Technical Memorandum:
Review of MW Proposed DSS for Casey Fields South (Employment) and Devon Meadows PSPs

Date: 31/03/2025

Project Number: 2101096, 2102129, 2300328

Project Name: Casey Fields South (Employment) & Devon Meadows PSP drainage strategy consultation

Authors: [redacted]

Reviewer: [redacted]

Version: 1

1. OVERVIEW

- Beveridge Williams (BW) have been commissioned by Villawood Pty Ltd, Pask Group and [redacted] and [redacted] of 1805 South Gippsland Highway to provide specialist water resources engineering advice during the consultation phase for the Casey Fields South (Employment) & Devon Meadows precinct structure plan (PSP) drainage strategy.
- A significant body of work has been completed to date by GHD and other specialists into the proposed drainage as well as groundwater and hydrogeology for the site. The following reports and their supporting RORB and MUSICX models were provided to BW for review:
    - Interim Report – Casey Fields South (Employment) and Devon Meadows Precinct Structure Plan, GHD, 21st Feb 2025
    - Drainage Strategy for 3 PSPs in South East Melbourne – Hydrogeological Desktop Assessment, GHD, 1st August 2022
    - Groundwater Investigations – Devon Meadows DSS and Five Ways Road DSS, GHD, 4th November 2024
- Representatives from BW have attended all 4 consultation sessions run by the Victorian Planning Authority (VPA) and Melbourne Water (MW) and have met directly with MW representatives to discuss the proposal.
- During the consultation meetings concerns have been identified by BW and other parties around the following issues:
    - The diversion channel proposed to divert flows across catchments from Devon Meadows to the future Clyde South PSP via Casey Fields;
    - Presence of significant unknowns such as impact to Clyde South PSP and downstream agricultural land;
    - No clear direction around the implementation of the latest climate change guidelines;
    - Staging of the proposed development, especially focused on the absence of downstream waterways to accept flows;
    - The amount of land proposed to be used for waterways, retarding basins and wetlands;
    - The lack of alignments with other planning objectives such as efficient urban form.
- This memorandum summarises BW's preliminary investigations including:
    - High level review of planning and objectives
    - High level review of site context
    - Review of GHD's current proposal
    - Outlining some alternative ideas to manage stormwater through this site

- It is noted that due to the relatively short consultation period and the complexity of problem at hand, this submission will be followed by a more detailed supplementary submission that will provide additional modelling, cost estimates etc. to assist with resolving the identified issues.

2. PLANNING CONTEXT AND SCHEME OBJECTIVES

- The study area for this memorandum is the Casey Fields South (Employment) & Devon Meadows PSPs and the neighbouring Clyde South PSP which has not yet commenced.
- The PSP areas are presented on the figure below.
- The PSP areas interact with 8 Melbourne Water Drainage Services Schemes (DSS) which are:
    - Devon Meadows DSS (2362) – In development in conjunction with PSP
    - Clyde Five Ways Rd DSS (2367) – In development in conjunction with PSP
    - Moore Rd DSS (2368) - In development in conjunction with PSP
    - Clyde Township DSS (2373) – To be developed with Clyde South PSP; Downstream of Casey Fields South PSP
    - Botanic Ridge DSS (2352) – In progress; located upstream of and drains into Devon Meadows
    - Junction Village North DSS (2365) – In progress; located upstream of and drains into Junction Village South
    - Junction Village South DSS (2363) – Not yet commenced construction; located upstream of and drains into Clyde Five Ways Rd DSS
    - Casey Fields South DSS (2364) – Completed; located upstream of and drains Moore Rd DSS
- There are 2 key areas downstream of the PSP's that are relevant to this assessment:
    - Existing Devon Meadows to the south of the proposed Devon Meadows PSP
    - The existing green wedge area to the south and east of future Clyde South PSP that is used for agriculture.
- The stormwater and flooding related controls for the PSPs are:
    - Flood control: ensure that flooding is appropriately managed through the PSP for the nominated design event. This requires appropriate capacity of assets with sufficient freeboard to surrounding properties and no detrimental impacts to adjacent (upstream and downstream) areas. It is noted that due to the release of ARR2019 version 4.2 and the latest climate change guidelines, design events are now required to account for climate change. Melbourne Water have not yet nominated a climate change projection required to select the design event.
    - Peak Runoff Control: implement retarding basins and other measures to ensure that peak runoff during the design event does not exceed pre-development conditions where the DSS ends
    - Volume Control: implement measures to ensure that the overall volume of flows discharging from the site (including frequent events) does not significantly increase as a result of development;
    - Water Quality Control: implement water sensitive design measures such constructed wetlands and sediment ponds to ensure that best practice water quality targets are achieved and receiving waters are protected from pollutants and excess nutrients.
- Other considerations for the drainage strategy are:
    - Socially and Economically Sustainable: The proposed design needs to be as cost effective as possible so as to be affordable for the community to operate and maintain
    - Considerate of other planning requirements: The proposed design needs to be sensitive to other requirements such as environmental protection, habitat, heritage requirements, open space requirements, and efficient urban layout
    - Minimise earthworks requirements: earthworks can be destructive, expensive and generate pollution and CO_2 emissions. The proposed design should work closely with the natural terrain to minimise earthworks requirements for the scheme and surrounding urban areas
    - Implementability: the design should consider the means by which the scheme is staged and delivered. There should be a clear process by which the scheme can be delivered without

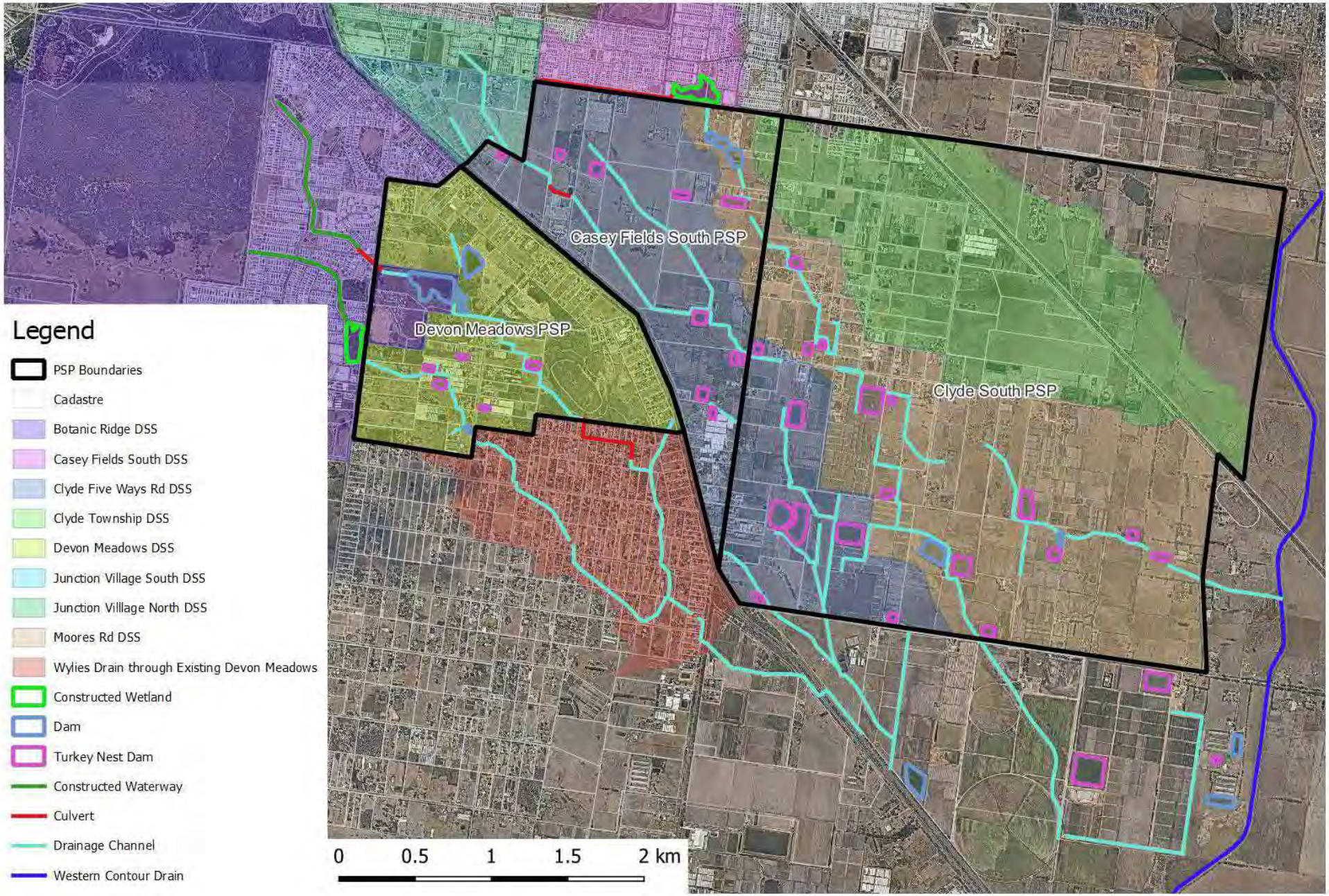
overreliance on temporary assets, and assets should be located on properties where there is sufficient other development available to fund the scheme works.

- Groundwater management: the study area is known for high groundwater levels and will need careful design to avoid impact to the groundwater table.
- Opportunities for water reuse: the proposed scheme should identify opportunities to capture and reuse stormwater, especially in the context of the downstream agricultural areas.
- Melbourne Water Wetland Preferences: Verbal feedback from Melbourne Water is that their maintenance team have reported that small to medium sized wetlands are performing well and their large end of line wetlands are not. As such they would like to see several smaller wetlands rather than one large wetland. MW have also noted that they do not want wetlands to discharge to downstream wetlands and flows should aim to bypass instead;
- Amenity and Public Use: Where possible, scheme assets should be configured to provide value/amenity to the community in the form of public open space. They should also aim to integrate, where possible, remnant vegetation and habitat.

