DA 2023/551 with the Council seeking consent under the Act to carry out the Development involving the residential subdivision of the Land to create 322 residential lots, two public open space lots, three drainage reserve lots, and one service lot over six stages.
- C The Development will create demands for the provision of different kinds of local public infrastructure by the Council.
- D The Developer has offered to provide Development Contributions and other material public benefits to the Council comprising monetary contributions, the dedication of land free of cost and developer works towards the provision of such infrastructure in connection with the Development as set out in this Deed.
- E The Parties wish to enter into this Deed to give effect to the offer made by the Developer.

Operative provisions

Part 1 - Preliminary

1 Definitions & Interpretation

Definitions

- 1.1 In this Deed, the words and phrases appearing in Column 1 of the following table have the meaning set out in Column 2 of that table corresponding to those words or phrases except in so far as the context or subject-matter otherwise indicates or requires:

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Table

Column 1	Column 2
Word or phrase	Meaning
Act	means the <i>Environmental Planning and Assessment Act 1979</i> (NSW).
Additional Environmental Land	means the part of the Land identified as 'Additional Environmental Land' in the Dedication Land Plan situated on, and adjoining, the Southern side of the Development and generally comprising of grassland, with an area that is in accordance with the Applicable Development Consent but excluding any part of that Land which is required to be dedicated to a State government authority pursuant to a planning agreement between the Developer and the Minister for Planning.
Applicable Contributions Plan	means the contributions plan (within the meaning of the Act) specified in Item 6.a) of the VPA Particulars as amended or substituted from time to time.
Applicable DSP	means the DSP specified in Item 6.b of the VPA Particulars as amended or substituted from time to time.
Applicable Development Consent	means the development consent specified or described in Item 5 of the VPA Particulars or granted in respect of the Development.
Approval	includes approval, consent, licence, permission or the like issued, granted or given by an Authority.
APZ (Asset Protection Zone) Land	means the part of the Local Park Land and the part of the Environmental Land identified as 'APZ Land' in the Dedication Land Plan, being land situated on the Eastern side of the Development.
Authority	means the Commonwealth or New South Wales government, a Minister of the Crown, a government department, a public authority established by or under any Act, a council or county council constituted under the <i>Local Government Act 1993</i> (NSW), or a person or body exercising functions under any Act including a commission, panel, court, tribunal and the like.

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Bank Guarantee	<p>means an irrevocable and unconditional undertaking without any expiry or end date in favour of the Council to pay an amount or amounts of money to the Council on demand issued by:</p> <ul style="list-style-type: none"> (a) one of the following trading banks: <ul style="list-style-type: none"> (i) Australia and New Zealand Banking Group Limited, (ii) Commonwealth Bank of Australia, (iii) Macquarie Bank Limited, (iv) National Australia Bank Limited, (v) St George Bank Limited, (vi) Westpac Banking Corporation, or (b) any other financial institution approved by the Council in its absolute discretion.
Bond	<p>means a documentary performance bond which must be denominated in Australian dollars and be an unconditional undertaking issued by an Australian Prudential Regulation Authority (APRA) regulated authorised deposit taking institution or an insurer authorised by APRA to conduct new or renewal insurance business in Australia that has at all times an investment grade security rating from an industry recognised rating agency.</p>
Certified Environmental Practitioner	<p>means a qualified environmental practitioner certified under the <i>Certified Environmental Practitioner (CEnvP) Scheme</i> with a site contamination specialist certification.</p>
Charge	<p>means the charge referred to in clause 19.</p>
Charge Land	<p>means the land specified or described in Item 16 of the VPA Particulars.</p>
Claim	<p>includes a claim, demand, remedy, suit, injury, damage, loss, Cost, liability, action, proceeding or right of action.</p>
Clearance Certificate	<p>means a clearance certificate issued by the Commissioner for Taxation under paragraph 14-220 of Schedule 1 of the <i>Taxation Administration Act 1953</i> (Cth).</p>
CLM Act	<p>means the <i>Contaminated Land Management Act 1997</i> (NSW).</p>

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Construction Certificate	has the same meaning as in the Act.
Construction Contract	means a contract or arrangement entered into between the Developer as principal and another person under which the other person undertakes to provide Work required by this Deed, or to supply related goods and services, for the Developer.
Contamination	has the same meaning as in the CLM Act.
Contractor	means the contractor under the Construction Contract.
Contribution Value	in relation to an Item specified in the Development Contributions Table means the \$ amount specified in Column 4 of that Table corresponding to the Item.
Cost	means a cost, charge, expense, outgoing, payment, fee and other expenditure of any nature.
Council Developer Works Contribution Amount	means the \$ amount or amounts specified in Item 9 of the VPA Particulars in relation to all or specified Developer Works.
Council Land Dedication Contribution Amount	means the \$ amount specified in Item 8 of the VPA Particulars in relation to all or specified Dedication Land.
CPI	means the 'Consumer Price Index – Sydney All Groups' published by the Australian Bureau of Statistics.
Dedication Land	means land that is required to be dedicated to the Council free of cost under this Deed irrespective of whether the dedication gives rise to or is otherwise taken into consideration in determining the Development Contribution Surplus Credit.
Dedication Land Plan	means the plan contained in Schedule 3 showing the location of the Dedication Land.
Deed	means this Deed and includes any schedules, annexures and appendices to this Deed.
Defect	means anything that adversely affects, or is likely to adversely affect, the appearance, structural

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	integrity, functionality or use or enjoyment of a Work or any part of a Work.
Defects Liability Period	means, in relation to the whole or any specified part of the Developer Works, the period specified in Item 14 of the VPA Particulars commencing on the day immediately after a Practical Completion Certificate is issued by the Council.
Defects Liability Security	means the \$ amount of Security specified in Item 18 of the VPA Particulars indexed in accordance with the Indexation Method.
Developer Works	means the Local Park Land Developer Works, the Dog Offleash Area Developer Works that the Developer is required to provide under this Deed.
Developer Works Agreed Cost	means the \$ amount specified in Item 9 of the Particulars.
Developer Works Location Plan	means the plan contained in Schedule 4 showing the location of the Developer Works.
Developer Works Plans & Drawings	means the detailed plans and drawings for the Developer Works approved by the Council referred to in Schedule 5.
Developer Works Provisions	means the provisions contained in Schedule 6.
Development	means the development specified or described in Item 2 of the VPA Particulars.
Development Application	means the development application within the meaning of the Act specified or described in Item 4.a of the VPA Particulars.
Development Contribution	means the dedication of land free of cost, a monetary contribution, the provision of any other material public benefit including but not limited to the provision of Works, or any combination of them.
Development Contribution Credit	means the \$ amount specified in Item 11 of the VPA Particulars
Development Contribution Surplus Credit	means the \$ amount specified in Item 12 of the VPA Particulars.

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Development Contributions Table	means the table contained in Schedule 2.
Development Servicing Plan (DSP)	means a 'DSP document' within the meaning of the '2016 Developer Charges Guidelines for Water Supply, Sewerage and Stormwater' issued by the Minister for Lands and Water pursuant to section 306(3)(c) of the <i>Water Management Act 2000</i> (NSW).
Dispute	means a dispute or difference of opinion between the Parties under or in relation to this Deed.
Dog Offleash Area Land	means the part of the Land identified as 'Dog Offleash Area' in the Dedication Land Plan located at the southern end of the Development on proposed Lot 649 in the Development.
Dog Offleash Area Land Developer Works	means the Developer Works on the Dog Offleash Area Land specified in Item C.2. of Schedule 2.
ELNO	has the meaning given to that term in the Participation Rules.
Environmental Land	means the part of the Land identified as 'Environmental Land' in the Dedication Land Plan situated on the Eastern side of the Development and generally comprising native trees and bushland.
Environmental Land Maintenance Contribution	means the monetary contribution specified in Item A.1. of Schedule 2.
Equipment	means any equipment, apparatus, vehicle or other equipment or thing to be used by or on behalf of the Developer in connection with the performance of its obligations under this Deed.
Final Completion Certificate	means a certificate in writing issued by the Council to the Developer to the effect that, in the reasonable opinion of the Council, the Developer Works to which the certificate relates have been completed by the Developer in accordance with this Deed.
Final Lot	means a lot created in the Development for separate residential occupation and disposition, which is not intended to be further subdivided for

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the purpose of the Development, or a lot of a kind or created for a purpose that is otherwise agreed by the Parties, not being a lot created by a subdivision of the Land:

- (a) that is to be dedicated or otherwise transferred to the Council, or
- (b) on which is situated a dwelling-house that was in existence on the date of this Deed.

Force Majeure Event

means an earthquake, cyclone, fire, riot or serious civil commotion, sabotage, act of a public enemy, act of God (excluding storms), war, revolution, radioactive contamination or flood, the effects of which cannot be prevented by taking those steps a prudent and competent person would take.

Foreign Resident Capital Gains Withholding Amount

mean the amount a purchaser is required to pay to the Commissioner for Taxation under paragraph 14-200 of the *Taxation Administration Act 1953 (Cth)*.

General Security

means a Bank Guarantee or a Bond or other form of security on terms reasonably satisfactory to the Council in the amount specified in Item 17.a of the VPA Particulars indexed in accordance with the method of indexation specified in 17.b of the VPA Particulars.

GST

has the same meaning as in the GST Law.

GST Law

has the same meaning as in *A New Tax System (Goods and Services Tax) Act 1999 (Cth)* and any other Act or regulation relating to the imposition or administration of the GST.

Instrument Change

means the change to the environmental planning instrument specified or described in Item 3 of the VPA Particulars.

Insurances

means the insurances specified in Item 21 of the VPA Particulars and such other insurances required by law in relation to the Developer Works.

Item

means a numbered item appearing in the VPA Particulars or the Development Contributions Table.

Just Terms Act

means the *Land Acquisition (Just Terms Compensation) Act 1991 (NSW)*.

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Land	means the land specified or described in Item 1 of the VPA Particulars.
Local Park Land	means the part of the Land identified as such in the Dedication Land Plan located on proposed Lot 149 in the Development having an area of approximately of 2,436sqm.
Local Park Land Developer Works	means the Developer Works on the Local Park Land specified in Item C.1. of Schedule 2.
Maintain	in relation to Developer Works, means keep in a good state of repair and working order, and includes repair of any damage to the Works.
Maintenance Period	in relation to Developer Works means the period specified in Item 14 of the VPA Particulars commencing on the date the Council issues a Transfer of Ownership Notice.
Maintenance Security	means the \$ amount of Security specified in Item 19 of the VPA Particulars indexed in accordance with the Indexation Method.
Modification Application	means the application to modify the Applicable Development Consent specified or described in Item 4.b of the VPA Particulars.
N/A	means Not Applicable.
Occupation Certificate	has the same meaning as in the Act.
Other Land	means land owned or occupied by a person other than the Developer or the Council to which entry and access is needed by the Developer to perform this Deed.
Participation Rules	means the participation rules as determined by the <i>Electronic Conveyancing National Law</i> as set out in the <i>Electronic Conveyancing (Adoption of National Law) Act 2012</i> (NSW).
Party	means a party to this Deed.
PEXA	means Property Exchange Australia Limited.
Practical Completion	in relation to the Developer Works or a specified part of the Developer Works occurs when the Council has issued a Practical Completion Certificate for the Developer Works or the part.

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Practical Completion Certificate	means a certificate issued by the Council to the Developer to the effect that, in the reasonable opinion of the Council, the Developer Works or a specified part of the Developer Works are substantially complete and any incomplete part or Defect is of a minor nature.
Practical Completion Date	means: <ul style="list-style-type: none"> (a) the date, time or event specified in Item 13 of the VPA Particulars in relation to all of the Developer Works, or (b) the dates, times or events specified in Item 13 of the VPA Particulars in relation to the Developer Works in a particular Stage or particular Developer Works.
Principal Contractor	means the Person defined in as the Principal Contractor under the <i>Work Health and Safety Act 2011</i> (NSW) or <i>Work Health and Safety Regulation 2011</i> (NSW) or an equivalent under Commonwealth work health and safety laws.
Rectification Notice	means a notice in writing: <ul style="list-style-type: none"> (a) identifying the nature and extent of a Defect or incomplete Work, and (b) specifying the works or actions that are required to Rectify the Defect or incomplete Work, and (c) specifying the date by which or the period within which the Defect or incomplete Work is to be rectified, which date or period must not be unreasonable having regard to the nature of the Defect or incomplete Work.
Rectify	means rectify, remedy or correct.
Regulation	means the <i>Environmental Planning and Assessment Regulation 2021</i> (NSW).
Review Period	means the period specified in Item 24 of the VPA Particulars.
Section 7.11 Contribution	means a monetary contribution payable to the Council under s7.11 of the Act pursuant to the Applicable Development Consent.
Site Audit	means a review by a suitably qualified environmental practitioner of the actual or possible contamination of Dedication Land that is conducted

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	for the purpose of determining whether the Dedication Land is suitable for the purpose for which it is required to be dedicated under this Deed.
Site Validation Report	a report prepared by a suitably qualified environmental practitioner and endorsed by a Certified Environmental Practitioner containing a critical review of the information collected in relation to a Site Audit of the Dedication Land and which concludes that the Dedication Land is suitable for the purposes for which it is required to be dedicated under this Deed and clearly sets out the reasons for that conclusion.
Stage	means a stage of the Development approved by the Applicable Development Consent or otherwise approved in writing by the Council for the purposes of this Deed.
Subdivision Certificate	h as the same meaning as in the Act.
Subdivision Works Certificate	has the same meaning as in the Act.
Technical Data	means all technical know-how and information in material form, including manuals, designs, standards, specifications, reports, models, plans, drawings, calculations, software, source code and test results.
Transfer of Ownership Notice	means a notice issued by the Council to the Developer stating that Developer Works the subject of a Practical Completion Certificate vest in the Council on a specified date being not sooner than 14 days after the notice is issued.
VPA Particulars	means the information contained in Schedule 1.
WHS	means work health and safety.
WHS Law	means the <i>Work Health and Safety Act 2011</i> (NSW) and <i>Work Health and Safety Regulation 2011</i> (NSW).
Work	means the physical result of carrying out work in, on, over or under land.
Works-As-Executed Plan	means detailed plans and specifications of Developer Works carried out by the Developer.

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Interpretation

- 1.2 In the interpretation of this Deed, the following provisions apply unless the context otherwise requires:
- 1.2.1 Headings are inserted for convenience only and do not affect the interpretation of this Deed.
 - 1.2.2 A reference in this Deed to a business day means a day other than a Saturday or Sunday or a public holiday on which banks are open for business generally in Sydney.
 - 1.2.3 If the day on which any act, matter or thing is to be done under this Deed is not a business day, the act, matter or thing must be done on the next business day.
 - 1.2.4 A reference in this Deed to dollars or \$ means Australian dollars and all amounts payable under this Deed are payable in Australian dollars.
 - 1.2.5 A reference in this Deed to a \$ value relating to a Development Contribution is a reference to the value exclusive of GST.
 - 1.2.6 A reference in this Deed to any law, legislation or legislative provision includes any statutory modification, amendment or re-enactment, and any subordinate legislation or regulations issued under that legislation or legislative provision.
 - 1.2.7 A reference in this Deed to any agreement, deed or document is to that agreement, deed or document as amended, novated, supplemented or replaced.
 - 1.2.8 A reference to a clause, part, schedule or attachment is a reference to a clause, part, schedule or attachment of or to this Deed.
 - 1.2.9 An expression importing a natural person includes any company, trust, partnership, joint venture, association, body corporate or governmental agency.
 - 1.2.10 Where a word or phrase is given a defined meaning, another part of speech or other grammatical form in respect of that word or phrase has a corresponding meaning.
 - 1.2.11 A word which denotes the singular denotes the plural, a word which denotes the plural denotes the singular, and a reference to any gender denotes the other genders.
 - 1.2.12 References to the word 'include' or 'including' are to be construed without limitation.
 - 1.2.13 A reference to this Deed includes the agreement recorded in this Deed.
 - 1.2.14 A reference to a Party to this Deed includes a reference to the employees, agents and contractors of the Party, the Party's successors and assigns.
 - 1.2.15 A reference to 'dedicate' or 'dedication' in relation to land is a reference to dedicate or dedication free of cost.
 - 1.2.16 Any schedules, appendices and attachments form part of this Deed.

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- 1.2.17 Notes appearing in this Deed are operative provisions of this Deed.
- 1.2.18 Nothing in this Deed requires the Developer to produce any or a particular number of Final Lots, or produce the Final Lots (or a subdivision stage) in any particular order.

2 Status of this Deed

- 2.1 This Deed is a planning agreement within the meaning of s7.4(1) of the Act.

3 Commencement

- 3.1 This Deed commences and has force and effect on and from the date when the Parties have:
- 3.1.1 both executed the same copy of this Deed, or
 - 3.1.2 each executed separate counterparts of this Deed and exchanged the counterparts.
- 3.2 The Parties are to insert the date when this Deed commences on the front page and on the execution page.

4 Application of this Deed

- 4.1 This Deed applies to the Land and to the Development.
- 4.2 The Developer acknowledges and agrees that the Applicable Development Consent may be granted subject to a condition requiring this VPA to be complied with in connection with the carrying out of the Development and the Developer is not to object to, or seek a review of, or of appeal against the imposition of such a condition.

5 Warranties

General warranty

- 5.1 The Parties warrant to each other that they:
- 5.1.1 have full capacity to enter into this Deed, and
 - 5.1.2 are able to fully comply with their obligations under this Deed.

6 Further agreements

- 6.1 The Parties may, at any time and from time to time, enter into agreements relating to the subject-matter of this Deed that are not inconsistent with this Deed for the purpose of implementing this Deed.

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7 Surrender of right of appeal, etc.

- 7.1 The Developer is not to commence or maintain, or to cause or procure the commencement or maintenance, of any proceedings in any court or tribunal or similar body appealing against, or questioning the validity of this Deed, or an Approval relating to the Development in so far as the subject-matter of the proceedings relates to this Deed.
- 7.2 Nothing in this clause 7 is to be taken as abrogating or removing the Developer's right to appeal under the Act in relation to a Development Consent in respect of the Development including any application to modify a development Consent under s4.55 or s4.56 of the Act, or an Approval relating to the Development where the subject matter of the proceedings does not relate to the Developer's obligations under this Deed.

8 Application of s7.11, s7.12 and Subdivision 4 of Division 7.1 of the Act to the Development

Section 7.11 of the Act

- 8.1 Item 7.a of the VPA Particulars states whether this Deed excludes (wholly or in part) the application of section 7.11 of the Act to the Development.
- 8.2 If Item 7.a of the VPA Particulars states that this Deed does not wholly exclude the application of section 7.11 of the Act to the Development, Item 7.b of the VPA Particulars states whether the benefits provided by the Developer under this Deed are to be taken into consideration when determining a Development Contribution under section 7.11 relating to the Development.

Section 7.12 of the Act

- 8.3 Item 7.c of the VPA Particulars states whether this Deed excludes (wholly or in part) the application of section 7.11 of the Act to the Development.

Subdivision 4 of Division 7.1 of the Act

- 8.4 Item 7.d of the VPA Particulars states whether this Deed excludes (wholly or in part) the application of Subdivision 4 of Division 7.1 of the Act to the Development.

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Part 2 – Development Contributions

9 Provision of Development Contributions

Development Contributions

- 9.1 The Developer is to make Development Contributions to the Council in accordance with the Development Contributions Table and any other provision of this Deed requiring the Developer to make Development Contributions.

Effect of modification of Applicable Development Consent

- 9.2 If:
- 9.2.1 Part A of the Development Contributions Table specifies that monetary Development Contributions are payable in respect of the Development per dwelling or per Final Lot or for a specified number of dwellings or Final Lots, and
 - 9.2.2 after this Deed is entered into the Applicable Development Consent is modified under the Act to allow for additional dwellings or Final Lots (or both),
- the Developer is to pay monetary Development Contributions to the Council for the additional dwellings or Final Lots (or both) not later than 14 days after the Applicable Development Consent has been modified or such later time as may be agreed in writing between the Parties.

Contribution Values

- 9.3 The Parties acknowledge and agree that a Contribution Value:
- 9.3.1 constitutes the agreed value of the public benefit of a Development Contribution required to be made under this Deed irrespective of the cost to the Developer of making the Development Contribution, and
 - 9.3.2 does not serve to define the monetary extent of the Developer's obligation to make the Development Contribution to which the Contribution Value relates.

Application of Development Contributions

- 9.4 The Council is to apply each Development Contribution made by the Developer under this Deed towards the public purpose for which it is made and otherwise in accordance with this Deed.

Flexibility in application of Development Contributions

- 9.5 Despite clause 9.4, the Council may apply a Development Contribution made under this Deed (other than the Environmental Land Maintenance Contribution) towards a public purpose other than the public purpose specified in this Deed if the Council reasonably considers that the public

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interest would be better served by applying the Development Contribution towards that other purpose rather than the purpose so specified.

10 Payment of monetary Development Contributions

- 10.1 A monetary Development Contribution is made for the purposes of this Deed when the Council receives the full amount of the contribution payable under this Deed in cash or by unendorsed bank cheque or by the deposit by means of electronic funds transfer of cleared funds into a bank account nominated by the Council.

11 Dedication of land

When dedication of land made

- 11.1 A Development Contribution comprising Dedication Land is dedicated for the purposes of this Deed when:
- 11.1.1 the Council is given:
- (a) a Clearance Certificate that is valid at the time of dedication of the Dedication Land, or
 - (b) the Foreign Resident Capital Gains Withholding Amount in respect of the Dedication Land, and
- 11.1.2 One of the following has occurred:
- (a) a deposited plan is registered in the register of plans held with the Registrar-General that dedicates the Dedication Land as a public road (including a temporary public road) under the *Roads Act 1993* (NSW) or creates a public reserve or drainage reserve under the *Local Government Act 1993* (NSW), or
 - (b) the Council is given evidence that a transfer of the Dedication Land to the Council has been effected by means of electronic lodgement and registration through PEXA or another ELNO.

Developer to facilitate dedication

- 11.2 The Developer is to do all things reasonably necessary to enable registration of the instrument of transfer to occur.

Dedicated Land to be free of encumbrances

- 11.3 The Developer is to ensure that Dedication Land is free of all encumbrances and affectations (whether registered or unregistered and including without limitation any charge or liability for rates, taxes and charges) except as otherwise agreed in writing by the Parties .
- 11.4 For the avoidance of doubt, clause 11.3 does not apply in relation to encumbrances or affectations being statutory rights that exist or arise under legislation that are of a type which the Developer could not prevent from

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affecting the Dedication Land and in respect of which no action can be taken by the Developer of that land.

Request by Developer

11.5 If, having used all reasonable endeavours, the Developer cannot ensure that Dedication Land is free from all encumbrances and affectations (other than those referred to in clause 11.4), then:

11.5.1 the Developer may request that Council agree to accept the land subject to those encumbrances and affectations, and

11.5.2 if the encumbrance or affectation:

- (a) does not, in Council's reasonable opinion, prevent or adversely impact the future use of the land for the public purpose for which it is to be dedicated under this Deed, and
 - (b) is not a charge arising as a result of unpaid taxes or charges, and
 - (c) does not impose any financial obligation on the Council,
- the Council must not withhold its agreement unreasonably to accept the land subject to the encumbrance or affectation, and

11.5.3 the Council may otherwise withhold its agreement to the encumbrance or affectation in its absolute discretion.

Site Validation Report

11.6 Before dedicating the Dedication Land to the Council, the Developer, at its cost, is to obtain and provide to the Council a Site Validation Report stating that the Dedication Land is suitable for the purpose for which the Dedication Land is required to be dedicated under this Deed without being subject to compliance with an environmental management plan.

Indemnity

11.7 The Developer indemnifies and agrees to keep indemnified the Council against all Claims made against the Council as a result of any Contamination on or emanating from the Dedication Land but only in relation to Contamination that existed on or before the date that the Dedication Land is transferred or dedicated to Council or compulsorily acquired by Council pursuant to this Deed.

Responsibility for Cost of Land Dedication

11.8 The Developer is responsible for meeting all Costs of and incidental to the dedication of the Dedication Land to the Council unless one of both of the following applies:

11.8.1 Item 8 of the VPA Particulars specifies a Council Land Dedication Contribution Amount towards the Cost of all or specified Dedication Land, or

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11.8.2 this Deed otherwise expressly provides for a Dedication Land Cost to be met that is not required to be met by the Developer.

Contribution by Council towards Cost of Dedication Land

11.9 If Item 8 of the VPA Particulars specifies a Council Land Dedication Contribution Amount, the Council is to pay that amount to the Developer in accordance with any requirements specified in that Item or otherwise in accordance with a written agreement entered into between the Council and the Developer.

Caveat by Council

11.10 The Developer acknowledges that the Council has an equitable estate or interest in the Dedication Land entitling the Council, pursuant to section 74F of the *Real Property Act 1900* (NSW), to lodge with the Registrar-General a caveat prohibiting the recording of any dealing affecting the Council's estate or interest in that land.

11.11 The Council is to do such things as are reasonable necessary to promptly:

11.11.1 provide caveator's consent (in a form acceptable to the NSW Land Registry Services) where reasonably requested by the Developer, provided the matter requiring the consent does not affect the Council's estate or interest in respect of the relevant part of the Land under this Deed, and

11.11.2 remove any caveat from the title to a part of the Land once this Deed has been registered on that part of the Land.

12 Application of Developer Works Provisions

Application of Developer Works Provisions

12.1 The Developer Works Provisions apply to and in respect of Developer Works required by this Deed.

13 Cost of Developer Works

Responsibility for Cost of Developer Works

13.1 The Developer is responsible for meeting all Costs of and incidental to the Developer Works required to be provided under this Deed unless one of both of the following applies:

13.1.1 Item 10 of the VPA Particulars specifies a Council Developer Works Contribution Amount towards the Cost of all or specified Developer Works, or

13.1.2 this Deed otherwise expressly provides for a Developer Works Cost that is not required to be met by the Developer.

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Contribution by Council towards Cost of Developer Works

- 13.2 If Item 10 of the VPA Particulars specifies a Council Developer Works Contribution Amount, the Council is to pay that amount to the Developer in relation to the Developer Works within 14 days after both of the following have occurred:
- 13.2.1 all of the Developer Works have vested in the Council, and
 - 13.2.2 all land on which the Developer Works have been carried out that is not owned, occupied or otherwise controlled by the Council has been transferred to the Council.

14 Development Contribution Credit

Application of clause

- 14.1 This clause 14 applies if a Development Contribution Credit is specified in Item 11 of the VPA Particulars.

Application of Development Contribution Credit

- 14.2 Pursuant to s7.11(5)(b) of the Act, in consideration of the Developer carrying out the Developer Works and otherwise performing all of its obligations under this Deed, the Section 7.11 Contribution payable by the Developer is to be reduced by the Development Contribution Credit.

15 Development Contribution Surplus Credit

Application of Developer Contribution Surplus Credit

- 15.1 If a Development Contribution Surplus Credit is specified in Item 12 of the VPA Particulars:
- 15.1.1 the Council is to apply the Development Contribution Surplus Credit, towards the satisfaction of any monetary contributions the Developer is required to pay to the Council under s7.11 of the Act in relation to any development (other than the Development) for which development consent is granted under the Act after this Deed commences, and
 - 15.1.2 the Developer may assign the Development Contribution Surplus Credit or any part of it to any person if the Developer:
 - (a) obtains the written consent of the Council, which may not be unreasonably withheld, and
 - (b) enters into a deed with the Council and the transferee of the Monetary Contribution Surplus Credit on terms reasonably satisfactory to the Council.

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Indexation of Developer Contribution Surplus Credit

- 15.2 The Development Contribution Surplus Credit is to be indexed from the date of this Deed until the date it is applied in accordance with clause 15.1 in accordance with the indexation method contained in the Applicable Contributions Plan.

Part 3 – Dispute Resolution

16 Dispute Resolution – mediation

Application of clause

- 16.1 This clause 16 applies to any Dispute arising in connection with this Deed other than a dispute to which clause 17 applies.

When Dispute arises

- 16.2 Such a Dispute is taken to arise if one Party gives another Party a notice in writing specifying particulars of the Dispute.

Meeting between Parties

- 16.3 If a notice is given under clause 16.2, the Parties are to meet within 14 days of the notice in an attempt to resolve the Dispute.

