



Stormwater Management Plan

Project:	Dowerin Peak Planning 2026
Client:	CBH
Author:	B. Smith
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CONSULTING CIVIL AND TRAFFIC ENGINEERS
1 ST. FLOOR, 908 ALBANY HIGHWAY, EAST VICTORIA PARK WA 6101.
PHONE|+61 8 9355 1300
EMAIL| admin@shawmac.com.au



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Version	Prepared By	Reviewed By	Approved By	Date
A	B. Smith	R. Needham	R. Needham	25.08.26

Responses to EHO-RA info requests:

From: Ryan Needham <rneedham@shawmac.com.au>

Sent: Thursday, 10 September 2026 8:20 AM

Subject: RE: Attention SHAWMAC B. Smith & R. Needham RE: SHAWMAC Document 2608011-SWMP-001 Additions to Existing Grain Handling Facility – Development Application - Lot 25 on Deposited Plan 425195, Dowerin

“Hi Chris,

Responses as follows:

1. 5-year ARI and 20% AEP terminology are interchangeable.
 2. There is one existing culvert as shown in Table 2 where we are not achieving the 300mm freeboard. This culvert only conveys stormwater from the existing site. We need to extend it, but the issue is there regardless of the expansion. Personally, I don't think this is a big issue - 220mm is achieved, the deficient freeboard only occurs for a few minutes at the peak of the event, it doesn't affect any external areas and CBH carries the risk of any damage. Otherwise, no issue with the proposed condition.
 3. The previous version of the SWMP assessed the 20-year event for permanent infrastructure, so the modelling outcomes aren't comparable. There's no change in the basin size in the models, but the top area and volume have been presented differently in both reports (latest report is more correct). Apologies for the confusion. The report is intended to show that the basins which were built for the 20-year event under the previous works have capacity to contain the 5-year event for the whole catchment once the new works are built. This is demonstrated by the available freeboard. There's no additional compensation provided, it's just the difference in the design events. Where we've mentioned 30% design, this is just stating that the design has a maturity of 30% i.e. it's not fully completed yet.
- Ryan Needham... Manager, Civil, Level 1...”

From: Roberts, Timothy <Timothy.Roberts@cbh.com.au> Sent: Wednesday, 9 September 2026 2:06 PM
“.... I can answer dot point one though – a 1 in 5-year storm event is the same as a 20% AEP event (1 in 5 equals 20%)....”

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1. Introduction

1.1. The Project

It is understood that CBH are proposing to construct three (3) temporary open bulkheads at their existing Dowerin West site as part of their 2026 peak planning project.

Refer to **Figure 1** for an extract of CBH's concept plan for the proposed works.

