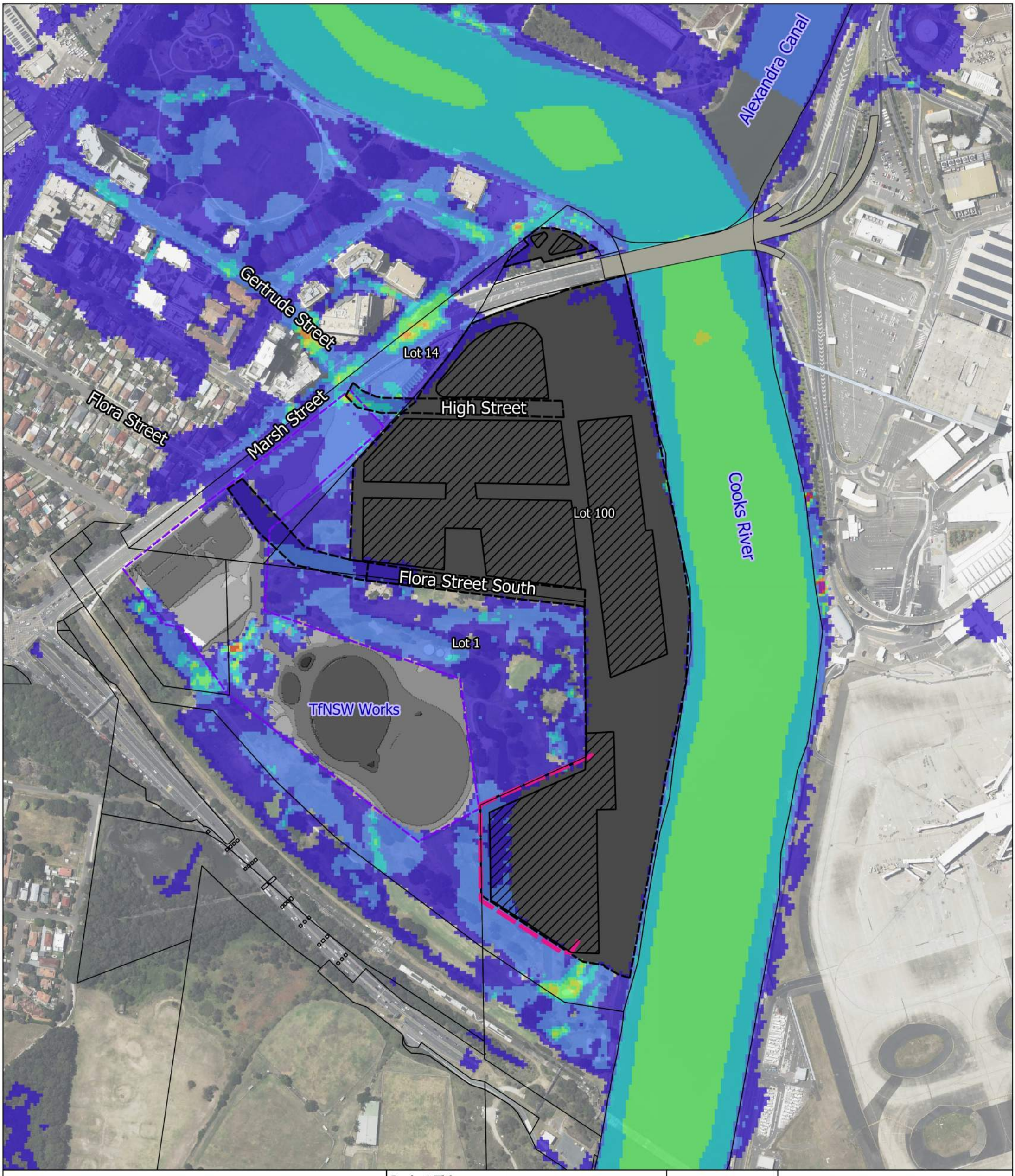

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Development Buildings
- Extent of Development Footprint
- Block 3C Fence
- Giovanni Brunetti Bridge

Peak Flood Velocity (m/s)

- <= 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- > 3.5

Project Title
Cooks Cove Planning Proposal

Drawing Title
28m Undercroft Design Option Peak Flood Velocity (0.05% AEP)

Job No	**Figure No**
252942	C.5.4
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	05/12/23	JO	GR	GR

N

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Sources: Google Maps, CNES/Airbus, Landsat/Copernicus, Maxar Technologies

Alexandra Canal
Gertrude Street
Lot 14
Flora Street
Marsh Street
High Street
Lot 100
Cooks River
Flora Street South
Lot 1
TfNSW Works

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Development Buildings
- Extent of Development Footprint
- Block 3C Fence
- Giovanni Brunetti Bridge

Peak Flood Velocity (m/s)

- <= 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- > 3.5

Project Title
Cooks Cove Planning Proposal

Drawing Title
28m Undercroft Design Option Peak Flood Velocity (PMF)

Job No	Figure No
252942	C.5.5

Coordinate System	Drawing Status
GDA 1994 MGA ZONE 56	DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	05/12/23	JO	GR	GR

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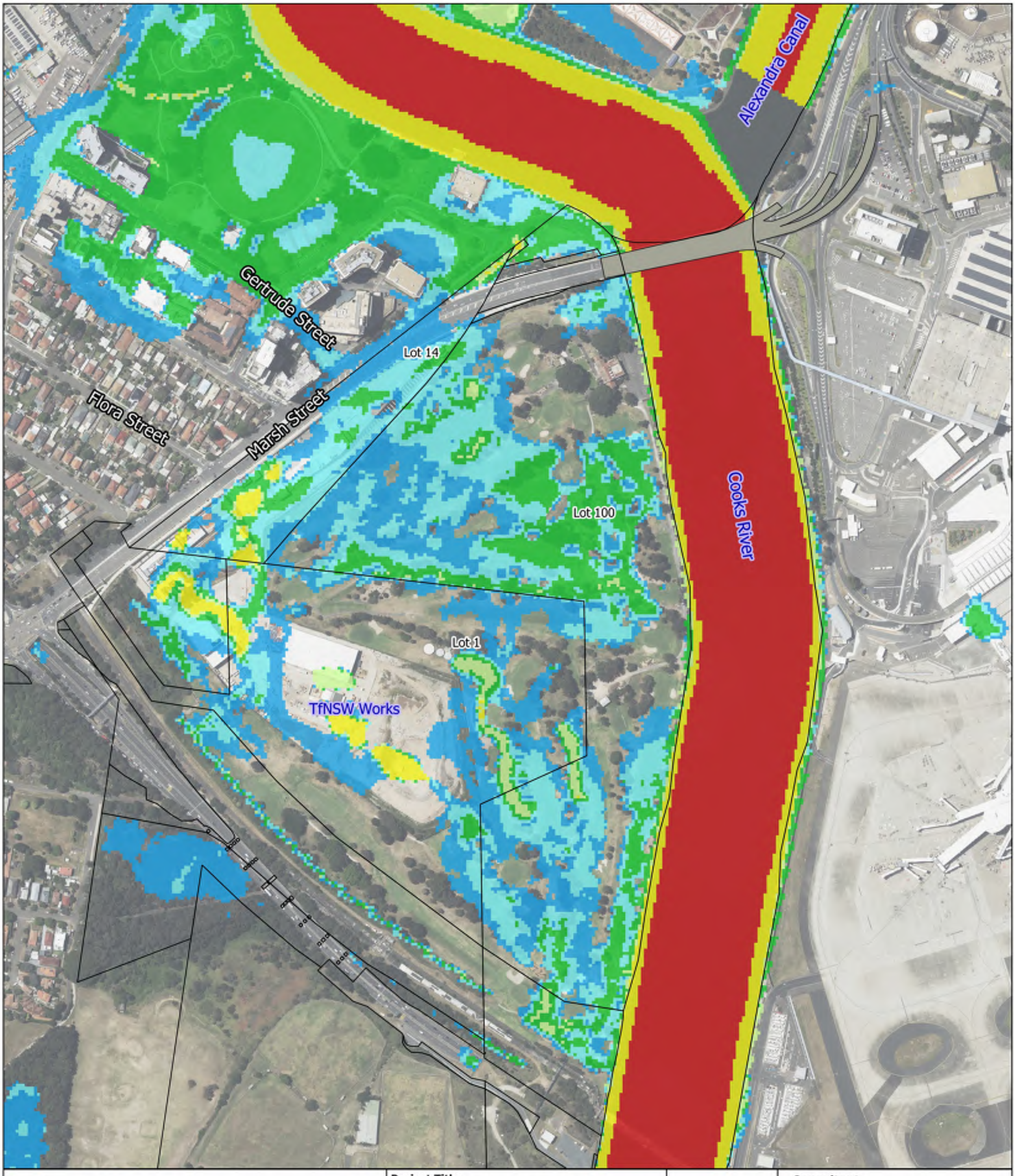
Appendix D: Flood Hazards over Three Time Periods