Meditation of Dispute

- 16.4 If the Dispute is not resolved within a further 28 days, the Parties are to mediate the Dispute in accordance with the Mediation Rules of the Law Society of New South Wales published from time to time and are to request the President of the Law Society to select a mediator.

Exercise of legal rights

- 16.5 If the Dispute is not resolved by mediation within a further 28 days, or such longer period as may be necessary to allow any mediation process which has been commenced to be completed, then the Parties may exercise their legal rights in relation to the Dispute, including by the commencement of legal proceedings in a court of competent jurisdiction in New South Wales.

Costs

- 16.6 Each Party is to bear its own costs arising from or in connection with the appointment of a mediator and the mediation.
- 16.7 The Parties are to share equally the costs of the President, the mediator, and the mediation.

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17 Dispute resolution – expert determination

Application of clause

- 17.1 This clause 17 applies to a Dispute arising in connection with this Deed if:
- 17.1.1 the Parties agree that the Dispute can be appropriately determined by Expert Determination, or
 - 17.1.2 the Chief Executive Officer (or equivalent) of the professional body that represents persons who appear to have the relevant expertise to determine the Dispute gives a written opinion at the joint request of the Parties that the Dispute can be determined by a member of that body.

When Dispute arises

- 17.2 A Dispute to which this clause applies is taken to arise if one Party gives another Party a notice in writing specifying particulars of the Dispute.

Meeting between Parties

- 17.3 If a notice is given under clause 17.2, the Parties are to meet within 14 days of the notice in an attempt to resolve the Dispute.

Expert determination

- 17.4 If the Dispute is not resolved within a further 28 days, the Dispute is to be referred to the President of the NSW Law Society to appoint an expert for expert determination.

Expert determination binding

- 17.5 The expert determination is binding on the Parties except in the case of fraud or misfeasance by the expert.

Costs of Parties

- 17.6 Each Party is to bear its own costs arising from or in connection with the appointment of the expert and the expert determination.

Costs of Expert

- 17.7 The Parties are to share equally the costs of the President, the expert, and the expert determination.

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Part 4 - Enforcement

18 General Security

Application of this clause

- 18.1 This clause 18 applies if Item 17.a of the VPA Particulars specified an amount of General Security.

Composition of General Security

- 18.2 For the avoidance of doubt, the General Security includes the Defects Liability Security and the Maintenance Security.

Provision of General Security

- 18.3 The Developer is to provide the General Security to the Council:
- 18.3.1 before the Developer obtains a Construction Certificate for any part of the Development or before the Developer commences any part of the Developer Works, whichever occurs first, or
 - 18.3.2 at such other time agreed in writing by the Council.

Apportionment of General Security

- 18.4 If agreed in writing by the Council, the General Security may be apportioned to different Stages or different Developer Works, in which case the Developer is to provide the portion of the General Security relating to a particular Stage or particular Developer Works to the Council before the Developer obtains a Construction Certificate for the particular Stage or the Developer commences the particular Developer Works.

Purpose of General Security

- 18.5 The Council is to hold the General Security as security for the Developer performing its obligations under this Deed relating to the Developer Works and other material public benefits (other than the payment of monetary Development Contributions and the dedication of Dedication Land).

Indexation of General Security

- 18.6 The Developer is to ensure that the amount of the General Security provided to the Council at any time is indexed in accordance with Item 17.b of the Particulars.

Call-up of General Security

- 18.7 Subject to clause 21.2, if the Developer breaches any its obligations under this Deed relating to the purpose for which the General Security is required to be provided, the Council may, without further notice to the Developer and notwithstanding any other remedy it may have under this Deed, under any Act

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or otherwise at law or in equity, call-up the General Security, the Defects Liability Security or the Maintenance Security, as appropriate, and apply it to remedy the Developer's breach and the Council's costs specified in clause 21.5 of so doing.

Release & return of General Security

- 18.8 Subject to clause 18.10, the Council is to release and return the General Security or any unused part of it to the Developer within 14 days of issuing a Practical Completion Certificate for the Developer Works unless the Parties have entered into a written agreement providing for the progressive release of the General Security at times or upon the occurrence of events specified in the agreement.
- 18.9 Despite clause 18.8 but subject to clause 18.10, if the Developer has provided the Council with a portion of the General Security relating to a particular Stage or particular Developer Works, the Council is to release and return the portion or any unused part of it to the Developer within 14 days of issuing a Practical Completion Certificate for all of the Developer Works in the particular Stage or the particular Developer Works.
- 18.10 The amount of the General Security released and returned by the Council under clause 18.8 or 18.9 must not exceed the amount of the General Security minus the percentages of that amount allocated to the Defects Liability Security and the Maintenance Security.
- 18.11 The Council is to release and return the Defects Liability Security, or any remaining part, to the Developer within 28 days after the end of the Defects Liability Period if, at that time, the Developer is not in breach of an obligation under this Deed to which the Defects Liability Security relates.
- 18.12 The Council is to release and return the Maintenance Security, or any remaining part, to the Developer within 28 days after the end of the Maintenance Period if, at that time, the Developer is not in breach of an obligation under this Deed to which the Maintenance Security relates.

Replacement General Security

- 18.13 The Developer may provide the Council with a replacement General Security at any time.
- 18.14 On receipt of a replacement General Security, the Council is to release and return the replaced the General Security to the Developer.
- 18.15 If the Council calls-up the General Security or any portion of it, the Council may give the Developer a written notice requiring the Developer to provide a further or replacement General Security to ensure that the amount of General Security held by the Council equals the amount the Council is entitled to hold under this Deed.

Restriction on entering Council land

- 18.16 Despite any other provision of this Deed, the Council, in its absolute discretion, may refuse to allow the Developer to enter, occupy or use any land owned or controlled by the Council or refuse to provide the Developer with any plant, equipment, facilities or assistance relating to the carrying out the

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Development if the Developer has not provided the General Security to the Council in accordance with this Deed.

19 Charge on Dedication Land

Application of this clause

- 19.1 This clause applies if Item 16 of the VPA Particulars specifies land for the purposes of the definition of 'Charge Land' in clause 1.1 of this Deed.

Grant of charge

- 19.2 On the date of execution of this Deed, the Developer grants to the Council a fixed and specific charge over the Developer's right, title and interest in the Charge Land, to secure:
- 19.2.1 the performance of the Developer's obligation to make monetary Development Contributions under this Deed, and
 - 19.2.2 any damages that may be payable to the Council, or any costs which may be incurred by the Council in the event of a breach of this Deed by the Developer relating to making monetary Development Contributions.

Exercise of rights under Charge

- 19.3 Subject to clause 21.2, the Council may exercise its rights under the Charge if the Developer does not make monetary contributions in accordance with this Deed.

Registration

- 19.4 Upon the execution of this Deed, the Developer is to give to the Council an instrument in registrable form under the *Real Property Act 1900* (NSW) duly executed by the registered proprietor of the Charge Land that is effective to register the Charge on the title to the Charge Land.
- 19.5 If the Charge Land does not form the whole of a lot in a deposited plan at the time that the instrument referred to in clause 19.4 is required to be given:
- 19.5.1 the Developer is to give the Council an instrument that charges the whole of the lot containing the Charge Land, and
 - 19.5.2 a reference in this Deed to the Charge Land is taken to be a reference to the whole of that lot.
- 19.6 The Developer is to do all other things necessary, including executing all other documents, to enable lodgement and registration of the Charge to occur electronically through PEXA or another ELNO.

Caveat and discharge

- 19.7 The Developer acknowledges that the Council has an equitable estate or interest in the Charge Land entitling the Council, pursuant to section 74F of

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the *Real Property Act 1900* (NSW), to lodge with the Registrar-General a caveat prohibiting the recording of any dealing affecting the Council's estate or interest in that land.

19.8 The Developer agrees that:

19.8.1 the Council may lodge a caveat on the title of the Charge Land,

19.8.2 the Council is to release the caveat from any part of the Charge Land once that part is contained in a separate lot to the remainder of the Charge Land, and

19.8.3 the Council cannot be required to have the caveat removed from the title to the Charge Land other than in accordance with clause 19.9.

19.9 In order to enable Final Lots to be sold, the Council is to release the Charge and withdraw the caveat from the title to any Final Lot on satisfaction by the Developer of its obligations under this Deed to make Development Contributions in respect of the creation of the lot.

19.10 For the purposes of clause 19.2, the Council is to use its reasonable endeavours to provide any documentation necessary to enable the release of the Charge and withdrawal of the caveat from the title of a Final Lot on or immediately prior to the date for settlement of the sale of that lot.

Subdivision of charge land not precluded

19.11 Nothing in this Deed prevents the registration of a plan of subdivision in respect of the Charge Land nor the creation of a Final Lot from the Charge Land.

Priority

19.12 The Developer is not to create any mortgage or charge over the Charge Land or grant any other interest in the Charge Land ranking in priority equal with or ahead of the Charge created under this Deed without the prior written approval of the Council.

20 Acquisition of Dedication Land

Compulsory acquisition of Dedication Land

20.1 Subject to clause 20.2 and 21.2, if the Developer does not dedicate the Dedication Land at the time at which it is required to be dedicated, the Developer consents to the Council compulsorily acquiring the land for compensation in the amount of \$1 without having to follow the pre-acquisition procedure under the Just Terms Act.

20.2 The Council is to only acquire land pursuant to clause 20.1 if it considers it reasonable to do so having regard to the circumstances surrounding the failure by the Developer to dedicate the land required to be dedicated under this Deed.

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Pre-acquisition agreement

- 20.3 Clause 20.1 constitutes an agreement for the purposes of s30 of the Just Terms Act.

Re-imburement of Council for third party compensation

- 20.4 If, as a result of the acquisition referred to in clause 20.1, the Council is required to pay compensation to any person other than the Developer, the Developer is to reimburse the Council that amount, upon a written request being made by the Council, or the Council can call on the General Security.

Indemnity

- 20.5 The Developer indemnifies and keeps indemnified the Council against all Claims made against the Council as a result of any acquisition by the Council of the whole or any part of the Dedication Land except if, and to the extent that, the Claim arises because of the Council's negligence or default.
- 20.6 The Developer is to promptly do all things necessary, and consents to the Council doing all things necessary, to give effect to this clause 20, including without limitation:
- 20.6.1 signing any documents or forms,
 - 20.6.2 giving land owner's consent for lodgement of any Development Application,
 - 20.6.3 producing certificates of title to the Registrar-General under the *Real Property Act 1900* (NSW), and
 - 20.6.4 paying the Council's costs arising under this clause 20.

21 Breach of obligations

Notice of breach

- 21.1 If the Council reasonably considers that the Developer is in breach of any obligation under this Deed, it may give a written notice to the Developer:
- 21.1.1 specifying the nature and extent of the breach,
 - 21.1.2 requiring the Developer to:
 - (a) Rectify the breach if the Council reasonably considers it is capable of rectification, or
 - (b) pay compensation to the reasonable satisfaction of the Council in lieu of rectifying the breach if it reasonably considers the breach is not capable of rectification,
 - 21.1.3 specifying the period within which the breach is to be rectified or compensation paid, being a period that is reasonable in the circumstances.

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Notice of breach pre-requisite to exercise of rights

- 21.2 The Council may not exercise its rights under clause 18.7, 19.3 or 20.1 unless it has first given the Developer a notice under clause 21.1 and the Developer has failed to comply with the Notice.

Step-in right relating to Developer Works

- 21.3 If the Developer fails to comply with a notice given under clause 21.1 relating to the provision of Developer Works, the Council may, notwithstanding any other remedy it may have under this Deed, under any Act or otherwise at law or in equity, step-in and remedy the breach and may enter, occupy and use any land owned or controlled by the Developer and any Equipment on such land for that purpose.

Recovery of costs by Council as debt due

- 21.4 Despite any other provision of this Deed, any costs incurred by the Council in remedying a breach of this Deed may be recovered by the Council as a debt due in a court of competent jurisdiction.
- 21.5 For the purpose of clause 21.4, the Council's costs of remedying a breach the subject of a notice given under clause 21.1 include, but are not limited to:
- 21.5.1 the costs of the Council's employees, agents and contractors reasonably incurred for that purpose,
 - 21.5.2 all fees and charges necessarily or reasonably incurred by the Council in remedying the breach, and
 - 21.5.3 all legal costs and expenses reasonably incurred by the Council, by reason of the breach.

Exercise of Council's rights at law or in equity

- 21.6 Nothing in this clause 21 prevents the Council from exercising any rights it may have at law or in equity in relation to a breach of this Deed by the Developer, including but not limited to seeking relief in an appropriate court.

22 Enforcement in a court of competent jurisdiction

- 22.1 Except in the case of any urgent interlocutory injunctions, the Parties must not bring or maintain any action in any Dispute until they have attempted to resolve the Dispute in accordance with clauses 16 and 17.
- 22.2 Without limiting any other provision of this Deed, the Parties may enforce this Deed in any court of competent jurisdiction.
- 22.3 For the avoidance of doubt, nothing in this Deed prevents:
- 22.3.1 a Party from bringing proceedings in the Land and Environment Court to enforce any aspect of this Deed or any matter to which this Deed relates, or

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- 22.3.2 the Council from exercising any function under the Act or any other Act or law relating to the enforcement of any aspect of this Deed or any matter to which this Deed relates.

Part 5 – Registration & Restriction on Dealings

23 Registration of this Deed

Application of clause

- 23.1 This clause 23 applies if Item 20 of the VPA Particulars states that this Deed is to be registered for the purposes of s7.6(1) of the Act.

Documents for registration

- 23.2 Upon the commencement of this Deed, the Developer is to deliver to the Council:
- 23.2.1 an instrument in registrable form requesting registration of this Deed on the title to the Land duly executed by the registered proprietor of the Land, and
 - 23.2.2 the written irrevocable consent of the registered proprietor and each person referred to in s7.6(1) of the Act to that registration.
- 23.3 The Developer is to do such other things as are reasonably necessary to enable lodgement and registration of this Deed to occur electronically through PEXA or another ELNO.

Removing notation from title

- 23.4 The Parties are to do such things as are reasonably necessary to promptly remove any notation relating to this Deed (including any caveat under clause 11.10) from the title to a part of the Land:
- 23.4.1 in so far as the part of the Land concerned is a Final Lot,
 - 23.4.2 in relation to any other part of the Land, once the Developer has completed its obligations under this Deed to the reasonable satisfaction of the Council or this Deed is terminated or otherwise comes to an end for any other reason.

24 Restriction on dealings

Restriction

- 24.1 The Developer is not to:
- 24.1.1 sell or transfer the Land, other than a Final Lot, or

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24.1.2 assign the Developer's rights or obligations under this Deed, or novate this Deed,

to any person unless:

24.1.3 the Developer has, at no cost to the Council, first procured the execution by the person to whom the Land or part is to be sold or transferred or the Developer's rights or obligations under this Deed are to be assigned or novated, of a deed in favour of the Council on terms reasonably satisfactory to the Council, and

24.1.4 the Council has given written notice to the Developer stating that it reasonably considers that the purchaser, transferee, assignee or novatee, is reasonably capable of performing its obligations under this Deed, and

24.1.5 the Developer is not in breach of this Deed, and

24.1.6 the Council otherwise consents to the transfer, assignment or novation, such consent not to be unreasonably withheld.

Continued performance of obligations by Developer

24.2 Subject to clause 24.3, the Developer acknowledges and agrees that it remains liable to fully perform its obligations under this Deed unless and until it has complied with its obligations under clause 24.1.

Exclusion from restriction

24.3 Clause 24.1 does not apply in relation to any sale or transfer of the Land if this Deed is registered on the title to the Land at the time of the sale.

Part 6 – Indemnities & Insurance

25 Risk

25.1 The Developer performs this Deed at its own risk and its own cost.

26 Release

26.1 The Developer releases the Council from any Claim it may have against the Council arising in connection with the performance of the Developer's obligations under this Deed except if, and to the extent that, the Claim arises because of the Council's negligence, fraud, wilful misconduct or default.

27 Indemnity

27.1 The Developer indemnifies the Council from and against all Claims that may be sustained, suffered, recovered or made against the Council arising in

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connection with the performance of the Developer's obligations under this Deed except if, and to the extent that, the Claim arises because of the Council's negligence or default.

28 Insurance

Requirement for Developer insurances

- 28.1 The Developer is to take out and keep current to the satisfaction of the Council the Insurances in relation to the Developer Works until the Developer Works are completed in accordance with this Deed.

Failure to comply with requirement

- 28.2 If the Developer fails to comply with clause 28.1, the Council may effect and keep in force such insurances and pay such premiums as may be necessary for that purpose and the amount so paid shall be a debt due from the Developer to the Council and may be recovered by the Council as it deems appropriate including:
- 28.2.1 by calling upon the General Security provided by the Developer to the Council under this Deed, or
- 28.2.2 recovery as a debt due in a court of competent jurisdiction.
- 28.3 The Developer is not to commence to provide any Developer Works unless it has first provided to the Council satisfactory written evidence of all of the insurances specified in clause 28.1.

Part 7 – Other Provisions

29 Annual report by Developer

Requirement for Developer to provide report

- 29.1 The Developer is to provide to the Council by not later than each anniversary of the date on which a Development Consent is granted for the Development a report ('**Annual Performance Report**') detailing the performance of its obligations under this Deed in the previous 12 month period ('**Reporting Period**').

Form and content of report

- 29.2 The Annual Performance Report is to be in such a form and to address such matters as is reasonably required by the Council from time to time but must at a minimum detail the following:
- 29.2.1 all Approved Persons during the Reporting Period and any changes to Approved Persons during that period,

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- 29.2.2 all Development Contributions made by the Developer pursuant to this Deed during the Reporting Period and the dates on which the contributions were made,
- 29.2.3 all Development Contributions due to be made by the Developer pursuant to this Deed in the next 12 month period,
- 29.2.4 all Developers Works that had been commenced prior to the Reporting Period or were commenced during the Reporting Period but were not completed in that period,
- 29.2.5 all Developers Works due to be commenced or completed within the next 12 month period,
- 29.2.6 all Securities provided by the Developer to the Council under this Deed and held by the Council during the Reporting Period and the current value of each such Security.

Strict requirement

- 29.3 The Developer acknowledges and agrees that the provision of the Annual Performance Report each year in accordance with this clause 29 is a strict requirement of this Deed.

30 Review of Deed

Obligation to review Deed

- 30.1 The Parties agree to review this Deed by the end of each Review Period, and otherwise if either Party is of the opinion that any change of circumstance has occurred, or is imminent, that materially affects the operation of this Deed.

Review triggers

- 30.2 For the purposes of clause 30.1, the relevant changes include (but are not limited to) any change to a law that restricts or prohibits or enables the Council or any other planning authority to restrict or prohibit any aspect of the Development.

Duty of Parties

- 30.3 For the purposes of addressing any matter arising from a review of this Deed referred to in clause 30.1, the Parties are to use all reasonable endeavours to agree on and implement appropriate amendments to this Deed.

Where change of law occurs

- 30.4 If this Deed becomes illegal, unenforceable or invalid as a result of any change to a law, the Parties agree to do all things necessary to ensure that an enforceable agreement of the same or similar effect to this Deed is entered into.

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No Dispute

- 30.5 A failure by a Party to agree to take action requested by the other Party as a consequence of a review referred to in clause 30.1 (but not 30.4) is not a Dispute for the purposes of this Deed and is not a breach of this Deed.

31 Notices

- 31.1 Any notice, consent, information, application or request that is to or may be given or made to a Party under this Deed is only given or made if it is in writing and sent in one of the following ways:
- 31.1.1 delivered or posted to that Party at its address set out in Item 22 or 23 of the VPA Particulars, or
 - 31.1.2 emailed to that Party at its email address set out in Item 22 or 23 of the VPA Particulars.
- 31.2 If a Party gives the other Party 3 business days' notice of a change of its address or email, any notice, consent, information, application or request is only given or made by that other Party if it is delivered, posted or emailed to the latest address.
- 31.3 Any notice, consent, information, application or request is to be treated as given or made if it is:
- 31.3.1 delivered, when it is left at the relevant address,
 - 31.3.2 sent by post, 2 business days after it is posted, or
 - 31.3.3 sent by email and the sender does not receive a delivery failure message from the sender's internet service provider within a period of 24 hours of the email being sent.
- 31.4 If any notice, consent, information, application or request is delivered, or an error free transmission report in relation to it is received, on a day that is not a business day, or if on a business day, after 5pm on that day in the place of the Party to whom it is sent, it is to be treated as having been given or made at the beginning of the next business day.

32 Approvals and Consent

- 32.1 Except as otherwise set out in this Deed, and subject to any statutory obligations, a Party may give or withhold an approval or consent to be given under this Deed in that Party's absolute discretion and subject to any conditions determined by the Party.
- 32.2 A Party is not obliged to give its reasons for giving or withholding consent or for giving consent subject to conditions.

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33 Costs of this Deed

Costs of Deed

- 33.1 The Developer is to pay to the Council the Council's costs not exceeding the amount specified in Item 25 of the VPA Particulars in relation to preparing, negotiating, executing and stamping this Deed, and any document related to this Deed within 7 days of a written demand by the Council for such payment.

Enforcement costs

- 33.2 The Council may serve a notice in writing on the Developer ('**Enforcement Cost Notice**') requiring the Developer to pay all or any reasonable costs and expenses incurred by the Council in connection with:
- 33.2.1 investigating a non-compliance by the Developer with this Deed, and
- 33.2.2 enforcing compliance by the Developer with this Deed.
- 33.3 For the avoidance of doubt, the costs and expenses referred to in clause 33.2 may include the costs or expenses incurred by the Council relating to the preparation or serving of the Enforcement Cost Notice.
- 33.4 An Enforcement Cost Notice is to specify the amount required to be paid to the Council by the Developer and the date by which the amount is to be paid.
- 33.5 The Council may recover any unpaid costs and expenses specified in an Enforcement Cost Notice as a debt in a court of competent jurisdiction.

No dispute

- 33.6 Part 3 of this Deed does not apply anything done by the Council and any requirement imposed on the Developer by the Council in accordance with this clause 33.

34 Entire Deed

- 34.1 This Deed contains everything to which the Parties have agreed in relation to the matters it deals with.
- 34.2 No Party can rely on an earlier document, or anything said or done by another Party, or by a director, officer, agent or employee of that Party, before this Deed was executed, except as permitted by law.

35 Further Acts

- 35.1 Each Party must promptly execute all documents and do all things that another Party from time to time reasonably requests to effect, perfect or complete this Deed and all transactions incidental to it.

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36 Governing Law and Jurisdiction

- 36.1 This Deed is governed by the law of New South Wales.
- 36.2 The Parties submit to the non-exclusive jurisdiction of its courts and courts of appeal from them.
- 36.3 The Parties are not to object to the exercise of jurisdiction by those courts on any basis.

37 Joint and Individual Liability and Benefits

- 37.1 Except as otherwise set out in this Deed:
 - 37.1.1 any agreement, covenant, representation or warranty under this Deed by 2 or more persons binds them jointly and each of them individually, and
 - 37.1.2 any benefit in favour of 2 or more persons is for the benefit of them jointly and each of them individually.

38 No Fetter

- 38.1 Nothing in this Deed shall be construed as requiring Council to do anything that would cause it to be in breach of any of its obligations at law, and without limitation, nothing shall be construed as limiting or fettering in any way the exercise of any statutory discretion or duty.

39 Illegality

- 39.1 If this Deed or any part of it becomes illegal, unenforceable or invalid as a result of any change to a law, the Parties are to co-operate and do all things necessary to ensure that an enforceable agreement of the same or similar effect to this Deed is entered into.

40 Severability

- 40.1 If a clause or part of a clause of this Deed can be read in a way that makes it illegal, unenforceable or invalid, but can also be read in a way that makes it legal, enforceable and valid, it must be read in the latter way.
- 40.2 If any clause or part of a clause is illegal, unenforceable or invalid, that clause or part is to be treated as removed from this Deed, but the rest of this Deed is not affected.

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41 Amendment

- 41.1 No amendment of this Deed will be of any force or effect unless it is in writing and signed by the Parties to this Deed in accordance with section 203 of the Regulation.

42 Waiver

- 42.1 The fact that a Party fails to do, or delays in doing, something the Party is entitled to do under this Deed, does not amount to a waiver of any obligation of, or breach of obligation by, another Party.
- 42.2 A waiver by a Party is only effective if it:
- 42.2.1 is in writing,
 - 42.2.2 is addressed to the Party whose obligation or breach of obligation is the subject of the waiver,
 - 42.2.3 specifies the obligation or breach of obligation the subject of the waiver and the conditions, if any, of the waiver,
 - 42.2.4 is signed and dated by the Party giving the waiver.
- 42.3 Without limitation, a waiver may be expressed to be conditional on the happening of an event, including the doing of a thing by the Party to whom the waiver is given.
- 42.4 A waiver by a Party is only effective in relation to the particular obligation or breach in respect of which it is given, and is not to be taken as an implied waiver of any other obligation or breach or as an implied waiver of that obligation or breach in relation to any other occasion.
- 42.5 For the purposes of this Deed, an obligation or breach of obligation the subject of a waiver is taken not to have been imposed on, or required to be complied with by, the Party to whom the waiver is given.

43 GST

- 43.1 In this clause:
- Adjustment Note, Consideration, GST, GST Group, Margin Scheme, Money, Supply and Tax Invoice** have the meaning given by the GST Law.
- GST Amount** means in relation to a Taxable Supply the amount of GST payable in respect of the Taxable Supply.
- GST Law** has the meaning given by the *A New Tax System (Goods and Services Tax) Act 1999* (Cth).
- Input Tax Credit** has the meaning given by the GST Law and a reference to an Input Tax Credit entitlement of a party includes an Input Tax Credit for an acquisition made by that party but to which another member of the same GST Group is entitled under the GST Law.
- Taxable Supply** has the meaning given by the GST Law excluding (except where expressly agreed otherwise) a supply in respect of which the supplier

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chooses to apply the Margin Scheme in working out the amount of GST on that supply.

- 43.2 Subject to clause 43.4, if GST is payable on a Taxable Supply made under, by reference to or in connection with this Deed, the Party providing the Consideration for that Taxable Supply must also pay the GST Amount as additional Consideration.
- 43.3 Clause 43.2 does not apply to the extent that the Consideration for the Taxable Supply is expressly stated in this Deed to be GST inclusive.
- 43.4 No additional amount shall be payable by the Council under clause 43.2 unless, and only to the extent that, Council is entitled to an Input Tax Credit (in accordance with the GST Law), for its acquisition of the Taxable Supply giving rise to the liability to pay GST.
- 43.5 If there are Supplies for Consideration which is not Consideration expressed as an amount of Money under this Deed by one Party to the other Party that are not subject to Division 82 of the *A New Tax System (Goods and Services Tax) Act 1999*, the Parties agree:
- 43.5.1 to negotiate in good faith to agree the GST inclusive market value of those Supplies prior to issuing Tax Invoices in respect of those Supplies;
- 43.5.2 that any amounts payable by the Parties in accordance with clause 43.2 (as limited by clause 43.4) to each other in respect of those Supplies will be set off against each other to the extent that they are equivalent in amount.
- 43.6 No payment of any amount pursuant to this clause 43, and no payment of the GST Amount where the Consideration for the Taxable Supply is expressly agreed to be GST inclusive, is required until the supplier has provided a Tax Invoice or Adjustment Note as the case may be to the recipient.
- 43.7 Any reference in the calculation of Consideration or of any indemnity, reimbursement or similar amount to a cost, expense or other liability incurred by a party, must exclude the amount of any Input Tax Credit entitlement of that party in relation to the relevant cost, expense or other liability.
- 43.8 This clause continues to apply after expiration or termination of this Deed.

44 Explanatory Note

- 44.1 The Appendix contains the Explanatory Note relating to this Deed required by section 205 of the Regulation.
- 44.2 Pursuant to section 205 of the Regulation, the Parties agree that the Explanatory Note is not to be used to assist in construing this Deed.

