SPARKS +PARTNERS
CONSULTING ENGINEERS
HYDRAULIC I CIVIL I FIRE

PO Box 979
Level 1, 91 George Street
PARRAMATTA NSW 2150

Office 02 9891 5033
Fax 02 9891 3898
admin@sparksandpartners.com.au

sparksandpartners.com.au

ABN 95 161 152 969

INTEGRATED WATER CYCLE MANAGEMENT AND FLOOD REPORT

SENIORS LIVING DEVELOPMENT

FOX HILLS GOLF CLUB

Date:	22 March 2021
Revision:	2
Issue:	Site Compatibility Submission
Ref. No.:	20221_C_RPT_IWCM and Flood Report

Prepared for: **INTEGRATED PROJECTS**

Client Details: Email: david@integratedprojects.com

Disclaimer

Document Control

Revision	Date	Description	Prepared	Reviewed	Approved
1	12.03.21	Site Compatibility Submission	BB	SK	BB
2	22.03.21	Site Compatibility Submission	BB	SK	BB

Prepared by	Benjamin Barrett	Revision	2
Approved by	Benjamin Barrett	Revision	2

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 1

2. INTRODUCTION 2

2.1 Existing Site 2

2.2 Proposed Development 2

3. INTEGRATED WATER MANAGEMENT 3

3.1 General 3

3.2 Rainwater Reuse 3

3.3 Stormwater Quality 3

3.4 Stormwater Quantity 3

4. FLOODING 5

CONCLUSION 6

APPENDIX A. HIGH LEVEL CONCEPT DRAINAGE PLANS 7

APPENDIX B. BCC OSD CALCULATION SUMMARY 8

APPENDIX C. COUNCIL FLOOD ADVICE LETTER 9

1. EXECUTIVE SUMMARY

Sparks & Partners have been engaged by Integrated Projects to provide civil engineering services to support the proposed Site Compatibility submission for the proposed Seniors Living Development at Fox Hills Golf Club, 55 Fox Hills Crescent, Prospect. The engineering services include the assessment and concept design of the stormwater drainage infrastructure, finished surface levels and flood management for the proposed development.

2. INTRODUCTION

2.1 Existing Site

The existing site is a golf course and the footprint of the development covers several holes of the golf course. The area is currently previous landscaping. The areas of the golf course outside of the development include ponds and dams for water collection and reuse. The site generally falls toward Girraween Creek, which collects and drains runoff from the Golf Course. Girraween Creek is subject to flooding and the site, outside of the development area, contains high, medium and low risk flood precincts. The area has minimal formal drainage systems, with reliance on infiltration and primarily overland flow to drain stormwater runoff. No stormwater quality or quantity control measures exist within the development area.

2.2 Proposed Development

The proposed development occupies a total site area of 63,012 m² and consists of residential buildings, access roadways, pedestrian pavements, landscaping and recreation areas. A detailed description of the proposed development is located within the Altis Architecture Site Compatibility Statement.

3. INTEGRATED WATER MANAGEMENT

3.1 General

The objective of integrated water management is to provide a strategy that brings together the different aspects of the water cycle as a whole rather than an ad hoc approach to water management. This includes the management aspects of freshwater, wastewater and stormwater. The following integrated water management strategies have been considered and can be adequately addressed by the proposed development:

1. Employ an integrated water collection and recycling system for capturing and recycling roofwater;
2. Control the quality of stormwater that is disposed from the site;
3. Control the quantity of stormwater that is discharged for the site.

The high-level concept stormwater drainage plans detail the location of the water management infrastructure including pipe networks and OSD basin, and are included in Appendix A.

3.2 Rainwater Reuse

Through the reuse of collected roofwater for non-potable reuse the proposed demand on potable water resources is reduced. The proposed development will capture roof water from part of the building roof areas and collected for storage and reuse throughout the development, in accordance with Council policies.

3.3 Stormwater Quality

The site is within the Section 94 Contribution Plan No. 19 – Blacktown Growth Centre area, as identified on council DCP Part J. Water quality requirements will be satisfied with a contribution to Council.

3.4 Stormwater Quantity

The proposed development requires the implementation of on-site detention (OSD) as per the BCC current OSD mapping issued 16th December 2020. Engineering Guide for Development to control stormwater discharge from the site. A catchment plan of the proposed development is included in the Appendix A.

The BCC OSD summary sheet has been utilised to determine the required volume and discharge for the proposed development. The site is situated within the UPRCT Permanent OSD catchment. Based on the above catchment areas the storage required for the proposed development is approx. 2,867m³ with a maximum discharge of 1,197.23L/sec. OSD will be

provided within a reconfigured Dam on the site, with discharge to be conveyed as overland flow toward Girraween Creek, in a similar manner to the current stormwater discharge. The OSD summary sheet is located in the Appendix B for review.

4. FLOODING

The Fox Hills Golf Course is identified as affected by flooding based on a Council Flood advice letter issued on October 6th, 2020. This letter is located in Appendix C for reference.

The flood mapping identifies areas of the golf course that are subjected to high, medium and low flood hazards, centered around Girraween Creek. 1% AEP flood levels range between RL38.68 and RL44.39 and PMF level ranges between RL 39.60 and RL45.55.

The proposed Seniors Living development is located outside of the flood zones. Freeboard will be provided to the ground floor habitable levels to the local flood levels within the site. Similarly, basement carparking will be flood protected to Council policy requirements. Pedestrian and vehicular access to the Seniors Living development is available during the 1% AEP flood via Fox Hills Crescent and Oakwood Road.

During detailed design development it will be demonstrated that all Council flooding policy requirements for flood safety and evacuation will be satisfied.

