Clarence... a brighter place

DEVELOPMENT APPLICATION

PDPLANPMTD-2024/041897

PROPOSAL: Change of Use to Visitor Accommodation

LOCATION: 14 Algona Street, South Arm

RELEVANT PLANNING SCHEME: Tasmanian Planning Scheme - Clarence

ADVERTISING EXPIRY DATE: 12 March 2024

The relevant plans and documents can be inspected at the Council offices, 38 Bligh Street, Rosny Park, during normal office hours until 12 March 2024. In addition to legislative requirements, plans and documents can also be viewed at www.ccc.tas.gov.au during these times.

Any person may make representations about the application to the Chief Executive Officer, by writing to PO Box 96, Rosny Park, 7018 or by electronic mail to clarence@ccc.tas.gov.au. Representations must be received by Council on or before 12 March 2024.

To enable Council to contact you if necessary, would you please also include a day time contact number in any correspondence you may forward.

Any personal information submitted is covered by Council's privacy policy, available at www.ccc.tas.gov.au or at the Council offices.

Clarence City Council

Clarence... a brighter place

APPLICATION FOR DEVELOPMENT / USE OR SUBDIVISION

*The personal information on this form is required by Council for the development of land under the Land Use Planning and Approvals Act 1993. We will only use your personal information for this and other related purposes. If this information is not provided, we may not be able to deal with this matter. You may access and/or amend your personal information at any time. How we use this information is explained in our **Privacy Policy**, which is available at www.ccc.tas.gov.au or at Council offices.*

Proposal: from residential to visitor accomodation (Air BnB)

Location:
Address 14 Algona Street
Suburb/Town South Arm Postcode 7022

Current Owners/s:

Applicant:

Personal Information Removed

RECEIVED
31 JAN 2024
BY: CUSTOMER CONTACT

Tax Invoice for application fees to be in the name of: (if different from applicant)

Estimated cost of development $

Is the property on the Tasmanian Heritage Register? Yes ☐ No ☑

(if yes, we recommend you discuss your proposal with Heritage Tasmania prior to lodgement as exemptions may apply which may save you time on your proposal)

If you had pre-application discussions with a Council Officer, please give their name: SHILPI

Current Use of Site: Unoccupied

Does the proposal involve land administered or owned by the Crown or Council? Yes ☐ No ☑

Declaration:

- *I have read the Certificate of Title and Schedule of Easements for the land and am satisfied that this application is not prevented by any restrictions, easements or covenants.*
- *I authorise the provision of a copy of any documents relating to this application to any person for the purposes of assessment or public consultation. I agree to arrange for the permission of the copyright owner of any part of this application to be obtained. I have arranged permission for Council's representatives to enter the land to assess this application*
- *I declare that, in accordance with Section 52 of the Land Use Planning and Approvals Act 1993, that I have notified the owner of the intention to make this application. Where the subject property is owned or controlled by Council or the Crown, their signed consent is attached. Where the application is submitted under Section 43A, the owner's consent is attached.*
- *I declare that the information in this declaration is true and correct.*

Acknowledgement:

- *I acknowledge that the documentation submitted in support of my application will become a public record held by Council and may be reproduced by Council in both electronic and hard copy format in order to facilitate the assessment process; for display purposes during public consultation; and to fulfil its statutory obligations. I further acknowledge that following determination of my application, Council will store documentation relating to my application in electronic format only.*

Applicant's Signature:

Signature D. Clifford Date 29/1/2024

PLEASE REFER TO THE DEVELOPMENT/USE AND SUBDIVISION CHECKLIST ON THE FOLLOWING PAGES TO DETERMINE WHAT DOCUMENTATION MUST BE SUBMITTED WITH YOUR APPLICATION.

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
79345	26
EDITION	DATE OF ISSUE
8	21-Dec-2023

SEARCH DATE : 31-Jan-2024
SEARCH TIME : 12.44 PM

DESCRIPTION OF LAND

City of CLARENCE
Lot 26 on Diagram 79345 (formerly being 339-19D)
Derivation : Part of 3900 Acres Gtd. to G.H.B. Gellibrand.
Prior CT 2917/75

SCHEDULE 1

N171253 TRANSFER to ANDREW JOHN CLIFFORD and DEBORAH LOUISE CLIFFORD Registered 21-Dec-2023 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
A107583 FENCING CONDITION in Transfer
E371619 MORTGAGE to Macquarie Bank Limited Registered 21-Dec-2023 at 12.01 PM

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

D 339 T9

DIAGRAM FROM ACTUAL

REGISTERED NUMBER

79345

EY

COUNTY OF MONMOUTH

PARISH OF RALPH'S BAY

No. OF APPLICATION

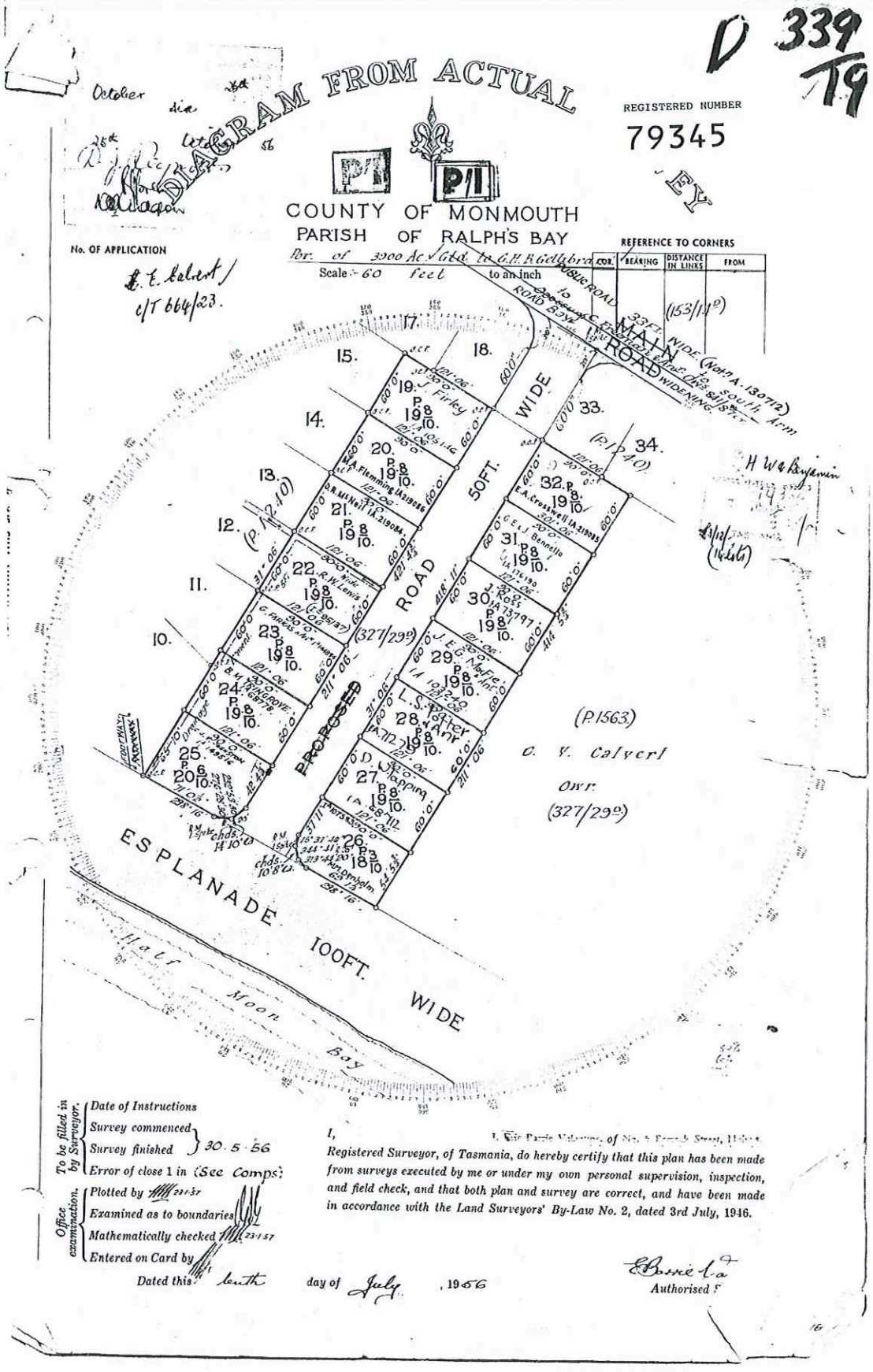
E. E. Calvert / c/T 664/23.

Por. of 3900 Ac. Grtd. to G.H.F. Gellibrand

Scale - 60 feet to an inch

REFERENCE TO CORNERS

COR.	BEARING	DISTANCE IN LINKS	FROM



To be filled in by Surveyor.

Date of Instructions

Survey commenced

Survey finished 30. 5. 56

Error of close 1 in (See Comps)

Office examination.

Plotted by 23-1-57

Examined as to boundaries

Mathematically checked 23-1-57

Entered on Card by

I, [illegible] of No. 5 Patrick Street, Hobart Registered Surveyor, of Tasmania, do hereby certify that this plan has been made from surveys executed by me or under my own personal supervision, inspection, and field check, and that both plan and survey are correct, and have been made in accordance with the Land Surveyors' By-Law No. 2, dated 3rd July, 1946.

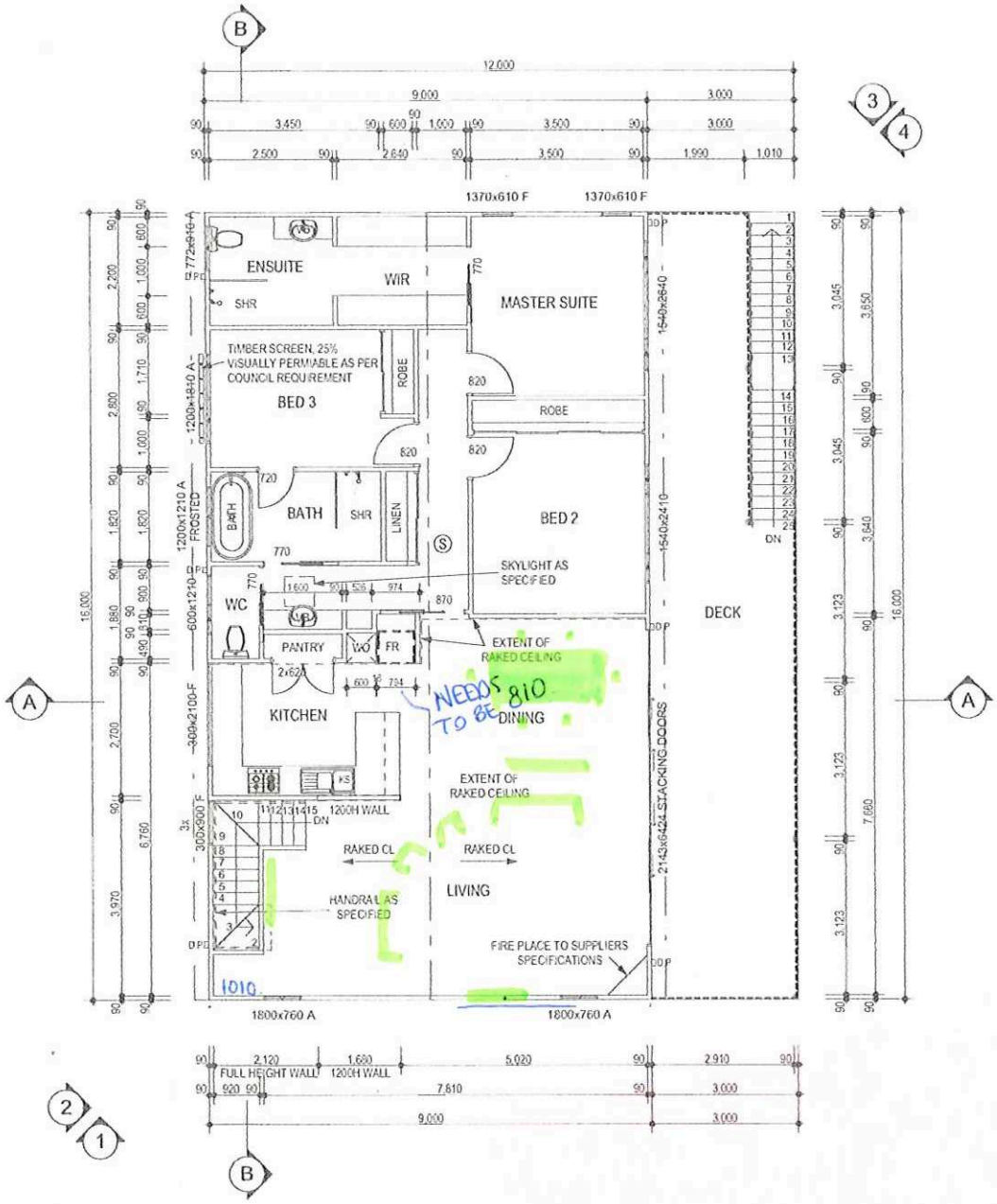
Dated this 4th day of July, 1956

Authorised S[illegible]

OCT 17 FLOOR PLANS

BUILDER TO PROVIDE EXHAUST FANS TO BATHROOM AND ENSUITE - LOCATION TO BE CONFIRMED WITH CLIENT ON SITE

BUILDER TO PROVIDE MIN 20mm THICK THERMAL LAGGING INSULATION TO HOT WATER PIPES



FLOOR COVERING REQUIREMENTS

- TIMBER FLOORING TO OFFICE
- TILED FLOORING TO ENTRY, KITCHEN, DINING, LIVING AND PASSAGE

DIMENSIONS ARE TO TAKE PRECEDENCE OVER SCALED MEASUREMENTS

Streamline DRAFTING & DESIGN
www.streamlinedesigns.com.au ABN: 51429140948
109 Linden Road Primrose Sands, TAS 7173
Ph: 0428 901 871
Email: michael@streamlinedesigns.com.au

REV	COMMENT	DATE
A	DRAFT ONLY (NOT FOR APPROVAL OR CONSTRUCTION)	15/03/17
B	ISSUED FOR APPROVAL / CONSTRUCTION	14/07/17

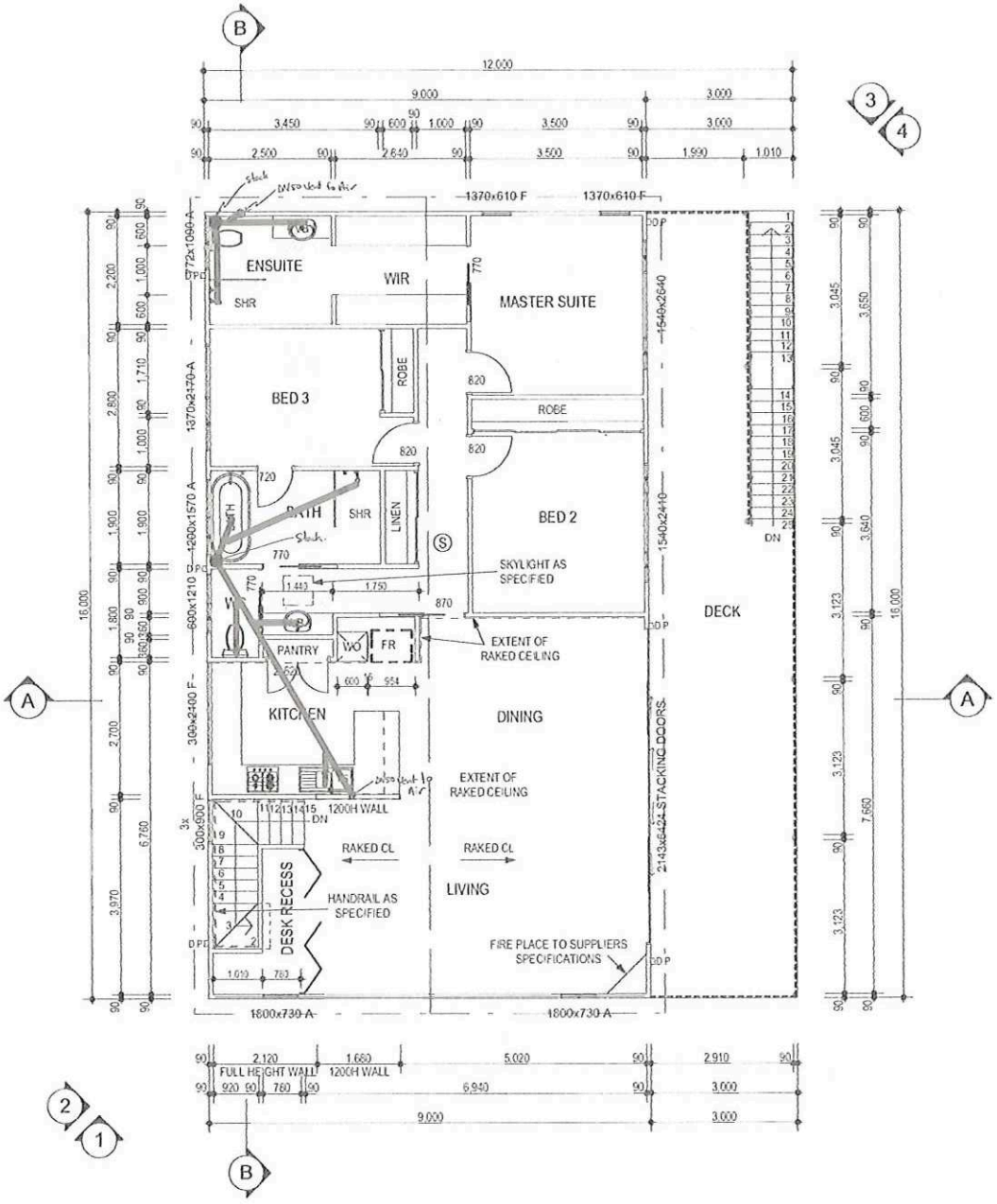
JUDD RESIDENCE

FIRST FLOOR PLAN

CLIENT: KIRSTIE JUDD	DESIGNER: MICHAEL KELLY -CC6697	
	JOB NO: 17032	PAGE SIZE: A3
ADDRESS: 14 ALGONA STREET SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A04
	SCALE:	REV: B

Original Floor Plan 2017
Proposed extension for
Bottom Level
(was approved) 2021
There is a 2 car garage
as well as enough
Parking for 3 other cars
in driveway.
max number of Guests
will be 6.
Air BNB
re. 14 Algona St
Debbie Clifford South Arm

PLUMBING PLANS



FLOOR COVERING REQUIREMENTS

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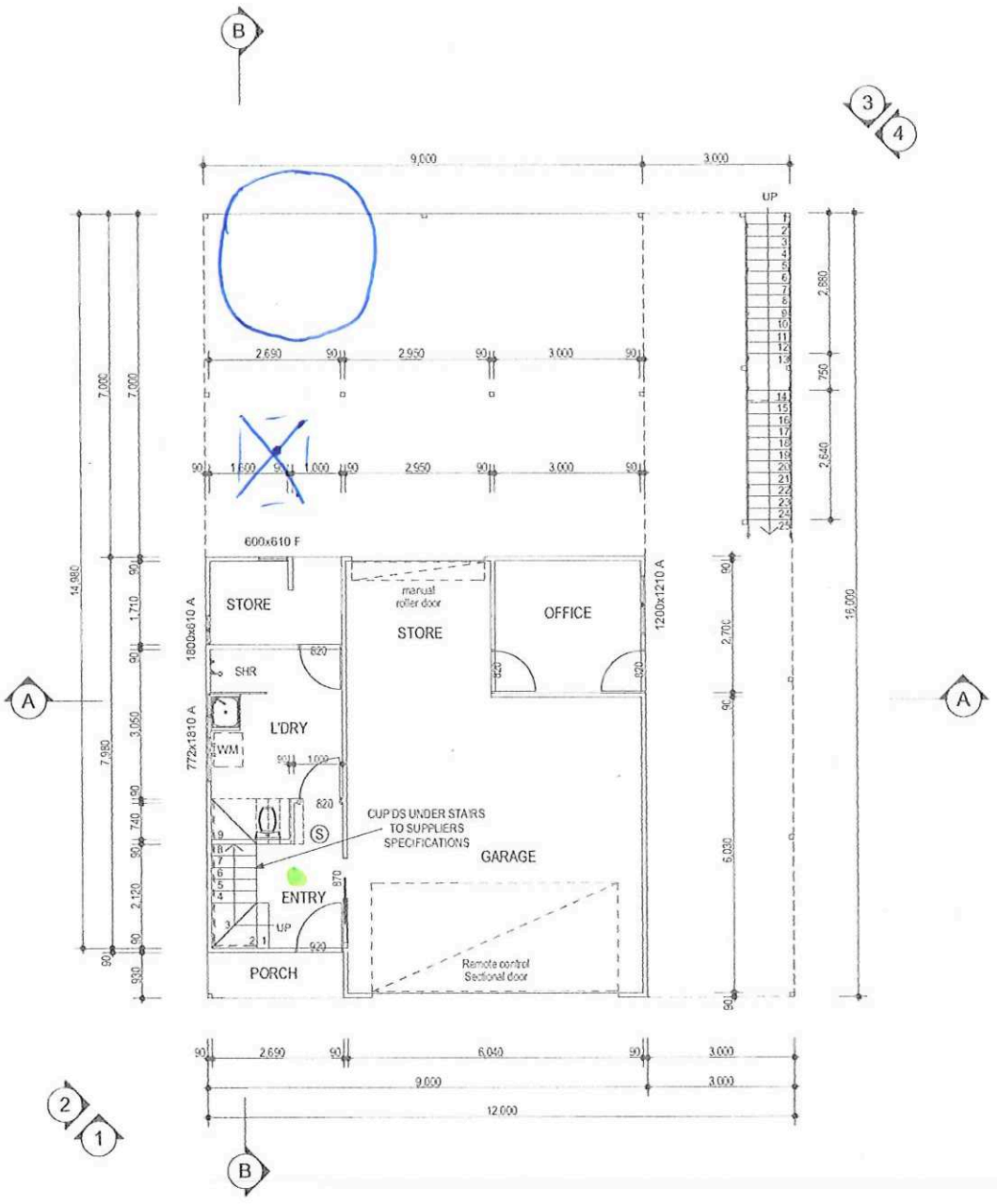
ADDRESS: 14 ALGONA STREET, SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A04
	SCALE:	REV: B