Legend

- Cadastre
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Pre-Base Case Peak Flood Hazard (1% AEP)

Job No	Figure No
252942	D1

Coordinate System	Drawing Status
GDA 1994 MGA ZONE 56	DRAFT

Scale
0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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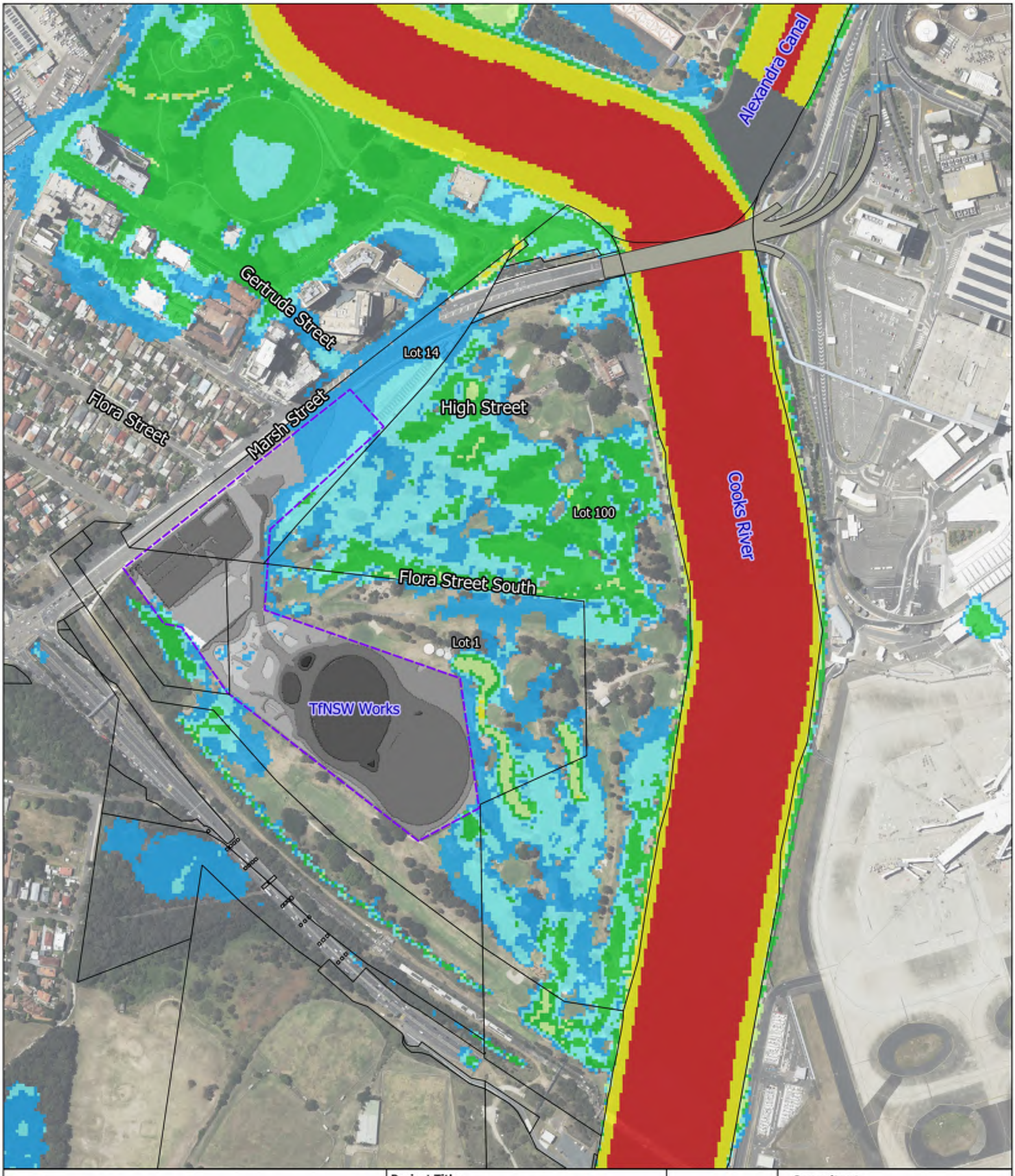
Sources: Google Maps, CNES/Airbus, Landsat/Copernicus, Maxar Technologies



Legend

- Cadastre
- M6/M8 Permanent Facilities
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Base Case Peak Flood Hazard (1% AEP)

Job No	Figure No
252942	D2
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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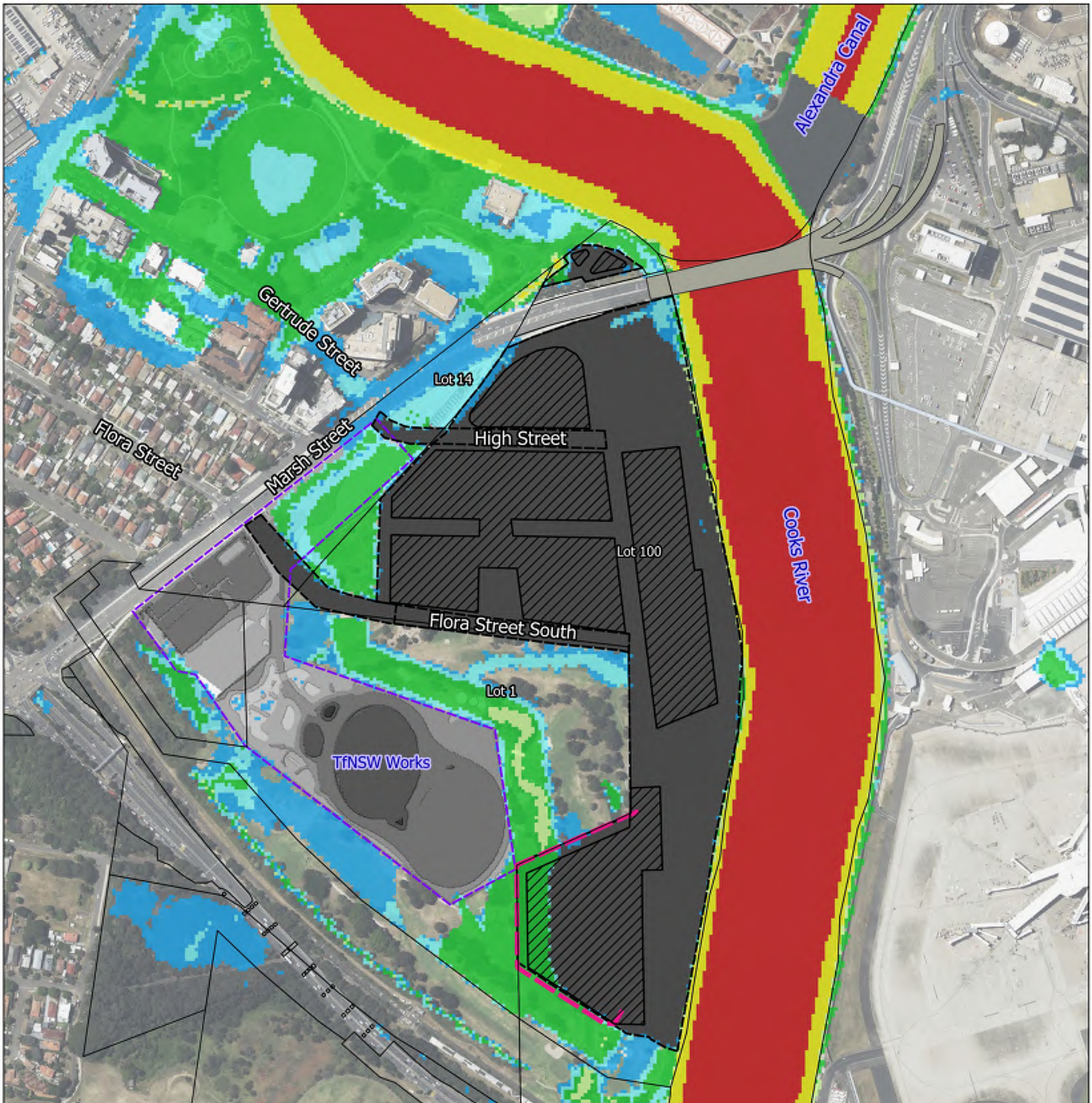

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Development Buildings
- Extent of Development Footprint
- Block 3C Fence
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Design Peak Flood Hazard (1% AEP)

