November 6 2018
Ref 1738FRMP

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Civil Engineering
Hydraulic & Flood Consultants
Environmental Management
Local Government Engineering
www.stefanigroup.com.au
77 Mann St Gosford NSW 2250
tel 4322 6517

Gardner Wetherill & Associates
Suite 2.01, 460 Pacific Hwy
ST LEONARDS NSW 2065

Attention: Mr Ross Gardner

FLOOD RISK MANAGEMENT PLAN FOR KENT ROAD PUBLIC SCHOOL, CNR KENT & HERRING RDS, MARSFIELD
STATE SIGNIFICANT DEVELOPMENT APPLICATION

Dear Sir,

We have been engaged to prepare a Flood Risk Management Plan (FRMP) that will outline a strategic approach to managing flood impacts in relation to a proposed development at the abovementioned address, further referred to as the Site.

An aerial photograph of the Site and its surrounding streets and neighbours is presented in **Appendix A**. This FRMP has been prepared as a support document to the State Significant Development Application submitted for the proposed development, Plan Set 17058SSDA prepared by Gardener Wetherill Associates, and partly illustrated in **Appendix B**.

This FRMP relates to this Site zoned part "SP2 Educational Establishment" and part "SP2 Classified Road" and should not be used for any other location, client or purpose. The State Significant Development is only located on lands zoned "SP2 Educational Establishment". This report outlines;

a) a review of the flood characteristics from modelling undertaken for Ryde City Council in 2010 prepared by Bewsher Consulting Pty Ltd with the release of the Macquarie Park Floodplain Risk Management Study and Plan;
b) a summary of the development controls that have been implemented through the City of Ryde Development Control Plan (Ryde DCP) 2014, Part 8.2 Stormwater and Floodplain Management Chapter 4 Flooding and Overland Flow; and
c) an assessment of the flood mitigation and adaption measures required to limit the risk of identified flood impacts relevant to the Site in respect to the proposed development.

The implementation of flood mitigation measures will significantly reduce the risk of flood inundation, property damage and human injury/death from potential floods impacting the proposed development and the existing activities on the Site.

The Site and Flood Context

The Site is approximately 40,805sqm in area and is located approximately 300m to the west of Shrimptons Creek. The Site is generally a rectangular parcel of land bordered to the northwest by Herring Rd with road boundary levels ranging between 62.0AHD and 61.0AHD, to the northeast by Kent Rd with road boundary levels ranging between 61.6AHD and 55.3AHD and residential allotments along the southern areas of the Site. Site levels progress as low as 55.1AHD, in the eastern corner of the Site adjacent to No.116 Kent Rd with levels rising to 61.0AHD adjacent to No.1 Lucinda Rd.

The proposed State Significant Development Application seeks approval for the redevelopment of Kent Road Public School, including:

i. Site preparation;
ii. Construction of three (3) new two (2) to three (3) storey buildings to allow for increased student population from 750 to 1,000, containing;
    a. 34 Homebase spaces;
    b. Canteen;
    c. Administration facilities;
    d. Staff facilities;
    e. Special program/counselling rooms;
iii. Construction of a new entry canopy;
iv. Reconfiguration of car drop off / pick up arrangements on Kent Road;
v. Landscaping and fencing; and
vi. Tree removal.

The proposed finished ground floor level of the buildings is 60.3AHD and the building footprints occupy an area of approximately 2,522sqm, 6% of the Site area. This State Significant Development Application includes all associated pathways, car parking, open space and services which occupies an area of 7,468sqm, being 18% of the Site area.

On December 12 2017, we visited the Site to determine its flood context following a review of Council's Macquarie Park Floodplain Risk Management Study & Plan. Photographs taken on that visit are presented in **Appendix D**. Council's Flood Report received December 19 2017, presented in **Appendix E**, provides flows and flood levels at various locations around the Site, which in summary indicates;

a) The Site being affected by a 100-year ARI (Average Recurrence Interval) flood with inundation over 12,199sqm, 30% of the Site, with flood depths up to 650mm;
b) The Site being affected by a PMF (Probable Maximum Flood) with inundation over 24,633sqm, 60% of the Site, with flood depths up to 1.55m;

Flood Risk Management Plan No.1738FLD is presented in **Appendix C** and illustrates the location and flood levels of the data issued by Council. The identified PMF flood extent is illustrated for which flood risk management requirements apply in accordance with the NSW Floodplain Development Manual and Ryde DCP2014. The Site appears to be impacted by mainstream flooding with low to high flood hazard conditions which are differentiated to assess development potential on the Site.

Our visit highlighted many contextual flood issues that surrounds the Site and neighbouring properties. Based on our observations and a preliminary review of Council's flood mapping, it is our opinion that:

1) The Site is located on lands affected by the PMF event.
2) Property boundary fences along the south boundary alignments significantly alters the flows onto and from the Site.
3) Fences and elevated buildings whilst allowing the flood to flow through or under the structures, does increase the risk of blockages from floating debris transported within the flood.
4) The majority of overland flow that impacts the Site originates from the natural depression that traverses No.1 Lucinda Rd.
5) The Bewsher flood mapping does not appear to model the existing fence alignments.

The Site will continue to be inundated with the development as no filling or Site level alterations are proposed. The Site will be inundated in the 100-year ARI flood event and PMF with maximum depths estimated at 0.65m and 1.55m, respectively, based on Council's Flood Report level estimates.

Estimated peak flow velocities are generally range between 1m/s and 3m/s in the 100-year ARI within the main floodway through the Site. Site observations indicates no evidence of soil erosion and a fair grass coverage over the flowpath indicates flow velocities are generally less than 2m/s. Reviewing the NSW Floodplain Development Manual and based on Council's flood modelling, a preliminary assessment of the Site is that it is categorised as a provisional high hydraulic hazard.

