



ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/118-2022

Dated: 4 November 2022

Memorandum

То	Kristine Palm	Date	6 July 2022						
From	Rasitha Perera, Reviewer: David Cox	No. of pages	1 of 7						
Reference	30032687-CVL-MEM-Flood Modelling Intake								
Subject	Flood Impact Assessment – Pump Station Intake and New Access Road								

1. Background

The Reference Design for the Gladstone to Fitzroy Pipeline (GFP 2008) is based on a pipeline that connects a new intake pump station in the Fitzroy River (upstream of Rockhampton) to new reservoirs at Aldoga (West of Gladstone) via Alton Downs water treatment plant (WTP).

The combined river intake and pump station is to be located on the bank of the Fitzroy River approximately 15.5 km upstream of the Fitzroy River Barrage and within the existing SunWater Stanwell pump station site. The pump station is to deliver water to a water treatment plant at Alton Downs. The controls and electricals for the pump station are situated in a separate control building (see Figure 1), which currently sits above the 100-year level in the Fitzroy River.

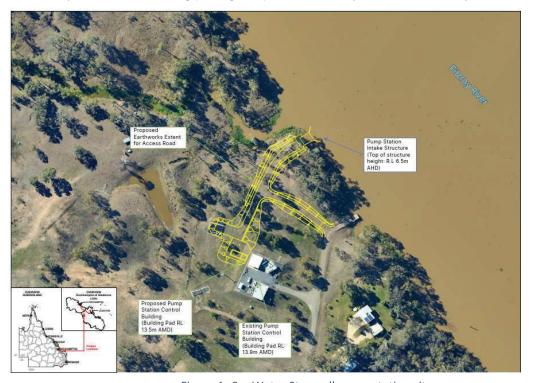


Figure 1: SunWater Stanwell pump station site

The pumping station involves a combined river intake structure of reinforced concrete construction with access walkways and platforms, and incorporating separate wet chambers for each pump, and variable depth inlet ports.

RRC have requested a Flood Statement to be provided for the Fitzroy River Intake and new access work. The Flood Statement is to be signed off by a RPEQ and is to identify / confirm no impacts on downstream or upstream properties and up to the 1% AEP (100-year ARI) event as a result of the proposed.

Accordingly, the purpose of this memorandum is to address RRC's request in terms of the current proposed designs.

2. Information Received

2.1 Reference Design (2008)

The Fitzroy River has very low velocities during low-flow periods and water levels are fairly constant. The water levels are controlled by the Fitzroy River Barrage downstream at Rockhampton, and upstream of the site by other weirs. It has been assumed that during periods of low-flow, the river takes on the behaviour of a dam.

The existing one in one hundred-year ARI (Q100 or 1% AEP) Fitzroy River flood level has an elevation of approximately 13m AHD at the pump station site. In comparison, the existing SunWater pump station control room is at an elevation of 13.9mAHD. As such, the existing control room satisfies the Reference Design (2008); the control room shall be sited at not less than 0.5 metres above the 1% AEP flood level.

The top of the intake pump station has been designed to 6.5mAHD which is approximately top of bank level. Consequently, during some flood events the station will be submerged. Intake structure design for:

- Pump Start Level (TWL) RL 3.7mAHD
- Pump Stop Level (BWL) RL 2.00mAHD

2.2 Flood Model – Fitzroy River (TMR) (2022)

SMEC received a TUFLOW flood model from the Department of Transport and Main Roads to facilitate with RRC's approvals processes. It is believed that this model was developed for TMR's Rockhampton Ring Road project and has been extensively peer reviewed. SMEC have not undertaken an independent review of the received model as part of the current assessment and the only changes to the model will be topographic changes necessary to assess the proposed access road works. The 8m grid cell version of TMR's model will provide the baseline for the current flood impact assessment and the deliverables will include peak flood depth, peak flood velocity, peak flood hazard and peak flood afflux mapping. The 2% AEP (1 in 50 year ARI), 1% AEP (1 in 100 year ARI) and the 0.05% AEP (1 in 2000 year ARI) flood events will be modelled.

2.3 Concept Design (2021)

As mentioned earlier, the building which houses controls and electricals for the pump station currently sits above an elevation of 13.9m AHD (see Figure 1). It is understood however that the existing building is to be relocated slightly and lowered to 13.5m AHD. These proposed amendments have been included as part of the current assessment.

