Appendix I

Flood Due Diligence

Gillenbah BESS

FOR: Gillenbah BESS Development Pty Ltd

SLR PROJECT No: 630.032197.00001 **REVISION:** v1.1

Technical Memorandum

To:	Lionel Zhou	**From:**	Nigel Bosworth
Company:	Servo Energy		**SLR Consulting Australia**
cc:		**Date:**	13 November 2024
		Project No.	630.032099.00001

RE: Gillenbah BESS
Preliminary flood investigation – summary of findings

This memo summarises the findings of the preliminary flood modelling carried out to provide guidance on site feasibility and constraints for the development of a Battery Energy Storage System (BESS) at Lot 10 DP754571 (Northern Lot) and Lot 8 DP 1088320 (Southern Lot) The Gap Road, Gillenbah NSW.

1.0 Methodology

The preliminary modelling has been undertaken using TUFLOW, hydrologic and hydraulic modelling software package (Version 2023-03-AE), using the rain-on-grid approach. The model was constructed based on Australian Rainfall and Runoff 2019 methodology, using:

- Topography – 5.0 metre LiDAR obtained from ELVIS (https://elevation.fsdf.org.au/) incorporating the Narrandera2015 and Yanco2014 datasets – modelled with a 10.0 metre grid.
- Rainfall obtained from Bureau of Meteorology (http://www.bom.gov.au/water/designRainfalls/revised-ifd) for grid 34.9125S, 146.5375E for the 1% Annual Exceedance Probability event, 168 hour storm of 146 mm.
- Hydrologic parameters have been obtained from the Australian Rainfall and Runoff Data Hub (https://data.arr-software.org/), for location 34.91S, 146.54E with losses used (initial loss 25 mm, adjusted to 10 mm, with 0.0 mm continuing loss).
- Mannings roughness for the catchment and site 0.06 (ARR Table 6.2.2).

The developed scenario (incorporating the proposed BESS facility) has been modelled using an area identified by Servo Energy. This has been mapped at a 250 metre by 250 metre area on the east of the site, adjacent to The Gap Road. This area has been raised above the flood level within the model.

2.0 Results

The results of the modelling are presented in the figures:

- Figure 1 – 1% AEP existing depth/elevation
- Figure 2 – 1% AEP existing velocity
- Figure 3 – 1% AEP design depth/elevation
- Figure 4 – 1% AEP design velocity
- Figure 5 – 1% AEP flood afflux map

The results of the preliminary modelling, shown on Figures 1 – 5, indicate that both northern and southern lots, along with the proposed BESS facility site is subject to flooding in the 1% AEP event. Key flood characteristics for the 1% AEP that relate to the lots include:

- The area is affected by back water flooding from the cowal (trapped low point) located to the west, with no overland flow paths through the proposed BESS facility location.
- The 1% AEP flood level at the northern lot and proposed BESS facility site is approximately 146.5 metres AHD, with flood depth in the location of the proposed BESS facility is up to 0.8 metres.
- The southern lot includes two creeks that receive flow from catchments to the south, with depths up to 1.0 metre. Large areas of the southern lot, two parcels of approximately 35 hectares and 20 hectares are mapped as flood free in the 1% AEP event
- Flood velocities in the location of the proposed BESS facility in the northern lot are less than 0.2 m/s, with higher velocities in the creeks within the southern lot, up to 0.5 m/s.
- Flood afflux (difference between design levels and existing) resulting from the proposed BESS facility is less than 1.0 mm, with no flood impacts outside the site boundaries.

Additional analysis has been caried out for the catchment involving modelling of two additional scenarios based on rainfall and mapping of the maximum depth of the cowal. The additional rainfall scenarios modelled were: the 1 in 2000 (0.05%) AEP event of 223 mm, along with a sensitivity analysis run based on a “wet season” rain event (assumed as the three highest monthly rainfall depths measured at the Narrandera Airport AWS of 583 mm, occurring in a single week).

The maximum depths at the proposed location of the BESS facility were:

- The 1 in 2000 AEP flood level at the site is approximately 147 metres AHD.
- The “wet season” flood level at the site is approximately 148 metres AHD.
- The spill level for the cowal is approximately 149.5 metres AHD.

3.0 Recommendation

The preliminary flood modelling undertaken for this investigation indicates that the site is flooded in the 1% AEP event. Earthworks would be required for the proposed BESS facility site within the Northern Lot to be developed as a BESS facility, with the elevation of the earthworks pad anticipated to be 147 metres AHD, which incorporates the 1% AEP flood level + 0.5 metres freeboard (this level is likely to be above the 1 in 2000 AEP flood elevation). Earthworks required if the BESS facility is to be located in the northern lot are anticipated to be between 75,000 and 100,000 m^3 and is not modelled to result in flooding impacts off site.

Locating the BESS facility on the Southern Lot would not require earthworks to be above flood levels, assuming acceptable set back from the creek lines. This option is recommended as more suitable than the site proposed in the Northern Lot on this basis.

Additional modelling will be required as part of the ongoing design process, incorporating more detailed and robust hydrologic and hydraulic modelling methodologies, and to address the requirements for a Development Application submission.

Regards,

Nigel Bosworth,

MEngSt(Water) GradCertEng(Water) BE(Env) MIEAust CPEng NER
Technical Director - Stormwater, Hydrology & Flooding

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Gillenbah BESS
Water Depth - 1%AEP
Existing Case

Figure 1

Legend

- Site Boundary
- Electricity Transmission Line

Water Depth (m)

- 0 - 0.3
- 0.3 - 0.6
- 0.6 - 0.9
- 0.9 - 1.2
- 1.3 - 1.5

0 250 500 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:12,500 at A3
Project Number:	626.30126
Date:	13-Nov-2024
Drawn by:	FX

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Gillenbah BESS
Velocity - 1%AEP
Existing Case

Figure 2

Legend

- Site Boundary
- Electricity Transmission Line

Velocity (m/s)

- 0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5

0 250 500 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:12,500 at A3
Project Number:	626.30126
Date:	13-Nov-2024
Drawn by:	FX

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Gillenbah BESS
Flood Afflux - 1%AEP

Figure 5

Legend

Site Boundary

Electricity Transmission Line

Flood Afflux (m)

0.0 - 0.01

0.0101 - 0.1

0.101 - 1

0 250 500 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:12,500 at A3
Project Number:	626.30126
Date:	13-Nov-2024
Drawn by:	FX

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