Inundation depths during these storm events can exceed these estimated depths across the street property boundary from incidental wave action from passing vehicles and is not the result of a hydraulic flood conveyance. The modelling undertaken has analysed the catchment in some rare specific adverse circumstances, such as conveyance blockages and rainfall conditions. It is possible that these flood depths may not represent a specific rainfall event and the rarity of these assumptions cannot be guaranteed and therefore caution should always be exercised from event to event. The chances of all these risks occurring is unlikely but should be planned for as the consequences can be catastrophic.

Flood Requirements

City of Ryde Development Control Plan (Ryde DCP) 2014, seeks to ensure development and future occupants of the land are appropriately protected from the impacts of stormwater inundation on land identified as being flood affected as defined under LEP 2014 clause 6.3 Flood Planning. The flood risk planning requirements and controls under this section are based on;

i. the exposure to flood risk, that is the type of development and land use; and
ii. the level of flood risk or flood hazard within flood affected areas.

The proposed State Significant Development is an educational facility and is categorised as 'Sensitive Uses and Facilities'. This development accommodates services or facilities which are essential to evacuation during periods of flooding or if effected would unreasonably affect the ability of the community to return to normal activities after flood events.

The level of flood risk is basically a product of flood depth and the velocity of flow and can be categorised as;

- High Flood Risk - areas where there is a potentially catastrophic damage to property, risk to life, evacuation problems or where development would significantly or adversely alter flood behaviour. Most development is restricted in these locations.
- Medium Flood Risk - areas whereby there would be potential flood damage or public safety is a concern but could be addressed by the application using appropriate measures.
- Low Flood Risk - land within the floodplain (i.e. within the extent of the probable maximum flood) but not identified as either High Flood Risk, Medium Flood Risk Precinct or as an Overland Flow Precinct.

The objective of flood affected lands and property is to;

a) ensure that development on land affected by flooding and overland flow is undertaken in a manner which provides for the safety of occupants of that development as well as minimise damage to private property, during such flooding events.
b) ensure essential services and land uses are designed with respect to potential flooding and overland flow risks.
c) ensure development does not exacerbate flooding on other properties.
d) ensure flood protection measures are sympathetic to the streetscape and relationship of the building to the street, do not have other adverse environmental impacts

Sensitive Uses and Facilities, such as educational establishments, are uses by the community which, if disabled, would impose a great detriment to the community in returning to normal operations after a flood event. To minimise the property damage and risk to human injury/death the following flood risk management controls are required in accordance with the DCP;

a) no development is allowed within Flood Risk Precincts categorised as Medium or High;
b) all floor levels must be no lower than the PMF level;
c) development must not adversely impact the existing flood regime in terms of diverting major overland flows or reduce flood storage such to adversely impact the surrounding area; and
d) new structures subject to flood waters and major overland flows must be designed and constructed to withstand the anticipated hydrostatic forces. For all parts of the development potentially exposed to floodwater up to the PMF event, the development structure must:
    i. be constructed of flood compatible building components; and
    ii. a structural engineer must certify that the completed works are designed and capable of withstanding forces subject to forces of floodwater, debris, buoyancy forces anticipated by the PMF flood event.

Consultation with Ryde City Council during August 2018 has indicated support for the proposal development 'in-principle". A summary of relevant comments made by Council is provided below.

> ….. the flood risk responses based on engineering judgement and hydraulic calculations is acceptable, flood modelling is not required. The existing overland flow characteristics that traverse through the site shall be assessed by means of a detailed Flood Impact Assessment report. This report is to address all the requirements that are outlined in the NSW Floodplain Manual, Australian Rainfall and Runoff 2016 and to the satisfaction of Council.
>
> ..… Filling of land is not permitted on the overland flow paths. The minor regrading of the land is acceptable.
>
> ….. Please note that Council does not support the proposed extension to the existing car parking area into the medium hazard overland flow path. Could you also provide further details on usage/any proposed works for existing block E which is located in the flowpath.

Flood Risk Management Measures

Our proposed flood mitigating measures will reduce the risk of property damage and risk to human injury/death. These flood mitigating measures are in accordance with Ryde DCP and are presented on **Flood Risk Management Plan No.1738FLD**, attached in **Appendix C**, and include:

1) All building finished floor levels must be above the Flood Planning Levels (FPL) noted in the FRMP.
2) Development is permitted within the northern Low Flood Risk Precinct.
3) No building development is permitted within the Medium to High Flood Risk Precinct.
4) No building development is permitted on the southern Low Flood Risk Precinct because of access restrictions through the Medium to High Flood Risk Precinct.
5) Landscaping of the floodplain is allowed subject to assessment and implemented controls to ensure that the hydraulic flood profile is not altered.
6) No filling is permitted within the flood extent on the Site that will remove flood storage.

The strategy is to allow the flood to continue to inundate the existing Site topography and undertake works outside of the Low, Medium and High Flood Hazard zones. The flowpath shape will not be altered and so the flood regime and flood levels are not exacerbated on adjoining properties. Some flowpath improvements will be realised with the removal of existing demountables within the Medium Flood Risk Precinct. The proposed development does not impinge on the 100-year ARI flood extent and is located outside of the Medium and High Flood Risk Precincts of the flood extent. The proposed works are located on the fringe of the Low Flood Risk Precinct and occupy an approximate area of 930sqm, 3% of the Site.

In accordance with the flood risk nature of the Site and following the principles of the NSW Floodplain Development Manual we have adopted the FPL at specific locations within the Site be defined as the greater of the PMF level and the 100-year ARI flood level plus a 500mm freeboard. The new educational buildings will have a finished ground floor level of 60.3AHD which provides a freeboard of approximately 1.7m and 1.3m in the 100-year ARI and PMF events, respectively. The proposed auxiliary works which support the landscape, footpaths and play areas for the school infringe on the Low Flood Risk Precinct and will have an insignificant impact of overall flood levels and storage.