CONCLUSION

Based on the preparation of the high level concept stormwater drainage plans it is demonstrated that Council requirements for integrated water management and flood management have been considered and incorporated into the Seniors Living development proposal. During Development Application and Construction Certificate stages, further details of the stormwater and flood management will be developed and available for review and approval by Council. The Seniors Living proposal is compatible with Council DCP and polices for integrated water management and flood management.

APPENDIX A. HIGH LEVEL CONCEPT DRAINAGE PLANS

SENIORS LIVING DEVELOPMENT
CONCEPT STORMWATER MANAGEMENT

LOCALITY PLAN
NOT TO SCALE - COURTESY OF SIX MAPS

NOT TO SCALE

DRAWING SCHEDULE

DWG No.	DRAWING NAME
DA1101	COVER PAGE & DRAWING SCHEDULE
DA4101	CONCEPT STORMWATER & GRADING PLAN - SHEET 1
DA4102	CONCEPT STORMWATER & GRADING PLAN - SHEET 2
DA4301	CONCEPT STORMWATER CATCHMENT PLAN
DA4711	CONCEPT STORMWATER OSD BASIN 1 DETAILS

IMPORTANT
- DO NOT SCALE OFF THIS DRAWING. USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY
- DRAWINGS TO BE READ IN CONJUNCTION WITH SPECIFICATION.
- THE INFORMATION ON THIS DRAWING REMAINS THE PROPERTY OF SPARKS & PARTNERS CONSULTING ENGINEERS REPRODUCTION OF THE WHOLE OR PART OF THE DOCUMENT CONSTITUTES AN INFRINGEMENT OF COPYRIGHT©

NORTH POINT

REFERENCES

DATE	AMENDMENT	INIT	REV
12.03.21	SITE COMPATIBILITY ISSUE	BB	1
22.03.21	SITE COMPATIBILITY ISSUE	BB	2

STRUCTURAL
-
MECHANICAL
-
ELECTRICAL
-
CIVIL
-

CLIENT
Integrated Projects

ARCHITECT
ALTIS ARCHITECTURE

PROJECT
SENIORS LIVING DEVELOPMENT
FOX HILL GOLF CLUB

SPARKS+PARTNERS
CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE
Level 1, 91 George Street | Parramatta | NSW 2150
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au
https://sparksandpartners.com.au/

DRAWING TITLE
CIVIL DESIGN
COVER PAGE & DRAWING SCHEDULE

DATE	DRAWN	DESIGNED	CHECKED
MAR 2021	JK	BB	

SCALE	SIZE	REVISION
NTS	A1	2

PROJECT No	DRAWING No
20221	DA1101

SITE COMPATIBILITY ISSUE

LEGEND

FFL 555.555	FINISHED FLOOR LEVEL OF PROPOSED BUILDING
+ FS55.555	FINISHED SURFACE LEVEL
+ eRL55.555	EXISTING REDUCED SURFACE LEVEL
FALL 1.5% / FALL 1:20	DIRECTION OF SURFACE FALL
	PROPERTY BOUNDARY LINE
	EASEMENT BOUNDARY LINE
	EXTENT OF BATTER
	PROPOSED STORMWATER PIPE (≤ø300)
	PROPOSED STORMWATER PIPE (≥ø375)
	PROPOSED STORMWATER INLET PIT (GRATED COVER)
ø225	PIPE FLOW DIRECTION AND SIZE
	HEADWALL AND ENERGY DISSIPATOR
	HEADWALL
	ONSITE DETENTION TANK
	OVERLAND FLOW PATH

STORMWATER MANAGEMENT NOTES

1. REFER TO DA4301 FOR STORMWATER CATCHMENT PLAN
2. REFER TO DA4711 FOR ON-SITE DETENTION DETAILS

OSD DISCHARGE AS OVERLAND FLOW THROUGH GOLF COURSE TOWARD GIRRAWEEN CREEK

eRL42.300

OUTLET CONTROL STRUCTURE. POTENTIALLY MULTIPLE STRUCTURES TO SPREAD OUTLET OVERLAND FLOW

3803.919sq m

1-1.2m LEVEE CONSTRUCTED AROUND THE DAM TOP OF LEVEE RL 42.650

IL 41.760

eRL41.600

INLET HEADWALL AND RIP RAP.

BATTER TO EXISTING LEVELS

eRL42.500

eRL42.520

eRL43.050

eRL43.500

eRL44.160

eRL45.560

BATTER TO EXISTING LEVELS

eRL46.000

BATTER TO EXISTING LEVELS

eRL44.500

LOW FLOOD RISK PRECINCT EXTENT

STORMWATER PIPELINES TO EXISTING DAM LOCATION

eRL43.530

eRL44.500

eRL46.000

FFL 45.000

FFL 46.300

FFL 49.400

FFL 46.800

FFL 44.100

FFL 48.100

FFL 50.900

FFL 51.200

eRL43.840

eRL44.920

eRL46.640

eRL48.670

eRL50.020

eRL53.050

BOUNDARY

BOUNDARY

BOUNDARY

DP 834672

LOT 100

AKRON PLACE

METELLA ROAD

REFER DA4102 FOR CONTINUATION

0 10 25 50
1:500

SITE COMPATIBILITY ISSUE

IMPORTANT
- DO NOT SCALE OFF THIS DRAWING. USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY
- DRAWINGS TO BE READ IN CONJUNCTION WITH SPECIFICATION.
- THE INFORMATION ON THIS DRAWING REMAINS THE PROPERTY OF SPARKS & PARTNERS CONSULTING ENGINEERS REPRODUCTION OF THE WHOLE OR PART OF THE DOCUMENT CONSTITUTES AN INFRINGEMENT OF COPYRIGHT©