45 Termination of Deed

- 45.1 This Deed terminates if:
- 45.1.1 no part of the Development has been carried out; and

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- 45.1.2 either:
- (a) the Developer notifies the Council in writing that it no longer proposes to carry out the Development; or
 - (b) the Developer notifies the Council in writing that it considers that there is no reasonable prospect that the necessary Approvals will be obtained for the carrying out of the Development within a timeframe acceptable to the Developer, and
- 45.1.3 all development consents, within the meaning of the Act, that have been granted in respect of the Development (if any) have been surrendered in accordance with 4.63 of the Act and the surrender has taken effect; and
- 45.1.4 all Development Applications in respect of the Development that have not yet been determined (if any) have been withdrawn in accordance with s40 of the Regulation and the withdrawal has taken effect.
- 45.2 If this Deed is terminated under clause 45.1:
- 45.2.1 the Parties are released and discharged from their obligations under this Deed;
 - 45.2.2 the Council must promptly release and return any Security provided by the Developer under this Deed; and
 - 45.2.3 Council must do all things reasonably required to have the Registrar General remove this Deed from the relevant folios of the Register upon which it is still registered.
- 45.3 Any right or obligation of any party that is expressed to operate or have effect on or after the completion, expiration or termination of this Deed for any reason, will not merge on the occurrence of that event but will remain in full force and effect.

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Schedule 1: VPA Particulars

(Clause 1.1)

Item	Details
1. Land	<p>Lot 1 DP 302745, 457 Cessnock Road, Gillieston Heights NSW 2321</p> <p>Lot 2 DP 302745, 463 Cessnock Road, Gillieston Heights NSW 2321</p> <p>Lot 1 DP 311179, 501 Cessnock Road, Gillieston Heights NSW 2321</p> <p>Lot 1 DP 601226, 507 Cessnock Road, Gillieston Heights NSW 2321</p> <p>Lot 2 DP 601226, 527 Cessnock Road, Gillieston Heights NSW 2321</p> <p>Lot 3 in DP 71130, 527 Cessnock Road, Gillieston Heights NSW</p>
2. Development	Residential subdivision of the Land to create 322 residential lots, two public open space lots, three drainage reserve lots, and one service lot over six stages as more particularly described in the Development Application.
3. Instrument Change	N/A
4. Application:	
a. Development Application	DA2023/551 as may be modified or substituted prior to determination under the Act.
b. Modification Application	N/A
5. Applicable Development Consent	Any consent granted under the Act to the Development Application as modified from time to time.
6. Applicable Plan:	
a. Applicable Contributions Plan	<i>Maitland City Wide Section 94 Contributions Plan 2016</i> as amended, substituted or replaced after the commencement of this Deed.
b. Applicable DSP	N/A
7. Application of the following provisions of the Act to the Development:	

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a. Section 7.11	Excluded except to the extent that the Applicable Contributions plan authorises the imposition of a condition on the grant of consent to the Development requiring monetary section 7.11 contributions for City Wide Road & Traffic Facilities and Plan Management & Administration.
b. Consideration of benefits	Not to be considered
c. Section 7.12	Excluded
d. Subdivision 4 of Division 7.1	Not excluded
8. Council Land Dedication Contribution Amount	N/A
9. Developer Works Agreed Cost	\$800,000
10. Council Developer Works Contribution Amount	N/A
11. Development Contribution Credit	N/A
12. Development Contribution Surplus Credit	N/A
13. Practical Completion Date	Prior to issuing of a Subdivision Certificate authorising the creation of a Final lot in the Stage in which the particular Developer Works are carried out
14. Defects Liability Period	12 months
15. Maintenance Period	12 months
16. Charge Land	N/A
17. General Security:	
a. General Security	\$1,964,975
b. Indexation of General Security	Indexed according to the <i>Producer Price Index (Output of the Construction Industries, Building Construction New South Wales)</i> published by the Australian Bureau of Statistics
18. Defects Liability Security	10% of General Security retained as the Defects Liability Security less the amount of any Security (being Security equivalent to Defects Liability Security) that is required under a Development Consent to be provided by the

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	Developer to the Council for the relevant Developer Work.
19. Maintenance Security	10% of General Security
20. Registration of this Deed	Yes
21. Insurances	
a. Contract Works Insurance	For the full replacement value of the Works (including the cost of demolition and removal of debris, consultants' fees and authorities' fees), to cover the Developer's liability in respect of damage to or destruction of the Works.
b. Public Liability	For at least \$20,000,000.00 for a single occurrence, which covers the Council, the Developer and any subcontractor of the Developer, for liability to any third party.
c. Professional Indemnity Insurance	\$10,000,000 to be taken out by the Developer's contractors if the relevant services include services of an advisory nature. [Drafting Note. Amount to be subject to further consideration during the exhibition process by Council's governance team and may change prior to execution.]
d. Workers Compensation Insurance	As required by law.
e. Other insurance	As required by law.
22. Council Contact for Notices	<p>Postal Address: 263 High Street, PO Box 220, Maitland NSW 2320</p> <p>Email: Isaac.Milajew@maitland.nsw.gov.au</p> <p>Telephone: 02 4939 1048</p> <p>Representative: Isaac Milajew</p>
23. Developer Contact for Notices	<p>Postal Address: Level 21, 1 Farrer Place Sydney NSW 2000</p> <p>Email: sam.smith@walkercorp.com.au Melinda.Wong@walkercorp.com.au</p> <p>Telephone: 0439 805 876</p> <p>Representative: Sam Smith</p>
24. Review Period	Each period of one (1) year commencing on the date when a Development Consent is granted for the Development.

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25. Costs of Deed	\$15,000
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Schedule 2: Development Contributions Table

COLUMN 1 Item No / Details	COLUMN 2 Public Purpose	COLUMN 3 Timing	COLUMN 4 Contribution Value \$
A. Monetary Contributions			
1. <u>Environmental Land Maintenance Contribution</u> being a monetary contribution in the amount of \$450,050 towards the Council's costs of maintaining the Environmental Land following the dedication of that land by the Developer to the Council under this Deed indexed in accordance with the CPI in the same manner as the City Wide Road & Traffic Contribution	Environmental management and protection, including bushfire management	Payable before the issuing of the first Subdivision Certificate for Stage 6 of the Development or as otherwise agreed in writing between the parties.	
2. <u>City Wide Road & Traffic Contribution</u> being a monetary contribution for 'City Wide Road & Traffic Facilities' specified in the Applicable Contributions Plan in the amount of \$3,724 per Final lot in each Stage of the Development indexed from the date of this Deed in the manner provided for in the	City Wide Road & Traffic Facilities	The amount for a Final Lot in a Stage is payable before the issuing of a Subdivision Certificate authorising the creation of that Final Lot in the Stage	

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Applicable Contributions Plan			
3. <u>City Wide Plan Administration Contribution</u> being a monetary contribution for 'Plan Management & Administration' specified in the Applicable Contributions Plan in the amount of \$281 per Final lot in each Stage of the Development indexed from the date of this Deed in the manner provided for in the Applicable Contributions Plan	Management and Administration of the Applicable Contributions Plan	The amount for a Final Lot in a Stage is payable before the issuing of a Subdivision Certificate authorising the creation of that Final Lot in the Stage	
B. Dedication Land			
1. <u>Local Park Land</u> (including part of the APZ Land)	Public recreation and bushfire management	After the issuing of a Practical Completion Certificate for the Developer works specified in Item C.1. of this Table and prior to the issuing of the first Subdivision Certificate for Stage 3 of the Development or as otherwise agreed to in writing between the Parties	\$550,000
2. <u>Dog Offleash Area Land</u>	Public recreation	After the issuing of a Practical Completion Certificate for the Developer works specified in Item C.2. of this Table and prior to the issuing of the first Subdivision Certificate for Stage 6 of the Development or as otherwise agreed to in writing between the Parties	\$500,000

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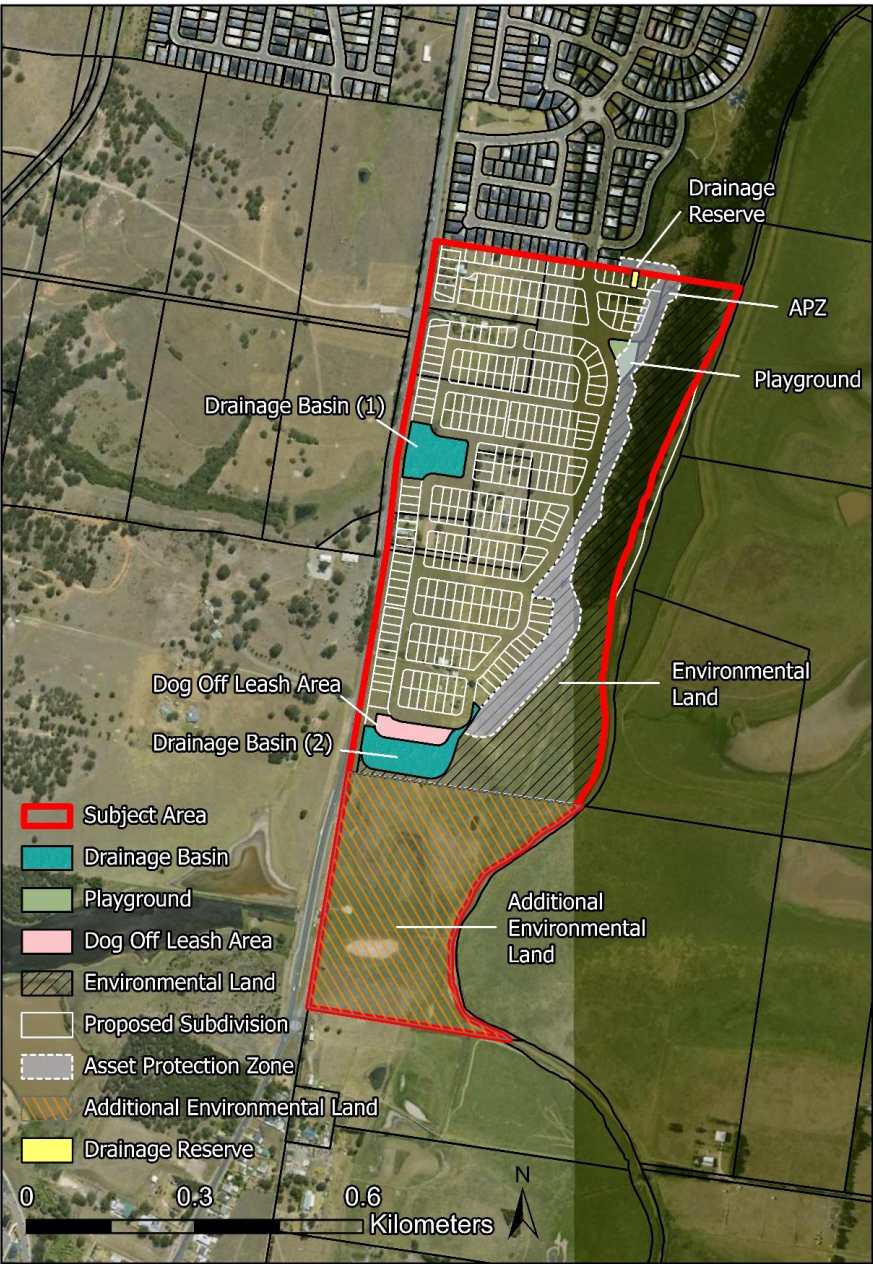


3. <u>Environmental Land</u> (including part of the APZ Land)	Environmental management and protection including bushfire management	Prior to the issuing of the first Subdivision Certificate for Stage 6 of the Development or as otherwise agreed to in writing between the Parties	
4. <u>Additional Environmental Land</u>	Environmental management and protection including bushfire management	Prior to the issuing of the first Subdivision Certificate for Stage 6 of the Development, or at such time as agreed in writing between the Parties.	\$114,975
C. Developer Works			
1. <u>Local Park Land Developer Works</u> comprising soft-fall flooring, a picnic shelter, a play space and seating in the location shown on the Developer Works Location Plan and carried out in accordance with the Developer Works Plans and Drawings and in accordance with this Deed	Public recreation	The Developer Works for the Local Park must be the subject of a Practical Completion Certificate prior to the dedication of the land comprising the Local Park to the Council.	\$500,000
2. <u>Dog Offleash Area Land Developer Works</u> comprising parking, green space, perimeter fencing, seating, and path in the location shown on the Developer Works Location Plan and carried out in accordance with the Developer Works Plans and Drawings and in accordance with this Deed	Public recreation	The Developer Works for the Dog Offleash Area must be the subject of a Practical Completion Certificate prior to the dedication of the land comprising the Dog Offleash Area to the Council.	\$300,000

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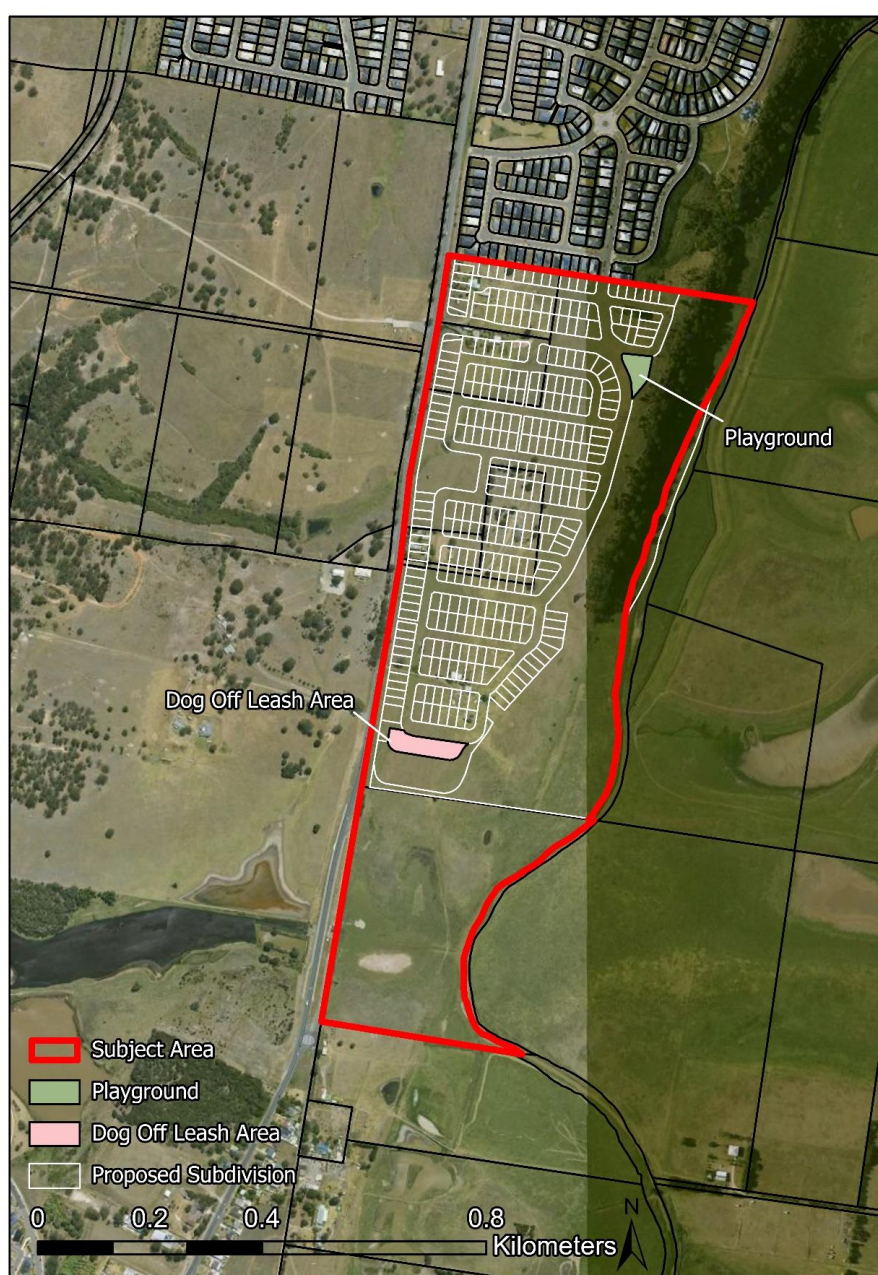
Schedule 3: Dedication Land Plan



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Schedule 4: Developer Works Location Plan



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Schedule 5: Developer Works Plans and Drawings

[Drafting Note. Insert Developer Works plans and drawings relating to the Local Park and Dog Offleash Area. If there are no plans and drawings at the time of execution of this Deed, clauses 28-35 of Schedule 6 apply and the relevant plans and drawings are added to this schedule later.]

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Schedule 6: Developer Works Provisions

Deed not Construction Contract

- 1 The Parties acknowledge and agree that this Deed is not a Construction Contract between the Council and the Developer.

Developer Works before execution of Deed

- 2 This Deed applies to any Developer Works that occurred before the Deed was executed.

Approved persons

- 3 Not used.
- 4 Not used.
- 5 Not used.

Developer to procure compliance

- 6 The Developer is to provide every person engaged by it in relation to the Developer Works with a copy of this Deed executed by both Parties and procure their compliance with the relevant requirements of this Deed.

Requirement for Construction Contract

- 7 The Developer must enter into a Construction Contract with its Contractor for the construction of the Developer Works before any construction work occurs.
- 8 The Developer must provide the Council with a copy of the Construction Contract upon receipt of a written request by the Council.
- 9 The Developer must obtain the approval of the Council to any change to the Contractor, which approval the Council may not unreasonably withhold.

General obligations relating to Developer Works

- 10 The Developer is to provide the Developer Works:
 - 10.1 in the location or locations shown on the Developer Works Location Plan,
 - 10.2 in accordance with the Developer Works Plans and Drawings,
 - 10.3 by the Practical Completion Date, and
 - 10.4 otherwise in accordance with this Deed.
- 11 The Developer is to provide and complete the Developer Works in a good and workmanlike manner having regard to the intended purpose of the Developer Works and in accordance with:
 - 11.1 all applicable laws,

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- 11.2 any Approval required by any law relating to the provision of the Developer Works, and
- 11.3 the lawful requirements of any Authority.
- 12 The Developer is to ensure that anything necessary for the proper performance of its obligations under this Deed relating to the provision of the Developer Works is supplied or made available for that purpose.

Warranties relating to Developer Works

- 13 The Developer warrants to the Council that:
 - 13.1 it has obtained all Approvals and has complied with all laws and applicable industry standards in relation to the Developer Works,
 - 13.2 it accepts that, if any aspect of the Developer Works do not comply this Deed, the Council is entitled to require the Developer to cease the Developer Works and to pursue its rights and remedies relating to the non-compliance under this Deed and, subject to this Deed, at law or in equity,
 - 13.3 the Developer Works, when completed, are to be fit for purpose,
 - 13.4 Not used.
- 14 The Developer is to procure in favour of the Council from the appropriate Approved Person engaged in relation to the Developer Works, any warranty reasonably required by the Council relating to the design, construction, supervision, inspection, testing or certification of the Developer Works.

Ownership & care of Developer Works

- 15 The Developer owns, and is responsible for care of the Developer Works, and bears all risk and liability in connection with the Developer Works, until the Council gives the Developer a Transfer of Ownership Notice in relation to the Developer Works.

Work health & safety

- 16 The Developer acknowledges that it is the Principal Contractor under WHS Law for the Developer Works unless and until such time that:
 - 16.1 the Developer engages the Contractor to construct the Developer Works, or
 - 16.2 engages another person to be the Principal Contractor for the Developer Works,and authorises the person to have management or control of the workplace relating to the Developer Works and to discharge the duties of a Principal Contractor under WHS Law.
- 17 For the purpose of the Developer's compliance with its obligations under clause 16, the Council:
 - 17.1 acknowledges that the Developer (or the Contractor, where appropriate) is the person with management and control of the relevant works area for the purpose of Part 2 of the *Work Health and Safety Act 2011* (NSW); and

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- 17.2 authorises the Developer (or the Contractor, where appropriate) to exercise authority of the Council necessary to enable the Developer to discharge its obligations under clause 16.
- 18 If the Developer at any time terminates the engagement of the Contractor, or terminates its authority for the Contractor or other person referred to in clause 16 to be the Principal Contractor for the Developer Works, the Developer becomes the Principal Contractor until such time as a new person is appointed as Contractor or to otherwise be the Principal Contractor for the Developer Works.
- 19 The Developer is to use its best endeavours to ensure that all persons involved in the Developer Works comply with relevant WHS Law and procedures, including but not limited to:
- 19.1 following published government and industry WHS guidelines,
 - 19.2 providing WHS induction training,
 - 19.3 keeping and regularly updating WHS records,
 - 19.4 preparing and maintaining an WHS management plan,
 - 19.5 preparing a Project Safety Plan that details safety strategies, including how persons must act to comply with WHS Law,
 - 19.6 providing safe work method statements for all tasks and ensuring they are complied with,
 - 19.7 directing staff to take corrective action or stop work if they are not complying with the method statements or WHS Law,
 - 19.8 identifying hazards and assessing risks using due diligence,
 - 19.9 eliminating or controlling risks in line with WorkCover requirements using due diligence,
 - 19.10 reviewing risk assessments and controlling measures,
 - 19.11 providing information to employers and contractors about WHS,
 - 19.12 documenting site-specific safety procedures.
- 20 The Developer is to use its best endeavours to ensure that:
- 20.1 the Council can audit, inspect and test the Developer Works without breaching WHS Law, and
 - 20.2 the Council can access and use the Developer Works without breaching WHS Law.
- 21 The Developer is to promptly inform the Council of any incident occurring in relation to the Developer Works where a person is injured or otherwise exposed to a risk to his or her health or safety, including, but not limited to, an incident which is required to be reported to WorkCover.

Accidents & dangerous occurrences

- 22 The Developer is to notify WorkCover and the Council, as soon as it becomes aware of any serious accident or dangerous occurrence relating to the Developer Works.

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Maitland City Council
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- 23 Within a further 7 days, the Developer must formally notify or procure the notification of WorkCover of the accident or occurrence in accordance with the WHS Law, using any prescribed form.
- 24 The Developer must give to the Council a copy of all information and documents that have been provided to WorkCover relating to the accident or occurrence.
- 25 The Developer must also give to the Council, if requested by the Council, a written report relating to the accident or occurrence in the form specified by the Council.
- 26 The Developer must cooperate with WorkCover and the Council if the accident or occurrence is investigated by Work Cover or the Council.
- 27 The Developer must immediately give the Council a copy of any improvement or prohibition notices that WorkCover issues in relation to the Developer Works.

Design of Developer Works

- 28 Clauses 28 - 35 apply if and to the extent that Schedule 5 does not contain Developer Works Plans and Drawings for the Developer Works or any part.
- 29 The Developer may not commence construction of the Developer Works unless the Developer Works are designed and approved in accordance with this Deed.
- 30 Before commencing the design of the Developer Works, the Developer is to request the Council to provide the Developer with the Council's design requirements for the works.
- 31 Upon receipt of the Developer's request, the Council may:
- 31.1 initially request the Developer to provide a written proposal concerning the design of the Developer Works, including preliminary concept designs, to assist Council in determining and notifying the Developer of its requirements, and subsequently request the Developer to submit the plans and drawings of the Developer Works to the Council for approval, or
- 31.2 request the Developer to submit the plans and drawings of the works to the Council for approval.
- 32 The Council may reasonably require the Developer to make any change to the plans and drawings of the Developer Works that it reasonably considers necessary or desirable as a precondition to approving the plans and drawings, and the Developer is to make any such change.
- 33 The Council is to inform the Developer in writing when it approves the plans and drawings of the Developer Works.
- 34 The Parties are to ensure that the reference to the plans and drawings approved by the Council under are included in Schedule 5 without delay after that approval is given.
- 35 The Developer is not to make any application for any Approval relating to the Developer Works unless the Council approved the plans and drawings of the Developer Works under this Deed.

Variations to approved Developer Works & Costs

- 36 The Developer Works may be varied by agreement in writing between the Parties, acting reasonably, without the necessity for an amendment to this Deed.

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- 37 The Party seeking the variation is to make a written request to the other Party accompanied by such information and supporting documents as is reasonably necessary to enable the other Party to properly consider the request.
- 38 The Party to whom the request is made is not to unreasonably delay, or withhold its Approval to, the request.
- 39 The Party who seeks the variation of the Developer Works must meet the costs of the variation, unless the other Party otherwise agrees.

Developer's obligations before construction commencement

- 40 Not less than 10 business days before the Developer commences construction of any of the Developer Works specified in Part C of Schedule 2 of this Deed, the Developer is to give the Council written notice of its intention to do so accompanied by:
- 40.1 a copy of all approved plans and drawings for the Developer Works so specified in electronic and paper format, and
- 40.2 a list of all contractors and their contact details.
- 41 The Developer is to organise and conduct a pre-start meeting with Council personnel before starting the construction of a Developer Work specified in Part C of Schedule 2 of this Deed.

Protection of people, property & utilities

- 42 The Developer is to use all reasonable endeavours to ensure that, in providing the Developer Works:
- 42.1 all necessary measures are taken to protect people and property,
- 42.2 unnecessary interference with the passage of people and vehicles is avoided, and
- 42.3 nuisances and unreasonable noise and disturbances are prevented.
- 43 The Developer is not to obstruct, interfere with, impair or damage any public road, public footpath, public cycleway or other public thoroughfare, or any pipe, conduit, drain, watercourse or other public utility or service on any land in connection with the Developer Works unless authorised in writing by an Approval, the Council or any relevant Authority.

Damage to assets & property

- 44 The Developer must immediately notify the Council in writing of any loss or damage that occurs in respect of a Council asset of which it becomes aware while performing the Developer Works.
- 45 The Developer must replace or fix any Council asset the Developer loses or damages while performing the Developer Works in accordance with any reasonable requirements of the Council.
- 46 If an audit, inspection or test of the Developer Works shows that:
- 46.1 the Developer Works do not conform to the location, design, specifications, materials or finishes approved by the Council under this Deed, or

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46.2 damage has occurred to a Council asset or the property of another person in connection with the Developer Works,

the Council may give the Developer a notice in writing requiring it to take corrective action to bring the Developer Works into conformity or repair the damage, as the case requires.

- 47 Without limiting any other remedies available to the Council under this Deed, if the Developer does not comply with the Council's requirements under clause 46, the Council may take the action required of the Developer and recover the Council's costs of so doing from the Developer.

Entry onto Land

- 48 The Developer is responsible for obtaining all necessary rights to lawfully enter, occupy, and provide the Developer Works on Other Land.
- 49 Upon receiving reasonable prior written notice from the Developer, the Council is to allow the Developer, to enter, occupy, and use Council owned or controlled land specified in the notice at any reasonable time if the occupation or use of the land by the Developer is reasonably necessary for the Developer Works.
- 50 The Council is not required to allow the Developer to enter, occupy and use any Council owned land that is used for public purposes unless and until the Developer has paid any applicable fee or rent, as approved by the Council, for that purpose,
- 51 Upon receiving reasonable prior notice from the Council, the Developer is to provide the Council with safe and unhindered access at any reasonable time to any land on which the Developer Works are being, or have been, provided, in order to audit or inspect the Developer Works or to remedy any breach by the Developer of its obligations under (and in accordance with) this Deed in relation to the Developer Works.
- 52 The Council must comply with the Developer's reasonable safety requirements while on any land on which the Developer Works are being provided.

Audit, inspection, testing of Developer Works

- 53 The Council may undertake an audit, inspection or test of the Developer Works at any reasonable time for any purpose related to this Deed upon giving reasonable prior notice to the Developer.
- 54 The Developer is to provide the Council with any assistance that is reasonably required by the Council to enable the Council to undertake any audit, inspection or test of the Developer Works.
- 55 If an audit, inspection or test reasonably shows that particular action must be taken in relation to the Developer Works, the Developer is to:
- 55.1 take the action in the manner, and within the time, the Council reasonably requires, and
- 55.2 provide evidence to the Council that the action has been taken.
- 56 If an audit, inspection or test shows that the Developer Works have not been provided in accordance with this Deed, the Developer is to pay any Costs incurred by the Council in connection with the audit, inspection or test.

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- 57 If the Council reasonably decides that a further and more detailed audit, inspection or test of the Developer Works is required, the Council may determine an approved fee in that regard and the Developer is to pay to the Council the fee so approved.

Access to information & records

- 58 The Council may make a written request to the Developer:
- 58.1 to provide information to the Council concerning the Developer Works,
 - 58.2 to allow the Council to inspect the Developer's records concerning the Developer Works, including by giving the Council access to premises owned, occupied or controlled by the Developer for that purpose.
- 59 The Developer is to comply with any such request made by the Council not later than 15 business days after the Council makes the request.