As the Site will continue to be impacted by flood events, further measures are required to satisfy the objectives of this investigation, which include;

a) all structures located below the FPLs are to be made of flood compatible building components, including electrical junctions/switches for lighting;
b) all structures located below the FPLs are to be able to withstand the forces of floodwater, debris and buoyancy with certification required by an Engineer; and
c) all outdoor furniture, gas bottles and equipment will be fixed to the ground or secured within a steel mesh cage to limit flood damage to downstream neighbouring properties.
d) all goods and materials that may cause pollution or are potentially hazardous must be stored above the FPL.

No excessive filling of the Site is proposed and will be permitted; therefore no significant loss of flood storage and flood conveyance capacity will occur as a result of the development.

Any future construction or works within the road carriageway between the 'SP2 zone – Classified Road' boundaries by the Roads and Maritime Service will grade and direct stormwater flows from Herring Rd to Kent Rd in an easterly direction to the low point in Kent Rd. This redirection of flows will include all generated flows up to large rare storm events and will follow the natural fall of the catchment to ensure the provisions within the NSW Floodplain Development Manual are adopted.

The proposed Flood Protection Wall along the Herring Road boundary is a temporary flood risk mitigating measure to ensure PMF overflows from Herring Rd are directed away from the new educational facility. The 70m wall is located within the Site between the existing Site pedestrian access and the No.63 Herring Rd boundary and offset 600mm from the Herring Rd boundary, as illustrated on **Flood Risk Management Plan No.1738FLD**. The top of wall will be a min 600mm high above the back edge of the Herring Rd footpath. The installation of this wall has no impact in storms up to and including the 100-year ARI storm event and has an insignificant impact in larger and rarer storm events.

Flood Response

The risk of flood on this Site is high but it can be mitigated and therefore warrants appropriate flood management measures to reduce the risk of flood inundation, property damage and human injury/death from potential impacting floods.

A formal Site Flood Response Plan (SFRP) to educate students, employees and visitors on flood risks and protocols is required for this development. All principle entries to the property are located above the 100-year ARI flood extent and all have an evacuation route that is clear of the floodway to areas on the Site above the FPLs. The primary flood emergency strategy for the Site is to ensure that all students, employees and visitors are safe. The recommended Site Flood Evacuation Strategy will be to remain within the Site and move to designated areas above the FPLs via dedicated pedestrian vectors.

The NSW State Emergency Service (SES) undertakes flood planning as a legislative responsibility to determine how best to respond to floods. The NSW State Flood Plan (2008) outlines arrangements for responding to floods in NSW. Local Flood Plans (LFP) are subordinate plans of the Emergency Management Plan which describes emergencies and responsible combat agencies. Currently there is no standalone LFP for the Ryde Council Area. However, the Ryde SES Unit operate a Facebook page which is used for local updates on weather and status of emergencies. The SES is located in Macquarie Park and is well placed to assist the area during flood events. The SFRP will outline the role of the SES and their responsibilities during a flood event so that employees on the Site have a clear understanding.

Provision of accurate and timely flood warning is problematic for flashy urban catchments, such as the one the Site resides. Due to the rapid response of the catchment, it is important to utilised a combination of thresholds including rainfall forecast announced by Bureau of Meteorology and the SES and overland flow levels within the Site. The details of these flood risk awareness thresholds and how they combine to form the trigger for the Site Flood Evacuation Strategy will be outlined in the SFRP.

Recommendations and Conclusion

This proposed development will collect and convey small frequent flows from the Site via a pipeline network discharging into the existing pipeline drainage system surrounding and traversing the Site. Larger infrequent flows from the Site will be allowed to overflow into overland flowpaths that traverse between buildings and are numerous around the Site.

The development works will be protected with appropriate sediment erosion control measures, such as inlet gravel bag traps and sediment fences, during construction. The preparation of a Sediment Control Plan or a Soil and Water Management Plan will be an essentially requirement for this development which must be administered through the construction period.

All property overland flow paths will be designed to convey the 100-year ARI storm overflows considering the design constraints of pedestrian safety and vehicle stability in accordance with the NSW Floodplain Development Manual. The requirements of the NSW Floodplain Development Manual regarding pedestrian safety and vehicle stability design guidelines are relevant to this development and need to be certified as part of the design process.

We wish to outline our professional opinions and recommendations on the flood risk management implications and strategies required to progress the proposed State Significant Development Application at the abovementioned property.

a) The minimum Flood Planning Level (FPL) for the identified developable area of the Site is 59.10AHD.

b) It is our opinion, the Site is inundated in the 100-year ARI flood event and PMF with maximum depths estimated at 0.65m and 1.55m, respectively, based on Council's Flood Report level estimates.
c) It is our opinion the development proposed on this Site will not have any adverse flood impact on neighbouring properties from flood conveyance or loss in flood storage.
d) A formal Site Flood Response Plan be implemented and administered for the operation of the School.