NORTH POINT

REFERENCES

DATE	AMENDMENT	INIT	REV
12.03.21	SITE COMPATIBILITY ISSUE	BB	1
22.03.21	SITE COMPATIBILITY ISSUE	BB	2

STRUCTURAL
-

MECHANICAL
-

ELECTRICAL
-

CIVIL
-

CLIENT
Integrated Projects

ARCHITECT
ALTIS ARCHITECTURE

PROJECT
SENIORS LIVING DEVELOPMENT
FOX HILL GOLF CLUB

SPARKS+PARTNERS
CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE
Level 1, 91 George Street | Parramatta | NSW 2150
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au
https://sparksandpartners.com.au/

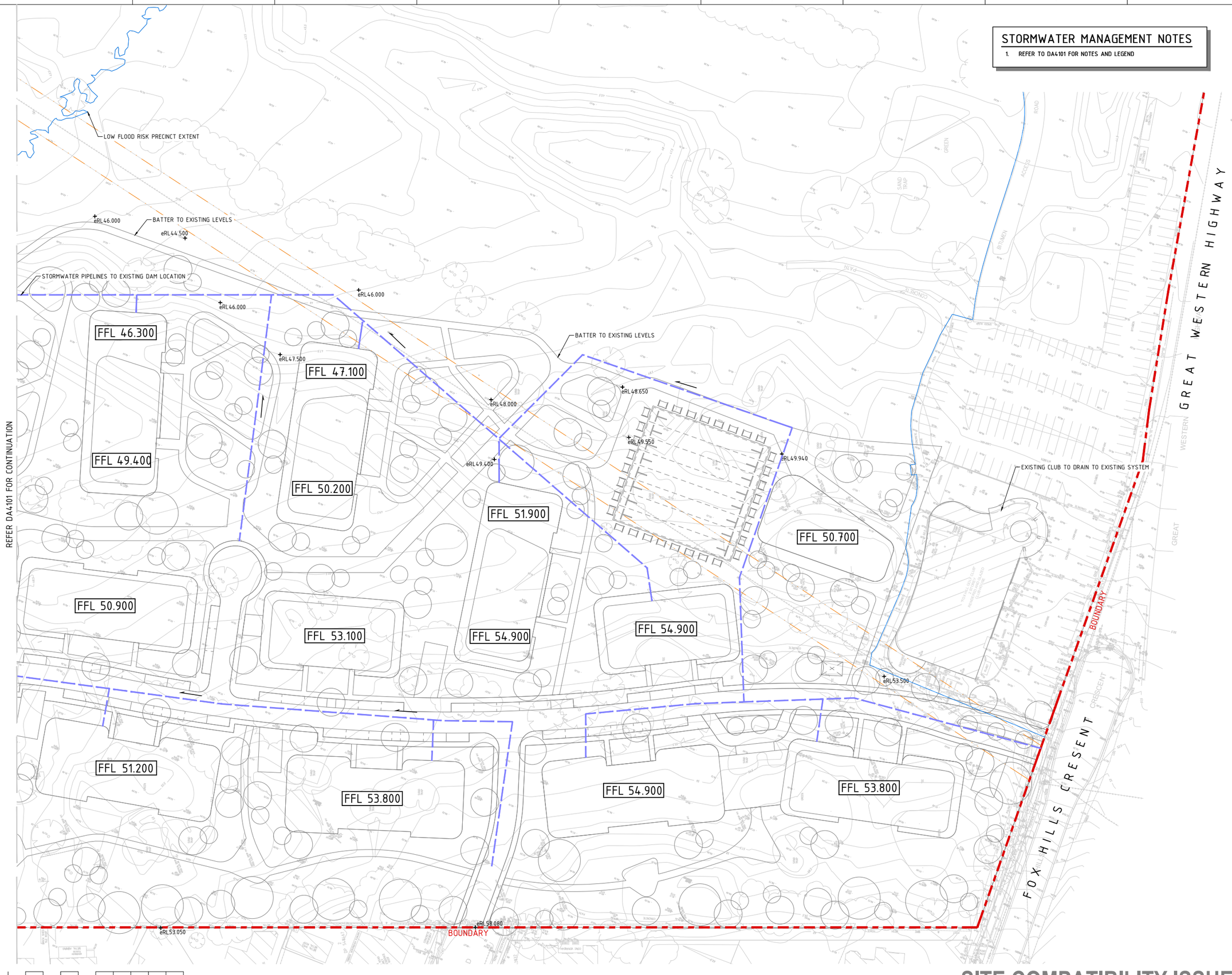
DRAWING TITLE
CIVIL DESIGN
CONCEPT STORMWATER & GRADING PLAN - SHEET 1

DATE	DRAWN	DESIGNED	CHECKED
MAR 2021	JK	BB	

PROJECT No	SCALE	SIZE	REVISION
20221	1:500 @ A1	A1	2

DRAWING No DA4101

W:\20 - PROJECTS\20202021 - 53 FOX HILLS CR, TOONGABBIE\5-DESIGN FILE\A - DESIGN DRAWINGS\D - DWG\20221_DA4101.DWG



IMPORTANT
- DO NOT SCALE OFF THIS DRAWING. USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY
- DRAWINGS TO BE READ IN CONJUNCTION WITH SPECIFICATION.
- THE INFORMATION ON THIS DRAWING REMAINS THE PROPERTY OF SPARKS & PARTNERS CONSULTING ENGINEERS REPRODUCTION OF THE WHOLE OR PART OF THE DOCUMENT CONSTITUTES AN INFRINGEMENT OF COPYRIGHT©