Practical Completion of Developer Works

- 60 The Developer is to use all reasonable endeavours to ensure that the whole of the Developer Works is the subject of one or more Practical Completion Certificates by not later than the Practical Completion Date.
- 61 The Developer may make a written request ('**Developer's Request**') to the Council to issue a Practical Completion Certificate for the Developer Works or any part of the Developer Works by not later than the Practical Completion Date or such later date agreed in writing between the Parties.
- 62 The Developer's Request is to be accompanied by the following information:
- 62.1 a Works-as-Executed Plan of the Developer's Works to which the Developer's Request relates, and
 - 62.2 all technical data relating to those Works, including but not limited to, geotechnical testing, structural certificates, CCTV footage and material certifications.
- 63 Upon receipt of the Developer's Request, the Council is to inspect the relevant Developer Works in the presence of a representative of the Developer at a time reasonably agreed between the Parties that is not later than 14 days after the Council receives the request.
- 64 As a precondition to issuing a Practical Completion Certificate, the Council may direct the Developer in writing to complete, Rectify or repair any specified part of the Developer Works the subject of the Developer's Request within a period specified in the direction in order to bring the Developer Works into conformity with this Deed or any Approval.
- 65 The Developer is to promptly comply with any such direction given by the Council.
- 66 The Council may undertake more than one inspection and issue more than one direction to the Developer in order to be satisfied that a Practical Completion Certificate may be issued for the Developer Works the subject of the Developer's Request.
- 67 The Council is to promptly issue a Practical Completion Certificate for the Developer Works the subject of the Developer's Request when it is reasonably satisfied that no aspect of the relevant Developer Works reasonably requires completion, rectification or repair.

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Maintenance of Developer Works

- 68 The Developer is to Maintain the Developer Works during the Maintenance Period.
- 69 The Council is to permit the Developer to enter any land owned or controlled by the Council to enable the Developer to Maintain the Developer Works during the Maintenance Period.

Rectification of Defects

- 70 The Council may give the Developer a Rectification Notice during the Defects Liability Period.
- 71 The Developer is to comply with a Rectification Notice according to the terms of the Rectification Notice and to the reasonable satisfaction of the Council.
- 72 The Council is to do such things as are reasonably necessary to enable the Developer to comply with a Rectification Notice given by the Council.

Copyright in Works-As-Executed Plan

- 73 The Developer, being the copyright owner in the Works-As-Executed Plan, assigns the copyright in the Works-As-Executed Plan to the Council free of Cost to the Council.
- 74 If the Developer is not the copyright owner of the Work-As-Executed Plan, the Developer is to promptly procure the assignment of the copyright of the Works-As-Executed Plan to the Council free of cost to the Council.

Transfer of Ownership of Developer Works

- 75 At any time after the Council issues a Practical Completion Certificate for Developer Works to the Developer, the Council may issue a Transfer of Ownership Notice to the Developer for those Developer Works.
- 76 The Developer Works the subject of a Transfer of Ownership Notice vest in the Council on the vesting date stated in the Transfer of Ownership Notice.

Transfer of land on which Developer Works Constructed

- 77 Unless otherwise specified in this Deed or agreed in writing between the Parties:
- 77.1 the Developer is to do all things necessary to dedicate or procure the dedication to the Council of the land on which Developer Works the subject of a Transfer of Ownership Notice are constructed,
- 77.2 the dedication is to occur by not later than the vesting date stated in the Transfer of Ownership Notice,
- 77.3 the dedication is to be free of cost to the Council.
- 78 Land on which Developer Works the subject of a Transfer of Ownership Notice are constructed that is required to be dedicated to the Council is Dedication Land for the purposes of this Deed.

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Easements, covenants, etc.

- 78.1 The Developer must create, or procure the creation of, any easement or covenant or any other instrument benefitting the Council that is reasonably required by the Council in relation to the Developer Works.
- 78.2 The Developer is to ensure that any such easement, covenant or other instrument is registered on the title to the relevant land before the vesting date specified in a Transfer of Ownership Notice for such Works.
- 78.3 The Costs required to be incurred by the Developer in doing so include, unless otherwise agreed in writing between the Parties, the payment of compensation to any person.

Removal of structures & Equipment

- 79 When providing the Developer Works on any Council owned or controlled land is completed for the purposes of this Deed, the Developer, without delay, is to:
 - 79.1 remove from the land any structure not comprising or required in connection with the completed Developer Works and make good any damage or disturbance to the land as a result of that removal,
 - 79.2 remove from the land any Equipment and make good any damage or disturbance to the land as a result of that removal, and
 - 79.3 leave the land in a neat and tidy state, clean and free of rubbish.

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Execution

Executed as a Deed

Dated:

Executed by the COUNCIL by the General Manager pursuant to a delegation granted by the governing body under section 377(1) of the *Local Government Act 1993* at a duly convened meeting held on **[Insert]**:

General Manager

Witness

Witness Name

Executed by Walker Gillieston Heights Pty Limited in accordance with s127(1) of the *Corporations Act 2001* (Cth):

Director

Director / Secretary

Name

Name

Walker Gillieston Heights South Planning Agreement
Maitland City Council
Walker Gillieston Heights Pty Limited



Appendix: Explanatory Note

(Clause 44)

Environmental Planning and Assessment Regulation 2021

(Section 205)

Draft Planning Agreement

Under s7.4 of the *Environmental Planning and Assessment Act 1979*

Parties

Council

Maitland City Council ABN 11 596 310 805 of 285-287
High Street, Maitland NSW 2320

Developer

Walker Gillieston Heights Pty Limited ABN 30
077 152 848 of Governor Macquarie Tower, Level 21 1 Farrer
Place, Sydney NSW 2000

Description of the Land to which the Draft Planning Agreement Applies

The land to which the Planning Agreement applies is shown on the Land Dedication Plan and is described as:

- Lot 1 DP 302745, 457 Cessnock Road, Gillieston Heights NSW 2312
- Lot 2 DP 302745, 463 Cessnock Road, Gillieston Heights NSW 2312
- Lot 1 DP 311179, 501 Cessnock Road, Gillieston Heights NSW 2312
- Lot 1 DP 601226, 507 Cessnock Road, Gillieston Heights NSW 2312
- Lot 2 DP 601226, 527 Cessnock Road, Gillieston Heights NSW 2312
- Lot 3 DP 71130, 527 Cessnock Road, Gillieston Heights NSW 2312

Description of Proposed Development/Instrument Change

The development application to which the Planning Agreement relates is DA 2023/551 for the subdivision of five existing lots into 322 residential allotments, associated infrastructure, and

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public open space. The proposal includes the following more specifically; demolition of existing dwellings and ancillary structures, removal of vegetation, construction of retaining walls and associated earthworks, two stormwater basins and associated drainage works, one drainage easement, one playground, one dog off leash area, footpaths, roads, landscaping, fencing, and servicing.

Description of Development Contributions

The development contributions to be provided under the Planning Agreement are described in the table below:

Facility	Land Area (ha)	Land Cost	Emb Cost	Total Contribution
Local Park	0.2436	\$550,000	\$500,000	\$1,050,000
Dog Offleash Area including Environmental Land and APZ	14.9307	\$500,000	\$300,000	\$800,000
Additional Environmental Land	12.3000	\$114,975		\$114,975
Contribution towards Maintenance of Environmental Land				\$450,050
City Wide Road & Traffic Facilities Contribution				\$1,199,128
Administration Contribution				\$90,482
Total	27.4743	\$1,164,975	\$800,000	\$3,704,635

Summary of Objectives, Nature and Effect of the Draft Planning Agreement

Objectives of Draft Planning Agreement

The Planning Agreement will require the dedication of land, provision of works and payment of development contributions providing recreation and open space land and facilities for the residents of Gillieston Heights and the wider community. The Planning Agreement will result in the preservation of land with high environmental/ecological value, providing community access to one of the last remaining dry rainforest areas in the Maitland LGA.

Nature of Draft Planning Agreement

This Draft Planning Agreement is an agreement between the two parties which creates reciprocal obligations on each party with the intent of achieving the objectives of the agreement in providing community benefit.

Effect of the Draft Planning Agreement

To legally bind both parties to the performance of their respective obligations conferred under this Agreement.

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Assessment of the Merits of the Draft Planning Agreement

The Planning Purposes Served by the Draft Planning Agreement

In line with Council's adopted Local Housing Strategy and Environmental Sustainability Strategy, this Agreement serves to protect the important ecological values of the site. Utilising and providing services and infrastructure close to the existing community in the form of a family-friendly community that will deliver greater housing choice.

How the Draft Planning Agreement Promotes the Public Interest

The Planning Agreement makes provision for the dedication of land and provision of capital works which will benefit the local and wider community. It supports the orderly and economic use of the subject site taking into consideration the community's interests and residential amenity in keeping with the character of surrounding Development.

Assessment of the positive or negative impact of the Draft Planning Agreement on the public or relevant section of the public

The positive outcomes for the public include the provision of two open space and recreation facilities in the form of a local playground and dog off leash area. The public will also have access to environmental land and the last remaining dry rainforest in the LGA. There are no negative impacts anticipated as a result of the implantation of the Planning Agreement.

Whether the Draft Planning Agreement Conforms with the Planning Authority's Capital Works Program

The provision of land and works proposed by the Planning Agreement are outside the scope of Council's current Capital Works Program. However, the works have been necessitated by the development and their cost will be borne by the Developer at a nil net cost to Council. The provision of the works aligns with Council's strategic objectives for Gillieston Heights and are considered to generally conform with the intent of Council's Capital Works Program.

Whether the Draft Planning Agreement specifies that certain requirements must be complied with before a construction certificate, occupation certificate or subdivision certificate is issued

The Developer must provide Council with General Security to the amount specified in Schedule 1 Item 17(a) in the form of either bank guarantee or insurance bond before the issuing of a construction certificate for any of the works associated with the relevant DA 2023/551.

The Developer must pay the Environmental Land Maintenance Contribution as specified in Schedule 2 Item 1 of the Agreement prior to the issuing of the first subdivision certificate for Stage 6 of the Development or as otherwise agreed in writing between the Parties.

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The Developer must pay the applicable City Wide Road & Traffic Contribution as specified in Schedule 2 Item 2 of the Agreement prior to the issuing of the subdivision certificate for each stage of the development.

The Developer must pay the applicable City-Wide Administration Contribution as specified in Schedule 2 Item 2 of the Agreement prior to the issuing of the subdivision certificate for each stage of the development.

The Developer must dedicate the Local Park Land prior to the issuing of the first Subdivision Certificate for Stage 3 of the Development or as otherwise agreed in writing between the Parties.

The Developer must dedicate the Dog Offleash Area Land and Environmental Land prior to the issuing of the first Subdivision Certificate for Stage 6 of the Development or as otherwise agreed in writing by the Parties.

Officers Reports

HUNTER ESTUARY VIBRANT RIVER EDUCATION GRANT

Attachment 4 - Lorn Landscape Plan for Plantings (Under Separate Cover)

Meeting Date: 27 February 2024

Attachment No: 4

Number of Pages: 27



Lorn Landscape Plan for Plantings

Maitland City Council

27 October 2023

Document Status				
Version	Doc type	Reviewed by	Approved by	Date issued
1.0	Draft report	Neil Dufty	Neil Dufty	27 October 2023

Project Details

Project Name	Lorn Landscape Plan for Plantings
Client	Maitland City Council
Client Project Manager	Deanne Nelson-Pritchard
Water Technology Project Manager	Petra Arola
Water Technology Project Director	Neil Dufty
Authors	Petra Arola, Kelsey Sanborn, Marion Huxley
Document Number	R01v02_24050025_Lorn Landscape Plan



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ACKNOWLEDGEMENT OF COUNTRY



The Board and employees of Water Technology acknowledge and respect the Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of Country throughout Australia. We specifically acknowledge the Traditional Custodians of the land on which our offices reside and where we undertake our work.

We respect the knowledge, skills and lived experiences of Aboriginal and Torres Strait Islander Peoples, who we continue to learn from and collaborate with. We also extend our respect to all First Nations Peoples, their cultures and to their Elders, past and present.



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1 INTRODUCTION

This report is prepared for Maitland City Council (MCC) to prepare a landscape plan for the proposed plantings at Lorn, NSW, along the foreshore of the Hunter River. The project will be undertaken as part of the Stakeholder Engagement Plan for the Hunter River Education Campaign prepared by Water Technology for MCC in May 2023.

Project funds were reserved for beautification of a location along the river foreshore. During the work for the Hunter River education campaign, it was noted that there is a strong push from community in Lorn to beautify the area along the Lorn foreshore by improving the natural environment through landscape plantings. Recent and recurring flooding in the Hunter River has uprooted much of the vegetation along the riverbanks, leaving mainly grasses and other groundcover species.

There is an interest in reestablishing the local native rainforest that grew in the area prior to European settlement by revegetating using local provenance species. The foreshore location is also a popular location for events and leisure activities, which was considered in this report. By revegetating areas along the riverbank MCC also hopes to limit flood impacts along the river foreshore, and to improve the areas useability and value to the local community, as well as its ecosystem values.

MCC has decided to act and proposes to develop a landscape plan for the Lorn foreshore area. This plan would be used to engage stakeholders and community groups in the works and to gain support for the planned plantings, both for this project and into the future. In this report recommendations for the landscape plan have been made by considering the local ecology, community uses and flooding of the site.



2 BACKGROUND

2.1 Location

The site is an approximately 720 m long stretch covering roughly 6 ha of the inner bend on the Hunter River, from Belmore Bridge downstream on the eastern riverbank. The subject site is shown in Figure 2-1.

The following lots are included in the works:

- Lot 7007 DP1006732
- Lot 1 DP953307
- Lot 1 DP953307
- Lot 1 A DP5394
- Lot 2 A DP5394
- Lot 3 A DP5394
- Lot 4 A DP5394
- Lot 5 A DP5394

The site is mainly zoned RE1 – Public Recreation under the Maitland Local Environmental Plan 2011 (LEP), with a smaller area zoned RU1 – Primary Production along The Esplanade. This is adjacent to a private property located on the river side of The Esplanade. The entire area is under MCC care and contains areas that are Council community land, Council operational land and Crown land.

The area is bound to the west by the powerlines at Belmore Bridge, to the north by The Esplanade, to the east by old paddocks, and to the south by the Hunter River.

2.2 Current site conditions

In its current state, the site is generally bare and open with little infrastructure. The river ledge and lower foreshore areas are steep and sandy with patchy grass cover and a few Casuarinas (*Casuarina/Allocasuarina* spp.) and Willows (*Salix* spp.), partly uprooted by floodwaters. On the upper bank, the ground levels onto a grassy area with a footpath and a parking lot. Beyond the parking lot, along The Esplanade is a flood levee.

Until recently, the eastern section of the site has been operating as horse agistment. Some fencing remains in place but otherwise the site has no infrastructure. The vegetation includes some trees possibly planted for wind break and some large wattle shrubs; however, it is predominantly cleared with only a groundcover of grasses and weeds present.

The western area by Belmore Bridge is largely cleared with some native trees planted as part of a former Landcare site. Part of this site is used as a dog off-leash area. It also functions as a site for community events.

Severe erosion of sand on the inner bank at Belmore Bridge and underneath it has caused a steepening of the riverbank. Bank stabilisation and potential remediation at this location will not be assessed in detail as part of this study as engineering solutions are expected to be required.

The site is subject to flooding and has suffered from multiple floods during the 2020-2023 La Niña event. Flooding on the site is discussed in Section 5.3. Recent floods have uprooted and washed away most of the trees along the lower foreshore.



Figure 2-1 Subject site on the Hunter River foreshore

3 FOCUS AREAS

3.1 Local ecology and ecosystems

The purpose of the proposed plantings is to beautify the Lorn foreshore. Suggestions were made during the community engagement for the Hunter River Education Campaign that the local rainforest community be restored in the area, and this has been used to guide the recommendations for the proposed plantings. The detail regarding the vegetation communities are detailed in Section 4.2.1.

Revegetation should be planned thoroughly and tailored to the site whilst maintaining a catchment-wide perspective. Typical planting of riparian areas occurs in three zones: the upper, middle and lower banks, with the varying vegetation types in each described below.

- Upper Bank: Large trees, with deep roots are ideal for this zone along with shrubs and ground cover.
- Middle Bank: Medium size trees, shrubs and ground covers will help to bind the soils and reduce flow velocities along the bank.
- Lower Bank: Trees, shrubs and groundcovers with matted root systems and flexible branches protect the bank from undercutting and scour.

General guidance for a comprehensive revegetation program includes the following attributes:

- Varied in layout, where required. Revegetation can occur in belts, rows and clumps. Rows planted perpendicular to the flow of the river to have a maximum effect on velocity reduction, while rows planted parallel to the flow would have a more moderate impact on flood velocities.
- Best undertaken either a few months before or immediately after the wet season.
- Should include maintenance of revegetated areas to ensure the successful establishment of the vegetation. Maintenance includes watering, guarding and replacing plants as required.



- Plantings should be undertaken using appropriate plant species for the intended purpose and for the local ecology. Grasses, reeds, rushes, sedges and shrubs have a significant role in assisting bank stability, while larger trees are better suited to provide habitat and shade on the upper bank.

It is noted that perpendicular plantings would cause a concern of redirecting the flow across the river towards Maitland. Parallel plantings and plantings in clumps may therefore be preferred.

Erosion and sediment controls for plantings along the foreshore and riverbank may be required including:

- Installation of coir logs to stabilise the banks and riparian areas
- Plantings in jute mats or mesh to minimise weeds on the banks and riparian areas

It is preferred that local provenance native species of trees, groundcover and riparian vegetation be used. Suggested species are outlined in Section 5.1 of this report.

3.2 Flooding

The Lorn foreshore is frequently inundated by floodwater from the Hunter River and as such impacts of flooding on the plantings are considered, as well as the impacts of the plantings on flood mitigation plans and structures. Revegetating riparian areas is considered the most cost-effective form of long-term erosion control and also assists in flood control by slowing down the flood water.

A study undertaken by UNSW Water research Laboratory (WRL), in collaboration with MCC, investigated the potential impacts of the proposed plantings on floods and flood mitigation schemes in the area. It found that tree plantings are acceptable, as long as they are

- In accordance with the *Development Control Guidelines for Development within the Hunter Valley Flood Mitigation Scheme* (NSW DPIE 2021),
- Not planted within 50 m of the crest level of a spillway or control bank, and □ Not planted on the levee bank itself.

The *Development Control Guidelines for Development within the Hunter Valley Flood Mitigation Scheme* outlines development control measures with the purpose to preserve levee integrity and maintain visibility and access. While grass cover on a levee is permitted, the grass requires regular mowing to allow inspection of the levee. Non-woody plants of up to 1.2 m tall are permitted within the 10 m buffer zone around the levee. Trees, shrubs and woody plants must be planted at least 10 m away from the levee due to risks associated with ground destabilisation when trees are toppled or die. Additional restrictions are in place for spillways; however, they are not relevant at this location.

3.3 Community uses

From a community perspective, consideration should be given to factors such as amenity, shade and useability of the area. Safety is also a major consideration as trees risk toppling over from floods and branches may fall in strong winds. The vegetation will need to be properly maintained to avoid any safety risks.

Community involvement in the project is desired as it would strengthen the sense of ownership; the foreshore is a place that belongs to everyone and in return everyone values and looks after it. The plantings on the upper riverbank and floodplain are proposed to be done with community involvement, while the more exposed areas along the lower bank will be planted under other projects as MCC plantings.

Due to its public nature, the site may also be subject to vandalism. Destruction of plantings may occur and measures should be taken to avoid this. Consideration should also be paid to Crime Prevention Through Environmental Design (CPTED) principles when planning the plantings.

The site has no current management plan. The Lorn Riverbank Plan of Management was finalised in 2015 but is not in effect.





4 METHODOLOGY

4.1 Field assessment

A detailed field assessments was carried out by Petra Arola (Water Technology Pty Ltd) on 27 September 2023, also attended by Deanne Nelson-Pritchard and Will Brown from MCC and Bob Dennerly, a local community representative. The field investigation included:

- Ecological condition assessment including a broad assessment of the vegetation on site including presence of native species to determine the Plant Community Type (PCT) compared to mapping data that is currently present upstream and downstream, as well as exotic species.
- Geomorphic condition assessment including identification of the bank sediment type (e.g. gravel, sand, silt) and the occurrence and scale of riverbank erosion.
- Current area uses including community uses of the site, existing flood mitigation measures, and any other infrastructure.

Figure 4-1 through Figure 4-5 were obtained during the site visit and feature some of the key areas of the site.





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Figure 4-1 Location of former land care site, looking towards Belmore Bridge



Figure 4-2 Bank erosion under Belmore Bridge



Figure 4-3 Events area and dog off leash area as seen from Belmore Bridge



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Figure 4-4 Foreshore with uprooted Willows and patchy groundcover

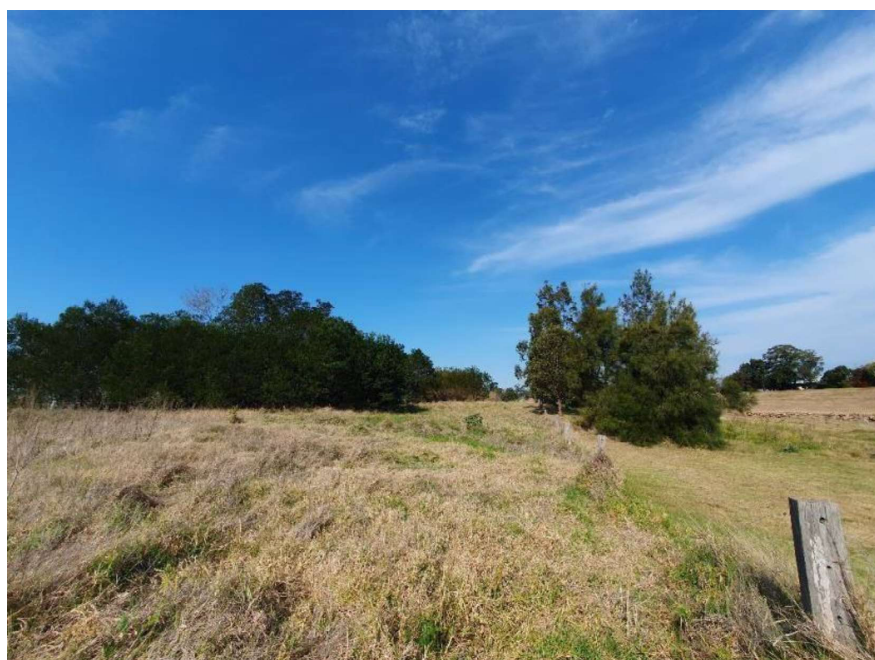


Figure 4-5 Old paddock area currently surrounded by fence



4.2 Desktop assessment

4.2.1 Vegetation mapping

NSW State Vegetation Type Mapping (SVTM) was reviewed for the site, as well as upstream and downstream locations. The SVTM is a regional-scale map of each of the three levels of the NSW vegetation classification hierarchy. It maps the distribution of each PCT, Vegetation Class and Vegetation Formation. The site itself has no mapped PCTs, as is the case for nearby downstream locations. The site is located within the Sydney Basin IBRA Region and Lower Hunter Channels and Floodplains (Het) Mitchell Landscape.

Upstream of the site, the dominant PCT mapped on foreshore sites with similar conditions as the subject site is PCT 3083 - Lower Hunter Tuckerroo Riparian Rainforest. The PCT originally occurred on alluvial flats of the lower Hunter and Paterson rivers in areas that have now been extensively cleared, leaving only small remnant patches. All known occurrences of this PCT are highly disturbed and have a low native species richness, making it difficult to set the standard for evaluation and assessment for the PCT.

Based on available data, this PCT is a tall, dense rainforest, sometimes with very tall sclerophyll or River sheoak (*Casuarina cunninghamiana*) emergents, with a canopy including Native quince (*Alectryon subcinereus*), Blueberry ash (*Elaeocarpus obovatus*), Whalebone tree (*Streblus brunonianus*), Tuckerroo (*Cupaniopsis anacardioides*) and Port Jackson fig (*Ficus rubiginosa*).

PCT 3083 is a part fit with the following listed Threatened Ecological Communities (TECs):

- Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions, Vulnerable under the *Biodiversity Conservation Act 2016* (BC Act);
- Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions, Endangered under the BC Act; and
- Lowland Rainforest of Subtropical Australia, Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

It should be noted that revegetating an area to restore the local communities, habitats and ecosystems is a difficult task on its own from an ecological point of view. In the plantings at Lorn, there are a multitude of additional factors to be considered as outlined below which partly conflict with the ecological goals for the plantings. Therefore, planting a smaller area of this PCT in a more protected location could be a more suitable approach rather than revegetating the PCT across the entire site.

Other species that are hardy and occur commonly along the Hunter River that would be well suited for planting on the site include Casuarinas e.g. Swamp oak (*Casuarina glauca*), River red gum (*Eucalyptus camaldulensis*), Spotted gum (*Corymbia maculata*), Ironbarks e.g. Red ironbark (*Eucalyptus fibrosa*). There is a local population of River red gum in the Hunter catchment, the only one occurring in a coastal catchment and therefore of conservation significance. This population forms part of the Hunter Floodplain Red Gum Woodland ecological community listed as endangered under the BC Act.

During the site visit, discussions regarding planting of cedar were had. Due to low planting success and difficulties with maintaining the tree's health and longevity this is not recommended. If cedar was to be planted the White cedar (*Melia azedarach*) is preferred due to the site being within its natural distribution range.

4.2.2 Flooding

Local flood data was reviewed from the *Hunter River Branxton to Green Rocks Flood Study* (WMAwater, September 2010). This is the most recent flood study for the area (noting the later *Hunter River Review of Branxton Flood Levels* [WMAwater, 2013] revision does not cover this location).



The UNSW Water Research Laboratory letter dated 16 June 2022 titled *Expert advice for planting of trees on floodplains*, as well as the *Development within the Hunter Valley Flood Mitigation Scheme: Development Control Guidelines* (NSW Department of Planning, Industry and Environment, 2021) was additionally referenced regarding interactions between the plantings and flood mitigation plans and structures.

The topography of the site is shown in Figure 4-6. Due to recent flooding and ongoing bank erosion, the steepness and shape of the riverbank has changed and is likely to continue to do so.



Figure 4-6 Topography of the subject site

4.2.3 Community uses

Community and other uses of the site were discussed with MCC representatives during the site visit and are shown in Figure 4-7.

The western area of the site is the location of community events, including the New Years Eve fireworks, music events, and the Australia Day floating event. A section of the parkland should be set aside for these events, and the proposition is to not do any plantings closer to the bridge on the upper foreshore/floodplain.

The eastern section is currently fenced off by an old paddock fence and does not contain any infrastructure. No landscaping appears to be undertaken within this area as the grass is tall and the vegetation is dominated by weeds and fast growing species. This site is proposed for community plantings and a more parklike structure with a walkway.



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The middle section is narrower and appears to mainly be used for walking and cycling along the existing paved pathway. This area could benefit from shading and the suggestion is to plant clumps of trees while keeping the understorey open.

The lower bank and immediate foreshore is occasionally used as a local beach, but the water level in the river is normally low. Plantings along here would be undertaken to stabilise the sandy riverbank and stop erosion.



Figure 4-7 Community and other uses of the site

5 RESULTS

5.1 Restrictions

Plantings of a height more than 1.2 m are to remain outside the 10m buffer area of the levee. Additionally, no plantings should be undertaken close to the bridge to avoid compromising its structural integrity. For this purpose, the subject site for the plantings is from the powerline easement to the southeast. If plantings are planned within the easement the power company needs to be consulted.

The events area would be kept open and available for larger scale events, with some trees potentially planted around the edges and by the existing patch of trees to extend the shaded area. By increasing the shade, it would provide a spot to picnic and relax outdoors, as well as a chance to cool down for dog walkers and those using the area for exercise.



While the current patchy groundcover along the lower riverbank would benefit from plantings to halt erosion, it is better done as part of MCC plantings rather than community plantings due to the high risk of flooding and planting failure. Revegetation should be done using hardy groundcover species which are both drought and flood tolerant, and that do well in a sandy sediment. Once the plantings on the foreshore are more established, the remaining willows should be removed both due to being WoNS and to minimise risk of bank destabilisation.

As discussed during the site visit, the bank erosion and stabilisation projects will be addressed under future projects such as the Coastal Management Program, as engineering solutions are likely to be required. The main focus of this project will be on beautification and community involvement, and therefore areas on higher ground are better suited, primarily the area around the eastern carpark and the old paddock.

Figure 5-1 and Table 5-1 summarise the restrictions and planting opportunities.



