Meander Valley Council
Working Together

PLANNING NOTICE

An application has been received for a Permit under s.57 of the Land Use Planning Approvals Act 1993:

APP NO.:	**PA\26\0162**
APPLICANT:	**TasWater**
SITE:	**6 & 8 Racecourse Drive, Deloraine (CTs: 165648/1 & 165343/1)**
PROPOSAL:	**Utilities – Sewage Treatment Plant (temporary geobag laydown area for the capture & dewatering of sludge) – discretionary use, attenuated activity, flood-prone area.**

The application can be inspected until **Tuesday, 17 March 2026**, at www.meander.tas.gov.au or at the Council Office, 26 Lyall Street, Westbury (during normal office hours).

Written representations may be made during this time addressed to the General Manager, PO Box 102, Westbury 7303, or by email to planning@mvc.tas.gov.au. Please include a contact phone number. Please note any representations lodged will be available for public viewing.

If you have any questions about this application please do not hesitate to contact Council's Planning Department on 6393 5320.

Notified on 28 February 2026.

Jonathan Harmey
GENERAL MANAGER

APPLICATION FORM

Meander Valley Council
Working Together

PLANNING PERMIT

Land Use Planning and Approvals Act 1993

- Application form & details MUST be completed **IN FULL**.
- Incomplete forms will not be accepted and may delay processing and issue of any Permits.

OFFICE USE ONLY

Property No: 1 5 8 7 3 **Assessment No:** 7 6 - 3 3 0 0 - 0 0 0 5

DA 2610264 **PA** 2610162 **PC**

- Is your application the result of an illegal building work? ☐ Yes ☑ No — Indicate by ✓ box
- Have you already received a Planning Review for this proposal? ☑ Yes ☐ No
- Is a new vehicle access or crossover required? ☐ Yes ☑ No

PROPERTY DETAILS:

Address:	6 Racecourse Dr
Certificate of Title:	PID 3233141
Suburb:	Deloraine 7304
Lot No:	
Land area:	20ha *m² / ha*
Present use of land/building:	Vacant cown land - Meander Valley Council *(vacant, residential, rural, industrial, commercial or forestry)*

- Does the application involve Crown Land or Private access via a Crown Access Licence: ☑ Yes ☐ No
- Heritage Listed Property: ☑ Yes ☐ No

DETAILS OF USE OR DEVELOPMENT:

Indicate by ✓ box ☐ Building work ☐ Change of use ☐ Subdivision ☐ Demolition ☐ Forestry ☑ Other

Total cost of development *(inclusive of GST)*:	$ NA *Includes total cost of building work, landscaping, road works and infrastructure*
Description of work:	Temporary Geobag laydown area for the capture and dewatering of sludge extracted Deloraine STP polishing lagoons
Use of building:	NA (main use of proposed building – dwelling, garage, farm building, factory, office, shop)
New floor area:	NA m²
New building height:	NA m
Materials: External walls:	NA
Colour:	
Roof cladding:	NA
Colour:	

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
165648	1
EDITION	DATE OF ISSUE
1	29-Apr-2013

SEARCH DATE : 26-Feb-2026
SEARCH TIME : 04.52 pm

DESCRIPTION OF LAND

Parish of CALSTOCK Land District of WESTMORLAND
Lot 1 on Plan 165648
Being the land described in Conveyance No.10/8969
Excepting thereout Lot 8 P25123 1858m2, Lot 9 P25123 9012m2, Lot 1 D29073 573m2, Lot 1 D30615, 313m2, Lots 1 & 2 P165343 6.374ha
Derivation : Part of Lot 277, 510 Acres Gtd. to Pearson Foote
Derived from A24548
Prior CT 132548/1

SCHEDULE 1

MEANDER VALLEY COUNCIL

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

D4502 BURDENING EASEMENT: A Pump Station Easement (appurtenant to Lot 1 on P165343) over the Pump Station Easement shown on P165648

D4502 BURDENING EASEMENT: Right of Carriageway (appurtenant to Lots 1 & 2 on P165343) over the Right of Way 6.00 wide shown on P165648

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

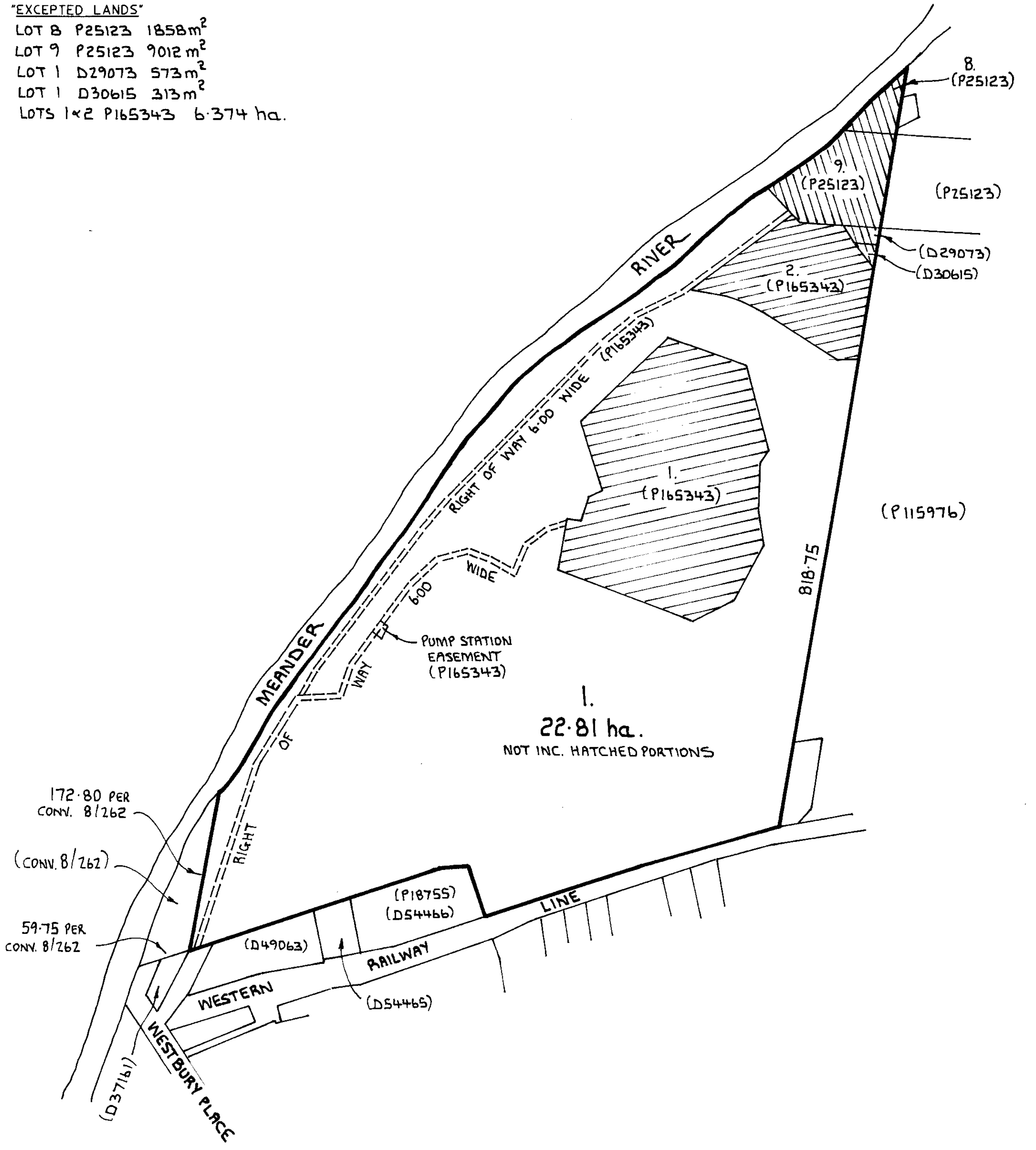
PLAN OF TITLE

OWNER FOLIO REFERENCE F/R 132548-1 GRANTEE PART OF LOT 277 510 ACRES GTD. TO PEARSON FOOTE	LOCATION WESTMORLAND CALSTOCK CONVERTED BY PLAN No P132548 COMPILED BY L.T.O. NOT TO SCALE LENGTHS IN METRES	Registered Number P 165648 APPROVED 22 MAR 2013 Alice Kawa Recorder of Titles

MAPSHEET MUNICIPAL CODE No. 121 (4640-44)	LAST UPI No GWD14	LAST PLAN No P132548	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN

SKETCH BY WAY OF ILLUSTRATION ONLY **BALANCE PLAN**

"EXCEPTED LANDS"
LOT 8 P25123 1858m²
LOT 9 P25123 9012 m²
LOT 1 D29073 573m²
LOT 1 D30615 313m²
LOTS 1&2 P165343 6·374 ha.



A-142

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
165343	1
EDITION	DATE OF ISSUE
2	16-Oct-2015

SEARCH DATE : 26-Feb-2026
SEARCH TIME : 04.33 pm

DESCRIPTION OF LAND

Parish of CALSTOCK Land District of WESTMORLAND
Lot 1 on Plan 165343
Derivation : Part of Lot 277, 510 Acres Gtd. to Pearson Foote
Prior CT 132548/1

SCHEDULE 1

E10434 TASMANIAN WATER & SEWERAGE CORPORATION PTY LTD
Registered 16-Oct-2015 at noon

SCHEDULE 2

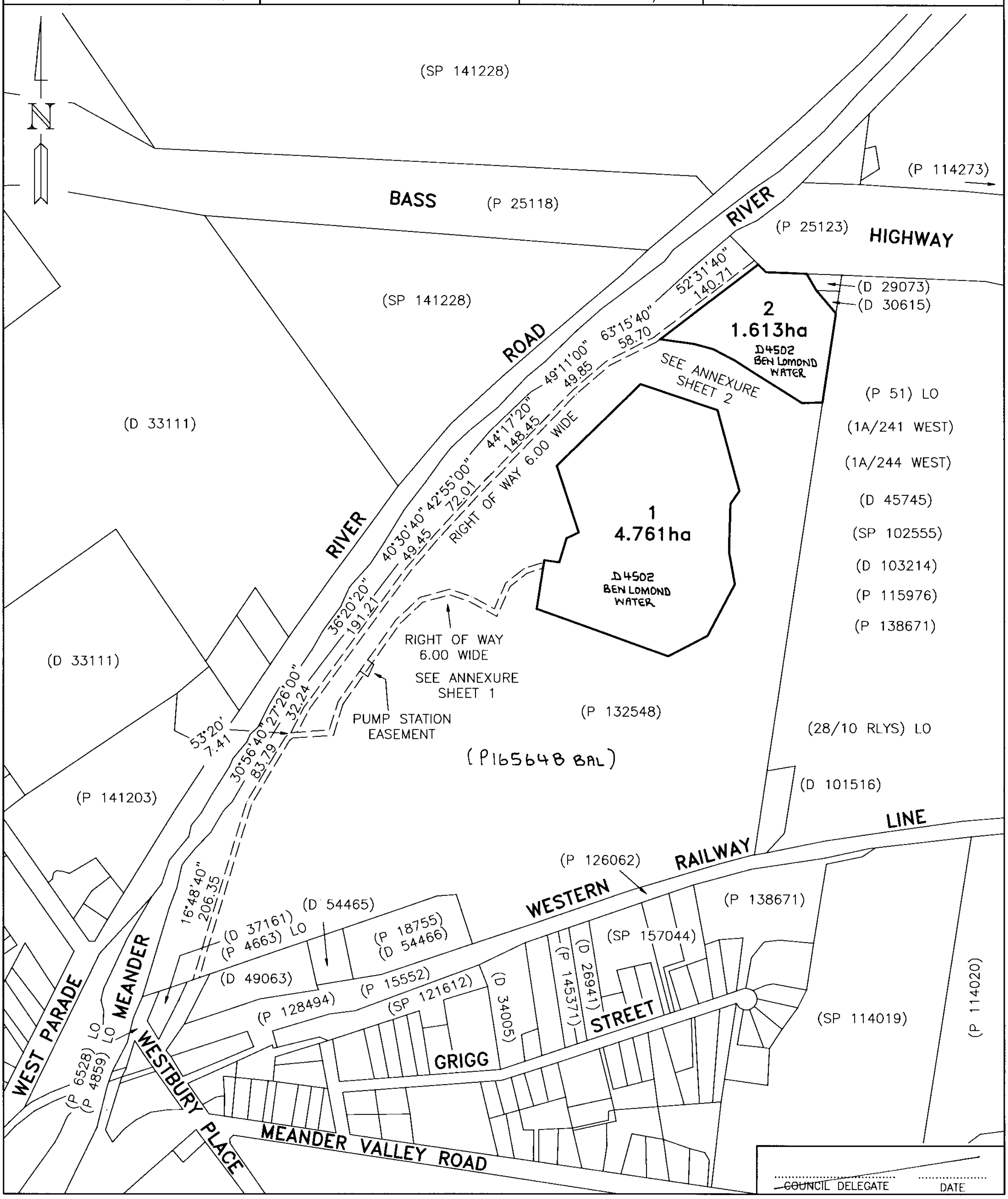
Reservations and conditions in the Crown Grant if any
D4502 BENEFITING EASEMENT: A Pump Station Easement over the Pump Station Easement shown on P165343
D4502 BENEFITING EASEMENT: Right of Carriageway over the Right of Way 6.00 wide shown on P165343

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

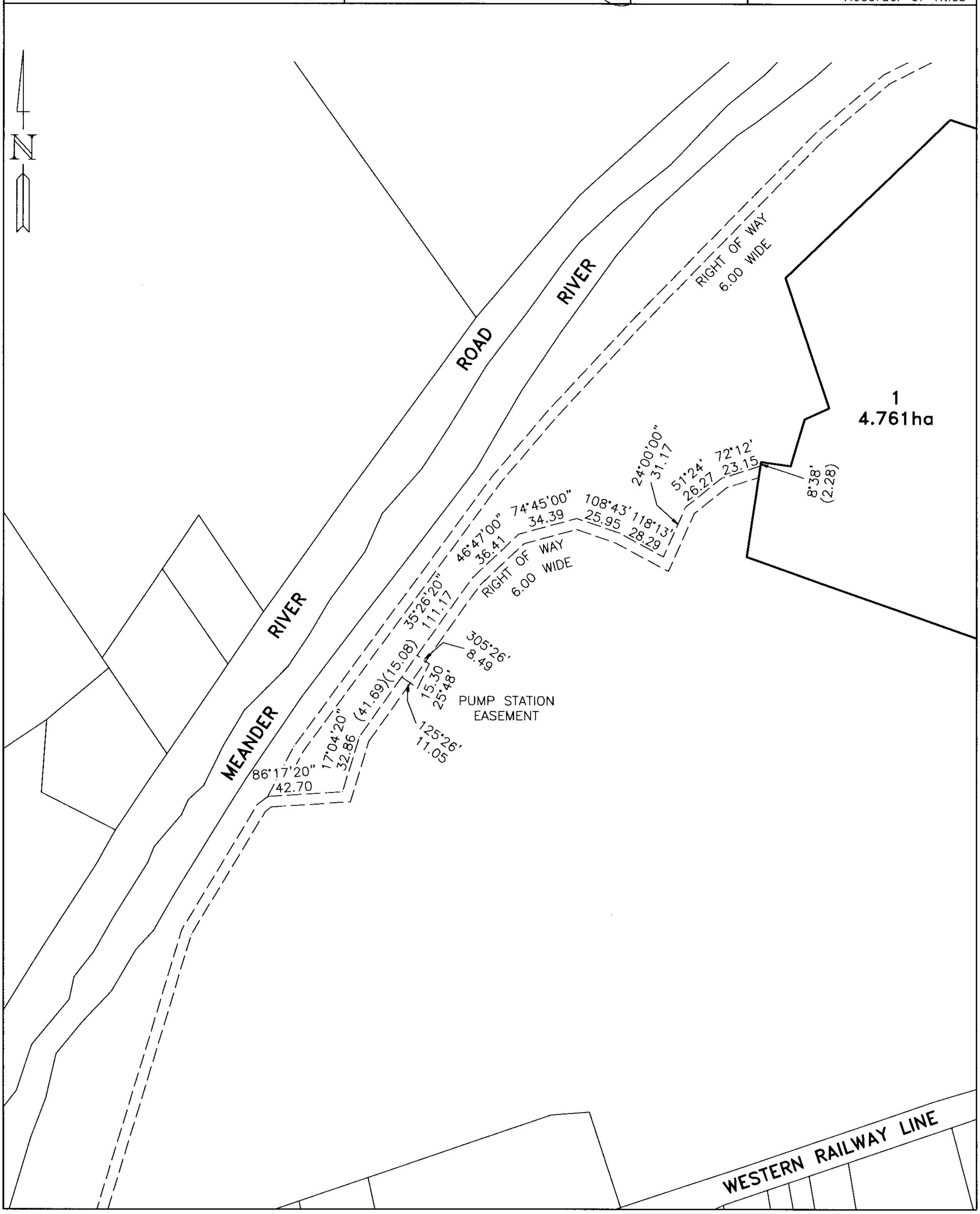
OWNER MEANDER VALLEY COUNCIL FOLIO REFERENCE ~~CONV. 10/8969~~ F/R 132548-1 GRANTEE PART OF LOT 277, 510 ACRES GTD TO PEARSON FOOTE	**PLAN OF SURVEY** BY SURVEYOR J.R. DAVEY OF COHEN & ASSOCIATES PTY LTD, LAUNCESTON LOCATION LAND DISTRICT OF WESTMORLAND PARISH OF CALSTOCK SCALE 1 : 4000 LENGTHS IN METRES	REGISTERED NUMBER **P165343** APPROVED 22 MAR 2013 ~~EFFECTIVE FROM~~ Alice Kawa Recorder of Titles

MAPSHEET MUNICIPAL CODE No 121 (4640-44)	LAST UPI No GWD14	LAST PLAN No P 132548 CONV. 10/8969	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN



28/80 (5940) 21/9/2010 16:57

PLAN OF SURVEY ANNEXURE SHEET SHEET 1 OF 2 SHEETS	OWNER MEANDER VALLEY COUNCIL FOLIO REFERENCE CONV. 10/8969 SCALE 1 : 2000 LENGTHS IN METRES	Registered Number **P 165343**
SIGNED FOR IDENTIFICATION PURPOSES .... ~~Council~~ Delegate	THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED INDEX PLAN.THE SURVEYORS CERTIFICATE EXTENDS TO THE DETAILS ON THIS SHEET. Registered Land Surveyor .... date 14/3/10	APPROVED 22 MAR 2013 ~~EFFECTIVE FROM~~ Alice Kawa Recorder of Titles