NORTH POINT

REFERENCES

DATE	AMENDMENT	INIT	REV
12.03.21	SITE COMPATIBILITY ISSUE	BB	1
22.03.21	SITE COMPATIBILITY ISSUE	BB	2

STRUCTURAL
-
MECHANICAL
-
ELECTRICAL
-
CIVIL
-

CLIENT
Integrated Projects

ARCHITECT
ALTIS ARCHITECTURE

PROJECT
SENIORS LIVING DEVELOPMENT
FOX HILL GOLF CLUB

SPARKS+PARTNERS
CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE
Level 1, 91 George Street | Parramatta | NSW 2150
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au
https://sparksandpartners.com.au/

DRAWING TITLE
CIVIL DESIGN
CONCEPT STORMWATER &
GRADING PLAN - SHEET 2

DATE	DRAWN	DESIGNED	CHECKED
MAR 2021	JK	BB	

PROJECT No	SCALE	SIZE	REVISION
20221	1:500 @ A1	A1	2

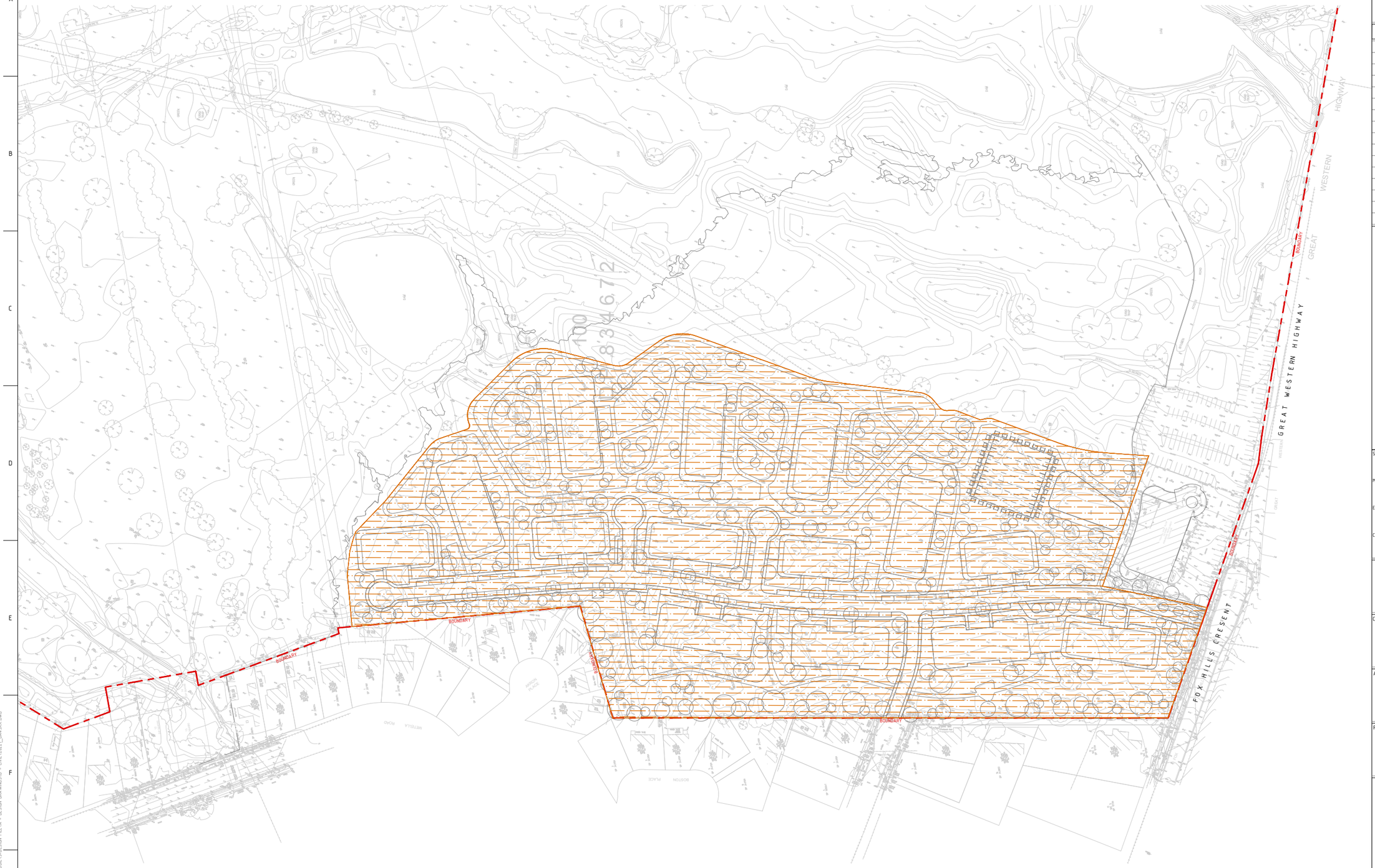
DRAWING No DA4102

SITE COMPATIBILITY ISSUE

W:\2 - PROJECTS\2021\20221 - 53 FOX HILLS CR, TOONGABBIE\5.0DESIGN FILE\A - DESIGN DRAWINGS\0 - CIVIL\20221_DA4102.DWG

LEGEND

CATCHMENT AREA = 63,012m²



0 20 50 100
1:1000

SITE COMPATIBILITY ISSUE

IMPORTANT
- DO NOT SCALE OFF THIS DRAWING, USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY
- DRAWINGS TO BE READ IN CONJUNCTION WITH SPECIFICATION.
- THE INFORMATION ON THIS DRAWING REMAINS THE PROPERTY OF SPARKS & PARTNERS CONSULTING ENGINEERS REPRODUCTION OF THE WHOLE OR PART OF THE DOCUMENT CONSTITUTES AN INFRINGEMENT OF COPYRIGHT©