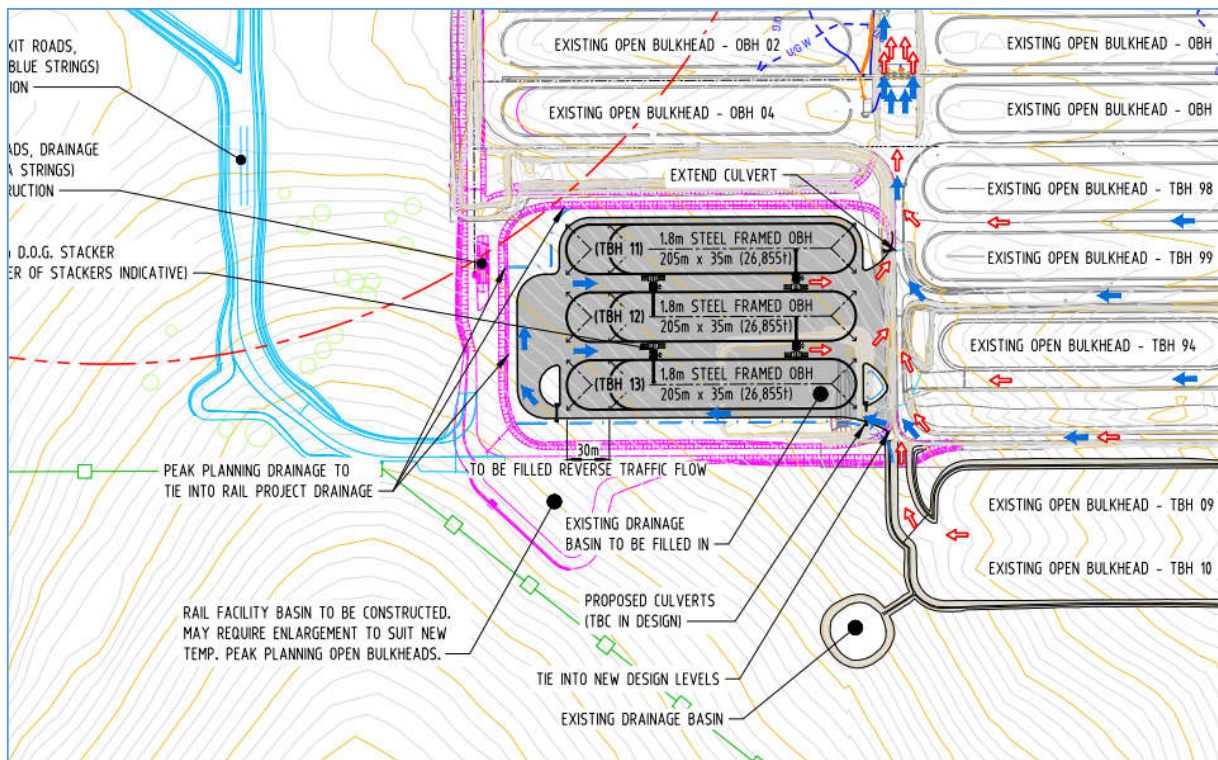


Figure 1: CBH Concept Plan

1.2. Purpose

The purpose of this report is to document the drainage design philosophy and outcomes for the 30% design.

2. Existing Situation

2.1. Surface Water Catchments

The CBH site comprises of seven major catchments that direct stormwater into five existing non-free-draining basins, and one existing free draining basin. Runoff from the site is conveyed to these basins via a network of pipes and open drains. The site is predominately bounded by vacant land, with Irvine Road and an existing railway line located along the northwest boundary.

Figure 2 below shows the existing CBH catchments.