FLOOR COVERING REQUIREMENTS

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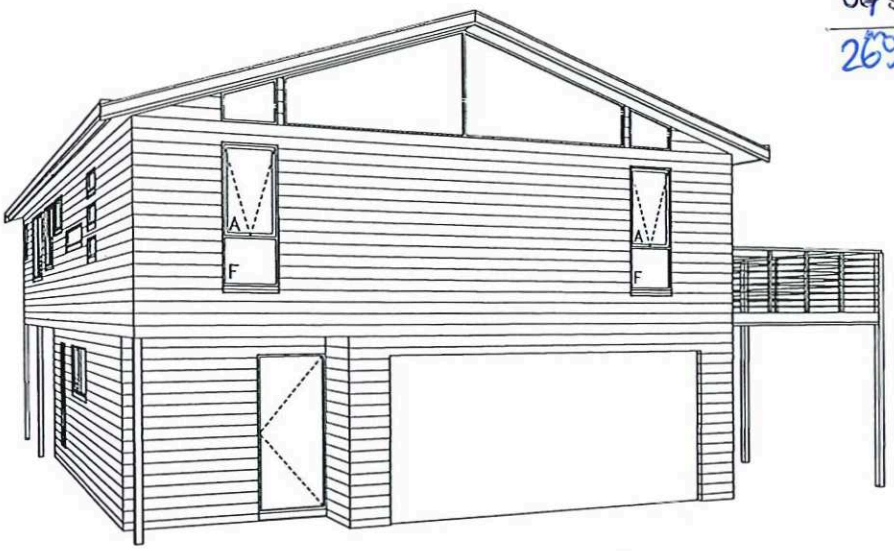
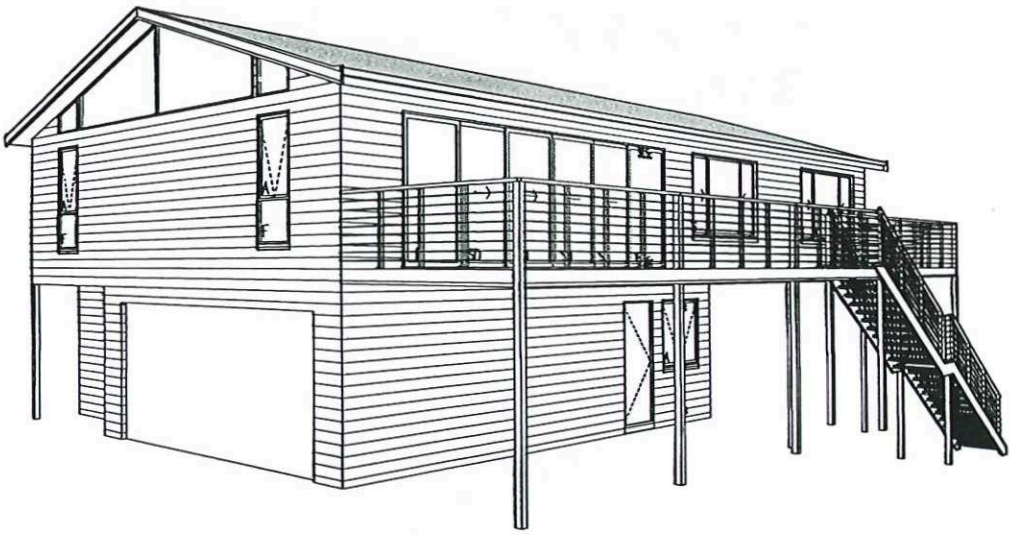
GROUND FLOOR PLAN

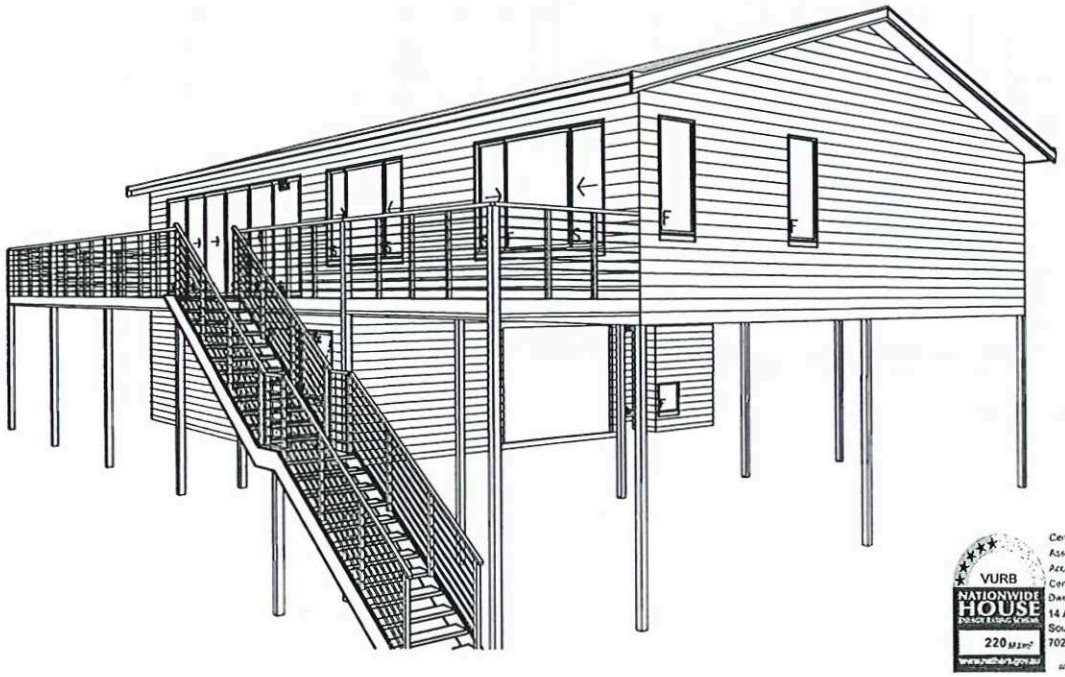
CLIENT: KIRSTIE JUDD	DESIGNER: MICHAEL KELLY -CC6697	
	JOB NO: 17032	PAGE SIZE: A3
ADDRESS: 14 ALGONA STREET SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A03
	SCALE:	REV: B

170.0 sqm HOUSE LIVING
42 sqm DECK.
57 sqm. GARAGE + STORE
269. sqm.

ceived 1/08/2017







Certificate no: 0001707249
Assessor Name: Nathan Peart
Accreditation no: VIC/BDAV/12/1488
Certificate date: 14 Jul 2017
Dwelling Address:
14 Algona Street
South Arm, Tas
7022

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JUDD RESIDENCE

3D VIEWS

CLIENT:
KIRSTIE JUDD

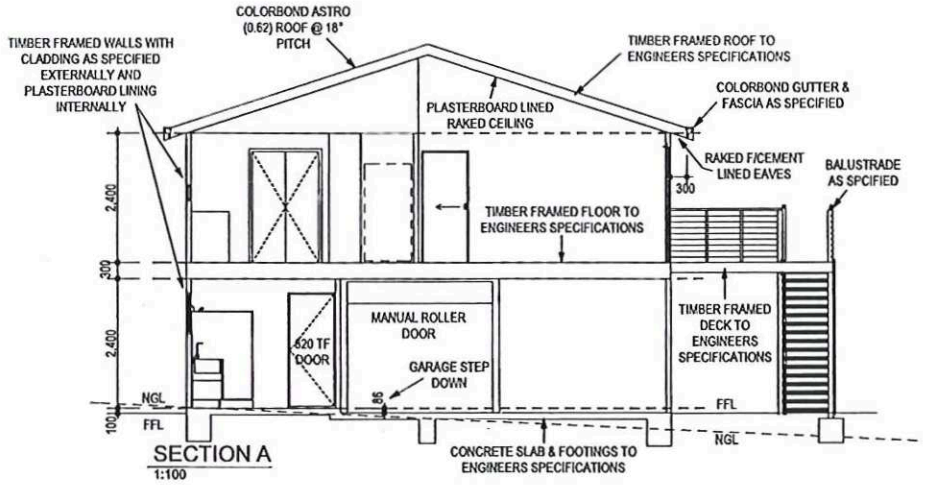
ADDRESS:
14 ALGONA STREET
SOUTH ARM TAS 7022

DESIGNER: MICHAEL KELLY -CC6697
JOB NO: 17032 PAGE SIZE: A3
DATE: 14/07/17 SHEET: A07
SCALE: REV: A

VURB NATIONWIDE HOUSE ENERGY RATING SCHEME 220 MJ/m²

Certificate no.: 0001707249
Assessor Name: Nathan Peart
Accreditation no.: VIC/BDAV/12/1488
Certificate date: 14 Jul 2017
Dwelling Address:
14 Algona Street
South Arm, Tas
7022

www.nathers.gov.au



SECTION A
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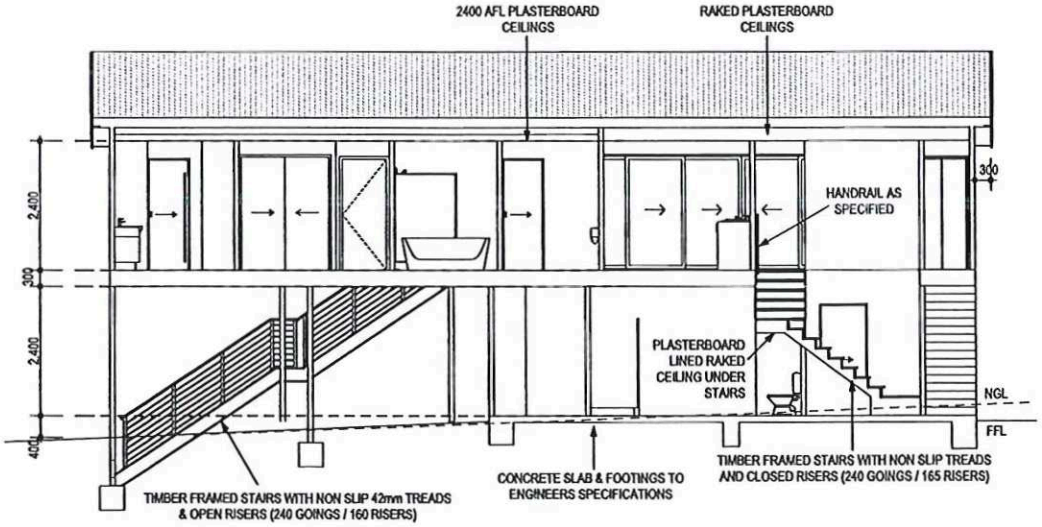

SECTION B
1:100

DIMENSIONS ARE TO TAKE PRECEDENCE OVER SCALED MEASUREMENTS

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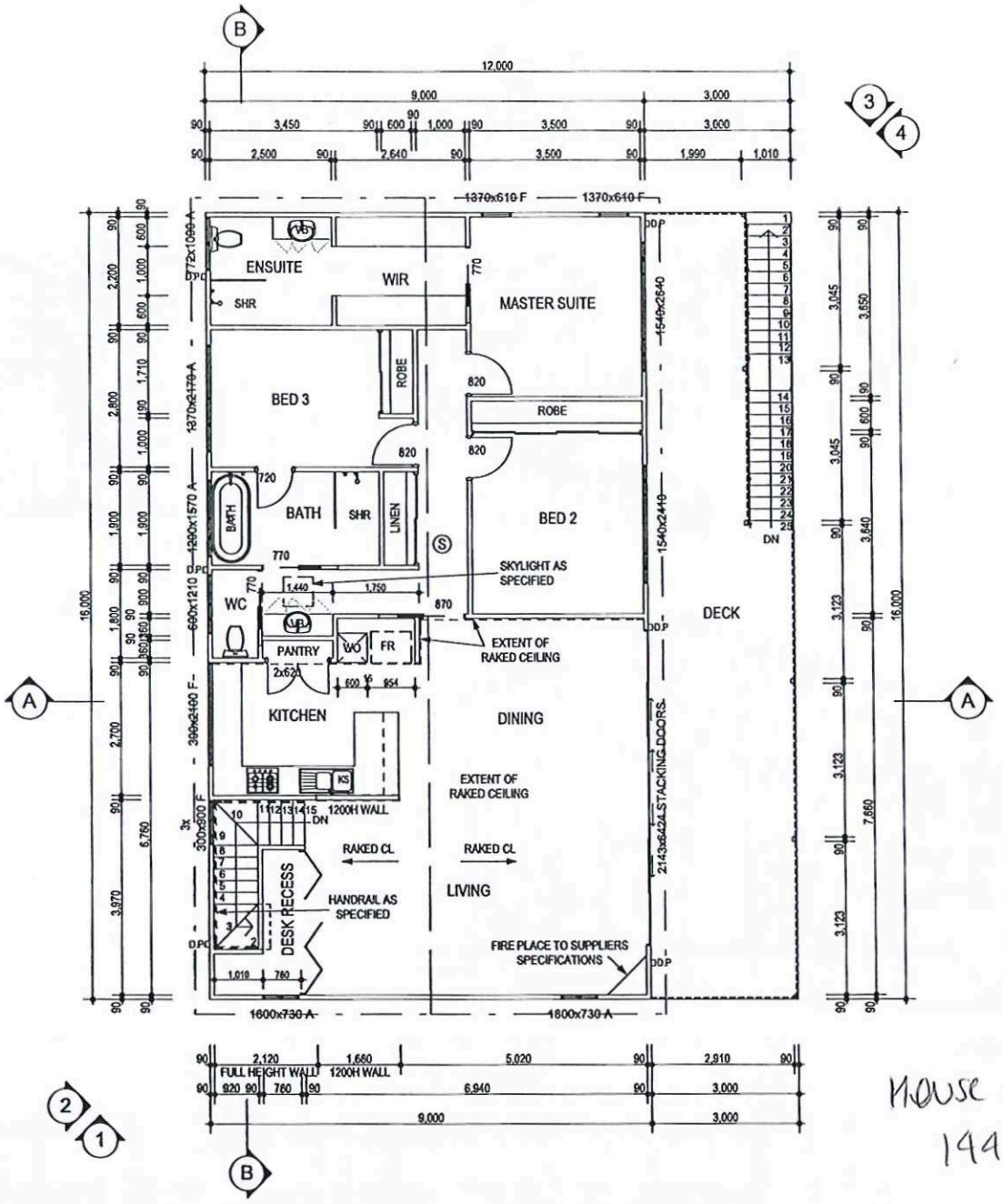
JUDD RESIDENCE
SECTIONS

CLIENT: KIRSTIE JUDD	DESIGNER: MICHAEL KELLY-CC6697	
	JOB NO: 17032	PAGE SIZE: A3
ADDRESS: 14 ALGONA STREET SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A06
	SCALE:	REV: A

Rec 1/08/2017



House upper 149 sqm.

Deck: 42 sqm.

FLOOR COVERING REQUIREMENTS

- TIMBER FLOORING TO OFFICE
- TILED FLOORING TO ENTRY, KITCHEN, DINING, LIVING AND PASSAGE

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FIRST FLOOR PLAN

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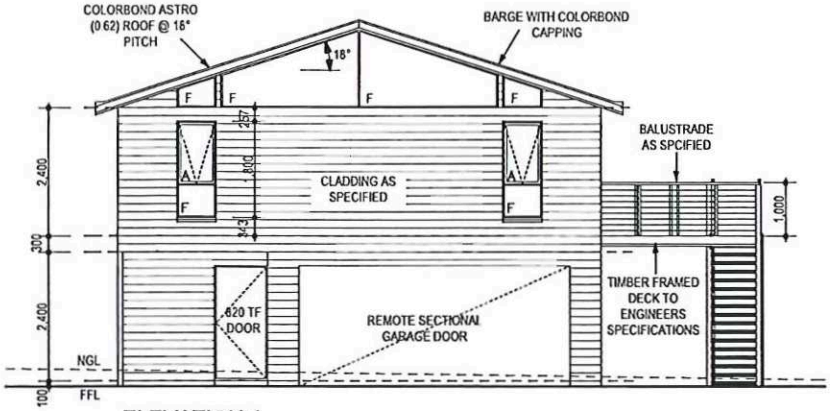
	JOB NO: 17032	PAGE SIZE: A3
ADDRESS: 14 ALGONA STREET SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A04
	SCALE:	REV: A



ELEVATION 1
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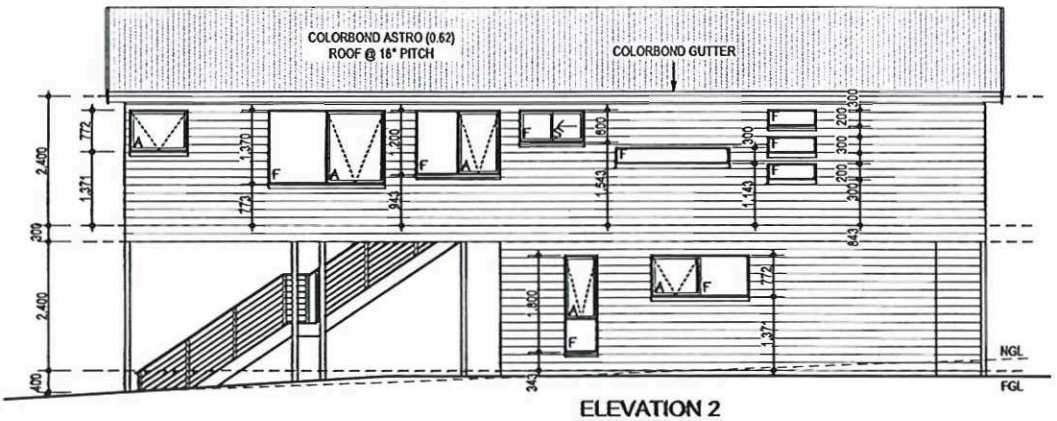

ELEVATION 2
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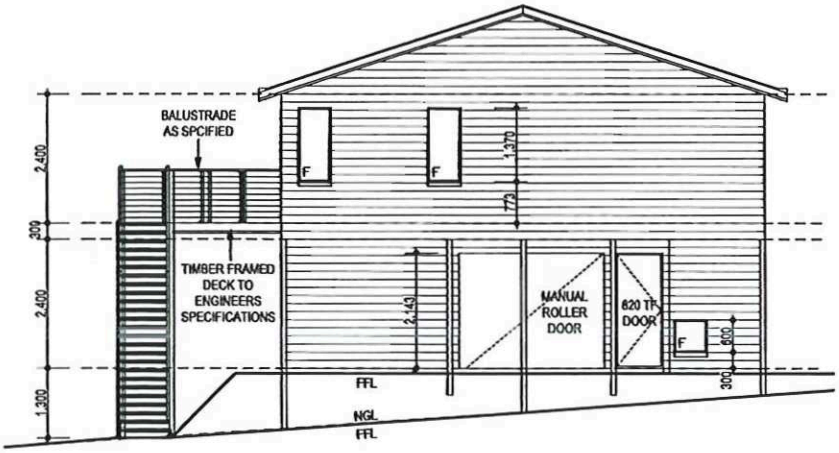

ELEVATION 3
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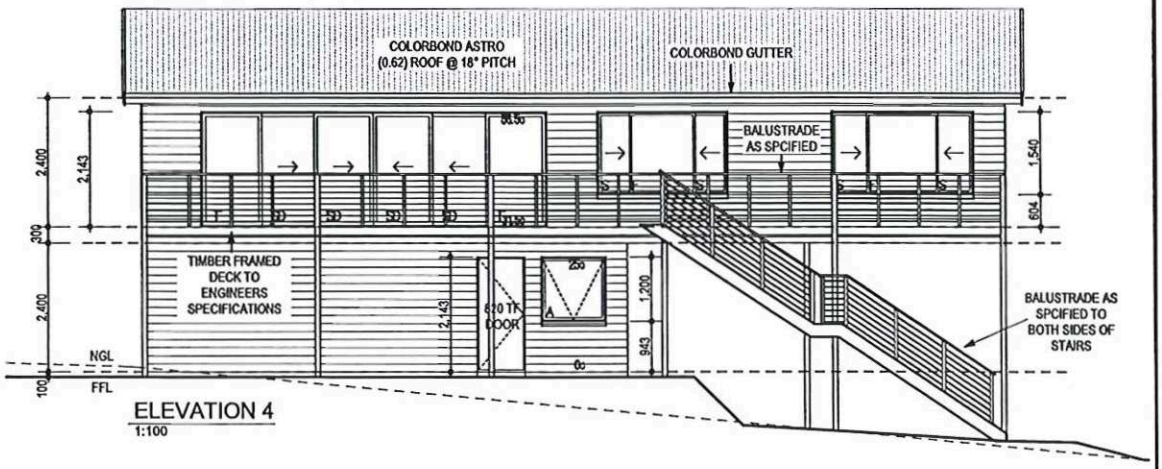

ELEVATION 4
1:100

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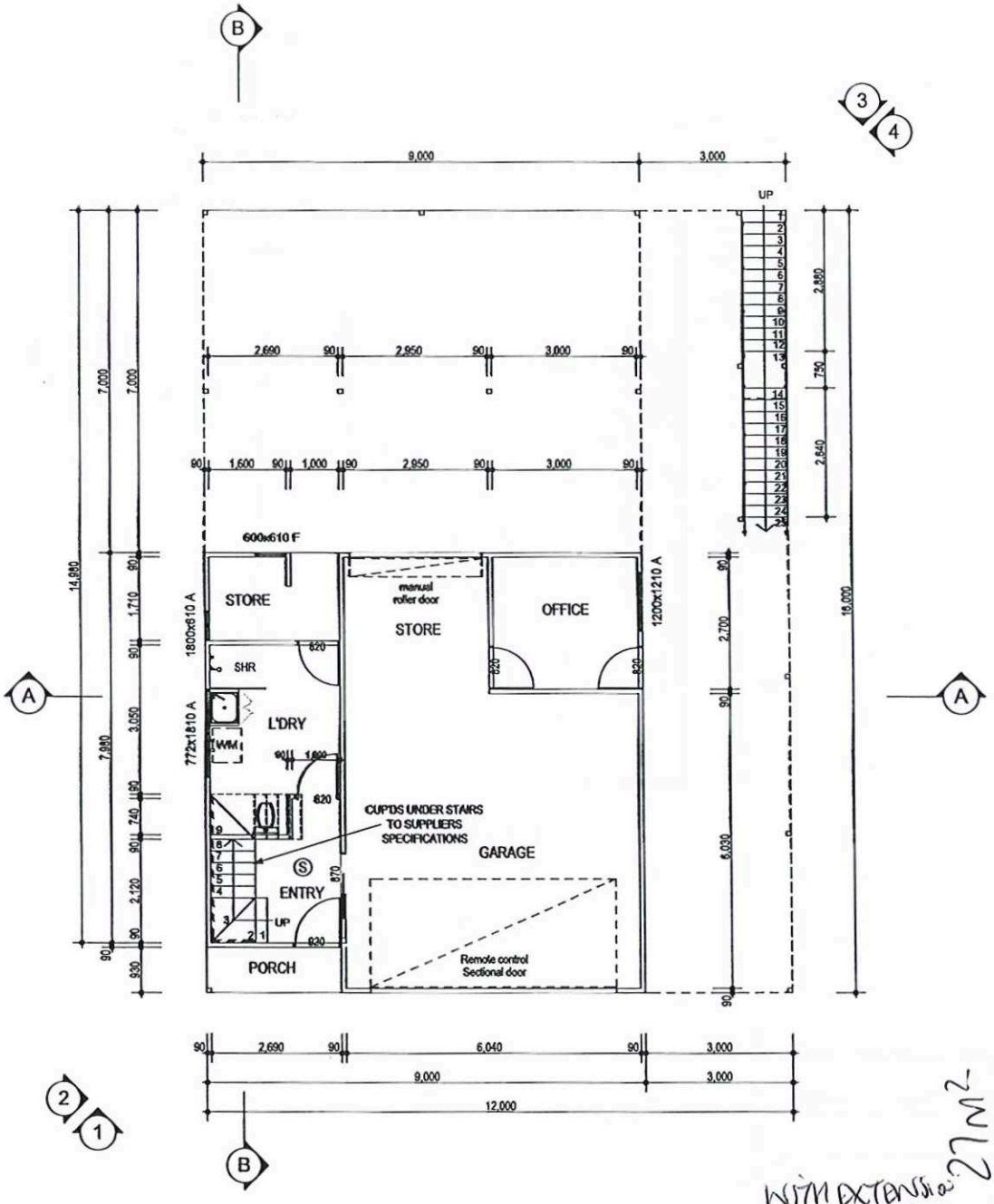
JUDD RESIDENCE