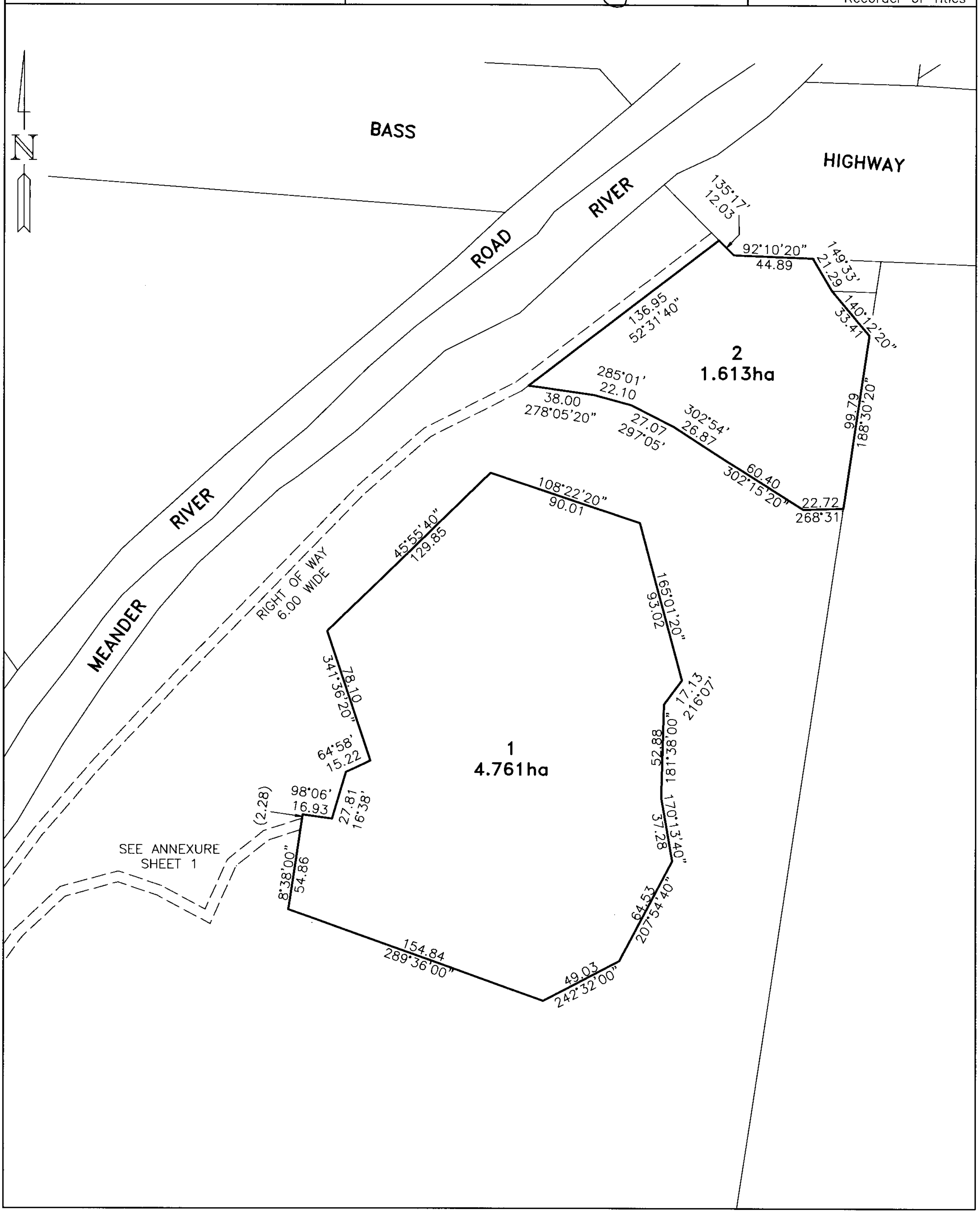
28/80 (5940) 21/9/2010 16:57

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

PLAN OF SURVEY ANNEXURE SHEET SHEET 2 OF 2 SHEETS	OWNER MEANDER VALLEY COUNCIL FOLIO REFERENCE CONV. 10/8969 SCALE 1 : 2000 LENGTHS IN METRES	Registered Number P165343
SIGNED FOR IDENTIFICATION PURPOSES .... ~~Council~~ Delegate	THIS ANNEXURE SHEET FORMS PART OF THE ATTACHED INDEX PLAN. THE SURVEYORS CERTIFICATE EXTENDS TO THE DETAILS ON THIS SHEET. Registered Land Surveyor .... date 14/9/10	APPROVED ~~EFFECTIVE FROM~~ 22 MAR 2013 Alice Kawa Recorder of Titles



28/80 (5940) 14/9/2010 16:17

Meander Valley Council
Working Together

Consent to Lodge Development Application

In accordance with Section 52 of the *Land Use Planning and Approvals Act 1993,* Meander Valley Council hereby provides consent to lodge a development application PA\26\0162 for Utilities - Sewerage treatment (desludging of treatment ponds - temporary placement of Geobags) at 6 Racecourse Drive DELORAINE (CT: 165648/1). The development requires use and development on Council owned land.

Signed:

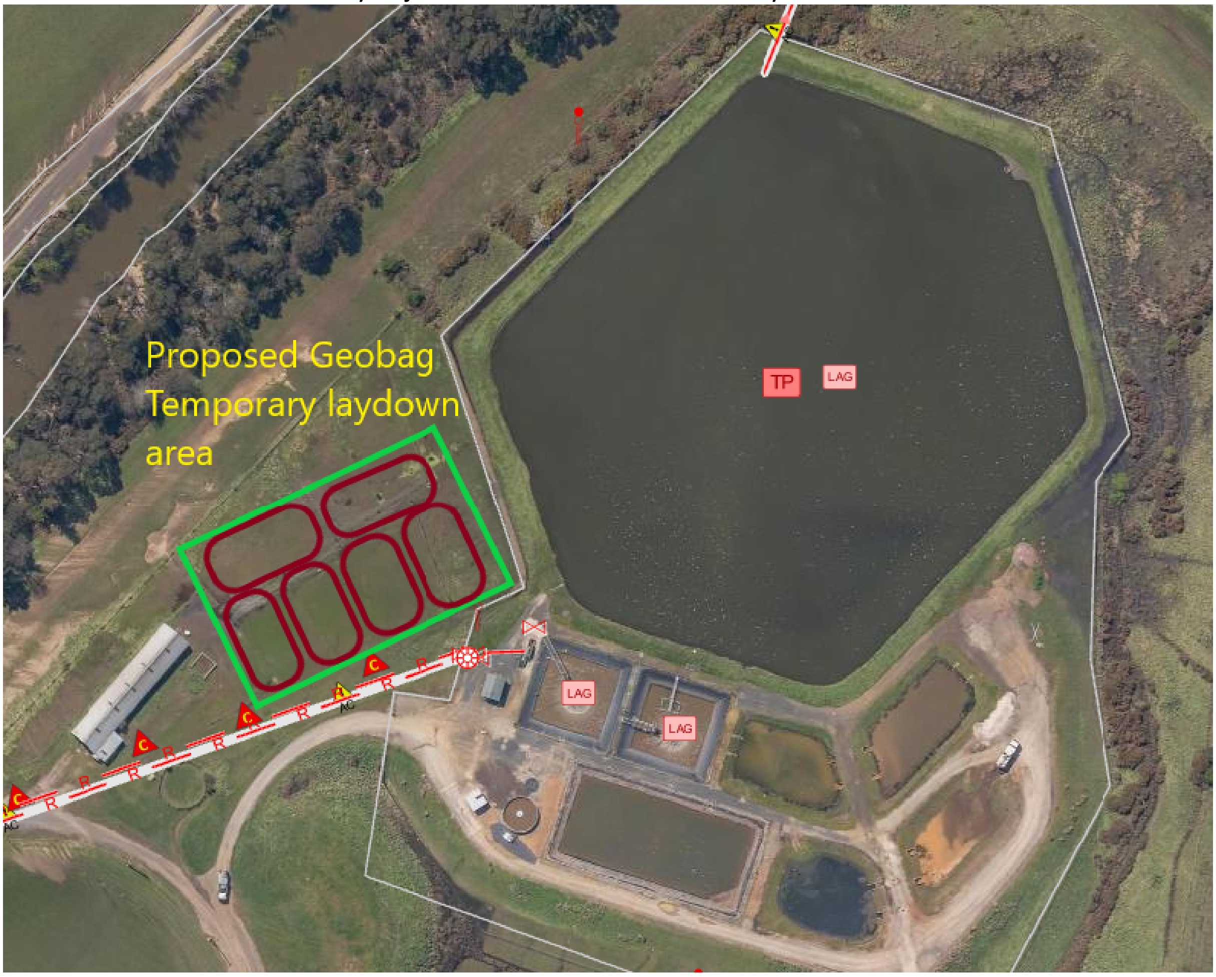
Jonathan Harmey
GENERAL MANAGER

05 February 2026

Natasha Whiteley

From:	Verdouw, Jeremy <Jeremy.Verdouw@taswater.com.au>
Sent:	Tuesday, 16 December 2025 11:16 AM
To:	Planning - Meander Valley Council
Cc:	French, Darren; Environment Mailbox
Subject:	Deloraine STP desludging - Planning Application for temporary Geobag laydown area
Attachments:	MVC Planning Applicaiton Form - TasWater Geobag Laydown area - Deloraine.pdf; 12684100-REP-Deloraine STP Desludging - Flood Hazard Report-Rev0-20251210.pdf; 2025-10-17_MWA#6930 (Geobags).pdf

To Meander Valley Council Planning team,
As you will be aware, TasWater is planning to undertake desludging of Lagoon 1 at the Deloraine Sewage Treatment Plant (STP) during the 2025–26 financial year. Due to significant site constraints the preferred methodology is to employ a remotely controlled dredge to remove sludge, with dewatering to be managed via Geobags. As there is insufficient space within the STP boundaries for temporary Geobag storage, a suitable laydown area has been identified on land immediately adjacent to the western boundary of the STP site.



The land surrounding the STP site is the Deloraine Recreation Precinct, owned by Meander Valley Council, and located on the eastern bank of the Meander River. This area falls within a flood-prone zone as well as Heritage listing as per the Tasmanian Planning Scheme – Meander Valley Council.
Previous advice provided to TasWater is that in order to progress this project, a Planning Application would need to be submitted which addresses the Flood-Prone Areas Hazard Code as well as written approval from Tasmanian Heritage Council that the works may proceed.
We have now have the required documentation on hand to formally submit our Planning Application for the proposed works to Meander Valley Council planning for review. Please find attached the following:

- Completed Planning Application Form:

        - **MVC Planning Application Form – TasWater Geobag Laydown area – Deloraine. Pdf**
- Flood Hazard Report from GHD:
    - **12684100-REP-Deloraine STP Desludging – Flood Hazard Report-Rev0-20251210.pdf**
- Minor Works Approval from Tasmania Heritage Council:
    - **2025-10-17_MWA#6930 (Geobags).pdf**

Should you have any questions or require any further information, please don't hesitate to contact me.
Kind regards,

Jeremy Verdouw
Senior Environmental Scientist - Biosolids

M +61 434 879 262
E Jeremy.Verdouw@taswater.com.au
A GPO Box 1393, Hobart, TAS 7001
10-18 Birdwood Avenue, Moonah, TAS 7009
—
taswater.com.au

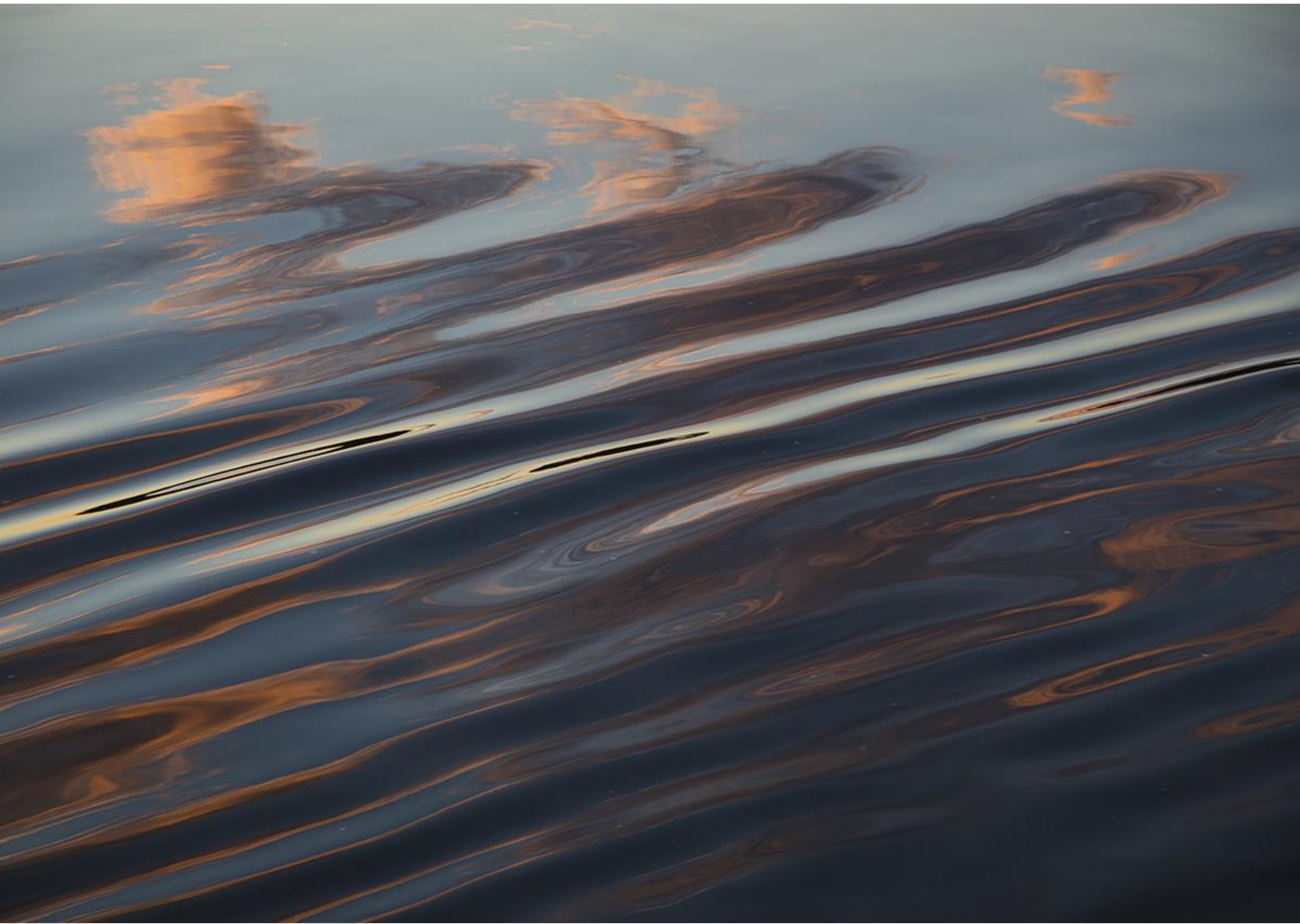
Deloraine STP Desludging

Flood Hazard Report

TasWater

10 December 2025

→ **The Power of Commitment**



Project name	Deloraine STP Desludging
Document title	Deloraine STP Desludging | Flood Hazard Report
Project number	12684100
File name	12684100-REP-Deloraine STP Desludging - Flood Hazard Report.docx

Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	0	D. Agius	S. Wright R. Gray		S. Wright		10/12/2025

GHD Pty Ltd | ABN 39 008 488 373
Contact: S Wright, Technical Director – Civil Engineer | GHD
113 Cimitiere Street, Ground Floor
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T +61 3 6332 5500 | **F** +61 3 8732 7046 | **E** lstmail@ghd.com | **ghd.com**

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Appendices

1. Introduction

TasWater is planning to undertake desludging of Lagoon 1 at the Deloraine Sewage Treatment Plant (STP) during the 2025–26 financial year. The process will employ a remotely controlled dredge to remove sludge, with dewatering to be managed via Geobags. As there is insufficient space within the STP boundaries for temporary Geobag storage, a suitable laydown area has been identified (see Section 3.2.1 Topographic amendments) on land immediately adjacent to the western boundary of the STP site. The land surrounding the STP site is the Deloraine Recreation Precinct, owned by Meander Valley Council, and located on the eastern bank of the Meander River. This area falls within a flood-prone zone as per the Tasmanian Planning Scheme – Meander Valley Council, Flood-Prone Areas Hazard Code.

Meander Valley Council (MVC) has provided verbal approval for TasWater to use the adjacent land for temporary Geobag storage, subject to the submission and assessment of a Development Application (DA). In accordance with the requirements of the Tasmanian Planning Scheme – Meander Valley Council, Flood- Prone Areas Hazard Code (the Code), a Flood Hazard Report is necessary to support the DA, ensuring the proposed temporary infrastructure complies with the relevant performance criteria of the Code.

1.1 Purpose of this report

The purpose of this Flood Hazard Report is to present the results of flood modelling undertaken for the Deloraine Recreation Precinct, assessing the pre- and post-development scenarios during 1% AEP event and address the performance requirements of Clause C12.6, Development Standards for Buildings and Works, Performance Criteria P1.1 and P1.2, of the Code.

The purpose of this Flood Hazard Report is to present the results of flood modelling undertaken for the TasWater laydown area, specifically assessing potential flood impacts associated with the temporary Geobag storage during the Lagoon 1 desludging works coinciding with a 1% AEP flood event. This report also addresses the performance requirements of Clause C12.6, Development Standards for Buildings and Works, Performance Criteria P1.1 and P1.2, of the Code.

This Flood Hazard Report shall be used by TasWater as supporting information for the project DA.

1.2 Scope and limitations

1.2.1 Scope

The scope of GHD's engagement by TasWater for this project is detailed below:

Flood modelling:

- Review and update if required, existing TUFLOW flood model.
- Update 2024 model with proposed temporary infrastructure (proposed works).
- Run updated model for 1% AEP design storm event (pre and post development) and prepare output flood maps (Flood Extent and Depth Map, Estimated Flood Water Velocity Map and Flood Hazard Map).

Prepare a Flood Hazard Report which addresses the following:

- Pre and post temporary infrastructure flood model overview, including model setup, hydrology, hydraulics, and key assumptions.
- Pre and post temporary infrastructure flood model results.
- Flood hazard assessment.
- With consideration to the proposed temporary installation, flood model results, and flood hazard assessment, address the Performance Criteria requirements of the Code.
- Provide draft report to TasWater for review and comment.
- Finalise and issue final report to TasWater.

1.2.2 Limitations

This report has been prepared by GHD for TasWater and may only be used and relied on by TasWater for the purpose agreed between GHD and TasWater as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than TasWater arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by TasWater and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has prepared the XPRAFTS and TUFLOW Flood Models ("Models") for, and for the benefit and sole use of, TasWater to support this Flood Hazard Report and must not be used for any other purpose or by any other person.

The Models are a representation only and does not reflect reality in every aspect. The Models contain simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Models. Accordingly, the outputs of the Models cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Models are from publicly available sources or provided by or on behalf of the TasWater, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Models as further Inputs becomes available.

The Models are limited by the mathematical rules and assumptions that are set out in the Report or included in the Models and by the software environment in which the Models are developed.

The Models are customised models and not intended to be amended in any form or extracted to other software for amending. Any change made to the Models, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Models including any outputs.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.3 Assumptions

Key assumptions are stated in the relevant sections of this report where they apply. In addition, the following general assumptions and scope limitations are relevant to this study:

– The modelling focuses on the flooding across the Deloraine Recreation Precinct and adjacent land only. The post-development elevation was assumed based on feature heights provided by TasWater.
– No hydraulic modelling of underground drainage systems has been conducted as part of this study.
– The assumptions and scope limitations applicable to the 2023 flood modelling undertaken by GHD for Meander Valley Council's for the Deloraine Recreation Precinct Flooding Analysis (GHD, 2023), are applicable to the modelling undertaken for this engagement.
– This assessment builds on the Deloraine Recreation Precinct modelling and associated flood hazard reporting undertaken by GHD in 2024 (GHD, 2024) for Meander Valley Council, this report has been attached as Appendix A.

2. Design flood event hydrology

The XP-RAFTS model created for the 2024 Deloraine Recreation Precinct study was adopted as the basis for this assessment. While the model configuration has remained the same, recent updates to Australian Rainfall and Runoff (ARR), particularly version 4.2 (Ball J, 2019), have emphasised the importance of evaluating current rainfall conditions using a climate uplift factor. This approach is deemed critical, as it scales design rainfall estimates to reflect the changes to climate since the Bureau of Meteorology (BoM) updated its Intensity-Frequency-Duration (IFD) database in 2016. Applying a climate uplift factor allows flood modelling and other hydraulic assessments to account for the observed increases in rainfall intensity driven by climate change, resulting in more accurate and robust flood risk analyses under contemporary conditions.

Due to the long-term design life of the proposed Deloraine Recreation Precinct, the modelling undertaken in 2024 considered climate change through to the year 2100, but did not assess the impacts of near-term climate change, and as such, was updated to assess 2025, climate uplifted rainfall. This process is described in the following sections.