3. SITE ANALYSIS

- A site context plan is presented below
- The most significant receiving waterbody near the subject site is the Western Contour Drain which conveys flows to Western Port Bay
- Flows internal to the study area are captured and conveyed to the Western Contour Drain via the network of channels, dams, and floodways. In many locations, the channels have been filled or dammed to capture low flows for agricultural purposes.
- The channels, dams and basins mapped in the study area are based on detailed 1m LiDAR (2023) and detailed 0.15mm pixel aerial photography (Feb 2025). It is noted in some areas that the observed channels differ from the registered waterways on record.
- Each sub-area in the study area is characterised as follows:
  - Devon Meadows DSS (2362)
    - Predominantly rural residential and farms
    - Bounded to the north and east by the South Gippsland Highway
    - Low grades between 0-1%, but with ridges between the existing floodways that can reach 10m higher than the invert of the floodway
    - Some areas of valuable remnant vegetation
    - Degraded/fragmented waterways with water extracted to nearby Turkey Nest Dams
    - Very high groundwater levels
    - Identified as high risk for indigenous heritage
    - Receives flows on the western side from Botanic Ridge
    - Discharges to existing Devon Meadows to the south in 4 locations
  - Clyde Five Ways Rd DSS (2367)
    - Predominantly rural residential and farms
    - Low grades between 0-1%, ridges between the existing floodways only reach 3-4m higher than the invert of the floodway
    - Bisected by existing Clyde Five Ways Road. There are existing culverts under the road, but based on the available information are small and are probably inadequate to convey the 1% AEP.
    - Upstream of Clyde Five Ways Road, the drainage lines are relatively well defined except where the gully has been filled by the existing school (Lighthouse College) and the channel replaced with 4 x 0.9m pipes
    - Downstream of Clyde Five Ways Rd waterways are mostly degraded/fragmented with water extracted to nearby Turkey Nest Dams
    - Receives flows from Junction Village South DSS

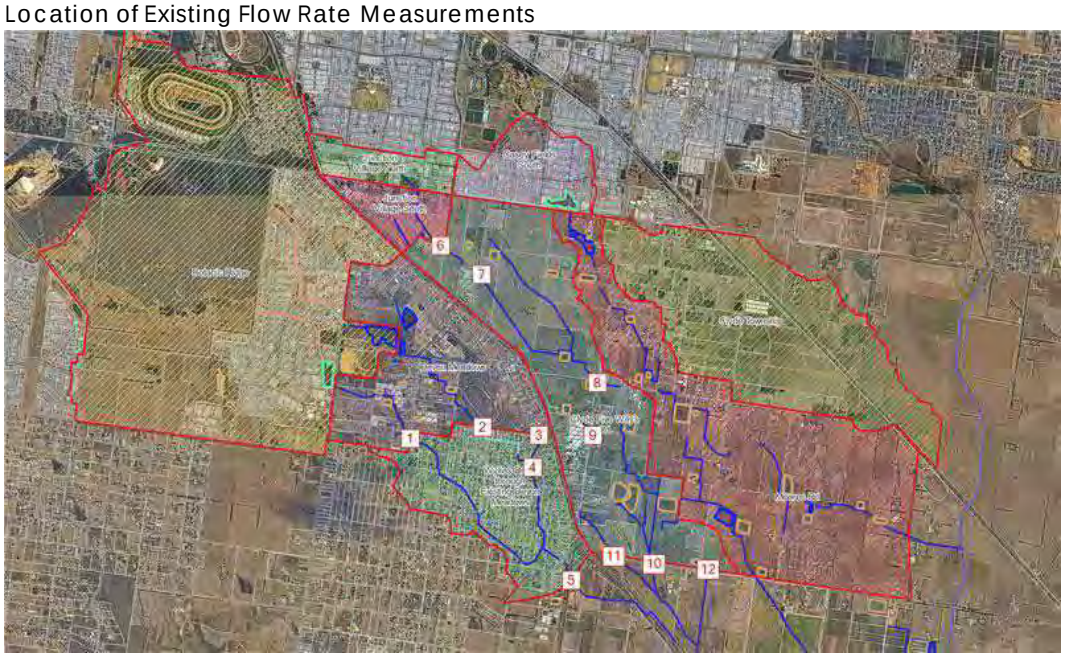
        - Discharges to the Green Wedge Zone via existing culverts under Manks Rd. Capacity of these culverts is also likely limited considering Manks Rd is only elevated approximately 1m above the invert of the channel.
    - Moore Rd DSS (2368)
        - Predominantly rural residential and farms
        - Low grades between 0-1%, ridges between the existing floodways only reach 3-4m higher than the invert of the floodway
        - Degraded/fragmented waterways with water extracted to nearby Turkey Nest Dams
        - Receives flows from Casey Fields South DSS
        - Has a small catchment that discharges south via Manks Rd
        - Predominantly Discharges to the east
    - Clyde Township DSS (2373)
        - Predominantly rural residential and farms
        - Low grades between 0-1%, ridges between the existing floodways only reach 3-4m higher than the invert of the floodway
        - Degraded/fragmented waterways with water extracted to nearby Turkey Nest Dams
        - Predominantly Discharges to the east
    - Botanic Ridge DSS (2352)
        - Residential development area mostly complete with constructed waterways.
        - Some retarding basins appear to still be in construction
        - Includes some upstream areas that are vegetated/forested
    - Junction Village North DSS (2365)
        - Residential subdivision mostly complete with house construction yet to commence
    - Junction Village South DSS (2363)
        - Mostly rural residential and light industrial
        - No new development or scheme works completed
    - Casey Fields South DSS (2364)
        - Residential development and DSS works complete
    - Existing Devon Meadows
        - Existing residential area consisting of mostly rural residential
        - Drainage in this area relies on 2 main drainage channels that pass through the existing lots. The channel is typically about 8m wide and 1.2m deep.
        - Several areas of the existing drainage channel have been modified/filled by the current landowners. Probably the biggest concern is the resident at 23 Fisheries Rd who has filled the channel and replaced it with a single 0.9m pipe blocking the entire outfall here.
    - Green Wedge Agricultural Area
        - Predominantly rural residential and farms
        - Low grades between 0-1%, ridges between the existing floodways only reach 3-4m higher than the invert of the floodway
        - Degraded/fragmented waterways with water extracted to nearby Turkey Nest Dams
        - Predominantly Discharges to the east


Casey Fields South PSP
Devon Meadows PSP
Clyde South PSP
Legend
PSP Boundaries
Cadastre
Botanic Ridge DSS
Casey Fields South DSS
Clyde Five Ways Rd DSS
Clyde Township DSS
Devon Meadows DSS
Junction Village South DSS
Junction Villlage North DSS
Moores Rd DSS
Wylies Drain through Existing Devon Meadows
Constructed Wetland
Dam
Turkey Nest Dam
Constructed Waterway
Culvert
Drainage Channel
Western Contour Drain
0
0.5
1
1.5
2 km

To better understand the baseline hydrologic/hydraulic conditions:

- BW have adopted GHDs hydrology model, and extended the Devon Meadows model to include the catchment down to Fisheries Road
- BW have run the model with GHDs input data and updated to include the SSP2 100 year and SSP5 100 year climate change assumptions.
- Due to time constraints, only flows in Devon Meadows DSS and Clyde Five Ways Rd DSS have been assessed. BW proposes to further expand the model in our supplementary submission.
- Key locations are presented in the figure below with peak flow rates for critical storms presented in the table below. The results indicate that depending on the climate change assumption, flows could increase by approximately 50% (SSP2) or even up to 100% (SSP5).
- BW have built a preliminary TUFLOW model using 1m LiDAR and GHDs hydrologic inputs. Similar to the hydrology, only flows in Devon Meadows DSS and Clyde Five Ways Rd DSS have been assessed at this stage. Flood maps showing extents, depths and hazard are enclosed with this memorandum.
- The flood mapping indicates that the current LSIO and Urban Flood Zone extents are out of date and probably based on old and/or coarse data (such as the 10m Vicgrid elevation data) and so do not give a good understanding of conditions in the study area.
- The flood results indicate that:
    - The study area is characterised by many areas of breakout/complex flow paths especially where the channels have been dammed or filled by farmers or the existing landowners in Devon Meadows.
    - The majority of sheet flow areas are shallow and low hazard
    - Areas of higher hazard occur in the channels and areas where water ponds at culvert crossings and existing dams.
- Based on discussions with MW, a key area for assessment was the volumetric discharge from Devon Meadows DSS area to downstream properties. Verbally, MW have indicated that this concern is based on anecdotal evidence only.
- BW have prepared a water balance model based on hydrology inputs previous model for a subdivision in Botanic Ridge that covers a 50 year period to 2020. This model will be provided with the detailed supplementary sub87mission, but a summary of key output is presented below.
- The water balance modelling indicates that the development of Devon Meadows will increase the volumetric runoff by an average of 550 ML per year. As shown in calculations below, this volume would be enough to fill a large farm dam and could be conveyed under gravity by a single 225mm pipe.

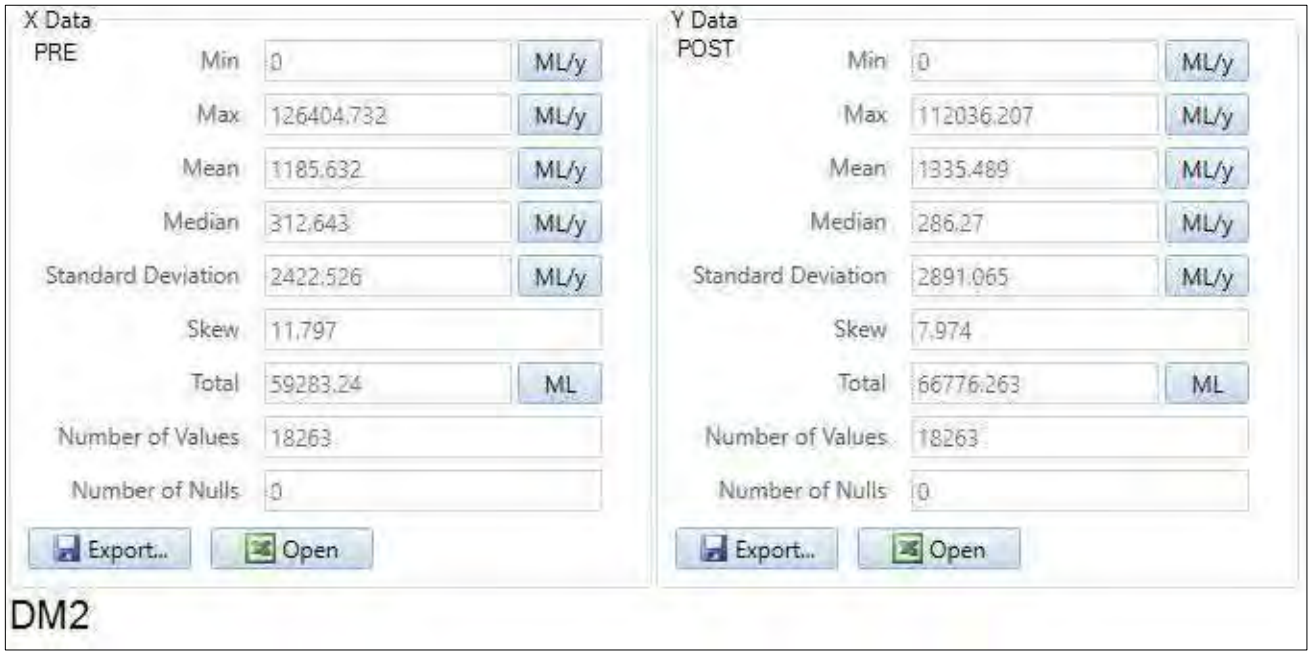
Location of Existing Flow Rate Measurements