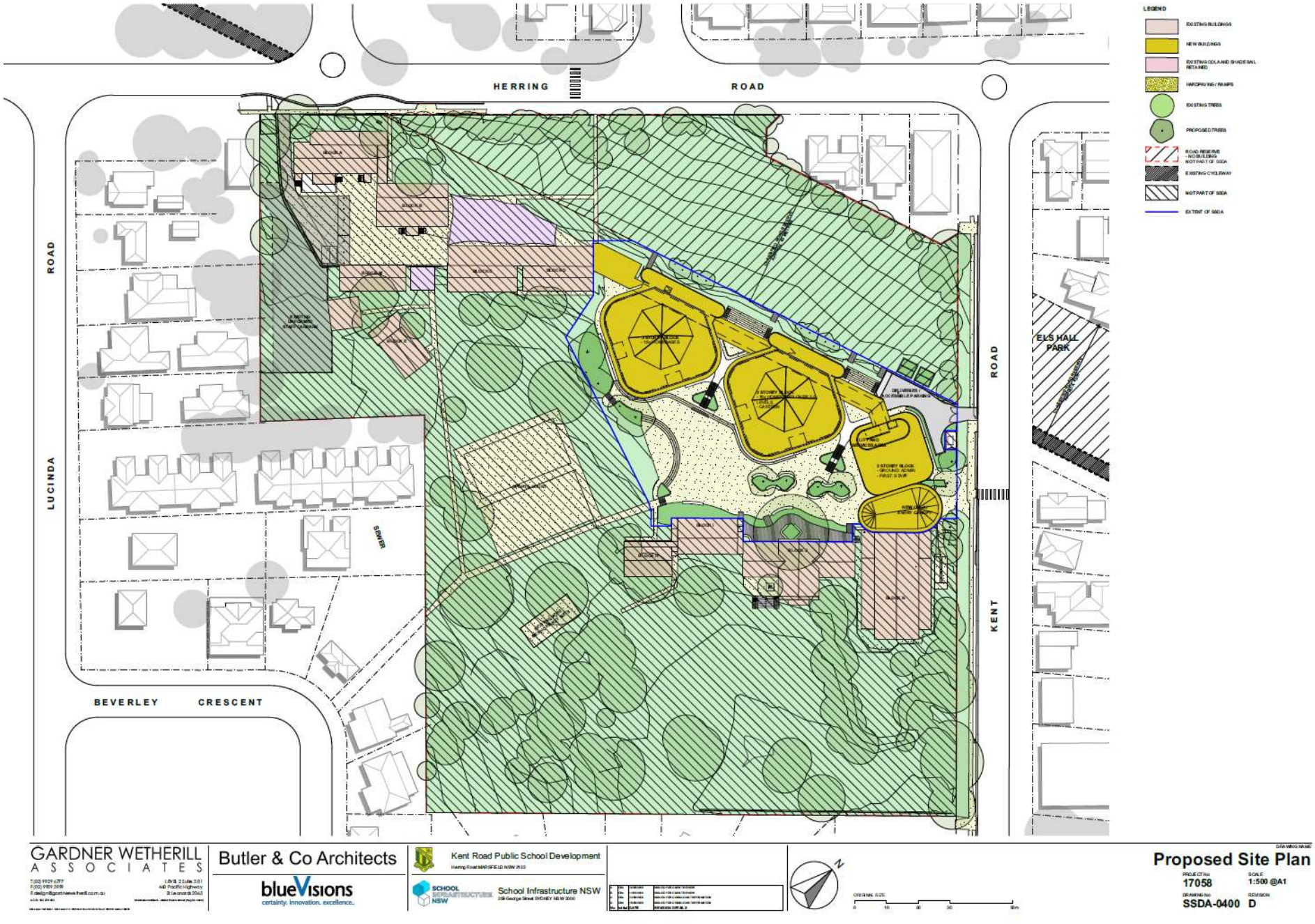
We recommend that the State Significant Development Application on this Site be approved, as detailed in the **Flood Risk Management Plan No.1738FLD** presented in **Appendix C**, with the outlined flood risk management measures implemented.

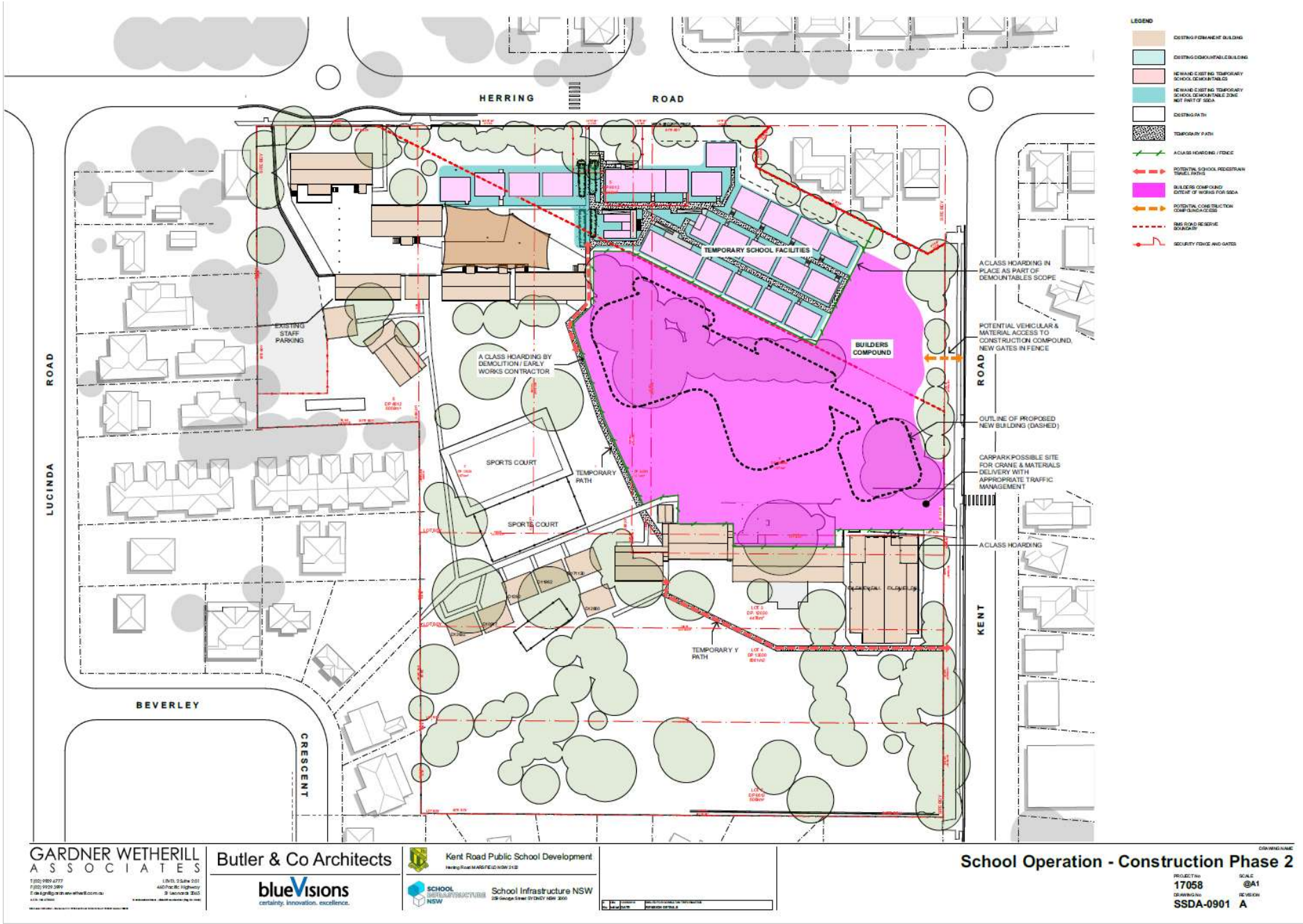
Whilst we cannot guarantee that Approving Authorities will accept our opinions, flood strategy or arguments, we will demonstrate to the best of our knowledge and experience the flood mitigation measures that can be implemented to limit the flood impacts on adjoining lands so that a proposed development can proceed.