2.1 Design rainfall

The latest design rainfall data and IFD curves were obtained from the BoM website. As per the scope, the IFDs were uplifted based on the latest climate change guidance from the ARR in version 4.2 (Ball J, 2019). This uplift corresponded to near-term impacts of one of the minor pathways to represent the current, 2025 climate. These conditions are constantly changing and uncertain by nature, and as such, **this should be noted as an inherent limitation of the modelling**. Specifically, this simulation adopted the following conditions:

- a projection horizon of the year 2030
- a potential future development option of Shared Socioeconomic Pathways (SSP) of 1-2.6

The outcomes of these conditions on the rainfall depths in a 1% AEP event are shown in Table 2.1.

Table 2.1 IFD design rainfall depth (mm)

Duration	1% AEP (mm)	1% AEP- climate uplift applied (mm)	Climate change factor
12 hour	106.0	117.7	1.11
18 hour	125.0	137.5	1.10
24 hour	140.0	154.0	1.10
30 hour	151.0	166.1	1.10

2.2 Losses

The initial and continuing loss data were obtained from the ARR data hub. The same climate change conditions discussed in Section 2.1 were adopted to modify the loss parameters applied to the hydrology modelling. A summary of these parameters is provided in Table 2.2:

Table 2.2 Initial and continuing losses

Parameters	Value	Source
Initial Loss (mm)	16	ARR Data Hub
Continuing Loss (mm/h)	4.40	ARR Data Hub
Design Consideration		
Climate Scenario	Long-term 2030	
socio-economic pathways	SSP1-2.6	
Global mean surface temperature projections (ΔT)	4.5	ARR V4.2 Table1.6.2
Rates of change		
IL (%)	18.8	ARR V4.2 Table1.6.3
CL (%/°C)	44.4	ARR V4.2 Table1.6.3
Factored Design Loss		
Initial Loss (mm)	3.25 – 19.9	ARR V4.2 Equation 1.6.1 (varies with duration)
Continuing Loss (mm/h)	4.85	ARR V4.2 Equation 1.6.1

2.3 Results

The peak flow rates from the design flood hydrology model for the 1% AEP event, with and without climate change uplift, are tabulated in Table 2.3, along with the corresponding duration and temporal pattern. Of note is the temporal shift from a front-loaded storm (TP01) to a double-peak, back-loaded storm (TP05). The model outcomes demonstrate that, generally speaking, the ~10% increase in rainfall can translate to a ~12% increase in peak flow rate.

Table 2.3 Outcomes of Design Flood Hydrology

Event	Climate change	Peak flow rate	Critical duration	Temporal pattern
1% AEP	N/A	540 m^3/s	12 hours	TP01
1% AEP	2030 – SSP 1.2	612 m^3/s	12 hours	TP05

3. Hydraulics model development

The TUFLOW hydraulic model from the Deloraine Recreation Precinct Flood Hazard Report (GHD, 2024) was also adopted as the basis for the hydraulic modelling (GHD, 2024). Further information pertaining to its creation and inputs can be found in the associated report (attached as Appendix A). This section will detail updates made to the model for the purposes of this assessment.

3.1 Scenarios

The intent of the flood model was to assess the expected change in hydraulic conditions resulting from the implementation of the proposed Geobag laydown area (see Section 3.2.1). To do this, the following hydraulic scenarios were simulated:

– Existing scenario (pre-development):
  - A base model that utilises existing elevation information (see Section 3.2)
– Developed scenario (post-development):
  - Updated the existing terrain to include the proposed Geobag laydown area, including Geobags.

3.2 Elevation data

This version of the model adopted the same base terrain as the 2024 Deloraine Recreation Precinct model, including:

– 1 m LiDAR for Meander Valley and Transmission Line North (Elvis, 2014)
– Detailed Survey (MVC, 2023)

The elevation data was ingested into TUFLOW using a model grid cell size of two metres with a Sub Grid Sampling (SGS) distance of one metre. SGS allows the use of a larger model grid cell size whilst maintaining the topographic accuracy of a smaller grid cell size. This is done by interpreting the grid cells and applying a dynamic elevation across the cell rather than assuming a static elevation for the entire cell face.

3.2.1 Topographic amendments

The extents of the proposed Geobag laydown area were provided to GHD by TasWater and applied to the model as a topographic amendment. Based on sketches, photos, and dimensions provided TasWater, the amendment was applied in two stages. The first, was a 1m border around the site to represent the earthen bund around the Geobags. While it is understood that the bund will be graded at 2:1, the model grid is not fine enough to represent this, so a conservative vertical wall was adopted. The second layer represented the Geobags and was raised to the maximum, filled height of 2 m. Both features were treated as immovable objects for the purposes of this assessment; however, in reality, substantial flows across the site could cause erosion and material loss, which could alter the final result. A comparison of terrain elevations between the existing and developed scenarios has been provided as Figure 3.1 and Figure 3.2.

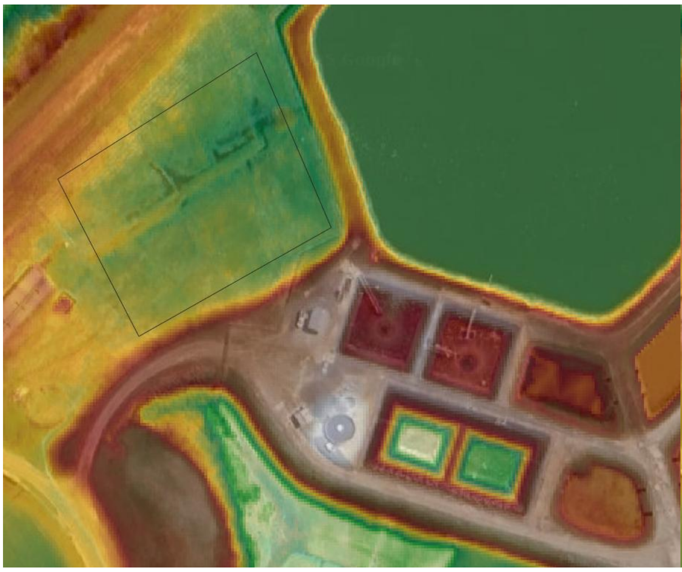

Figure 3.1 Existing scenario with Geobag laydown area annotated by a black box.

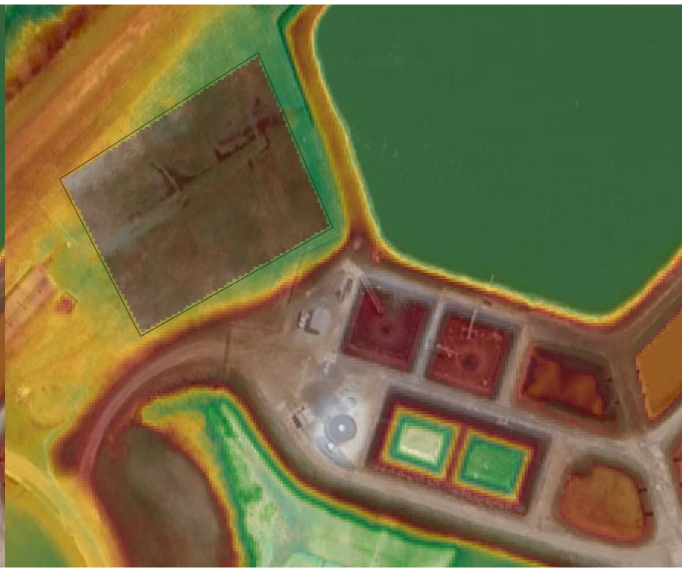

Figure 3.2 Design scenario with Geobag laydown area raised

3.3 Boundary conditions

Boundary conditions remained consistent from the previous modelling, save for the climate change uplift that was applied to rainfall depths to both the rain-on-grid components and the hydrology model, as discussed in Section 2.

4. Flood Modelling Assessment

The flood model was simulated for the 1% AEP event under current-day climate conditions. The outcomes of the hydrology assessment (see Section 2.3) determined the critical event for the Meander River to be the 12-hour, temporal pattern 5 event. This event was adopted for both the existing and developed cases.

The outcomes of the hydraulic modelling assessment have been depicted using maps and are included as Appendix B for both the pre- and post-development scenarios. These maps display peak depth, velocity, and utilise the TUFLOW depth and flow velocity outputs to determine the different hazard vulnerability classifications as detailed in Section 4.3. Further information pertaining to the impacts of the proposed Geobag laydown area has been provided in the following sections.

4.1 Flood Depth Assessment

General flood modelling results for different locations within the proposed laydown area are summarised in Table 4.1 and Table 4.2 for both the pre- and post-development scenarios, respectively. These sampling locations are also included in the flood maps from Appendix B.

Table 4.1 Site location modelling results for pre-development 1% AEP event with climate uplift

Location	Peak depth (m)	Peak velocity (m/s)	Hazard Category
A – Western corner of the laydown area	1.05	0.85	H4
B – Northern wall of the recreation ground structure (existing building)	0.75	0.74	H3
C – Southern wall of the recreation ground structure (existing building)	0.77	0.60	H3
D – Northern extents of the recreation grounds	1.11	0.70	H3

Table 4.2 Site location modelling results for post-development 1% AEP event with climate uplift

Location	Peak depth (m)	Peak velocity (m/s)	Hazard Category
A – Western corner of the laydown area	1.11	0.63	H3
B – Northern wall of the recreation ground structure (existing building)	0.80	0.50	H3
C – Southern wall of the recreation ground structure (existing building)	0.80	0.59	H3
D – Northern extents of the recreation grounds	1.13	0.70	H3

4.2 Development effect on flooding

From the comparison of pre- and post-development modelling results, the extent of flood inundation is not meaningfully impacted by the proposed development. The maximum afflux is observed across the northern extents of the recreation grounds (up to 20 mm of afflux) and along the structure (existing building) north of the grounds (up to 100 mm of afflux). The simulated flood risk of the surrounding residential areas does not appear to be increased by the implementation of the temporary Geobag laydown area.

4.3 Flood Hazard Classification

The severity of flooding varies depending on its behaviour, such as extent, depth, velocity, isolation, rate of rise of floodwaters, and duration. To manage flood risk, it is important to understand the potential flood behaviour and identify the relative degree of flood hazard on a floodplain. This section defines flood hazard as the potential loss of life, injury, and economic loss caused by future flood events. It also outlines methods to quantify flood hazard, which can help identify specific flood parameters and benchmark them against thresholds to better understand the danger of flooding to people, buildings, and infrastructure in the community.

The quantification and classification of flood hazard involve considering flood depth and velocity in combination. Understanding the relative degree of hazard and underlying flood behaviour is crucial as different management approaches may be required.

The combined flood hazard curves presented in Figure 4.1 set hazard thresholds that relate to the vulnerability of the community when interacting with floodwaters. The combined curves are divided into hazard classifications that relate to specific vulnerability thresholds as described in Table 4.3. Table 4.4 provides the limits for the classifications provided in Table 4.3. A flood hazard map classified against these vulnerability thresholds for the site and adjacent land is presented in Appendix B for the pre and post development scenarios.

For full details and additional information on the flood hazard classification, please refer to the *Australian Disaster Resilience Guideline 7-3: Technical flood risk management guideline: Flood hazard, 2014, Australian Institute for Disaster Resilience.*

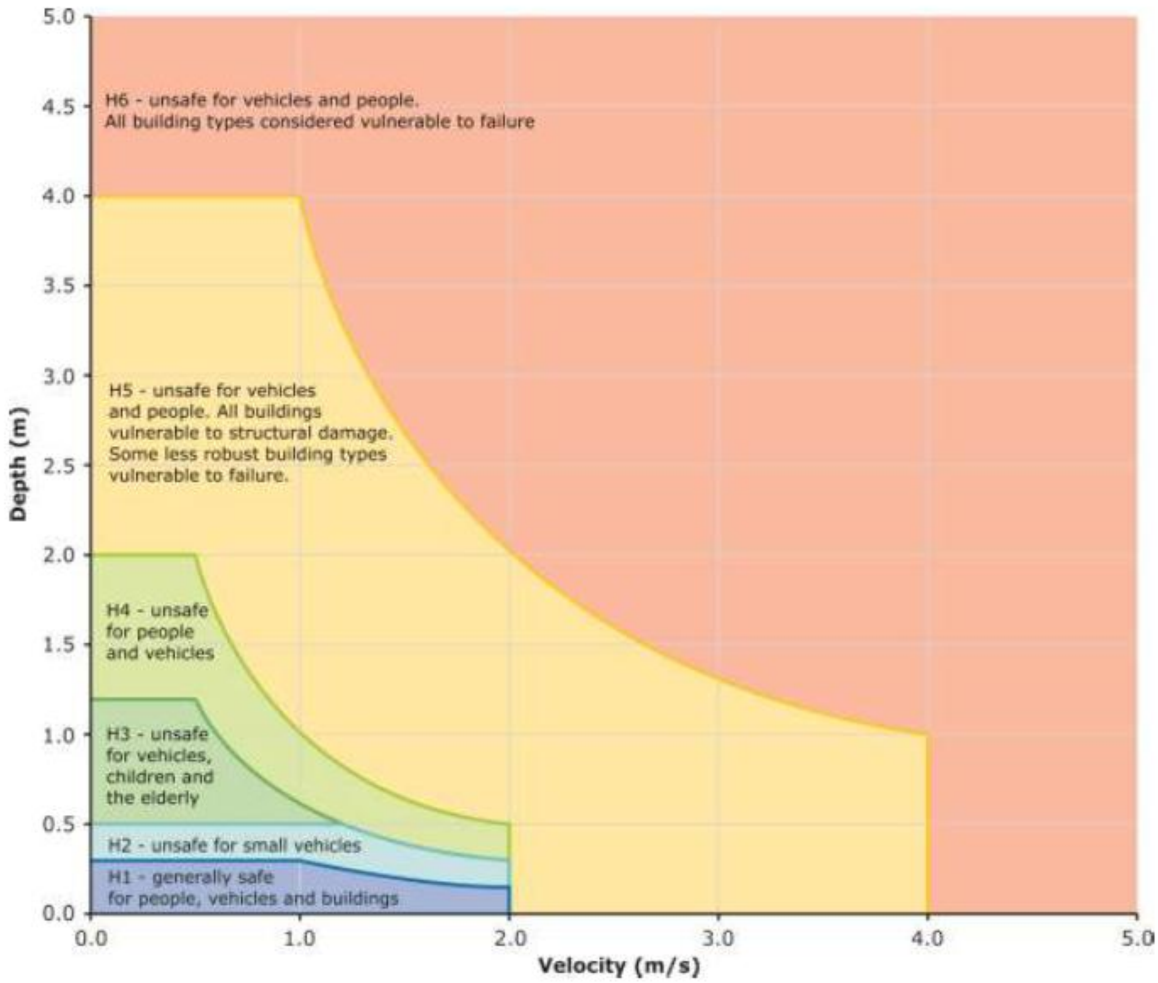

Figure 4.1 ***General flood hazard vulnerability curves***

(Source: Australian Disaster Resilience Guideline 7-3:Technical flood risk management guideline: Flood hazard, 2014, Australian Institute for Disaster Resilience).

Table 4.3 Combined hazard curves – vulnerability thresholds

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Table 4.4 Combined hazard curves – vulnerability thresholds classification limits

Hazard Vulnerability Classification	Classification limit (D (depth)and V (velocity) in combination) m^2/s	Limiting still water depth (D) m	Limiting velocity (V) m/s
H1	D*V ≤ 0.3	0.3	2.0
H2	D*V ≤ 0.6	0.5	2.0
H3	D*V ≤ 0.6	1.2	2.0
H4	D*V ≤ 1.0	2.0	2.0
H5	D*V ≤ 4.0	4.0	4.0
H6	D*V > 4.0	-	-

5. Flood-Prone Areas Hazard Code Assessment

The performance criteria requirements of Clause C12.6, Development Standards for Buildings and Works, Performance Criteria P1.1 and P1.2, of the Tasmanian Planning Scheme – Meander Valley Council, Flood-Prone Areas Hazard Code are addressed below with consideration to the proposed development works, flood model results, and flood hazard assessment, detailed in this report.

5.1 Clause C12.6 Development Standards

C12.6.1 Buildings and works within a flood-prone hazard area		
Objective: That: (a) building and works within a flood-prone hazard area can achieve and maintain a tolerable risk from flood; and (b) buildings and works do not increase the risk from flood to adjacent land and public infrastructure.		
Acceptable Solutions	**Performance Criteria**	**Response**
A1 *No Acceptable Solution*	P1.1 Buildings and works within a flood-prone hazard area must achieve and maintain a tolerable risk from a flood, having regard to: (a) the type, form, scale and intended duration of the development; (b) whether any increase in the level of risk from flood requires any specific hazard reduction or protection measures; (c) any advice from a State authority, regulated entity or a council; and (d) the advice contained in a flood hazard report.	(a) The proposed laydown area is a temporary feature, to be removed within a year of implementation, once the Geobags have drained. Throughout this year, their form will gradually reduce from their initial height of 2m, further reducing their impact on the flooding of surrounding areas. The temporary desludging infrastructure to be installed, including temporary laydown area and Geobags, shall be designed, and utilise materials and construction methods, which offer some resilience to/can withstand intermittent short term flood inundation. The development should incorporate measures, such as air vents or other pressure-relief outlets, to prevent floodwater from building uplift pressure beneath the liner. Without a way for trapped air or water to escape, the liner may be displaced or deformed.
		(b) The flood assessment detailed in this report (Section 4) indicated that the level of flood risk will not be substantially impacted by the Geobags and temporary laydown area. This is demonstrated by comparing the Hazard mapping for the pre- and post-development scenarios (see Appendix B). The flood hazard for the Deloraine Recreation Precinct generally does not change from H3, *'Unsafe for vehicles, children and the elderly'*.
		(c) Occupants to follow advice given during a flood event (if any) from State authorities, and Council. TasWater to apply their existing emergency management and safety procedures for the temporary laydown area.
		(d) The measures detailed in this report should be addressed to achieve and maintain a tolerable risk from flood to the proposed development.

C12.6.1 Buildings and works within a flood-prone hazard area		
	P1.2 A flood hazard report also demonstrates that the building and works: (a) do not cause or contribute to flood on the site, on adjacent land or public infrastructure; and (b) can achieve and maintain a tolerable risk from a 1% annual exceedance probability flood event for the intended life of the use without requiring any flood protection measures.	(a) Based on the Afflux mapping for the site (see Appendix B), the proposed work is not expected to increase the level of flood risk to adjacent land or public infrastructure. Flood levels to the south of temporary laydown area site observe a minor increase (by a maximum of 100 mm) due to the impedance to flow introduced by the laydown area, however this impact is limited to the immediate vicinity of the laydown area.
		(b) The site is at risk of a 1% AEP event both pre and post-development. The introduction of the Geobags and temporary laydown area does not further increase the risk of flooding during this event. The temporary desludging infrastructure, including temporary laydown area and Geobags, shall be designed, and utilise materials and construction methods, which offer some resilience to/can withstand intermittent short term flood inundation, so as to maintain a tolerable risk from a 1% AEP flood event.

6. Conclusion

In order to facilitate essential desludging of Lagoon 1 at the Deloraine STP, TasWater is proposing to construct a temporary bunded laydown area adjacent to the treatment plant on land owned by MVC, and install four 18 m x 36 m Geobags to dewater the sludge over a 6-12 month period. These proposed works are subject to a Development Application for a Planning Permit under the *Land Use Planning and Approvals Act 1993*.

TasWater engaged GHD Pty Ltd (GHD) to undertake a Flood Assessment and prepare this Flood Hazard Report to assess the impact of these temporary works on flood levels and to address the requirements of the Code.

To assess the flood hazard of the proposed site, a 1% AEP climate uplift event was assessed using the TUFLOW modelling platform to determine the afflux potential and change in hazard rating for the site. The results indicate afflux can be expected to exceed 100 mm directly southeast of the temporary laydown area site, however, afflux is limited to the immediate vicinity of the laydown area.

Based on the modelling, the proposed development does not appear to further increase the risk of flooding and associated impacts during a 1% AEP flood event.