2.4 CFD Intake and Access Road (2022)

The top of the pump station intake has been designed to 6.5mAHD which is approximately top of bank level. This information, together with the details for the proposed access road provided in Appendix A, were developed by SMEC designers into a new 12D Tin and was relied upon to complete the assessment. Figure 2 provides plan and section views of the proposed access road elevation leading up to the pump station control building. With reference to the section view, note that the pump station intake structure, by design, can be expected to regularly submerge. Hence, the impact of it on overbank flood levels are expected to be fairly low.

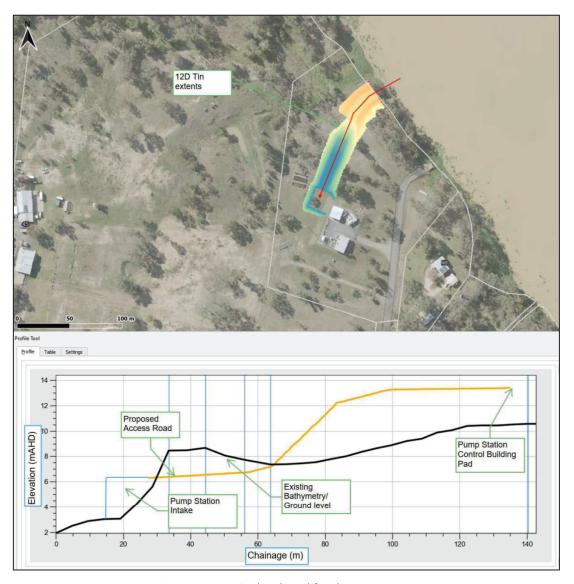


Figure 2: 12D Tin developed for the assessment

3. Flood Model Assessment

A detailed hydraulic analysis was undertaken using TMR's flood model to accurately simulate flooding behaviour in the area of Fitzroy River and specifically around the existing SunWater Stanwell pump station site. Both existing and design cases were modelled, with the proposed new arrangement of the pump station control building included in the existing case model.

The proposed access road was also modelled, with geometric details based on the drawings provided in Appendix A and using model topographic modifiers, which is standard industry practice. No other changes were made to the flood model.

The model was then run for the specified design events and modelled depths, velocities and flood hazards were extracted. Figures showing the flood depths for the 2% AEP, 1% AEP and the 0.05% AEP, and flood velocity and hazard (velocity – depth product) for the 1% AEP are provided in Figure 3 to Figure 7 below.