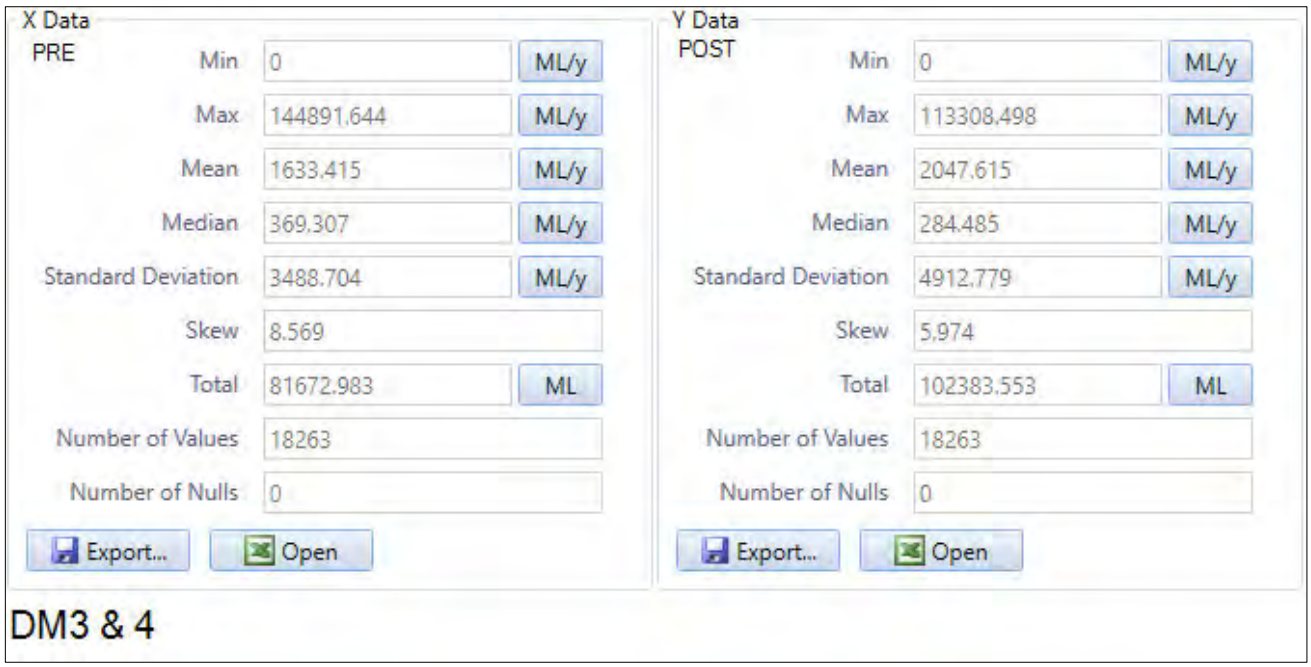


Existing Peak Flow Rates Summary

Location	Description	Event	Critical Peak Flow (m^3/s)	Critical Duration
1	Future Basin DM2 Discharge	1% AEP Current	6.87	12-hour
		1% AEP SSP2 2100	10.25	6-hour
		1% AEP SSP5 2100	16.70	4.5-hour
2	Future Basin DM3 Discharge and location of existing 1350mm pipe	1% AEP Current	6.00	9-hour
		1% AEP SSP2 2100	10.39	4.5-hour
		1% AEP SSP5 2100	16.99	1.5-hour
3	Future Basin DM4 Discharge	1% AEP Current	3.73	1.5-hour
		1% AEP SSP2 2100	5.95	1-hour
		1% AEP SSP5 2100	8.74	1-hour
4	Wylies Drain Confluence of DM3 and DM4 Discharge	1% AEP Current	8.13	4.5-hour
		1% AEP SSP2 2100	12.81	3-hour
		1% AEP SSP5 2100	19.48	3-hour
5	Wylies Drain at Fisheries Road	1% AEP Current	16.50	4.5-hour
		1% AEP SSP2 2100	23.77	3-hour
		1% AEP SSP5 2100	33.43	4.5-hour
6	Inflow from Junction Village Wetland RB	1% AEP Current	10.18	1.5-hour
		1% AEP SSP2 2100	13.23	1.5-hour
		1% AEP SSP5 2100	22.70	1-hour
7	Flow at Discharge from School Drainage	1% AEP Current	15.70	0.5-hour
		1% AEP SSP2 2100	19.34	0.5-hour
		1% AEP SSP5 2100	30.35	0.5-hour
8	Future Basin CF3 Outfall at Clyde Five Ways Rd	1% AEP Current	13.64	3-hour
		1% AEP SSP2 2100	17.80	2-hour
		1% AEP SSP5 2100	28.48	1.5-hour
9	Existing Crossing and proposed location of Diversion Drain crossing Clyde Five Ways Rd	1% AEP Current	2.74	1-hour
		1% AEP SSP2 2100	3.61	0.75-hour
		1% AEP SSP5 2100	6.16	1-hour
10	Existing Crossing at Manks Road. Future main outfall for Clyde Five Ways Rd DSS	1% AEP Current	19.44	4.5-hour
		1% AEP SSP2 2100	25.16	4.5-hour
		1% AEP SSP5 2100	34.06	3-hour
11	Minor Outfall at Manks Rd	1% AEP Current	2.45	1-hour
		1% AEP SSP2 2100	3.09	1-hour
		1% AEP SSP5 2100	5.54	1.5-hour
12	Minor Outfall at Manks Rd	1% AEP Current	1.12	1-hour
		1% AEP SSP2 2100	1.49	1-hour
		1% AEP SSP5 2100	2.52	1-hour

Water Balance Model Preliminary Results



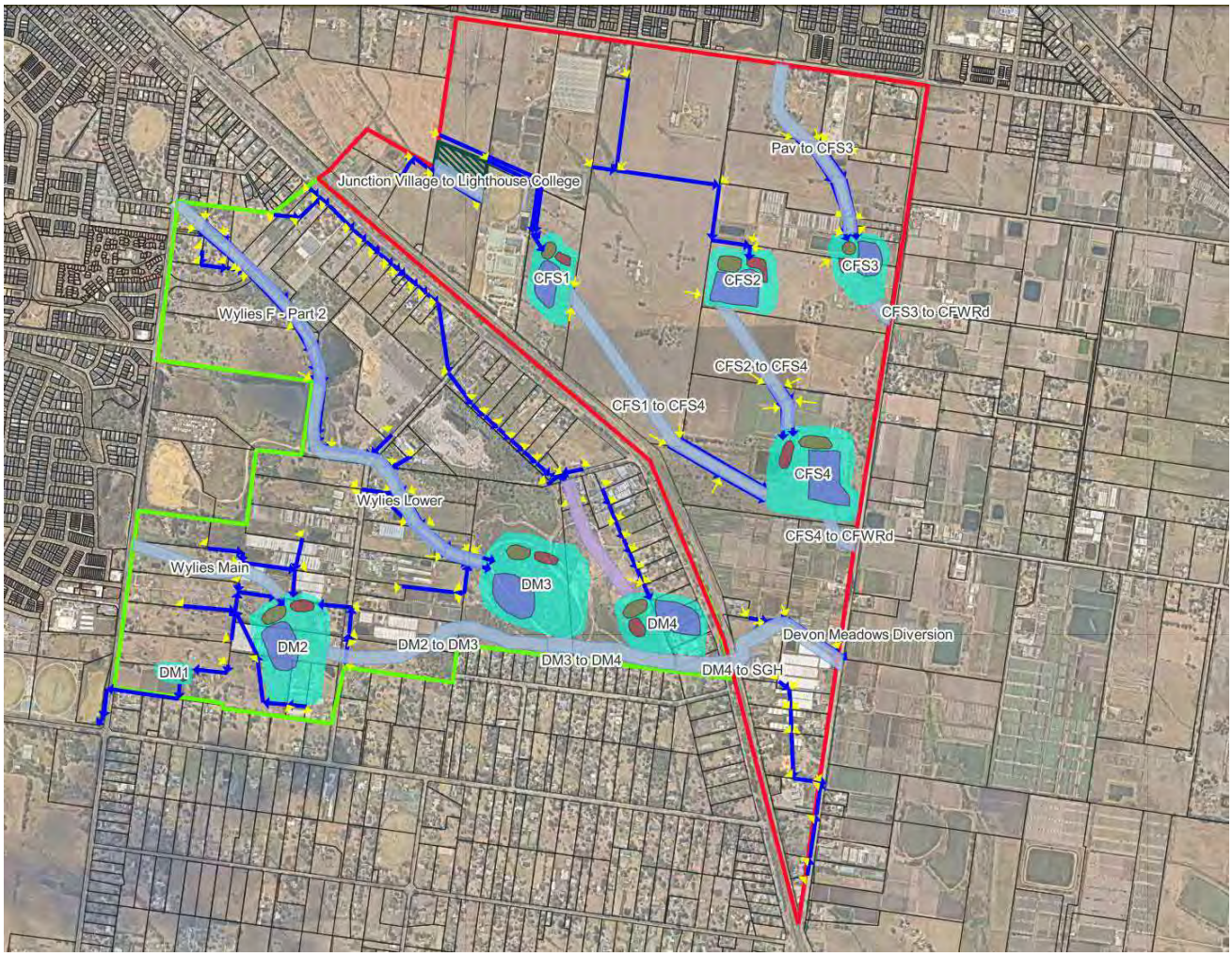


- @DM2 using the means – 1335 ML/y – 1185 ML/yr = 150 ML/yr
- @DM3&4 using the means – 2048 ML/y – 1633 ML/yr = 415 ML/yr
- Therefore, total available excess volume from Devon Meadows is approx =565 ML/y
- This is enough to fill a single 2.8ha dam approx 2m deep every year, which is comparable to some of the larger farm dams downstream
- If this volume was conveyed under gravity a flow rate of approx 18 L/s would be required, which could be conveyed in a single 225mm pipe at 0.5% grade (capacity approx 32 L/s)

4. REVIEW OF CURRENT PROPOSAL

- Under the current proposal from MW and GHD:
  - 4 basins (WLRB) are proposed for Devon Meadows and a further 4 basins on Casey Fields
  - 8 new constructed waterways are required including the proposed diversion channel
  - The key component of the strategy is the diversion channel is to achieve the following:
    - Divert flood flows away from downstream properties to solve flood capacity issues in existing Devon Meadows
    - Prevent increase in volume of water to downstream properties in existing Devon Meadows
  - The strategy terminates at Clyde Five Ways Road with 3 assumed connection points to the downstream channel network.
  - It is noted that the area included in the strategy does not represent the full Clyde Five Ways Rd DSS and Moore Rd DSS.