7. References

Ball J, B. M. (2019). *Australian Rainfall and Runoff: A Guide to Flood Estimation, Version 4.2.* Commonwealth of Australia (Geoscience Australia).

BOM. (2003). *The Estimation of Probable Maximum Precipitation in Australia: Generalised Short Duration Method.* Hydrometeorology Advisory Service, Bureau of Meteorology.

Chow, V. T. (1959). *Open-channel hydraulics.* New York: McGraw-Hill.

GHD. (2024). *Deloraine Recreation Precinct - Flood Hazard Report for PA\25\0045.*

Jordan, P., Natahn, R., Mittiga, L., & Taylor, B. (2015). *Growth curve and temporal patterns of short.* Australian Journal of Water Resources, 69-80.

Appendix A

Deloraine Recreation Precinct – Flood Hazard Report for PA\25\0045

Deloraine Recreation Precinct

Flood Hazard Report for PA\25\0045

Meander Valley Council

24 December 2024

→ **The Power of Commitment**

Project name	Deloraine Recreation Precinct - Flood Hazard Report for PA\25\0045						
Document title	Deloraine Recreation Precinct | Flood Hazard Report for PA\25\0045						
Project number	12656735						
File name	12656735-REP-Deloraine Recreation Precinct-Flood Hazard Report for PA-25-0045.docx						
Status Code	Revision	Author	Reviewer		Approved for issue		
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S4	0	D. Lu / D. Agius	S. Wright / R. Gray	[signature]	B. Davie	[signature]	24/12/2024

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Appendices

1. Introduction

Meander Valley Council (MVC) is proposing to undertake development at the Deloraine Recreation Precinct site (the Site), formerly the Deloraine Racecourse, located at 6 Racecourse Drive, Deloraine. The proposed development includes the construction of carparks, roads and a playground on the site; along with the removal of several unused stable blocks.

Following MVC's recent Planning Application (PA/25/0045) for the project, MVC has been advised that a Flood Hazard Report addressing the requirements of the Tasmanian Planning Scheme – Meander Valley Council, Flood-Prone Areas Hazard Code (the Code), is required to process the Planning Application. MVC has subsequently engaged GHD to update the existing site flood model and prepare a Flood Hazard Report addressing the requirements of the Code with respect to the proposed development covered by PA/25/0045.

Figure 1.1 demonstrates the location of the development covered by PA/25/0045 relative to the overall Deloraine Recreation Precinct site (PID 3233141), and the extent of the Tasmanian Planning Scheme Code Overlay designated Flood Prone Area (base map source: https://maps.thelist.tas.gov.au/listmap/app/list/map accessed 04/12/24).

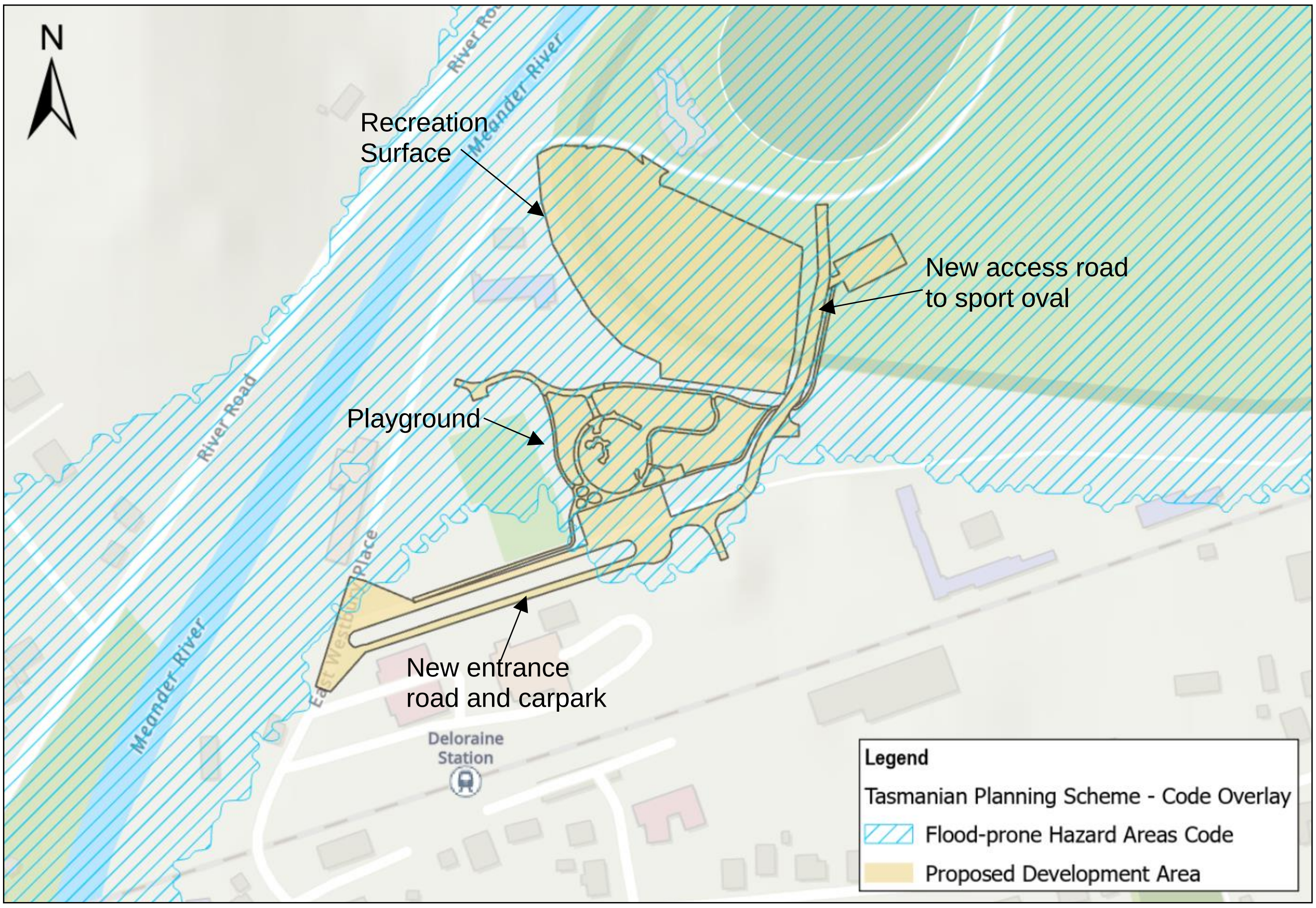


Figure 1.1 Map of proposed Development Works and Flood Prone Hazard Areas Code Overlay

1.1 Purpose of this report

The purpose of this Flood Hazard Report is to present the results of flood modelling undertaken for the Deloraine Recreation Precinct assessing the pre and post development scenarios during 1% AEP climate change event and address the performance requirements of Clause C12.6, Development Standards for Buildings and Works, Performance Criteria P1.1 and P1.2, of the Code.

This Flood Hazard Report shall be used by MVC as supporting information for Planning Application PA/25/0045.

1.2 Scope and limitations

1.2.1 Scope

The scope of GHD's engagement by MVC for this project is detailed below:

1. Update the hydrology to incorporate climate change considerations as per the Australian Rainfall and Runoff Guidelines (ARR) and simulate the 1% AEP climate change event.
2. Utilise the data and information from the existing Deloraine Recreation Precinct InfoWorks ICM flood model (SES flood model updated by GHD in 2023), to develop a 2D TUFLOW model. This model will be used to simulate the 1% AEP climate change event and assess the hydraulic conditions at the site both pre and post development.
3. Prepare a Flood Hazard Report (this report) which achieves the purpose detailed in Section 1.1.

1.2.2 Limitations

This report has been prepared by GHD for Meander Valley Council and may only be used and relied on by Meander Valley Council for the purpose agreed between GHD and Meander Valley Council as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Meander Valley Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Meander Valley Council and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has prepared the XPRAFTS and TUFLOW Flood Models ("Models") for, and for the benefit and sole use of, Meander Valley Council to support this Flood Hazard Report and must not be used for any other purpose or by any other person.

The Models are a representation only and does not reflect reality in every aspect. The Models contain simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Models. Accordingly, the outputs of the Models cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Models are from publicly available sources or provided by or on behalf of the Meander Valley Council, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Models as further Inputs becomes available.

The Models are limited by the mathematical rules and assumptions that are set out in the Report or included in the Models and by the software environment in which the Model is developed.

The Models are customised models and not intended to be amended in any form or extracted to other software for amending. Any change made to the Models, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Models including any outputs.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.3 Assumptions

Key assumptions are stated in the relevant sections of this report where they apply. In addition, the following general assumptions and scope limitations are relevant to this study:

- The modelling focuses on the flooding across the racecourse property and adjacent land only. The post development elevation adopted for the modelling was provided by Collective Consulting.
- No hydraulic modelling of underground drainage systems has been conducted as part of this study.
- The assumptions and scope limitations applicable to the 2023 flood modelling for the Deloraine Recreation Precinct Flooding Analysis (GHD, 2003), are applicable to the modelling undertaken for this engagement.

2. Design flood event hydrology

2.1 Model selection

An XP-RAFTS (RAFTS) hydrologic model was created to simulate the regional catchment hydrology for the Meander River. The RAFTS hydrologic modelling software is based on the Regional Stormwater Drainage Model (RSWM) developed by the Snowy Mountains Engineering Corporation (SMEC) and is an industry standard rainfall-runoff routing analysis package. It is capable of modelling changes due to development for both rural and urban sub-catchments and is an accepted model used to quantify flood flows from catchments as specified in the ARR (2019) guidelines. Once the RAFTS model is configured, Storm Injector is used to run the model within a storm-management framework that allows for the easy application and assessment of the multitude of simulated design flood results from RAFTS.

2.2 Catchment discretisation

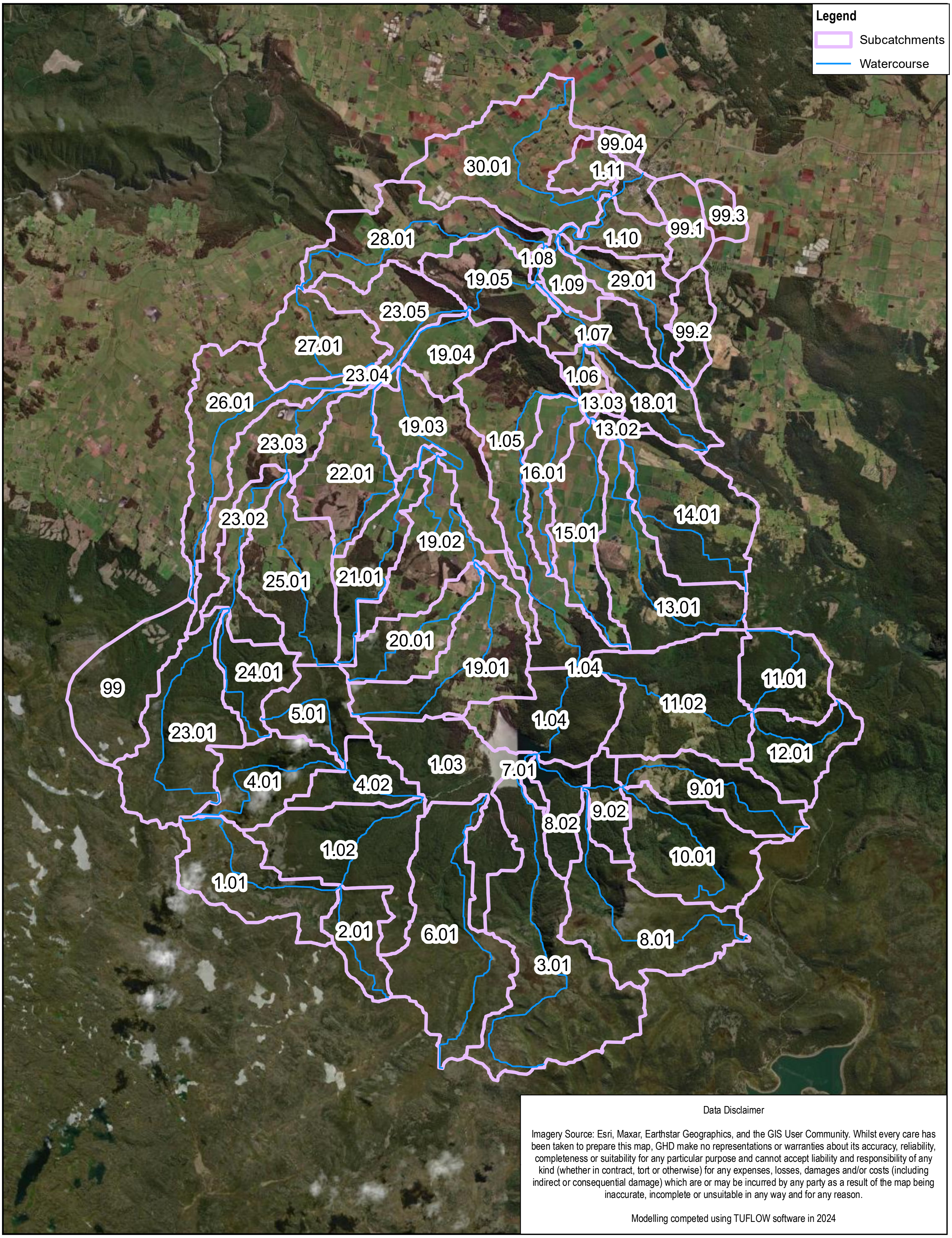
Catchments were discretised using the Horton Order analysis in which all sub-catchments with an order of one or higher were delineated. A map illustrating this catchment plan has been included as Figure 2.1.

2.3 Catchment inputs

Rafts utilises a number of input parameters to calculate the catchment response and associated runoff, including:

– Area
– Roughness (n)
– Slope
– Impervious percentage
– Catchment lag

The values of these input parameters for each catchment have been tabulated in Table 2.1.



Data Disclaimer

Imagery Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Whilst every care has been taken to prepare this map, GHD make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Modelling competed using TUFLOW software in 2024

Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Catchment Plan

Project No. **12656735.0**
Revision No. **A**
Date **24 Dec 2024**

Figure 2-1

D:\OneDrive - GHD\Projects\12656735 - Deloraine Recreation Precinct\GIS\SMA Mapping\12656735_SMA.mxd
Print date: 24 Dec 2024 - 08:14 (SMA record: 3)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius

Table 2.1 Catchment inputs

Name	Area (ha)	N Roughness	Slope (%)	Impervious (%)
1.01	1070.6	0.070	15.6	0
1.02	1404.3	0.100	8.2	0
1.03	977.8	0.070	4.2	0
1.04	1087.8	0.060	2.8	0
1.05	1806.5	0.060	1.0	0
1.06	174.4	0.100	1.7	0
1.07	496.3	0.060	1.0	0
1.08	44.4	0.070	1.0	0
1.09	291.5	0.060	1.0	0
1.1	392.3	0.060	1.0	0
1.11	469.3	0.070	1.0	0
2.01	513.5	0.070	22.4	0
3.01	2445.2	0.100	6.8	0
4.01	827.5	0.100	13.9	0
4.02	522.7	0.100	7.7	0
5.01	624.8	0.100	15.8	0
6.01	2323.7	0.060	8.4	0
8.01	1538.8	0.100	9.2	0
8.02	434.8	0.060	3.3	0
9.01	863.6	0.100	5.5	0
9.02	362.0	0.100	5.5	0
10.01	1262.6	0.100	8.3	0
11.01	738.5	0.060	6.9	0
11.02	1635.1	0.060	4.9	0
12.01	734.0	0.060	6.8	0
13.01	1366.5	0.060	1.8	0
13.02	93.7	0.060	2.1	0
13.03	90.9	0.060	3.4	0
14.01	1440.4	0.060	1.8	0
15.01	934.0	0.060	1.0	0
16.01	529.7	0.060	1.0	0
18.01	642.9	0.100	1.5	0
19.01	1313.6	0.060	2.6	0
19.02	1087.5	0.060	1.0	0
19.03	1079.5	0.060	1.0	0
19.04	563.8	0.060	1.0	0
19.05	805.7	0.070	1.1	0
20.01	738.9	0.060	4.3	0
21.01	752.9	0.060	2.1	0

Name	Area (ha)	N Roughness	Slope (%)	Impervious (%)
22.01	1047.3	0.060	1.0	0
23.01	1532.5	0.060	9.5	0
23.02	565.2	0.060	1.6	0
23.03	902.6	0.060	1.0	0
23.05	755.9	0.060	1.0	0
24.01	559.4	0.060	12.5	0
25.01	1262.5	0.060	3.1	0
26.01	1225.2	0.060	1.0	0
26.01a	1088.8	0.070	14.0	0
27.01	868.9	0.060	1.0	0
28.01	1293.1	0.060	1.1	0
29.01	641.1	0.060	1.2	0
30.01	1756.9	0.060	1.0	0
99.1	413.0	0.070	2.0	0
99.2	360.0	0.070	3.0	0
99.3	208.0	0.070	1.5	0
99.4	100.0	0.060	4.1	60

Roughness/land use

Manning's n (PERN) factors were applied to each of the catchment to represent their roughness, a summary of the values adopted for each ground type is provided in Table 2.2.

Table 2.2 Adopted hydrologic Manning's 'n' (PERN) values

Adopted Manning's 'n' Roughness	Ground Type
0.015	Impervious area (i.e., roads, buildings etc.)
0.025	Urban Pervious Area
0.050 – 0.070	Rural Pasture and Grasslands
0.100	Forested

Catchment lag

Catchment lag was assigned using an average velocity approach whereby an average velocity was applied to the streamflow path to generate a lag time. To determine the average velocity, small hydraulic models were created for three representative reaches throughout the catchment to simulate the riverine response a large event such as the 1% AEP. Model inflows were determined by conducting an RFFE for the catchment to the upstream face of the model. Using these models' representative velocities of 1.5, 4.5 and 7 m/s for the flat, moderate and steep reaches respectively. It is understood that both the level and spillway capacity of the Meander Dam can affect the catchment lag, for the purposes of this assessment, the Meander Dam was conservatively assumed to be full at the start of all simulations and pass all flow immediately (no attenuation).

2.4 Design rainfall

The latest design rainfall data and Intensity-Frequency-Duration (IFD) curves were obtained from the Bureau of Meteorology (BoM) website. As per the scope, the IFDs were uplifted based on the latest climate change guidance from the ARR in their 2024 update. These uplifts were determined for to a projected time horizon and Shared Socioeconomic Pathways (SSPs). These conditions are constantly changing and uncertain by nature and as such

<u>this should be noted as an inherent limitation of the modelling</u>. Specifically, this simulation adopted the following conditions:

– a projection horizon of the year 2100
– a potential future development option of Shared Socioeconomic Pathways (SSP) of 8.5

The outcomes of these conditions on the rainfall depths in a 1% AEP event are shown in Table 2.3.

Table 2.3 IFD design rainfall depth (mm)

Duration	1%AEP (mm)	1% AEP Climate Change applied (mm)	Climate Change Factor
12 hour	106.0	155.8	1.47
18 hour	125.0	180.0	1.44
24 hour	140.0	197.4	1.41
30 hour	151.0	212.9	1.41

2.5 Losses

The initial and continuing loss data was obtained from ARR data hub. The same climate change conditions discussed in Section 2.4 were adopted to calculate the loss parameters applied to the hydrology modelling. A summary of these parameters is provided in Table 2.4:

Table 2.4 Initial and continuing losses

Parameters	Value	Source
Initial Loss (mm)	16	ARR Data Hub
Continuing Loss (mm/h)	4.40	ARR Data Hub
Design Consideration		
Climate Scenario	Long-term 2100	
socio-economic pathways	SSP5-8.5	
Global mean surface temperature projections (∆T)	4.5	ARR V4.2 Table1.6.2
Rates of change		
IL (%)	18.8	ARR V4.2 Table1.6.3
CL (%/°C)	44.4	ARR V4.2 Table1.6.3
Factored Design Loss		
Initial Loss (mm)	3.68 – 22.57	ARR V4.2 Equation 1.6.1 (varies with duration)
Continuing Loss (mm/h)	6.35	ARR V4.2 Equation 1.6.1

2.6 Temporal patterns

The areal ensemble patterns from the ARR Datahub were applied in this study. Sensitivity assessments including the point temporal patterns were also undertaken to confirm an appropriate critical duration was selected.