Should you have any queries on the presented information or wish for any further clarification, please do not hesitate to call us.

Yours sincerely
Stefani Group Pty Ltd
David Stefani
0414 894 121


RMS Classified Road
Herring Rd lowpoint
Kent Rd
Kent Rd lowpoint
Herring Rd
School Site


HERRING
ROAD
LUCINDA
ROAD
KENT
ROAD
BEVERLEY
CRESCENT
ELS HALL
PARK
SEWER
LEGEND
EXISTING BUILDINGS
NEW BUILDINGS
EXISTING COLA AND SHADE SAIL RETAINED
HARDPAVING / RAMPS
EXISTING TREES
PROPOSED TREES
ROAD RESERVE - NO BUILDING NOT PART OF SSDA
EXISTING CYCLEWAY
NOT PART OF SSDA
EXTENT OF SSDA
GARDNER WETHERILL ASSOCIATES
Butler & Co Architects
blueVisions
certainty. innovation. excellence.
Kent Road Public School Development
School Infrastructure NSW
Proposed Site Plan
PROJECT No 17058
SCALE 1:500 @A1
DRAWING No SSDA-0400
REVISION D


HERRING ROAD
LUCINDA ROAD
BEVERLEY CRESCENT
KENT ROAD
TEMPORARY SCHOOL FACILITIES
BUILDERS COMPOUND
EXISTING STAFF PARKING
A CLASS HOARDING BY DEMOLITION / EARLY WORKS CONTRACTOR
SPORTS COURT
SPORTS COURT
TEMPORARY PATH
TEMPORARY Y PATH
A CLASS HOARDING IN PLACE AS PART OF DEMOUNTABLES SCOPE
POTENTIAL VEHICULAR & MATERIAL ACCESS TO CONSTRUCTION COMPOUND, NEW GATES IN FENCE
OUTLINE OF PROPOSED NEW BUILDING (DASHED)
CARPARK POSSIBLE SITE FOR CRANE & MATERIALS DELIVERY WITH APPROPRIATE TRAFFIC MANAGEMENT
A CLASS HOARDING
LEGEND
GARDNER WETHERILL ASSOCIATES
Butler & Co Architects
blueVisions
certainty. innovation. excellence.
Kent Road Public School Development
School Infrastructure NSW
School Operation - Construction Phase 2
17058
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SSDA-0901
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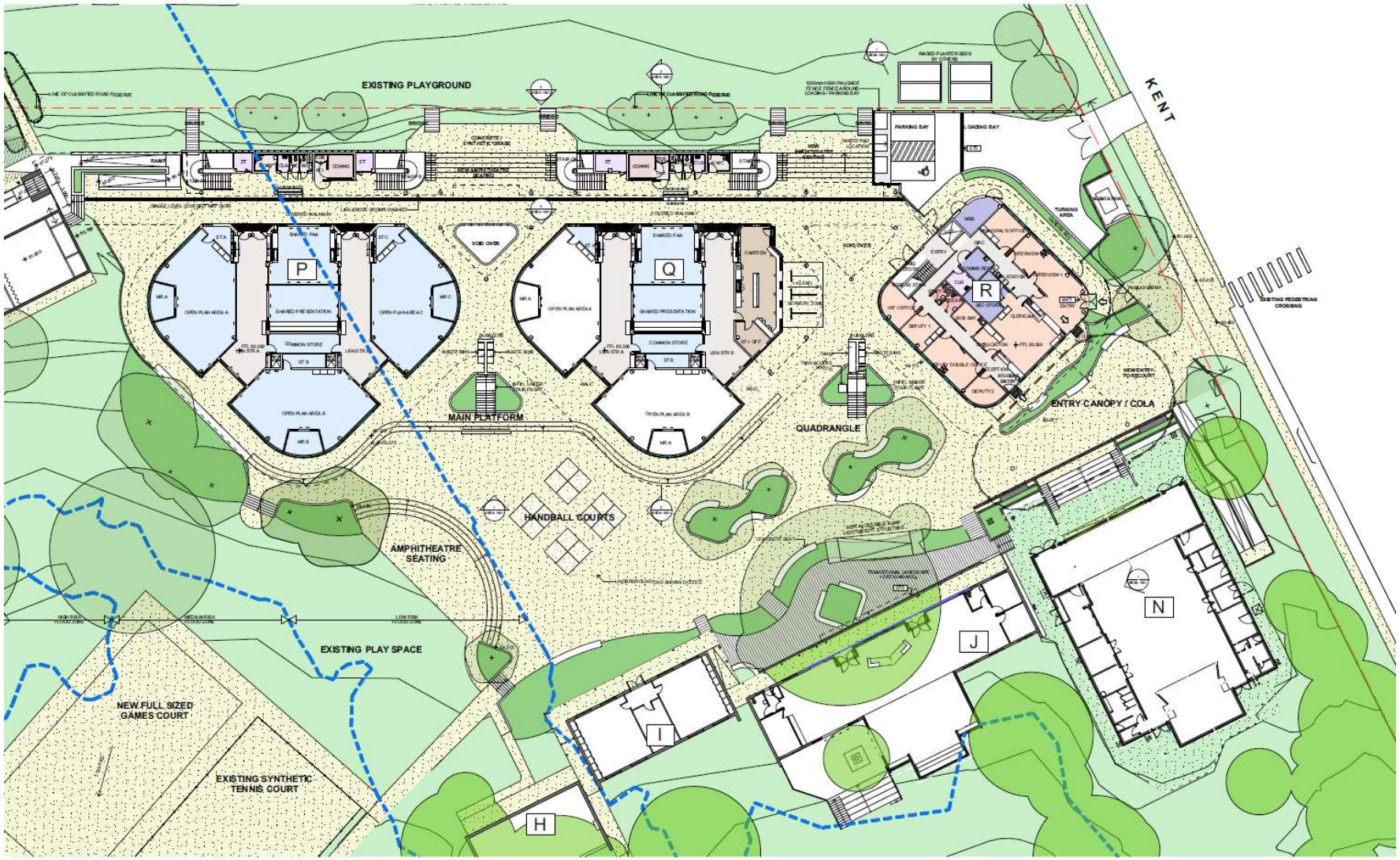