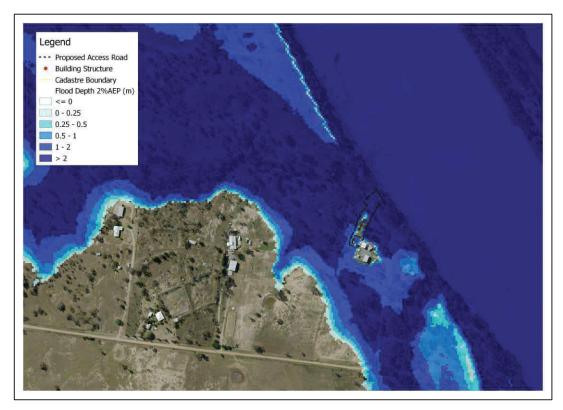


Figure 3: Modelled Depth – 2% AEP Event

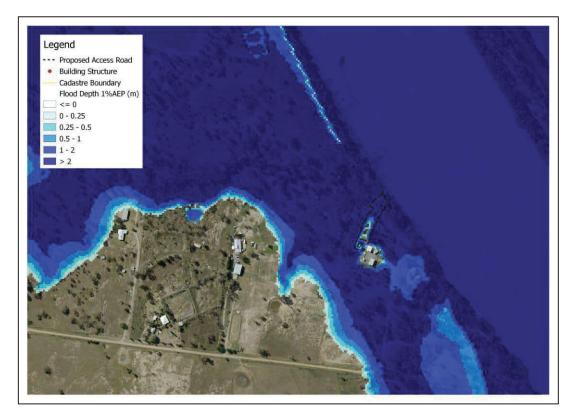


Figure 4: Modelled Depth – 1% AEP Event

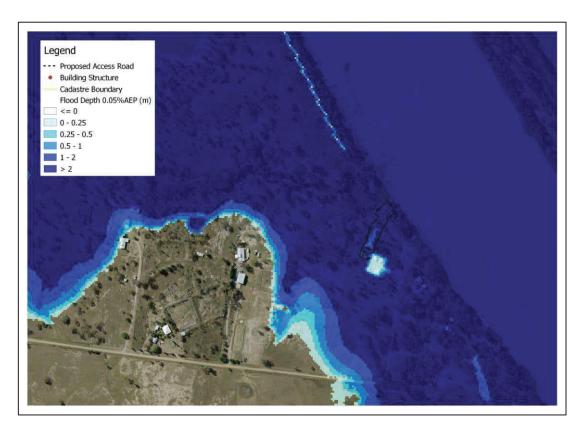


Figure 5: Modelled Depth – 0.05% AEP Event



Figure 6: Modelled Velocity – 1% AEP Event

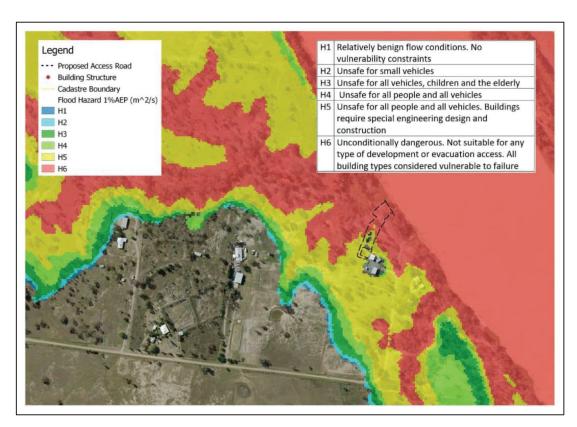


Figure 7: Modelled Hazard – 1% AEP Event

The above results indicate that while both the pump station intake and the proposed access road is subject to significant inundation for all modelled flood events, the pump station control building remains flood free up to the 1% AEP (Q100) event and therefore meets the Reference Design (2008) requirements. Flooded depths over the road on the other hand are in excess of 2m and hence represents a high flood hazard situation for both people and vehicles.

Table 1: Design Case Flood Afflux Results for Buildings

Building Loc ID	Existing WSL (m AHD)			Afflux (m)		Building	Existing WSL (m AHD)			Afflux (m)			
	0.05% AEP	1% AEP	2% AEP	0.05% AEP	1% AEP	2% AEP	Loc ID	0.05% AEP	1% AEP	2% AEP	0.05% AEP	1% AEP	2% AEP
1	13.534	-	-	-	-	-	19	-	-	-	-	-	-
2	13.534	-	-	-	-	-	20	-	-	-	-	-	-
3	-	-	-	-	-	-	21	14.202	12.907	12.497	0.002	-	-
4	13.515	11.974	11.577	-	-	-	22	14.202	-	-	0.002	-	-
5	13.737	12.208	11.823	-	-	-	23	-	-	-	-	-	-
6	13.904	12.689	-	-	-	-	24	-	-	-	-	-	-
7	13.916	-	-	-	-	-	25	-	-	-	-	-	-
8	13.957	-	-	-	-	-	26	-	-	-	-	-	-
9	13.964	-	-	-	-	-	27	-	-	-	-	-	-
10	13.970	12.769	-	-	-	-	28	14.202	-	-	0.002	-	-
11	14.148	-	-	-	-	-	29	14.202	-	-	0.002	-	-
12	14.234	12.859	12.438	-	-	-	30	14.202	-	-	0.002	-	-
13	14.267	12.869	12.446	-	-	-	31	14.202	-	-	0.002	-	-
14	14.330	12.917	12.482	-	-	-	32	14.202	-	-	0.002	-	-
15	14.201	12.884	12.462	-	-	-	33	14.202	-	-	0.002	-	-
16	14.264	-	-	-	-	-	34	14.144	12.888	12.485	-	-	-
17	-	-	-	-	-	-	35	14.201	12.906	12.497	0.002	-	-
18	-	-	-	-	-	-		-	-	-	-	-	-

Analysis was also undertaken to determine if the flood impacts from the proposed pump station intake, access road, and pump station control building pad represented a worsening when compared to the existing case. For this analysis, model results for a total of 35 reporting locations covering building structures in and around the Pump Station Intake and in the general vicinity of the proposed site were extracted and tabulated. These are presented in Table 1 and shows that for the 2% AEP and 1% AEP events, the proposed designs will result in negligible changes to existing flood levels at these locations. Flood afflux mapping covering a larger extent of the Fitzroy River catchment is provided in Appendix B. This mapping shows that the flood affluxes are localised to within the proposed site.