2.7 Areal reduction factors

The areal reduction factors (ARFs) were applied to each storm for all AEP events. The ARFs were sourced from the ARR datahub following the procedures outlined in ARR 2019 Book 2 Chapter 4 Tables 2.4.1, which generally varied between 0.85 and 0.95, depending on the duration and AEP.

2.8 Results

The peak flow rates from the design flood hydrology model for the 1% AEP event with and without climate change are tabulated in Table 2.5, along with the corresponding duration and temporal pattern. The model outcomes demonstrate that the 47% increase in rainfall can translate up to a 57% increase in peak flow rate. This equates it to an event more rare than a 1 in 1000 AEP in the current day climate scenario.

Table 2.5 Outcomes of Design Flood Hydrology

Event	Climate change	Peak flow rate	Critical duration	Temporal pattern
1% AEP	N/A	540 m^3/s	12 hours	TP01
1% AEP	2100 – SSP 8.5	855 m^3/s	12 hours	TP05

2.9 Validation

The flow rates from the design flood hydrology were validated against the outcomes of an the RFFE and the 2015 Deloraine Flood Plain Mapping Review (Hydrodynamica, 2015). The RFFE assessment indicated that the Meander River at Deloraine was one of the gauges used for the assessment and as such this value was adopted instead. A comparison between the three sources is provided in Table 2.6.

Table 2.6 Design flood validation

RAFTS 1% AEP	RFFE	2015 study	RAFTS 1% AEP CC
540	474	468	855

The two validation sources report peak flow rates that were 10-15% smaller than the RAFTS model results. This is to be expected due to the nature of design flood hydrology, the inherent differences between the approaches and the significant changes to design flood hydrology that were introduced with ARR 2016. For all these reasons, the RAFTS model is believed to be appropriately representing the catchment for the purposes of this study and as such these results were carried through into the hydraulic model.

3. Hydraulics model development

3.1 Scenarios

The intent of the flood model was to assess the expected change in hydraulic conditions as a result of the proposed developments near the racecourse. To do this the following hydraulic scenarios were created:

– Existing scenario (pre-development):
  - Create a base model using existing elevation information
– Developed scenario (post-development):
  - Updated terrain to include the 3D design surface supplied to GHD by Collective including:
    – New / upgraded entrance road, with new pedestrian path, car park and replacement entry gates including tree removal and relocation of RV dump point
    – Extend entrance road to existing football oval
    – Partial relocation of racetrack inner rail and track removal for new training surface and roadway
  - Updated the roughness zone for the new land use types (roads, carpark concrete, etc.)

3.2 Model selection

Hydraulic modelling has been undertaken using the TUFLOW hydraulic modelling software. TUFLOW is a 2D unsteady flow hydrodynamic modelling tool developed by BMT-WBM. TUFLOW is oriented towards establishing 2D flow and inundation patterns in rivers, floodplains and urban areas. TUFLOW solves the depth-averaged 2D shallow water equations for flows such as the free-surface flows occurring from floods and tides based on the creation of an appropriate-resolution DEM, surface inflows, surface roughness and boundary conditions. TUFLOW is recognised as an industry standard 2D hydrodynamic modelling package within Australia and is well suited to the modelling of the waterways and networks within the study area.

This model was adopted instead of the existing ICM model due to TUFLOW's proficiency in riverine and Rain-on-Grid modelling. Due to the location of the site in an Urban area along the banks of a significant river, it is believed that TUFLOW is very well suited to provide an afflux assessment (estimated increase in flood water depth) for this site.

3.3 Elevation data

Several different sources of elevation data informed the creation of the hydraulic model, including:

– 1 m LiDAR for Meander Valley and Transmission Line North (Elvis, 2014)
– Detailed Survey (MVC, 2023)
– 246018-TIF – 1 m 3D design surface of the carpark and entrance (Collective, 2024)
– 246024-TIF - 1 m 3D design surface of the playground (Collective, 2024)
– Recreation Surface – 1 m 3D design surface of the recreation surface (Collective, 2024)

The elevation data was ingested into TUFLOW using a model grid cell size of two metres with a Sub Grid Sampling (SGS) distance of one metre. SGS allows the use of a larger model grid cell size whilst maintaining the topographic accuracy of a smaller grid cell size. This is done by interpreting the grid cells and applying a dynamic elevation across the cell rather than assuming a static elevation for the entire cell face. The 3D design surfaces for the carpark, playground and recreation surface are depicted in Figure 3.2.

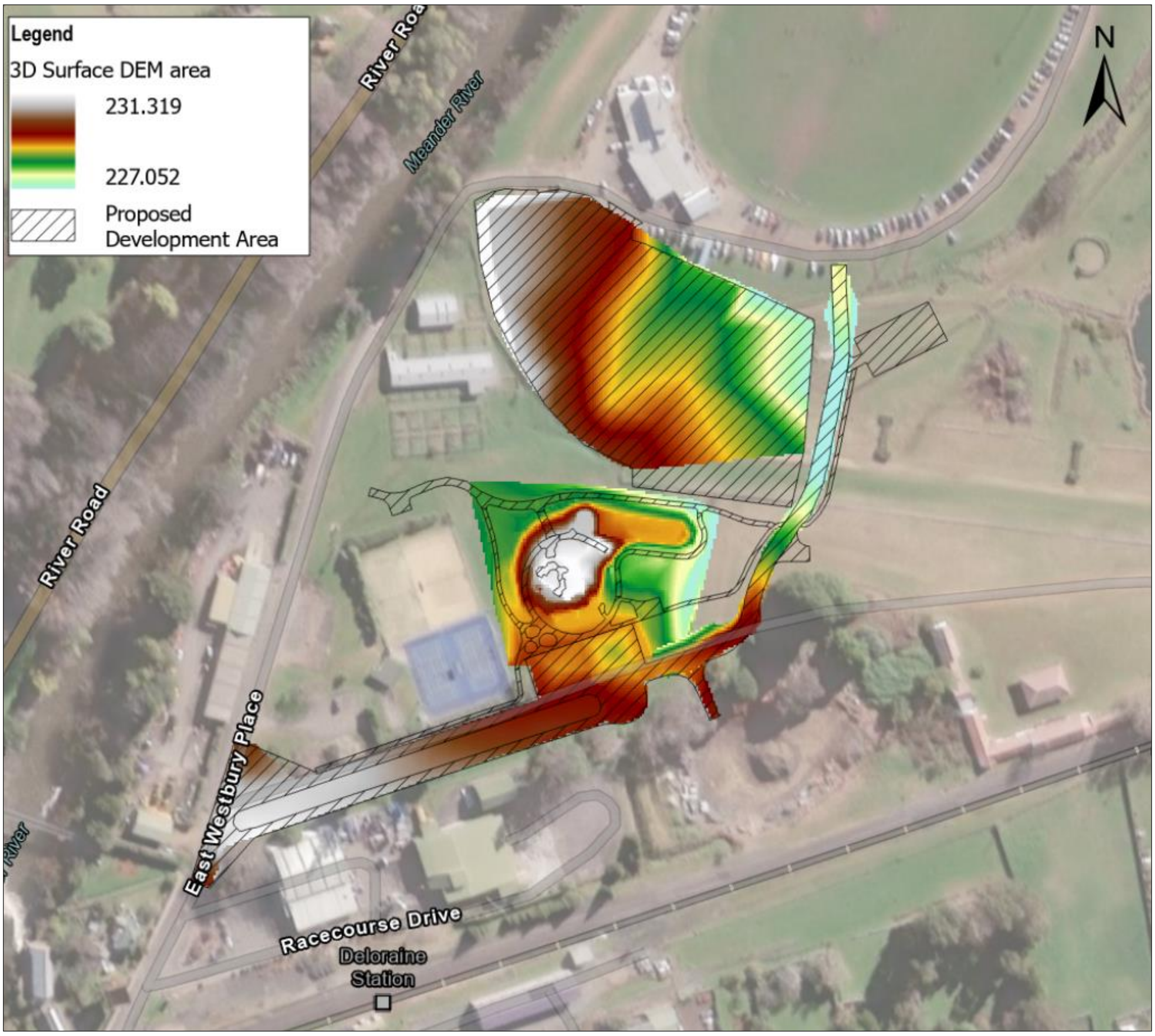


Figure 3.1 ***Map of proposed unsealed car parking, new playground and new recreation surface***

3.4 Boundary conditions

Hydrograph inflows

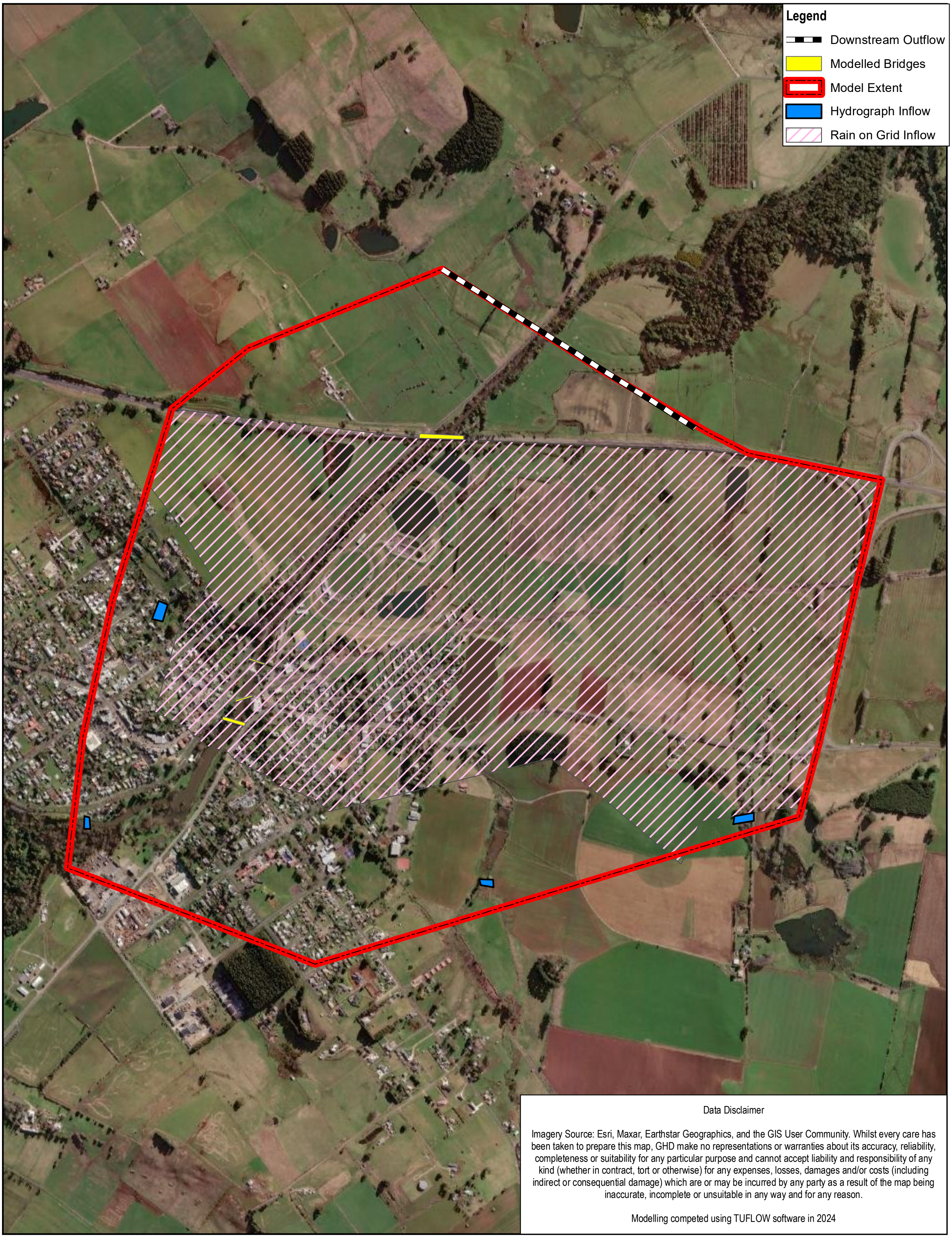
Source Area (SA) Inflows were digitised in the model to introduce catchment inflows from the hydrology into the Tuflow model. There are four such elements in the hydraulic model, the most significant of which applies the Meander River flows to the model. The locations of these inflows are depicted in Figure 3.2. Hydrographs representing catchment runoff were applied across each catchment region (within the model boundary) throughout the hydraulic model. Inflow hydrographs were sourced from the RAFTS model results.

Rain on grid inflow

A rain on grid element (2d_rf) was added to the model to apply the rainfall hyetograph across all encapsulated grid elements to simulate a real-life rainfall event. The inflow element covered the sections of the hydraulic model that were not represented in the hydrology model, its extent is depicted in Figure 3.2.

Outflow boundaries

The outflow boundary for the model was digitised as a HQ (Head vs. Flow) boundary condition across the Meander River (downstream of the bass highway) and was assigned a slope (b-factor) of 0.005 m/m. The location of this boundary condition can be seen in Figure 3.2.



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Modelling competed using TUFLOW software in 2024

Paper Size ISO A4

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Project No.	**12656735.0**
Revision No.	**A**
Date	**24 Dec 2024**

TUFLOW Model Setup

Figure 3-2

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Print date: 24 Dec 2024 - 08:14 (SMA record: 4)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius

3.5 Bridges

To simulate the effects on conveyance within the hydraulic model, bridges were modelled using TUFLOW's 2d layered flow constriction approach, this allowed the model to reflect free-flow conditions (i.e. no hydraulic losses or surcharging). The process is achieved by segmenting the bridge into three layers and assigning characteristics such as depth, blockage (%) and Factored Loss Coefficients (FLC). The distribution of these attributes is depicted in Figure 3.3 and the assigned values are detailed in Table 3.1. The values were derived using the recommendations from the Hydrologic and Hydraulic Modelling Technical Guideline (Department of Transport and Main Roads, 2019). In lieu of bridge drawings, measurements such as deck and pier thickness were estimated using aerial imagery and Google Street View, **this is an inherent limitation of the model**.

Guardrail blockage was conservatively assumed as 100% to account for the potential for debris blockage in an event as rare as a 1% AEP. The Rotary Bridge was excluded from the modelling exercise due to its geometry and stability as in an event with a flow rate as high as the 1% AEP climate change event (855 m^3/s) it is very likely that this bridge would no longer be present.

Table 3.1 Bridge modelling inputs

Description	L1_Obvert (m AHD)	L1_pBlock (%)	L1_FLC	L2_Depth (m)	L2_pBlock (%)	L2_FLC	L3_Depth (m)	L3_pBlock (%)	L3_FLC
Emu Bay Road	231.88	4.7	0.00684	0.75	100	1.6	1.0	100	1.6
TasRail Western Line Rail Bridge	232.10	10.0	0.02666	0.5	100	1.6	1.5	100	1.6
Footbridge	230.42	2.7	0.01597	0.3	100	1.6	1.0	100	1.6
Bass Highway	233.15	7.3	0.00389	2.5	100	1.6	1.0	100	1.6

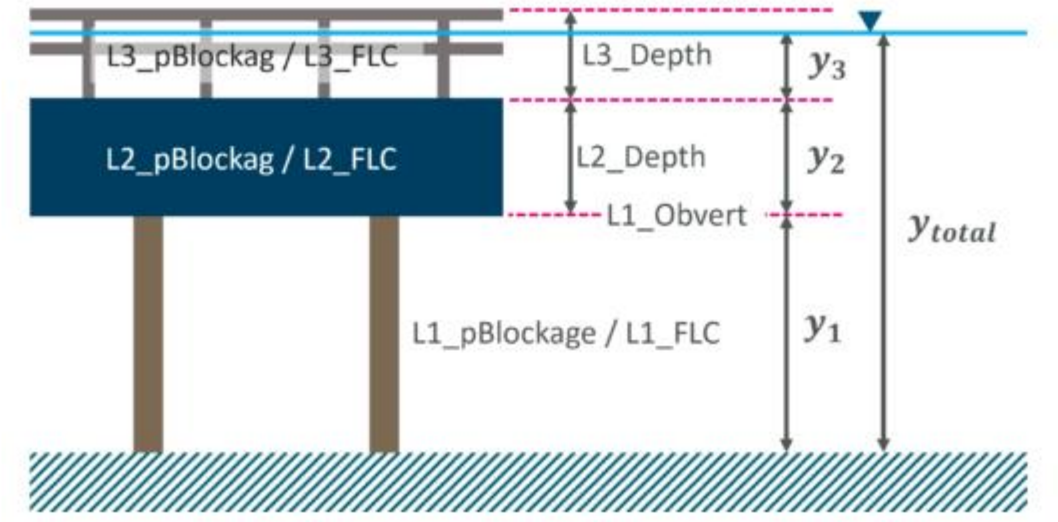

Figure 3.3 TUFLOW layered flow constriction inputs

3.6 Surface roughness

The Manning's 'n' roughness coefficient was used to represent the hydraulic resistance of surfaces in the TUFLOW model, which were reviewed and analysed using ariel imagery. The imagery demonstrated an adequate comparison to the values stated in *Open Channel Hydraulics* (Chow, 1959). The adopted values for each of the materials in the model are presented in Table 3.2 and Table 3.3 while the spatial variation of these materials is presented in Figure 3.4.

Table 3.2 Manning 'n' roughness values

Land use type	Manning's n value
Roads - asphalt	0.017
Water body	0.025
Open field – minimum vegetation	0.030
Scattered brush	0.035
Light vegetation	0.040
Dense vegetation	0.050
Commercial/industrial	0.100
High density urban	0.300

Table 3.3 Roughness Zone Parameters updated for proposed development

Land use type	Manning's n value
Compacted Gravel Path	0.017
Roads - Asphalt	0.017
Recreation Area	0.030
Playground	0.100

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Modelling competed using TUFLOW software in 2024

Paper Size ISO A4

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Mannings Discretisation

Figure 3-4

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Print date: 24 Dec 2024 - 08:14 (SMA record: 5)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius

4. Flood Modelling Assessment

The outcomes of the hydraulic modelling assessment have been depicted using maps, included as Appendix A for both the pre and post development scenarios. These maps display peak depth, velocity, and hazard, for the 1% AEP climate change event pre and post development, and include a graphical afflux assessment. The assessment indicates that the Bass Highway bridge acts as a significant hydraulic control for the catchment, while the smaller bridges upstream throughout Deloraine also have a meaningful impact on the hydraulic grade through the river reach being assessed. Further information pertaining the impacts of the proposed development have been provided in the following sections.

4.1 Flood Depth Assessment

The Deloraine Recreation Precinct flood model was simulated for the 1% AEP event under climate change conditions. The outcomes of the hydrology assessment (see Section 2.8) determined the critical event for the Meander River to be the 12 hour, temporal pattern 5 event. This event was adopted for both the existing and developed case.

General flood modelling results for different locations within the proposed development site are summarised below in Table 4.1 and Table 4.2 for pre and post development scenarios respectively. The flood afflux mapping for the modelled storms has been supplied along with peak depths and velocities for both scenarios in Appendix A.

Table 4.1 Site location modelling results for predevelopment 1% AEP climate change event

Location	Velocity (m/s)	Peak depth (m)	Hazard Category
New entrance roads and carparks	0.21	0.35	H4-H1
Playground	1.81	1.98	H5-H3
New access road and carpark near oval	0.85	2.3	H5-H2
Recreation Surface	1.8	2.3	H5-H1

Table 4.2 Site location modelling results for post development 1% AEP climate change event

Location	Velocity (m/s)	Peak flood elevation above ground level (m)	Hazard Category
New entrance roads and carparks	0.5	0.35	H1-H2
Playground	1.25	1.88	H5-H1
New access road and carpark near oval	1.08	2.3	H5-H2
Recreation Surface	1.9	2.3	H5-H1

4.2 Development Effect on Flooding

From the comparison of Pre and Post Development modelling results, the extent of flood inundation is not impacted from the proposed development. The flood risk of surrounding area including property, road and infrastructure is not increased by the proposed development at Deloraine Recreation Precinct.