NORTH POINT

REFERENCES

DATE	AMENDMENT	INIT	REV
12.03.21	SITE COMPATIBILITY ISSUE	BB	1
22.03.21	SITE COMPATIBILITY ISSUE	BB	2

STRUCTURAL
-
MECHANICAL
-
ELECTRICAL
-
CIVIL
-

CLIENT
Integrated Projects

ARCHITECT
ALTIS ARCHITECTURE

PROJECT
SENIORS LIVING DEVELOPMENT
FOX HILL GOLF CLUB

SPARKS+PARTNERS
CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE
Level 1, 91 George Street | Parramatta | NSW 2150
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au
https://sparksandpartners.com.au/

FPA AUSTRALIA Fire Protection Association Australia. CORPORATE MEMBER
HCAA

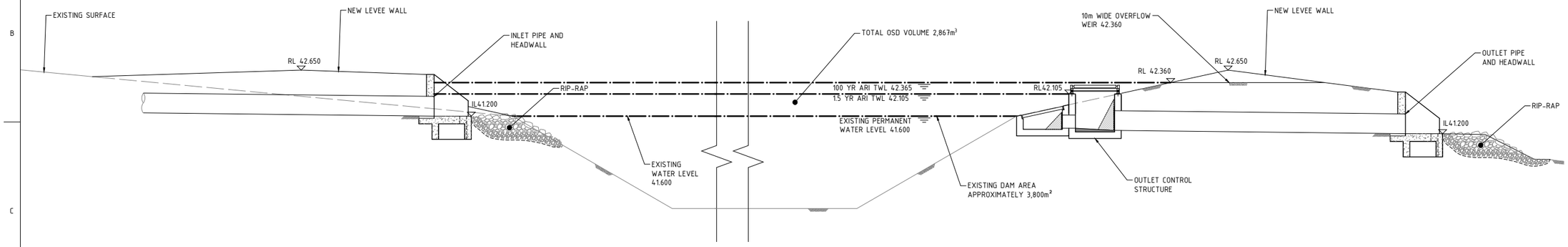
DRAWING TITLE
CIVIL DESIGN
CONCEPT STORMWATER
CATCHMENT PLAN

DATE	DRAWN	DESIGNED	CHECKED
MAR 2021	JK	BB	

PROJECT No	SCALE	SIZE	REVISION
20221	1:1000 @ A1	A1	2

DRAWING No DA4301

W:\2 - PROJECTS\2020\20221 - 53 FOX HILLS CR, TOONGABBIE\5-DESIGN FILE\A - DESIGN DRAWINGS\B - CIVIL\20221_DA4.DWG



OSD IN DAM SECTION

SCALE 1:50

A
DA4.101

AS SHOWN

IMPORTANT
- DO NOT SCALE OFF THIS DRAWING. USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY
- DRAWINGS TO BE READ IN CONJUNCTION WITH SPECIFICATION.
- THE INFORMATION ON THIS DRAWING REMAINS THE PROPERTY OF SPARKS & PARTNERS CONSULTING ENGINEERS REPRODUCTION OF THE WHOLE OR PART OF THE DOCUMENT CONSTITUTES AN INFRINGEMENT OF COPYRIGHT©

NORTH POINT

REFERENCES

DATE	AMENDMENT	INIT	REV
12.03.21	SITE COMPATIBILITY ISSUE	BB	1
22.03.21	SITE COMPATIBILITY ISSUE	BB	2

STRUCTURAL
-

MECHANICAL
-

ELECTRICAL
-

CIVIL
-

CLIENT
Integrated Projects

ARCHITECT
ALTIS ARCHITECTURE

PROJECT
SENIORS LIVING DEVELOPMENT
FOX HILL GOLF CLUB

SPARKS+PARTNERS
CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE
Level 1, 91 George Street | Parramatta | NSW 2150
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au
https://sparksandpartners.com.au/

DRAWING TITLE
CIVIL DESIGN
CONCEPT STORMWATER OSD
BASIN 1 DETAILS

DATE	DRAWN	DESIGNED	CHECKED
MAR 2021	JK	BB	

PROJECT No	SCALE	SIZE	REVISION
20221	AS SHOWN	A1	2

DRAWING No
DA4711

SITE COMPATIBILITY ISSUE

W:\2 - PROJECTS\2021\20221 - 53 FOX HILLS CR, TOONGABBIE\5-DESIGN FILE\A - DESIGN DRAWINGS\B - CIVIL\20221_DA4.7IX.DWG

APPENDIX B. BCC OSD CALCULATION SUMMARY

Above Ground OSD Summary with calculated values	
Site:	
Site Area	63012 m^2
Site Area NOT Draining to OSD	0 m^2
Reduced Levels (AHD):	
RL of Top of Tank	42.65
RL of Bottom of OSD Tank	41.6
RL of 1.5 Year ARI Overflow Weir	42.105
RL of Emergency Overflow Weir	42.365
RL of 1.5 Year ARI Orifice Centerline	41.6
RL of 100 Year ARI Orifice Centreline	41.6
RL of Invert of Discharge to Council Drainage Pit	41.2
RL of obvert of Pit outlet pipe	41.2
Minium RL of Garage Floor	42.74
Minium RL of House Floor	42.84
OSD Volume:	
Required Storage BELOW 1.5 Year ARI Overflow Weir	1890.4 m^3
Required Storage BELOW Emergency Overflow Weir	2867.0 m^3
Discharge Details:	
Using Filter Cartridges to Manage Water Quality	No
Discharge Location	Council Drainage Pit
Length of Emergency Overflow Weir	10.00 m
Maximum 1.5 Year ARI Site Discharge	252.05 L/s
1.5 Year ARI Orifice Discharge	252.05 L/s
Maximum 100 Year ARI Site Discharge	1197.23 L/s
100 Year ARI Orifice Discharge	1197.23 L/s
Orifice Details:	
Number of 1.5 Year ARI Orifices	1
Number of 100 Year ARI Orifices	1
1.5 Year ARI Orifice Size (mm)	409.0 mm
100 Year ARI Orifice Size (mm)	803.0 mm
Notifications:	