Appendix C from the GHD Report

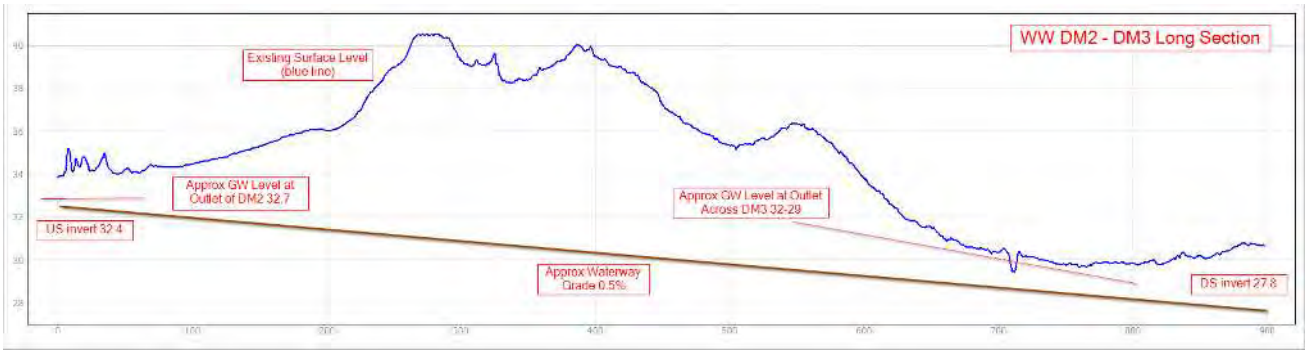


The current concerns with the proposed strategy are:

- The Diversion Channel
    - The stated purpose of this channel was to protect downstream homes in Devon Meadows from flooding and excessive increases in volumetric discharge.
    - While redirecting flows from Devon Meadows would protect these homes from the issues above, its not clear how it solves the issue. Rather it just relocates it as a problem for the landowners on Clyde South to manage until such time as they PSP/DSS can be developed and implemented. Even then, the issue would require additional assets or negotiation with downstream owners to resolve.
    - Supplementary discussions with MW have indicated that they have previously assessed flooding downstream and believe that these could be managed if flows are retarded to predevelopment at the boundary of Devon Meadows DSS. It was noted that the only real flood concern was existing properties along Facey Rd.
    - In these discussions, MW have also noted that the volumetric concern was based on anecdotal evidence (customer complaints) and not modelling or analysis.
    - Preliminary analysis of the flooding and water balance (refer previous section) conducted by BW indicates that these issues could probably be managed through more typical measures such as:
        - maintenance and minor capacity augmentation of the downstream channel to something like a 10m wide grassed channel (not a 40m waterway), which would require minimal property acquisition to achieve
        - retarding basins to ensure pre-development flow rates at the boundary
        - capture and retention of ~565 ML/y of flows in the basin and a diversion pipe in the order of 225mm to direct it to the farmland downstream for re-use
        - A more modest diversion between DM3 and DM4 before connecting to the existing Wylies Drain channel to protect homes along Facey Rd.
    - With regards to the actual implementability of the channel:
        - BW have used the 1m LiDAR and levels summarised in GHDs report to try and understand how the channel works with the terrain and groundwater levels.
        - Preliminary analysis indicates that the diversion channel requires significant cut to achieve the required levels, particularly between basins DM2 and DM3.
        - At its deepest, up to 10m of cut will be required which, with the proposed 1:5 batters, could require a reserve width of up to 100m at its widest rather than the 45m shown on GHDs concept plan. This would require a significant volume of earthworks to achieve with the associated significant cost.
        - When compared with GHD's groundwater observations, it appears that significant sections of the channel are proposed to be below the groundwater level which raises several key issues:
            - If groundwater is allowed to enter the channel, then this is essentially a groundwater extraction and diversion system that will convey an unknown volume of groundwater into Clyde South
            - If the channel is lined somehow to exclude groundwater, then this is a significant obstruction to the natural groundwater flow which may cause issues upstream in future Devon Meadows. Its also not clear how this would affect downstream groundwater users (human or environmental)
            - Considering the size and scale of the works, the groundwater interaction will complicate the construction methodology further adding cost.
        - The final consideration is that the outfall for this channel is still not negotiated and will require significant culvert upgrades under the South Gippsland Highway and Clyde Five Ways Road. There is also no channel for it to connect to downstream of Clyde Five Ways Road.
    - In summary, the proposed channel appears to be a drastic and expensive measure directed at solving a problem that was not properly assessed/quantified. It does not appear to even resolve

the perceived issue, instead just relocating it to a different location. We recommend abandoning the diversion channel proposal and focusing on a different solution to protect homes in Devon Meadows.

Long Section of the Diversion Channel Between DM2 and DM3

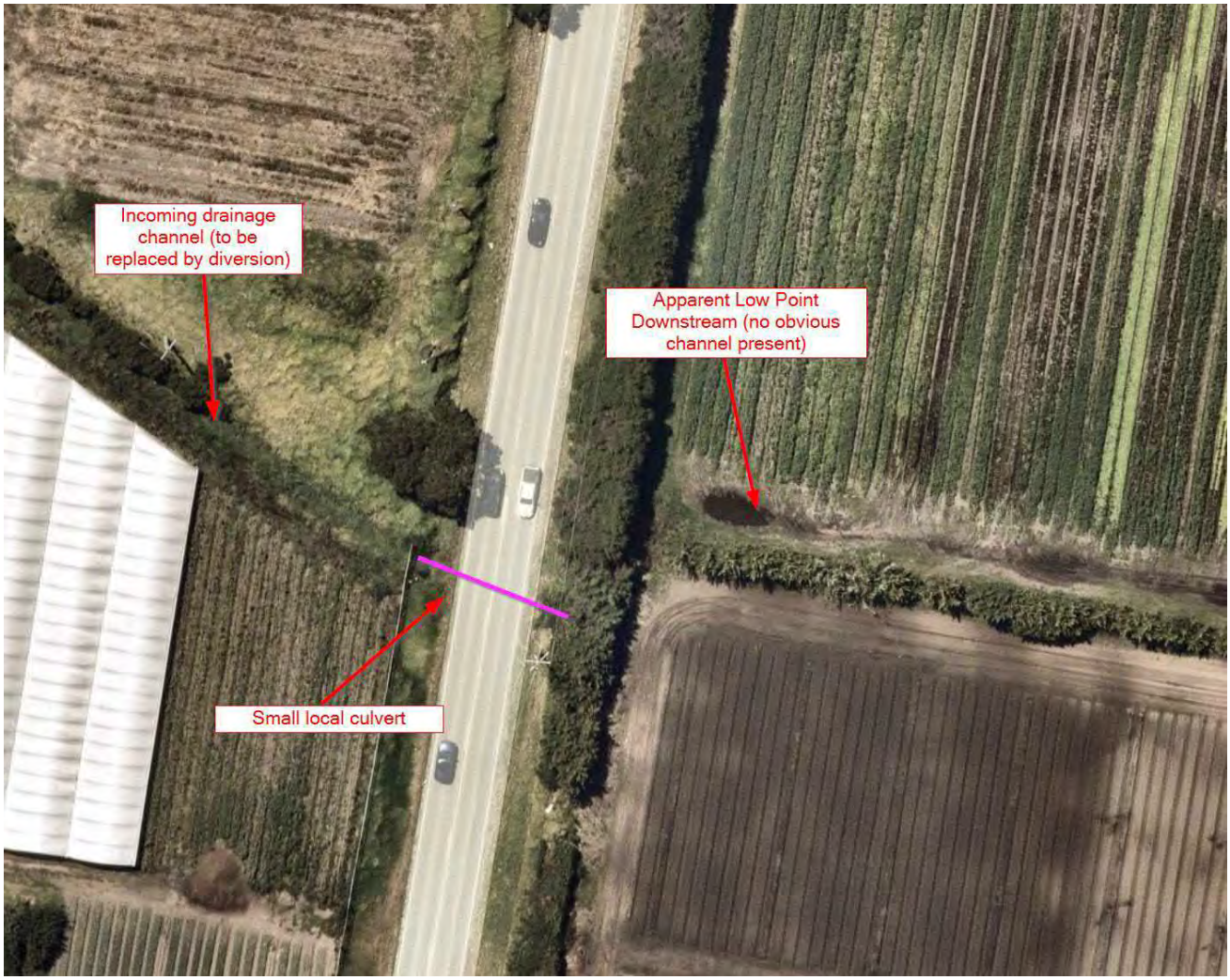


- Connection Points and Impact to Landowners in Clyde South
  - At this time, the proposed strategy relies on 3 connection points (shown in images below)
  - These points are characterised by:
    - Roads being only marginally above the surrounding floodplain
    - An absence of any major drainage features, which are at best a small drainage channel and culvert and at worst no drainage feature at all
  - The following is unclear:
    - How the proposed connections will work:
      - What will they connect to where no channel exists, will there be a requirement to extend the channel until an appropriate discharge point is reached?
      - Is it proposed to lower the channel or raise Clyde Five Ways Rd to construct sufficient culvert crossings?
      - How will these works impact the existing landowners
    - Under the current agricultural land use downstream, how will downstream properties manage additional flows from proposed upstream works, especially from increased volumetric discharge from Casey Fields (similar to the Devon Meadows issue) and both volumetric and flood flows from Devon Meadows relocated via the diversion drain.
      - Considering that the PSP has not commenced for Clyde South, implementation of any downstream management works could be years away
      - Will interim basins on Casey Fields be implemented to manage these interim issues?
    - Under the ultimate use, what works surplus to those required to meet Clyde South obligations will be required:
      - Additional retarding basin to ensure predevelopment flow rates at Manks Road (outfall from Clyde Five Ways DSS) is maintained
      - Additional basin/storage to capture and reuse excess volumetric flow (assuming this cannot be shunted downstream onto the green wedge?)
      - Additional waterway reserve area to handle additional flows diverted from Devon Meadows which could be between an 8-15 cu.m/s if retarded to pre-development (current climate conditions), depending on timing of the peaks. This could effectively increase flows passing through Clyde Five Ways Rd DSS in Clyde South PSP area by up to 100%. Further modelling is required to confirm this.
  - We would recommend that further analysis be undertaken to address the above questions prior to adoption of the proposed strategy.