Figure 5-1 Planting zones

Table 5-1 Planting zones

	Zone	Restrictions	Suitable plantings
Focus Area for community plantings	Paddock	None, keeping in mind flood impacts and community uses	Larger trees, shrubs, manicured plantings
	Pathway	Can be subject to higher flood velocities	Clumps of trees
Future focus area for plantings	Events area	Keeping area open	No plantings at this stage, in future some scattered trees may be planted
Planted under CMP	Foreshore	Frequent inundations as water levels change	Reeds, sedges, rushes which thrive in wet environments and have strong root systems



	Riverbank	Regular inundation due to flooding	Grasses, shrubs, small trees that withstand and are adapted to flood waters and harsh condition
	Zone	Restrictions	Suitable plantings
No plantings planned	Bridge and easement	Powerline easement Bridge structures	Subject to consultations with relevant authorities
	Levee buffer	No plantings taller than 1.2m within 10m of the levee	Grasses, forbs, ferns, shrubs up to 1.2 m tall
	Flood levee	Maintain visibility to check for structural soundness	Grass

5.2 Ecology

5.2.1 Choice of species for planting

When selecting species for planting, preference should be given to local provenance species. By planting those species that naturally occur in the area, the local ecosystem is strengthened and the resilience improved. Flora species also tend to do well in their natural range of occurrence, increasing the planting success rates.

Any planted species may spread downstream and therefore care has to be taken to not choose species that may end up causing problems further downstream. Common reed (*Phragmites australis*) is one example where the species would be well suited for the Lorn foreshore; however, if left unmanaged may choke waterways downstream.

It is also important to use practical species that have a strong root system that will stabilise them, particularly in flood events. Trees that are common on floodplains and in wet areas are also more likely to survive a heavy soaking of the root system that a flood event brings. Species that are generally hardy will have a much higher success rate than sensitive species that require stable or highly specialised conditions to thrive.

Attention should also be paid to species that may improve the local ecosystem e.g. by providing habitat or food resources for native species. Lorn and Maitland have had issues with a local population of flying-foxes feeding and roosting in unsuitable locations. By planting suitable feed and habitat trees this population may be relocated to the public parkland along the foreshore, away from private residences and infrastructure.

As per MCC preference, the view over the riverbank would preferably be maintained along the top of the riverbank. This can be achieved by planting trees that once mature have limited lower branches, and by not plantings shrubs and tall groundcover in selected areas.

Any vegetation planted will also need to be managed. Therefore, it is recommended to use low-maintenance (hardy) species and species that are easily pruned and monitored to avoid safety hazards. Future weather patterns and climate change should also be accounted for, with harsher climates predicted for the region including extended droughts and higher rainfall in wet seasons.

The plants that form part of the local PCT are listed in Table 5-2. Table 5-3 outlines general species that would be well suited for planting on the site based on their natural range of occurrence, as well as their suitability for the site conditions and intended purpose as bank stabilisation. The proposed planting zone on the bank is also



defined. More general species for plantings can be found in the *Hunter River Estuary Riparian Revegetation Guide* published by Local Land Services in 2020.

Limitations also include plant availability from nurseries. MCC uses local native plant nurseries and generally has not had issues sourcing tube stock. Provided sufficient warning is given the local native nurseries may be able to provide stock of less common species including rainforest species.

Table 5-2 PCT 3083 - Lower Hunter Tuckerroo Riparian Rainforest species by growth form

Growth form	Scientific name	Common name
Tree	<i>Ficus rubiginosa</i>	Port Jackson Fig
	<i>Casuarina cunninghamiana</i>	River Sheoak
	<i>Cupaniopsis anacardioides</i>	Tuckerroo
	<i>Elaeocarpus obovatus</i>	Blueberry Ash
	<i>Streblus brunonianus</i>	Whalebone Tree
	<i>Clerodendrum tomentosum</i>	Hairy Clerodendrum
	<i>Scolopia braunii</i>	Flintwood
	<i>Pararchidendron pruinosum</i>	Snow Wood
Shrub	<i>Alectryon subcinereus</i>	Native Quince
	<i>Capparis arborea</i>	Native Pomegranate
	<i>Breynia oblongifolia</i>	Coffee Bush
	<i>Backhousia myrtifolia</i>	Grey Myrtle
Groundcovers	<i>Adiantum aethiopicum</i>	Common Maidenhair
	<i>Lomandra confertifolia</i>	Mat-rush
	<i>Cissus antarctica</i>	Kangaroo Vine

A complete list of PCT species by growth form with median cover can be found in the Bionet Vegetation Classification tool and should be consulted prior to undertaking any plantings intended to restore this PCT.

Table 5-3 Example of species for general planting

Bank section	Scientific name	Common name
Floodplain and upper bank (Paddock, Pathway, Events area, upper Riverbank as per Figure 5-1)	<i>Eucalyptus camaldulensis</i>	River Red Gum
	<i>Corymbia maculata</i>	Spotted Gum
	<i>Eucalyptus fibrosa</i>	Red Ironbark
	<i>Eucalyptus tereticornis</i>	Forest Red Gum
	<i>Casuarina glauca</i>	Swamp Sheoak
	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark



	<i>Callistemon sieberi</i>	River Bottlebrush
	<i>Callistemon salignus (Melaleuca salicina)</i>	Willow Bottlebrush
	<i>Eucalyptus melliodora</i>	Yellow Box
	<i>Angophora floribunda</i>	Rough-barked Apple
Ledge (Foreshore and lower Riverbank as per Figure 5-1)	<i>Scirpus validus</i>	River Club Rush
	<i>Baumea articulata</i>	Jointed Rush
	<i>Juncus usitatus</i>	Common Rush
	<i>Eleocharis sphacelata</i>	Tall Spikerush
Bank section	Scientific name	Common name
	<i>Carex appressa</i>	Tall Sedge
	<i>Phragmites australis</i>	Common Reed

5.2.2 Planting

Plantings would ideally be undertaken in early autumn as the cooler temperatures will increase the success rate. Other seasonal factors such as climatic events (e.g. La Niña) and unseasonal weather should also be considered.

Different plants should be planted in different zones as outlined in section 3.1 of this report. Refer to the diagram in Figure 5-2 for an overview, noting that the example species are general and not specific for Lorn foreshore.

It is recommended the plantings are done from the top of the bank down. In flood events, these areas will be most protected and has a higher likelihood of survival. Once established, these plantings provide protection for the next lot of plantings in more exposed areas. Using more mature trees for planting also increases the success rate as they are more tolerant. It also minimises the risk of trampling and vandalism of new plantings.

It is recommended a section of the old paddock site is dedicated to revegetation of the local rainforest community, e.g. on the back corner or as a central piece surrounded by a walkway. This area should be treated as a 'natural' ecosystem site and be closed off from public access to allow proper restoration of the ecosystem and avoid trampling and other detrimental impacts. The revegetation of this PCT will likely require more resources and management than the open and more general plantings.

The mix of species on the sites and planting densities will also need to be considered. Especially trees that are planted too densely will suffer and should be planted far apart to give them space to grow. Involvement from specialists such as AABR, contractors or MCC staff with knowledge in the area during the plantings will be beneficial for this aspect.

Planting patterns will also need to be considered. Single trees create swirls in flood water and are more likely to be toppled over in flood events. By planting trees in clumps, the trees break up the flood water and help slow down the flow. Slower velocities means the trees have a better chance of withstanding the effects of flooding.

To increase success rates, tube stock is generally preferred over seed for trees, shrubs and larger plants. For native grasses and groundcover seed is the preferred option, however the seeding needs to be done in a low



rainfall period and watered frequently to allow quick germination and root development. More mature trees can be planted in areas where vandalism may occur as the more mature specimens are more tolerant.

The plantings would be done in steps over time to allow for planting in where plantings did not make it. All existing vegetation on the site would be kept for now and either incorporated in the new plantings or removed over time (notably the Willows and Acacia bushes). Existing vegetation provides shelter and protection for seedling plantings and can be removed once they start competing for resources.

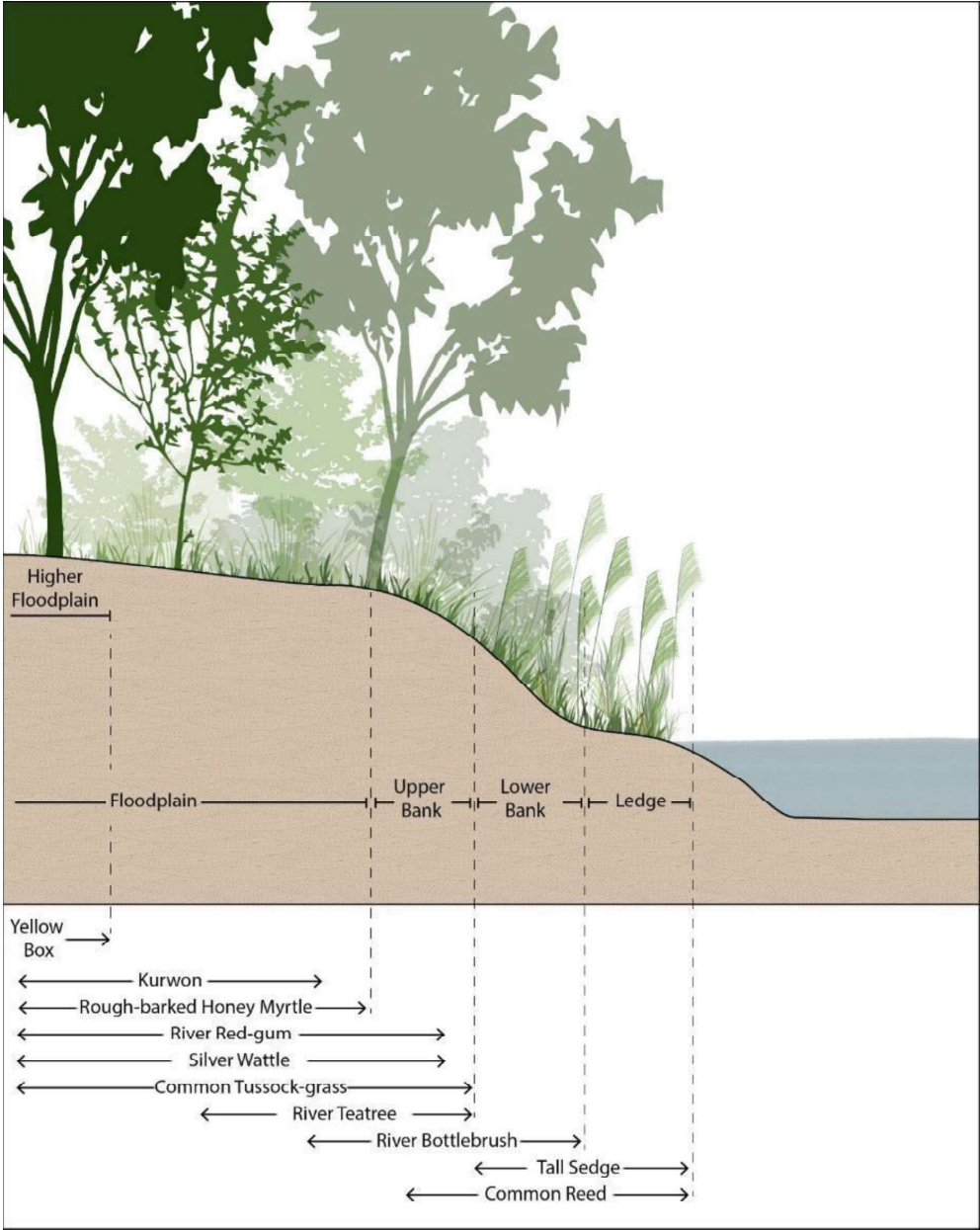


Figure 5-2 Diagram over species plantings in different zones on the riverbank. The species mentioned are general in nature and not specific to the Lorn foreshore site.



5.3 Flooding

Table 5-4 summarises the flood levels and velocities (where available) from the *Hunter River Branxton to Green Rocks Flood Study* (WMAwater, September 2010).

Table 5-4 Flood levels at Belmore Bridge (adjacent to the site)

Flood Annual Exceedance Probability (AEP)	Peak Flood Level (m AHD)	Estimated Peak Flood Velocities (m/s) (where available)
50%	Between 6.75 – 7.00*	N/A
20%	Between 9.25 – 9.25*	N/A
10%	Between 10.25 – 10.75*	N/A
5%	11.1**	N/A
2%	11.5**	N/A
1%	11.7**	In river: 3 – 5 Directly adjacent to river: 2 – 3 Majority of foreshore area: 1 – 2
0.5%	11.9**	N/A
'Extreme'	13.3**	In river: 3 – 5 Directly adjacent to river: 2 – 3 Majority of foreshore area: 1 – 2

*Inferred from mapping **Level at Belmore Bridge reported in flood study

Flood velocities are only reported in the flood study for the 1% AEP and the 'Extreme' floods. In these events, there are velocities up to approximately 3 m/s directly adjacent to the river, with the majority of the foreshore area in the 1 – 2 m/s range. While shallow floodwaters with velocities of 1 – 2 m/s can be relatively low-hazard, higher flood velocities of 2 m/s and above are hazardous for people. However, it would be expected for these velocities to be lower in smaller and more frequent floods (although the data is not available).

The approximate areas of inundation based on the above flood levels on the river side of the levee for the more frequent events are shown in Figure 5-3. Note that this is an approximation only based on the flood levels (only on the river side of the levee) and not based on detailed flood modelling.

This shows that the area up to 35 m away from the riverbank is inundated as frequently as the 50% AEP flood (i.e. a 1 in 2 year recurrence interval). This means the areas close to the river are very susceptible to flooding in small and frequent floods. The areas directly adjacent to the levee are inundated in 10% AEP or less frequent floods.

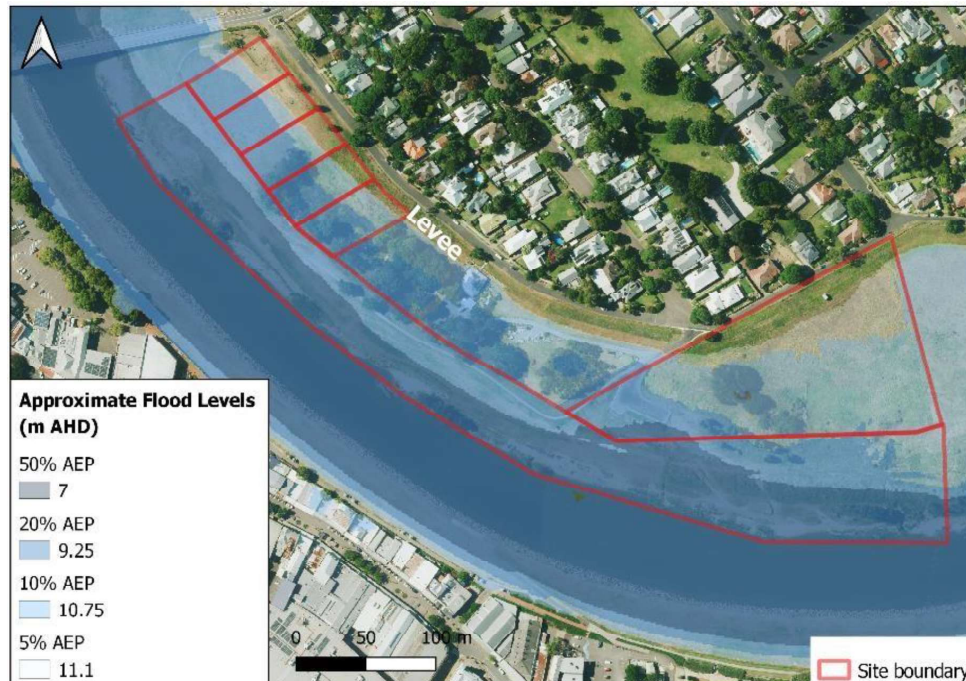


Figure 5-3 Approximate area of inundation in floods on the river side of the levee

As per the UNSW Water Research Laboratory letter dated 16 June 2022 titled *Expert advice for planting of trees on floodplains* and the *Development Control Guidelines for Development within the Hunter Valley Flood Mitigation Scheme*, generally the planting of trees on the floodplain will have minimal or no impacts to flood behaviour. However, trees may impact flood mitigation assets if planted on or directly adjacent to them, as fallen trees have the ability to obstruct and/or damage the assets. The following is recommended:

- Only regularly mowed grass cover on the levee itself;
- Only non-woody plants of up to 1.2 m tall within a 10 m buffer zone around the levee; □

Trees, shrubs and woody plants planted at least 10 m away from the levee.

It is noted that trees and dense riparian vegetation will help stabilise the riverbank, reduce sedimentation of the river, and therefore reduce local flood impacts. Vegetation directly along the riverbank, in the area that is expected to flood every two years on average, particularly would help decrease erosion and therefore flood impacts. However, it would be expected that vegetation in this area is frequently inundated with relatively shallow and low velocity flood waters, and less frequently inundated in larger events with greater flood depths and velocities. It is also noted that dense vegetation can slow down floodwaters' speed and redirect floodwaters, causing the flood front to widen. However, it is unlikely that revegetation of the proposed scale would have a significant change on flood behaviour in the study area, particularly due to the flood control of the levees. This would likely only be the case if the width and shape of the channel is significantly modified due to the planting of vegetation.



5.4 Community

Involvement from the indigenous community is strongly recommended. The local indigenous community has a vast amount of knowledge about the area and a cultural connection to the land, and it may be possible to include some of this in the project through planning of plantings and practices such as cultural burns. Ideally, the indigenous community would be involved from an early stage and maintained as an important party throughout the project and beyond.

For the community plantings, a proper briefing session should be held to inform the group about the context and plans for the planting. A strong focus should be placed on discussion around the plant survival rate and the risk of losing all plantings in case of extreme weather.

Once the plantings are done, it is advisable that the community involvement continues through e.g. monitoring, watering, weeding and other vegetation management. A citizen science approach can also be taken by e.g. documenting the vegetation growth and recording fauna species sighted using the local area and the plantings for habitat and identifying any changes to this.

For projects that involve regeneration of native bushland it is good practice to include organisations such as the Australian Association of Bush Regeneration (AABR) that specialise in bush regeneration. They can help both by giving out information and practical assistance and would help ensure that the plantings are done correctly and efficiently to maximise the success rate.

It is also worth tapping into existing local community groups to engage and spark interest for the plantings. Local Landcare groups as well as local community groups such as Lions, Rotary and Apex may be interested in supporting the plantings both financially, socially and through practical assistance.

6 RECOMMENDATIONS

The following recommendations are made for the proposed community plantings at Lorn:

- ❑ Main areas of plantings is the old paddock area, around the car park and along the existing pathway.
- ❑ Plantings of scattered trees along the roadside of the events area can be considered as long as it is outside the flood levee buffer.
- ❑ No plantings should be undertaken on the flood levee or 10 m around it. Plantings under the powerlines or close to the bridge are subject to consultation with the relevant authorities.
- ❑ Plantings should be undertaken using appropriate plant species for the intended purpose and for the local ecology, preferably using local provenance native species.
- ❑ PCT 3083 - Lower Hunter Tuckeroo Riparian Rainforest is locally occurring and considered the most suitable vegetation community for restoration purposes. This PCT should be planted as a separate community using only characteristic species and should be closed off from public access.
- ❑ Due to multiple limitations across the site (flooding, community uses, amenity, safety, erosion etc.), the plantings need to be adapted to reflect the site demands. Therefore some more general plantings are suggested for the more restricted areas, using hardier, low-maintenance and more commonly available species.
- ❑ When selecting species the following factors need to be considered among others: availability, tolerance, practicality, habitat features, safety, maintenance requirements, and long-term planning.
- ❑ Choice of species, season and planting timing, species mix, planting density, seedling maturity, maintenance and appropriate plant zoning will all affect the success rate of the plantings.



- Riparian vegetation can help stabilise the riverbank, reduce sedimentation of the river, and therefore reduce local flood impacts.
- Dense vegetation can also slow down floodwaters' speed and redirect floodwaters, causing the flood front to widen. It is unlikely that revegetation of the proposed scale would have a significant effect on flood behaviour in the study area, particularly due to the flood control of the levees. This would likely only be the case if the width and shape of the channel is significantly modified due to the planting of vegetation.
- A broader community involvement is recommended to include a range of groups and strengthen the sense of ownership of the site.

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Officers Reports

FORMER ANAMBAH LANDFILL REMEDICATION AND FUTURE USES OF THE SITE

Attachment 1 - Final Land Use and Remediation Options Assessment (Under Separate Cover)

Meeting Date: 27 February 2024

Attachment No: 1

Number of Pages: 52



Final land use and remediation options assessment

Anambah Former Landfill

Maitland City Council

14 February 2024

➔ **The Power of Commitment**



Project name		Remediation of Former Anambah Landfill					
Document title		Final land use and remediation options assessment Anambah Former Landfill					
Project number		12581229					
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Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	C. McDonell A. Jose J. Petersen	I. Gregson		I. Gregson		05/09/23
S3	B	C. McDonell	I. Gregson		I. Gregson		22/01/24
S3	C	C. McDonell	I. Gregson		I. Gregson		09/02/24
S3	D	C. McDonell	I. Gregson		I. Gregson		14/02/24

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Executive Summary

Maitland City Council (Council) owns, and previously operated, the former Anambah Landfill (the site) located on Anambah Road, Rutherford NSW. The site has been the subject of several stages of site investigation and assessment since its closure, including a program of ongoing monitoring.

Council is now focussing on the next steps for management of the site, which include planning for remediation and selecting a preferred future land use. Potential future land uses were assessed and comprised a combination of:

- Passive recreation / managed green space
- Commercial / Light industrial
- Solar

Consideration of various constraints was used to develop three conceptual site layouts for the commercial / light industrial land use, which included:

- Option 1: Commercial / light industrial being built only on areas that do not contain landfilled waste
- Option 2a: Commercial / light industrial being built over top of landfilled waste
- Option 2b: Commercial / light industrial being built over areas that currently contain landfilled waste but following waste removal and relocation – i.e. the same footprint as Option 2a

All three options included a solar farm on the eastern portion of the site.

Council assessed the options and considered that Option 2b was not feasible due to potential impacts to receptors, unclear regulatory pathway and risks and costs associated with relocating waste.

Council's preference was to develop the unimpacted north-west corner of the site, capping the remainder of the site and establishing a solar farm on the cap (Option 1). They also propose to leave the opportunity open to develop a further portion of the site if it becomes feasible in the future (Option 2a).

The following is recommended to progress to the next phase of the project:

- Proceed with planning of remediation works to suit the preferred land use options.
- Engagement with regulators to discuss planning approvals and rezoning. It is likely that a number of specialist studies will be required as a result of this.
- Conduct additional electrical network studies for the solar farm as an integral component of the connection application process including early discussions and consultation with Ausgrid.
- Undertake more detailed design of the site redevelopment to assist with approvals and to allow construction of remediation measures.
- Detailed cost / value comparison of Options 1 and 2a (in conjunction with detailed design) to more accurately estimate the construction costs and potential financial benefit from developing over the waste footprint adjoining Anambah Road. This may include adjusting the footprint of Option 2a to optimise the potential financial benefit.

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1. Introduction

Maitland City Council (Council) owns, and previously operated, the former Anambah Landfill (the site) located on Anambah Road, Rutherford NSW, as shown in Appendix A. The landfill ceased domestic waste disposal operations in late 1993 and is noted to be without environmental management systems compliant to modern standards.

The former landfill site has been the subject of several stages of site investigation and assessments since its closure, including a program of ongoing monitoring. More recently, investigations have concentrated on the management of landfill gas (LFG) and modelling of LFG and leachate generation. A thorough understanding of the extent of impact and how to manage LFG emissions is required before Council can progress potential remediation and long-term management of the site, ultimately for a productive end use.

Council is now focussing on the next steps for management of the site, which include planning for remediation and selecting a preferred future land use. Potential future land uses for consideration have been agreed with Council and comprise a combination of:

- Passive recreation / managed green space
- Commercial / Light industrial
- Solar

It is Council's objective that the selected land uses are able to achieve a financial return to help offset the cost of the remediation.

1.1 Purpose of this report

The key purpose of this report is to identify opportunities and constraints associated with the nominated land uses, to facilitate discussions with Council to select an optimal combination of land uses and to set out the basis on which the selection has been made.

1.2 Scope

The scope of this report includes the following:

- Technical assessment to inform the limits of feasibility for future land-use on the basis of geotechnical constraints associated with construction on old landfills.
- Assessment of potential for commercial land use on a portion of the site, comprising a high-level consideration of development cost, geotechnical structural risk, landfill remediation requirements, third-party land use impacts and future maintenance costs to Council.
- High level desktop assessment of the potential for the site to be used for solar PV energy generation.

1.3 Limitations

The findings and conclusions expressed in this report are subject to the scope of work outlined above and the Limitations Statement which is included Section 8.

This report is a high-level assessment of constraints and opportunities based on nominated land use options selected in agreement with Council, and should not be considered as detailed assessment or design. Issues considered are limited to those associated with the former landfill.

2. Existing site

2.1 Site identification

The former Anambah Landfill is triangular in shape, located on the eastern side of Anambah Road near the intersection of the New England Highway and Anambah Road in Rutherford, NSW. The site location and boundary are depicted in Appendix A. A summary of the site identification details is presented in Table 2.1 below.

Table 2.1 Site identification summary

Information	Details
Site address	Anambah Road, Rutherford, NSW
Current Lot and DP	Lot 2 Deposited Plan (DP) 1176708
Site area	Approximately 20 hectares (ha)
Site owner	Maitland City Council
Local government area (LGA)	Maitland City Council
Local land use zoning	Public recreation – RE1 on Maitland Local Environment Plan (LEP) 2011
Current land use	Vacant land
Surrounding land use	<p>North: Immediately to the north are residential properties on Cagney Road (zoned R1 general residential). Beyond the R1 properties are those zoned as rural landscape (RU2) and Environmental Living (E4). An E2 environmental conservation zoning is approximately 600 metres (m) to the north of the site.</p> <p>East: The majority of the land directly to the east is zoned as R1 however only land adjoining the southern half of the eastern boundary has been developed. This is a residential estate known as Signature Gardens Retirement Resort. A vacant block of land, identified as Lot 1 DP 1243663 owned by Council, is located immediately east of the northern half of the eastern site boundary of the former Landfill site. More R1 residential properties are located beyond.</p> <p>South: At the southern boundary of the former Landfill site is the New England Highway. Beyond that is an extensive commercial/light industrial estate zoned B5 business development. Signature Gardens Retirement Resort adjoins the southern boundary of Lot 1 DP 1243663.</p> <p>West: Anambah Road is located immediately to the west. Land further west is zoned B5 and contains a mixture of commercial/light industrial properties and vacant blocks yet to be developed.</p>

2.2 Environmental setting

The environmental setting of the site is described in detail in the *Consolidated Assessment Report* (GHD, 2021), with a summary presented in Table 2.2 below.

Table 2.2 Environmental setting

Information	Details
Topography	The majority of the former Landfill site is raised with respect to surrounding land areas (which are relatively flat), with surface levels between approximately 18 m and 24 m Australian Height Datum (AHD). There is a slight overall fall towards the east, north east in the northern half of the site, whilst the southern half generally falls gently to the south. The landfill surface has localised rises (up to 6 m) and dips as a result of filling and capping of the landfill cells.