APPENDIX C. COUNCIL FLOOD ADVICE LETTER

Tuesday 6 October 2020

Benjamin Barrett
Sparks and Partners
Level 1, 91 George Street
PARRAMATTA NSW 2150

55 Fox Hills Crescent, Prospect
Lot 100 / DP 834672

Flood advice letter

Thank you for your inquiry. The flood information in the table below details the maximum and minimum flood values (within the model grid) identified across the property.

Definitions of the various elements within the table are found in attachment 1.

	1% AEP Flood	PMF
Maximum Flood Level (metres AHD)	44.39	45.55
Minimum Flood Level (metres AHD)	38.68	39.60
Maximum Flood Depth (metres)	3.89	5.74
Minimum Flood Depth (metres)	0.00	0.01
Maximum Velocity (metres/second)	0.05	0.10
Minimum Velocity (metres/second)	0.00	0.10
Maximum Hazard (H1 to H6)	Extreme	Extreme
Minimum Hazard (H1 to H6)	Low	Low

Do Flood Planning Controls Apply:

Subject to Flood Planning Area (FPA Controls)? YES

Subject to SEPP controls? NO

Subject to local overland flooding controls? NO

Planning/development controls applicable?

If the answer to any of the 3 numbered items on the previous page are yes then the land is identified as a Flood Control Lot and **does not** meet the criteria of an exempt or complying development as detailed by the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* – Section 3.5.

The property must meet the controls set out below prior to approval of development.

- **Flood Planning Area (FPA)**

  The flood maps attached are based on the results of Engineering Flood Studies commissioned by Government authorities and Blacktown City Council. These maps indicate that the subject land lies partly or wholly within the Flood Planning Area (FPA).

  The Flood Planning Area is the area of land situated below the Flood Planning Level, which is defined as the 1% AEP plus 0.5 metres of freeboard.

  General requirements for use of this land are in the *Blacktown Development Control Plan 2015* – Chapter 9 'Development on Flood Prone Land' and the *Blacktown Local Environmental Plan 2015* – Clause 7.1.

  Where proposed development extends into the Flood Planning Area, a flood study may be required to ensure no adverse impacts occur.

  Flood modelling requirements are detailed in our Water Sensitive Urban Design Developer Handbook. Further details are in the *NSW Government's Floodplain Development Manual*.

  We do not warrant that information provided or made available to you is complete. We strongly recommend that, in all cases, you seek independent professional advice to supplement your enquiries.

Recommendations

1. A preliminary minimum floor level would be required of the highest adjacent 1% Annual Exceedance Probability (AEP) flow level plus 500 mm.
2. A development application must provide a detail survey to AHD and certified (signed) by a registered surveyor. The survey is to include sufficient spot levels with contours and any existing floor levels. The survey plan will need to show the origin and level of the benchmark used and a local benchmark on top of kerb installed for use during construction.
3. Council will not allow the importing of any fill within the 1% AEP flood area.
4. Any future development within the 1% AEP flood area would have to prove that it does not increase the flood risk to life or the surrounding area and it must maintain an appropriate overland flow path. This will require a Flood Study Report. Should you wish to proceed with a flood study please contact Council for specific flood modelling requirements.
5. Submit to Council a copy of this Flood Advice Letter, the Flood Study Report and electronic files of the Flood Model with the Development Application (DA).

6. Council can supply additional information, such as catchment plans and/or ALS/Lidar data for a fee. Contact floodadvice@blacktown.nsw.gov.au for this information.

Further information

If you have any queries on development of your land, please contact one of our Planners between 8.00 am and 5.30 pm, Monday to Friday, by phoning 02 9839 6000, or emailing council@blacktown.nsw.gov.au.

If you have any queries on the flood information contained in this letter, please contact one of our Floodplain Officers between 8.00 am and 5.30 pm, Monday to Friday by phone 02 9839 6350 or emailing floodadvice@blacktown.nsw.gov.au.

Regards,

Naomi Harris
Floodplain and Stormwater Team Leader

Definitions

AEP	stands for 'Annual Exceedance Probability'. A 1% AEP flood has a 1% chance of occurring in any given year.
PMF	stands for 'Probable Maximum Flood' The PMF is the largest flood that could conceivably be expected to occur at a given location. The PMF defines the maximum extent of flood prone land, that is, the floodplain.
Flood Level	is the elevation of the flood surface above Australian Height Datum (AHD)
Flood Depth	is calculated by subtracting the Flood Level from the ground elevations defined by 2018 LiDAR aerial survey data
Velocity	is the speed of the flowing flood water
Hazard	is defined in Figure 6.7.9 Book 6 Chapter 7 of Australian Rainfall and Runoff 2019 and identifies the potential risk that floodwaters pose to people, property and vehicles. A copy of Figure 6.7.9 is below.
Freeboard	is a factor of safety expressed in metres above a flood level for purposes of floodplain management