ELEVATIONS 1

CLIENT: KIRSTIE JUDD	DESIGNER: MICHAEL KELLY-CC6697	
	JOB NO: 17032	PAGE SIZE: A3
ADDRESS: 14 ALGONA STREET SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A05
	SCALE:	REV: A

ceived 1/08/2017

Certificate no: 0001707249
Assessor Name: Nathan Peart
Accreditation no: VIC/BDAV/12/1468
Certificate date: 14 Jul 2017
Dwelling Address:
14 Algona Street
South Arm, Tas
7022



WITH EXTENSION 27 m² 22-Sqm² 50m²

Lower level

House 29.5 sqm

Garage store 56 sqm

FLOOR COVERING REQUIREMENTS

- TIMBER FLOORING TO OFFICE
- TILED FLOORING TO ENTRY, KITCHEN, DINING, LIVING AND PASSAGE

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JUDD RESIDENCE
GROUND FLOOR PLAN

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	JOB NO: 17032	PAGE SIZE: A3
ADDRESS: 14 ALGONA STREET SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A03
	SCALE:	REV: A

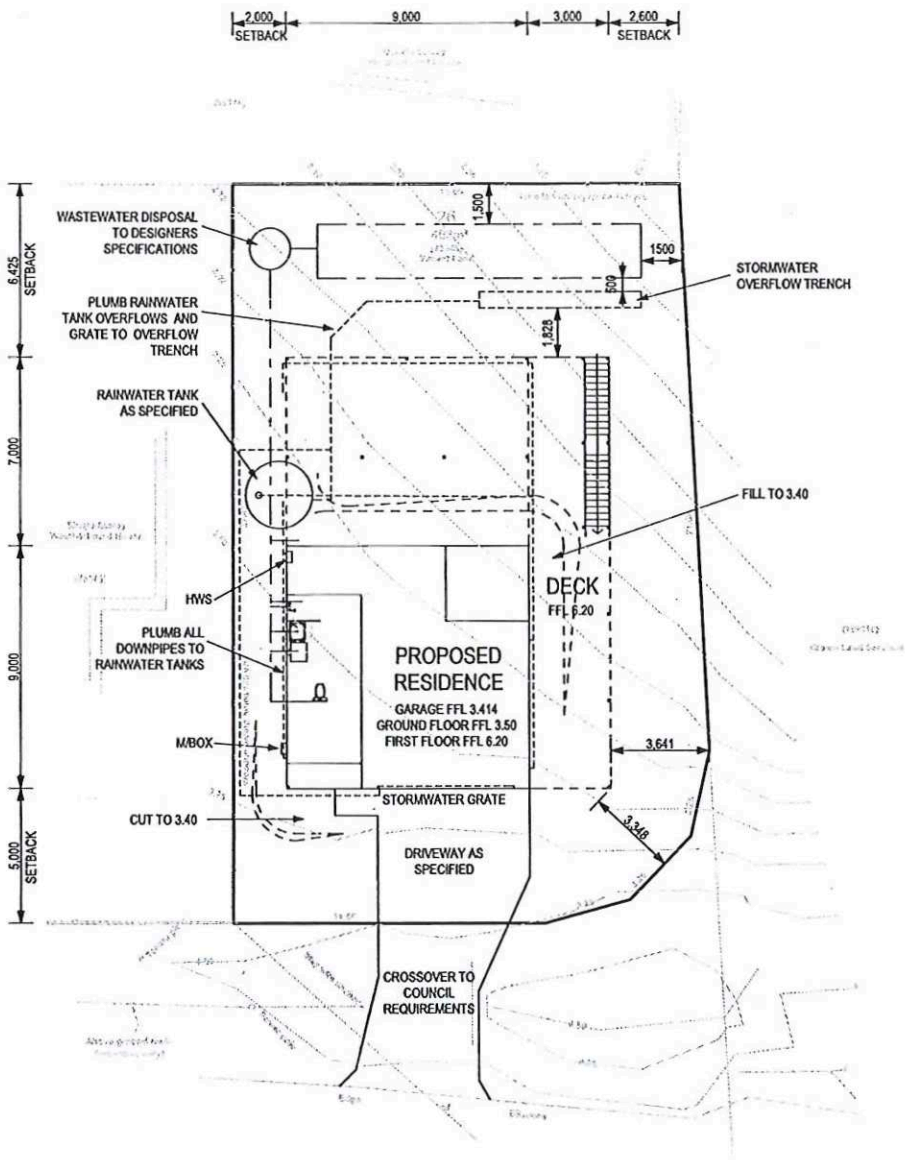
Rec'd 1/08/2017

VURB NATIONWIDE HOUSE ENERGY RATING SCHEME 220 MJ/m² www.nathers.gov.au

Certificate no: 0001707249
Assessor Name: Nathan Pearl
Accreditation no.: VIC/BDAV/12/1488
Certificate date: 14 Jul 2017
Dwelling Address:
14 Algona Street
South Arm, Tas
7022

R2.0 floor insulation
R4.1 ceiling insulation
R2.5 external wall insulation
See report for glazing & skylight details

www.nathers.gov.au



SITE NOTES

BUILDER TO VARIFY ALL BOUNDARY SETBACKS AND DIMENSIONS PRIOR TO COMMENCMENT OF CONSTRUCTION.

BUILDER TO VARIFY LOCATIONS OF ALL SERVICES AND ENSURE ADEQUARE FALLS TO SITE CONNECTION POINTS IN ACCORDANCE WITH AS 3500 BEFORE COMMENCEMENT OF CONSTRUCTION.

RETAINING WALLS GREATER THAN 1m HIGH MUST BE DESIGNED AND CERTIFIED BY A STRUCTURAL ENGINEER.

BATTERS TO COMPLY WITH NCC VOL. 2 PARTS 3.1.1.1 & 3.1.1.2

VEHICULAR CROSSOVERS TO BE CONSTRUCTED TO COUNICL REQUIREMENTS

FINISHED SURFACES TO BE GRADED AWAY FROM HOUSE AT A MINIMUM 1:20 FOR AT LEAST 1m

SOIL ERROSION & WATER MANAGEMENT

DOWNPIPES TO BE CONNECTED TO STORMWATER DISPOSAL AS SOON AS ROOF IS INSTALLED.

AG DRAINS WHERE SHOWN ARE TO BE INSTALLED PRIOR TO FOOTING EXCAVATION. AG DRAINS ARE TO BE 100Ø, 650 DEEP WITH FILTER SOCK U.N.O.

ALL EXCAVATED MATERIALS AND WASHDOWN AREAS TO BE PLACED UP SLOPE OF AG DRAIN OR A TEMPORARY SEDIMENT CONTROL FENCE

SURVEY DATA TAKEN FROM SURVEY REFERENCE: JUDDK02 10288-01 BY ROGERSON & BIRCH SURVEYORS.
TO BE READ IN CONJUNCTION WITH ORIGINAL SURVEY

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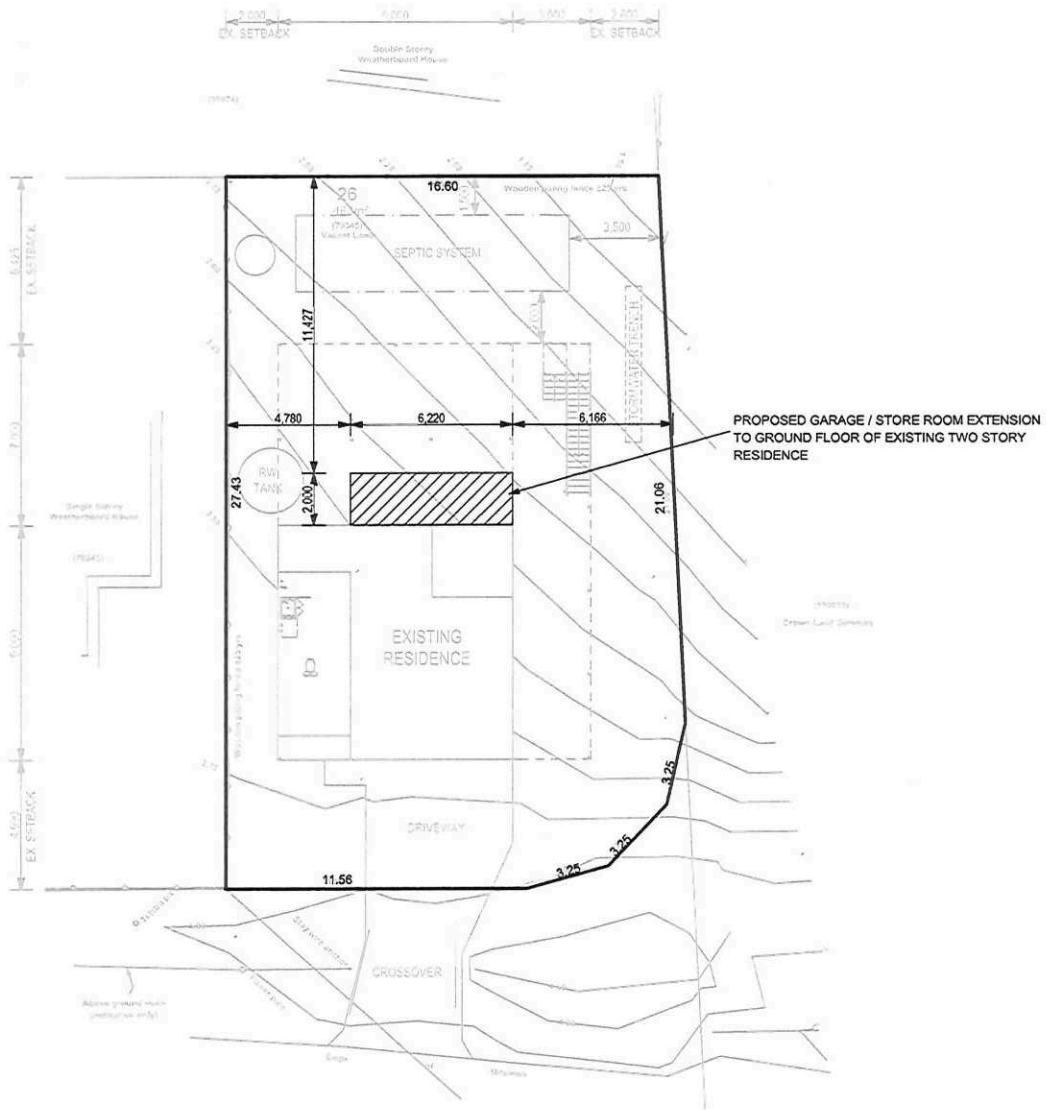
JUDD RESIDENCE

SITE PLAN

CLIENT: KIRSTIE JUDD	DESIGNER: MICHAEL KELLY - CC6697	
	JOB NO: 17032	PAGE SIZE: A3
ADDRESS: 14 ALGONA STREET SOUTH ARM TAS 7022	DATE: 14/07/17	SHEET: A02
	SCALE:	REV: A



Streamline BUILDING DESIGNS

MICHAEL KELLY - ACCREDITED BUILDING DESIGNER CC6697

0428 901 871
michael@streamlinedesigns.com.au
www.streamlinedesigns.com.au

REV	COMMENT	DATE
A	ISSUED FOR APPROVAL / CONSTRUCTION	26/07/21

JUDD EXTENSION

SITE PLAN

CLIENT: KIRSTIE JUDD		JOB NO: 21020	PAGE SIZE:
ADDRESS: ADDRESS		DATE: 26/07/21	SHEET: A03
		SCALE:	REV: A

GENERAL NOTES:

- ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT NCC (NATIONAL CONSTRUCTION CODES) AND ALL RELEVANT AUSTRALIAN STANDARDS

- THE BUILDER IS TO VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS

- DIMENSIONS ARE TO TAKE PRECEDENCE OVER SCALED MEASURMENTS. THE SCALE OF THIS DRAWING MAY BE AFFECTED BY PRINTING / COPYING AND SHOULD NOT BE RELIED ON

- DIMENSIONS ARE SHOWN IN MILLIMETRES AND DO NOT INCLUDE PLASTER OR OTHER FINISHES

- ALL STRUCTURAL DETAILS MUST BE CERTIFIED OR PROVIDED BY A STRUCTURAL ENGINEER. THE ENGINEERS DRAWINGS OR SPECIFICATIONS ARE TO TAKE PRECEDENCE OVER THESE DRAWINGS WHERE CONFLICTING

- ALL PLUMBING WORKS TO BE CARRIED OUT BY A LICENCED PLUMBER IN ACCORDANCE WITH AS 3500

- ALL ELECTRICAL WORK TO BE CARRIED OUT BY A LICENCED ELECTRICIAN IN ACCORDANCE WITH AS 3000

ENERGY EFFICIENCY & CONDENSATION CONTROL NOTES:

- THESE PLANS MUST BE READ IN CONJUNCTION WITH THE ENERGY RATING REPORT, THE BUILDER IS TO ENSURE ALL REQUIREMENTS OF THE ENERGY RATING REPORT ARE MET INCLUDING MINIMUM LEVELS OF INSULATION, GLAZING SHGC / U-VALUES AND LIGHTING SPECIFICATIONS.

- ALL INSULATION TO BE INSTALLED IN ACCORDANCE WITH NCC 3.12.1

- BUILDING WRAPS TO WALLS AND ROOF TO BE A VAPOUR PERMEABLE TYPE SUCH AS PROCTORWRAP OR SOLITEX AND MUST HAVE A MINIMUM 20mm AIR GAP

- ALL DOORS, WINDOWS, EXTERNAL WALLS, FLOORS AND ROOFS TO BE SEALED IN ACCORDANCE WITH NCC PART 3.12.3. FOAM OR RUBBER COMPRESSIBLE SEALS MUST BE PROVIDED TO ALL EXTERNAL WINDOWS AND DOORS.

- ALL EXHAUST FANS TO BE FITTED WITH BACKDRAUGHT DAMPERS AND DUCTED EXTERNALLY IN ACCORDANCE WITH NCC 3.8.5

- ALL ARTIFICIAL LIGHTING IS TO COMPLY WITH NCC 3.12.5.5. THE BUILDER IS TO ENSURE THE WATTAGE OF INSTALLED LIGHTING DOES NOT EXCEED: 5 W/m2 IN A HOME, 4 W/m2 ON A VERANDAH / BALCONY OR 3 W/m2 IN A GARAGE THAT IS PART OF OR ATTACHED TO A HOME

- EXTERNAL LIGHTING TO BE CONTROLLED BY A DAYLIGHT SENSOR OR HAVE AN AVERAGE LIGHT SOURCE EFFICACY OF NOT LESS THAN 40 LUMENS/W.

- ALL PIPES AND SERVICES TO HAVE THERMAL INSULATION COMPLYING WITH NCC PART 3.12.5

WINDOWS, DOORS & GLAZING NOTES:

- ALL WINDOWS & GLAZING INCLUDING SHOWER SCREENS TO COMPLY WITH AS 1288, AS 2047 AND NCC 3.6. (GLAZING SHGC AND U-VALUES TO COMPLY WITH ENERGY RATING REPORT)

- FLASHINGS TO WALL OPENINGS TO COMPLY WITH NCC 3.5.3.6

- OPENABLE WINDOWS TO COMPLY WITH NCC PART 3.9.2.5 PROTECTION OF OPENABLE WINODOWS

WET AREA NOTES:

- ALL WET AREAS (AS DEFINED BY BCA 3.8.1.2) ARE TO COMPLY WITH AS3740 AND NCC 3.8.1 (INCLUDING TABLE 3.8.1.1)

- USE APPROVED WALL AND FLOOR MATERIALS ONLY AND PROVIDE APPROVED FLASHINGS AND SEALANTS TO ALL JUNCTIONS AND AROUND ALL FITTINGS. ALL WATERPROOF MEMBRANES, JUNCTIONS, FLOORS, FIXTURES, SHOWER RECESSES AND SHOWER TRAYS ARE TO BE INSTALLED IN ACCORDANCE WITH NCC 3.8.1

- PROVIDE CERAMIC TILES & WATERPROOFING TO ALL WET AREA FLOORS (TILES TO TIMBER FRAMED FLOORS ARE TO BE LAID ON 15mm CEMENT SHEETING). TILED SHOWER FLOORS ARE TO HAVE A FALL TO THE FLOOR WASTE OF BETWEEN 1:60 - 1:100. FLOORS UNDER TILED SHOWERS ARE TO HAVE A NOM. 30 - 50mm STEPDOWN EITHER FORMED IN A CONCRETE FLOOR OR NOTCHED IN THE FLOOR JOISTS OF A FRAMED FLOOR (REFER ENGINEERS DOCUMENTS OR CONSULT WITH ENGINEER FOR DETAILS ON NOTCHING FLOOR JOISTS).

- PROVIDE CERAMIC TILES, LAMIPANEL OR OTHER APPROVED WATER - RESISTANT LINING TO A MINIMUM HEIGHT OF 1800mm TO SHOWER WALLS AND TO A HEIGHT OF 150mm BEHIND BATHS, BASINS, SINKS, TROUGHS, WASHING MACHINES AND WALL FIXTURES

- PROVIDE WATER STOPS IN ACCORDANCE WITH AS3740 TO ALL SHOWERS (UNDER SHOWER SCREENS / DOOR OPENINGS OR FOR UNENCLOSED SHOWERS ALONG THE EDGE OF THE SHOWER AREA) AND TO ALL ENTRIES / DOORS TO WET AREAS.

- PREFORMED PRODUCTS TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS.

STAIR AND BALUSTRADE NOTES:

- STAIRS TO COMPLY WITH BCA 3.9.1 AND BE FITTED WITH NON SLIP TREADS IN ACCORDANCE WITH AS4586

- BALUSTRADES AND HANDRAILS TO COMPLY WITH BCA 3.9.2. HANDRAILS TO BE A MINIMUM HEIGHT OF 865mm ABOVE TREAD NOSINGS AND 1000mm ABOVE LANDING OR FFL.

- STAIR TREADS AND BALUSTRADES OVER 1m ABOVE FGL MUST HAVE GAPS BETWEEN TREADS AND BALUSTERS LESS THAN 125mm

- WHERE CHANGE IN LEVEL IS OVER 1m A HANDRAIL MUST BE PROVIDED TO AT LEAST ONE SIDE FOR THE FULL LENGTH OF THE STAIRS INCLUDING AROUND ANY WINDERS.

- HEAD CLEARANCE HEIGHT ABOVE STAIR NOISINGS TO BE MINIMUM 2000mm

DEMOLITION NOTES

- ALL DEMOLITION WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BUILDING CODES AND REGULATIONS

- ASBESTOS MUST BE DETERMINED AND REMOVED BY A LICENCED ASBESTON REMOVALIST BEFORE COMMENCING WITH DEMOLITION OR CONSTRUCTION WORKS

- THE BUILDER IS TO PROVIDE TEMPORARY SUPPORTS TO THE EXISTING STRUCTURE WHERE NEEDED. TEMPORARY SUPPORTS TO COMPLY WITH THE ENGINEERS SPECIFICATIONS WHERE PROVIDED.

TIMBER FRAMING NOTES

- ALL TIMBER FRAMING INCLUDING TIE-DOWNS TO BE IN ACCORDANCE WITH AS1684 & ENGINEERS SPECIFICATONS

- MINIMUM MGP10 RADIATA PINE TO BE USED FOR ALL TIMBER FRAMING.

- MINIMUM WALL FRAMING MEMBER SIZES TO BE: COMMON STUDS = 90x35 @ 450 CTS, STUDS AROUND WET AREAS = 90x45 @ 450 CTS, NOGGINGS = 90x35, OPEN STUDS = 90x35, TOP & BOTTOM PLATES = 90x45

OTHER CONSTRUCTION NOTES:

- SITE PREPARATION & EARTHWORKS TO BE IN ACCORDANCE WITH NCC 3.1

- FOOTINGS AND SLABS TO BE IN ACCORDANCE WITH NCC 3.2 AND ENGINEERS SPECIFICATIONS WHERE PROVIDED.

- MASONRY INCLUDING FLASHINGS, WEEPHOLES, DPC, SEALING AROUND WINDOWS / DOORS, WALL TIES, FIXING STRAPS AND TIE-DOWNS TO BE IN ACCORDANCE WITH NCC 3.3 & AS3700

- STEEL LINTELS TO COMPLY WITH NCC 3.3.3.4 AND ENGINEERS SPECIFICATIONS WHERE PROVIDED.

- VERTICAL ARTICULATION JOINTS TO COMPLY WITH NCC 3.3.1.8 AND FIG 3.3.1.7

- WEEP HOLES AND DAMP PROOF COURSING TO BE IN ACCORDANCE WITH NCC 3.3.4.4, & 3.3.4.5

- SUB-FLOOR VENTILATION WHERE APPLICABLE TO COMPLY WITH NCC 3.4.1 MIN 6000mm PER LINEAR METER (TYPICALLY COMMON BRICK VENTS AT 1.8m CTS OR BLOCK VENTS AT 2.1m CTS).

- EXTERNAL CLADDING AS SHOWN ON PLANS TO COMPLY WITH NCC 3.5.3 AND BE INSTALLED TO MANUFACTURERS SPECIFICATIONS

- ROOF COVER AS SHOWN ON PLANS TO COMPLY WITH NCC 3.5.1 AND THE MANUFACTURERS SPECIFICATIONS.