Northern Crossing (CFS3 to CFWRd)

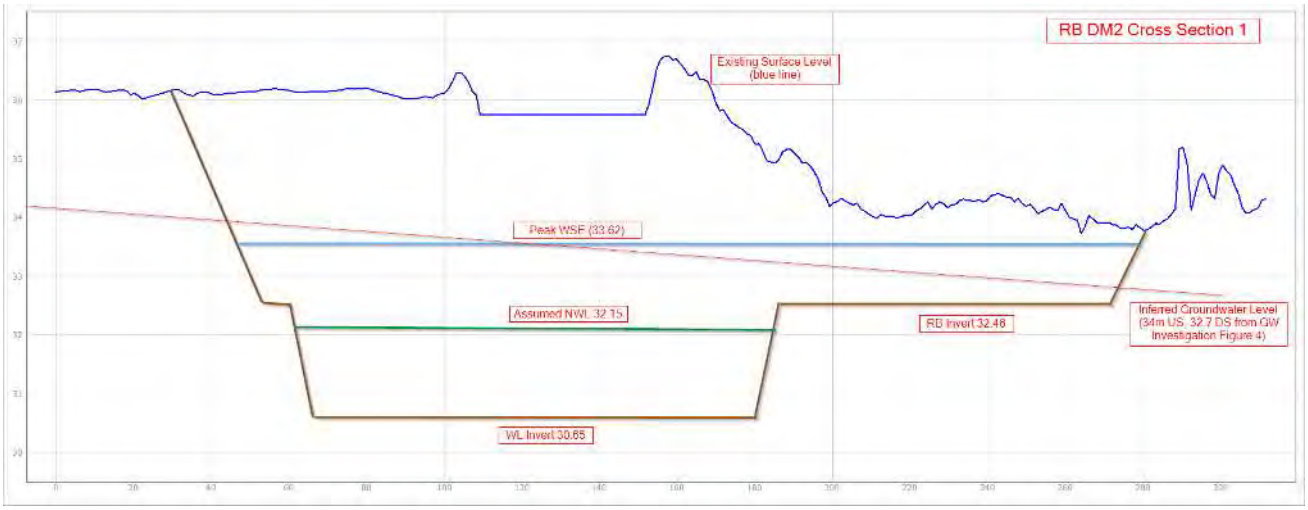
Central Crossing (CFS4 to CFWRd)

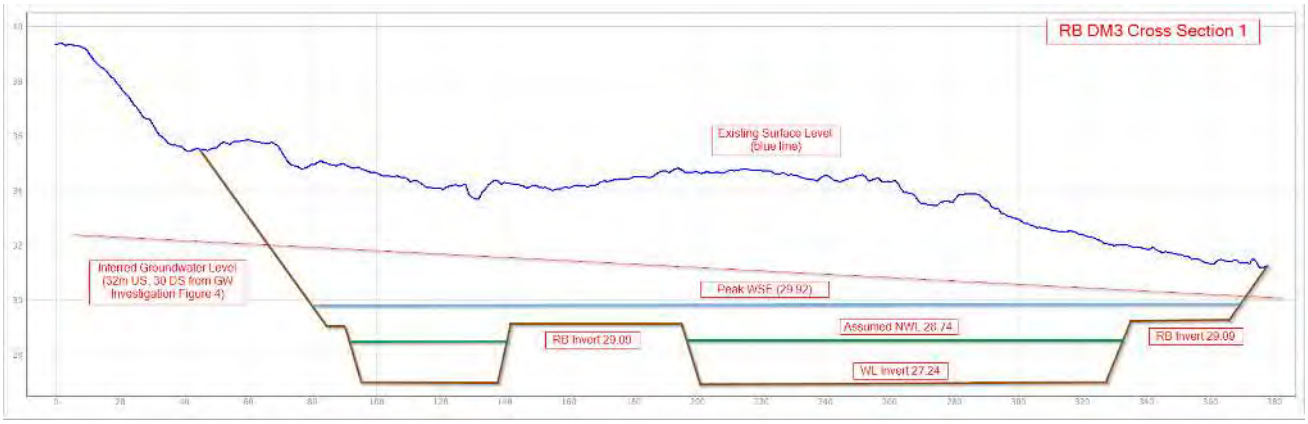
Proposed Southern Crossing – Devon Meadows Diversion



- The configuration of Drainage around Lighthouse College and WLRB CFS1
    - This area is complicated and the proposed strategy does not appear to consider how this will all work:
        - There are significant flows entering from Junction Village South WLRB. Even retarded to pre development flows, the estimated peak flow from this catchment will be around 10.2 cu.m/s (under current climate conditions).
        - This is complicated by the existing development of Lighthouse College and their filling of the gully and replacement of the channel with a trunk drain
        - WLRB is poorly located, with approximately 2/3rd of the inflow being water already treated in the upstream Junction Village wetland. The local catchment is only around 44ha
        - Additionally, the proposed CFS1 dominates the property that it sites on (1805 South Gippsland Highway), comprising more than 50% of the development area of that property meaning that the landowner will struggle to fund the upfront cost of the scheme works and as such this is unlikely to be implementable.
    - More work is needed in this area to understand the issues and potential solutions, but the following could be considered:
        - Bypassing the treated flows from Junction Village around the school and only allowing gap flows to drain to the culvert under the school. This diversion would aim to reconnect downstream of CFS1 so that the water is not retreated and would reduce pressure on the existing system.
        - With reduced flow rates, the isolated stretch of waterway proposed upstream of the school could be removed and replaced with a trunk drain, reducing cost.
        - CFS1 should be relocated downstream onto a larger property where the developer could actually afford to build the basin, otherwise no upstream development can proceed; or
        - The arrangement/distribution of downstream wetlands and retarding basins should be re-examined to improve efficiency and implementability.

- The Devon Meadows Retarding Basins
    - BW have used the 1m LiDAR and levels summarised in GHDs report to try and understand how the basins work with the terrain and groundwater levels.
    - Analysis indicates that these basins are proposed to be cut deep, as much as 5m in the ground and well below the estimated groundwater level.
    - Despite their extreme depth, the proposed storage height of water in the retarding basin is relatively shallow (typically 0.6m-1.2m in the 1% AEP) leading to relatively large footprints/land take by the basins
    - This is not feasible or realistic and these basins need to be redesigned.


RB DM2 Cross Section 1
Existing Surface Level (blue line)
Peak WSE (33.62)
Assumed NWL 32.15
RB Invert 32.48
Inferred Groundwater Level (34m US, 32.7 DS from GW Investigation Figure 4)
WL Invert 30.65


RB DM3 Cross Section 1
Existing Surface Level (blue line)
Inferred Groundwater Level (32m US, 30 DS from GW Investigation Figure 4)
Peak WSE (29.92)
RB Invert 29.00
Assumed NWL 28.74
RB Invert 29.00
WL Invert 27.24


RB DM4 Cross Section
Existing Surface Level (blue line)
Inferred Groundwater Level (Based on GW Investigation Figure 4)
Peak WSE 26.03
RB Invert 25.41
Assumed NWL 25.06
WL Invert 23.56

5. PROPOSAL FOR AN ALTERNATIVE CONCEPT

- Given the issues identified above, it is clear that there is a need for a rethink of significant components of the strategy.
- BW are currently undertaking additional modelling and concept design along the following lines to see if a more equitable solution can be found that addresses the above concerns:
    - Removal of the diversion drain to be replaced with minor improvements to the existing channels downstream and including of a 225mm diversion drain for re-use
    - Redesign of the Devon Meadows basins to demonstrate that objectives can be met without the need to divert to Clyde South
    - Concept design of works downstream of Clyde Five Ways Rd to allow MW and the VPA to arrange a PAO to secure outfalls for Casey Fields
    - Additional concept design of a potential diversion drain around Lighthouse College
    - An examination of Casey Fields basins to see if there is a more efficient/equitable distribution of assets
- As part of this assessment BW will be looking at potential footprints, concept level earthworks and cost comparison to demonstrate that the solution is an improvement over the current proposal.
- We aim to submit this work as part of a detailed supplementary submission.

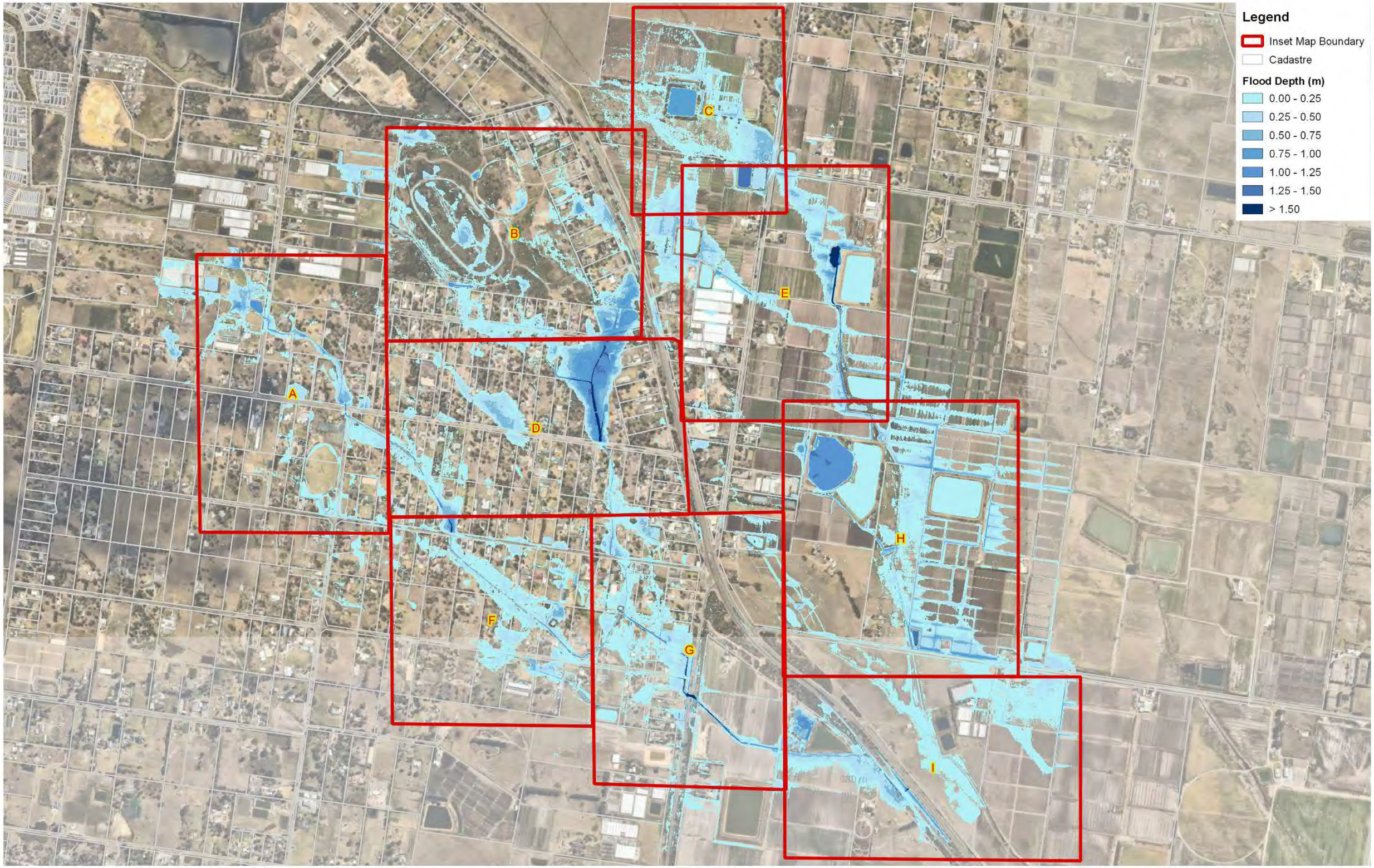
6. CONCLUSION AND RECOMMENDATIONS

It can be concluded that:

- The proposed study area is complicated and interacts with 3 PSPs and 8 DSS and has the potential to affect many downstream landowners including those subjects to the future Clyde South PSP.
- There are several significant concerns around the currently proposed strategy which can be summarised as follows:
    - The case for the diversion drain appears weak. It is unclear why such a significant and drastic solution is being proposed when based on preliminary analysis and discussion with MW, a simple solution such as augmentation of the existing channels in Devon Meadows and a 225mm diversion pipe appear to be sufficient to address MW's stated objectives
    - If the diversion drain goes ahead, it is unclear how the additional flood and volume directed to Clyde South will be managed in the interim (current condition) and how much additional burden in the form of additional waterway and basin reserve and other assets will be placed on the owners and residents of future Clyde South PSP area;
    - There are significant unknowns about how Casey Fields will outfall, especially in the absence of sufficient drainage downstream. There is the potential for significant impact to the residents of Clyde South and it is not clear what interim measures will be required here
    - The levels/designs for the basins and diversion drain in Devon Meadows are excessively deep, are below the groundwater level and will be impractical and expensive
    - The arrangement of drainage around Lighthouse College and proposed basin CFS1 is not currently implementable and requires further optimisation
- Due to time constraints and the considerable complexity of the study area, BW are preparing a supplementary technical assessment to further analyse this proposal and its issues, with the ultimate aim of proposing some sensible improvements to the strategy.