Job No	Figure No
252942	D3
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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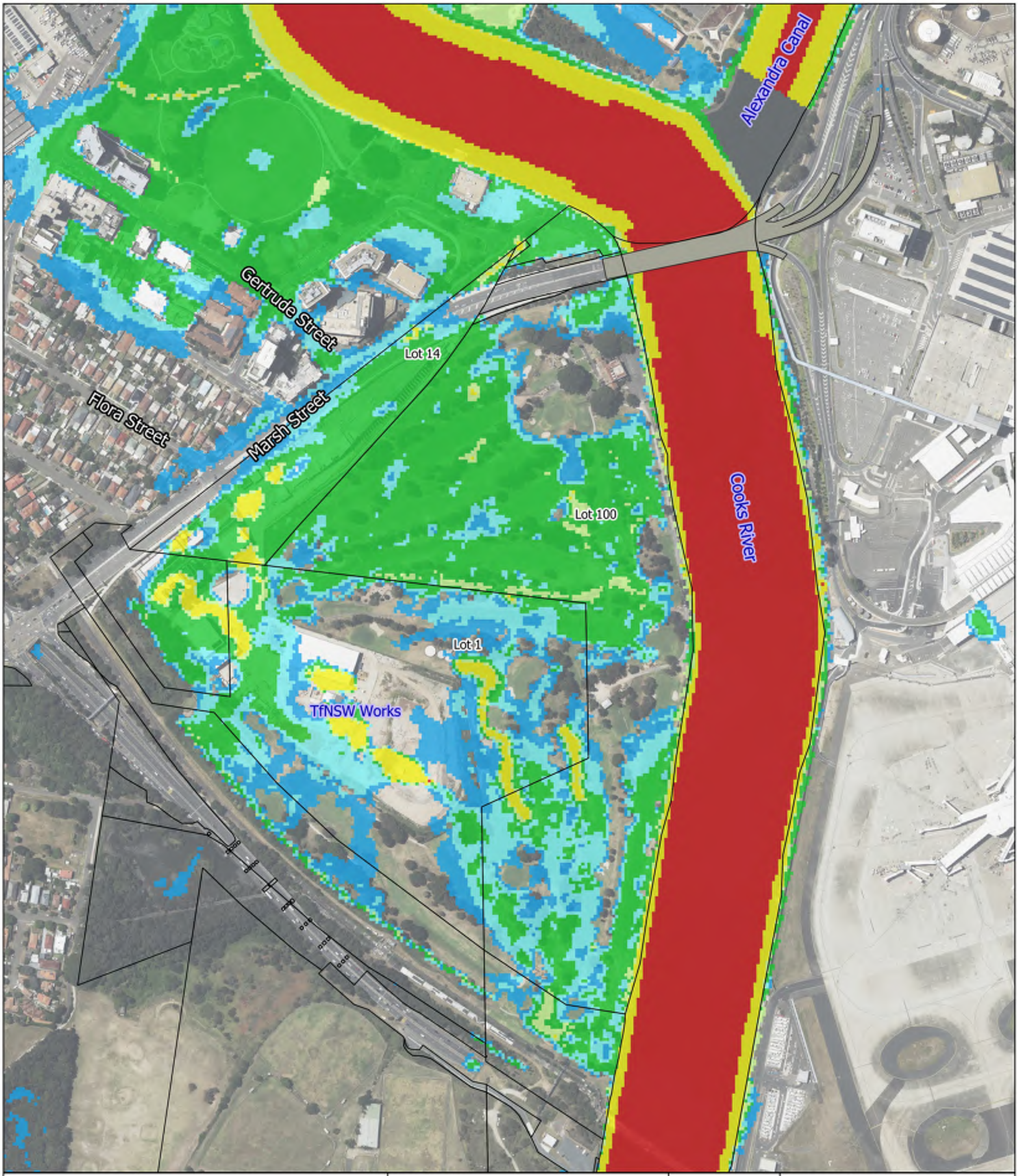
Sources: Google Maps, CNES/Airbus, Landsat/Copernicus, Maxar Technologies



Legend

- Cadastre
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Pre-Base Case Peak Flood Hazard (0.5% AEP)

Job No	Figure No
252942	D4
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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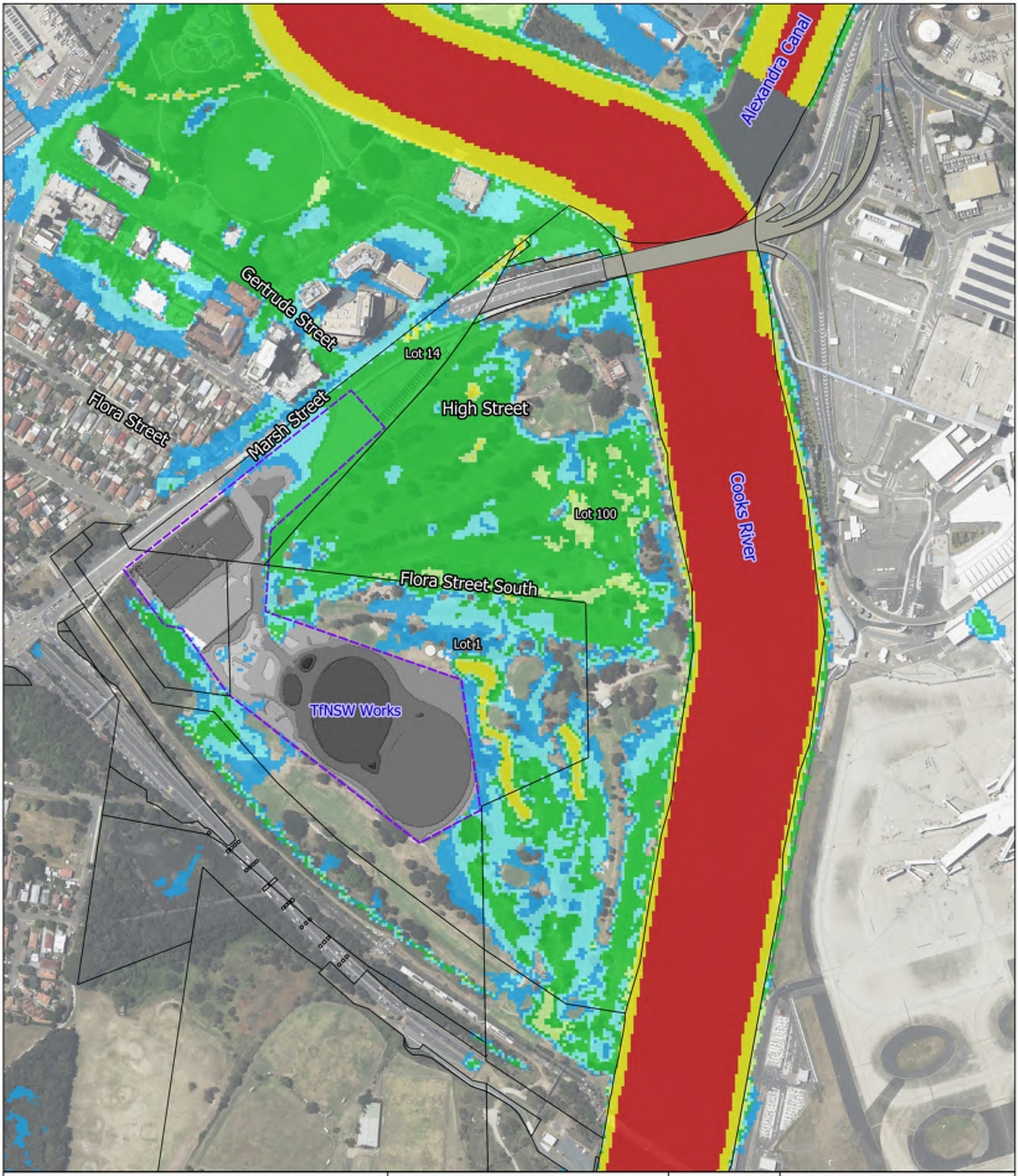

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Base Case Peak Flood Hazard (0.5% AEP)