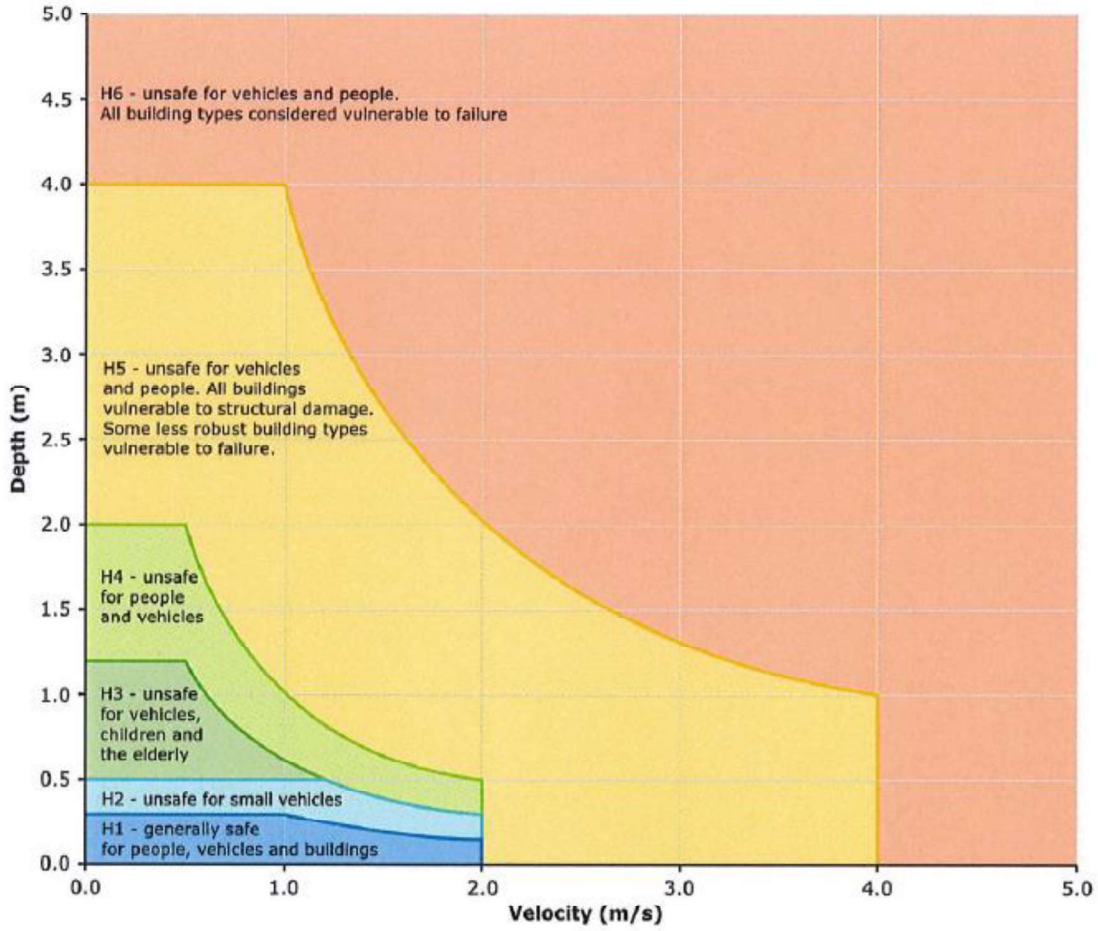
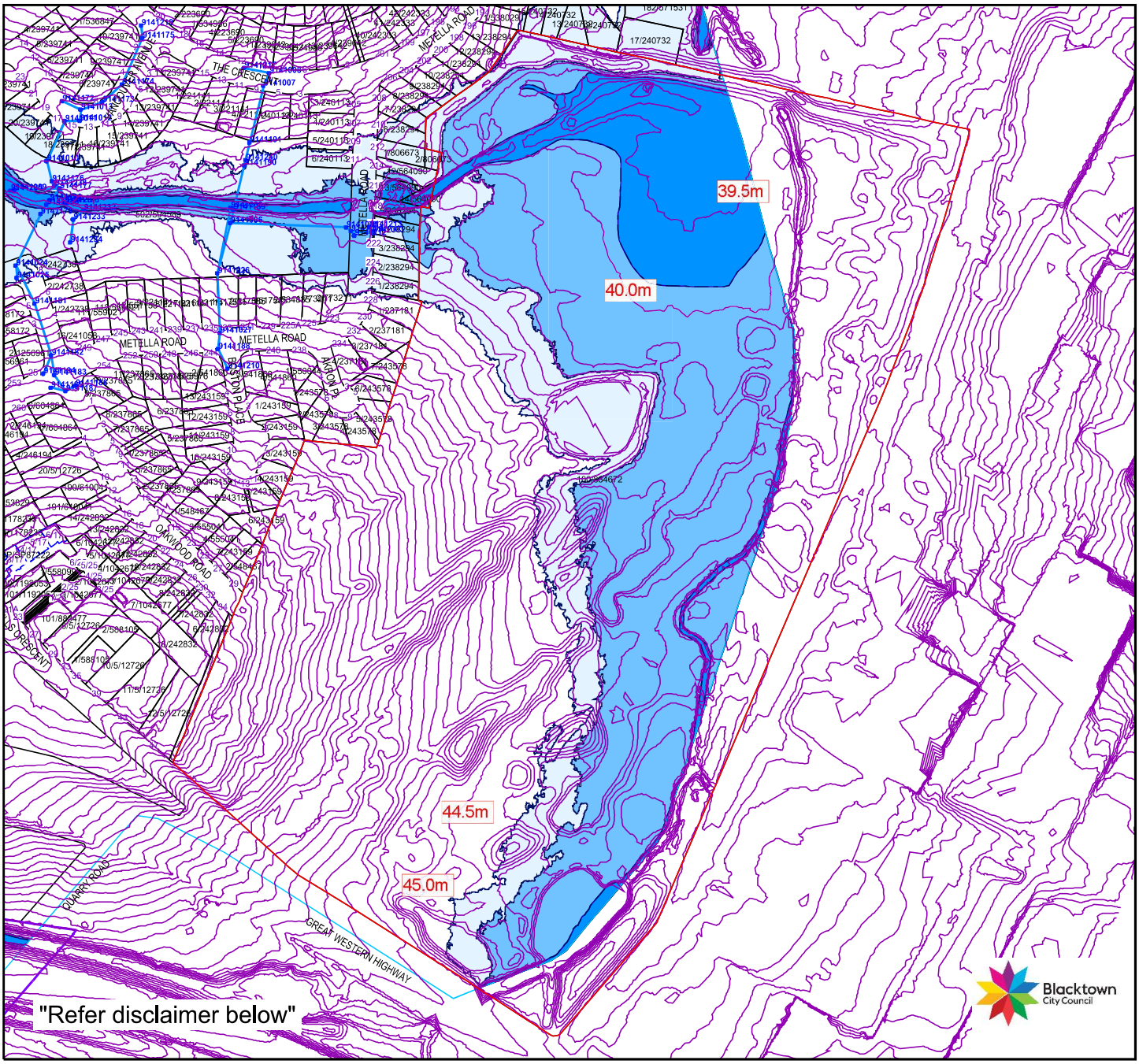