4. Conclusions

At the request of the Gladstone Area Water Board (GWAB) managing the ongoing Gladstone – Fitzroy Pipeline project, a hydraulic investigation of Fitzroy River has been undertaken to analyse and quantify flood impacts in the watercourse floodplain area at and around the SunWater Stanwell pump station site.

SMEC used TMR's flood model to predict flood levels and the following observations are made:

- in comparison to a predicted 1% AEP flood elevation of approximately 13m AHD, the electrical and control equipment currently situated above 13.9m AHD in the existing pump station control building should have flood immunity up to and including a 1% AEP event.
- The flood response to the proposed works area within the site was assessed, with model results indicating the proposed access road from the pump station intake to the existing pump station control building is subject to significant inundation during 2% AEP (1 in 50 year ARI), 1% AEP (1 in 100 year ARI) and the 0.05% AEP (1 in 2000 year ARI) flood events. As such, it is recommended that flood depth sign markers are placed either side of this road, the Flood Emergency Evacuation/ Management Plan for the pump station control building be appropriately updated and other safe operational requirements for the site be implemented.
- Based on the design of the access road analysed as part of this document, increases in flood levels for the events considered (the 2% AEP and 1% AEP events) are negligible outside of the proposed site. Additionally, please refer to the flood afflux mapping provided in Appendix B.