It is recommended that:

- Significant additional analysis be undertaken to address the other concerns noted above prior to endorsement of the drainage strategy
- That design of the DSS downstream of Clyde Five Ways Rd be brought forward and addresses in the current strategy so that future issues are not just kicked downstream to the community in Clyde South PSP.



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Checked by: SFK
Issued: 25/03/2025

Project: Casey Fields Devon Meadows

Client:XXXX

Inset Map Index
Base Case 1% AEP

Figure Number: 1

Rev: A

0 50 100 150 m

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Base Case 1% AEP
Flood Depth With Water Level Contours
Inset A
Figure 1

Project Coordination: EPSG:7855
Drawn by: YL
Checked by SFK
Issued: Date: 2025-03-29

Legend

Cadastre

Hazard Category

H1

H2

H3

H4

H5

H6

0 0.2 0.4 km

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Base Case 1% AEP
Hazard Category
Inset A
Figure 2

Project Coordination: EPSG:7855
Drawn by: YL
Checked by SFK
Issued: Date: 2025-03-29

Legend

- Cadastre_Clipped
- 0.1m Water Level Contour (mAHD)

Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- > 1.50

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Project: Casey Fields Devon Meadows

Client:XXXX

Base Case 1% AEP
Flood Depth With Water Level Contours
Inset B
Figure Number: 3 **Rev: A**

0 50 100 150 m

Legend

- Cadastre_Clipped

Hazard Category

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

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Client:XXXX

Base Case 1% AEP
Hazard Category
Inset B
Figure Number: 4

Rev: A

0 50 100 150 m

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Base Case 1% AEP
Flood Depth With Water Level Contours
Inset C
Figure 5

Project Coordination:	EPSG:7855
Drawn by:	YL
Checked by	SFK
Issued:	Date: 2025-03-29

Legend

Cadastre

Hazard Category

H1

H2

H3

H4

H5

H6

0 0.2 0.4 km

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Base Case 1% AEP
Hazard Category
Inset C
Figure 6

Project Coordination:	EPSG:7855
Drawn by:	YL
Checked by	SFK
Issued:	Date: 2025-03-29

Legend

- Cadastre_Clipped
- 0.1m Water Level Contour (mAHD)

Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- > 1.50

27m
26m
27m
27m
26m
25m
23m
22m

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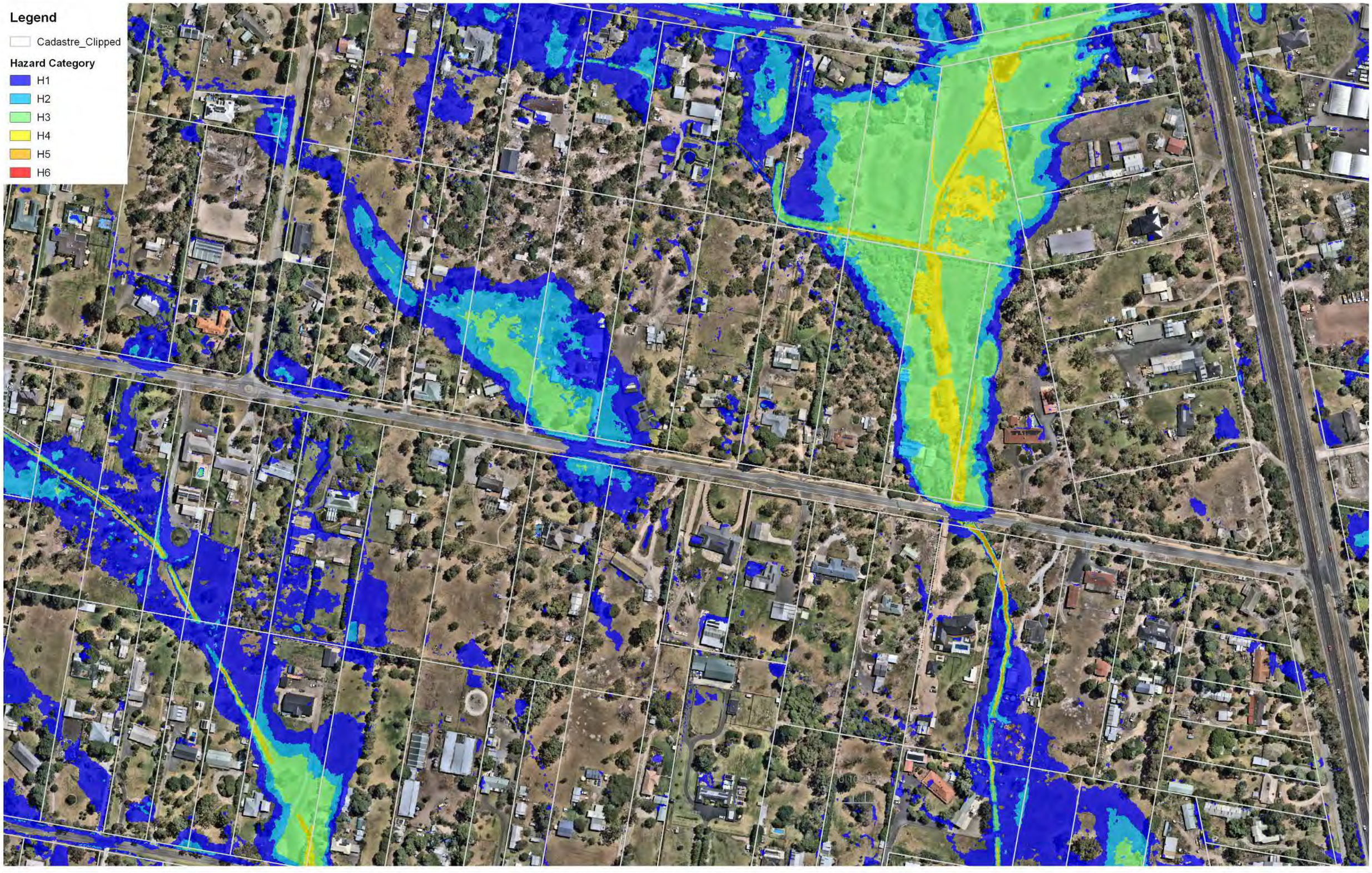
Project: Casey Fields Devon Meadows

Client:XXXX

Base Case 1% AEP
Flood Depth With Water Level Contours
Inset D
Figure Number: 7 Rev: A

0 50 100 150 m



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Client:XXXX

Base Case 1% AEP
Hazard Category
Inset D
Figure Number: 8

Rev: A

0 50 100 150 m

26m
24m
23m
22m
21m

Legend

- Cadastre
- 0.1m Water Level Contour (mAHD)

Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- > 1.50

0 0.2 0.4 km

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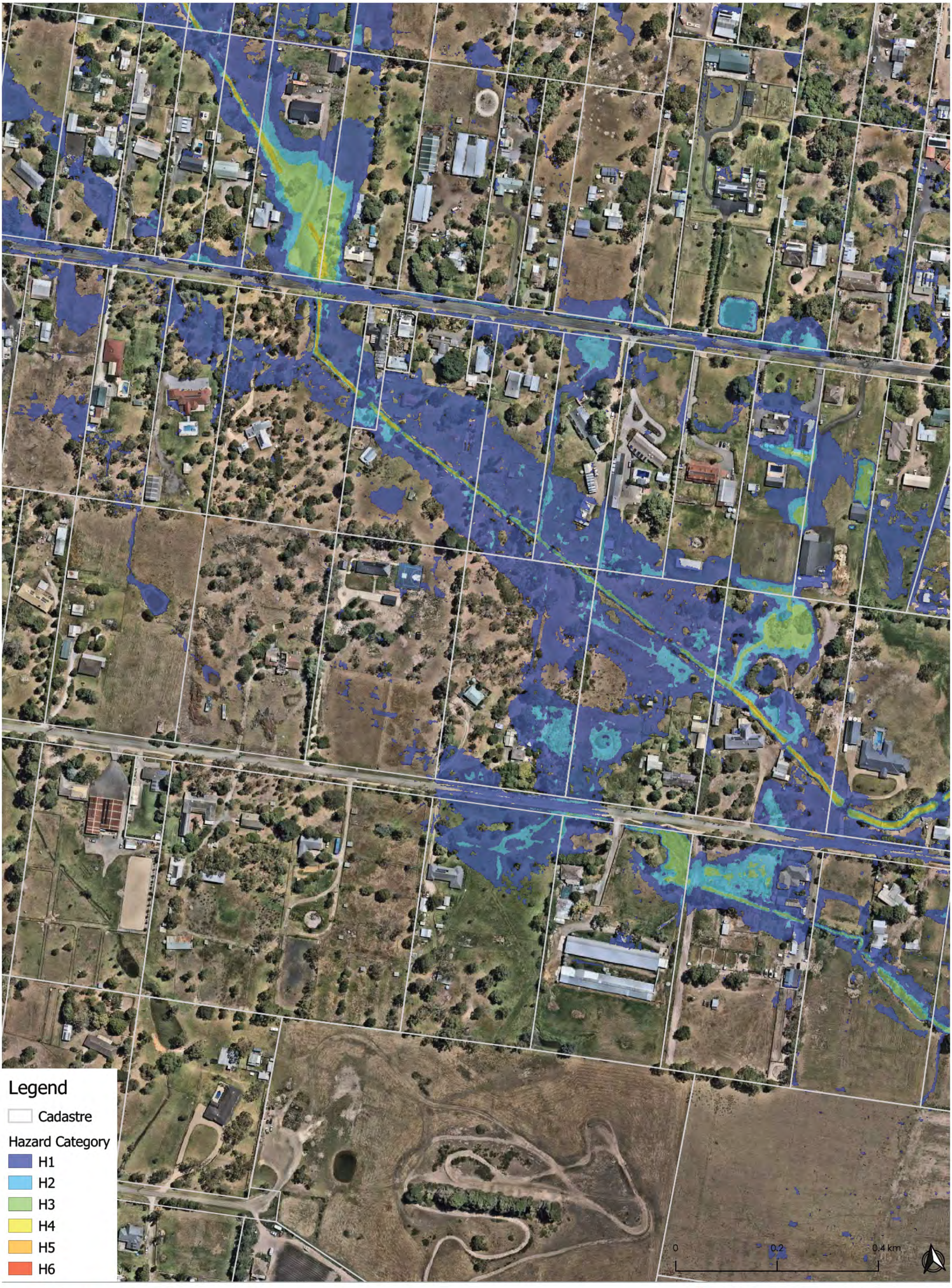
Base Case 1% AEP
Flood Depth With Water Level Contours
Inset E
Figure 9