4.3 Flood Hazard Classification

The severity of flooding varies depending on its behaviour, such as extent, depth, velocity, isolation, rate of rise of floodwaters, and duration. To manage flood risk, it is important to understand the potential flood behaviour and identify the relative degree of flood hazard on a floodplain. This section defines flood hazard as the potential loss of life, injury, and economic loss caused by future flood events. It also outlines methods to quantify flood hazard, which can help identify specific flood parameters and benchmark them against thresholds to better understand the danger of flooding to people, buildings, and infrastructure in the community.

The quantification and classification of flood hazard involve considering flood depth and velocity in combination. Understanding the relative degree of hazard and underlying flood behaviour is crucial as different management approaches may be required.

The combined flood hazard curves presented in Figure 4.1 set hazard thresholds that relate to the vulnerability of the community when interacting with floodwaters. The combined curves are divided into hazard classifications that relate to specific vulnerability thresholds as described in Table 4.3. Table 4.4 provides the limits for the classifications provided in Table 4.3. A flood hazard map classified against these vulnerability thresholds for the site and adjacent land is presented in Appendix A.

For full details and additional information on the flood hazard classification, please refer to the *Australian Disaster Resilience Guideline 7-3: Technical flood risk management guideline: Flood hazard, 2014, Australian Institute for Disaster Resilience.*

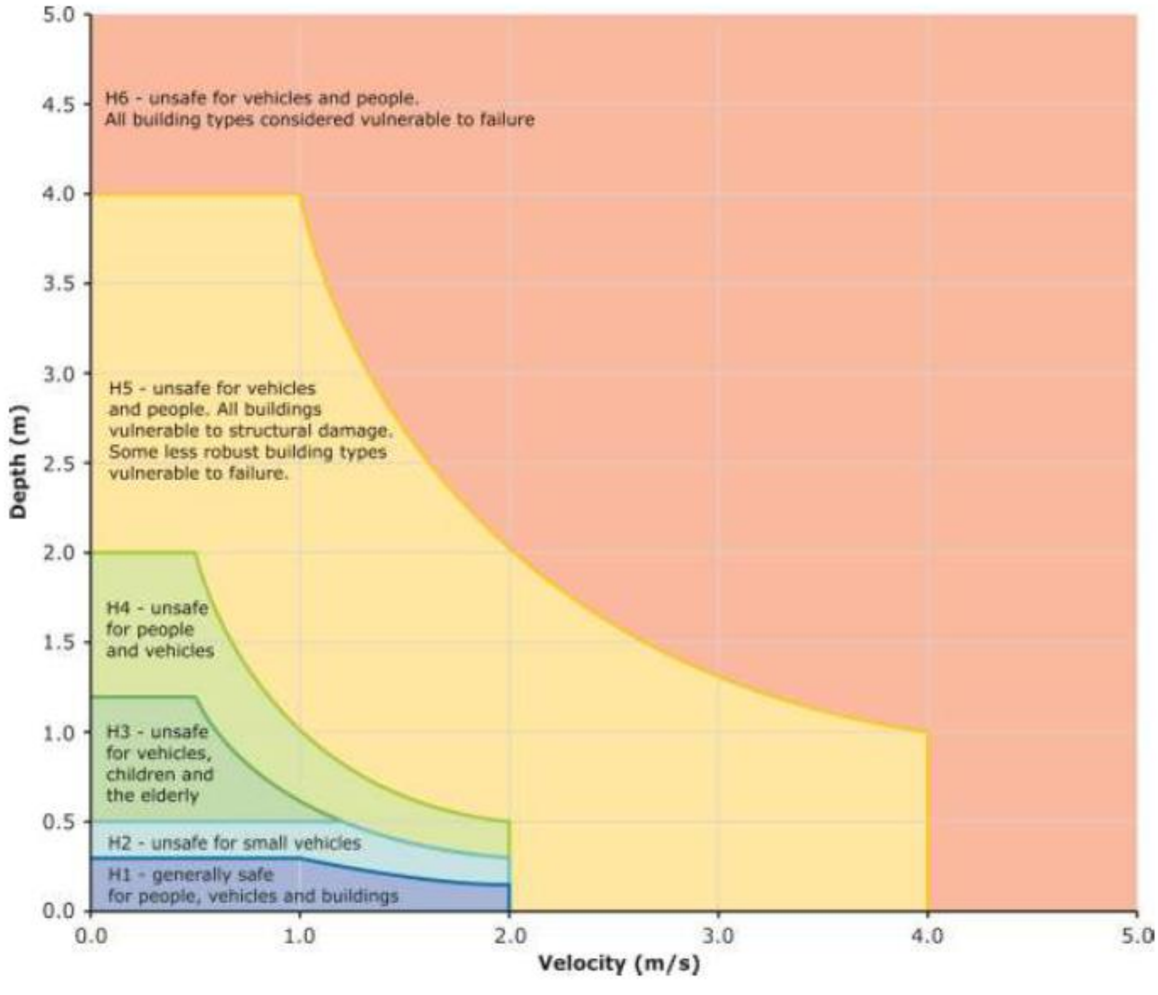


Figure 4.1 ***General flood hazard vulnerability curves***

Source: Australian Disaster Resilience Guideline 7-3:Technical flood risk management guideline: Flood hazard, 2014, Australian Institute for Disaster Resilience.

Table 4.3 ***Combined hazard curves – vulnerability thresholds***

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.

Hazard Vulnerability Classification	Description
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Table 4.4 Combined hazard curves – vulnerability thresholds classification limits

Hazard Vulnerability Classification	Classification limit (D (depth)and V (velocity) in combination) m^2/s	Limiting still water depth (D) m	Limiting velocity (V) m/s
H1	D*V ≤ 0.3	0.3	2.0
H2	D*V ≤ 0.6	0.5	2.0
H3	D*V ≤ 0.6	1.2	2.0
H4	D*V ≤ 1.0	2.0	2.0
H5	D*V ≤ 4.0	4.0	4.0
H6	D*V > 4.0	-	-

4.4 Flood Hazard Assessment

1% AEP with Climate Change flood maps are attached as Appendix A. These flood maps include depth, velocity hazard and afflux outputs. The flood hazard maps have been developed in accordance with the Australian Disaster Resilience Guideline (2014), and utilise the TUFLOW depth and flow velocity outputs to determine the different hazard vulnerability classifications as per Section 4.3.

The location of the development is subject to be inundated by 2 m and experience velocities up to 2 m/s. The Hazard map indicates that pre-development north area is classified as H2-H5 which is not safe for vehicles and people also all building types vulnerable to structural damage.

In the post development scenario, most of proposed pedestrian path, upgraded entrance road and the car pack adjacent are H1 level Generally safe for vehicles, people and buildings. Although the small part of the pedestrian path, entrance road to existing football oval and the temporary carpark are still not safe for vehicles and people under 1% AEP climate change event.

5. Flood-Prone Areas Hazard Code Assessment

The performance criteria requirements of Clause C12.6, Development Standards for Buildings and Works, Performance Criteria P1.1 and P1.2, of the Tasmanian Planning Scheme – Meander Valley Council, Flood-Prone Areas Hazard Code are addressed below with consideration to the proposed development works, flood model results, and flood hazard assessment, detailed in this report.

5.1 Clause C12.6 Development Standards

C12.6.1 Buildings and works within a flood-prone hazard area		
Objective: That: (a) building and works within a flood-prone hazard area can achieve and maintain a tolerable risk from flood; and (b) buildings and works do not increase the risk from flood to adjacent land and public infrastructure.		
Acceptable Solutions	**Performance Criteria**	**Respond**
A1 *No Acceptable Solution*	P1.1 Buildings and works within a flood-prone hazard area must achieve and maintain a tolerable risk from a flood, having regard to: (a) the type, form, scale and intended duration of the development; (b) whether any increase in the level of risk from flood requires any specific hazard reduction or protection measures; (c) any advice from a State authority, regulated entity or a council; and (d) the advice contained in a flood hazard report.	(a) The proposed development of new roads, carparks, and outdoor recreation areas can be designed and constructed to manage the risks and impacts of flooding on the development to an acceptable level to MVC. To minimise remediation of infrastructure following flood events, the planning and design of the development should consider the selection of materials and construction methods which offer some resilience to/can withstand intermittent short term flood inundation. The development is proposed as an outdoor recreational area on a MVC controlled site which can be closed by MVC prior to and following a flood event managing the risk to site users.

C12.6.1 Buildings and works within a flood-prone hazard area		
		(b) The flood assessment detailed in this report (Section 4.4) indicated that the level of risk will not increase from the proposed development. This is demonstrated by comparing the Hazard mapping for the pre and post development scenario (see Appendix A). The flood hazard for the access road does not change from H1-H2, *'generally safe for people, vehicles and buildings/unsafe for small vehicles'*. The flood hazard for the area covered by the proposed recreation surface, playground, new sports oval access road, and carparks stays as H4-H5, which is: '*Unsafe for vehicles and people, all building types vulnerable to structural damage, some less robust building types vulnerable to failure*'. As such it is recommended that an Evacuation Plan is developed including identification of a safe area to shelter and evacuation routes. The plan should also document the process for MVC to close the site prior to and following a flood event to managing the risk to site users. Further, an Infrastructure Management and Response Plan should be developed, detailing the remediation measures covering common flood damage exceeding an acceptable level to the proposed infrastructure and the measures to be implemented to address the damage.
		(c) Occupants to follow advice given during a flood event (if any). This should be reflected in the recommended Evacuation Plan.
		(d) Recommendations above include an Evacuation Plan and an Infrastructure Management and Response Plan.
	P1.2 A flood hazard report also demonstrates that the building and works: (a) do not cause or contribute to flood on the site, on adjacent land or public infrastructure; and (b) can achieve and maintain a tolerable risk from a 1% annual exceedance probability flood event for the intended life of the use without requiring any flood protection measures.	(a) Based on the Afflux mapping for the site (see Appendix A), the proposed work is not expected to increase the level of flood risk to adjacent land or public infrastructure. Flood levels on-site are impacted by the impedance to flow introduced primarily by the proposed playground. (b) The site is at risk to a 1% AEP event both pre and post development. The introduction of the development does not further increase the risk of flooding during this event.

6. Conclusion

This report has been prepared to demonstrate that the proposed Deloraine Recreation Precinct meets the requirements of the Tasmanian Planning Scheme – Meander Valley Council's Flood-Prone Areas Hazard Code.

To assess the flood hazard of the proposed site, a 1% AEP Climate change event was assessed in the TUFLOW modelling platform to determine the afflux potential and change in hazard rating for the site. The results indicate afflux can be expected to exceed 200 mm directly at the site, however, afflux is limited to the immediate vicinity of the development. Based on the modelling, the introduction of the development does not appear to further increase the risk of flooding during a 1% AEP climate change flood event.

Recommendations to control the risk of flood within a tolerable level include establishment of an emergency evacuation plan that considers an exit route to a designated safe area and a process to close the site prior to and following a flood event.

7. References

Babister, M., Trim, A., Testoni, I. and Retallick, M. 2016. The Australian Rainfall and Runoff Datahub, 37th Hydrology and Water Resources Symposium Queenstown NZ

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) Australian Rainfall and Runoff: A Guide to Flood Estimation, © Commonwealth of Australia (Geoscience Australia), Version 4.2, 2019.

CSIRO and Bureau of Meteorology (2015), Climate Change in Australia, Projections for Australia's NRM Regions. Technical Report, CSIRO and Bureau of Meteorology, Australia. Retrieved from www.climatechangeinaustralia.gov.au/en [http://www.climatechangeinaustralia.gov.au/en].

IPCC (Intergovernmental Panel on Climate Change) (2013), Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. [Stocker, T.F., and others (Eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA.

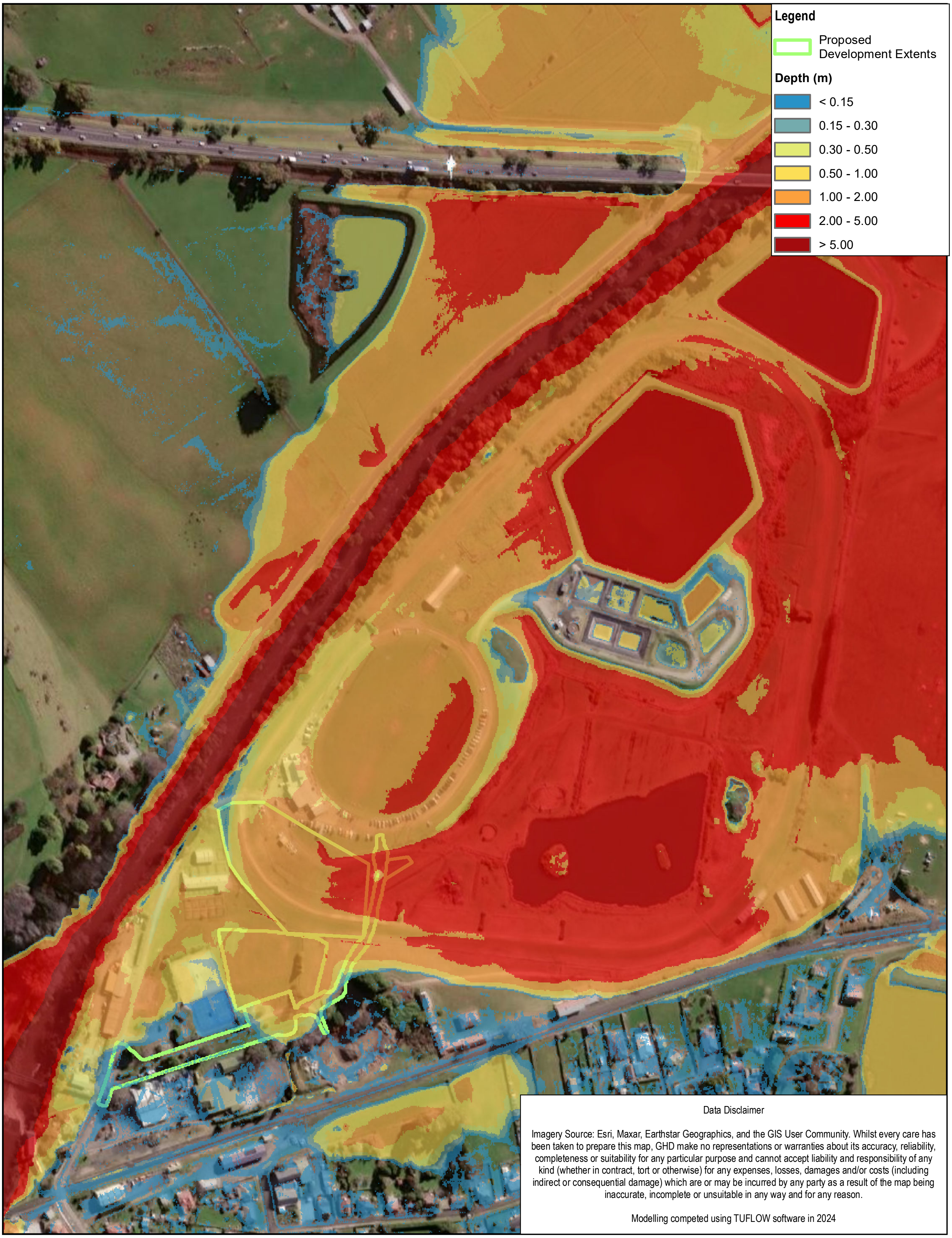
Australian Institute for Disaster Resilience CC BY-NC, 2014, Australian Disaster Resilience Guideline 7-3:Technical flood risk management guideline: Flood hazard,

Hydrofynamica, 2015, Deloraine Flood Plain Mapping Review for Meander Valley Council

Appendices

Appendix A

Flood Mapping



Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Existing Scenario
1% AEP Climate Change
Flood Depth and Extent

Project No. **12656735.0**
Revision No. **A**
Date **24 Dec 2024**

Figure A-1

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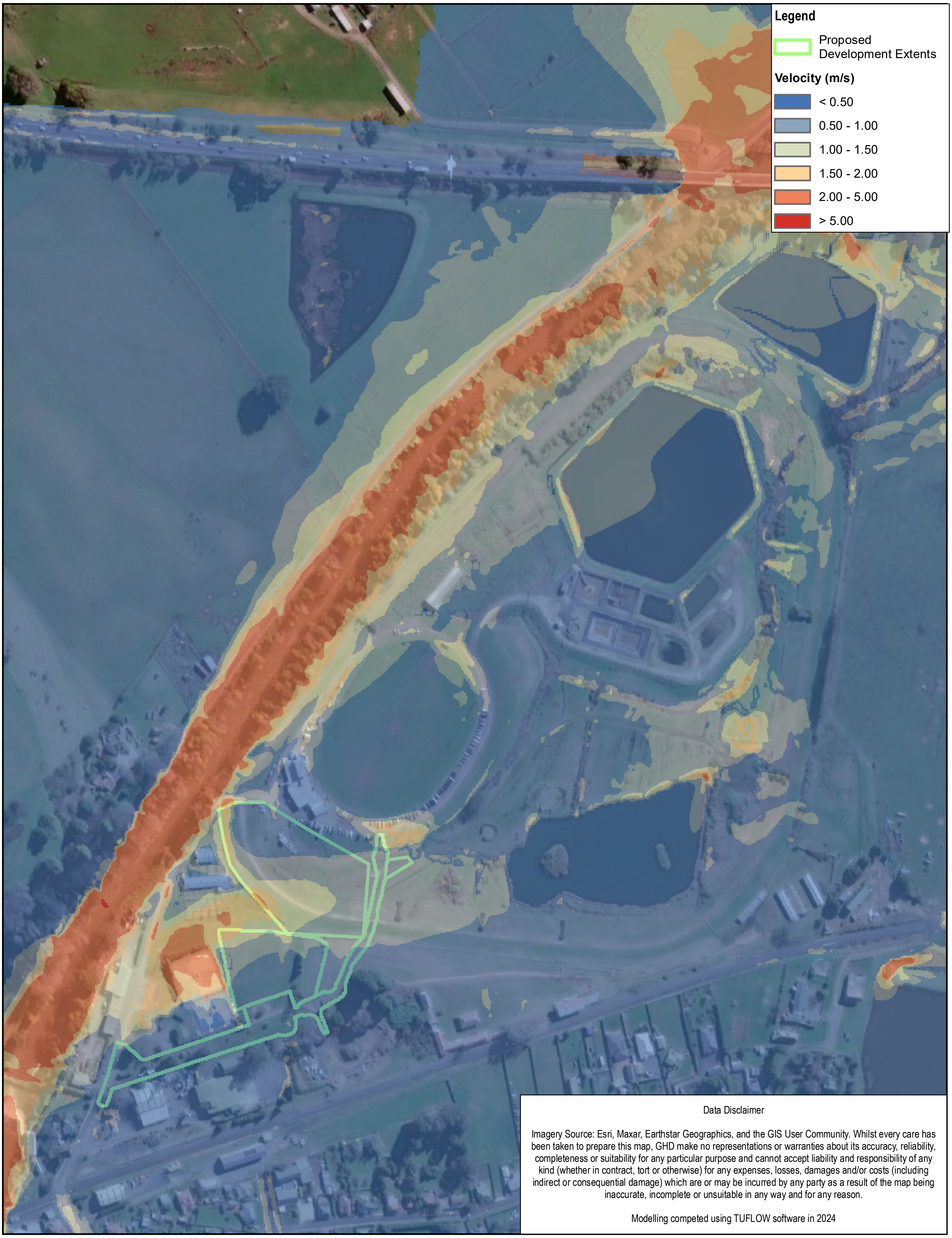

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Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Existing Scenario
1% AEP Climate Change
Velocity

Project No. **12656735.0**
Revision No. **A**
Date **24 Dec 2024**

Figure A-2

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Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Existing Scenario
1% AEP Climate Change
Hazard