Information	Details
Hydrology	<p>In the area around the site, there are creek lines with artificial dams located to the north (approximately 350 m) and west (approximately 150 m) of the site boundaries. The dams to the west appear to be predominantly stormwater retention basins which likely overflow to the south into Stoney Creek. The drainage line and dams to the north are more prominent features with a series of individual dams, the largest in an area of historical swamp or wetland habitat, which ultimately drain into the Hunter River, located approximately 1.3 km north of the site boundary.</p> <p>On the former Landfill site, perimeter batters are present with the toe of batters falling inside the property boundary. Stormwater drainage channels run adjacent to the edge of the landfill along all boundaries, collecting surface runoff and discharging into an existing watercourse running south under the New England Highway into Stoney Creek. The northern boundary of the former Landfill site drains to the west and then to the south along the western boundary of the site; while the eastern boundary drains directly to the south.</p> <p>Biofiltration trenches exist along most of the northern and eastern site boundaries of the former Landfill site, creating localised channels and lower lying areas.</p>
Soil landscape and geology	<p>Reference to the 1:100,000 Soil Landscape Sheet of the Newcastle Region, produced by the NSW Department of Land and Water Conservation (DLWC, 1995), indicates the site is characterised by the Wallalong (wga) group. The Wallalong group comprises alluvial fans and drainage plains on sediments of the Permian Dalwood Group in the East Maitland Hills region. It is extensively cleared tall open-forest with slopes of 1-3% with relief up to 30 m. Soils are soloths, lithosols or podzolic.</p> <p>Reference to the Newcastle 1:250,000 Geological data set indicates that the site is underlain by the Rutherford Formation of the Dalwood Group, comprising siltstone, marl and minor sandstone. This is consistent with the Newcastle 1:100,000 Geological Sheet 9232 (Geological Survey of NSW, 1975).</p> <p>Subsurface conditions encountered in a geotechnical investigation within the former Landfill site undertaken by Cardno (2016) may be summarised as:</p> <ul style="list-style-type: none"> – Capping – uncontrolled fill between 0.2 m to >1.8 m of predominantly high plasticity clay with insitu test results indicating firm to very stiff consistency. – Waste / Refuse – encountered to depths of between 5.5 m and 8.5 m below surface level (approximately 4 m – 7 m thick). – Alluvium – encountered clay in boreholes BH004 and BH005 and cone penetrometer test (CPT) CPT2A to CPT4 to the depth of the investigation. <p>Of note is extremely weathered rock encountered in test pit TP112 at a depth of 1.7 m below surface. Geotechnical investigation undertaken along the existing biofiltration trench alignment by Douglas Partners (2017) indicates subsurface conditions are relatively consistent and comprise:</p> <ul style="list-style-type: none"> – Fill – up to approximately 5.3 m thick, typically between 1.5 – 2.5 m thick (trench 1) and 2.0 – 3.5m thick (trench 2). Comprises firm to stiff clay. – Alluvium – to the depth of the investigation (8 – 15 m) comprising very stiff to hard clay. Alluvial sand was encountered at a depth of >8 m in test locations 1010/3030, 1016 and 1017/2017/3017.
Acid sulfate soils	<p>The 1:25000 Acid Sulfate Soils (ASS) risk map for Maitland as published by the DLWC (1997) indicates that there is no mapped evidence to suggest the occurrence of ASS</p>
Hydrogeology	<p>From previous investigations and monitoring, the regional groundwater table appears to be at a depth of approximately 12 m below the ground surface surrounding the landfill (i.e. at an elevation of approximately 8 m AHD), with flow direction to the north-west (RCA 2003, as cited in DLA (2014) and ERM (2019)). GHD notes there may be some uncertainty with regard to this flow direction.</p>
Site filling	<p>The former Landfill site appears to have had cells excavated across the site, based on old design/ work as executed (WAE) drawings from 1970 and 1976. The cells appear to have had a floor level ranging between 13.00-16.00 m AHD. They were then landfilled with waste. Finally, the waste was covered, or "capped" with material at thicknesses ranging between 0.1 m - 2.0 m. The source of the capping material is unknown. The total volume of landfilled waste was estimated to be 832,620 m³ (GHD, 2023a). Composition of the waste is generally unknown, except for the occasional requests to dispose of specialised or bulk waste noted in historical council documents.</p>

2.3 Site history

The former Landfill site was opened as a landfill in 1976 and operations ceased in September 1993 (ERM, 2019). It is unknown if the site was constructed with any basal liner system (however it is considered unlikely). Further details on historical operation of the landfill are provided in the Consolidated Assessment Report (GHD, 2021).

The composition of waste at the site is also unknown except for the occasional mention of specific waste type disposal applications in historical council meeting notes. Council has provided waste data from 1997 for their other site at Mt Vincent and it is considered possible that the waste data is comparable to that deposited at Anambah.

Historical ownership of the site is unknown prior to the commencement of landfilling in 1976. Subsequent to this time, the site has been owned by Council.

2.4 Regulatory information review

The site is not licensed under the POEO Act and it is not on the NSW EPA contaminated land register. The site was never explicitly managed under EPA guidelines and instead was under Council control and regulation.

The Former Anambah Landfill has been notified to the EPA under Section 60 of the CLM Act, and the site (including the former Landfill site and the western portion of Lot 1 DP 1243663) has been declared as 'significantly contaminated land' pursuant to Section 11 of the CLM Act, Declaration No. 20231104 dated 26 May 2023, based on methane and carbon dioxide emissions. A draft Voluntary Management Proposal (VMP) has been discussed with the EPA, and Declaration No. 20231104 is currently under review by the EPA.

Other key information includes:

- The landfill was closed in 1993 following a Land and Environment Court Case.
- A development application (DA) was submitted in 1995 regarding the rehabilitation of the site.
- A DA was submitted in 2004 for passive recreation of the landfill site (DA 04-0395).

GHD understands that neither of the above-mentioned developments proceeded.

2.5 Previous investigations

A thorough summary of previous investigations was undertaken in the Consolidated Assessment Report (GHD, 2021c).

Recent investigations and assessment carried out by GHD as part of a current engagement with Council are summarised in Table 2.3 below.

Table 2.3 Summary of recent investigations

Report	Summary
Anambah Former Landfill – Landfill Gas Generation Modelling Assessment (GHD, 2023a)	Describes the methodology and results of LFG generation modelling assessment for the former Landfill, based on the Australian Government's Clean Energy Regulator – National Greenhouse and Energy Reporting (NGER) Solid Waste Calculator 2021-22. Includes description of waste, estimated waste volume and modelled LFG generation, with a comparison to LFG monitoring results.
Anambah Former Landfill – Leachate Infiltration Modelling and Water Balance (GHD, 2023b)	An infiltration modelling assessment to estimate the leachate generation rates. The modelling comprises a Hydraulic Evaluation of Landfill Performance (HELP) model and water balance spreadsheet, in accordance with the NSW EPA's Environmental Guidelines: Solid Waste Landfills, 2nd Edition (2016). The letter outlines the methodology, assumptions, and results of the infiltration modelling including a comparison of existing cap conditions with an engineered cap (i.e. post remediation of the landfill).
Anambah former landfill – Review of effectiveness of biofiltration trenches (GHD, 2023c)	Updated review of the effectiveness of the existing biofiltration trenches in preventing subsurface migration from the landfill and reducing concentrations of methane captured by the trenches before discharge to atmosphere. Also considers the likely effectiveness of rehabilitating the existing trenches, and the constructability and likely effectiveness of alternative replacement trench arrangements.

Report	Summary
Anambah former landfill – Construction details of existing leachate monitoring wells (GHD, 2023d)	Assessment of construction details and condition of existing leachate monitoring wells W7 to W11 located on the landfill site, by use of geophysical investigation and down-hole camera inspection.
Anambah Landfill Additional LFG Well Installation Report (GHD, 2023e)	Documents installation of three new nested pairs of wells (3 m and 5 m deep) adjacent to existing wells A5, C and G210 to allow vertical delineation of LFG in a transect east of the former Landfill; and one additional well (W13) installed in the north-east quadrant of the landfill. One round of LFG monitoring was undertaken at the new wells and the three existing adjacent wells.

2.6 Anticipated remediation requirements

The anticipated remediation requirements are likely to be as follows:

- “Do nothing” is not acceptable as LFG exceeding relevant criteria has been identified at and extending past the property boundaries, and presents a potential risk to existing and/or future residential development. The EPA Declaration (as described in Section 2.4) indicates remediation of the site is required, in particular measures to prevent ongoing migration of LFG from the site to surrounding properties. Management of surface water infiltration and leachate generation is also required. Management of methane is also recommended to minimise greenhouse gas emissions.
- As a minimum, construction of effective LFG interception trenches / barriers along the northern and eastern sides of the site is required to prevent ongoing migration of LFG from the site towards existing and proposed residential areas. This will not address the remaining issues identified by the EPA. Capping of the site would be required to minimise surface water infiltration and leachate generation, and would also assist in management of methane to minimise greenhouse gas emissions.
- The site is not likely to be suitable for the proposed land use options (except possibly for commercial / light industrial in the north-west corner of the site) without remediation.

3. Constraints to future land use

3.1 Overview

In assessing potential future land use options for the site, consideration needs to be given to potential constraints, which typically include:

- Buffer zone limitations
- Existing and future services
- Land ownership
- Land zoning
- LFG generation and emissions
- Leachate generation and migration
- Location of sensitive receptors and line of sight
- Settlement and stability of the landfilled waste
- Maintaining the integrity of the landfill capping layer, to prevent exposure of the landfilled waste
- Topography and drainage
- Impacts to nearby receptors during remediation / redevelopment works
- Maitland Airport

These aspects are discussed in more detail in the following sections.

3.2 Buffer zone limitations

Buffer distances are set to protect sensitive land uses from any adverse impacts from the failure of operational and/or engineering controls at certain facilities, including landfill sites, waste water treatment plants among others.

Buffer zones also prevent a sensitive land use encroaching too close to an industrial site, in this case, a landfill, which could result in the operation of the site becoming untenable as attempts are made to meet regulatory requirements to minimise impacts and risks to neighbouring receptors.

Buffer distances are provided for in statutory land use planning instruments and guidance documents relating to the relevant industrial site(s). For example, in NSW, there is no mandatory required buffer distance for an existing landfill site; rather the onus is on the developer to determine that development occurring in close proximity to a landfill site is acceptable. For new landfill sites in NSW, both NSW OEH and NSW DUAP recommend that a detailed site specific assessment be completed if a landfill site is proposed within 250 metres of a sensitive receptor, for example residential properties.

Council will need to carefully consider any relevant buffer distances required for the site itself and those required for any existing or proposed future developments on or adjacent to the site, noting that there is already residential development to the north of the site and a retirement village along the southern portion of the eastern boundary.

3.3 Existing and future services

The site is not known to have any services directly above the landfilled waste, instead services such as sewer and electricity go around the site.

The existence or future provision of services such as electricity, water and sewerage across a landfill site presents a number of potential issues due to:

- Ensuring that existing services are not damaged or otherwise compromised by future land uses (not applicable in this case, although existing sewer mains adjoining the eastern boundary are a consideration for design of the landfill remediation);
- Settlement of the landfilled waste which may damage or reduce the efficiency of future services;

- The potential lack of a suitable thickness of materials across the landfill site in which to install future services; and
- The location of existing or future services below ground, close to or in the landfill waste, which can lead to the infiltration of landfill gas or contact with leachate. This can present various hazards as discussed below in Sections 3.7 and 3.10 below.

There are a number of options and approaches to overcome the issues identified above, including:

- Installing electricity and communications wires above ground that is, on poles;
- Using flexible pipework, able to withstand settlement, for water reticulation, sewerage and stormwater drainage;
- Providing flexible connections, where services connect to a building or structure, which allow for the settlement of the landfilled waste;
- Ensuring that a sufficient thickness of revegetation materials is placed above the barrier layer to allow for the future installation of services. Alternatively, locally thickened services corridors could be provided;
- Discharging stormwater into above ground channels or drains.

3.4 Land ownership

Council currently owns the entire site which assists with decision making regarding the future land uses.

3.5 Land zoning

The site is currently zoned as Landfill – Public recreation – RE1 on Maitland Local Environment Plan (LEP) 2011. As per the LEP, this means that environmental facilities and environmental protection works do not need development consent. Uses that are permitted with consent include:

- Car parks
- Community facilities
- Information and education facilities
- Kiosks
- Markets
- Public administration areas
- Recreation areas
- Recreation facilities (indoor and outdoors)
- Roads
- Signage

Potential developments which are not permitted within RE1 without development consent would require either:

- the specific granting of a development consent; or
- Re-zoning of part or all of the site to an appropriate zone and the subsequent granting of development consent.

3.6 Landfill gas generation and emissions

LFG generation was estimated as part of GHD, 2023a *Anambah Former Landfill – Landfill Gas Generation Modelling Assessment*. The assessment found the following:

- The LFG generation rate was estimated to peak in FYE 1994 at 907 m³/h.
- Following the estimated peak in 1994, the LFG generation decreased significantly before tapering off more gradually post-2010.

LFG monitoring on and offsite has found high concentrations of LFG (in particular methane, in excess of 80% v/v), however with relatively low flow rates (<11.7 l/hr).

Evaluation and concept design of options for a LFG Trial / Pilot system are currently being undertaken, which will provide further information on LFG generation and feasible control methods.

It is currently anticipated that LFG will be managed in the longer term by the following measures:

- Placement of a final capping system over the landfill to reduce the vertical migration of LFG
- Installation of an active or passive LFG extraction system
- Rebuilding a cutoff trench along the northern and eastern boundaries to reduce lateral migration of LFG
- Regular LFG monitoring

Potential pathways for LFG emissions may include:

- Discharge through landfill final cover layer, for example via cracks or areas of erosion;
- Discharge through penetrations through landfill final cover layer, for example unsealed leachate wells;
- Discharge via sub-surface geology;
- Discharge via on and off-site sub-surface services; and
- Discharge from the LFG monitoring and management system.

The potential hazards associated with the emission of LFG include the following:

- Fire and explosion
- Inhalation, which may lead to asphyxiation or other damage to health
- Greenhouse gas (GHG) emissions
- Odour nuisance
- Plant death

LFG emissions also present significant issues in regard to the construction of buildings and structures and associated services above the landfilled waste. LFG could enter and accumulate within buildings and structures and/or associated services and present a significant risk in regard to explosion and/or asphyxiation.

To reduce the likelihood of this outcome, buildings and structures and associated services located on landfill sites are commonly designed to prevent LFG entry and accumulation. This can include:

- Installing a geomembrane beneath the building or structure;
- Installing an air space beneath the building or structure;
- Installation of landfill gas interception and drainage systems beneath the building or structure;
- Venting underground services; and/or
- Designing services to appropriate standards for potentially explosive areas.

3.7 Leachate generation and migration

Leachate generation was estimated as part of GHD, 2023b *Anambah Former Landfill – Leachate Infiltration Modelling and Water Balance*. The assessment found the following:

- Existing capping scenarios have infiltration into the cap between 16-24% of rainfall
- A cap compliant with NSW EPA landfill guidelines would have infiltration of less than 1% of rainfall

It is therefore expected that capping of the landfill will significantly reduce leachate production. It is currently anticipated that leachate will be managed at the site by the following measures:

- Monitor for leachate migration and surface water contamination;
- Inspect for surface breakouts;
- Cap the site to minimise surface water infiltration and surface water contamination;
- Consider requirements, costs and benefits of leachate removal and treatment; and
- Implement measures to minimise impact of leachate on groundwater or surface water if required, as determined by groundwater and surface water monitoring.

Potential pathways for leachate migration may include:

- Discharge through landfill final cover layer, for example via cracks or areas of erosion, especially along the toe of the side slopes;
- Discharge via sub-surface geology, as the site has no engineered landfill lining system;
- Discharge via on and off-site sub-surface services;
- Discharge from the leachate monitoring system; and
- Discharge from the landfill gas monitoring and management system.

The potential hazards associated with the migration of leachate include the following:

- Contamination of groundwater and/or surface water bodies;
- Erosion or failure of slopes and/or final cover layer;
- Death or injury to aquatic life;
- Odour nuisance;
- Human exposure;
- Corrosion or damage to building materials or services; and/or
- Plant death.

Perched leachate exists within the landfill mass. This may increase the likelihood of leachate discharge from the site. Currently no formal leachate extraction or treatment occurs at the site.

Removal of leachate from the landfill would expose more waste to air within the landfill and would likely result in greater generation of LFG. It could also result in increased settlement.

Leachate migration can also present issues in regard to the construction of buildings and structures and associated services above the landfilled waste as leachate can corrode concrete over time, hence weakening it, if the two come into contact.

To reduce the likelihood of this outcome, buildings, structures, land and associated services located on landfill sites are commonly designed to prevent leachate and concrete coming into regular contact, by for example building up rather than down into or through the waste mass where leachate may be present.

3.8 Location of sensitive receptors and line of sight

As noted in Section 2.1 residential properties exist adjacent to the northern boundary and Signature Gardens Retirement village is adjacent to the southern half of the eastern boundary (with plans to extend to the north). The majority of the landfill site is a raised mound with respect to the surrounding land so it will remain visible from many locations.

3.9 Settlement and stability of the landfilled waste

All landfill sites are subject to large long-term total and differential settlement, the magnitude of which depends upon a number of factors including:

- The type and variability of waste landfilled
- The placement and compaction achieved during landfilling
- Time of waste filling
- Groundwater changes and load history of the waste
- The depth of waste.

Differential settlement can result in cracking of the landfill capping layer or settlement and sinking over portions of the landfill capping layer. The consequences of either cracking or settlement of the landfill can be:

- Loss of effectiveness in capping (e.g. to minimise infiltration of rainfall, emissions of LFG)
- Exposure of the landfilled waste
- Emission of LFG

- Emission of leachate, generally at the base or toe of the slopes
- Damage to any buildings and structures located on the landfilled waste

At the site, due to thickness of waste, up to 10 metres in some locations, settlement will occur with change / decomposition of waste and changes of groundwater or surface load. Generally, the rate and amount of settlement will decrease with time, as the landfilled waste stabilises over the coming years. This ongoing settlement has significant implications in relation to use of the site and particularly in relation to any proposed structures on the landfilled waste. Should structures be necessary at the site, the structures would need to be designed allowing for this settlement. This may involve the use of piles, piers, rafts or floating slabs, engineered to withstand the unique subsurface conditions, and will add significantly to the cost of construction. As a consequence of the potential settlement processes, landfilled areas are generally considered to be unsuitable for founding large or inflexible structures.

3.10 Landfill cap integrity

Maintaining the integrity of the landfill final cover layer is important for a number of the reasons previously identified in section 3.9 above. The integrity of the landfill final cover layer can be compromised in a number of ways, including:

- Settlement and cracking of the final capping layer;
- Abrupt differential settlement of waste beneath the final capping layer creating a 'sinkhole';
- Scour or erosion of the final capping layer;
- Failure of the sloped areas of the final landform;
- Excavation of the final capping layer, for example during construction of structures and facilities; and
- Penetrations to the final capping layer associated with structures or facilities.

It should be noted that with the exception of a sinkhole, all the above-mentioned waste exposure events happen slowly or are planned, and thus are usually able to be detected during routine inspections and monitoring, or managed during site specific works.

Although unlikely, a sinkhole could occur abruptly and therefore, the consequences of such an event are considered 'moderate' to 'high'. Monitoring of the landfill should include observations of any tension cracks or subsidence in the capping materials that could be precursors to the appearance of a sinkhole.

The current capping materials which have been placed over the landfill vary in total thickness between approximately 0.1-2.0 m.

The formal capping and revegetation of the site will be subject to a remediation action plan (RAP) and detailed design, however, will likely include an engineered barrier, LFG management and revegetation materials.

3.11 Topography and drainage

The site as previously mentioned has a landfilled mound that is raised with respect to the surrounding land. The top of the landfill mound generally has a slight grade with steep batters around the edges. Formal capping of the site may require some regrading to achieve acceptable grades and formation of drains.

3.12 Impacts to nearby receptors during remediation / redevelopment works

As mentioned above the site is in close proximity to residential properties and the Signature Gardens Retirement Village. Due to this, remediation of the site will need to consider the construction impacts to these receptors. To the extent possible, disturbance of the site should be avoided to minimise impacts. It is noted that disturbance of waste has the greatest potential to cause impacts to receptors through exposed waste and leachate leading to excessive odour impacts. This would need to be thoroughly managed through a construction management plan or similar. It is noted that these impacts would need to be assessed as part of the remediation approvals process.

3.13 Maitland Airport

Maitland Airport is located approximately 1 km to the west of the site.

One of the options proposed for the site involves constructing a photovoltaic array on the landfill. Risk of glare from this kind of structure is generally considered very low as photovoltaic materials are designed to absorb sun light as much as possible to produce electricity. Very low intensity reflective light may be observed depending on the geometry between the sun, the arrays and the flight paths.

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4. Future land use options and initial evaluation

4.1 Potential land use options

Following discussions with Council, the following land use options were shortlisted:

- Passive recreation / managed green space
- Commercial / Light industrial
- Solar

Details of these potential land uses are provided in the following sections.

4.1.1 Passive recreation / managed green space

Passive recreation is a land use that can provide a community benefit once the land is remediated. Options may include:

- Parkland or picnic areas with picnic facilities
- Children's play areas
- Car parking
- Off-leash dog walking area
- Walking trails
- Cycling path
- Observation points and platforms, for example, for bird watching.

Any structures such as kiosks, toilets, children's play equipment, bins and tables would be subject to the constraints of the shallow soil layer. Foundations cannot be allowed to penetrate the engineered cap layer and this will restrict the size of some structures and whether power and water can be supplied. Some would have to be located off the landfill mound.

Parklands and walking areas could be grassed and picnic tables, bins and or walking trails could be incorporated into the design to provide a wide-open space with opportunity for recreational activities. The landfill batters are relatively steep and so designated passive recreation areas would be more suitable on the flatter, top of the finished landfill.

The Passive recreation option would require effective management and supervision of the previously landfilled area, including implementation of a management plan. Ongoing active management of landfill gas and regular monitoring of landfill gas generation and emissions would be required, as well as regular monitoring and maintenance of the landfill capping layer.

Fencing or other forms of security would need to be installed to prevent damage to landfill related infrastructure such as gas management and other monitoring facilities. Compatibility / access with other land uses (i.e. solar) would also be a consideration.

Given the risk profile of a landfill and potential for ongoing landfill gas generation, barbecues or other facilities that require sub-surface gas supply lines or electricity would not be recommended, considering the risks. Similarly, no smoking or open fires should be allowed at the site. Certain LFG infrastructure and other facilities would need to be fenced to prevent access and vandalism.

Passive recreation has a number of advantages. It could be easily combined with other land uses, there are no issues relating to land planning or approvals, land ownership, or buffer zones. There are no activities associated with this option that are likely to threaten the integrity of the final landfill capping layer.

However, there would be a need to keep walking trails off batter slopes to prevent erosion and potentially to change landfill gas management measures, for example, flaring rather than passive venting may need to be employed to prevent any odour or fire hazard issues.

Managed green space is a land use that would require minimal maintenance for Council, however, would provide the least community benefit and would also not provide any financial benefits. Despite being restricted from the public, Council would still be required to maintain fencing and the capping (mowing and prevention of weeds) and continue monitoring as part of this option.

GHD has the following planning comments related to this land use as shown in Table 4.1.

Table 4.1 *Passive recreation / managed green space planning comments*

Legislation	Comment
Maitland Local Environmental Plan 2011	<p>The site is zoned RE1 Public Recreation.</p> <p>The objectives of the zone are:</p> <p><i>To enable land to be used for public open space or recreational purposes.</i></p> <p><i>To provide a range of recreational settings and activities and compatible land uses.</i></p> <p><i>To protect and enhance the natural environment for recreational purposes.</i></p> <p>Land uses permitted with consent:</p> <p><i>Aquaculture; Boat launching ramps; Boat sheds; Camping grounds; Car parks; Caravan parks; Centre-based child care facilities; Charter and tourism boating facilities; Community facilities; Information and education facilities; Jetties; Kiosks; Markets; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Roads; Signage; Water recreation structures; Water supply systems</i></p> <p>The land to the east of the site is zoned R1 General Residential land with a 450m² minimum lot size.</p> <p>These lands have been identified under the Maitland Local Housing Strategy 2041 to be developed to meet housing pressures and demand.</p> <p>As housing development increases within in this area, passive open space may be required to manage social needs within this locality.</p>

4.1.2 Commercial / Light industrial

Commercial / Light industrial is a land use that may assist Council financially with developing capital to remediate the site through land sales or leasing. Council has noted that there is currently a shortage of this land use in the local Maitland LGA making it desirable if feasible.

Council essentially has three ways to go about this development type:

- Option 1 - Build only on areas without landfill
- Option 2a - Build on areas without landfill and build over some areas of landfill without removal of waste
- Option 2b - Build on areas without landfill and remove waste from areas of landfill that are to be developed

The decision will have large implications on approvals, capping, construction methods, overall remediation, and costs. This assessment is only looking at each option from a high level, and overall extents of the selected option would be subject to a detailed cost / benefit analysis to test the construction and remediation costs against the expected sale/leasing of the land.

In all cases the most suitable area for commercial or light industrial use is along Anambah Road to provide easy road frontage to the future development.

The use of the site as commercial or light industrial is currently prohibited within the applicable land use zone.

GHD has the following planning comments related to this land use as shown in Table 4.2.

Table 4.2 *Commercial/light industrial planning comments*

Legislation	Comment
Hunter Regional Plan 2041	<p>The Anambah to Branxton area is the convergence of the growth corridors and will facilitate housing supply and employment lands generation.</p> <p>Growth in the short to medium term can likely be accommodated within existing zoned areas within the Anambah area.</p>

Legislation	Comment
Environmental Planning and Assessment Act 1979	A Planning Proposal would be required to rezone the land to commercial/light industrial. To support an amendment to the Maitland Local Environmental Plan 2011, a number of technical studies would be required to support the proposal including contamination, ecology, traffic, servicing, waste etc. Justification for the change to the local legislation is supported by the Department of Planning and Environment Hunter Regional Plan 2041 planning priorities and growth within the Maitland LGA and Anambah area.
Maitland Local Environmental Plan 2011	The E3 Productive Support zone is located adjacent to the site. Rezoning a portion of the land to E3 Productive Support would be in context with the existing land uses and allow for a range of employment generating opportunities. Land uses permitted with consent include: <i>Animal boarding or training establishments; Boat building and repair facilities; Business premises; Centre-based child care facilities; Community facilities; Depots; Food and drink premises; Function centres; Garden centres; General industries; Hardware and building supplies; Hotel or motel accommodation; Industrial retail outlets; Industrial training facilities; Information and education facilities; Kiosks; Landscaping material supplies; Light industries; Local distribution premises; Markets; Mortuaries; Neighbourhood shops; Office premises; Oyster aquaculture; Passenger transport facilities; Places of public worship; Plant nurseries; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Research stations; Respite day care centres; Rural supplies; Service stations; Specialised retail premises; Storage premises; Take away food and drink premises; Tank-based aquaculture; Timber yards; Vehicle body repair workshops; Vehicle repair stations; Vehicle sales or hire premises; Veterinary hospitals; Warehouse or distribution centres; Wholesale supplies; Any other development not specified in item 2 or 4</i>

Given that the footprint is immediately adjacent or above landfill waste, structures may be required to have gas building protection measures. These measures would be used to prevent or restrict gas from accumulating in any structures. Measures can include passive or active as below from EPA, 2020:

- Passive
 - reviewing and, if appropriate, upgrading the building design, particularly foundations and ventilation systems
 - upgrading and sealing joints and penetrations in reinforced floor slabs (generally in conjunction with other measures)
 - installing gas-proof membranes or other barriers beneath buildings to prevent vertical gas migration into the building
 - installing passive venting systems beneath buildings or incorporating them into the design of ground and sub-ground floors
- Active
 - sub-slab depressurisation systems
 - active venting systems using sub-floor voids or gravel blankets and pipe or modular drainage systems
 - active gas extraction wells or trenches
 - building over-pressurisation systems
 - sub-slab over-pressurisation systems

For the above measures, a gas protection score is assigned. A combination of two or more protection measures (no more than one of each type) that are appropriate for the site conditions must be selected so that the combined score equals or exceeds the required guidance value as shown in Appendix B.

4.1.2.1 Option 1

The most suitable area for light industrial that is not impacted by landfill is in the north-west corner of the site along Anambah Road. This area would remain outside of the future capped area and would be the most straightforward both in construction and gaining approvals. The maximum size of this area is expected to be approximately 12,000 m². For this size, Council will need to weigh up whether this is enough developable land versus the financial benefit.

In addition, this footprint assumes that the light industrial land can extend to the northern boundary. The approvals process may require a greater offset from the residential land.