- GUTTERS AND DOWNPIPES TO COMPLY WITH NCC 3.5.2

- 10mm PLASTERBOARD LINING TO ALL INTERNAL WALLS AND CEILINGS U.N.O. (MIN 6mm FIBRE CEMENT SHEETING TO ALL WET AREAS)

- FIBRECEMENT LINING TO ALL EAVES IN ACCORDANCE WITH NCC VOL. 2 PART 3.5.3.5

- HEATING APPLIANCES TO BE INSTALLED IN ACCORDANCE WITH NCC 3.7.3, RELEVANT AUSTRALIAN STANDARDS & MANUFACTURERS SPECIFICATIONS

- HOT WATER SYSTEM TO COMPLY WITH RELEVANT AUSTRALIAN STANDARDS AND BE INSTALLED TO MANUFACTURERS SPECIFICATIONS

- SMOKE ALARMS TO BE INTERCONNECTED AND HARD WIRED WITH BATTERY BACKUP TO AS 3786 & NCC VOL. 2 PART 3.7.2

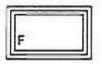
GENERAL NOTATION LEGEND

FFL	=	FINISHED FLOOR LEVEL
NGL	=	NATURAL GROUND LEVEL
FGL	=	FINISHED GROUND LEVEL
CL	=	CEILING
TOW	=	TOP OF WALL
BOW	=	BOTTOM OF WALL
DP	=	DOWNPIPE
DHO	=	DOOR HEIGHT OPENING
FHO	=	FULL HEIGHT OPENING
WS	=	WATER STOP
CTS	=	CENTERS
UNO	=	UNLESS NOTED OTHERWISE

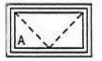
WINDOW NOTATION LEGEND

- WINDOW SIZES SPECIFIED ON FLOOR PLANS ARE FRAME / BRICKWORK OPENING SIZES ONLY. BUILDER TO MAKE ALLOWANCES FOR REVEALES / PACKING AND CONFIRM ALL SIZES ON SITE PRIOR TO PLACING ORDER

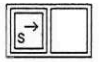
- ALL WINODW HEADS TO BE AT 2100 AFL UNLESS SHOWN OTHERWISE ON ELEVATIONS



= FIXED WINDOW



= AWNING WINDOW



= SLIDING WINDOW / SLIDING DOOR

= CLEAR GLAZING

= OBSCURE GLAZING

FLOOR PLAN LEGEND

EXISTING WALLS TO BE REMOVED SHOWN SHADED (REFER DEMOLITION NOTES)

90mm STUD FRAMED WALL WITH PLASTERBAORD LINING INTERNALLY AND SELECT CLADDING EXTERNALLY (REFER ELEVATIONS). INSULATION AS PER ENERGY RATING REPORT

240mm BRICK VENEER WALL (110 BRICK / 40 CAVITY / 90 TIMBER STUD) WITH PLASTERBOARD LINING INTERNALLY AND FACE BRICK / RENDER FINISH AS PER ELEVATIONS EXTERNALLY. INSULATION AS PER ENERGY RATING REPORT

110mm BRICK WALL WITH ENGAGED PIERS AS PER ENGINEERS SPECIFICATIONS

EXTENT OF WATERPROOFED WET AREA FLOOR WITH SELECT TILED FINISH (REFER WET AREA NOTES)

DENOTES SMOKE ALARM, INTERNCONNECTED AND HARD WIRED WITH BATTERY BACKUP TO AS 3786 & NCC VOL. 2 PART 3.7.2

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REV	COMMENT	DATE
A	ISSUED FOR APPROVAL / CONSTRUCTION	26/07/21

JUDD EXTENSION

GENERAL NOTES

CLIENT: KIRSTIE JUDD		JOB NO: 21020	PAGE SIZE:
ADDRESS: ADDRESS		DATE: 26/07/21	SHEET: A02
		SCALE:	REV: A

PROPOSED EXTENSION FOR KIRSTIE JUDD AT:
14 ALGONA STREET, SOUTH ARM TAS 7022

DRAWING SCHEDULE

A01 - COVER PAGE
A02 - GENERAL NOTES
A03 - SITE PLAN
A04 - FLOOR PLAN
A05 - ELEVATIONS
A06 - SECTION A-A

SITE DETAILS

- TITLE REFERENCE - 79345/26
- CLIMATE ZONE - 7
- SITE CLASS - TBC
- WIND CLASS - TBC
- ALPINE AREA - NO
- CORROSIVE ENVIRONMENT - SEVERE - REFER TO BCA SECTION 3.4.2.2 & BCA TABLE 3.4.4.2
- BAL RATING - N/A (NO AREAS OF BUSHFIRE PRONE VEGITATION >1ha WITHIN 100m OF THE BUILDING)
- OTHER KNOWN HAZARDS - NONE KNOWN

FLOOR AREAS

PROPOSED EXTENSION = 12.44m2

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JUDD EXTENSION
COVER PAGE

CLIENT: KIRSTIE JUDD
ADDRESS: ADDRESS

JOB NO: 21020 | PAGE SIZE:
DATE: 26/07/21 | SHEET: A01
SCALE: | REV: A

GENERAL NOTES:

- ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT NCC (NATIONAL CONSTRUCTION CODES) AND ALL RELEVANT AUSTRALIAN STANDARDS

- THE BUILDER IS TO VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCING CONSTRUCTION OR ORDERING MATERIALS

- DIMENSIONS ARE TO TAKE PRECEDENCE OVER SCALED MEASURMENTS. THE SCALE OF THIS DRAWING MAY BE AFFECTED BY PRINTING / COPYING AND SHOULD NOT BE RELIED ON

- DIMENSIONS ARE SHOWN IN MILLIMETRES AND DO NOT INCLUDE PLASTER OR OTHER FINISHES

- ALL STRUCTURAL DETAILS MUST BE CERTIFIED OR PROVIDED BY A STRUCTURAL ENGINEER. THE ENGINEERS DRAWINGS OR SPECIFICATIONS ARE TO TAKE PRECEDENCE OVER THESE DRAWINGS WHERE CONFLICTING

- ALL PLUMBING WORKS TO BE CARRIED OUT BY A LICENCED PLUMBER IN ACCORDANCE WITH AS 3500

- ALL ELECTRICAL WORK TO BE CARRIED OUT BY A LICENCED ELECTRICIAN IN ACCORDANCE WITH AS 3000

ENERGY EFFICIENCY & CONDENSATION CONTROL NOTES:

- THESE PLANS MUST BE READ IN CONJUNCTION WITH THE ENERGY RATING REPORT, THE BUILDER IS TO ENSURE ALL REQUIREMENTS OF THE ENERGY RATING REPORT ARE MET INCLUDING MINIMUM LEVELS OF INSULATION, GLAZING SHGC / U-VALUES AND LIGHTING SPECIFICATIONS.

- ALL INSULATION TO BE INSTALLED IN ACCORDANCE WITH NCC 3.12.1

- BUILDING WRAPS TO WALLS AND ROOF TO BE A VAPOUR PERMEABLE TYPE SUCH AS PROCTORWRAP OR SOLITEX AND MUST HAVE A MINIMUM 20mm AIR GAP

- ALL DOORS, WINDOWS, EXTERNAL WALLS, FLOORS AND ROOFS TO BE SEALED IN ACCORDANCE WITH NCC PART 3.12.3. FOAM OR RUBBER COMPRESSIBLE SEALS MUST BE PROVIDED TO ALL EXTERNAL WINDOWS AND DOORS.

- ALL EXHAUST FANS TO BE FITTED WITH BACKDRAUGHT DAMPERS AND DUCTED EXTERNALLY IN ACCORDANCE WITH NCC 3.8.5

- ALL ARTIFICIAL LIGHTING IS TO COMPLY WITH NCC 3.12.5.5. THE BUILDER IS TO ENSURE THE WATTAGE OF INSTALLED LIGHTING DOES NOT EXCEED: 5 W/m2 IN A HOME, 4 W/m2 ON A VERANDAH / BALCONY OR 3 W/m2 IN A GARAGE THAT IS PART OF OR ATTACHED TO A HOME

- EXTERNAL LIGHTING TO BE CONTROLLED BY A DAYLIGHT SENSOR OR HAVE AN AVERAGE LIGHT SOURCE EFFICACY OF NOT LESS THAN 40 LUMENS/W.

- ALL PIPES AND SERVICES TO HAVE THERMAL INSULATION COMPLYING WITH NCC PART 3.12.5

WINDOWS, DOORS & GLAZING NOTES:

- ALL WINDOWS & GLAZING INCLUDING SHOWER SCREENS TO COMPLY WITH AS 1288, AS 2047 AND NCC 3.6. (GLAZING SHGC AND U-VALUES TO COMPLY WITH ENERGY RATING REPORT)

- FLASHINGS TO WALL OPENINGS TO COMPLY WITH NCC 3.5.3.6

- OPENABLE WINDOWS TO COMPLY WITH NCC PART 3.9.2.5 PROTECTION OF OPENABLE WINODOWS

WET AREA NOTES:

- ALL WET AREAS (AS DEFINED BY BCA 3.8.1.2) ARE TO COMPLY WITH AS3740 AND NCC 3.8.1 (INCLUDING TABLE 3.8.1.1)

- USE APPROVED WALL AND FLOOR MATERIALS ONLY AND PROVIDE APPROVED FLASHINGS AND SEALANTS TO ALL JUNCTIONS AND AROUND ALL FITTINGS. ALL WATERPROOF MEMBRANES, JUNCTIONS, FLOORS, FIXTURES, SHOWER RECESSES AND SHOWER TRAYS ARE TO BE INSTALLED IN ACCORDANCE WITH NCC 3.8.1

- PROVIDE CERAMIC TILES & WATERPROOFING TO ALL WET AREA FLOORS (TILES TO TIMBER FRAMED FLOORS ARE TO BE LAID ON 15mm CEMENT SHEETING). TILED SHOWER FLOORS ARE TO HAVE A FALL TO THE FLOOR WASTE OF BETWEEN 1:60 - 1:100. FLOORS UNDER TILED SHOWERS ARE TO HAVE A NOM. 30 - 50mm STEPDOWN EITHER FORMED IN A CONCRETE FLOOR OR NOTCHED IN THE FLOOR JOISTS OF A FRAMED FLOOR (REFER ENGINEERS DOCUMENTS OR CONSULT WITH ENGINEER FOR DETAILS ON NOTCHING FLOOR JOISTS).

- PROVIDE CERAMIC TILES, LAMIPANEL OR OTHER APPROVED WATER - RESISTANT LINING TO A MINIMUM HEIGHT OF 1800mm TO SHOWER WALLS AND TO A HEIGHT OF 150mm BEHIND BATHS, BASINS, SINKS, TROUGHS, WASHING MACHINES AND WALL FIXTURES

- PROVIDE WATER STOPS IN ACCORDANCE WITH AS3740 TO ALL SHOWERS (UNDER SHOWER SCREENS / DOOR OPENINGS OR FOR UNENCLOSED SHOWERS ALONG THE EDGE OF THE SHOWER AREA) AND TO ALL ENTRIES / DOORS TO WET AREAS.

- PREFORMED PRODUCTS TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS.

STAIR AND BALUSTRADE NOTES:

- STAIRS TO COMPLY WITH BCA 3.9.1 AND BE FITTED WITH NON SLIP TREADS IN ACCORDANCE WITH AS4586

- BALUSTRADES AND HANDRAILS TO COMPLY WITH BCA 3.9.2. HANDRAILS TO BE A MINIMUM HEIGHT OF 865mm ABOVE TREAD NOSINGS AND 1000mm ABOVE LANDING OR FFL.

- STAIR TREADS AND BALUSTRADES OVER 1m ABOVE FGL MUST HAVE GAPS BETWEEN TREADS AND BALUSTERS LESS THAN 125mm

- WHERE CHANGE IN LEVEL IS OVER 1m A HANDRAIL MUST BE PROVIDED TO AT LEAST ONE SIDE FOR THE FULL LENGTH OF THE STAIRS INCLUDING AROUND ANY WINDERS.

- HEAD CLEARANCE HEIGHT ABOVE STAIR NOISINGS TO BE MINIMUM 2000mm

DEMOLITION NOTES

- ALL DEMOLITION WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT BUILDING CODES AND REGULATIONS

- ASBESTOS MUST BE DETERMINED AND REMOVED BY A LICENCED ASBESTON REMOVALIST BEFORE COMMENCING WITH DEMOLITION OR CONSTRUCTION WORKS

- THE BUILDER IS TO PROVIDE TEMPORARY SUPPORTS TO THE EXISTING STRUCTURE WHERE NEEDED. TEMPORARY SUPPORTS TO COMPLY WITH THE ENGINEERS SPECIFICATIONS WHERE PROVIDED.

TIMBER FRAMING NOTES

- ALL TIMBER FRAMING INCLUDING TIE-DOWNS TO BE IN ACCORDANCE WITH AS1684 & ENGINEERS SPECIFICATONS

- MINIMUM MGP10 RADIATA PINE TO BE USED FOR ALL TIMBER FRAMING.

- MINIMUM WALL FRAMING MEMBER SIZES TO BE: COMMON STUDS = 90x35 @ 450 CTS, STUDS AROUND WET AREAS = 90x45 @ 450 CTS, NOGGINGS = 90x35, OPEN STUDS = 90x35, TOP & BOTTOM PLATES = 90x45

OTHER CONSTRUCTION NOTES:

- SITE PREPARATION & EARTHWORKS TO BE IN ACCORDANCE WITH NCC 3.1

- FOOTINGS AND SLABS TO BE IN ACCORDANCE WITH NCC 3.2 AND ENGINEERS SPECIFICATIONS WHERE PROVIDED

- MASONRY INCLUDING FLASHINGS, WEEPHOLES, DPC, SEALING AROUND WINDOWS / DOORS, WALL TIES, FIXING STRAPS AND TIE-DOWNS TO BE IN ACCORDANCE WITH NCC 3.3 & AS3700

- STEEL LINTELS TO COMPLY WITH NCC 3.3.3.4 AND ENGINEERS SPECIFICATIONS WHERE PROVIDED.

- VERTICAL ARTICULATION JOINTS TO COMPLY WITH NCC 3.3.1.8 AND FIG 3.3.1.7

- WEEP HOLES AND DAMP PROOF COURSING TO BE IN ACCORDANCE WITH NCC 3.3.4.4. & 3.3.4.5

- SUB-FLOOR VENTILATION WHERE APPLICABLE TO COMPLY WITH NCC 3.4.1 MIN 6000mm PER LINEAR METER (TYPICALLY COMMON BRICK VENTS AT 1.8m CTS OR BLOCK VENTS AT 2.1m CTS).

- EXTERNAL CLADDING AS SHOWN ON PLANS TO COMPLY WITH NCC 3.5.3 AND BE INSTALLED TO MANUFACTURERS SPECIFICATIONS

- ROOF COVER AS SHOWN ON PLANS TO COMPLY WITH NCC 3.5.1 AND THE MANUFACTURERS SPECIFICATIONS.

- GUTTERS AND DOWNPIPES TO COMPLY WITH NCC 3.5.2

- 10mm PLASTERBOARD LINING TO ALL INTERNAL WALLS AND CEILINGS U.N.O. (MIN 6mm FIBRE CEMENT SHEETING TO ALL WET AREAS)

- FIBRECEMENT LINING TO ALL EAVES IN ACCORDANCE WITH NCC VOL. 2 PART 3.5.3.5

- HEATING APPLIANCES TO BE INSTALLED IN ACCORDANCE WITH NCC 3.7.3, RELEVANT AUSTRALIAN STANDARDS & MANUFACTURERS SPECIFICATIONS

- HOT WATER SYSTEM TO COMPLY WITH RELEVANT AUSTRALIAN STANDARDS AND BE INSTALLED TO MANUFACTURERS SPECIFICATIONS

- SMOKE ALARMS TO BE INTERCONNECTED AND HARD WIRED WITH BATTERY BACKUP TO AS 3786 & NCC VOL. 2 PART 3.7.2

GENERAL NOTATION LEGEND

FFL	=	FINISHED FLOOR LEVEL
NGL	=	NATURAL GROUND LEVEL
FGL	=	FINISHED GROUND LEVEL
CL	=	CEILING
TOW	=	TOP OF WALL
BOW	=	BOTTOM OF WALL
DP	=	DOWNPIPE
DHO	=	DOOR HEIGHT OPENING
FHO	=	FULL HEIGHT OPENING
WS	=	WATER STOP
CTS	=	CENTERS
UNO	=	UNLESS NOTED OTHERWISE

WINDOW NOTATION LEGEND

- WINDOW SIZES SPECIFIED ON FLOOR PLANS ARE FRAME / BRICKWORK OPENING SIZES ONLY. BUILDER TO MAKE ALLOWANCES FOR REVEALES / PACKING AND CONFIRM ALL SIZES ON SITE PRIOR TO PLACING ORDER

- ALL WINODW HEADS TO BE AT 2100 AFL UNLESS SHOWN OTHERWISE ON ELEVATIONS

= FIXED WINDOW

= AWNING WINDOW

= SLIDING WINDOW / SLIDING DOOR

= CLEAR GLAZING

= OBSCURE GLAZING

FLOOR PLAN LEGEND

EXISTING WALLS TO BE REMOVED SHOWN SHADED (REFER DEMOLITION NOTES)

90mm STUD FRAMED WALL WITH PLASTERBAORD LINING INTERNALLY AND SELECT CLADDING EXTERNALLY (REFER ELEVATIONS). INSULATION AS PER ENERGY RATING REPORT

240mm BRICK VENEER WALL (110 BRICK / 40 CAVITY / 90 TIMBER STUD) WITH PLASTERBOARD LINING INTERNALLY AND FACE BRICK / RENDER FINISH AS PER ELEVATIONS EXTERNALLY. INSULATION AS PER ENERGY RATING REPORT

110mm BRICK WALL WITH ENGAGED PIERS AS PER ENGINEERS SPECIFICATIONS

EXTENT OF WATERPROOFED WET AREA FLOOR WITH SELECT TILED FINISH (REFER WET AREA NOTES)

DENOTES SMOKE ALARM, INTERNCONNECTED AND HARD WIRED WITH BATTERY BACKUP TO AS 3786 & NCC VOL. 2 PART 3.7.2

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REV	COMMENT	DATE
A	ISSUED FOR APPROVAL / CONSTRUCTION	26/07/21

JUDD EXTENSION

GENERAL NOTES

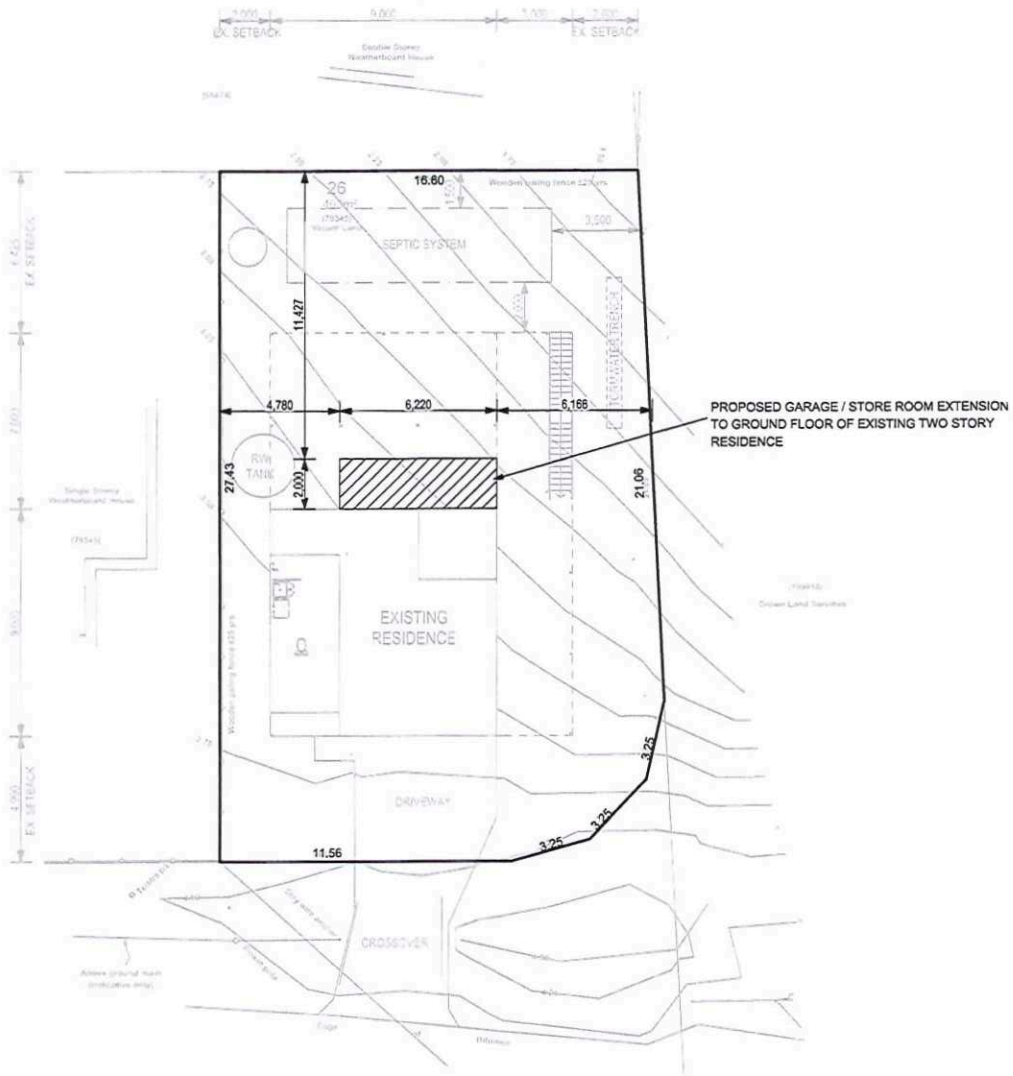
CLIENT: KIRSTIE JUDD

ADDRESS: ADDRESS

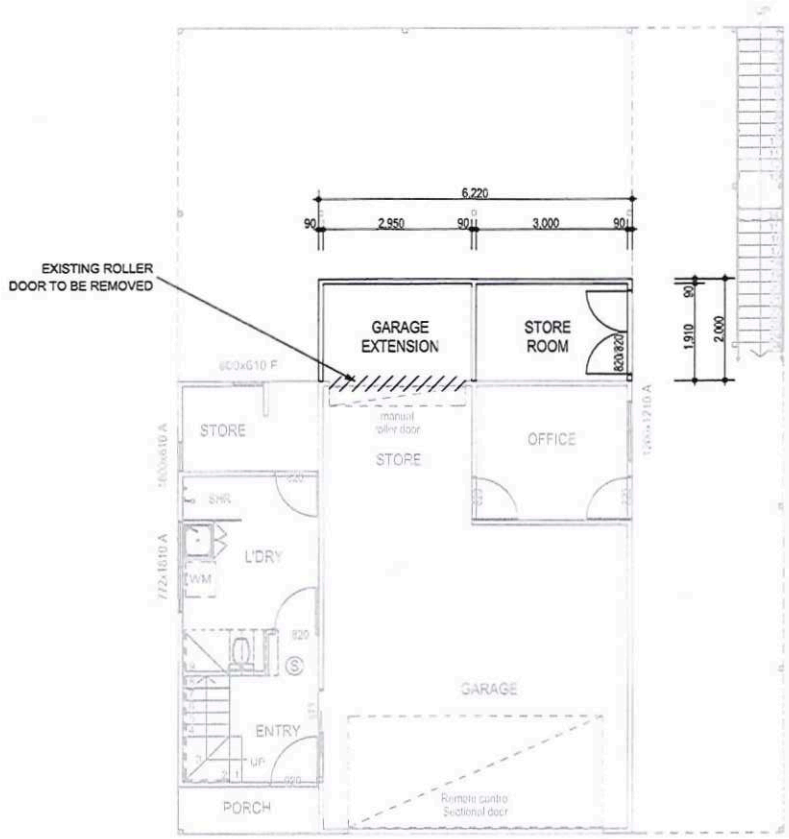
JOB NO: 21020 | PAGE SIZE:

DATE: 26/07/21 | SHEET: A02

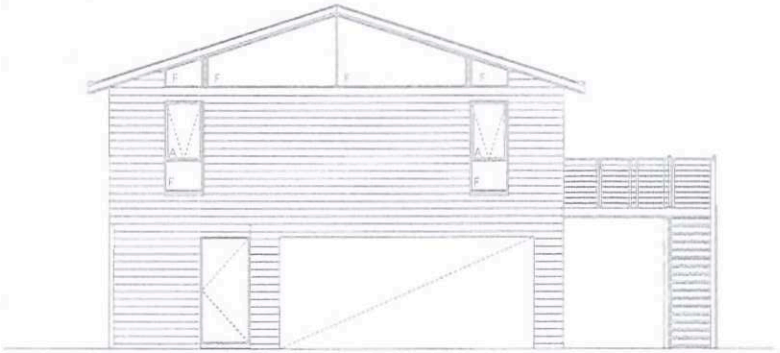
SCALE: | REV: A



Streamline BUILDING DESIGNS MICHAEL KELLY - ACCREDITED BUILDING DESIGNER CC6697 0428 901 871 michael@streamlinedesigns.com.au www.streamlinedesigns.com.au	REV	COMMENT	DATE	**JUDD EXTENSION** SITE PLAN	CLIENT: KIRSTIE JUDD	JOB NO: 21020	PAGE SIZE:
	A	ISSUED FOR APPROVAL / CONSTRUCTION	26/07/21		ADDRESS: ADDRESS	DATE: 26/07/21	SHEET: A03
						SCALE:	REV: A



Streamline BUILDING DESIGNS MICHAEL KELLY - ACCREDITED BUILDING DESIGNER CC6697 0428 901 871 michael@streamlinedesigns.com.au www.streamlinedesigns.com.au	REV / COMMENT / DATE A — ISSUED FOR APPROVAL / CONSTRUCTION — 26/07/21	**JUDD EXTENSION** GROUND FLOOR PLAN	CLIENT: KIRSTIE JUDD ADDRESS: ADDRESS JOB NO: 21020 · PAGE SIZE: DATE: 26/07/21 · SHEET: A04 SCALE: · REV: A



ELEVATION 1
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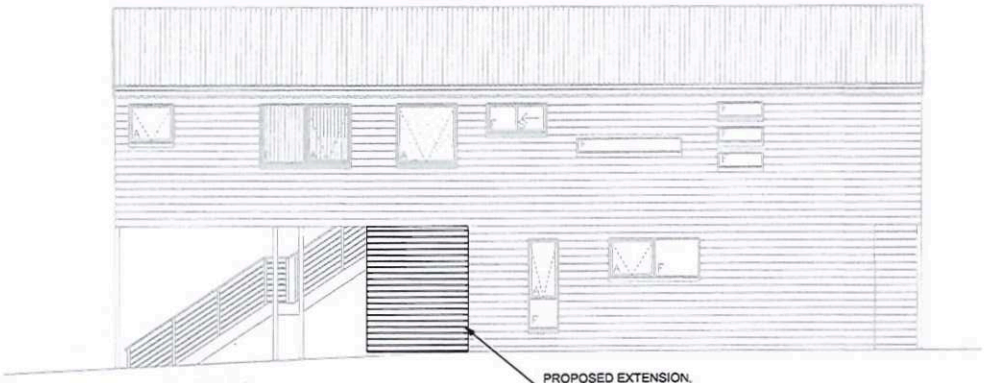
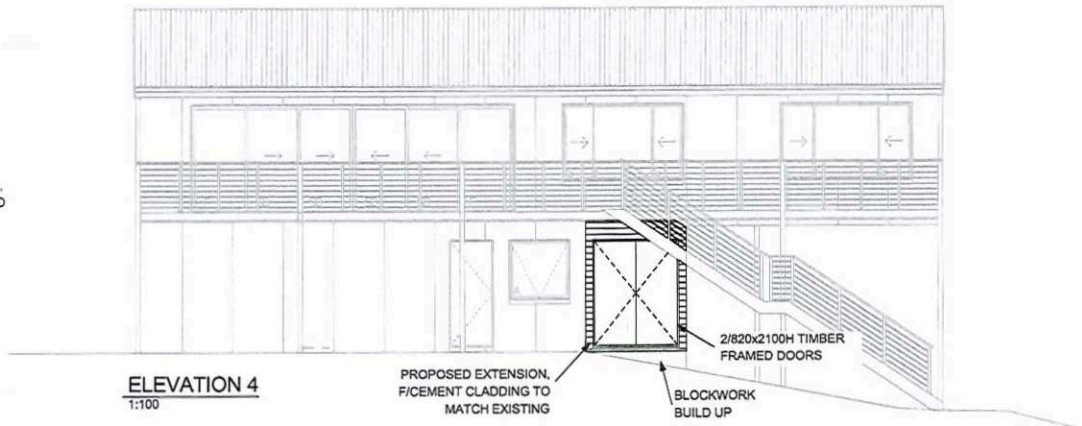


ELEVATION 2
1:100

ELEVATION 3
1:100



ELEVATION 4
1:100

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REV	COMMENT	DATE
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JUDD EXTENSION

ELEVATIONS

CLIENT: KIRSTIE JUDD		JOB NO: 21020	PAGE SIZE:
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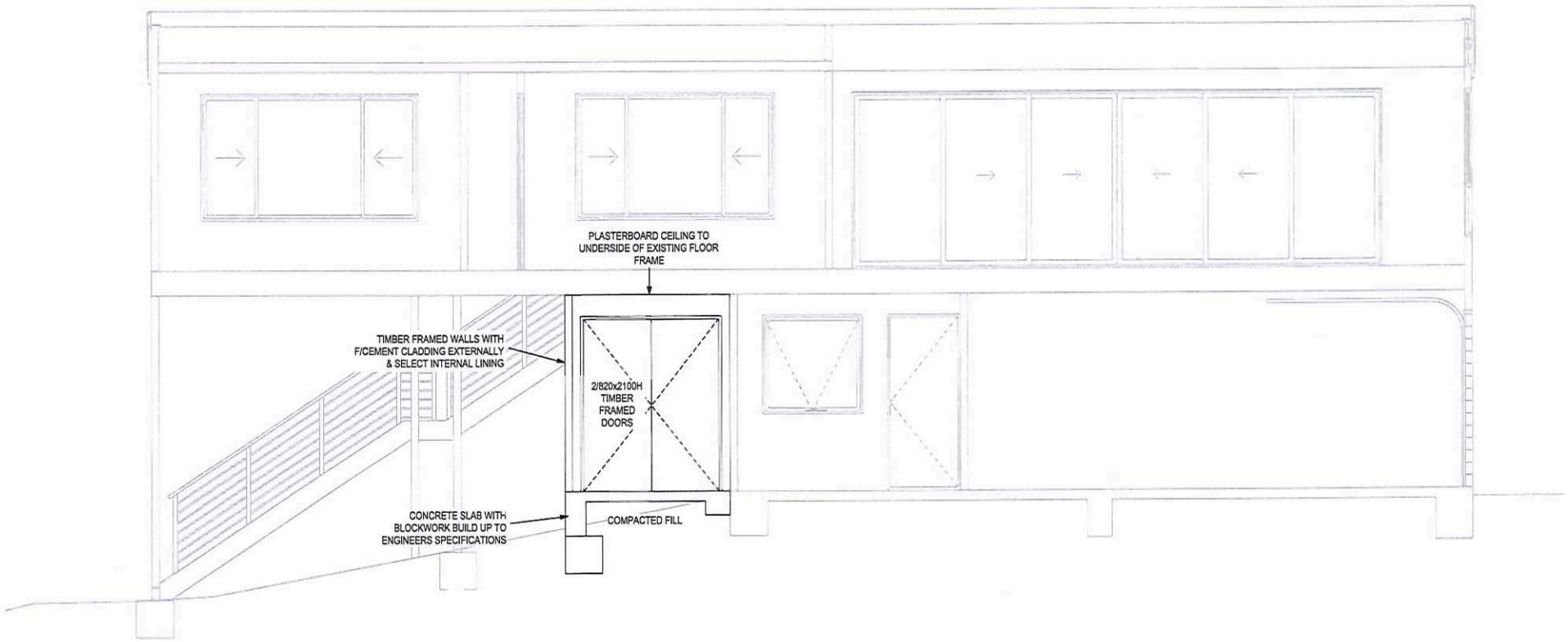

Streamline BUILDING DESIGNS

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JUDD EXTENSION

SECTION A-A

CLIENT: KIRSTIE JUDD		JOB NO: 21020	PAGE SIZE:
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GEO-ENVIRONMENTAL SOLUTIONS

COASTAL VULNERABILITY ASSESSMENT

14 Algona Street, South Arm

CLIENT

Kirstie Judd

June 2017

Geo-Environmental Solutions P/L 86 Queen Street Sandy Bay 7005. Ph 6223 1839 Fax 6223 4539

Tables

Figures

Executive Summary

Geo-Environmental Solutions Pty Ltd (GES) were contracted by Kirstie Judd to prepare a coastal erosion hazard assessment for a property at Half Moon Bay. The project area consists of a single cadastral title (CT 79345/26) located at 14 Algona Street, South Arm (The Site).

An application to conduct construction works has triggered the assessment in accordance with the Interim Planning Scheme (IPS) 2015. A 'first pass assessment' has been conducted for the site area by Sharples (2008). A second pass has been conducted by Carly et.al. (2008) which involved an assessment of coastline geomorphology and vulnerability to inundation and erosion processes. This assessment has been reviewed and built upon which involved site specific hydrodynamic modelling to further assess the site inundation and erosion risks.

The site is set back 35 to 50 m from present day sea-levels (approximately 0.1 m Australian Height Datum (AHD) based on DPAC (2012) adopted projections and ranges in elevation from 1.4 to 4.2 m AHD.

The desktop assessment has identified that soft sediments at the site is susceptible to largely refracted swell wave activity and exposed to local wind waves from a south easterly wind fetch. Erosion modelling has been conducted given that the site is within an erosion hazard overlay. The fontal dune is modelled to erode because of either:

- Sea level rise induced recession by 2067 (design life of the building) and/or
- Two consecutive swell wave erosion events coincident with a storm tide (high seas).

Parts of the site are modelled to erode including the southern corner of the proposed development area. This is not expected to pose a hazard provided that all foundations are established within the **stable foundation zone** indicated in the site cross sections.

Wave runup inundation is expected at the site given an extreme erosion event. An inundation hazard overlay has been indicated on part of the site and inundation hazards have been modelled. GES advises that this inundation risk to site inhabitants and property is low.

The qualitative risk assessment criteria have been developed to identify key risks that may arise from building works in areas that are vulnerable to erosion or inundation hazards. The risk assessment is based on 2067 projected life of the building.

GES has established from the risk assessment that the level of risk is acceptable within the lifetime of the proposed development works. Given the recommendations herein, there are no medium or high-risk ratings for the proposed development.

List of Abbreviations

AHD	Australian Height Datum
AEP	Annual Exceedance Probability
ARI	Average Reoccurrence Interval
CEM	Coastal Engineering Model
CEHC	Coastal Erosion Hazards Code
DCP	Dynamic Cone Penetrometer
DEM	Digital Elevation Model
DPAC	Department of Premier and Cabinet
ERMP	Erosion Risk Management plan
GES	Geo-Environmental Solutions Pty Ltd
GIS	Geographical Information System
IPAC	Inundation Prone Areas Code
IPCC	Intergovernmental Panel on Climate Change
IPS	Interim Planning Scheme
LiDAR	Light Detection And Ranging
LIST	Land and Information System, Tasmania
MRT	Mineral Resources Tasmania
NCCOE	National Committee on Coastal and Ocean Engineering
SB	Soil Bore
SPM	Shoreline Protection Manual
SSP	Surf Similarity Parameter
SWAN	Simulating Waves Nearshore
TAFI	Tasmanian Aquiculture and Fisheries Institute
WRL	Water Research Laboratory (University of New South Wales)

1 Introduction

Geo-Environmental Solutions Pty Ltd (GES) were contracted by Kirstie Judd to prepare a coastal erosion hazard assessment for a property at Half Moon Bay. The project area consists of a single cadastral title (CT 79345/26) located at 14 Algona Street, South Arm (The Site).

An application to conduct construction works has triggered the assessment in accordance with the Interim Planning Scheme (IPS) 2015. A 'first pass assessment' has been conducted for the site area by Sharples (2008). A second pass has been conducted by Carly et.al. (2008) which involved an assessment of coastline geomorphology and vulnerability to inundation and erosion processes. This assessment has been reviewed and built upon which involved site specific hydrodynamic modelling to further assess the site inundation and erosion risks.

The site is set back 35 to 50 m from present day sea-levels (approximately 0.1 m Australian Height Datum (AHD) based on DPAC (2012) adopted projections and ranges in elevation from 1.4 to 4.2 m AHD.

GES have undertaken this assessment using available scientific literature and datasets. Estimations are determined by approximation with appropriate regional information applied where appropriate to site specific information. Data collection and site-specific modelling was undertaken in assessment of the site.

2 Objectives

The objective of the site investigation is to:

- Identify which codes need to be addressed in terms of coastal vulnerability and identify the relevant performance criteria relevant to the project which need addressing;
- Conduct a literature review of all geological, geomorphologic, hydrodynamic information and any 'First or Second Pass Assessments' which are relevant to the site;
- Conduct a 'Hydrodynamic Assessment' assessment of the site to determine projected sea level rise, storm tides and site specific hydrodynamic conditions and where applicable, GES's site-specific soil investigation findings;
- Modell coastal erosion processes to determine potential risk to the dwelling; and
- Where applicable, provide recommendations on methods and design approach to reduce inundation risk.

3 Site Details

2.1 Project Area Land Title

The land studied in this report is defined by the following title reference:

- CT 79345/26

This parcel of land is referred to as the 'Site' and/or the 'Project Area' in this report.

2.2 Project Area Regional Coastal Setting

The Project Area is located at Halfmoon Bay on the western side of South Arm Peninsula between Opossum Bay and South Arm (Figure 1).

Halfmoon Bay has limited exposure to Swell Waves and is exposed to locally derived wind waves from the western side of the Derwent River. The site is subject to coastal processes from the following wave conditions:

- Largely refracted swell wave activity from the south;
- Westerly wind fetches from Tinderbox direction; and
- Predominantly wind fetch from the south west

Figure 1. Regional Location of Project Area - The Land and Information System, Tasmania (LIST)

2.3 Project Area Local Setting

The site is located at 14 Algona Street, South Arm and comprises of a 463 m^2 lot. The site is located 30 to 50 m from the coast (Figure 2).

The site ranges in elevation from 1.4 m AHD to 4.2 m AHD.

3 Planning

3.1 State Coastal Policy

On 16 April 2003 the State Coastal Policy Validation Act 2003 came into effect. This Act replaces the former definition of the Coastal Zone in the State Coastal Policy 1996 and reinstates the Policy. The Act also validates all previous decisions made under the Policy. The following clauses are pertinent to the scope of this report:

1.1. NATURAL RESOURCES AND ECOSYSTEMS

1.1.2. The coastal zone will be managed to protect ecological, geomorphological and geological coastal features and aquatic environments of conservation value.

1.4. COASTAL HAZARDS

1.4.1. Areas subject to significant risk from natural coastal processes and hazards such as flooding, storms, erosion, landslip, littoral drift, dune mobility and sea-level rise will be identified and managed to minimise the need for engineering or remediation works to protect land, property and human life.

1.4.2. Development on actively mobile landforms such as frontal dunes will not be permitted except for works consistent with Outcome 1.4.1.

1.4.3. Policies will be developed to respond to the potential effects of climate change (including sea-level rise) on use and development in the coastal zone.

3.2 The Tasmanian Building Act 2000

The Tasmanian Building Act 2000, section 159 states that "...the floor level of each habitable room in the building is 300 millimetres or more above the prescribed designated floor level for that land". This indicates that the habitable floor area must be 0.3 m above the design inundation level.

3.3 Australian Building Code Board

This report presents a summary of the overall site risk to coastal erosion and inundation processes. This assessment has been conducted for the year 2067 which is representative of a 'normal' 50-year building design life category based on a 2017 baseline (ABCB 2015).

Per the Australian Building Code Board (ABCB 2015), when addressing building minimum design life:

> *'The design life of buildings should be taken as 'Normal" for all building importance categories unless otherwise stated.'*
>
> As per Table 3-1, the building design life is 50 years for a normal building.

Table 3-1 Design life of building and plumbing installations and their components

Building Design Life Category	*Building Design Life (years)*	*Design life for components or sub systems readily accessible and economical to replace or repair (years)*	*Design life for components or sub systems with moderate ease of access but difficult or costly to replace or repair (years)*	*Design life for components or sub systems not accessible or not economical to replace or repair (years)*
Short	1 < dl < 15	5 or dl (if dl<5)	dl	dl
Normal	50	5	15	50
Long	100 or more	10	25	100

Note: Design Life (dl) in years

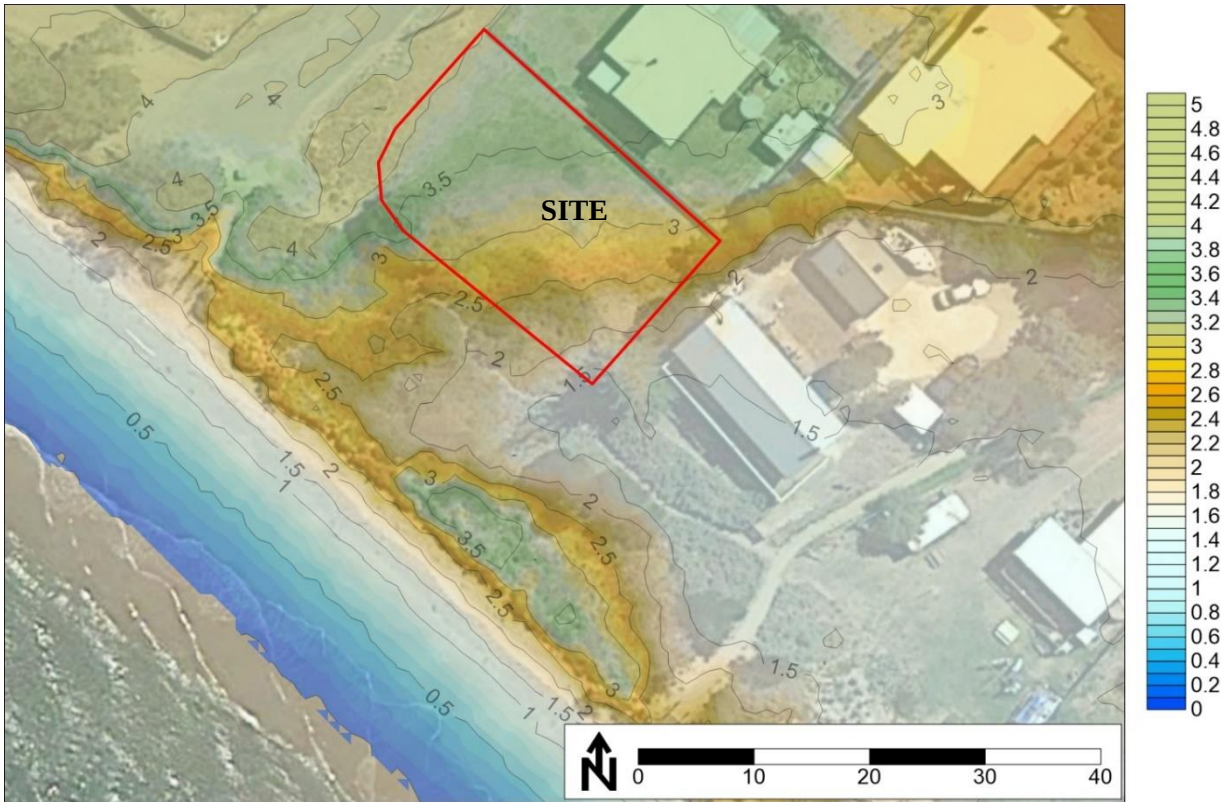

Figure 2 Site Local Setting (The LIST) Interim Planning Scheme Overlays

3.3.1 Waterways & Coastal Protection Areas (WCPA) Overlay

Part of the site falls within of the Waterways & Coastal Protection Areas (WCPA) overlay (Figure 3).

Figure 3 WCPA Overlay near the Site (The LIST)

3.3.2 Inundation Prone Areas Code (IPAC) Overlay

Part of the site falls within the E15Inundation Prone Areas Code (IPAC) overlay (Figure 4).

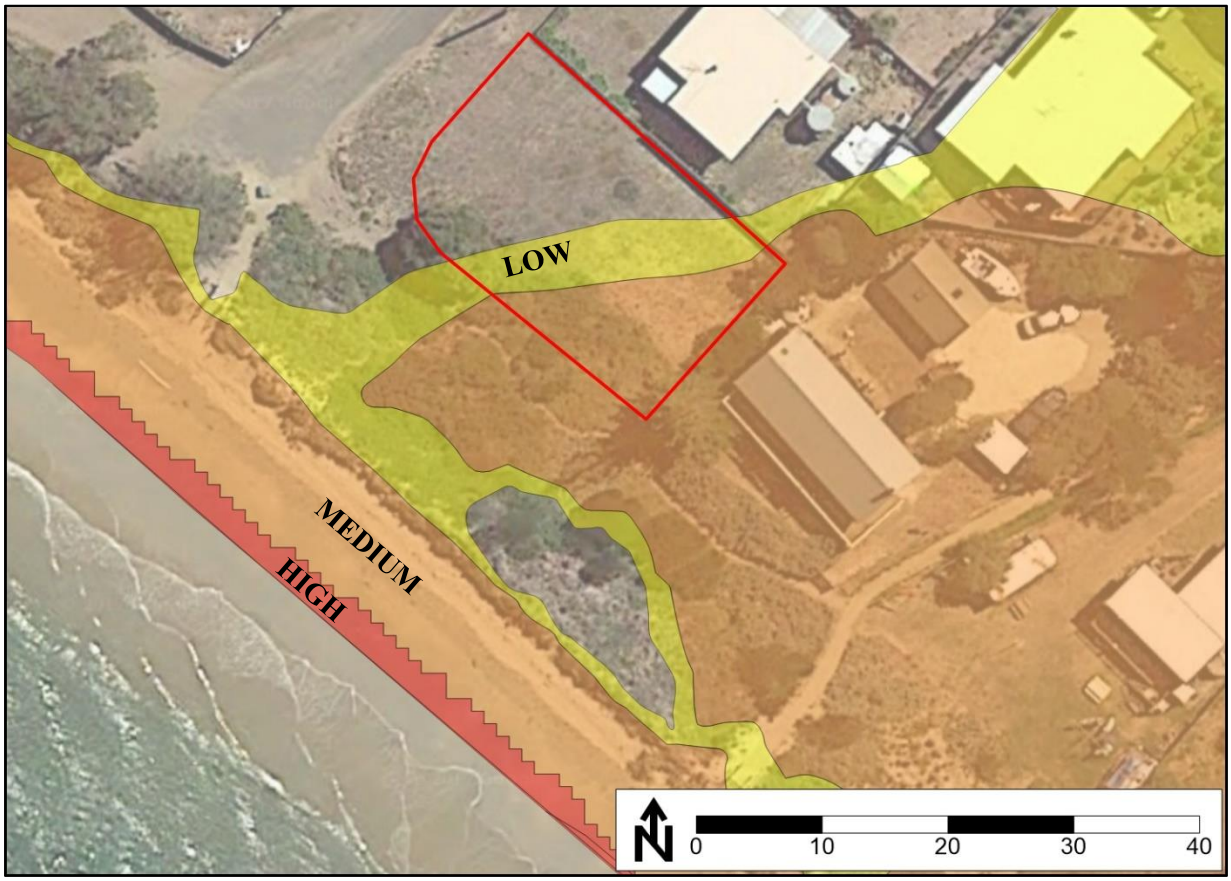

Figure 4 IPAC Overlay near the Site (The LIST) – Medium Hazard Illustrated by Orange Shading

3.3.3 Coastal Erosion Hazards Code (CEHC) Overlay

All the site falls within the Coastal Erosion Hazards Code (CEHC) overlay (Figure 5).