GARDNER WETHERILL ASSOCIATES

Butler & Co Architects

blueVisions certainty. innovation. excellence.

Kent Road Public School Development

School Infrastructure NSW

Ground Floor Plan

PROJECT No 17058

SCALE 1:200 @A1

DRAWING No SSDA-1200

REVISION B

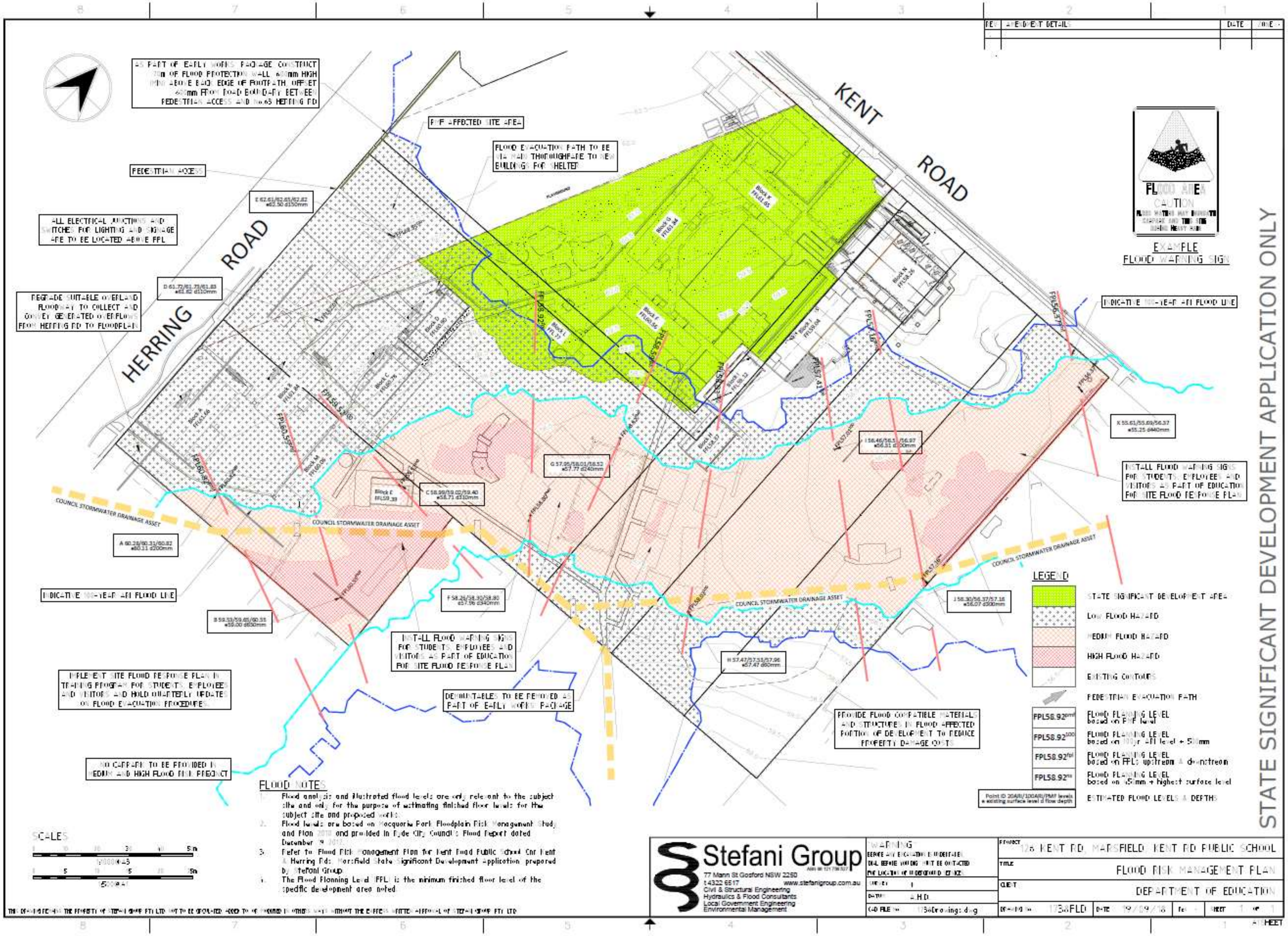

KENT ROAD
HERRING ROAD
PEDESTRIAN ACCESS
PMF AFFECTED SITE AREA
FLOOD EVACUATION PATH TO BE VIA MAIN THOROUGHFARE TO NEW BUILDINGS FOR SHELTER
ALL ELECTRICAL JUNCTIONS AND SWITCHES FOR LIGHTING AND SIGNAGE ARE TO BE LOCATED ABOVE FPL
REGRADE SUITABLE OVERLAND FLOODWAY TO COLLECT AND CONVEY GENERATED OVERFLOWS FROM HERRING RD TO FLOODPLAIN
INDICATIVE 100-YEAR ARI FLOOD LINE
COUNCIL STORMWATER DRAINAGE ASSET
INSTALL FLOOD WARNING SIGNS FOR STUDENTS, EMPLOYEES AND VISITORS AS PART OF EDUCATION FOR SITE FLOOD RESPONSE PLAN
IMPLEMENT SITE FLOOD RESPONSE PLAN IN TRAINING PROGRAM FOR STUDENTS, EMPLOYEES AND VISITORS AND HOLD QUARTERLY UPDATES ON FLOOD EVACUATION PROCEDURES
DEMOUNTABLES TO BE REMOVED AS PART OF EARLY WORKS PACKAGE
NO CARPARK TO BE PROVIDED IN MEDIUM AND HIGH FLOOD RISK PRECINCT
PROVIDE FLOOD COMPATIBLE MATERIALS AND STRUCTURES IN FLOOD AFFECTED PORTION OF DEVELOPMENT TO REDUCE PROPERTY DAMAGE COSTS
FLOOD AREA
CAUTION
EXAMPLE FLOOD WARNING SIGN
STATE SIGNIFICANT DEVELOPMENT APPLICATION ONLY
LEGEND
STATE SIGNIFICANT DEVELOPMENT AREA