4.1.2.2 Option 2a

Construction over landfill waste will require some form of ground improvement to mitigate potentially significant total and differential settlement and improve bearing capacity. Ground improvement options are:

- Remove waste / uncontrolled fill and replace with engineered fill (discussed under Option 2b below).
- Preload - construction of an embankment / pad, normally for a period of up to 1 year (with primary consolidation occurring within 3 to 6 months), which applies a load to the site surface that is equivalent to that applied by the proposed structure. Monitoring is undertaken to measure the rate of settlement. When the surface settlement has reached an acceptable rate, the preload is removed and construction may proceed. Based on typical light industrial slab loads, a preload height of >4 m (excluding capping layer over the remaining waste), would likely be required to manage long-term settlement and sufficiently increase bearing capacity for footings. To achieve a suitable bearing layer, a reinforced soil raft can be adopted, or else loads may be supported through the adoption of piled foundations. Preload would likely be effective for the full 5 m depth. Improvement over greater depths are also possible depending on the type of fill and available time for consolidation.
- Impact rolling – an 8T to 12T, non-circular module towed by a 4WD tractor or similar at approximately 10 km/hr to 12 km/hr. The process generally densifies and strengthens a soil profile to a depth of up to 2m. The effective depth and amount of improvement will depend on the groundwater conditions and the characteristics of the existing fill material. Advantages of this system is that it is relatively fast and inexpensive. However, a capping / bridging layer, up to approximately 0.5 m thick, would be required to form a surface trafficable to the towing plant and roller, which is likely to reduce the depth to which waste would be compacted and improved. To achieve a suitable bearing layer, a reinforced soil raft can be adopted, or else loads may be supported through the adoption of piled foundations.
- Dynamic compaction – dropping of a 10 T to 30 T weight from a crane in a grid pattern. Soil improvement (densification and strengthening) may generally be achieved to a depth of 10 m and is considered to be achieved above and below the groundwater table (depending on the drainage condition of the fill). Limitations at this site are the presence of nearby underground services, and noise and vibration impacting on nearby residents and housing, possibly inducing damage to nearby structures. A suitable bearing layer may be partially incorporated in the near surface compacted layer.

At this stage it is considered that the relatively high risk of potential obstructions being present within the waste will generally preclude intrusive methods such as vibro-compaction, soil mixing and jet grouting, although further consideration could be given to these methods if required.

Development of the southwestern boundary of the site as light industrial is possible with ground improvement. However, each potential ground improvement technique differs in cost, and has limitations either with regard to time (preload), depth of improvement (impact rolling) or construction impacts (dynamic compaction). Further work, a better understanding of time and cost constraints, and specialist contractor engagement would be required to more definitively assess the viability of this option and identify the most suitable method.

4.1.2.3 Option 2b

Removal of landfill waste, possible over excavation of contaminated in-situ soils, releveling and replacement with fill (if required) may be undertaken adopting conventional earthworks and waste handling methods. Work would likely be able to be undertaken by conventional earthworks contractors and plant. It is noted that waste is likely to be saturated with leachate. De-watering would likely not be feasible as that would need to potentially dewater the whole landfill (unless cells were discrete, which is possible). Pump tests would need to be considered as part of final design to evaluate the feasibility if this option is pursued. Sheet piling within the waste is possible, however there would be uncertainties about getting sheet piling to depth due to obstructions within the waste.

Exposing and excavating waste would likely result in excessive odour impacts to nearby sensitive receptors that would be difficult to manage during construction.

The final landform (adjoining the levelled area) would comprise capped landfill waste that would need to be long-term 'stable' and non-polluting. Hence, unsupported batter slopes would need to be limited to a maximum of 1V:4H to allow compaction of fill, revegetation and management of surface drainage.

Consideration would need to be given if the waste may be incorporated on site within the existing landfill or would need to be disposed of at another landfill site.

In order to exhume waste, EPA approval would need to be granted as per the *Protection of the Environment Operations (Waste) Regulation* (NSW Government, 2014). Clause 110a states the following:

1. The occupier of land that is or was a landfill site must ensure that waste is not exhumed from the land. Maximum penalty—400 penalty units in the case of a corporation, 200 penalty units in the case of an individual.
2. This clause does not affect the operation of a scheduled waste facility that is operating on a former landfill site if the landfill site is closed and capped and no waste is removed from beneath that cap.
3. This clause does not apply if the waste is exhumed as a consequence of works authorised in writing by the EPA, or authorised by the environment protection licence for the facility, and notified to the EPA in writing at least 2 days (or such greater period as may be specified in the written authorisation of the EPA or the environment protection licence) before the works commence.
4. It is a defence in any proceedings for an offence against this clause if the defendant establishes that—
 - a. the waste was exhumed in an emergency to protect human health or the environment, or
 - b. the waste was exhumed in accordance with a written direction of the EPA.

4.1.3 Solar Farm

In an era where renewable energy sources are gaining significant traction, repurposing landfills into clean energy hubs has emerged as an innovative and sustainable solution. This illustrates the potential and benefits of this unique synergy between waste management and green energy production. The land area available at Anambah landfill site could potentially be developed as a utility scale solar farm and could offset Maitland City Council's total energy consumption.

Solar units are relatively light structures and relatively flexible / adjustable systems are now available with non-intrusive footing options (e.g. Maverick 5B system). Considering the expected ongoing settlement at the site, a solar farm may be considered as a potential development option. A high level assessment of potential differential / total settlement at the site may be required to check whether if the predicted settlement is within the tolerance of these proprietary systems.

GHD has the following planning comments related to this land use as shown in Table 4.3

Table 4.3 Solar planning comments

Legislation	Comment
State Environmental Planning Policy (Transport and	Division 4 Electricity generating works or solar energy systems 2.35 Definitions <i>electricity generating works means a building or place used for the following purposes, but does not include a solar energy system—</i>

Legislation	Comment
Infrastructure) 2021	<p>(a) <i>making or generating electricity,</i></p> <p>(b) <i>electricity storage.</i></p> <p>A solar farm is defined as:</p> <p>solar energy system means any of the following systems—</p> <p>(a) <i>a photovoltaic electricity generating system used for the primary purpose of generating electricity for a land use—</i></p> <p>(i) <i>carried out on the land on which the system is located, or</i></p> <p>(ii) <i>carried out by the owner of the system on adjoining land,</i></p> <p>(b) <i>a solar hot water system,</i></p> <p>(c) <i>a solar air heating system.</i></p> <p>The RE1 Public Recreation zone is not identified as a proscribed zone for the development for solar energy systems.</p> <p>Further investigation is required to understand if the development can occur on Council owned land.</p>
Environmental Planning and Assessment Act 1979	<p>Under a Part 4 Assessment the installation of solar panels may be considered a conflicting use within a residential area that has relatively high housing density.</p> <p>Conflicts may include reflection and social amenity, vistas and views.</p> <p>Solar farms also require a buffer from existing urban development.</p> <p>Further investigation is required regarding permissibility and setbacks from existing urban development.</p>
Maitland Local Environmental Plan 2011	<p>Electricity generating works is currently prohibited in RE1 Public Recreation zone. However Council believes they have a mechanism to override this prohibition.</p>

4.1.3.1 NEM Classification & System size selection criteria

Large scale solar systems can be classified differently depending on size and interaction with the electricity market. The different classifications would affect financial performance, risk to council, and business case results. The key implication for Council for this site is the impact to system size, noting that limiting the size to below 5MW AC will avoid a number of issues and risks, but that this 5MW threshold may be subject to change by the Australian Energy Market Operator (AEMO). Based on current regulation any solar generator under 5MW AC capacity has the potential benefit of exemption from being scheduled or semi-scheduled and will be assessed under National Electricity Rule (NER) Chapter 5A. The benefits include:

- Simplified connection agreement which reduces costs for system modelling and registration
- Reduced time and risk in connection agreement
- Flexibility to be either a market (NEM wholesale) participant or non-market (selling electricity to the grid via a retailer on an agreed contract basis)
- Avoids losses from system curtailment during network stability issues (note this is based on current market regulation)
- Avoids the need to actively forecast generation and pay AEMO for mismatch between actual and forecast generation via FCAS (frequency control ancillary services) causer pays charges.

Based on the above, this assessment has assumed an “upper limit” AC system size of 5 MW to avoid any issues that arise for a larger system. The potential increases of the DC system size are possible based on the selected equipment rating and this has been factored into our assessment.

4.1.3.2 Technology Assessment

Renewable energy technology is continually evolving and advancing. This section provides a brief overview of the current technologies which could be considered for the large-scale solar development within the landfill area.

4.1.3.2.1 Racking

As discussed in section 2.2, the site's topography is critical especially when defining the racking selection for a large scale solar project. It has been identified that the majority of the former landfill site is raised with respect to surrounding land areas (which are relatively flat). There is a slight overall fall towards different directions at



different borders of the site. The site landfill model indicates different levels of capping fill, waste and natural soil across the specified solar array location. Based on these conditions, the following options are assessed and ranked as below.

1. **East-West 5B -Maveric modular racking:** The system is designed to minimize the need for extensive groundwork and site preparation. This can be especially beneficial in locations with challenging terrain or environmental constraints like waste fill facilities. The possibility of rapid deployment and prefabricated modular array design allows quick transportation and installation on site, reducing the need for onsite assembly and labour. This emerged as the top choice upon assessing the conditions on site.
2. **Fixed Tilt (FT):** Panels are mounted with a fixed tilt, with piles directly penetrating the ground. Mounting does not move and would typically be oriented at a 10–20-degree angle for this site. This method of installation will have lesser ground coverage ratio as compared to 5B- Maveric racking due to inter row shading considerations. This is a proven technology and has the lowest maintenance cost. Generally, this racking is piled directly into the ground to approximately 1 m depth. Depending upon the condition of the site FT racking can also be installed using a concrete ballast system. This emerged as the second option upon assessing the site conditions.
3. **Single Axis Tracking (SAT):** Panels track the sun path (East to West) rotating along a single axis that runs North to South. This provides high generation output compared to first two option and is more common for MW scale projects with lowest levelized cost of electricity (LCOE). However, the tracker piles are normally piled into the ground much deeper as compared to the FT system, hence this is not a recommended option in this case.

4.1.3.2.2 Inverters

Inverters are a critical component of the PV system and convert electricity from direct current (DC) produced by PV arrays to an alternating current (AC) which is supplied to network. For large PV systems there are two types of inverter topology available: centralised and decentralised (or string inverters). The key aspects among these two are compared in Table 4.4 below.

Table 4.4 Inverter technology comparison

Phase	Centralised	Decentralised
Planning and installation	Lower CAPEX per MW Physically larger individual units Fewer individual units, but less flexible. Better availability of modelling files to achieve grid connection and power system requirements.	Higher CAPEX per MW Physically smaller individual units Flexible design possibilities with a much higher number of individual units.
Example Image (Source: SMA)	 (Inverter Station L-R: Central inverter, Transformer, RMU)	 (Typical string inverter)
Typical Size Range	2,000-5,000 kW	5-100 kW
Typical Application	Large scale solar farms (>2MW)	Roof mount and small ground mount solar (<2MW)

Phase	Centralised	Decentralised
Construction / Commissioning	Fewer inverters are to be commissioned in the field, and inverter stations are pre-wired between inverter, transformer and RMU. Easy integration into high-capacity BESS units.	Quick installation of individual string inverters, but slower overall installation due to increased DC wiring terminations and AC terminations, as well as needing to wire inverters to AC combiners and then transformers onsite. Good use of the space available by factoring in location specifics. Optimised maximum power point tracking. Not optimally suited for high-capacity BESS units.
Operating phase	Higher OPEX Lower DC cable losses due to 1500V DC operation. Maximum level of efficiency with low self-consumption enables highest possible yields. Medium voltage specialist certification is required. Specialist O&M support (typically with OEM).	Lower OPEX Can be higher DC losses as typically 1000V DC. High level of plant availability. Quick device replacement when service is required- String inverter run to failure asset requiring on like for like swap out. Most electrical contractors can work with low-voltage equipment, including string inverters.

Based on the site condition assessment, a single central inverter with a capacity less than 5 MW seems more favourable for this site.

4.1.3.2.3 PV Panels

Solar PV panels are the primary generator component of the system. Depending on the cell technology PV panels are classified mainly into four categories:

1. Monocrystalline panels: These are made from a single pure silicon crystal that is cut into several wafers. Use of pure silicon makes monocrystalline panels the most space efficient and long lasting.
2. Polycrystalline panels: These are from different silicon crystal. Different silicon fragments are melted and poured into a square mould.
3. Passivated emitter and rear cell (PERC) panels: These panels are improved version of monocrystalline cells by adding a passivation layer in the rear surface of cell, hence enhancing its efficiency.
4. Thin Film panels: Unlike crystalline panels that use silicon, thin film panels are made from different materials like cadmium telluride (CdTe), copper indium gallium selenide (CIGS) etc.

Monocrystalline panels with 550Wp capacity were used for this assessment.

4.1.3.3 Site assessment

GHD has conducted a preliminary desktop assessment to analyse the feasibility of a proposed solar PV system within the landfill area as indicated below in Figure 4.1. Site boundary extents of solar were assessed by GHD against aerial imagery.

GHD has based the solar site area assessment on the following:

- Site boundaries in the information provided to GHD
- Aerial imagery indicating site boundaries, which also indicated potential locations of:
 - Some trees at site boundaries which would dictate a solar setback to limit shading impacts
 - A pond located near to the eastern side of the land, and some natural drainage channels located near to the pond, which have been avoided with an assumed approximate clearance of 10m. (Noting that re-forming of the landfill surface for final capping may remove this pond).
 - Existing landfill side slopes and likely future capping dictates setback required from the northern and eastern site boundaries.
 - Assessment was done assuming the area will be levelled where required to accommodate tolerance requirements of the racking manufacturer.

An overview of the site layout with 5B- Maveric system and Fixed Tilt racking rows is shown in Figure 4.1-4.2 and Figure 4.3-4.4 respectively. The outer highlighted area is the land available for the development for various land use options and the dark orange highlighted area accounts for the inverter station, O&M building, and spare part storage.



Figure 4.1 Layout with 5B-Maveric Racking

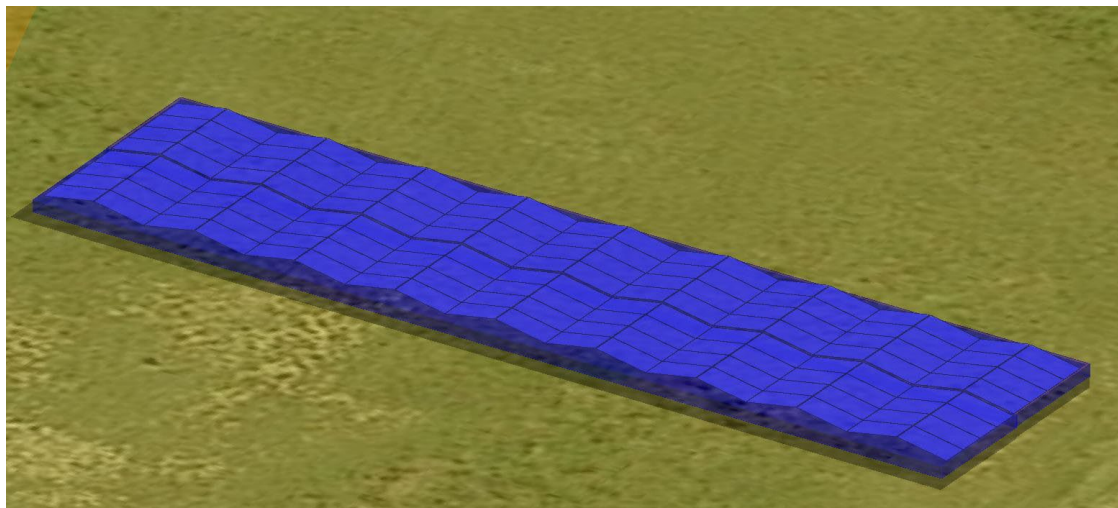


Figure 4.2 3D Illustration of 2 x Array Tables of 5B Racking



Figure 4.3 Layout with Fixed Tilt Racking

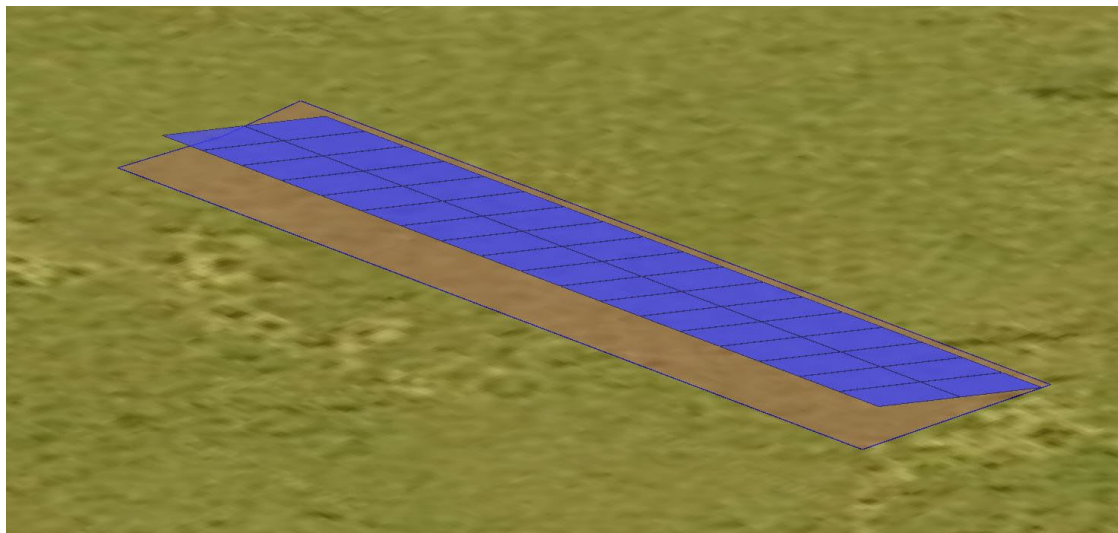


Figure 4.4 3D illustration of 1 x Fixed Tilt Array Table

A summary of both options is provided in Table 4.5 below. Detailed PVSyst reports for both options are provided in Appendix C.

Table 4.5 Site Assessment Summary

Item	5B – Maveric Racking	Fixed Tilt Racking
Indicative system size within selected land area	5.78 MWp	5.46 MWp DC
Table configuration (Racking and stringing)	4x18 panel landscape mode (72 panels per table) 2 strings of 36 panels per table	2 panel portrait mode (36 panels per table) 1 string of 36 panels per table
Inverter and Module selection	1 x SMA Central 4.6 MVA inverter skid 10512 x Trina 550 Wp panel	1 x SMA Central 4.6 MVA inverter skid 9936 x Trina 550 Wp panel
Generated Electricity	8.15 GWh / year	8.3 GWh / Year
Specific production and Performance Ratio (PR)	1410 kWh / kWp/ Year PR – 81.20 %	1520 kWh / kWp/ Year PR- 81.47 %
Key aspects	<ul style="list-style-type: none"> – Pre-wired and plug and play – Re-deployable solution – Less land usage as compared to FT – Minimal ground penetration and civil works 	<ul style="list-style-type: none"> – Slightly higher PR as compared to 5B – Low soiling as compared to 5B – Proven technology with very low maintenance – Slightly more civil and structural works

4.1.3.4 Grid Connection

Maitland City Council has engaged Gridscape to undertake a network feasibility review for the 5 MVA solar farm connection. Based on the assessment report prepared by Gridscape and considering the system size and layout assessed in this report, connection to the 11 kV feeder 29876 which runs adjacent to the western boundary side of the site seems more feasible. This feeder is fed from the Rutherford Zone Substation and supply to residential areas surrounding the Anambah landfill site, and has an assessed minimum power rating of 7.6 MVA. Rutherford Zone Substation has a secure rating for the loss of 1 element (N-1) of 38 MVA and hosts 2 x 33 MVA 33/11 kV transformers. Figure 4.5 below shows the 11 kV geo-schematic of Rutherford zone substation in the vicinity of proposed solar plant location.

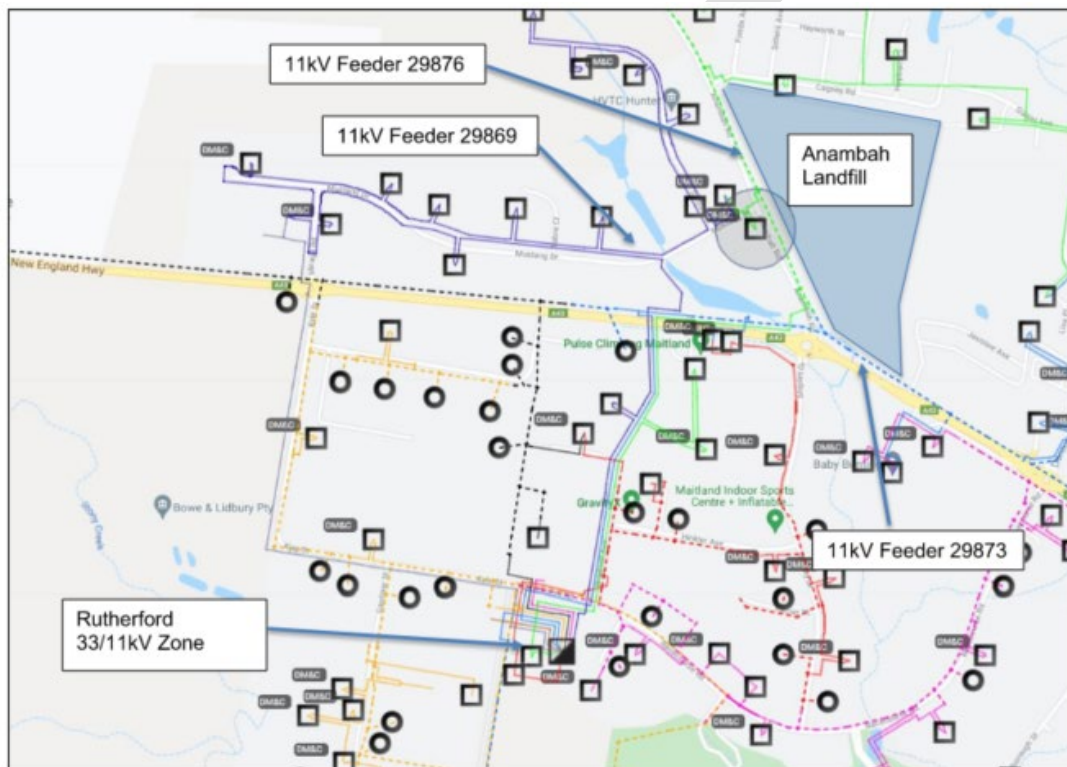


Figure 4.5 Ausgrid 11kV Rutherford Zone network in the vicinity of proposed solar plant location¹

Based on Gridscape's assessment, the 11 kV feeder 29876 exhibits an indicative fault level of 100 MVA and a short circuit ratio (SCR) of 20. Both of these values are considered highly favourable for the connection of generators with a capacity below 5 MVA.

Based on the proposed layout as shown in section 4.1.3.3, an overhead connection to the existing 11 kV feeder 29876 through the northern boundary of the site is deemed as the most viable connection option. This connection necessitates an estimated span of roughly 220 metres of 11 kV overhead cabling, incorporating a High Voltage Connection (HVC) configuration. It is imperative to acknowledge that additional network studies must be conducted in full as an integral component of the connection application process, and it is highly advisable to engage in early discussions and consultations with Ausgrid regarding this matter.

¹ MCC Anambah Solar - Ausgrid Options 18-02-2022.pdf

4.1.3.5 Large-scale generation certificates

The solar farm may be eligible for large-scale generation certificates (LGCs) from the electricity that it produces. One LGC can be created per megawatt hour (MWh) of eligible electricity generated by a power station. Registered LGCs can be sold or transferred to entities with liabilities under the Renewable Energy Target or other companies looking to voluntarily surrender LGCs (Australian Government, 2022).

4.1.3.6 Delivery Method

Solar PV projects of this nature are typically delivered via an 'Engineer, Procure, Construct' (EPC) model whereby design, procurement and construction risk is transferred to the EPC contractor. Council would act as the developer or Principal, financing the project up-front as a capital project. The following are the steps to deliver the project under an EPC contract arrangement.

1. Confirm system sizes and development location in accordance with other land use option outcomes.
2. Apply contingencies to costs and consider risks to develop a risk matrix. Investigate high risks up-front to determine if within Council's acceptable limits.
3. Appoint an Owner's Engineer (OE) or similar technical advisor to assist Council in navigating and mitigating technical and commercial risks.
4. Engage early with relevant network service provider (Ausgrid) and planning authorities.
5. Undertake geotechnical investigations and surveys, liaising with solar mounting supplier to mitigate the key technical risks associated with the geotechnical outcome.
6. Undertake detailed authority approvals. There may be benefit in engagement with an EPC contractor or consultant to prepare early designs for the purpose of approvals.
7. Liaise with potential operation and maintenance contractors to obtain early input for any aspects that should influence the design to reduce ongoing costs.
8. Update risk matrix based on outcomes to date.
9. Prepare tender documentation with updated concept designs, technical documentation, and contract documents. Technical concept design detail would be limited due to EPC contract delivery method.
10. Commence EPC delivery phase.
11. Operate and maintain the system via a third party.

5. Land use combinations and initial evaluation

Through discussions with Council it has been agreed to assess a combination of the three land uses (as described in Section 4.1) across the site, including three different options for the commercial / light industrial land as follows:

- Option 1: Commercial / light industrial being built only on areas that do not contain landfilled waste
- Option 2a: Commercial / light industrial being built over top of landfilled waste
- Option 2b: Commercial / light industrial being built over areas that currently contain landfilled waste but following waste removal and relocation – i.e. the same footprint as Option 2a

All options have commercial/industrial along Anambah Road, solar in the north-east corner of the site and passive recreation / managed green space across the remainder of the site. The above layouts are shown in Figure 5.1 and Figure 5.2, which include high level renders of how these would look once constructed. It is noted that the exact footprints are likely to change through further detailed assessment, and generic rendering of the land uses was used. This may not represent final construction of each of the land uses.



Figure 5.1 Potential layout of Option 1

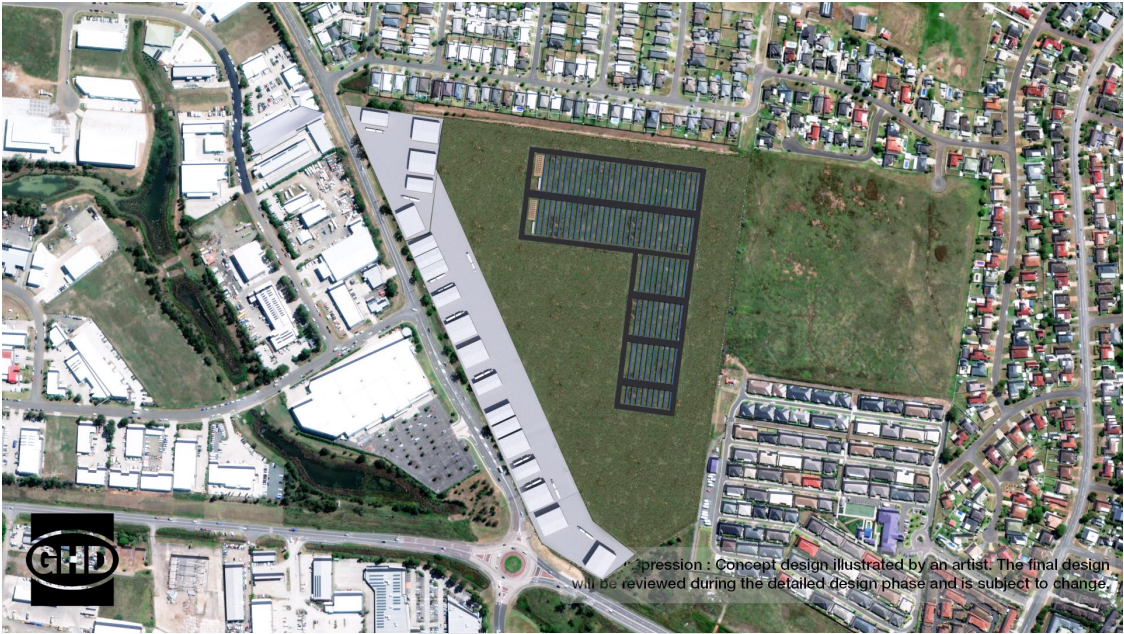


Figure 5.2 Potential layout of Option 2a/2b

The layouts were compared against the constraints identified in Section 3 as summarised below in Table 5.2. A legend for the comparison is shown in Table 5.1.