Job No	Figure No
252942	D5
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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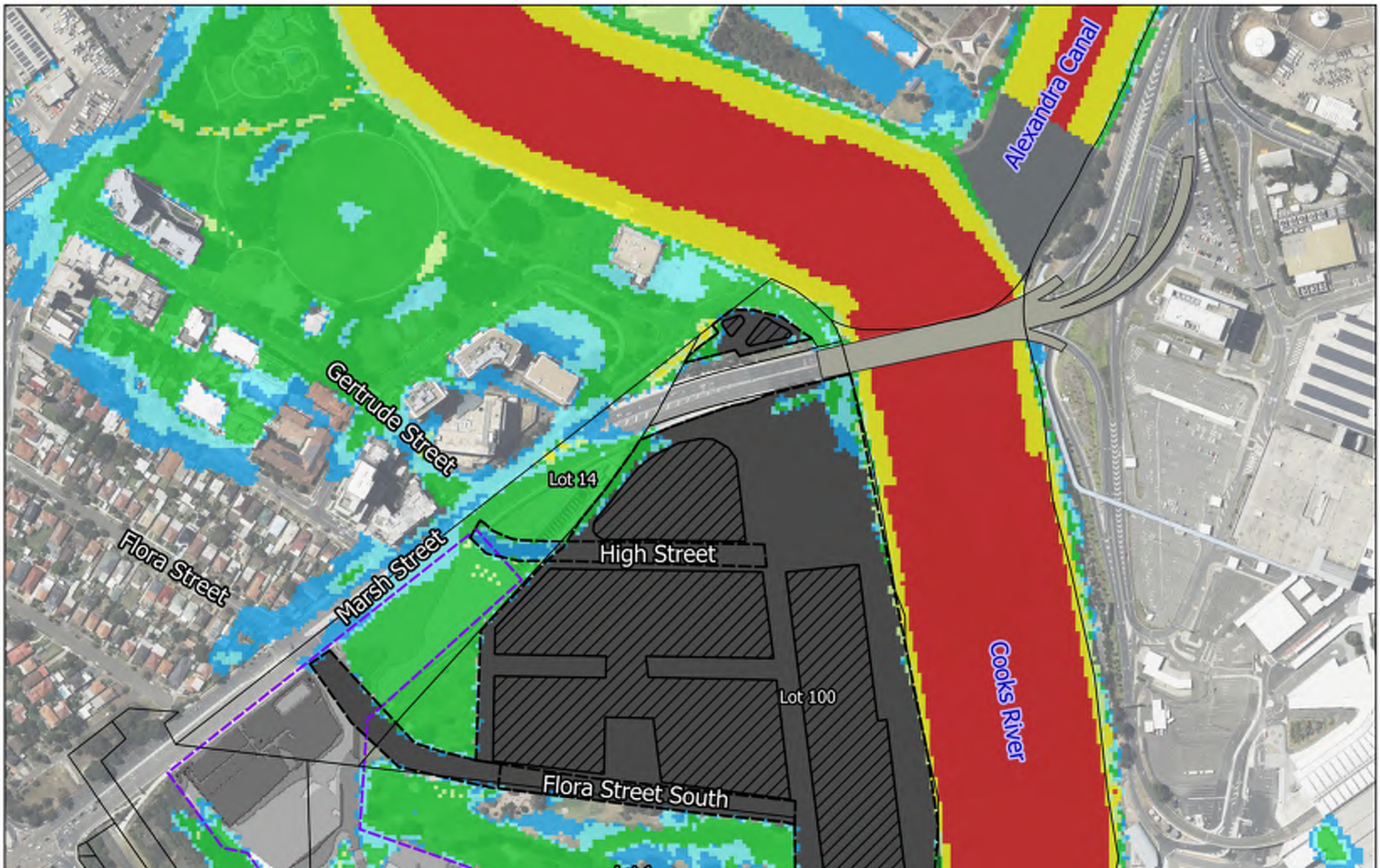

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Development Buildings
- Extent of Development Footprint
- Block 3C Fence
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Design Peak Flood Hazard (0.5% AEP)

Job No	Figure No
252942	D6
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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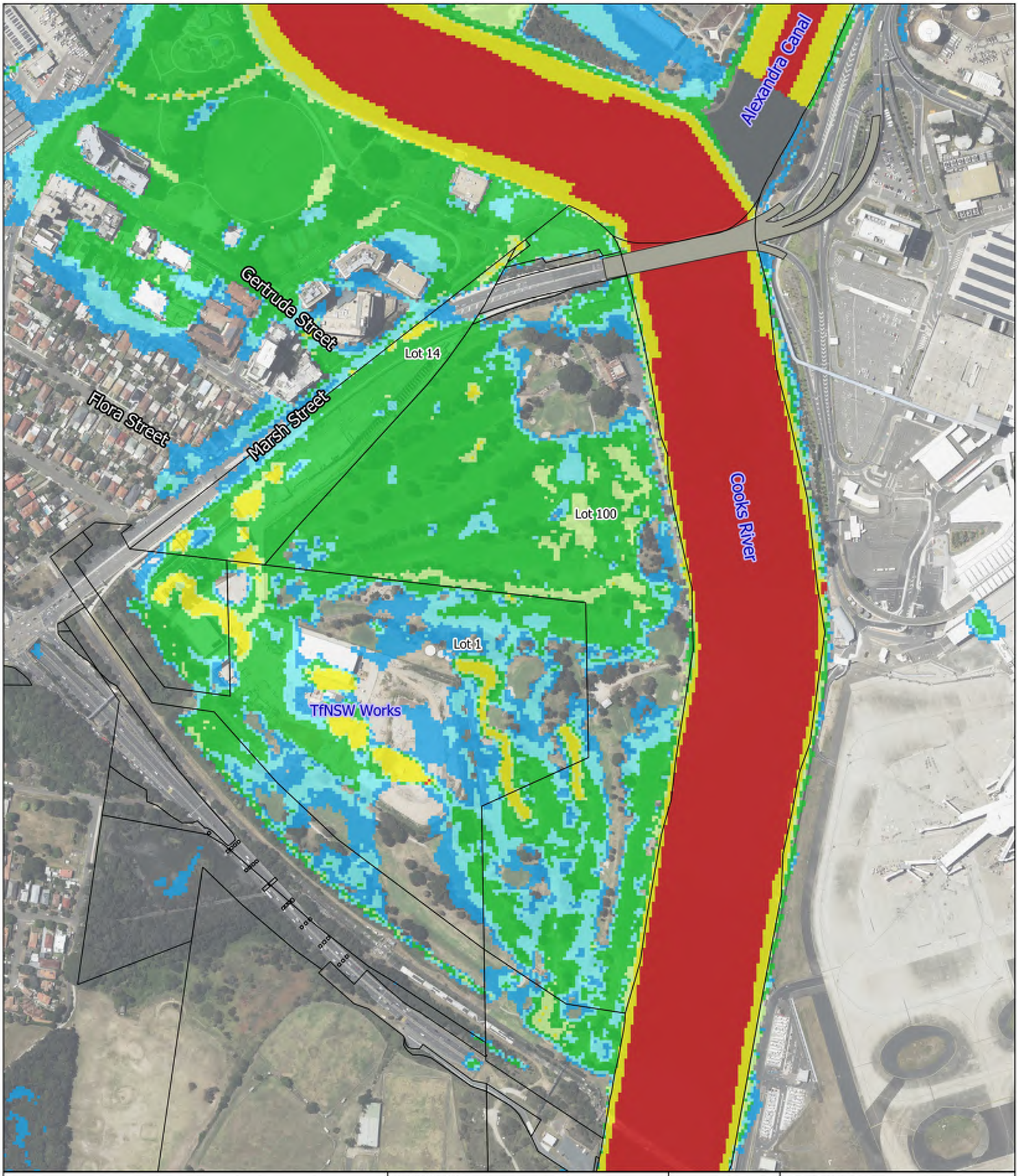
Sources: Google Maps, CNES/Airbus, Landsat/Copernicus, Maxar Technologies



Legend

- Cadastre
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Pre-Base Case Peak Flood Hazard (0.2% AEP)

Job No	Figure No
252942	D7
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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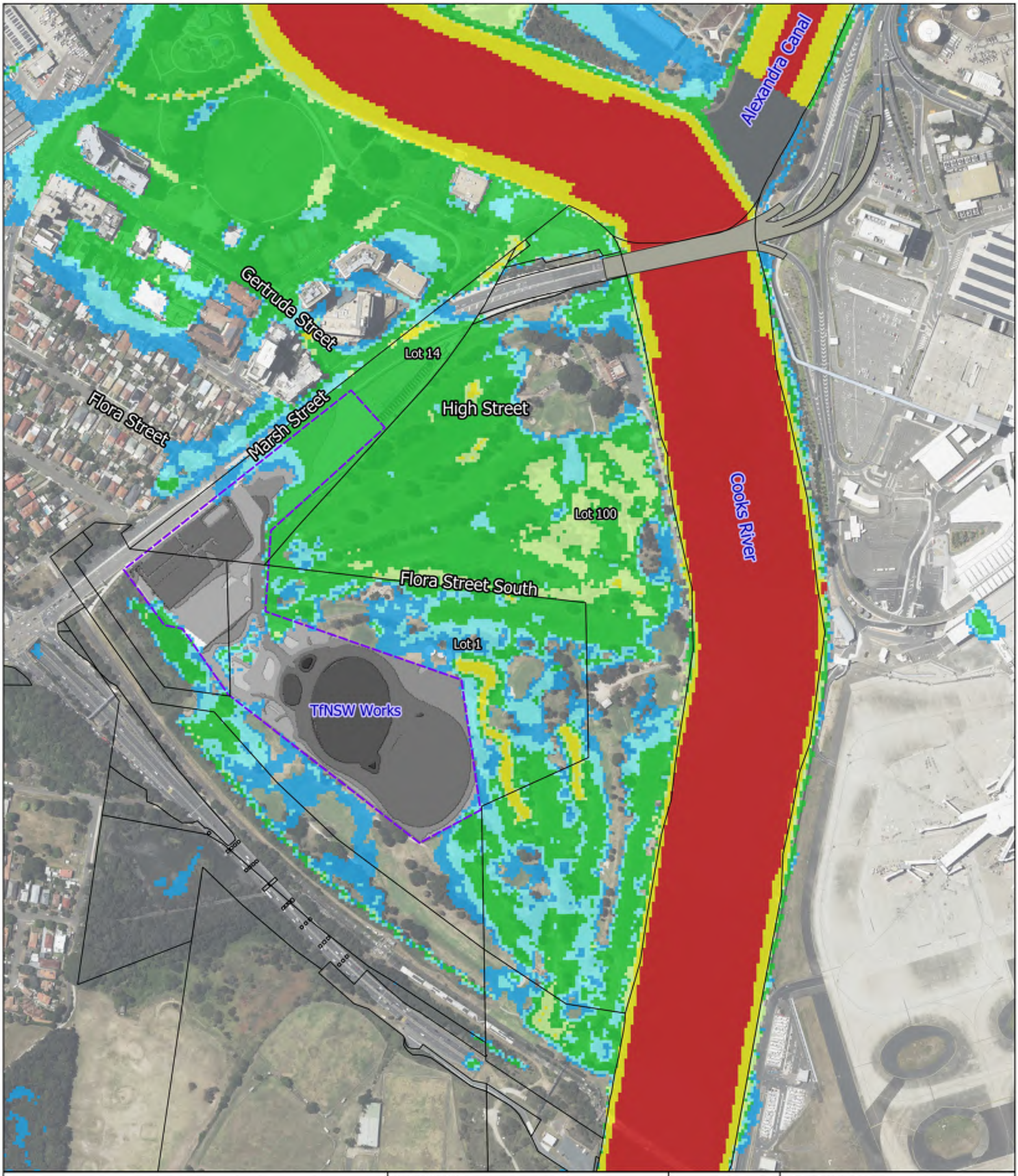