LOW FLOOD HAZARD
MEDIUM FLOOD HAZARD
HIGH FLOOD HAZARD
EXISTING CONTOURS
PEDESTRIAN EVACUATION PATH
FLOOD PLANNING LEVEL
ESTIMATED FLOOD LEVELS & DEPTHS
FLOOD NOTES
SCALES
Stefani Group
77 Mann St Gosford NSW 2250
t 4322 6517
www.stefanigroup.com.au
Civil & Structural Engineering
Hydraulics & Flood Consultants
Local Government Engineering
Environmental Management
WARNING
PROJECT
TITLE
FLOOD RISK MANAGEMENT PLAN
CLIENT
DEPARTMENT OF EDUCATION
A.H.D

Plate 1 View Kent Rd over Low Point on Site

Plate 2 Southern view from Low Point over floodway

Plate 3 Western view to demountables in floodway

Plate 4 View north over floodway

Plate 5 Western view at demountables

Plate 6 Eastern view to demountables in floodway

Plate 7 Southern view of corner with No.13 Lucinda

Plate 8 View west at corner with No.13 Lucinda

Plate 9 View between buildings, Herring Rd beyond

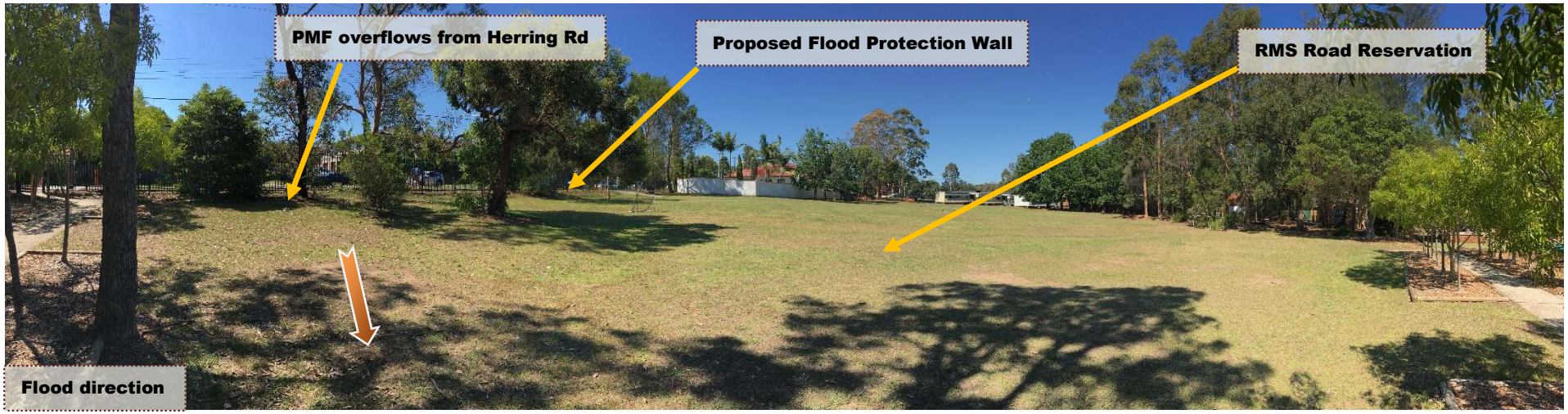


Plate 10 Panoramic northern view of RMS Road Reservation

City of Ryde

Lifestyle and opportunity @ your doorstep

Mr David Stefani
77 Meadow Road
SPRINGFIELD NSW 2250

19 December 2017 Our ref: D17/171626

Dear David,

RE: Request for Flood Information – 126 Kent Road, Marsfield

Reference is made to your application received on 15 December 2017 seeking flood level information pertaining to the above-mentioned address.