Project Coordination:	EPSG:7855
Drawn by:	YL
Checked by	SFK
Issued:	Date: 2025-03-29



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Base Case 1% AEP
Hazard Category
Inset E
Figure 10

Project Coordination: EPSG:7855
Drawn by: YL
Checked by SFK
Issued: Date: 2025-03-29

22m
19m
20m
19m
21m
23m
17m
16m
15m

Legend

- Cadastre
- 0.1m Water Level Contour (mAHD)

Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- > 1.50

0 0.2 0.4 km

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Base Case 1% AEP
Flood Depth With Water Level Contours
Inset F
Figure 11

Project Coordination: EPSG:7855
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Checked by SFK
Issued: Date: 2025-03-29

Legend

Cadastre

Hazard Category

H1

H2

H3

H4

H5

H6

0 0.2 0.4 km

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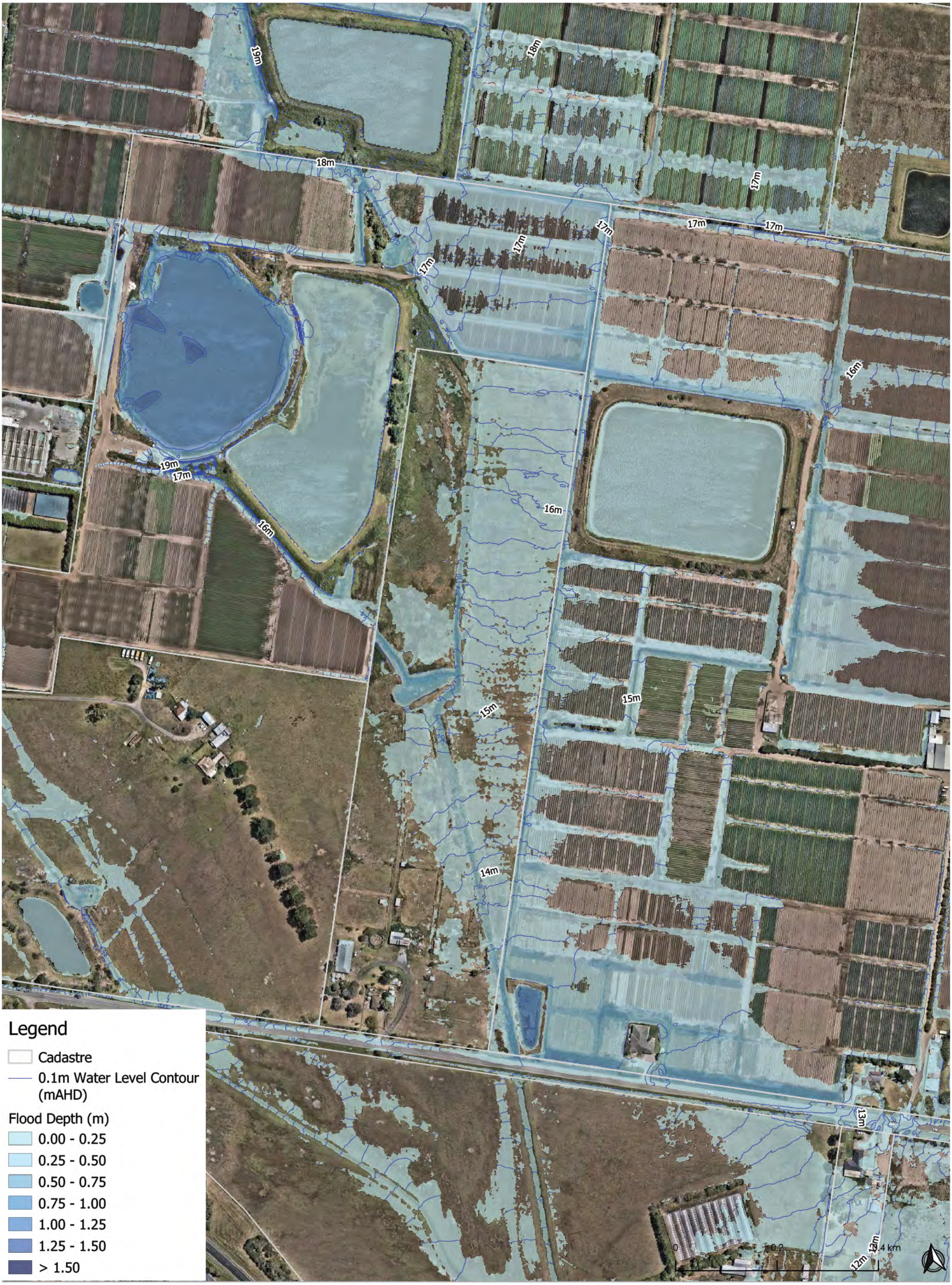
Base Case 1% AEP
Hazard Category
Inset F
Figure 12

Project Coordination: EPSG:7855
Drawn by: YL
Checked by SFK
Issued: Date: 2025-03-29



Legend

- Cadastre
- 0.1m Water Level Contour (mAHD)

Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- > 1.50

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Base Case 1% AEP
Flood Depth With Water Level Contours
Inset G
Figure 13

Project Coordination:	EPSG:7855
Drawn by:	YL
Checked by	SFK
Issued:	Date: 2025-03-29

Legend

Cadastre

Hazard Category

H1

H2

H3

H4

H5

H6

0 0.2 0.4 km

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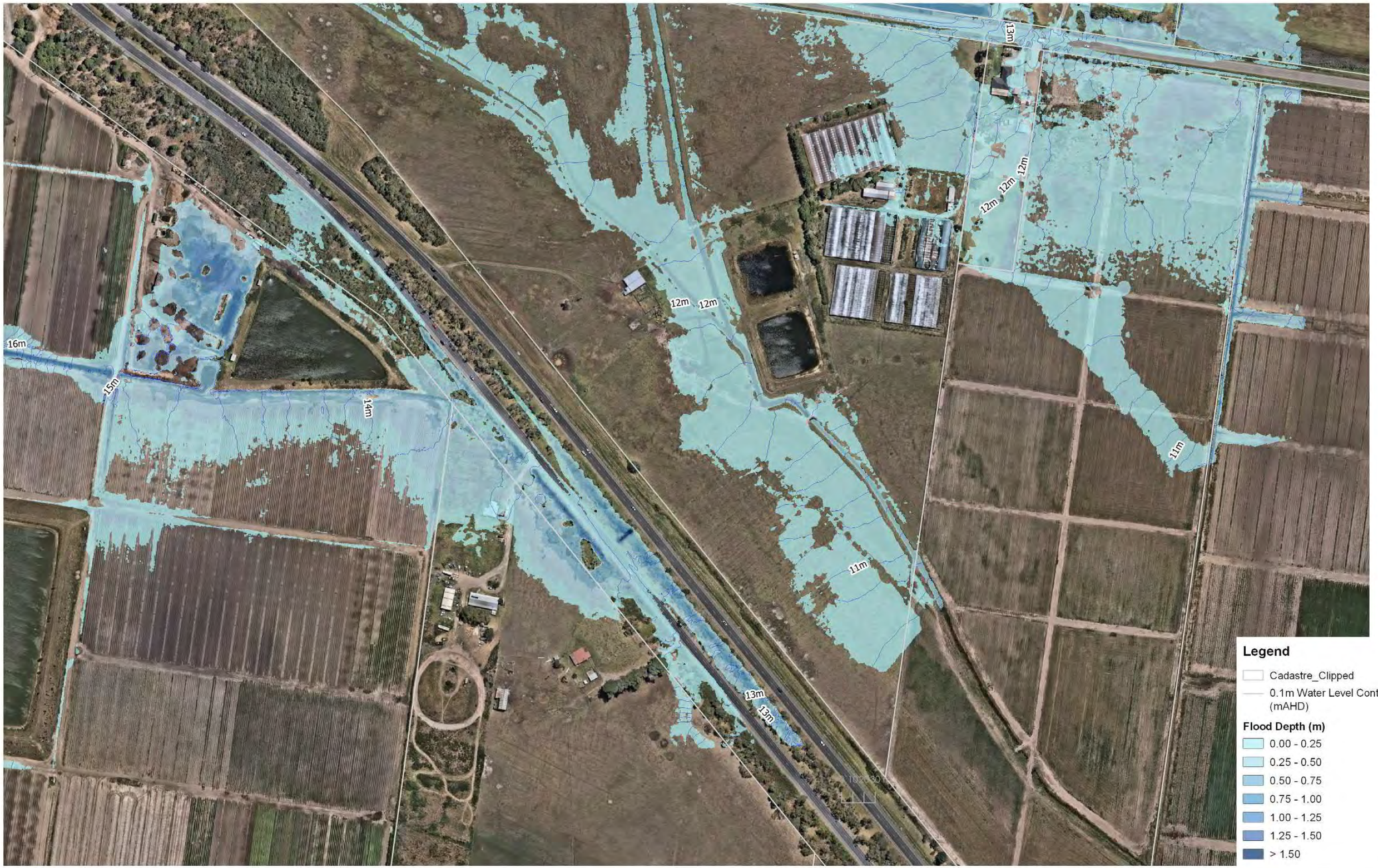
Base Case 1% AEP
Hazard Category
Inset G
Figure 14

Project Coordination: EPSG:7855
Drawn by: YL
Checked by SFK
Issued: Date: 2025-03-29