Figure 6.7.9. Combined Flood Hazard Curves (Smith et al., 2014)



Plot Date: 21/09/2020

BLACKTOWN CITY COUNCIL

Flood Risk Map

This is Council's current flood map. However Council is currently reviewing the flood modelling in this area. Finalisation of this modelling work may result in a variation to the quoted flood levels and amendments to Council's current flood mapping extents.

DISCLAIMER: The flood risk precincts shown are based on information available to Council and should be regarded as an indicative guide only. A more accurate indication of the extent of the respective flood risk precincts can be determined by relating surveyed ground levels at Australian Height Datum (AHD) to the hydraulic and/or flood level criteria determining flood risk precinct boundaries. This information may be obtained by a written request to Council accompanied by a ground level survey to AHD prepared by a Registered Surveyor. Should flood risk precinct extents be required for the purpose of a financial transaction of any nature, then the parties to that transaction should apply to Council for formal certification and/or seek independent legal or professional advice.

Scale 1:6000

- Parcel Extent.Motorway Extent
- Parcel Extent.Strata Common Extent
- Parcel Extent.Strata Unit Extent
- Parcel Extent.Torrens Title Extent
- Parcel LPI Extent.Motorway Extent
- Parcel LPI Extent.Strata Common Extent
- Parcel LPI Extent.Torrens Title Extent
- Pathway.Registered Extent
- Local Government Area.Gazetted Boundary
- Drainage Conduit.Route
- Drainage Node.Location
- Flood Extents.High Flood Risk Precinct
- Flood Extents.Medium Flood Risk Precinct
- Flood Extents.Low Flood Risk Precinct
- DTM Contour.36.5m Contour
- DTM Contour.37.0m Contour
- DTM Contour.37.5m Contour
- DTM Contour.38.0m Contour
- DTM Contour.38.5m Contour
- DTM Contour.39.0m Contour
- DTM Contour.39.5m Contour
- DTM Contour.40.0m Contour
- DTM Contour.40.5m Contour
- DTM Contour.41.0m Contour
- DTM Contour.41.5m Contour
- DTM Contour.42.0m Contour
- DTM Contour.42.5m Contour
- DTM Contour.43.0m Contour
- DTM Contour.43.5m Contour
- DTM Contour.44.0m Contour
- DTM Contour.44.5m Contour
- DTM Contour.45.0m Contour
- DTM Contour.45.5m Contour
- DTM Contour.46.0m Contour
- DTM Contour.46.5m Contour
- DTM Contour.47.0m Contour
- DTM Contour.47.5m Contour
- DTM Contour.48.0m Contour
- DTM Contour.48.5m Contour
- DTM Contour.49.0m Contour
- DTM Contour.49.5m Contour
- DTM Contour.50.0m Contour
- DTM Contour.50.5m Contour
- DTM Contour.51.0m Contour
- DTM Contour.51.5m Contour
- DTM Contour.52.0m Contour
- DTM Contour.52.5m Contour
- DTM Contour.53.0m Contour
- DTM Contour.53.5m Contour
- DTM Contour.54.0m Contour
- DTM Contour.54.5m Contour
- DTM Contour.55.0m Contour
- DTM Contour.55.5m Contour
- DTM Contour.56.0m Contour
- DTM Contour.56.5m Contour
- DTM Contour.57.0m Contour
- DTM Contour.57.5m Contour
- DTM Contour.58.0m Contour
- DTM Contour.58.5m Contour
- DTM Contour.59.0m Contour
- DTM Contour.59.5m Contour
- DTM Contour.60.0m Contour
- DTM Contour.60.5m Contour
- DTM Contour.61.0m Contour
- DTM Contour.61.5m Contour
- DTM Contour.62.0m Contour
- DTM Contour.62.5m Contour
- DTM Contour.63.0m Contour

Plotted by: swadmin

a4_bcic_flood_portait_external.xml