Project No. 12656735.0
Revision No. A
Date 24 Dec 2024

Figure A-3

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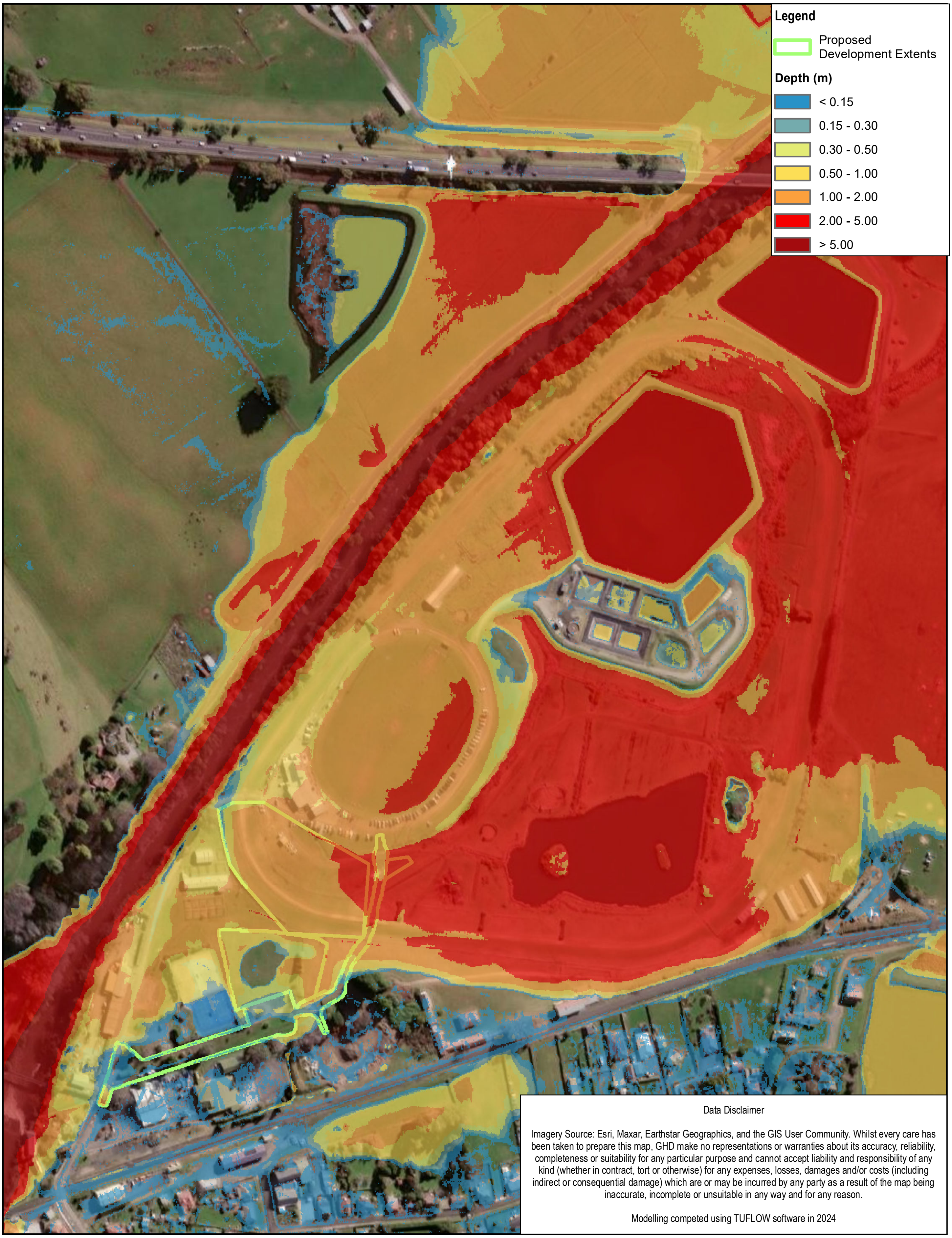

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Modelling competed using TUFLOW software in 2024

Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Design Scenario
1% AEP Climate Change
Flood Depth and Extent

Project No. 12656735.0
Revision No. A
Date 24 Dec 2024

Figure A-4

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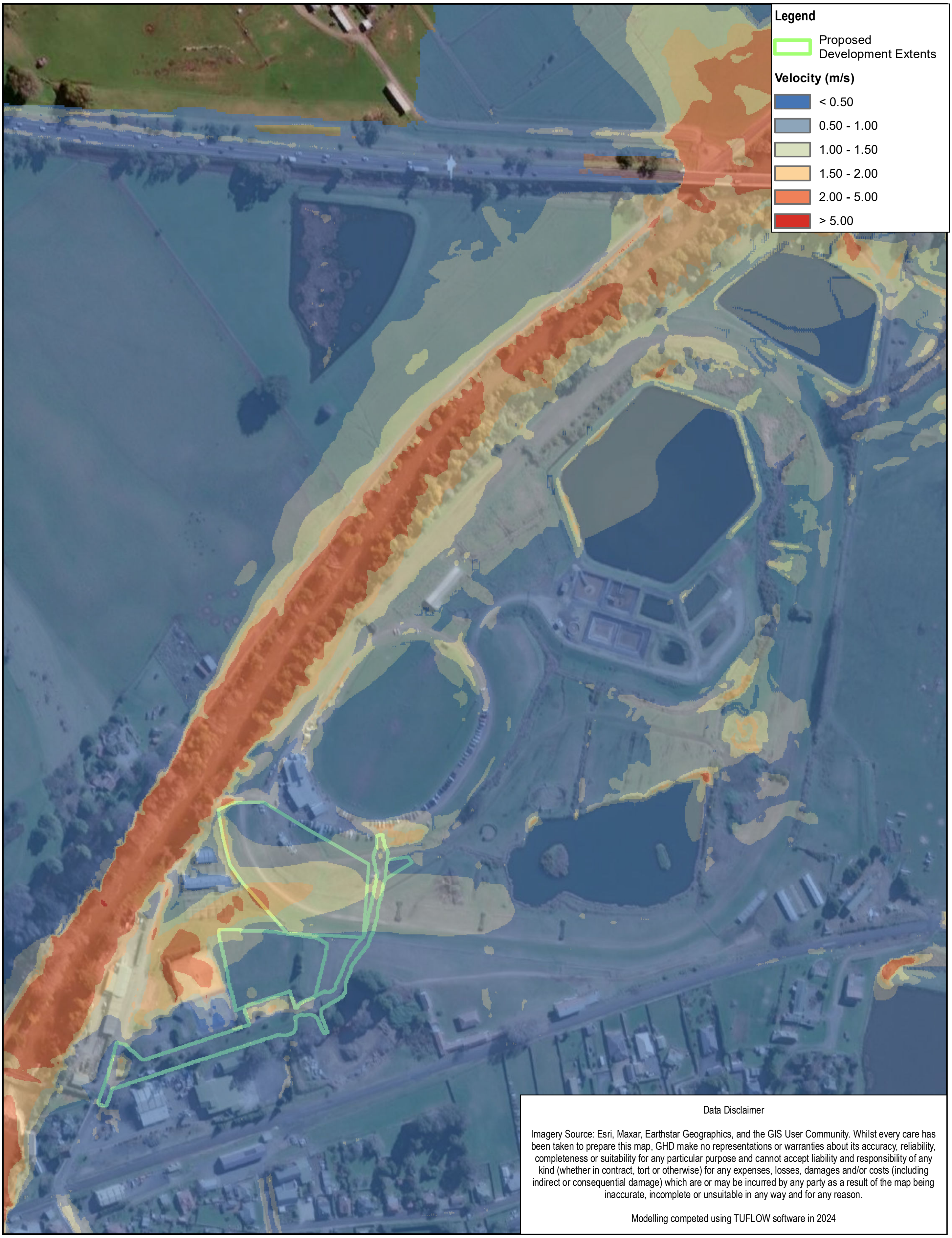

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Modelling competed using TUFLOW software in 2024

Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GHD

Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Design Scenario
1% AEP Climate Change
Velocity

Project No. **12656735.0**
Revision No. **A**
Date **24 Dec 2024**

Figure A-5

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Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius

Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Deloraine Recreation Precinct
Flood Hazard Report

Design Scenario
1% AEP Climate Change
Hazard

Project No. **12656735.0**
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Figure A-6

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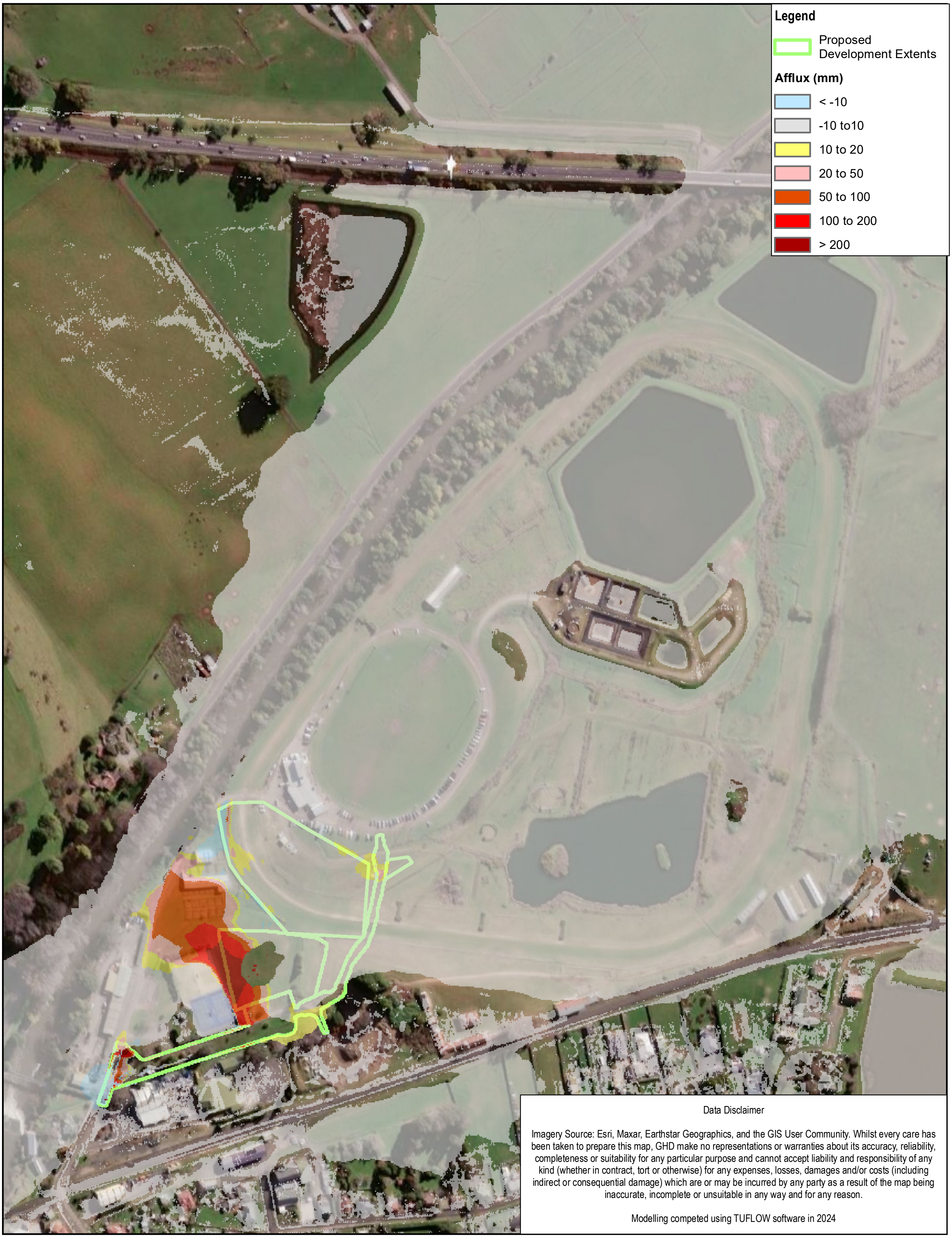

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Meander Valley Council
Deloraine Recreation Precinct
Flood Hazard Report

Flood Afflux
1% AEP Climate Change

Project No. **12656735.0**
Revision No. **A**
Date **24 Dec 2024**

Figure A-7

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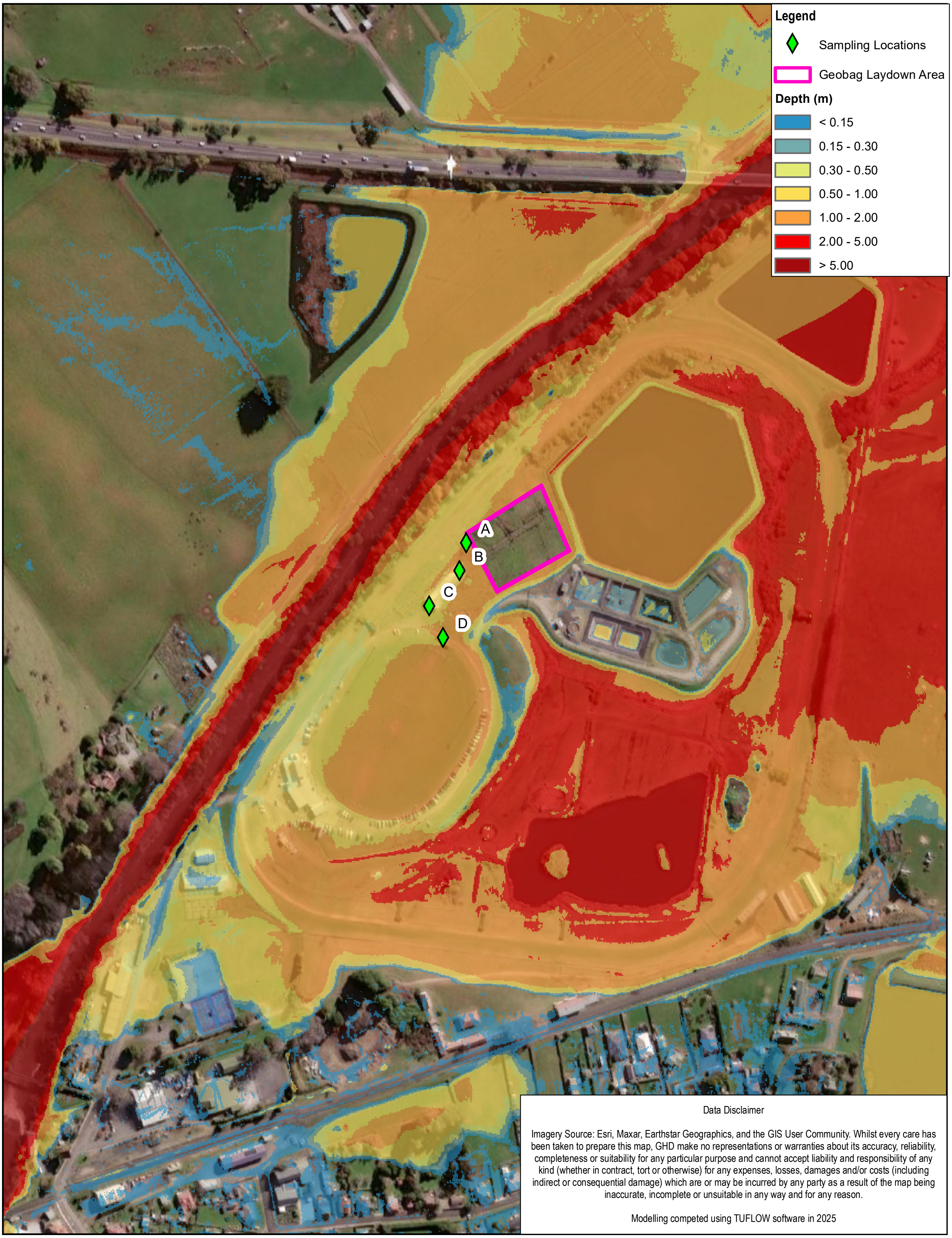
Appendix B

Flood Mapping



Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

TasWater
Deloraine STP Desludging
Flood Hazard Report

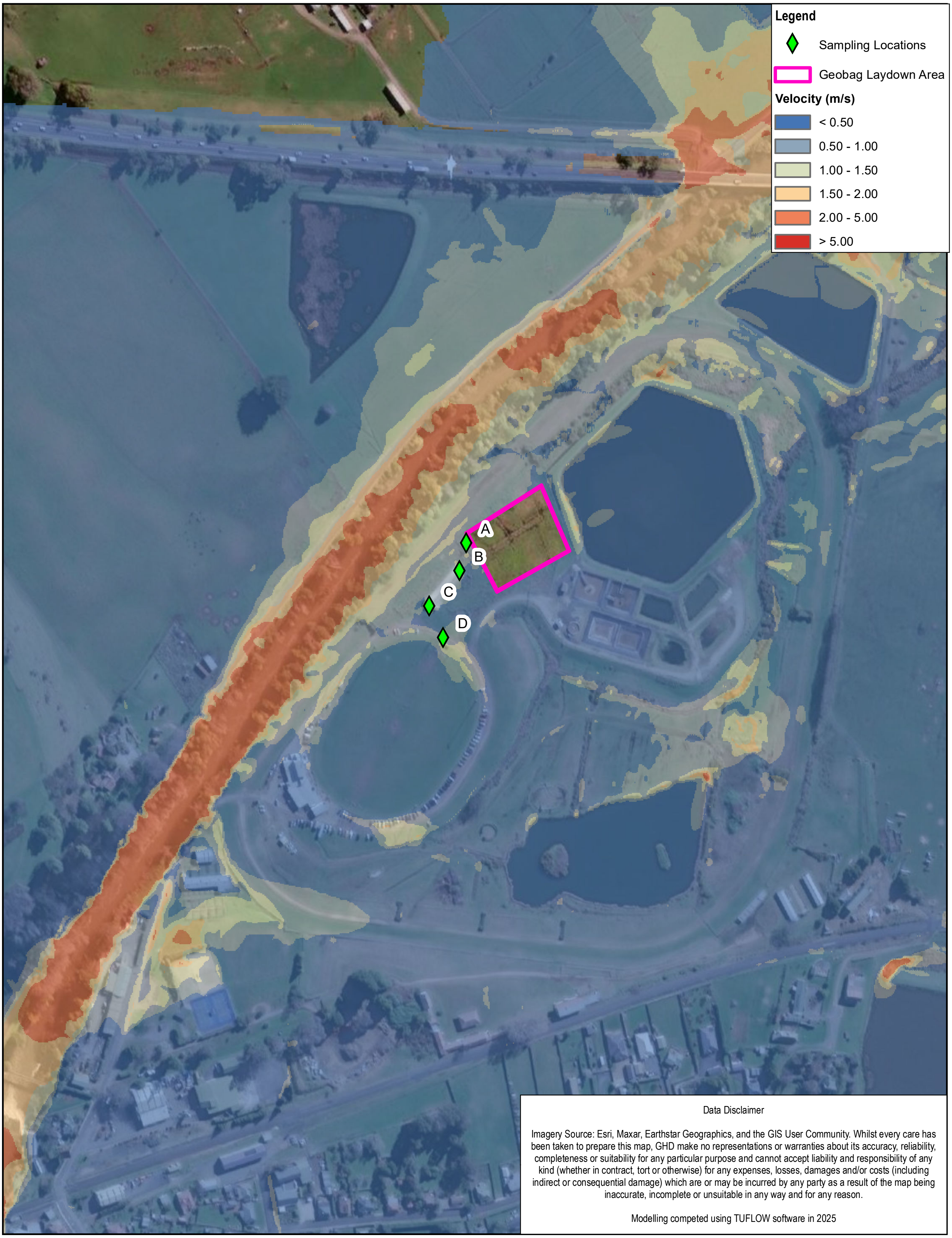
Existing Scenario
1% AEP Climate Uplift
Flood Depth and Extent