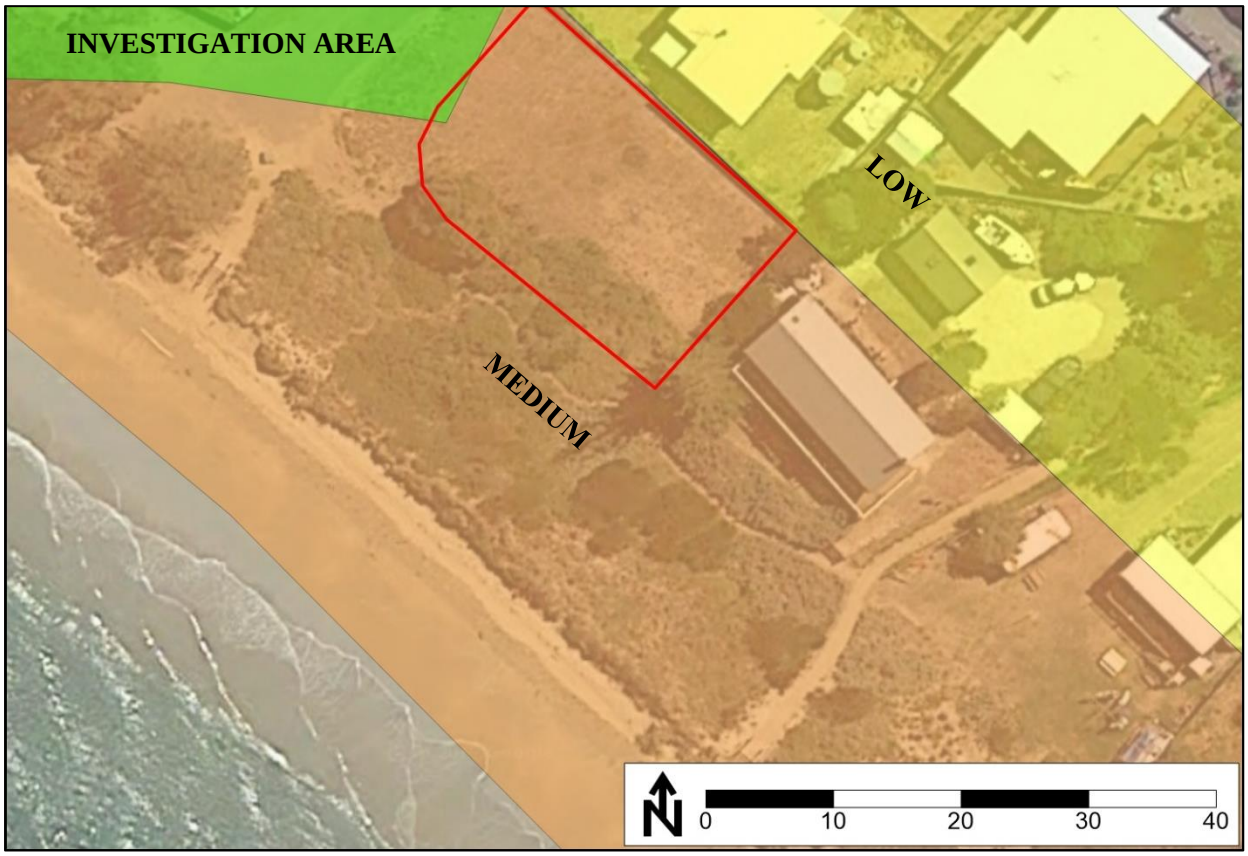

Figure 5 CEHC Overlay near the Site (The LIST)

3.4 Proposed Development

There are no formalised development plans for the site and therefore this assessment has been conducted for the entire site. Development will depend on the findings within this assessment (Table 1).

Table 1 Summary of Site Areas Falling Within Potential Coastal Vulnerability Zones

Site Location	Elevation Range (m AHD)[1]	WCPA (E11) Overlay	IPAC (E15) Overlay Low Risk	IPAC (E15) Overlay Medium Risk	IPAC (E15) Overlay High Risk	CEHC (E16) Overlay
Deck	6.2	-	-	-	-	100%
Residence Ground & Garage	3.414 - 3.5	60	10%	-	-	100%
Driveway	3.4 to 4.0	100	-	-	-	100%

- Overlay Outside of Inundation Zone

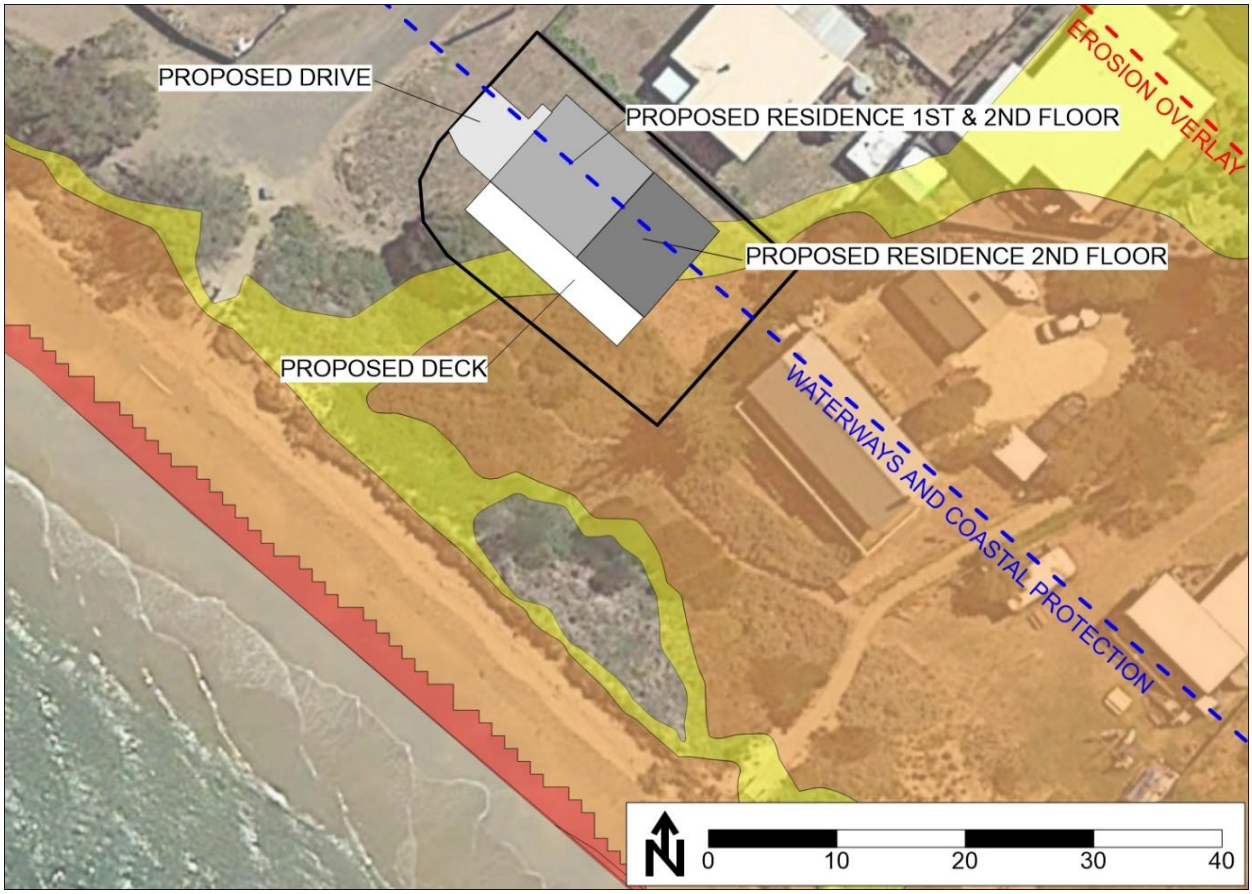

Figure 6 CEHC Overlay near the Site (The LIST)

3.5 Acceptable Solutions

Where applicable, the need for further performance criteria compliance is outlined in Appendix 2.

3.5.1 Waterways & Coastal Protection Code (WCPC)

E11.7.1 A1 Building and Works

As the proposed building and works is within a WCPC area and is not within a building area on a plan of subdivision approved under this planning scheme, the proposed building ***does not meet*** *E11.7.1 A1 acceptable solutions for buildings and works.*

3.5.2 Coastal Inundation Prone Areas Code (IPAC) – Low Inundation Hazard

Given that the proposed ground floor dwelling space has a finished floor level which is 3.4 m AHD which is above the Low AEP1pct_2100 RU and 300mm FB of 2.9 m AHD for Half Moon Bay, the proposed development meets the E15.7.3 A1 acceptable solutions.

Given that there is no proposal for development of a landfill, or solid walls greater than 5 m in length and 0.5 m in height, the proposal meets E15.7.5 A1 acceptable solutions for assessing inundation hazard

3.5.3 Coastal Erosion Hazard

Given that the entire site resides in the CEHC Area, and there are no acceptable solutions for buildings and works in a CEHC Area, the E16.7.1 P1 performance criteria will need to be addressed.

3.6 Performance Criteria

The following performance criteria need to be addressed:

- E11.7.1 P1; and
- E16.7.1 P1.

4 Site Physical Assessment

4.1 First Pass Mapping

4.1.1 Natural Resource Management (NRM) Mapping

The LIST presents a summary of the site coastal vulnerability over a 100 m section of the coastline near the site (Appendix 3). Table 2 presents a summary of the relevant site geomorphic information, coastal vulnerability and natural values. The site is in a high vulnerability erosion area given that is mapped as 'Open coast sandy shore backed by low-lying sandy plains'. The local area has a natural values index of 2 indicating a 'medium integrated conservation value' area. As the site is close to the lagoon system, the wastewater system will need to be designed to reflect this medium conservation significance natural value. The local area has a geovalue of one (1) indicating the local area has a high geoconservation priority. The site development will not impact on the local features of geoconservation significance – namely the lagoon system and dune systems.

Table 2 Summary of Natural Resource Management (NRM) Mapping (The LIST)

Aspect	Description
Coastal Vulnerability	Open coast sandy shore backed by low-lying sandy plains
	Sandy beach or shoreline - fine to med grainsize
	Sloping sandy bottom in lowest intertidal to subtidal zone
Backshore Type Coastal Vulnerability	Dunes (one or more ridges with lagoons and unconsolidated sediment plain)
Vegetation Viability Coastal Values	Not assessed
Vegetation Significance Coastal Values	Not assessed
Coastal Values	Not assessed
Vegetation Condition Coastal Values	Not assessed
Conservation Significance SE Strategy	Not assessed
Potential Habitat Listed Significant SPP	Potential habitat for listed / significant species
Geovalue	1
Geomorphic Value	2
Natural Value Index	2

4.2 Local Geomorphology

A series of panoramic photos were taken along the shoreline to identify general shoreline conditions. Given photographs were taken in Winter, storm bite is apparent within the beach escarpment. A historical soil profile is apparent within the embankment which is likely to have formed when the area comprised of a lagoon system. As apparent along much of western South Arm peninsula, there are signs of an underlying recession trend which needs to be considered on top of any recession modelling attributed to sea level rise.

There is a historical lagoon system to the southeast of the site which may have had an entrance further to the south. Flattened surrounded shingles line the shore which look to have been eroded by wave action or possibly reworked from lagoon tidal currents.

4.3 Soil Assessment

A total of three boreholes were excavated at the site (Figure 7). Soil at the site comprises of predominantly sand (Table 3). An organic layer is apparent on the beach (Table 4) which has a graduated dip to the southeast indicating the direction of the likely lagoon river mouth approximately 50 m to the southeast of the site.

Table 3 Summary of Site Soil Profile (BH1 & BH2)

BH1 Depth (m)	BH2 Depth (m)	Horizon	Description
0 – 0.60	0 – 0.30	A1	Grey SAND (SP), single grain, common fine roots, dry, loose consistency, clear boundary to
0.60 – 1.00	0.30 – 0.80	A31	Brown and Pale Brown SAND (SW), single grain, dry to slightly moist, medium dense consistency, trace clay, gradual boundary to
1.00 – 1.5+	0.80 – 1.5+	A32	Pale Brown SAND (SP), very fine, single grain, slightly moist, medium dense consistency, lower boundary undefined.

Table 4 Summary of Beach Soil Profile (BH3)

BH3 Depth (m)	Horizon	Description
0 – 0.20	A1	Pale brown SAND (SP), single grain, common fine roots, dry, loose consistency, clear boundary to
0.20 – 0.6	A11	Very dark grey/brown Sandy SILT (ML), moist, low plasticity, gradual boundary to
0.6 – 1.2	A12	Dark grey silty Sandy organic soil (PT), wet, medium dense consistency, lower boundary undefined.

Figure 7 Soil Bores and Panorama Photos (Appendix 3)

4.4 Summary

In summary, the following can be concluded for the site specific location based on the first pass geomorphology and coastal vulnerability information:

- The site is exposed to largely refracted swell wave activity and exposed to local wind waves from a south easterly wind fetch;
- Erosion modelling will not be conducted and an assumption will be made that the fontal dune is expected to erode within the next 50 years which is equivalent to the lifetime of the development;
- Although the site is classified as having moderate vulnerability natural values, site use and wastewater systems will need to be sensitive to these values given the proximity to the lagoon system; and
- Natural and geomorphic values of conservation significance have not been identified at the site.

5 Inundation Assessment

5.1 Previous Studies

A second pass assessment has been conducted for Halfmoon Bay by Carley et.al. 2008. This reporting has identified the following for Halfmoon Bay:

- Primary wind generated waves and secondary swell waves for Halfmoon Bay;
- Swell wave activity from the south with significant wave heights of 1.1 m and wave period of 15 seconds;
- Local wind generated waves for Halfmoon Bay from the Northwest, delivering a significant wave height of 1.6 m and wave period of 4.5 s (given that the site is largely sheltered from a north westerly wind, this type of wave conditions would be rare); and
- A wave setup of 0.24 m and a wave runup of 2.5 m;

5.2 Scope of Works

GES have conducted a site specific hydrodynamic assessment. The following scope of works has been adopted for the site:

- Develop a comprehensive site-specific wave model for the site based on methods outlined in the Shoreline Protection Manual SPM (1984) and the Coastal Engineering Model (CEM 2008) which will provide site specific information on actual inundation levels and site erosion potential;
- To identify short term hydrodynamics based on site specific 1% Annual Exceedance Probability (AEP) astronomical tide, barometric low (storm), wave runup, wave setup and wind setup conditions;
- Drawing on localised 1% AEP information made available in the IPS (2015) to understand site still water levels for year 2050 and 2100 and where applicable translate these to time frames to be more relevant to the design life of the proposed site works;
- Use hydrodynamic information, dune profiles, and bathymetry to determine beach recession;
- Determine storm erosion demand for the site; and
- Provide a comprehensive risk assessment addressing all performance criteria and providing recommendations where applicable.

5.3 Site Baseline Seawater Levels

5.3.1 Storm Tide

Storm tide events may be defined in terms of the culmination of astronomical tide and storm surge events. Maximum storm tide inundation levels have been adopted for the site based on a 1% AEP that an inundation event will occur. Storm tide levels are obtained from the IPS (2015) inundation hazard tables.

The storm tide level adopted for the site 1.31 m

5.3.2 Sea Level Rise

The IPS (2015) has adopted the following sea level rise estimates based DPAC projections with reference to a 2010 baseline:

- 0.2 m rise by 2050; and
- 0.8 m rise by 2100.

Based on these figures, sea level elevations presented in are applied to the site. 2067 projections are used reference the design life of the proposed structures.

Table 5 Present Day & Projected Inundation Levels for 2100 based on DPAC (2012) estimates.

DPAC (2012) Sea Levels	2017 DPAC	2067 DPAC	2100 DPAC
Sea Levels (m AHD)	0.12	0.43	0.89

5.3.3 Stillwater Levels

The effects of storm tide may be combined with sea levels projections to provide baseline water levels (reported in m AHD) which are referred to as still water level.

The still-water levels adopted for the site is based on 1% AEP storm tides as well as present day, 50-year life of the building and 2100 DPAC (2012) estimates (Table 6).

Table 6 Summary of Site Stillwater Levels for Present Day, 50 Year life of the Building, & Projected 2100 Inundation Levels based on DPAC (2012) estimates.

Stillwater Elevations	2017 DPAC	2067 DPAC	2100 DPAC
DPAC (2012) Sea Levels (m AHD)	0.12	0.43	0.89
Tidal Influence & Barometric Low Influence (m)	1.31	1.31	1.31
Wind Setup (m)	0.00	0.00	0.00
Summary (m AHD)	1.43	1.74	2.20

5.4 Site Wave Modelling

Coastal process hydrodynamics were assessed at the site. Information collected is used to assist in interpreting site specific:

- Maximum site inundation levels;
- Effects of storm inundation levels on site erosion;
- Longer term recession trends.

Without consideration of site hydrodynamic wave models, these potential hazards cannot be addressed. Depending on the planning requirements and the level of site risk, this information may or may not have not have been utilised in the site inundation and/or erosion model. It is recognised however, that a site specific coastal processes study is imperative in any coastal vulnerability assessment which seeks to identify the potential hazards and potential risks to assets and life.

5.4.1 Methods

Some of the information obtained for the models is extracted directly from the IPS (2015) inundation level tables. Other information has been collected from SWAN wave models (Carly 2008). A 1 in 100 year ARI significant wave height has been extrapolated from the data. Where applicable, wind fetch wave models have been developed based on the CEM (2008) and SPM (1984) formulations which interpret site bathymetry, topography and wind speeds.

Hydrodynamic risks are measured in terms of 1% AEP events. Site specific processes considered in this section include but are not limited to the following (some of which are detailed in Figure 8):

- Wave runup;
- Wave setup; and
- Wind setup.

A 300 mm freeboard value has been adopted by the IPS (2015) to account to for the Tasmanian Building Act 2000 regulations. Site hydrodynamic factors are included within this 300 mm freeboard zone which essentially defines any hydrodynamic inundation processes which are above the adopted still water levels. The 300 mm value will tend to overestimate inundation levels at some sites and underestimate inundation levels at other sites.

Given that hydrodynamic processes are largely site specific, GES develop hydrodynamic models for the specific sites of interest which are based on the following information:

- Tasmanian Aquaculture and Fisheries Information (TAFI) bathymetry data,
- Formulations in the CEM (2008), the SPM (1984) and;
- Local wind conditions (AS/NZS 1170.2:2011).

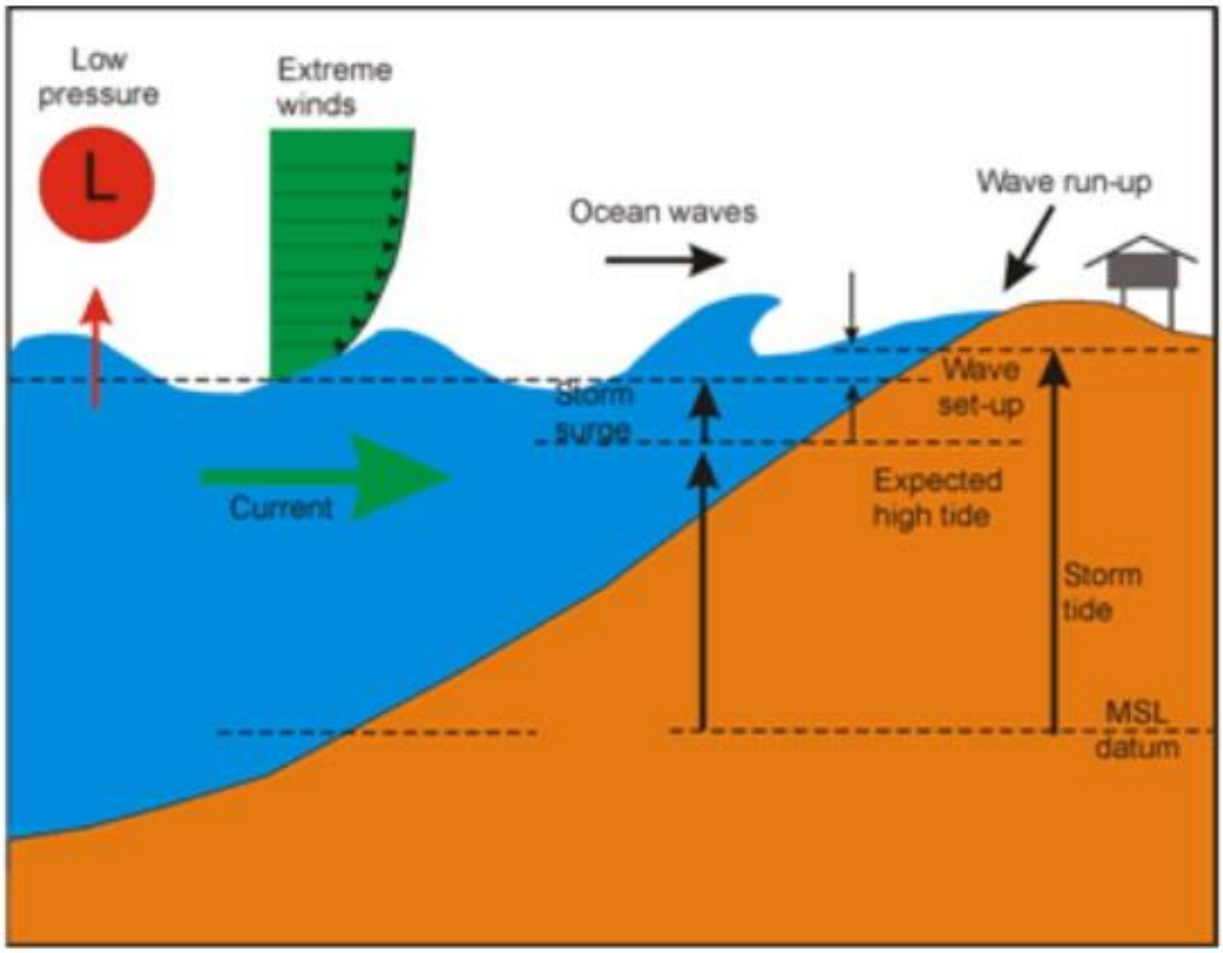

Figure 8 Hydrodynamic Parameters Associated with Storm Surge Events

As wind setup, wave setup and wave runup normally occur simultaneously during storm surge events, these components are combined with extreme tide and storm surge predictions to provide maximum inundation levels for the site. Wave models have been generated for the site to define the site-specific hazards.