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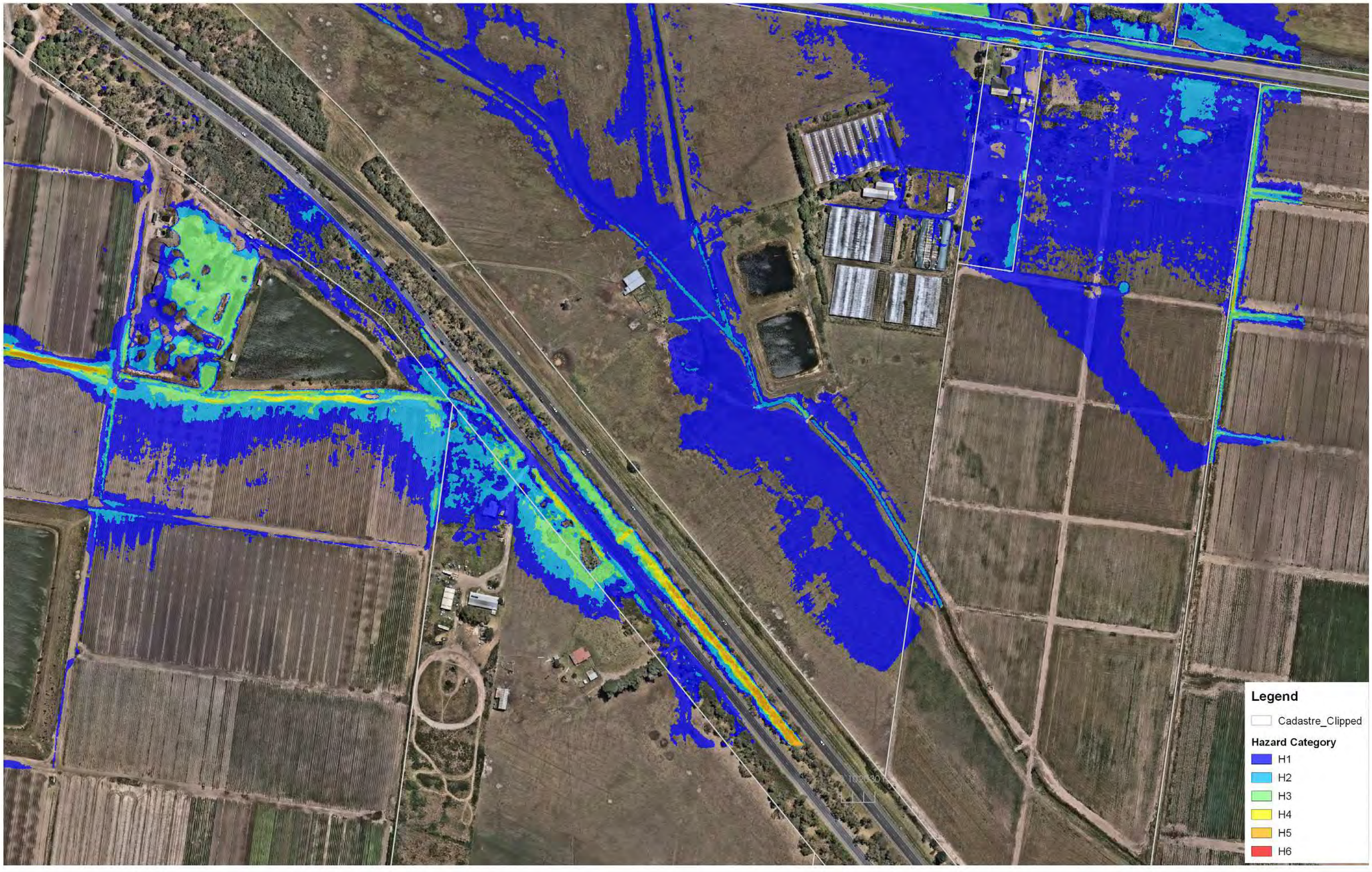
Base Case 1% AEP
Flood Depth With Water Level Contours
Inset H
Figure Number: 15 **Rev: A**

0 50 100 150 m



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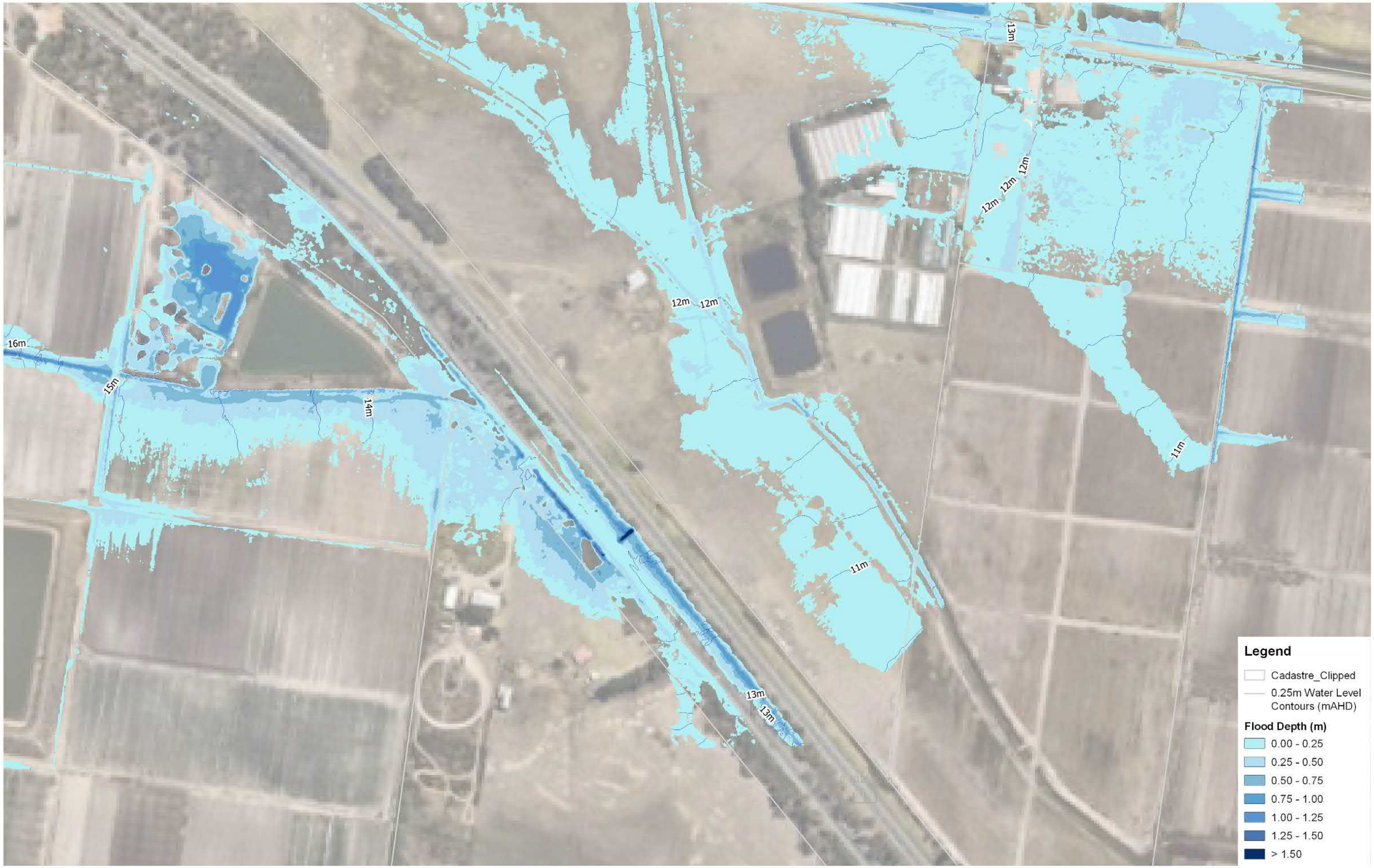
Base Case 1% AEP
Hazard Category
Inset H
Figure Number: 16 **Rev: A**

0 50 100 150 m



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Client:XXXX

Base Case 1% AEP
Flood Depth With Water Level Contours
Inset I
Figure Number: 17 Rev: A

0 50 100 150 m

Legend

- Cadastre
- 0.1m Water Level Contour (mAHD)

Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- > 1.50

0 0.2 0.4 km

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Base Case 1% AEP+ Climate Change in 2100
Flood Depth With Water Level Contours
Inset A
Figure 17

Project Coordination: EPSG:7855
Drawn by: YL
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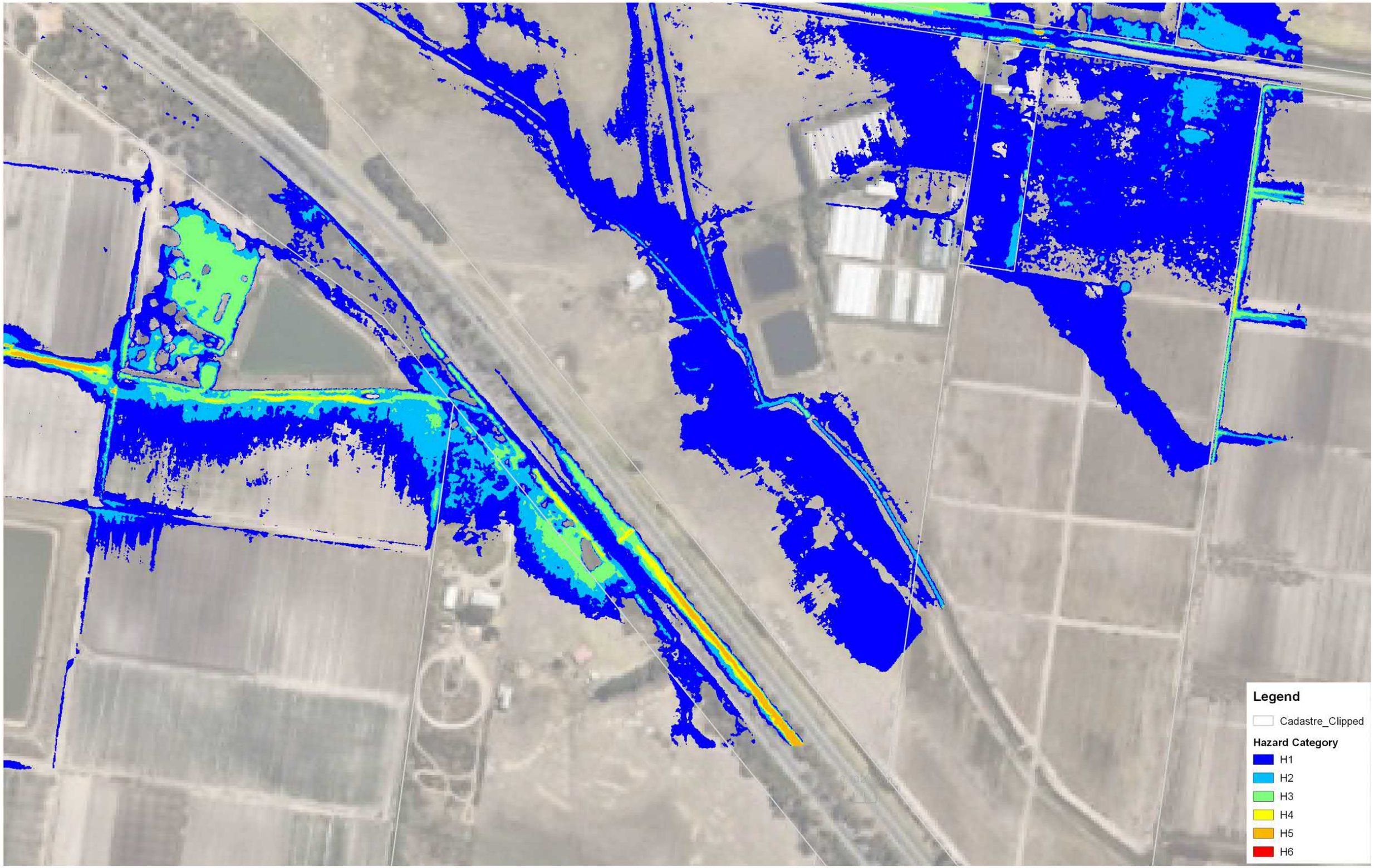
Issued: Date: 2025-03-29



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Base Case 1% AEP
Hazard Category
Inset I
Figure Number: 18

Rev: A

0 50 100 150 m