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Base Case Peak Flood Hazard (0.2% AEP)

Job No	Figure No
252942	D8
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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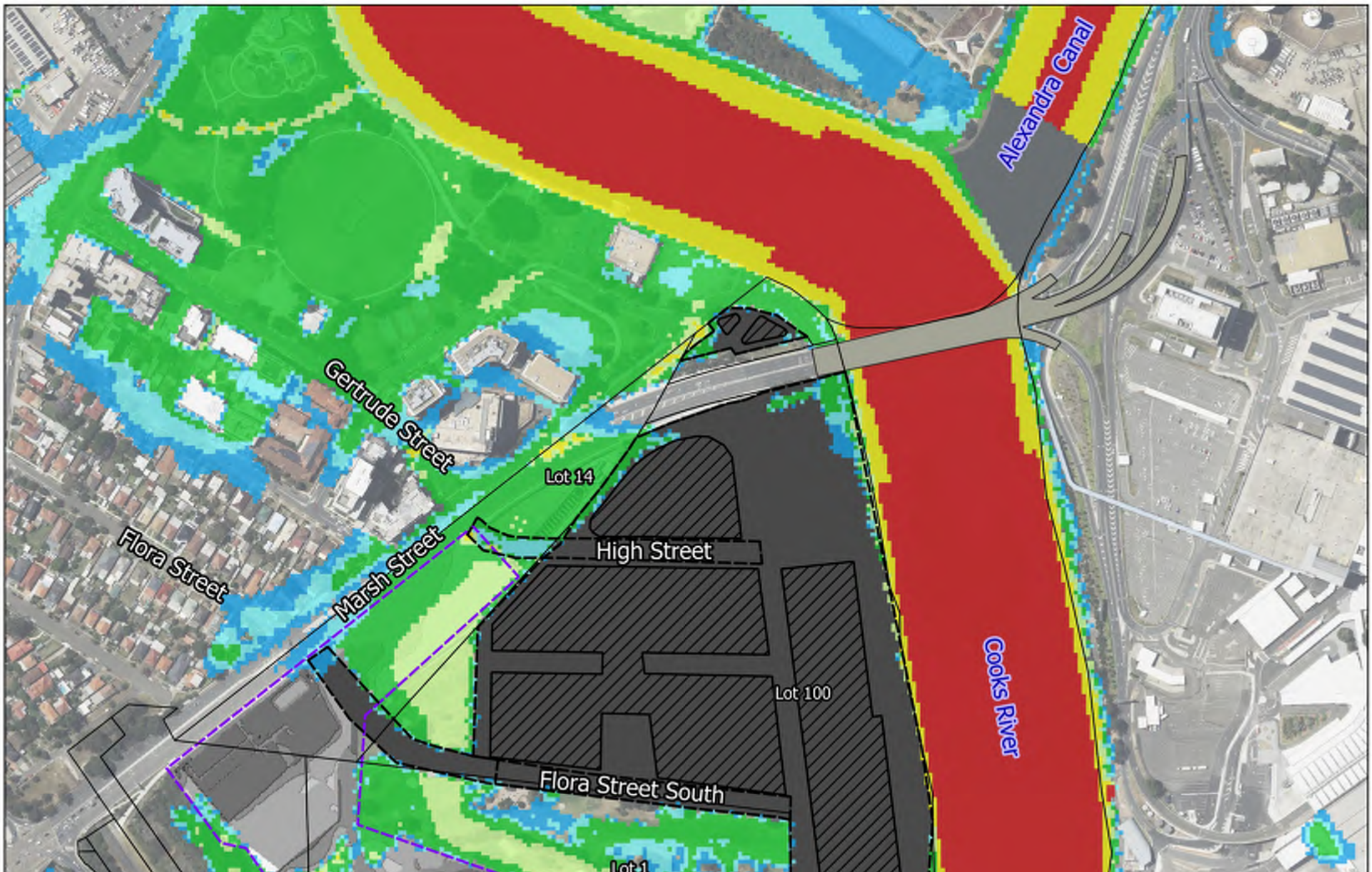

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Development Buildings
- Extent of Development Footprint
- Block 3C Fence
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Design Peak Flood Hazard (0.2% AEP)

Job No	Figure No
252942	D9
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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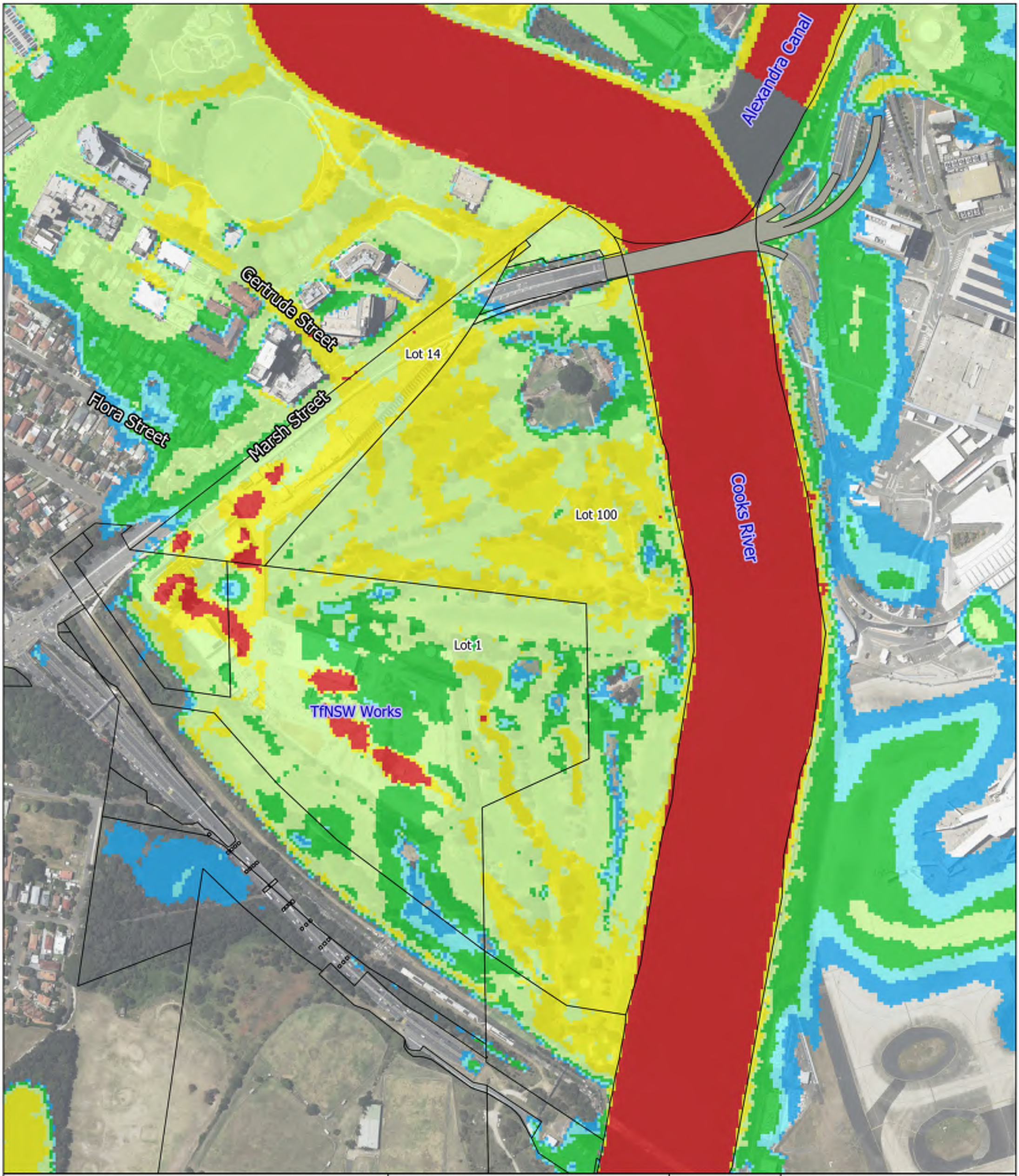