Table 5.1 Constraints legend

Colour	Meaning
	No significant constraint
	Constraints requiring design or management
	Not feasible due to constraints

Table 5.2 Option constraints

Constraint	Passive recreation/managed green space	Commercial/light industrial			Solar
		Option 1	Option 2a	Option 2b	
Buffer zone limitations					
Existing and future services					
Land ownership					
Land zoning					
Landfill gas generation and emissions					
Leachate generation and migration					
Location of sensitive receptors and line of sight					

Constraint	Passive recreation/managed green space	Commercial/light industrial			Solar
		Option 1	Option 2a	Option 2b	
Settlement and stability of the landfilled waste					
Landfill cap integrity					
Topography and drainage					
Impacts to nearby receptors during remediation / redevelopment works					
Maitland Airport					

Based on the constraints, it can be seen that each of the options have a number of items to consider and appropriately design or manage, although all options are considered feasible with the exception of Option 2b. Council agreed that Option 2b had too many constraints regarding potential impacts to receptors, unclear regulatory pathway and risks and costs associated with relocating waste.

More detailed assessment of constraints, design factors and detailed costing of Options 1 and 2a will be required to determine the construction costs and potential financial benefit from developing the areas where waste is present. This may include adjusting the footprint of Option 2a to optimise the potential financial benefit.

GHD undertook comparative high level costings (contained within GHD, 2024 (draft)) related to the remediation works required to allow redevelopment and generally found Option 1 to be cheaper than Option 2a (by approximately 3% to 14% depending on footprint of ground improvement required). This was primarily due to both options having the same capping footprint for remediation of the landfill, but Option 2a also needed ground improvements to allow redevelopment. It is noted that this comparison did not factor in any financial benefit that may come from being able to develop additional commercial/light industrial land.

6. Conclusions/recommendations

GHD has undertaken an assessment of land use options for beneficial use of the Anambah Former Landfill following remediation. The options agreed with Council for assessment included:

- Passive recreation/managed green space
- Commercial/light industrial
- Solar

The assessment considered a number of constraints anticipated to be relevant to each of the options. The main constraints were seen to be:

- Developing on top of waste due to settlement
- Excavating waste due to proximity to sensitive receivers
- Re-zoning the site to allow for commercial/light industrial or solar
- Development line of sight to sensitive receivers

Other applicable constraints (including management of landfill gas, leachate, surface water runoff etc) will be managed as part of the site remediation; however design of the remediation should consider final land uses and be undertaken with those uses in mind.

It is expected that most of the site constraints can be managed through a number of mitigation measures, although some of these may cost more than the value of the land use. Of particular note in this regard is developing commercial/industrial land within the landfill footprint, which would require ground improvement or excavation of waste, both of which will be challenging and costly.

Three arrangements of the potential land uses were assessed, as follows:

- Option 1: Commercial / light industrial being built only on areas that do not contain landfilled waste
- Option 2a: Commercial / light industrial being built over top of landfilled waste
- Option 2b: Commercial / light industrial being built over areas that currently contain landfilled waste but following waste removal and relocation – i.e. the same footprint as Option 2a

All three options included a solar farm on the eastern portion of the site.

Options 1 and 2a were considered feasible but also had multiple constraints to overcome (particularly Option 2a due to constraints to future construction over remaining waste). Council considered that Option 2b was not feasible due to potential impacts to receptors, unclear regulatory pathway and risks and costs associated with relocating waste.

Council's current preference is to proceed with Option 1, while also leaving the opportunity open to develop a further portion of the site through ground improvement if it becomes feasible in the future (Option 2a).

The following is recommended to progress to the next phase of the project:

- Proceed with planning of remediation works to suit the preferred land use options.
- Engagement with regulators to discuss planning approvals and rezoning. It is likely that a number of specialist studies will be required as a result of this.
- Conduct additional electrical network studies for the solar farm as an integral component of the connection application process including early discussions and consultation with Ausgrid.
- Undertake more detailed design of the site redevelopment to assist with approvals and to allow construction of remediation measures.
- Detailed cost / value comparison of Options 1 and 2a (in conjunction with detailed design) to more accurately estimate the construction costs and potential financial benefit from developing over the waste footprint adjoining Anambah Road. This may include adjusting the footprint of Option 2a to optimise the potential financial benefit.

7. References

Australian Government – Clean Energy Regulator. *Large-scale generation certificates*. Accessed 4 September 2023. <https://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Power-stations/Large-scale-generation-certificates>

EPA, 2020. *Assessment and management of hazardous ground gases – Contaminated Land Guideline*. May 2020.

GHD (2021c). *Former Anambah Landfill – Consolidated Assessment Report*, August 2021

GHD (2023a). *Anambah Former Landfill – Landfill Gas Generation Modelling Assessment*. July 2023.

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GHD (2023e). *Anambah Landfill Additional LFG Well Installation Report*. July 2023

GHD (2024). *Comparative construction costs for Anambah land use options (Draft)*. January 2024.

NSW Government (2011). *Maitland Local Environmental Plan 2011*.

NSW Government, 2014. *Protection of the Environment Operations (Waste) Regulation*. 2014.

8. Limitations

This final land use and remediation options assessment for Anambah Former Landfill site in Rutherford, NSW (the "Report"):

- Has been prepared by GHD Pty Ltd ("GHD") for Maitland City Council.
- May be used and relied on by Maitland City Council.
- May be provided to and used by the site auditor for the purposes of review as part of site audit activities.
- Must not be used by, or relied on by any parties other than those listed above without the prior written consent of GHD and subject always to the next paragraph.
- May only be used for the purpose as stated in Section 1.1 of the Report (and must not be used for any other purpose).

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than Maitland City Council arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- Were limited to those specifically detailed in Section 1 of this Report
- Were undertaken in accordance with current professional practice and by reference to relevant environmental regulatory authority and industry standards, guidelines and assessment criteria in existence as at the date of this Report.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking the services mentioned above and preparing the Report ("Assumptions"), as specified throughout this Report. GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation of this Report and are relevant until such times as the site conditions or relevant legislations changes, at which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.

This Report is based solely on the investigations and findings contained in the reports referenced herein and on the conditions encountered and information reviewed at the time of each referenced report. This Report should be read in conjunction with the referenced reports. It is also subject to all the limitations and recommendations in the referenced reports.

GHD has prepared this Report on the basis of information provided by Maitland City Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked ("Unverified Information") beyond the agreed scope of work. GHD expressly disclaims responsibility in connection with the Unverified Information, including (but not limited to) errors in, or omissions from, the Report, which were caused or contributed to by errors in, or omissions from, the Unverified Information.

The opinions, conclusions and any recommendations in this Report are based on information obtained from, and testing undertaken at or in connection with, specific sampling points and may not fully represent the conditions that may be encountered across the site at other than these locations. Site conditions at other parts of the site may be different from the site conditions found at the specific sampling points.

Investigations undertaken in respect of this Report were constrained by the particular site conditions, such as the location of surrounding buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this Report.

GHD has considered and/or tested for only those chemicals specifically referred to in this Report and makes no statement or representation as to the existence (or otherwise) of any other chemicals.

Site conditions (including any the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD expressly disclaims responsibility:

- Arising from, or in connection with, any change to the site conditions
- To update this Report if the site conditions change

Subsurface conditions can vary across a particular site and cannot be exhaustively defined by the investigations carried out prior to this Report. As a result, it is unlikely that the results and estimations expressed or used to compile this Report will represent conditions at any location other than the specific points of sampling. A site that appears to be unaffected by contamination at the time of the Report may later, due to natural causes or human intervention, become contaminated.

Except as otherwise expressly stated in this Report, GHD makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.

These Disclaimers should be read in conjunction with the entire Report and no excerpts are taken to be representative of the findings of this Report.

DRAFT

Appendices

Appendix A

Figures



Appendix B

Gas protection score

Table B.1 Guidance values for gas protection (Table 8, EPA, 2020)

Characteristic situation	Standard commercial buildings (offices, etc.)	Large commercial (warehousing) and industrial buildings
1	0	0
2	2	1 ²
3	2	2
4	4	3
5	5	4
6	6	6

Table B.2 Scores for protection measures (EPA, 2020)

Measure or system element	Score	Comments
Venting and dilution measures		
Passive sub-floor ventilation with very good performance – the steady-state concentration of methane over 100% of the ventilation layer remains below 1% v/v at a wind speed of 0.3 metres per second (m/s) ³	2.5	The design of the venting layer (i.e. granular medium with inlet/outlet pipes versus open-void or modular drainage system) ⁴ must be considered when modelling steady-state concentrations
Passive sub-floor ventilation with good performance – the steady-state concentration of methane over 100% of the ventilation layer remains below 1% v/v at a wind speed of 1 m/s and below 2.5% v/v at a wind speed of 0.3 m/s) ³	1.5	If post-installation testing of passive ventilation indicates that it cannot meet this requirement, inlets and outlets must be upgraded. If this is unsuccessful, it will be necessary to retrofit an active system
Sub-floor ventilation with active abstraction or pressurisation	2.5	Not appropriate for NEPM HIL A residential settings because robust management systems, including alarms, must be in place to ensure long-term operation and maintenance... Achieving the full score requires a design with adequate redundancy and full coverage of the building footprint.
Ventilated car park (basement or undercroft)	4.0 ⁵	Assumes that the car park is vented to deal with exhaust fumes in accordance with BCA ⁶ requirements. The design of a car-park and the specifications of its ventilation system need to be considered in assigning an appropriate score of up to four.
Horizontal soil barriers beneath building footprint		
Horizontal clay or amended soil barriers designed to achieve defined permeability and diffusivity of the gases of concern placed, compacted and tested under appropriate engineering supervision	5	Requires appropriate engineering input and integration with the building design from the earliest possible stage. This must consider the effects of any proposed piling on the gas regime
Floor slabs		
Reinforced concrete ground-bearing floor slab or waffle pod slab	0.5	At a minimum, it is good practice to install ventilation in all foundation systems to relieve pressure. Breaches in floor slabs, such as joints, have to be effectively sealed against gas ingress to maintain performance
Reinforced concrete ground-bearing foundation raft slab with limited service penetrations cast into slab	1.0	
Reinforced concrete cast in situ or post-tensioned suspended slab with minimal service penetrations and water bars around all penetrations and at joints	1.5	

² If maximum measured methane concentration exceeds 20% v/v, increase to CS 3³ Verified by post-construction monitoring⁴ See appendix 6, EPA, 2020⁵ Score depends on site-specific conditions and design⁶ Building Code of Australia

Measure or system element	Score	Comments
Fully tanked basement	2.0 ⁵	The design of a basement and the specifications of its ventilation system need to be considered in assigning an appropriate score. Fully tanked means designed to be waterproof under the range of groundwater conditions likely at the site, to the extent that supplementary internal drainage is not required.
Membranes		
Proprietary gas-resistant membrane with a gas transmission rate for the gases of concern on the site that is certified and appropriate to the overall design of the gas protection system. It should be installed by a specialist to an appropriate level of workmanship with documented internal CQC, including integrity testing (e.g. tracer gas or smoke testing), under independent CQA carried out by a certified specialist ⁷ or appropriately qualified and experienced professional with independent verification of the entire process ⁸	2.0	Membrane performance depends on the membrane material and thickness specified, design and quality of the installation, protection from and resistance to damage after installation, and the integrity of joints in membranes that require joints. Materials that offer some degree of self-sealing and repair are preferred. Long-term performance depends on the durability of the material, including its resistance to chemical degradation in the environment in which it is installed
Monitoring and detection (alarms)		
Intermittent monitoring using hand-held equipment	0.5	Monitoring and alarm systems are only valid as part of a combined gas protection system. Where fitted, permanent systems should be installed in the underfloor venting system but can also be provided in the occupied space as a back-up
Permanent monitoring system installed in the occupied space of the building	1.0	
Permanent monitoring system installed in the underfloor venting or dilution system	2.0	
Pathway intervention external to building footprint		
Vertical barriers	9	Required for residential and public buildings at CS 4 and above
Vertical venting systems (source depressurisation)	9	

⁷ For example, Geosynthetic Certification Institute – Inspectors Certification Program

⁸ See appendix 7 EPA, 2020

⁹ Score depends on site-specific conditions and design, but scores of 4.0+ should be achievable

Appendix C

PVSyst Modelling Reports



Version 7.4.0

PVsyst - Simulation report

Grid-Connected System

Project: Anambah Solar Project

Variant: New simulation variant

No 3D scene defined, no shadings

System power: 5782 kWp

Rutherford - Australia

Author

GHD Pty Ltd (Australia)

**PVsyst V7.4.0**

VC0, Simulation date:
23/08/23 13:49
with v7.4.0

Project: Anambah Solar Project

Variant: New simulation variant

GHD Pty Ltd (Australia)

Project summary

Geographical Site		Situation	Project settings
Rutherford		Latitude -32.72 °S	Albedo 0.20
Australia		Longitude 151.53 °E	
		Altitude 35 m	
		Time zone UTC+10	
Meteo data			
Rutherford			
Meteonorm 8.1 (1990-2007), Sat=71% - Synthetic			

System summary

Grid-Connected System		No 3D scene defined, no shadings	
Simulation for year no 1			
PV Field Orientation		Near Shadings	User's needs
Fixed planes 2 orientations		No Shadings	Unlimited load (grid)
Tilts/azimuths 10 / -99 °			
10 / 81 °			
System information			
PV Array		Inverters	
Nb. of modules	10512 units	Nb. of units	1 unit
Pnom total	5782 kWp	Pnom total	4600 kWac
		Pnom ratio	1.257

Results summary

Produced Energy	8152045 kWh/year	Specific production	1410 kWh/kWp/year	Perf. Ratio PR	81.20 %
Apparent energy	8603743 kVAh/year				

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Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Main results	5
Loss diagram	6
Predef. graphs	7
Single-line diagram	8

**PVsyst V7.4.0**

VC0, Simulation date:
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with v7.4.0

Project: Anambah Solar Project

Variant: New simulation variant

GHD Pty Ltd (Australia)

General parameters**Grid-Connected System**

No 3D scene defined, no shadings

PV Field Orientation**Orientation**

Fixed planes 2 orientations
Tilts/azimuths 10 / -99 °
10 / 81 °

Sheds configuration

No 3D scene defined

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Horizon

Free Horizon

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

Grid injection point**Power factor**

Cos(phi) (lagging) 0.950

PV Array Characteristics**PV module**

Manufacturer Trina Solar
Model TSM-DE19-550Wp Vertex
(Original PVsyst database)

Unit Nom. Power 550 Wp
Number of PV modules 10512 units
Nominal (STC) 5782 kWp
Modules 292 Strings x 36 In series

At operating cond. (50°C)

Pmpp 5289 kWp
U mpp 1031 V
I mpp 5132 A

Total PV power

Nominal (STC) 5782 kWp
Total 10512 modules
Module area 27466 m²

Inverter

Manufacturer SMA
Model Sunny Central 4600 UP
(Original PVsyst database)

Unit Nom. Power 4600 kWac
Number of inverters 1 unit
Total power 4600 kWac
Operating voltage 1003-1325 V
Pnom ratio (DC:AC) 1.26

Total inverter power

Total power 4600 kWac
Number of inverters 1 unit
Pnom ratio 1.26
Inverter PNom limit defined as apparent power

Array losses**Array Soiling Losses**

Loss Fraction 3.0 %

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 27.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 3.3 mΩ
Loss Fraction 1.5 % at STC

Serie Diode Loss

Voltage drop 0.7 V
Loss Fraction 0.1 % at STC

LID - Light Induced Degradation

Loss Fraction 2.0 %

Module Quality Loss

Loss Fraction -0.4 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.2 %

Module average degradation

Year no 1
Loss factor 0.4 %/year
Mismatch due to degradation
Imp RMS dispersion 0.4 %/year
Vmp RMS dispersion 0.4 %/year

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Array losses**IAM loss factor**

Incidence effect (IAM): Fresnel, AR coating, $n(\text{glass})=1.526$, $n(\text{AR})=1.290$

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.816	0.681	0.440	0.000

Spectral correction

FirstSolar model

Precipitable water estimated from relative humidity

Coefficient Set	C0	C1	C2	C3	C4	C5
Monocrystalline Si	0.85914	-0.02088	-0.0058853	0.12029	0.026814	-0.001781

System losses**Unavailability of the system**

Time fraction 1.0 %
3.7 days,
3 periods

Auxiliaries loss

constant (fans) 2.00 kW
2.0 kW from Power thresh.
Night aux. cons. 4.00 kW

AC wiring losses**Inv. output line up to MV transfo**

Inverter voltage 690 Vac tri
Loss Fraction 0.04 % at STC

Inverter: Sunny Central 4600 UP

Wire section (1 Inv.) Copper 1 x 3 x 3000 mm²
Wires length 5 m

MV line up to Injection

MV Voltage 11 kV
Wires Alu 3 x 300 mm²
Length 1701 m
Loss Fraction 0.93 % at STC

AC losses in transformers**MV transfo**

Medium voltage 11 kV

Transformer parameters

Nominal power at STC 5.68 MVA
Iron Loss (24/24 Connexion) 5.68 kVA
Iron loss fraction 0.10 % at STC
Copper loss 56.77 kVA
Copper loss fraction 1.00 % at STC
Coils equivalent resistance 3 x 0.84 mΩ

**PVsyst V7.4.0**

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with v7.4.0

Project: Anambah Solar Project

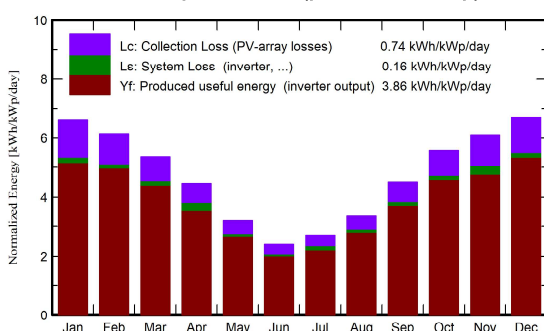
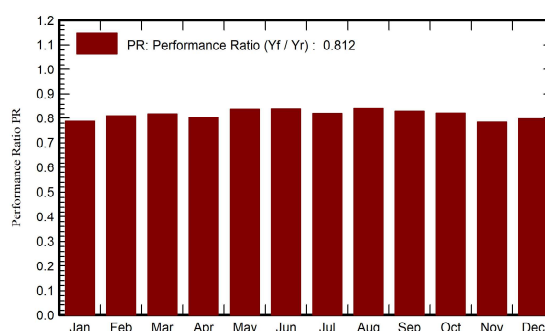
Variant: New simulation variant

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Main results**System Production**

Produced Energy 8152045 kWh/year
Apparent energy 8603743 kVAh/year

Specific production 1410 kWh/kWp/year
Perf. Ratio PR 81.20 %

Normalized productions (per installed kWp)**Performance Ratio PR****Balances and main results**

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	205.8	81.65	24.01	204.4	193.6	961327	930810	0.788
February	173.1	80.66	23.10	172.0	162.8	833271	807139	0.812
March	167.9	62.38	21.13	167.0	157.6	817577	791481	0.820
April	134.7	40.67	17.62	133.9	125.3	666129	620743	0.802
May	99.6	32.73	14.12	99.1	91.5	497178	480194	0.838
June	72.8	30.10	11.74	72.4	66.3	365353	351622	0.840
July	84.4	29.41	10.89	84.1	77.2	424425	399807	0.822
August	104.2	44.89	12.23	103.5	96.2	522791	505372	0.845
September	136.4	53.10	15.36	135.2	127.2	671471	649418	0.831
October	174.3	77.76	18.24	173.2	163.9	851296	824160	0.823
November	184.4	81.53	20.20	183.2	173.4	883395	830374	0.784
December	209.8	89.52	22.60	208.4	197.4	992055	960924	0.798
Year	1747.4	704.40	17.57	1736.5	1632.5	8486269	8152045	0.812

Legends

GlobHor Global horizontal irradiation
DiffHor Horizontal diffuse irradiation
T_Amb Ambient Temperature
GlobInc Global incident in coll. plane
GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array
E_Grid Energy injected into grid
PR Performance Ratio



PVsyst V7.4.0

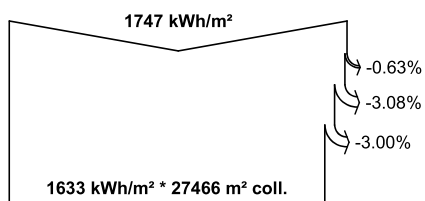
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Project: Anambah Solar Project

Variant: New simulation variant

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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

IAM factor on global

Soiling loss factor

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

Module Degradation Loss (for year #1)

PV loss due to irradiance level

PV loss due to temperature

Spectral correction

Module quality loss

LID - Light induced degradation

Mismatch loss, modules and strings

Ohmic wiring loss

Mixed orientation mismatch loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

Available Energy at Inverter Output

Auxiliaries (fans, other)

AC ohmic loss

Medium voltage transfo loss

MV line ohmic loss

System unavailability

Active Energy injected into grid

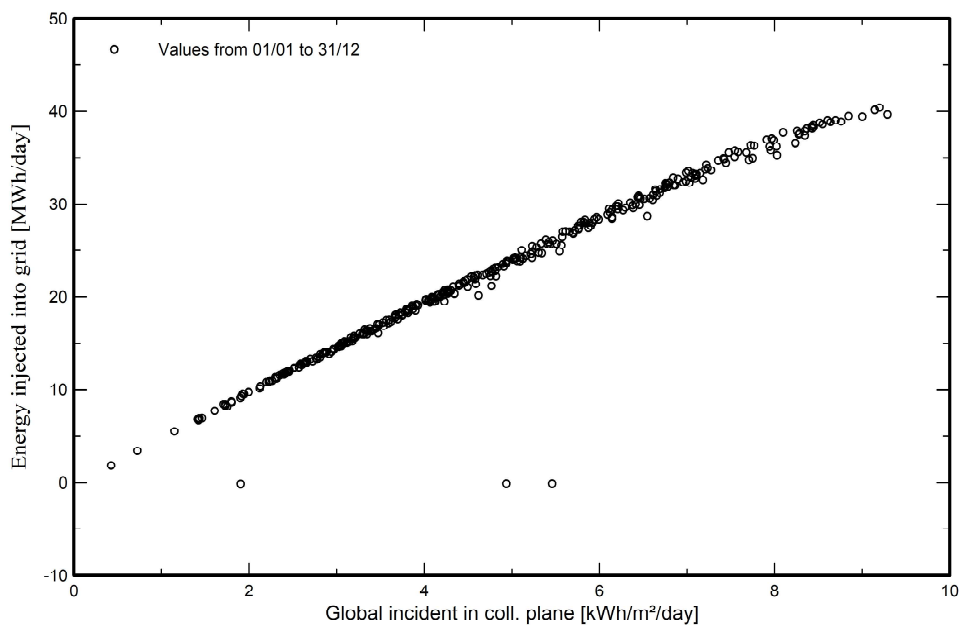
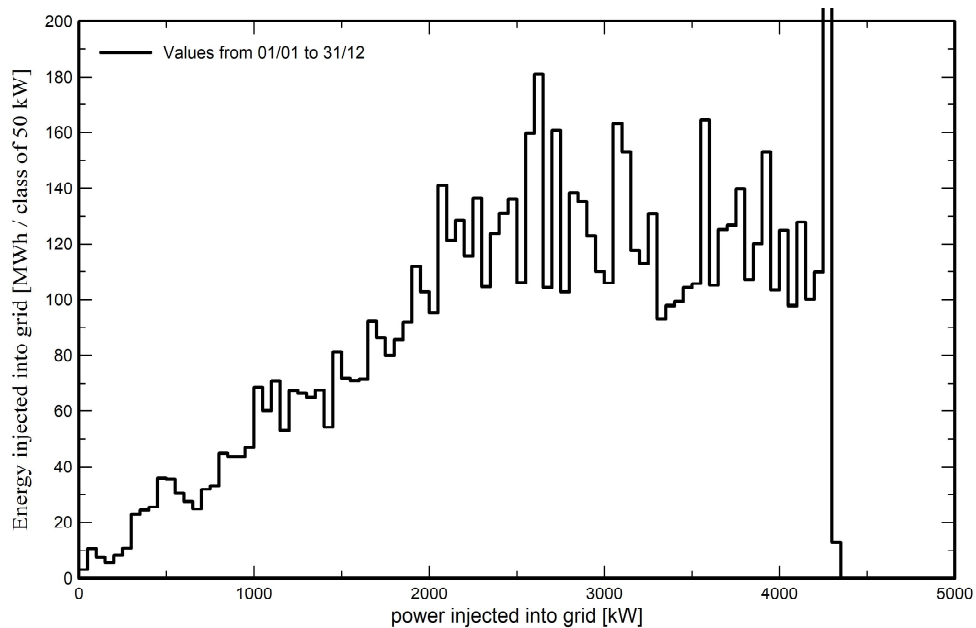
Reactive energy to the grid: Aver. cos(phi) = 0.950

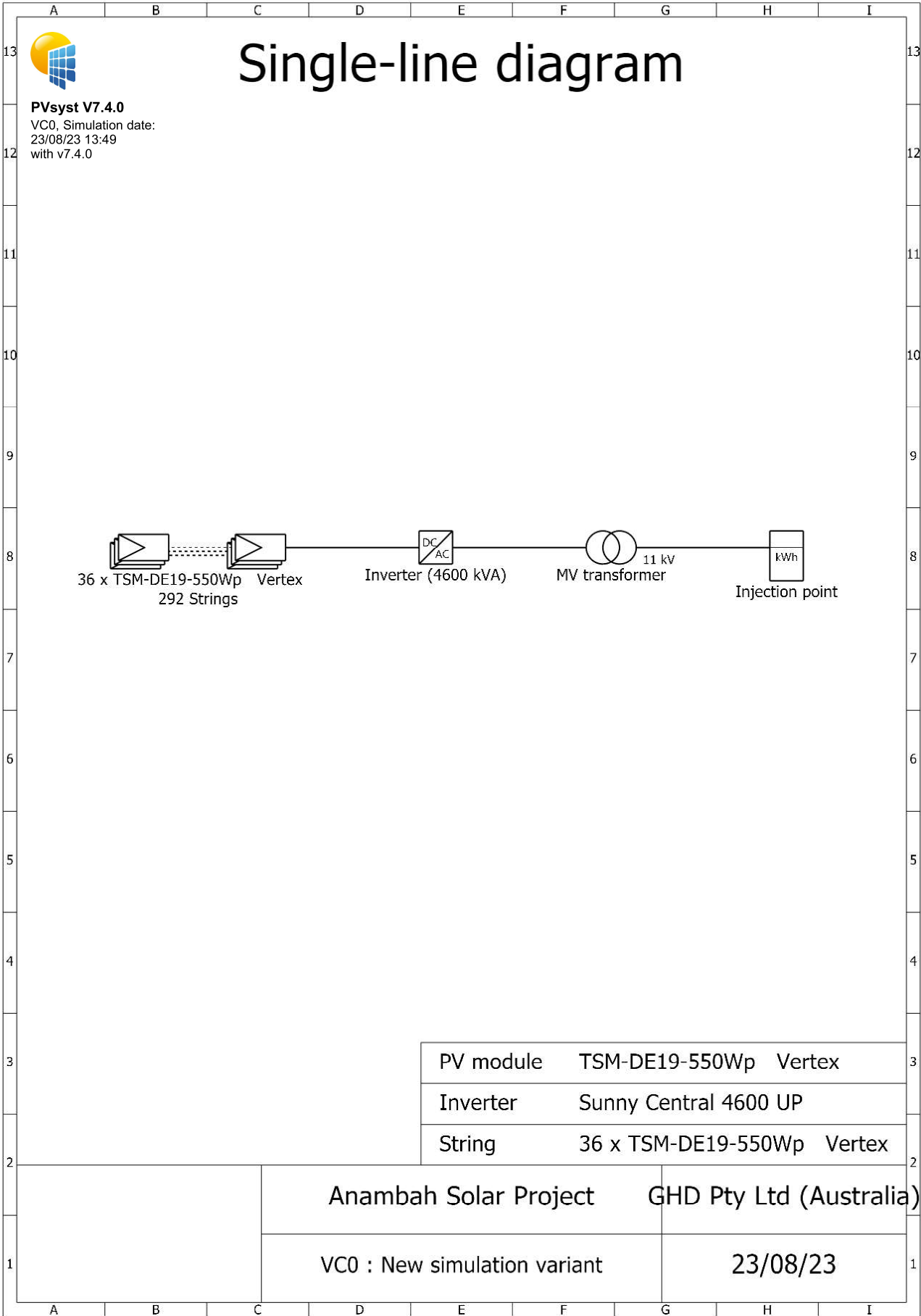
Apparent energy to the grid

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Predef. graphs**Daily Input/Output diagram****System Output Power Distribution**





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