5.4.2 Site Wave Conditions

Table 7 provides a summary of the dominant waves intercepting the site.

Table 7 Summary of Dominant Waves Intercepting the Site

Wave Details	Swell Wave	Swell Wave	Local Wind Fetch
Direction	South	Southeast	Southwest
Wave Height (m)	0.9	0.7	1.2
Period (s)	15.0	15.0	3.4
Approach Angle	45	45	5

5.4.3 Dominant Wave Characteristics

The most dominant wave originates from a southerly swell generated from the Southern Ocean (Table 8). The wave will approach the nearshore zone which has a 2.5 % grade bathymetry, breaking at an angle of 6° to the shore and at a depth of 1.7 m.

Table 8 Details of the Dominant Wave Intercepting the Site

Wave Position	Parameter	Value
Nearshore	Origin	Swell Wave
	Direction	South
	Approach Angle	45
	Nearshore Wave Height (m)	0.9
	Period (s)	15.0
Breaking	Breaker Height (m)	1.3
	Breaking Depth (m)	1.7
	Breaking Angle	6
	Nearshore Gradient (%)	2.5

5.5 Summary

The following can be summarised from the current assessment:

- Swell waves from the south and southwest (rather than wind waves from the southwest) are modelled to have the most impact on coastal processes at the site;
- These waves will be used to model site and wave runup erosion hazards.

6 Coastal Erosion Assessment

6.1 Previous Studies

A second pass assessment has been conducted for Halfmoon Bay by Carley et.al. 2008. This reporting has identified the following for Halfmoon Bay:

- A closure depth of 2.1 m and a horizontal recession of 3.33 m for 2050 and 10 m for 2100 (high emissions scenarios); and
- A storm erosion demand of 60 m3/m.

6.2 Scope of Works

Table 9.presents a summary of the various methods adopted by GES to identify erosion hazards in vulnerable coastal zones.

Table 9 Summary of Assessment Approaches for Identify Site Erosion Hazards

Investigative Approach	Investigation Details	Typical Application
Invasive Investigation.	Conduct borehole drilling or substrate profiling to make inferences about the susceptibility of the site to erosion	Where scouring is anticipated, or building foundation can be established on a firm substrate
Site Historical Aerial Imaging	Assess historical long term shoreline position relative to sea levels at the time and how this may translate to future recession trends	Where the proposed development is in a medium to high risk erosion zone and recession models need confirmation, or may not apply given the coastal setting
	Assess historical short term shoreline positions relative to known storm events to forward project sediment storm erosion demand.	Used where Tasmarc surveys are not available or there is no previous storm erosion modelling done for the site.
Tasmarc Surveys	Investigate historical beach profiles to determine storm erosion demand.	Where the development is on hydrodynamically active beach and more information is required to understand beach storm erosion processes
Sediment Budgets	Conduct a detailed assessment of sediment budgets.	Where the site is inferred to be influenced by water currents or longshore drift processes
Shoreline Recession Model	Development of a long term shoreline recession model based on projected DPAC (2012) sea level rise scenarios and using calculated closure depths and various Bruun Rule formulations (1988)	Where site is in an inferred to be in an erosion hazard zone and where the proposed development building cannot be founded on a stable foundation.
Storm Erosion Demand	Conduct a detailed assessment of site storm erosion vulnerability due to coastal processes as well as available geological and geomorphological information	Where site is in an inferred to be in an erosion hazard zone and where the proposed development building cannot be founded on a stable foundation.
Stable Foundation Zones	Development of a cross section through the site detailing zone of reduced foundation capacity and the stable foundation zone through Nielsen et. al. (1992) methods	Where site is in an inferred to be in an erosion hazard zone and where the proposed development building cannot be founded on a stable foundation.

GES have adopted the following coastal erosion assessment methods to further assess hazards at the site:

- Shoreline recession model; and
- Stable foundation zone.

6.3 TASMARC Survey

TASMARC is an initiative started in 2004 by John Hunter, Chris Sharples, Richard Coleman and Werner Hennecke of the University of Tasmania. They were concerned about a lack of historical information about the Tasmanian shoreline and the way it is responding to storm events and sea-level rise. They identified a need for accurate measurements of shoreline positions and beach profiles with the data collected being securely archived for the future.

The resultant data provides information about seasonal and long-term changes in the shape and position of beaches. It will also provide information which can be used to verify beach measurements made by other methods.

The nearest TARMARC survey from the site is South Arm Beach North based on survey reference point 730/16 presented in Figure 9 and the beach survey profile is presented in Figure 10.

Findings indicate that up to 5 m^3/m of sand erosion may be expected from a single or series of storm erosion events. It is more than likely the storm erosion occurred in winter 2011, when the Southern Beaches were impacted by southerly swells during a storm tide event. This represents a fraction of the 60 m^3/m storm erosion demand inferred by Carley *et. al.* 2008. This beach is not typically exposed to extreme swell wave, with extreme storm waves being most discerned 400 m offshore where they impact the Pigeon Holes point.

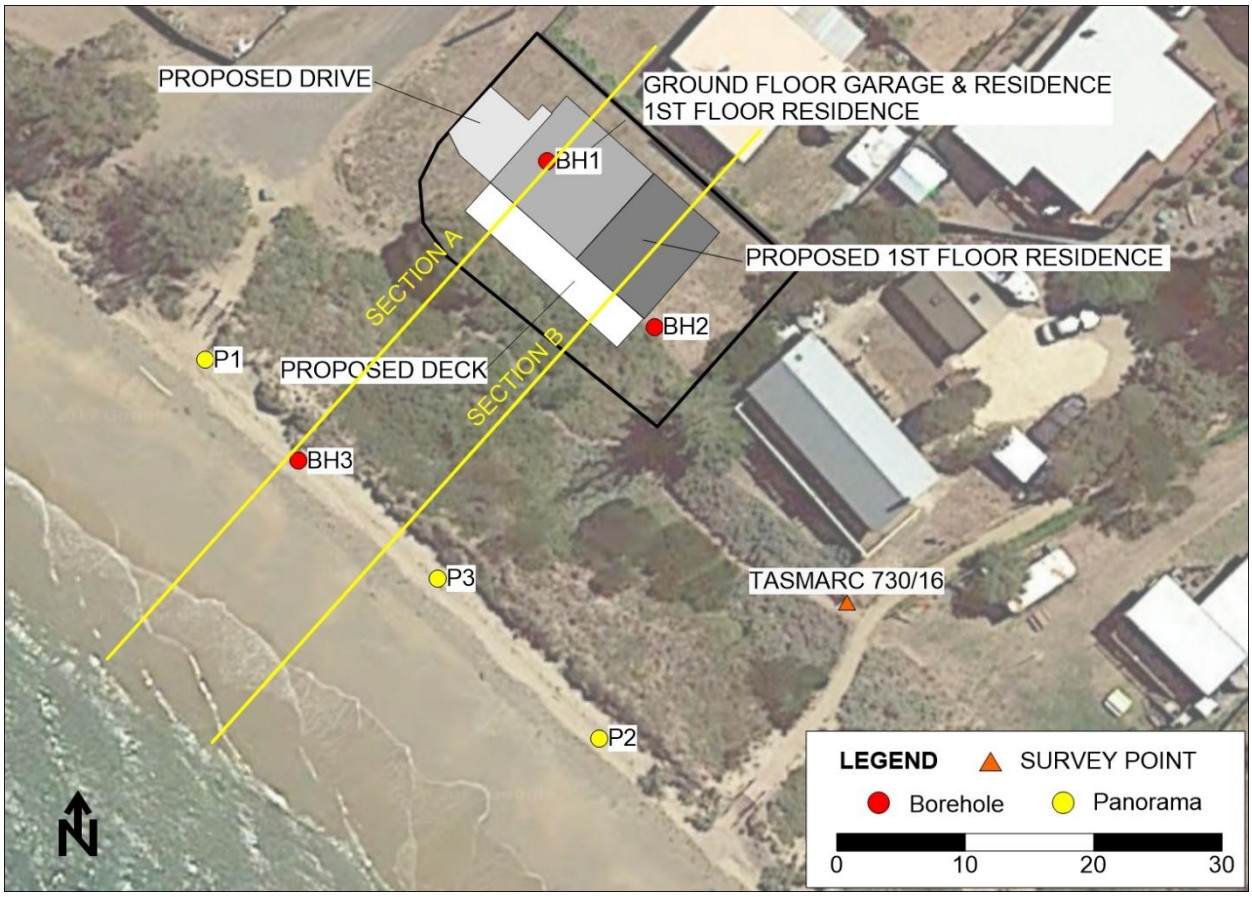

Figure 9 Cross Sections & TASMARC Survey Point

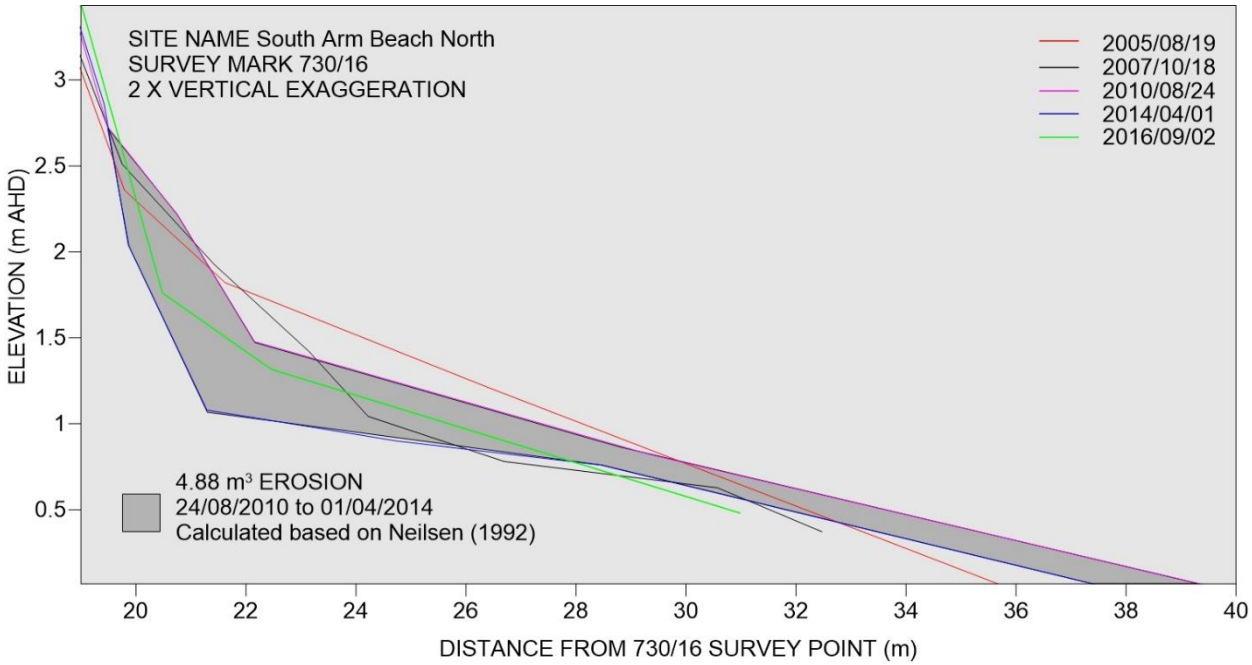

Figure 10 TASMARC Survey Cross Section Highlighting 24/08/2014 to 02/09/2016

6.4 Shoreline Recession

The Bruun Rule has been applied to the site to estimate the response of the shoreline profile to sea-level rise. The Bruun Rule is widely used by government and non-government bodies to determine recession rates on sandy shores which are at risk of inundation. The Bruun Rule states that a typical concave-upward beach profile erodes sand from the beach face and deposits it offshore to maintain constant water depth. There are a few cases where the Bruun rule cannot be applied, which include where longshore drift is predominant, where there is dominant influence of surrounding headlands and in environments where wave activity is minimal.

3.1.1 Closure Depths

The most contentious variable for the Bruun rule is the closure depth for which various formulations and methods exist. The closure depth may be defined as the depth offshore of a beach where depths do not change with time. The closure depth is calculated based on methods derived by Dean and Darymple (2002). The parameters used in the assessment are presented in Table 10.

Table 10 Parameters Used to Calculate Closure Depth

Variable	Value
Breaker Wave (Hallermeier 1978)	1.30
Wave Period (s)	15
Sand SG (g/cm^{-3})	2.65
Closure depth (m)	2.90

3.1.2 Bruun Rule Beach Recession Model

The standard Bruun Rule has been applied to the site to determine sea level rise induced recession from the dominant waves active at the site.

The Standard Bruun Rule is typically expressed as R = s(L/(D + h)) and is illustrated in Table 9

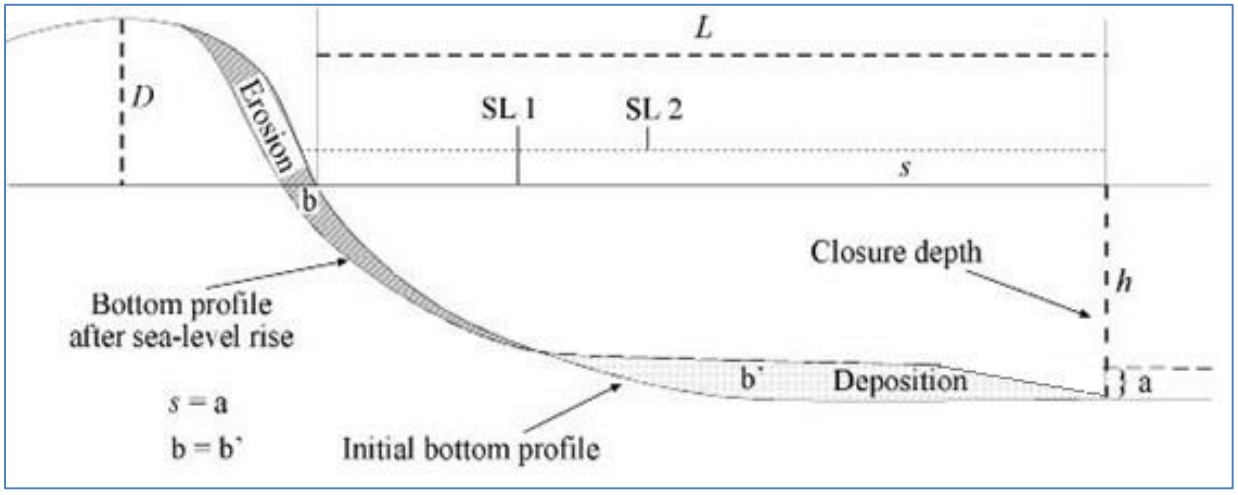

Figure 11 Summary of standard Bruun Rule for Calculating Beach Recession

Table 11 presents a summary of the Bruun Rule variables utilised in the site recession model which have been obtained from the digital elevation models for the site.

Table 11 Summary Bruun Rule Variables Utilised in the Site Recession Model

Variable	Symbol	Value
Length of Active Erosion Zone (m)	L	130
Profile Closure Depth (m)	h	2.90
Active Dune/Berm Height (m)	D	3.00

The recession rate given the various sea level rise scenarios are presented in **Table 12**.

Table 12 Calculated Bruun Rule Recession Rate at the Site

Variable	Symbol	2067 DPAC	2100 DPAC
Sea Level Rise above 2014 DPAC LiDAR baseline (m)	s	0.32	0.78
Horizontal Recession (m)	R	7	17

A horizontal recession value of 5 m is applicable for the site given 2067 DPAC life of building projections

6.5 Storm Erosion

Aside from longer term recession attributed to sea level rise, storm erosion events have the potential to cause beach erosion (storm bite) which is followed by a period of beach rebuilding. The erosion and nourishment cycle is typically in equilibrium unless longer term recession or progradation is occurring.

GES considers a storm erosion demand of 25 m^3/m is applicable for the site accounting for consecutive 12.5 m^3/m erosion events.

6.6 Stable Foundation Zone

A stable foundation zone assessment has been conducted for the site. The basis behind this particular assessment involves the use of Nielsen et. al. (1992) methods for assessing stable foundation zones in sand.

A cross section has been constructed through the site to indicate the worst-case scenario 2067 sea level rise scenario based on recession modelling (Figure 12). The storm erosion demand has been constructed based on Nielsen et. al. (1992) equations which use a 1:10 post storm gradient. A storm erosion demand of 25 m3/m has been applied to the site to account for a 1% AEP storm event.

The stable foundation zone is defined at approximately 1 m AHD on the north-western side of the dwelling and 0 m AHD on the south-eastern side of the dwelling.

6.7 Summary

The following can be concluded from the costal erosion assessment:

- GES have used a shoreline recession model and a stable foundation zone analysis based on sediment erosion from two consecutives 1% AEP (1 in 100 year) storm events to determine likely erosion extent at the site;
- Horizontal recession of 7 m has been calculated for the site based on site specific dune heights, wave conditions, closure depths, beach profile geometry and 2067 sea levels;
- 25 m3/m storm erosion demand has been calculated for the site which will occur due to a 1% AEP storm erosion event combined with storm tide inundation levels. When these events are projected on top of 2067 sea levels, modelling indicates that there may be erosion near the south-eastern side of the proposed dwelling; and
- Although there is a minor soil erosion risk, adopted methods (Nielsen 1992) indicate there is a geotechnical hazard from slumping sands in the dunes. It is therefore recommended that foundations are piled into the stable foundation zone.

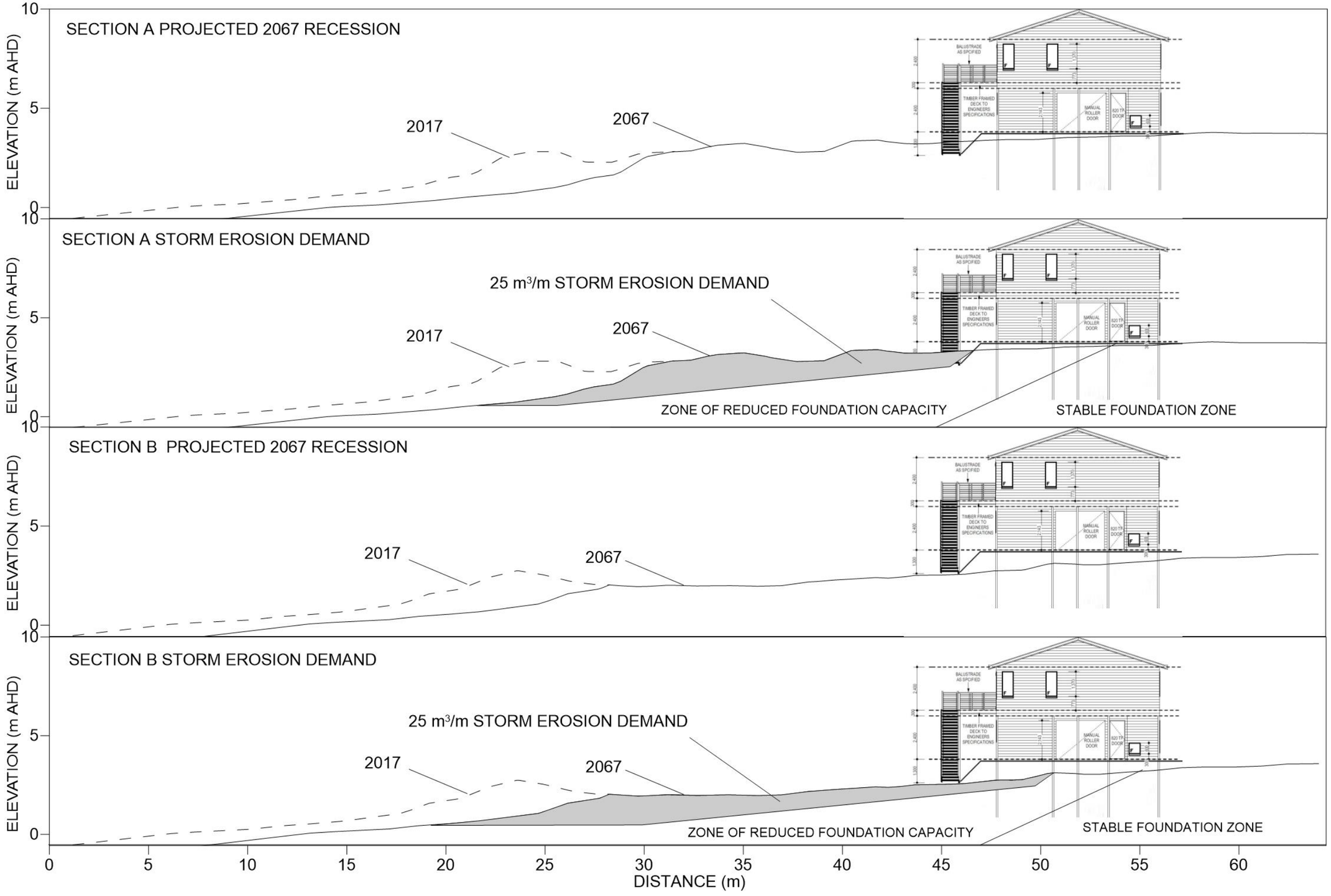

Figure 12 Site Cross Sections Demonstrating 2067 Recession and 25 m3/m Storm Erosion Demand

7 Wave Runup Assessment

7.1 Cross Section A

7.1.1 Nearshore Hydrodynamics

Hydrodynamic variables calculated for Cross Section A are presented in Table 13. Modelling indicates that wave runup from a southerly swell is steep based on present day 1% AEP storm tide events. Slightly lower gradients are expected across a 2067 recession profile (or a storm erosion profile as will be discussed)

Table 13 Details of the Southerly Swell Wave Hydrodynamics Based on Present Day, 2067 & 2100 Scenarios

Coastal Process	2017 DPAC	2067 DPAC	2100 DPAC
Wave Setup	0.06	0.06	0.06
R2% Wave Runup (Mase 1989)*	3.82	2.78	1.83
*Smooth Beach			

7.1.2 Inundation Levels

Given an extreme present-day storm tide inundation event combined with modelled wave runup from a 1% AEP swell wave from the south, will ramp up the frontal dune system to an elevation of 5.25 m AHD.

An extreme storm erosion event or sea level rise recession from 0.43 m sea level rise (modelled to occur by 2067 based on DPAC projections) and are expected to have a similar magnitude effect with complete erosion of the frontal dune system. As a result, wave runup may reach elevations of 4.5 m AHD (Table 14).