Legend

- Cadastre
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Pre-Base Case Peak Flood Hazard (PMF)

Job No	Figure No
252942	D10
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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Legend

- Cadastre
- M6/M8 Permanent Facilities
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Base Case Peak Flood Hazard (PMF)

Job No	Figure No
252942	D11
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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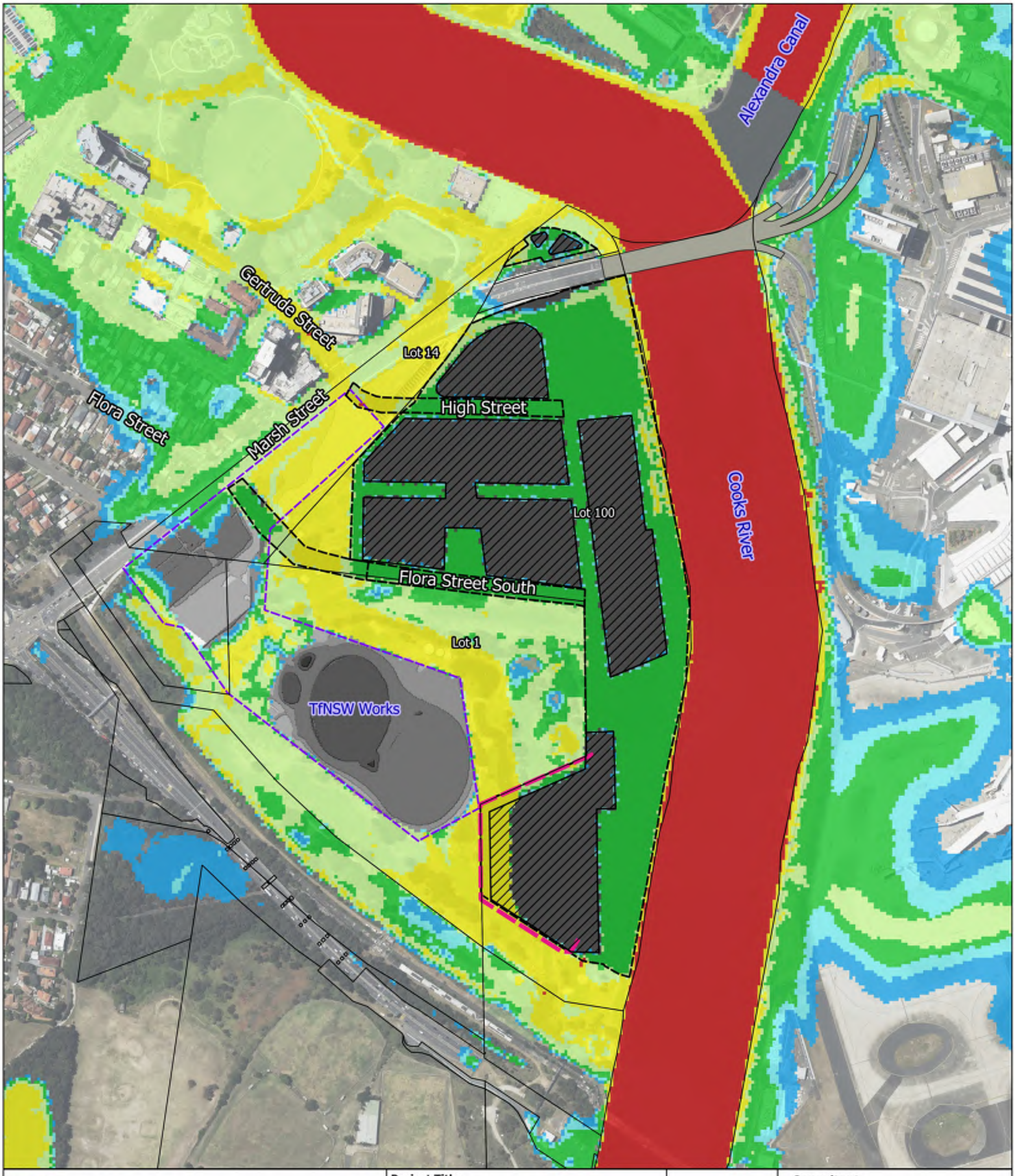

Legend

- Cadastre
- M6/M8 Permanent Facilities
- Development Buildings
- Extent of Development Footprint
- Block 3C Fence
- Giovanni Brunetti Bridge

Peak Flood Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Project Title
Cooks Cove Planning Proposal

Drawing Title
Design Peak Flood Hazard (PMF)

Job No	Figure No
252942	D12
Coordinate System GDA 1994 MGA ZONE 56	**Drawing Status** DRAFT

Scale 0 40 80 120 160 200 m

Issue	Date	By	Chkd	Appd
A	23/01/24	JO	GR	GR

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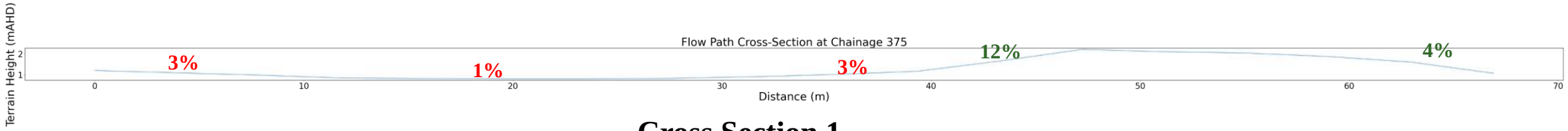
Sources: Google Maps, CNES/Airbus, Landsat/Copernicus, Maxar Technologies

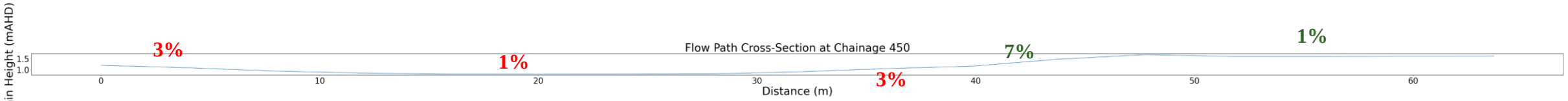
Appendix E: Cross Sections with Gradients Shown

Cross Sections / Contours of Open-space Landform

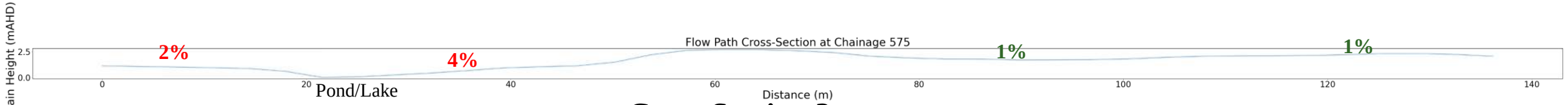
ARUP



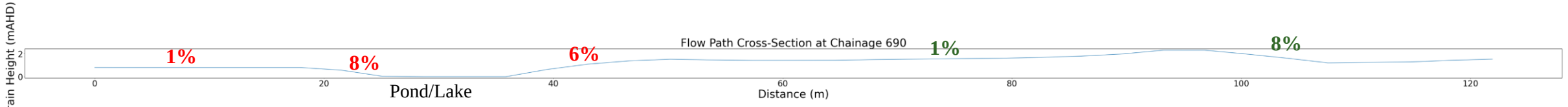
Cross Section 1



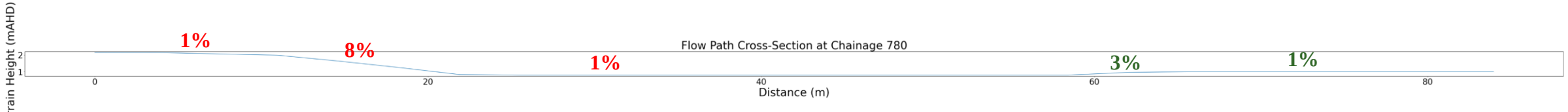
Cross Section 2



Cross Section 3



Cross Section 4



Cross Section 5

Appendix F: Model Data

Flood Animations

- Base case: 1% AEP and PMF
- Planning Proposal case: 1% AEP, 0.2% AEP and PMF

TUFLOW Model

- Base case = version 101L
- Planning Proposal case = version 206L

Appendix G: CV for FIRA Author

ARUP

Profession
Flood Risk Management Engineer

Current position
Flooding and Surface Water Leader for Arup Australasia Region

Joined Arup
2019

Years of experience
35+ years

Qualifications
Bachelor of Engineering (Civil Hons), University of Queensland, 1987

MBA (Technology Management), Deakin University, 1998

Professional associations
Member of the Institute of Engineers Australia (MIEAust) since 1994

Accreditations
Registered Professional Engineer of Queensland (RPEQ)

RIW Accreditation

ARTC Engineering Design & Project Management Accreditation for Civil Design

Greg Rogencamp

Over a career spanning more than 35 years, Greg has carried out numerous flood risk assessments in NSW, Queensland and internationally.