Project No. **12684100**
Revision No. **0**
Date **03 Dec 2025**

Figure B-1

D:\Users\dagius\OneDrive - GHD\Projects\12684100 - Deloraine Desludging Project\HH\03_GIS\SMA Mapping\12684100_SMA.mxd
Print date: 03 Dec 2025 - 12:56 (SMA record: 6)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius



Data Disclaimer

Imagery Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Whilst every care has been taken to prepare this map, GHD make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Modelling competed using TUFLOW software in 2025

Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

TasWater
Deloraine STP Desludging
Flood Hazard Report

Existing Scenario
1% AEP Climate Uplift
Velocity

Project No. **12684100**
Revision No. **0**
Date **03 Dec 2025**

Figure B-2

D:\Users\dagius\OneDrive - GHD\Projects\12684100 - Deloraine Desludging Project\HH\03_GIS\SMA Mapping\12684100_SMA.mxd
Print date: 03 Dec 2025 - 12:56 (SMA record: 7)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius

Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

TasWater
Deloraine STP Desludging
Flood Hazard Report

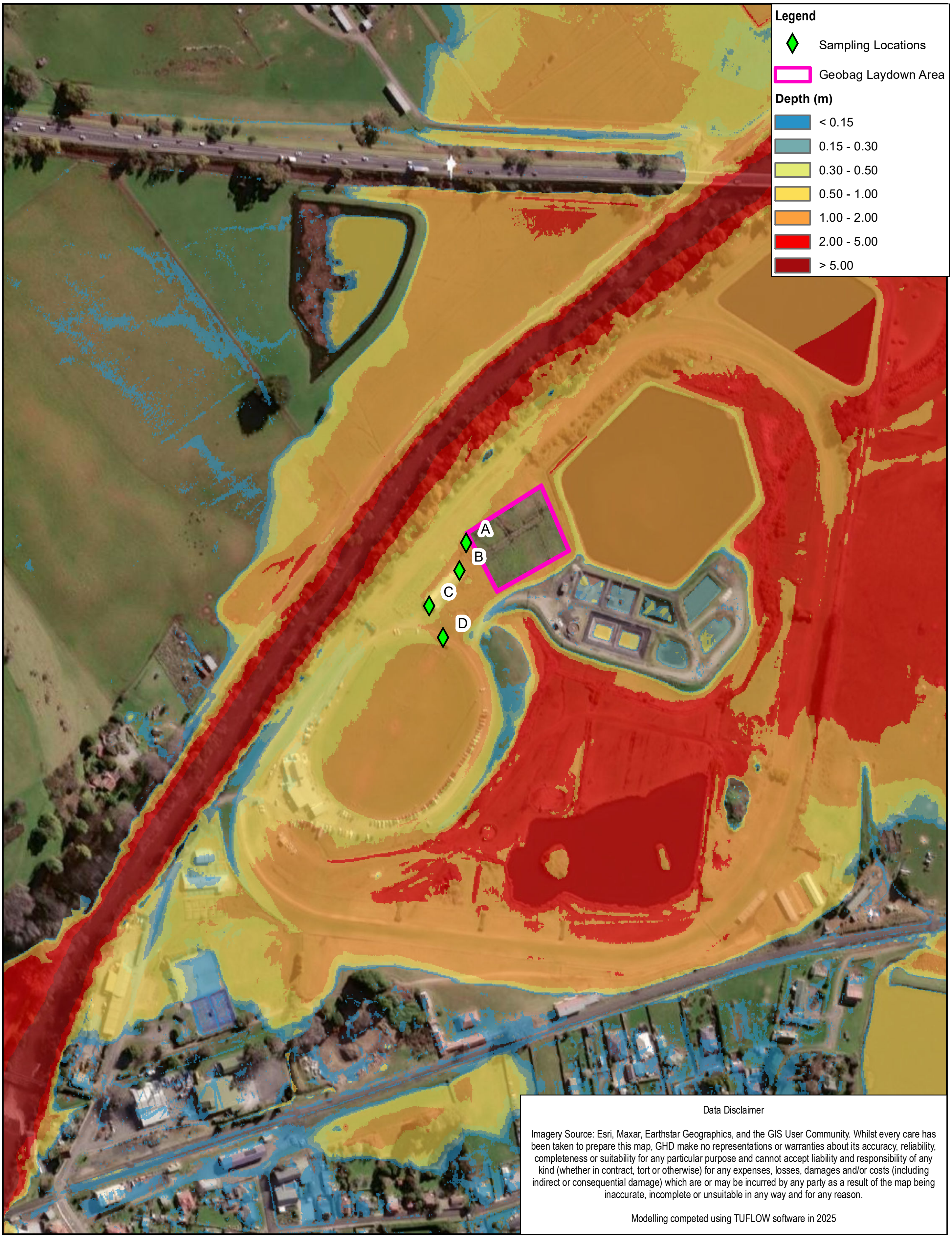
Existing Scenario 1% AEP Climate Uplift Hazard

Project No. **12684100**
Revision No. **0**
Date **03 Dec 2025**

Figure B-3

D:\Users\dagius\OneDrive - GHD\Projects\12684100 - Deloraine Desludging Project\HH\03_GIS\SMA Mapping\12684100_SMA.mxd
Print date: 03 Dec 2025 - 12:56 (SMA record: 8)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius



Data Disclaimer

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Modelling competed using TUFLOW software in 2025

Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

TasWater
Deloraine STP Desludging
Flood Hazard Report

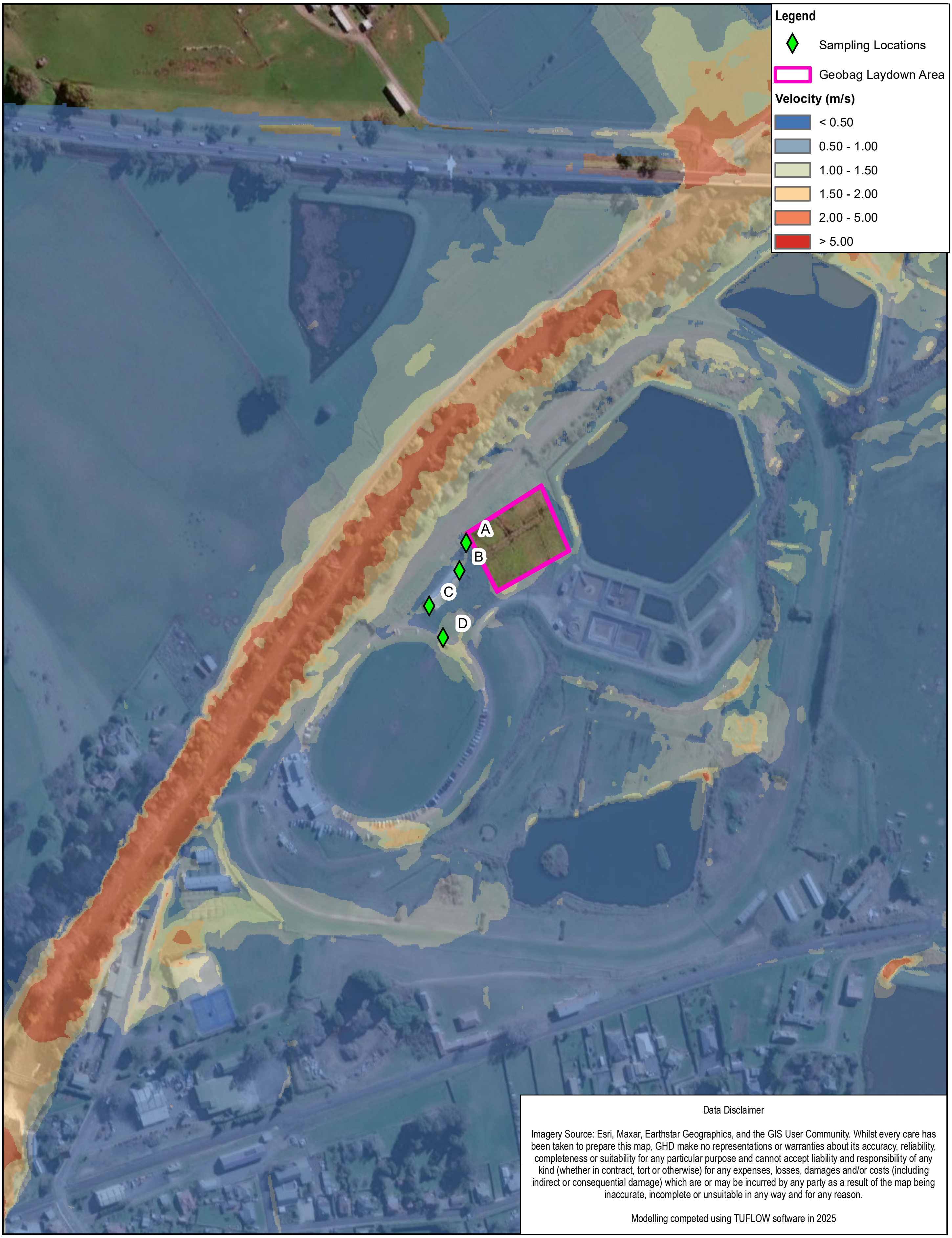
Design Scenario
1% AEP Climate Uplift
Flood Depth and Extent

Project No. **12684100**
Revision No. **0**
Date **03 Dec 2025**

Figure B-4

D:\Users\dagius\OneDrive - GHD\Projects\12684100 - Deloraine Desludging Project\HH\03_GIS\SMA Mapping\12684100_SMA.mxd
Print date: 03 Dec 2025 - 12:56 (SMA record: 9)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius



Data Disclaimer

Imagery Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Whilst every care has been taken to prepare this map, GHD make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Modelling competed using TUFLOW software in 2025

Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

TasWater
Deloraine STP Desludging
Flood Hazard Report

Design Scenario
1% AEP Climate Uplift
Velocity

Project No. **12684100**
Revision No. **0**
Date **03 Dec 2025**

Figure B-5

D:\Users\dagius\OneDrive - GHD\Projects\12684100 - Deloraine Desludging Project\HH\03_GIS\SMA Mapping\12684100_SMA.mxd
Print date: 03 Dec 2025 - 12:56 (SMA record: 10)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius

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Modelling competed using TUFLOW software in 2025

Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

TasWater
Deloraine STP Desludging
Flood Hazard Report

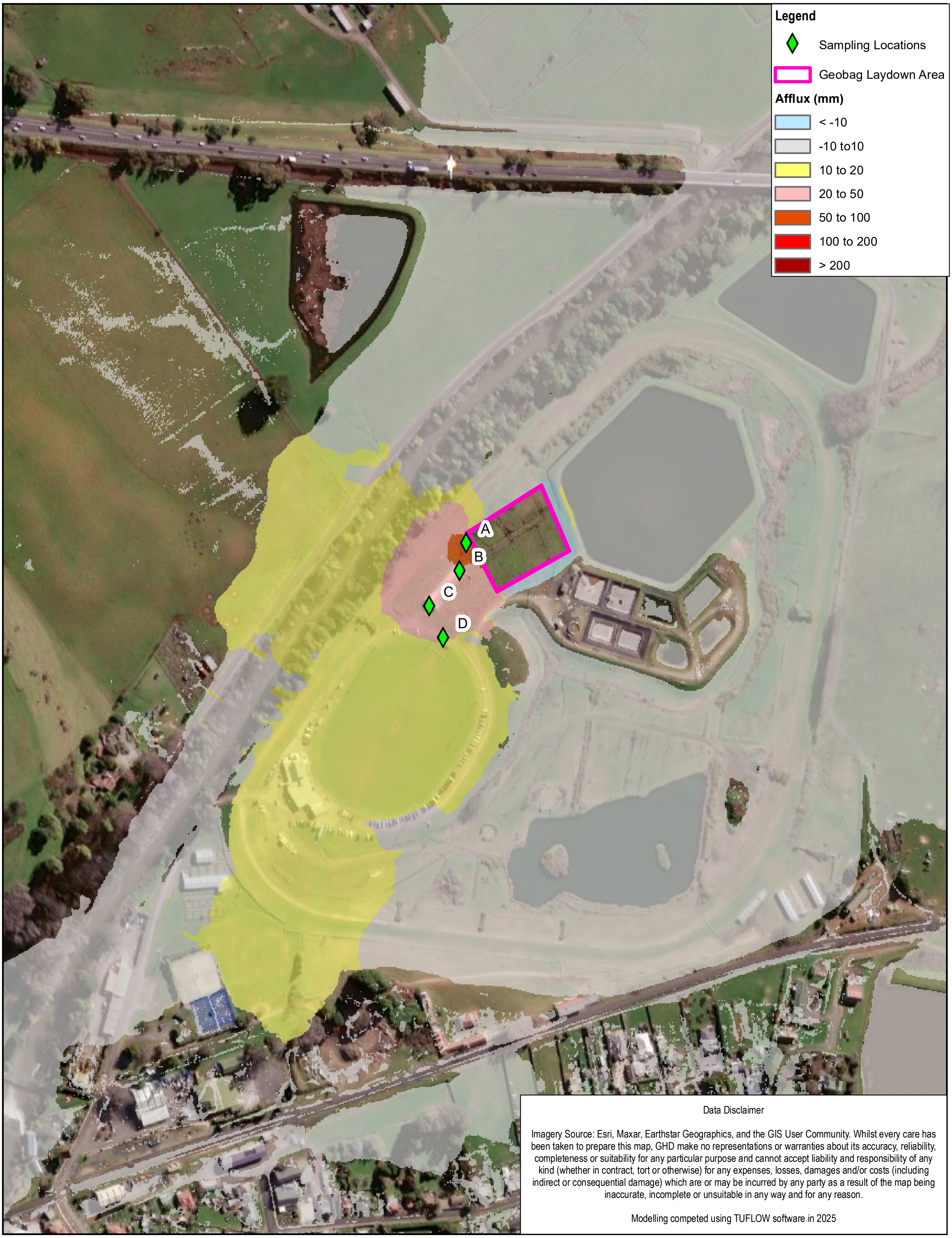
Design Scenario
1% AEP Climate Uplift
Hazard

Project No. **12684100**
Revision No. **0**
Date **03 Dec 2025**

Figure B-6

D:\Users\dagius\OneDrive - GHD\Projects\12684100 - Deloraine Desludging Project\HH\03_GIS\SMA Mapping\12684100_SMA.mxd
Print date: 03 Dec 2025 - 12:56 (SMA record: 11)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius



Data Disclaimer

Imagery Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Whilst every care has been taken to prepare this map, GHD make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Modelling competed using TUFLOW software in 2025

Paper Size ISO A4

0 0.03 0.06 0.09 0.12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

TasWater
Deloraine STP Desludging
Flood Hazard Report

Flood Afflux
1% AEP Climate Uplift

Project No. **12684100**
Revision No. **0**
Date **03 Dec 2025**

Figure B-7

D:\Users\dagius\OneDrive - GHD\Projects\12684100 - Deloraine Desludging Project\HH\03_GIS\SMA Mapping\12684100_SMA.mxd
Print date: 03 Dec 2025 - 12:56 (SMA record: 12)

Data source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: dagius

ghd.com

→ The Power of Commitment

Natasha Whiteley

From: Verdouw, Jeremy <Jeremy.Verdouw@taswater.com.au>
Sent: Wednesday, 4 February 2026 11:05 AM
To: Planning - Meander Valley Council
Cc: Environment Mailbox; French, Darren
Subject: RE: PA\26\0162 - S56 & 51A Request for Fees - 6 Racecourse Drive, Deloraine - Geobags

Hi Natasha,
I have received conformation from the TasWater Accounts team that the planning fee was paid on the 22 of December 2026. Please follow up with your accounts to team to ensure payment went through at their end.
I have provided additional required information below – responses are in red:
1. Council consent
The proposal is located on Council land. Consent from the General Manager in accordance with Section 52(1B) of the Act is required, including a letter and signature on the application form.
Please note that unless you want to arrange for this to provided earlier, Council's Town Planner will request this consent from the General Manager upon payment of the application fees and the submission of the additional information requested below.
TasWater is happy for this request for consent to made by the town planner on our behalf.
2. Full details of proposal
Please provide a full description and/or plans of the proposal, including at least the following:
• Any site works at the laydown area;
Site works will include:

- Scraping away the grass surface and levelling any humps and bumps
- Digging a small sump at the STP end of the laydown area approx. 1m wide x 1m long and 2m deep
- Building up of a small bund wall around the entire perimeter of the laydown area approx. 0.5m high
- Once levelled with a 2 degree slope back to the sump, the area will be lined with geofabric and then a sealed PVC liner. The liner will be weighted down by soil in the perimeter bund.
- Geobags will then be rolled out and hooked up to the sludge dredge as required during the desludging process. Ie. bags will be gradually filled up 2 or 3 at a time before additional bags are rolled out.

- Works will be completed by excavation machinery by our lagoon desludging contractor - Armstrong Resource Management

• Details of the proposed fencing of the laydown area and if this will provide screening of the geobags from the surrounding public open spaces;

Proposed fencing would be temporary construction fencing. The proposed laydown area will be situated well away from the main public use areas, TasWater therefore see no need to include additional screening as a part of the fencing.

• Further details of how the geobags are used, including if there will be any commercial vehicles, plant and equipment operating on the site during the set up and decommissioning phases;

Geobags will be gradually filled with sludge - generally 2-3 bags at a time. Sludge flows are alternated between bags to allow time for excess water to drain out before returning flows to the bag.

Preparation of the site will require use of a 20T excavator as well as a front end loader carry the gebags and geofabric into place. Commercial vehicles such as flatbed trucks for transporting equipment and utes for general day to day activities will also be used during set up and decommissioning phases.

• The operating hours of the set up and decommissioning phases; and

Standard operating hours of 7am to 5pm will be adhered to throughout the desludging works

• The expected maximum duration of the temporary use.

Desludging works will take up to 4 months. The sludge will be left to sit in the Geobags for a further 12 months to allow sufficient dewatering prior to land spreading. In total the maximum duration of the temporary laydown area is expected to be 16 months.

3. Emissions – Odour

Please advise if the proposal is expected to generate odour or any other emissions, both during the set up and ongoing presence of the geo bags and if so, how these emissions will be managed.

No odour is expected to be generated during the preparation of the laydown area and minimal to no odour is expected to be generated during the desludging works. The sludge being removed from the Deloraine polishing lagoon is secondary treated sludge which has had many years to break down in the base of the lagoon. It is

therefore very inert and is unlikely to generate any odour. Once contained in the Geobag any minimal odour will be contained very effectively with the Geobag.
It would be helpful if TasWater could advise the attenuation distance for the use within the context of Table C9.2 of the Attenuation Code of the Tasmanian Planning Scheme.
The proposed laydown area will basically sit within existing STP site area and we don't anticipate any additional odour emissions to the that currently being generated by the STP. The current buffer distance to closest occupied dwellings is 500 to 750m which is substantial. We have no recent records of odour complaints from Deloraine STP and don't anticipate any additional odours being generated as a result of the proposed desludging activity.

Please let me know if you require anything further to progress the review and approval of this application.
Kind regards,

Jeremy Verdouw
Senior Environmental Scientist - Biosolids

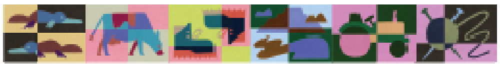
TasWater

M +61 434 879 262
E Jeremy.Verdouw@taswater.com.au
A GPO Box 1393, Hobart, TAS 7001
10-18 Birdwood Avenue, Moonah, TAS 7009
—
taswater.com.au

From: Planning - Meander Valley Council
Sent: Monday, 2 February 2026 4:35 PM
To: Verdouw, Jeremy
Subject: PA\26\0162 - S56 & 51A Request for Fees - 6 Racecourse Drive, Deloraine - Geobags

Dear Jeremy
Please find attached a letter requesting payment of the application fees, along with additional information which has been identified as necessary to assess the application.
Kind Regards
Natasha

Planning - Meander Valley Council
Meander Valley Council
E: planning@mvc.tas.gov.au
P: 03 6393 5300



MEANDER VALLEY

26 Lyall Street Westbury, TAS 7303
PO Box 102, Westbury Tasmania 7303

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