Please find attached flood level data sheet providing flood levels for the 20 year and 100 year ARI (Average Recurrence Interval) flood events as well as the PMF (Probable Maximum Flood) event.

The DRAINS model 100 ARI (Average Recurrence Interval) peak overland flow rate near the site is 17.7 m^3/s.

Please be advised that flood models only approximate flood behaviour. Care and expertise is required in the interpretation of these flood levels. In addition, this flood information does not take into account any local overland flow issues.

Any person or organisation who acts on the information provided does so at his / her / its own risk. To the extent permitted by law, the City of Ryde accepts no responsibility and excludes all liability whatsoever in respect of any use of or reliance upon this information.

Should you require any further information, please feel free to contact Stormwater and Catchments Section on (02) 9952 8222.

Yours sincerely,

Guna Veerasingham
Stormwater Coordinator

Civic Centre 1 Devlin Street, Ryde NSW
Ryde Planning and Business Centre
1 Pope Street, Ryde (Below Ryde Library)

Post Locked Bag 2069, North Ryde NSW 1670
Email cityofryde@ryde.nsw.gov.au
www.ryde.nsw.gov.au

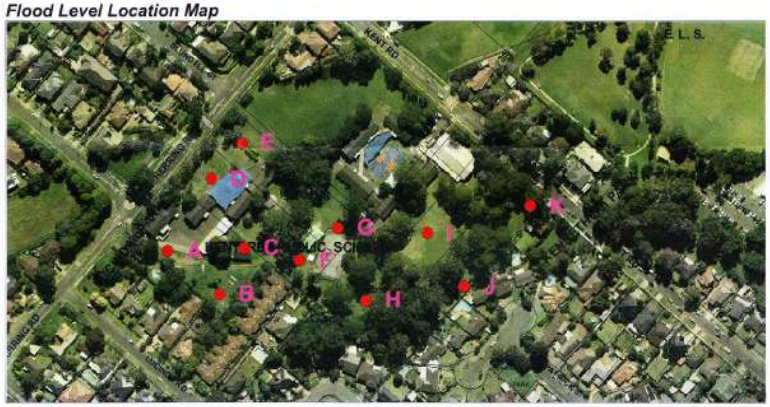
Customer Service (02) 9952 8222
TTY (02) 9952 8470 **Fax** (02) 9952 8070
Translating and Interpreting Service 131 450

City of Ryde

FLOOD INFORMATION REQUEST

Property Address: 126 Kent Road, Marsfield
Issue Date: 21 December 2017
Flood Study Reference: Macquarie Park Flood Study Report (April 2010)
Flood Model Reference: TUFLOW Model (July2010)

Flood Level Location Map



Flood Level Data Table

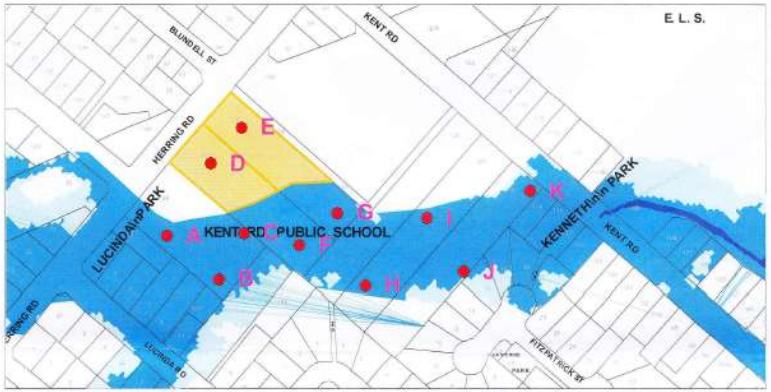
Location	20 Year ARI Flood (m AHD)	100 Year ARI Flood (m AHD)	Probable Maximum Flood (m AHD)
A	60.28	60.31	60.82
B	59.53	59.65	60.55
C	58.99	59.02	59.40
D	61.72	61.73	61.83
E	58.26	58.30	58.80
F	62.61	62.65	62.82
G	57.95	58.01	58.52
H	57.47	57.53	57.96
I	56.46	56.51	56.97
J	56.30	56.37	57.16
K	55.61	55.69	56.37

City of Ryde

Notes:

- All levels are based on Australian Height Datum (AHD).
- Flood levels are indicative only.
- The flood levels were derived using Areal Laser Survey (ALS) data which is considered as approximate.
- This flood level information is for existing site conditions only.
- For any new development proposal with different footprint, concept plans are required.
- The floor levels of the proposed habitable floor area should be set with a free board of 300 mm (Low Risk) and 500 mm (Medium Risk and High Risk) to the 100 year ARI flood level. A free board of 150 mm is applicable for non habitable floor areas. Refer City of Ryde Development Control Plan 2014.
- A site specific flood study / risk assessment may be required for any future development. Engage a suitably qualified engineer to assist you in this matter. Any study or assessment shall be in accordance with the NSW Government's Floodplain Development Manual 2005 and the City of Ryde Development Control Plan 2014.
- Site specific ground and building survey levels should be used to relate flood levels and to assess the impact of flooding.

Flood Risk: Low to Medium – The site is affected by overland flow path



DRAINS Model Peak Flow Rates for the 100 year ARI (Average Recurrence Interval)

City of Ryde