He has developed high-level flood strategies for large organisations as well as flood risk management studies for the Queensland and NSW governments.

His flood risk assessment work has also included flood assessments of levee schemes on major river systems such as the Brisbane River, Clarence River, Richmond River, Thames River, Condamine River and Lockyer Creek.

He was awarded the Harold Sternbeck medal for the best paper at the Floodplain Managers Association 2012 Conference.

NSW Flood Risk Management Experience

Ulmarra Floodplain Management Study, NSW.
Project manager / engineer for 2D/1D (TUFLOW) flood risk assessment of this town on the Clarnece River including defining existing flood behaviour as well as the consideration of levees and proposed road embankment impact.

Lawrence Floodplain Management Study, NSW.
Project manager / engineer for 2D/1D (TUFLOW) flood risk assessment in defining flood behaviour (depth, velocity and hazard) as well as the consideration of developments on the floodplain and changes to a sand island in the Clarence River.

Ballina Floodplain Management Study, NSW.
Project engineer for the floodplain experiences flooding from three primary sources of the Richmond River, ocean storm tides, and local runoff. The study developed a floodplain management plan in accordance with NSW floodplain management policy.

Paterson River Floodplain Management Study, NSW
Project manager for a flood study requiring hydraulic assessment of a range of structural floodplain management measures using a 1D hydraulic model (MIKE-11), extensive flood mapping and quantification of economic damages and benefits.

Manning River Floodplain Management Study, NSW
Project engineer for a study requiring hydraulic assessment of a range of structural floodplain management measures on the Manning River floodplain to reduce flood risks for the towns of Taree, Harrington and Wingham.

Grafton Levee Overtopping Study, NSW.
Project manager for a study using a multiple 2D domain model of the Grafton township to simulate the overtopping behaviour of the levee system. The study looked at overtopping location, rates of rise and drainage.

Maclean Levee Overtopping Study, NSW.
Project manager for a study using a multiple 2D domain model of the Maclean township to simulate the overtopping behaviour of the levee system.

NSW Flood Study Experience

Nambucca Heads Flood Study
Project manager for a NSW flood study for the mouth of the Nambucca River using a multi-domain TUFLOW model of the river and Warrell Creek. The study included assessments of river bed scour during flood events

Bankstown Urban Drainage Studies - Stage 2, NSW
Project manager for three urban catchments (Duck River, Salt Pan Creek and Little Salt Pan Creek) that were modelled using complex 2D / 1D TUFLOW flood models using the direct rainfall (i.e. rain on every cell) method.

Tweed / Byron Coastal Creeks Flood Study, NSW
Project manager for the development of a four (4) 2D/1D (TUFLOW) models of the Cudgen, Cudgera, Mooball and Marshalls Creeks for the purposes of defining flood behaviour (levels, depth, velocity and hazard). The models were calibrated to three historical flood events. Hydrological models of the catchments were also developed.

Williams River Flood Study, NSW
Project manager for the development of a 2D/1D (TUFLOW) model of the Williams River (80km) and the towns of Raymond Terrace, Seaham, Clarencetown and Dungog for the purposes of defining flood behaviour (levels, depth, velocity and hazard). The model was calibrated to three historical flood events. A hydrological model of the catchment was also developed and calibrated to three historical flood events. Extensive community consultation was carried out to identify historical flood levels that were then used in calibrating the 2D / 1D model.

Fairy Creek Flood Study, Wollongong, NSW
Project manager for a complex 2D / 1D (TUFLOW) flood model of a very steep catchment upstream of an urban area was developed. The 2D model covered the flatter urban areas with complex overland flowpaths. Within the 2D domain, a 1D elements represented open channels and pipe networks. A complex 1D model was dynamically linked to the 2D model to simulate upstream flooding behaviour.

Kyogle Flood Study, NSW
Project manager for a flood study aimed at quantifying the flooding behaviour of the Richmond River passing through the northern NSW town of Kyogle. The study used hydrological modelling (RAFTS-XP), and 2D hydraulic (TUFLOW) assessments as well as extensive flood mapping.

Cottage Creek Flood Study, Newcastle, NSW
Project manager for a flood study aimed at quantifying the flooding behaviour of Cottage Creek in the Newcastle suburbs of Merewether and Cooks Hill. The study used hydrological modelling (RAFTS-XP), 1D hydraulic (MIKE-11) and 2D hydraulic (TUFLOW) assessments as well as extensive flood mapping.

Lower Clarence River Flood Study Review, NSW.
Project manager for the development of a large 2D (TUFLOW) model of the Lower Clarence River floodplain (500km2) for the purposes of defining flood behaviour (levels, depth, velocity and hazard). The model was calibrated to six historical flood events and required a flood frequency analysis to define inflows.

Kingscliff Drainage Scheme, NSW
Project manager / engineer for the development of a drainage scheme using RAFTS-XP and EXTRAN-XP. The study developed a drainage strategy for the major drainage components of the flat area of the catchment to cope with expected development.

South Tweed Heads Drainage Scheme, NSW
Project engineer for a flooding and drainage assessment using RAFTS-XP and ESTRY. The drainage scheme was proposed to include a limited tidal exchange system and the flood impacts of this system and associated lakes required assessment.

NSW Flood Risk Assessments for Highways / Urban Developments

Flooding and hydraulics lead, Woolgoolga to Ballina Pacific Highway Upgrade, NSW
Lead for the flood discipline for the EIS and concept design of bridges and culverts for a 170 km section of the Pacific Highway across two major rivers (Richmond and Clarence Rivers) and 15 creeks ($4.5 billion project). Greg was heavily involved with the client throughout the community consultation presenting at over 10 public meetings and workshops with floodplain residents and cane farmer groups.

Wells Crossing to Iluka Road Pacific Highway Upgrade, NSW
Project manager for defining flood impacts and conceptual design of bridges and culverts for a 75km section of the Pacific Highway across the Clarence River floodplain ($2 billion project). The study used numerous 2D models (TUFLOW) of the entire Clarence River floodplain and a number of smaller creeks. The study considered the impacts of the numerous proposed routes on flood levels, times of inundation and definition of road levels.

Ulmarra Bypass Pacific Highway Upgrade, Clarence River, NSW
Project manager / engineer in this study. The project involved advice on flooding issues during route selection, sizing of appropriate waterways and definition of appropriate road heights.

Shark Creek Deviation, Clarence River, NSW
Project engineer for a flood impact assessment of a proposed new crossing of Shark Creek at its confluence with the Clarence River.

Yelgun to Chinderah Pacific Highway Upgrade, NSW
Project engineer and manager for defining the flood impacts using 1D / 2D modelling (TUFLOW) of waterways crossing the highway route. The proposed upgrade crossed the Tweed River, numerous coastal creeks and associated floodplains. The study considered the impacts of the proposal on flood levels, erosion and definition of road levels.

Tintenbar to Ewingsdale Pacific Highway Upgrade, NSW
Project director for defining flood impacts and conceptual design of bridges and culverts using a 2D model (TUFLOW) of the North Creek area north of Ballina. The study considered the impacts of the numerous proposed routes on flood levels, times of inundation and definition of road levels.

Ballina Bypass Pacific Highway Upgrade, NSW
Project director for defining flood impacts and conceptual design of bridges and culverts using a 2D model (TUFLOW) of the Richmond River and Ballina floodplain. The study considered the impacts of the numerous proposed routes on flood levels, times of inundation and definition of road levels. The assessment was complicated by the site being influenced by storm surge, local creek flooding and Richmond River flooding.

Coopernook Bypass Pacific Highway Upgrade, Manning River, NSW
Project manager / engineer in this study. The proposed bypass crossed the Landsdowne River floodplain

which forms an important backwater area for the Manning River system. The impact assessment involved sizing of waterway openings, redefinition of drainage routes and recommendations for mitigating other drainage impacts of the road.