Yours sincerely,

Rasitha Perera

Associate Engineer – Water, Dams and Hydropower

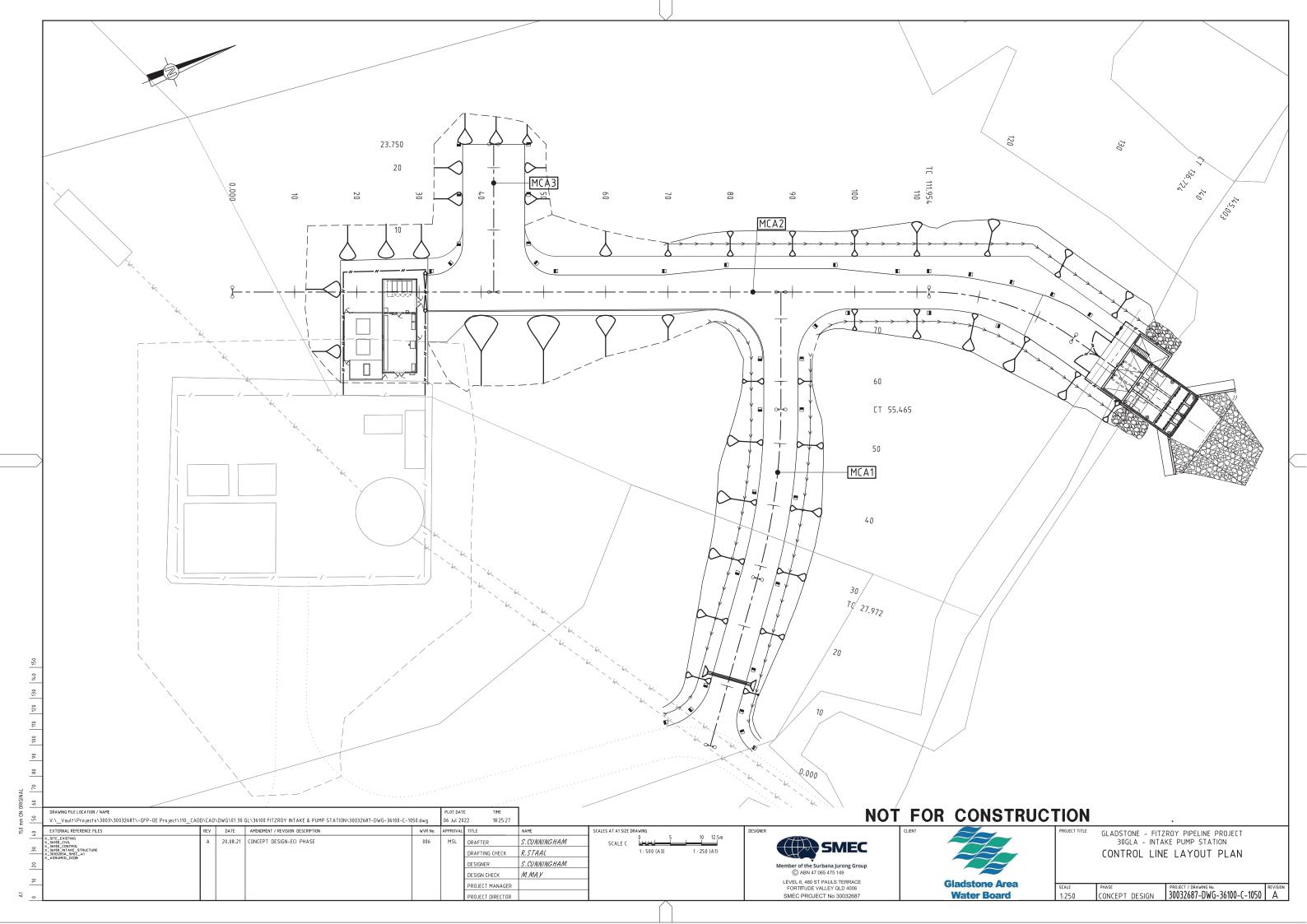
Reviewer: David Cox

Senior Associate Engineer - Water, Dams and Hydropower

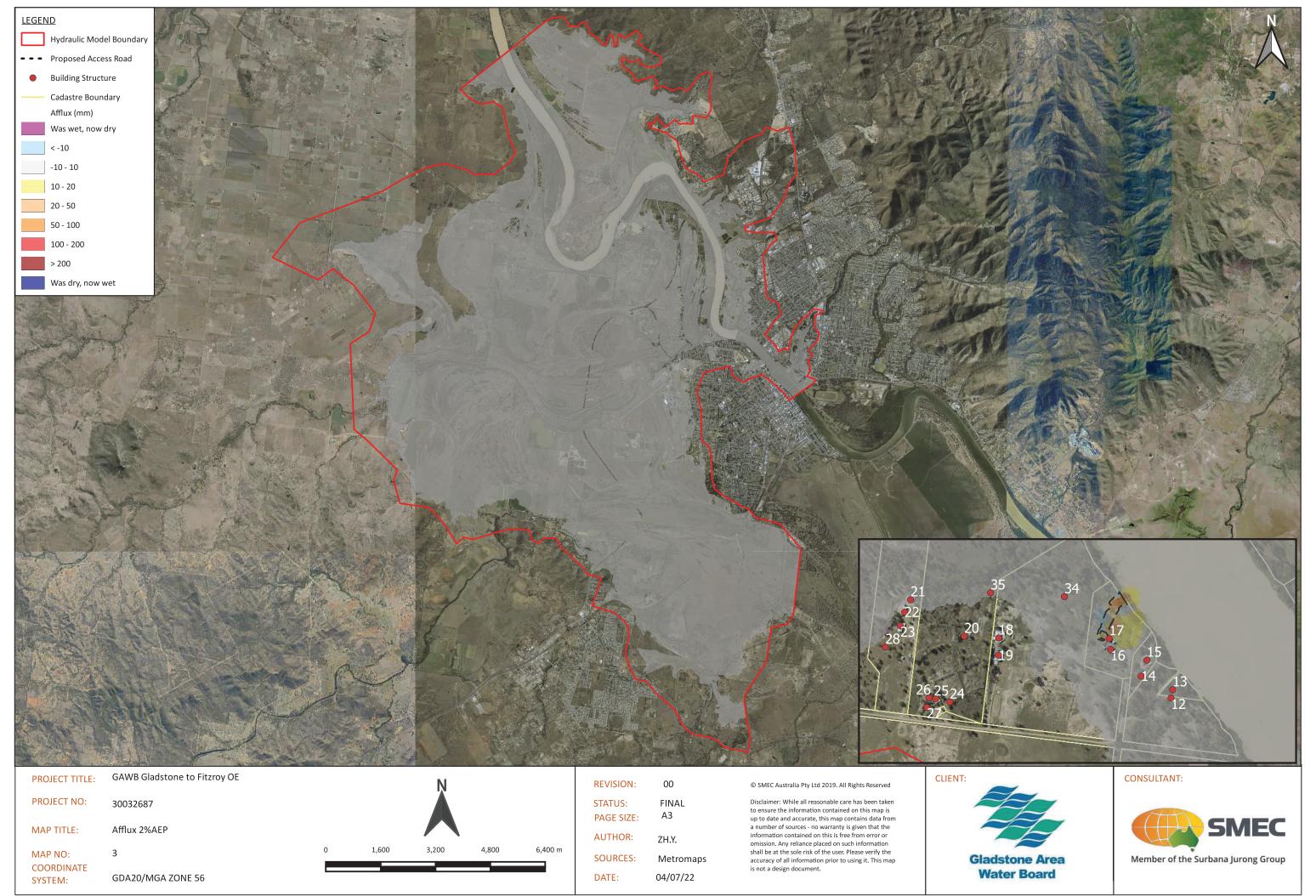
Attachments:

- A. Design Drawings Proposed pump station intake and new access road.
- B. Flood afflux maps Fitzroy River catchment and near the SunWater Stanwell pump station site

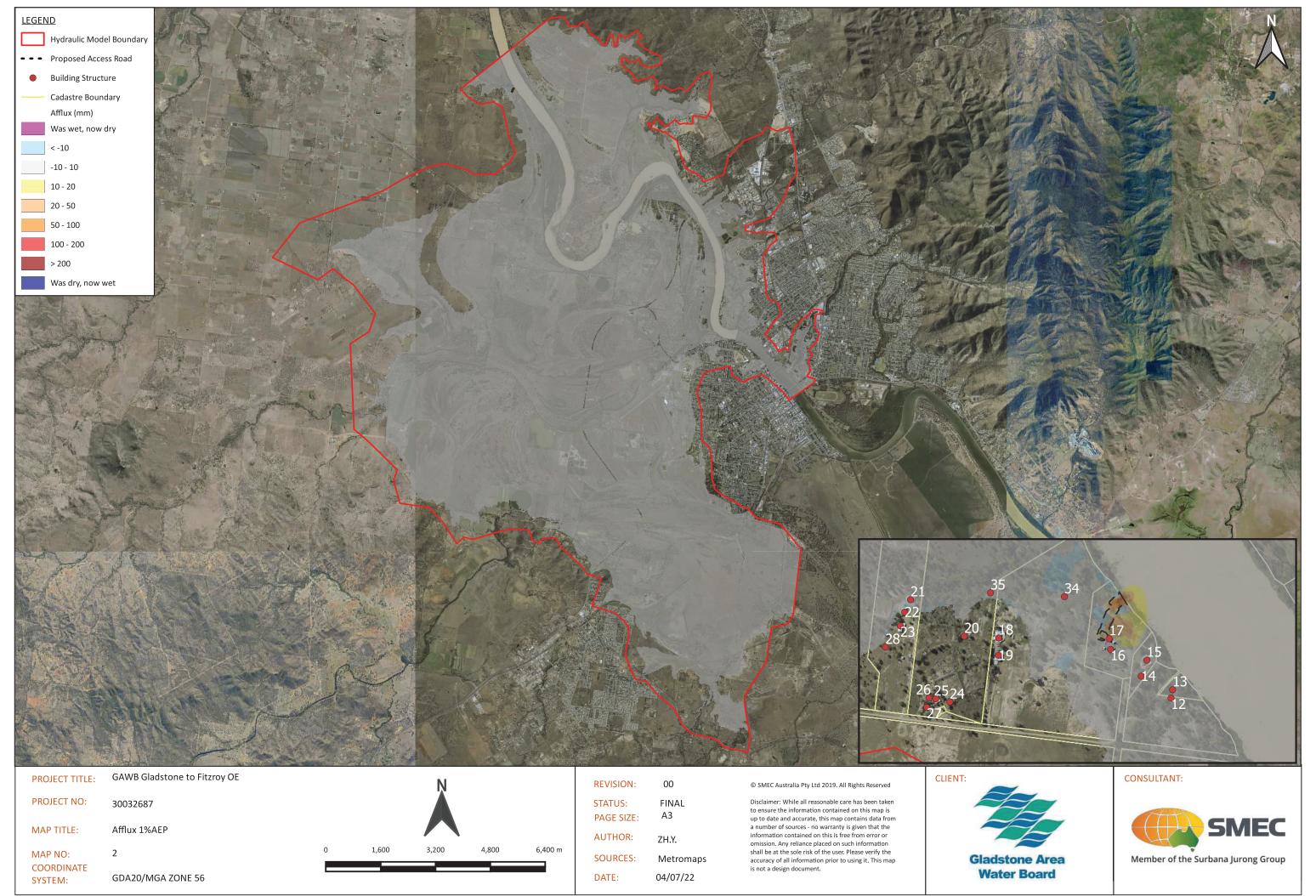
Appendix A – Design Drawings



Appendix B - Flood afflux maps



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