The waves are expected to be largely attenuated across the dunes by the long grasses. There may be minor basement level inundation for a very short period of time given 1% AEP present day and 2067 scenarios.

Table 14 Site Inundation Levels Based on Southerly Swell Waves for Present Day, 2067 & 2100 Scenarios

Inundation Levels	2017 DPAC	2067 DPAC	DPAC 2100
Still Water Elevations (m AHD) Including Wind Setup Where Applicable	1.43	1.74	2.20
Wave Setup Elevations (m AHD)	1.59	1.91	2.37
R2% Wave Runup (m AHD)	5.24	4.52	4.03

7.2 Cross Section B

7.2.1 Nearshore Hydrodynamics

Hydrodynamic variables calculated for Cross Section B are presented in Table 15. Modelling indicates that wave runup from a southerly swell is steep based on present day 1% AEP storm tide events. Dune overtopping is probably in this section of the beach.

Table 15 Details of the Southerly Swell Wave Hydrodynamics Based on Present Day, 2067 & 2100 Scenarios

Coastal Process	2017 DPAC	2067 DPAC	2100 DPAC
Wave Setup	0.06	0.06	0.06
R2% Wave Runup (Mase 1989)*	3.82	1.83	1.83
*Smooth Beach			

7.2.2 Inundation Levels

Given an extreme present-day storm tide inundation event combined with modelled wave runup from a 1% AEP swell wave from the south, overtopping of the 2.7 to 3.7 m high frontal dune system is expected with wave runup levels overtopping the dune to a height of 5.25 m AHD. Wave runup is expected to encroach the dwelling possibly causing minor inundation and roll back towards the neighbouring dwelling to the southeast.

An extreme storm erosion event or sea level rise recession from 0.43 m sea level rise (modelled to occur by 2067 based on DPAC projections) and are expected to have a similar magnitude effect with complete erosion of the frontal dune system. Following storm erosion or recession provided no mitigation measures are put in place, considerably lower wave runup levels are expected due to reduced backshore gradients. As a result, wave runup level are expected to reach elevations of approximately 3.6 m AHD by 2067 (Table 15).

Table 16 Site Inundation Levels Based on Southerly Swell Waves for Present Day, 2067 & 2100 Scenarios

Inundation Levels	2017 DPAC	2067 DPAC	DPAC 2100
Still Water Elevations (m AHD) Including Wind Setup Where Applicable	1.43	1.74	2.20
Wave Setup Elevations (m AHD)	1.59	1.91	2.37
R2% Wave Runup (m AHD)	5.24	3.57	4.03

8 Risk Assessment

The qualitative risk assessment criteria have been developed to identify key risks that may arise from building works in areas that are vulnerable to erosion or inundation hazards. The risk assessment is based on 2067 projected life of the building.

The criteria are based on a risk assessment matrix consistent with Australian Standard AS4360 on Risk Management (AS4360). The qualitative assessment of risk severity and likelihood (Appendix 4) were used to help provide a qualitative risk assessment based upon the coastal vulnerability assessment completed for the site.

A detailed risk assessment addressing the performance criteria is presented in Appendix 5. GES has established from the risk assessment that the level of risk is acceptable within the lifetime of the proposed development works. Given the recommendations herein, there are no medium or high-risk ratings for the proposed development.

9 Recommendations

Erosion and geotechnical risks at the site can be effectively managed through adequate placement of any proposed dwellings.

GES have provided recommendations in Appendix 5 risk assessment which include:

- A soil and water management plan is recommended at the site; and
- The dwelling should be founded within the stable foundation zone.

The proposed development presents an acceptable solution to managing potential site risks provided the recommendations in this report are adhered to in building and engineering design.

Kris J Taylor BSc (Hons)

Environmental & Engineering Geologist

10 Limitations

The following limitations apply to this report:

- Wave modelling in accordance with the CEM (2008), the SPM (1984) and wind parameters from AS/NZS 1170.2:2011;
- Published SWAN swell modelling information where available;
- Published water current information;
- Navionics, TAFI, Geoscience Australia and Australia Hydrographic Service bathymetry;
- Light Detection And Ranging (LIDAR) digital elevation model (metadata file in Appendix 1) is calibrated or assessed to the closest ground control point for determining relative accuracy (Appendix 2);
- Storm surge observations where applicable
- The LIST cadastral information
- Photogrammetric modelling of historic coastal recession and/or progradation for the site was not undertaken. However, historic aerial photographs for the project area were reviewed and incorporated into a geographic information system enabling preliminary measurements of dune variations.
- The values estimated in this report provide an order of magnitude for assessing climate change impacts and in particular climate change induced sea level rise impacts. The information is based on a collation of existing information and data, with some site specific modelling for planning purposes.

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Appendix 1 Acceptable Solutions

Waterways and Coastal Protection Areas (WCPA)

Standard	Code	Acceptable Solution		Performance Criteria
Development	E11.7.1 Buildings & Works	A1	Building and works within a Waterway and Coastal Protection Area must be within a building area on a plan of subdivision approved under this planning scheme.	P1
		A2	Building and works within a Future Coastal Refugia Area must be within a building area on a plan of subdivision approved under this planning scheme.	P2
		A3	Buildings and works within a Potable Water Supply Area must be within a building area on a plan of subdivision approved under this planning scheme.	P3
		A4	Development must involve no new stormwater point discharge into a watercourse, wetland or lake.	P4
	E11.7.2 Dependent on a Coastal Location	A1	An extension to an existing boat ramp, car park, jetty, marina, marine farming shore facility or slipway must be no more than 20% of the size of the facility existing at the effective date.	P1
		A2	No Acceptable Solution for dredging and reclamation.	P2
		A3	No Acceptable Solution for coastal protection works initiated by the private sector.	P3
Subdivision	E11.8.1 Subdivison	A1	Subdivision of a lot, all or part of which is within a Waterway and Coastal Protection Area, Future Coastal Refugia Area or Potable Water Supply Area must comply with one or more of the following: a) be for the purpose of separation of existing dwellings; b) be for the creation of a lot for public open space, public reserve or utility; c) no works, other than boundary fencing works, are within a Waterway and Coastal Protection Area, Future Coastal Refugia Area or Potable Water Supply Area; d) the building area, bushfire hazard management area, services and vehicular access driveway are outside the Waterway and Coastal Protection Area, Future Coastal Refugia Area or Potable Water Supply Area.	P1

Coastal Erosion Hazard Code (CEHC) Areas

Standard	Code	Acceptable Solution		Performance Criteria
Use	E16.6 Change of Use	A1	A1 No Acceptable solution	P1
Development	E16.7.1 Buildings & Works	A1	A1 No Acceptable solution	P1
	E16.7.2 Dependent on a Coastal Location	A1	A1 An extension to an existing boat ramp, car park, jetty, marina, marine farming shore facility or slipway must be no more than 20% of the size of the facility existing at the effective date.	P1
		A2	A2 No Acceptable Solution for dredging and reclamation.	P2
		A3	A3 No Acceptable Solution for coastal protection works initiated by the private sector.	P3
Subdivision	E16.8.1 CEHC Area	A1	No Acceptable solution	P1
		A2	No Acceptable solution	P2
	Dependent on a Coastal Location	A1	No Acceptable solution	P1

Inundation Prone Areas Code (IPAC)

Standard	Code	Acceptable Solution		Performance Criteria
Use	E15.6 Change of Use	A1	Change of use of a non-habitable building to a habitable building or a use involving habitable rooms must comply with all of the following: a. floor level of habitable rooms is no less than the AHD level for the Coastal Inundation Low Hazard Area in Table E15.1; b. floor level of habitable rooms is no less than the AHD level for the 1% AEP plus 300mm if in an area subject to riverine flooding.	P1
Development	E15.7.1 High Coastal IPAC	A1	No Acceptable solution	P1
		A2	A non-habitable building, an outbuilding or a Class 10b building under the Building Code of Australia, there is no acceptable solution.	P2
	E15.7.2 Medium Coastal IPAC	A1	New habitable building - No Acceptable solution	P1
		A2	An extension to an existing habitable building must comply with **one** of the following: (a) new habitable rooms must comply with both of the following: I. Floor level no lower than the Minimum Level for the Coastal Inundation Low Hazard Area in Table E15.1, II. Floor area of the extension no more than 40 m2 from the date of commencement of this planning scheme; (b) new habitable rooms must be above ground floor	P2
		A3	A non-habitable building, an outbuilding or a Class 10b building under the Building Code of Australia, must have a floor area no more than 40 m2.	P3
	E15.7.3 Low Coastal IPAC	A1	A new habitable building must comply with the following: Floor level no lower than the Minimum Level for the Coastal Inundation Low Hazard Area in Table E15.1;	P1
		A2	An extension to a habitable building must comply with either of the following: (a) floor level of habitable rooms is no lower than the Minimum Level for the Coastal Inundation Low Hazard Area in Table E15.1; (b) floor area is no more than 60 m2	P2
		A3	A non-habitable building, an outbuilding or a Class 10b building under the Building Code of Australia, must have a floor area no more than 60 m^2.	P3
	E15.7.4 Riverine IPAC	A1	A1 A new habitable building must have a floor level no lower than the 1% AEP (100 yr ARI) storm event plus 300 mm.	P1
		A2	An extension to an existing habitable building must comply with one of the following: a) floor level of habitable rooms is no lower than the 1% AEP (100 yr ARI) storm event plus 300 mm; b) floor area of the extension no more than 60 m2 as at the date of commencement of this planning scheme.	P2
		A3	The total floor area of all non-habitable buildings, outbuildings and Class 10b buildings under the Building Code of Australia, on a site must be no more than 60 m2.	P3
	E15.7.5 Riverine & Coastal IPAC	A1	For landfill, or solid walls greater than 5 m in length and 0.5 m in height, there is no acceptable solution.	P1
		A2	No acceptable solution where mitigation required	P2
		A3	A land application area for onsite wastewater management must comply with all of the following: a) horizontal separation distance from high water mark or from the top of bank of a watercourse or lake must be no less than 100 m; b) vertical separation distance from the water table must be no less than 1.5 m.	P3
	E15.7.6 Dependent on a Coastal Location	A1	An extension to an existing boat ramp, car park, jetty, marina, marine farming shore facility or slipway must be no more than 20% of the size of the facility existing at the effective date.	P1
		A2	No acceptable solution.	P2
		A3	a) A3 No Acceptable Solution for coastal protection works initiated by the private sector.	P3
Subdivision	E15.8.1 Medium and High IPAC	A1	No Acceptable Solution.	P1
	E15.8.2 Dependent on a Coastal Location	A1	No Acceptable Solution.	P1

Appendix 2 The LIST NRM Data

Feature	
Segment Id	18793
Segment Length (m)	100
Minimum Vulnerability: Coastal Vulnerability Mapping	Not a minimal vulnerability shoreline
Cliff Vulnerability: Coastal Vulnerability Mapping	Not a cliffed shoreline
Unclassified Vulnerability: Coastal Vulnerability Mapping	Not an unclassified vulnerability shoreline
Erosion Vulnerability: Coastal Vulnerability Mapping	Not a soft clayey-gravelly or colluvial shoreline
Sandy Vulnerability: Coastal Vulnerability Mapping	Open coast sandy shore backed by low-lying sandy plains
Muddy Vulnerability: Coastal Vulnerability Mapping	Not a muddy shoreline
Coastal Vulnerability0	Sandy beach or shoreline - fine to med grainsize
Coastal Vulnerability	Sloping sandy bottom in lowest intertidal to subtidal zone
Backshore Type Coastal Vulnerability	Dunes (one or more ridges with lagoons and unconsolidated sediment plain)
Artificial Shore	No
Industry1 500M	No industry present within 500m
Industry2 500M	No industry present within 500m
Industry3 500M	No industry present within 500m
Industry1 1Km	No industry present within 1km
Industry2 1Km	No industry present within 1km
Industry3 1Km	No industry present within 1km
Foreshore Structure1	No structure present
Structure1 Use Frequency	NA
Foreshore Structure2	No structure present
Structure2 Use Frequency	NA
Foreshore Structure3	No structure present
Structure3 Use Frequency	NA
Foreshore Structure4	No structure present
Structure4 Use Frequency	NA
Construction Level 100M	1 - 25%
Construction Level 500M	Part construction
Cleared Level 100M	76 - 100%
Cleared Level 500M	All cleared
Recreation Use1	Walking
Recreation1 Use Frequency	Medium use
Recreation Use2	Dog exercise
Recreation2 Use Frequency	Medium use
Recreation Use3	Swimming
Recreation3 Use Frequency	Low use
Biological Feature Significance Value	
Protected Area	
Access1	Walking
Access2	
Access3	
Access4	
Access5	
Vegetation Viability Coastal Values	Not assessed
Vegetation Significance Coastal Values	Not assessed
Coastal Values	Not assessed
Vegetation Condition Coastal Values	Not assessed
Habitat Condition SE Strategy	Not assessed
Conservation Significance SE Strategy	Not assessed
Reserve Class CAR	Informal Reserve on other public land
Public Land Classification	Public Reserve
Coastal Zone Type PWS	

Marine Reserve	
LGA Reserve	
WHA	
Classification	4
Zoning	Passive Recreation
Geomorphic Condition	Significantly disturbed
Actual Habitat Listed Significant SPP	
Potential Habitat Listed Significant SPP	Potential habitat for listed / significant species
Geovalue	1
Sensitivity TGD	
Geomorphic Value	2
Tourism Use	No listed tourism use
European Heritage	No listed European heritage values
Carcinus Maenas	Unknown
Crassostrea Gigas	Likely
Spartina Anglica	Absent
Undaria Pinnatifida	Unlikely
A Arenaria	Present
A Populifolia	Absent
E Paralias	Absent
E Villosa	Absent
T Junceiforme	Absent
Pollution Source1 500M	No pollution sources within 500m
Pollution Source2 500M	No pollution sources within 500m
Pollution Source3 500M	No pollution sources within 500m
Pollution Source1 1Km	Rural runoff
Pollution Source2 1Km	
Pollution Source3 1Km	
Biology Attribute Value	2
Geomorphic Attribute Value	2
Natural Value Index	2
Amenities Attribute Value	5
Recreational Tourism Value	2
Value0	
Human Use Value Index	3
Eco Disturbance Attribute Condition	3
Geomorphic Attribute Condition	4
Introduced Species Attribute Condition	3
Condition Index	3
Anthropogenic Modification Attribute Pressure	2
Pollution Attribute Pressure	2
Recreational Tourism Attribute Pressure	5
Pressure	5
Introduced Species Attribute Pressure	3
Pressure Index	3
Further Information	An explanatory report accompanies this dataset and can be obtained from http://www.aquenal.com.au/reports.htm or by emailing coastal.enquiries@environment.tas.gov.au

Natural Values Index

Foreshores within or directly adjacent to protected natural areas are assumed to have a higher degree of naturalness compared to those adjacent to developed areas. This indicator aims to identify foreshores that are part of wider natural functioning systems, rather than focussing on individual ecological elements. High value protected areas are selected based on reservation status and the associated restrictions on activities.

Natural Value Index of 1

Significant community or habitat present.

Foreshores assigned the highest value score (i.e. a score of 1) under this indicator are those within or directly adjacent to a dedicated formal reserve equivalent to IUCN (International Union for Conservation of Nature) protected area management categories i, ii, iii, iv, or vi (see IUCN Guidelines for Applying Protected Area Management Categories (Dudley 2008) for Shore Base: A Coastal Management Tool Aquenal Pty Ltd 96 further detail). Formal reserves include National Parks, State Reserves, Game Reserves, Nature Reserves, Historic sites, Forest Reserves, Conservation areas, and areas with a Conservation Covenant.

Natural Value Index of 2

Medium Integrated Conservation Value (CFEV)

High value foreshores (i.e. those assigned a score of 2) are those within or directly adjacent to areas not listed under IUCN equivalents but included in other Informal Reserves, and State or Forestry Managed Land.

Geomorphic Attribute Value (Geomorphology)

Geomorphic value is derived from a calculation of geoconservation priority (Geovalue) and the sensitivity category applied to sites of geoconservation significance by the Tasmanian Geoconservation Database (TGD). Geovalues (Sharples and Mowling 2006) are designed to highlight coastal segments which are most likely to warrant management attention regarding the maintenance of geoconservation value.

Geovalue of 1

Indicates high geoconservation priority, with coastal segments having either the highest sensitivity to disturbance, and/or the most natural condition.

Geovalue of 2

Indicate moderate geoconservation priority.

Geovalue of 3

Indicate moderate to low geoconservation priority.

Geovalue of 4

Indicates lowest geoconservation priority where coastal segments are of low sensitivity to disturbance, yet are significantly disturbed. This mainly refers to hard rock shores that have been extensively modified.

See Sharples and Mowling (2006) for further information on calculation of Geovalues.

Appendix 3 Beach Panorama

P1. Beach Panorama - Northwest

P2. Beach Panorama - Mid

P3. Beach Panorama - Southeast

Appendix 4 Quantitative Risk Assessment Tables

Consequence Index

Consequence	Erosion
Catastrophic	Loss of life, loss of significant environmental values due to a pollution event where there is not likely to be recovery in the foreseeable future.
Major	Extensive injuries. Complete structural failure of development, destruction of significant property and infrastructure, significant environmental damage requiring remediation with a long-term recovery time.
Moderate	Treatment required, significant building or infrastructure damage i.e. loss of minor outbuildings such as car ports, garages and the like. Replacement of significant property components. linings, hard paved surfaces, cladding, flooring. Moderate environmental damage with a short-term natural or remedial recovery time.
Minor	Medium loss – repair of outbuildings and repair and minor replacement of building components of buildings. Replacement of floor/window coverings, some furniture through seepage (where applicable). Minor environmental damage easily remediated.
Insignificant	No injury, low loss – no replacement of habitable building components, some remediation of garden beds, gravel driveways etc. Environment can naturally withstand and recover without remediation. Inundation of the site, but ground based access is still readily available and habitable buildings are not inundated, including incorporated garages.

Likelihood Index

Level	Descriptor	Description	Guideline
A	Almost Certain	Consequence is expected to occur in most circumstances.	Occurs more than once per month.
B	Likely	Consequence will probably occur in most circumstances.	Occurs once every 1 month – 1 year.
C	Occasionally	Consequence should occur at some time.	Occurs once every 1 year - 10 years.
D	Unlikely	Consequence could occur at some time.	Occurs once every 10 years – 100 years.
E	Rare	Consequence may only occur in exceptional circumstances.	Occurs less than once every 100 years.

Source: AS/NZS 4360:2004 Risk Management

Qualitative Risk Matrix

Likelihood of the Consequence	Maximum Reasonable Consequence				
	(1) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Catastrophic
(A) Almost certain	11 High	16 High	20 Extreme	23 Extreme	25 Extreme
(B) Likely	7 Moderate	12 High	17 High	21 Extreme	24 Extreme
(C) Occasionally	4 Low	8 Moderate	13 High	18 Extreme	22 Extreme
(D) Unlikely	2 Low	5 Low	9 Moderate	14 High	19 Extreme
(E) Rare	1 Low	3 Low	6 Moderate	10 High	15 High

Source: AS/NZS 4360:2004 Risk Management

Appendix 5 Quantitative Risk Assessment

Performance Criteria E11.7.1 P1 **Building and works within a Waterway and Coastal Protection Area must satisfy all of the following:**	**Relevance**	**Management Options**	**Managed Risk Assessment (where relevant)**			**Further Assessment Required**
			Consequence	**Likelihood**	**Risk**	
(a) avoid or mitigate impact on natural values	The site has a Natural Value Index of 2 indicating a medium conservation value. The site is largely modified with introduced flora.		Minor (2)	Unlikely (D)	Low (5)	No
(b) mitigate and manage adverse erosion, sedimentation and runoff impacts on natural values	During and after construction works	A soil and water management plan is recommended at the site. A stormwater absorption trench is required.	Minor (2)	Unlikely (D)	Low (5)	No
(c) avoid or mitigate impacts on riparian or littoral vegetation	Outside of the littoral and riparian vegetation extent		Insignificant (1)	Rare (E)	Low (1)	No
(d) maintain natural streambank and streambed condition, (where it exists)	No applicable					No
(e) maintain in-stream natural habitat, such as fallen logs, bank overhangs, rocks and trailing vegetation	No applicable					No
(f) avoid significantly impeding natural flow and drainage	No applicable.					No
(g) maintain fish passage (where applicable);	No applicable					No
(h) avoid landfilling of wetlands	Not applicable					No
(i) works are undertaken generally in accordance with 'Wetlands and Waterways Works Manual' (DPIWE, 2003) and "Tasmanian Coastal Works Manual" (DPIPWE, Page and Thorp, 2010), and the unnecessary use of machinery within watercourses or wetlands is avoided.		Works are undertaken generally in accordance with 'Wetlands and Waterways Works Manual' (DPIWE, 2003) and "Tasmanian Coastal Works Manual" (DPIPWE, Page and Thorp, 2010), and the unnecessary use of machinery within watercourses or wetlands is avoided.				No

BUILDING AND WORKS WITHIN A COSTAL EROSION HAZARD AREA

Performance Criteria E16.7.1 P1 **Buildings and works must satisfy all of the following:**	**Relevance**	**Management Options**	**Preliminary Risk Assessment (where relevant)**			**Further Assessment Required**
			Consequence	**Likelihood**	**Risk**	
(a) not increase the level of risk to the life of the users of the site or hazard for adjoining or nearby properties or public infrastructure;		Provided the structure is founded within the stable foundation zone	Minor (2)	Unlikely (D)	Low (5)	No
(b) erosion risk arising from wave run-up, including impact and material suitability, may be mitigated to an acceptable level through structural or design methods used to avoid damage to, or loss of, buildings or works;	South-eastern side of development within modelled erosion zone.	As above	Minor (2)	Unlikely (D)	Low (5)	No
(c) erosion risk is mitigated to an acceptable level through measures to modify the hazard where these measures are designed and certified by an engineer with suitable experience in coastal, civil and/or hydraulic engineering;	No mitigation required	As above	Insignificant (1)	Rare (E)	Low (1)	No
(d) need for future remediation works	Negligible	As above	Insignificant (1)	Rare (E)	Low (1)	No
(e) health and safety of people is not placed at risk	Negligible site erosion hazard	As above	Minor (2)	Unlikely (D)	Low (5)	No
(f) important natural features are adequately protected	E11.7.1 P1		Minor (2)	Rare (E)	Low (3)	No
(g) public foreshore access is not obstructed where the managing public authority requires it to continue to exist	Not Applicable	As above				No
(h) access to the site will not be lost or substantially compromised by expected future erosion whether on the proposed site or off-site	Access is from higher ground		Insignificant (1)	Rare (E)	Low (1)	No
(i) provision of a developer contribution for required mitigation works consistent with any adopted Council Policy, prior to commencement of works.	No need for structural mitigation.		Insignificant (1)	Rare (E)	Low (1)	No
(j) not be located on an actively mobile landform	Sand dunes not actively mobile		Insignificant (1)	Rare (E)	Low (1)	No