Cundletown to Moorland Pacific Highway Upgrade, Manning River, NSW

Project manager / engineer in this study. The project involved advice on flooding issues during route selection and detailed EIS studies.

Moorland to Heron Creek Pacific Highway Upgrade, NSW

Project manager / engineer in this study. The project involved advice on flooding issues during route selection, sizing of appropriate waterways and definition of appropriate road heights.

Taree Traffic Relief Route, Manning River, NSW

Project engineer for various flood modelling tasks for a completely new crossing of the Manning River floodplain.

M7 Concept Design and Bridge Assessments

Project manager / engineer responsible for the development and calibration of a complex 2D / 1D model of Cabramatta Creek and its tributaries to assess the impacts of the Western Sydney Orbital project (renamed to M7). Also responsible for waterway / bridge sizing and impact analysis for tender design.

Searanch Development Cudgera Creek, NSW

Flooding investigation using 1D methods (ESTRY)**.** The residential development involved filling of the floodplain and the study was aimed at defining the impacts to flood levels and times of inundation.

QLD Flood Risk Management Experience

Lockyer Valley Flood Risk Management Study, Qld

Supervised development of hydraulic models and key outputs for the Lockyer Creek catchment. The multi-domain 2D flood model was calibrated to the 2011 flood event.

Bundaberg Floodway House Purchase Scheme - DILGP/DLGRMA

Project manager for a feasibility assessment of a house purchase scheme for over 120 houses in Bundaberg North. Study morphed into feasibility assessment of alternative measures including house flood resilience measures.

Bundaberg Flood Risk Management Study, DILGP, Qld

Project manager for an assessment of flood mitigation options for Bundaberg. This included complex community consultation with numerous parties. This was a highly political project requiring high levels of client communication. Greg also carried out assessments of the pre-feasibility of large dams in the Burnett River catchment to reduce flood risks.

Brisbane River Catchment Flood Risk Management Strategy, QRA/WBM, Qld

Project manager for the concept design of 12 structural flood mitigation measures including levees, dredging and dams. Project manager for the high-level cost estimation of these measures.

FloodSmart Futures Strategy, BCC

Project manager for the development of a high-level over-arching flood risk management strategy for Brisbane City Council (FloodSmart Futures). Intense project delivered in 4 weeks with a high level of client satisfaction. Greg was instrumental in project leadership, stakeholder workshops and technical direction.

Oxley Creek Transformation Master Plan, BCC

Greg was the flood risk lead on this challenging project to develop a master plan to transform the Oxley Creek corridor and floodplain. Working closely with Lat 27 and Council, Greg provided valuable inputs into

the identification of flood risks, constraints and opportunities for the project. This work was largely desktop, relying upon Greg's interpretation of existing flood mapping.

Condamine River Flood Risk Management Study - Southern Downs Regional Council

Supervised development of hydraulic models and key outputs for the upper Condamine River catchment which includes Warwick, Allora and Killarney. The complex multi-domain 2D flood model was calibrated to four flood events. Greg was heavily involved in the community consultation. Outputs included damage assessments, development of mitigation options and establishment of development control criteria.

Northern Coastal Catchments Flood Risk Management Study, BCC

Greg managed the delivery and technical direction of a flood risk management studies of a number of catchments in the northern coastal suburbs of Brisbane including Brighton Creek. Technical direction of various coastal and flood risk assessments, including flood damages, hazard, loss-of-life, flood evacuation and access, transportation networks, and critical infrastructure. Also included technical direction of the development of flood risk management opportunities and associated assessments using a multi-criteria assessment.

Southern Coastal Catchments Flood Risk Management Study, BCC

Greg managed the delivery and technical direction of a flood risk management studies of a number of catchments in the southern coastal suburbs of Brisbane including Lota Creek and Wynnum Creek. Technical direction of various coastal and flood risk assessments, including flood damages, hazard, loss-of-life, flood evacuation and access, transportation networks, and critical infrastructure. Also included technical direction of the development of flood risk management opportunities and associated assessments using a multi-criteria assessment.

Oxley Creek Flood Risk Management Study, BCC

Greg managed the delivery and technical direction of a flood risk management studies of the Oxley Creek catchment. Technical direction of various flood risk assessments, including flood damages, hazard, loss-of-life, flood evacuation and access, transportation networks, and critical infrastructure. Also included technical direction of the development of flood risk management opportunities and associated assessments using a multi-criteria assessment.

Breakfast Creek Flood Risk Management Study, BCC

Greg managed the delivery and technical direction of a flood risk management studies of the Breakfast Creek catchment, extending to the Enogerra Reservoir. Technical direction of various flood risk assessments, including flood damages, hazard, loss-of-life, flood evacuation and access, transportation networks, and critical infrastructure. Also included technical direction of the development of flood risk management opportunities and associated assessments using a multi-criteria assessment.

International Flood Risk Management Experience

2012 London Olympics Flood Assessment - London Olympics Authority,

Project technical director for development of a large 2D/1D (TUFLOW) model to assess options associated with the London Olympics 2012 site and numerous development scenarios.

Tongatapu Multihazard Assessment Tonga, Asian Development Bank

The study aims to develop a multi-hazard risk assessment for Tongatapu, including a range of risk sources, such as flooding, wind, economic, pandemic and so on. Greg was the Flooding Technical Director responsible for the technical direction on a day-to-day basis of the rainfall analysis, complex 2D flood modelling and integration with storm surge.

Flood Risk Assessments for Rohingya Camps in Bangladesh, International Office of Migration

Arup was commissioned to assess the natural hazard risks of 11 refugee camps near Cox's Bazar District, Bangladesh. Five of these camps (Camp 23 to Camp 27) required flood risk assessments to enable site

planners to make more informed decisions on how and where to develop. 2D flood models were developed for each site. The flood risk assessment considered hazards such as increased rainfall, river flows and storm surge associated with cyclonic storms. Greg was the Flooding Technical Director responsible for the technical direction on a day-to-day basis of the 2D flood modelling and integration with storm surge tailwater levels and mapping of storm surge and flood inundation.

Flood Capacity Assessment for Penang International Airport, Malaysia Airports Holdings Berhad

Arup was commissioned by MAHB to assess the capacity of urban drainage features (open channels, large culverts, tidal flood-gates) at Penang International Airport. The assessment fed into the concept design of an expansion of the airport which requires relocation of some open channels. A RAFTS-XP hydrological model was built to simulate runoff from the highly urbanised and steep catchment. A HEC-RAS hydraulic model was also built to simulate the complex flooding patterns inside the airport and in the adjoining urban areas. The models were used to assess options for the upgrade and determine associated impacts on surrounding flood-prone urban land. Greg was the Flooding Technical Director responsible for the technical direction on a day-to-day basis of the hydrological and hydraulic flood modelling.

Publications and Presentations

Rogencamp, G.J. 'Flood Risk Management Prioritisation Frameworks', 55th Annual Floodplain Management Authorities Conference, Brisbane, 2015.

Rogencamp, G.J., Rogers, L. 'A Floodsmart Future: Strategic Flood Risk Management in Brisbane', 53rd Annual Floodplain Management Authorities Conference, Tamworth, 2013.

Rogencamp, G.J., Barton, J 'The Lockyer Creek Flood of January 2011: What Happened and How Should We Manage Hazard for Rare Floods', 52nd Annual Floodplain Management Authorities Conference, Batemans Bay, 2012.

Rogencamp, G.J., Hill, P 'Implications of the Lockyer Valley Flood on Management of Flood Risk in Australia', 37th IEAust International Hydrology and Water Resources Symposium, Sydney, 2012.

Rogencamp, G.J., Davidge, E, 'Rehabilitating Floodplains by Rehabilitating Flood Models', 51st Annual Floodplain Management Authorities Conference, Batemans Bay, 2011.

Rogencamp, G.J. 'Application of 2D / 1D Hydraulic Models for Urban Catchments', 28th IEAust International Hydrology and Water Resources Symposium, Wollongong, 2003.

Benham S.A. and Rogencamp, G.J. 'Application of 2D Flood Models with 1D Drainage Elements', 43rd Annual Floodplain Management Authorities Conference, Forbes, 2003.

Rogencamp, G.J., Chin, T, Dinham I. 'Applications of Two-Dimensional Modelling in Floodplain Management', 42nd Annual Floodplain Management Authorities Conference, Kempsey, 2002.

Rogencamp, G.J., Syme, W.J., Lienster S.C., Hamilton, E.K. 'Community Surveys: An Essential Part of Flood Studies', 39th Annual Floodplain Management Authorities Conference, Tamworth, 1999.

Rogencamp, G.J., McAlister, A.B. 'Coastal Lagoon Catchment Land Use Planning: A Multi-Disciplined GIS Framework for Decision Making", 9th Annual Coastal Conference, Foster, 1999.