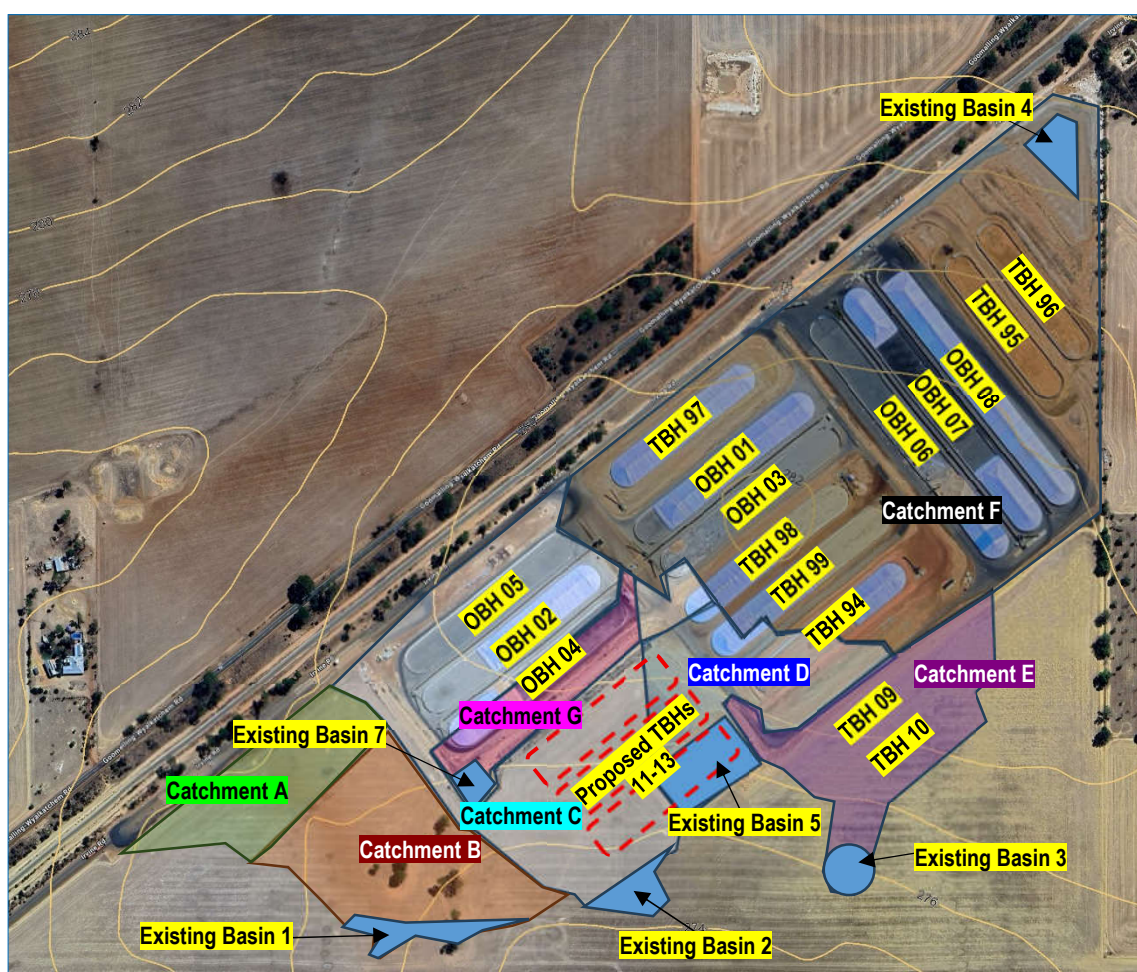


Figure 2: Existing CBH Catchments

Catchment A and Catchment B contains a temporary access road with a temporary weighbridge, although it is noted that these are not present in current aerial imagery. Catchment A directs runoff from the access road towards it's the northwest corner, with an open drain daylighting. Catchment B directs runoff from the other portion of the access road towards existing Basin 1. Catchment C contains access roads, equipment, and a rail facility, but it is noted that these are also not present in current aerial imagery. Runoff from Catchment C is



directed towards the existing Basin 2. Catchment D contains the western portions of the existing TBH 99 and 94 and directs runoff towards existing Basin 5. Catchment E contains TBH09 and TBH10, directing runoff towards existing Basin 3. Catchment F contains the eastern portion of the site, directing runoff towards existing Basin 4. Catchment G contains a portion of OBH04, and the land below. Runoff from this catchment is directed towards existing Basin 7, which has a 450 HDPE outlet, discharging water into the open drain running along the western edge of Catchment C, and towards existing Basin 2.



3. Stormwater Management Strategy

3.1. Strategy Overview

In general, the adopted stormwater management strategy involves the existing Basin 5 being filled in for the construction of TBH's 11-13, with runoff from Catchment D now being directed into the existing Basin 2 within Catchment C. The new bulkheads will have a new network of open drains, ultimately discharging into the existing drain network of Catchment C, and into existing Basin 2.

The existing culvert outlets from Catchment D will be extended/realigned to connect to the existing open drains which discharge to Basin 2 via a culvert under the existing access road. With the removal of Basin 5 and the construction of the new bulkheads, the flow rate through the existing culvert under the access road will increase, and as the access road is permanent infrastructure the culvert will need to be upgraded to provide for the 5% AEP flow rate.

The emergency bulkheads were designed to accommodate runoff from a 20% AEP event, and the existing basins were assessed for a 20% AEP event, consistent with CBH's standards.

Figure 3 shows the proposed drainage strategy.

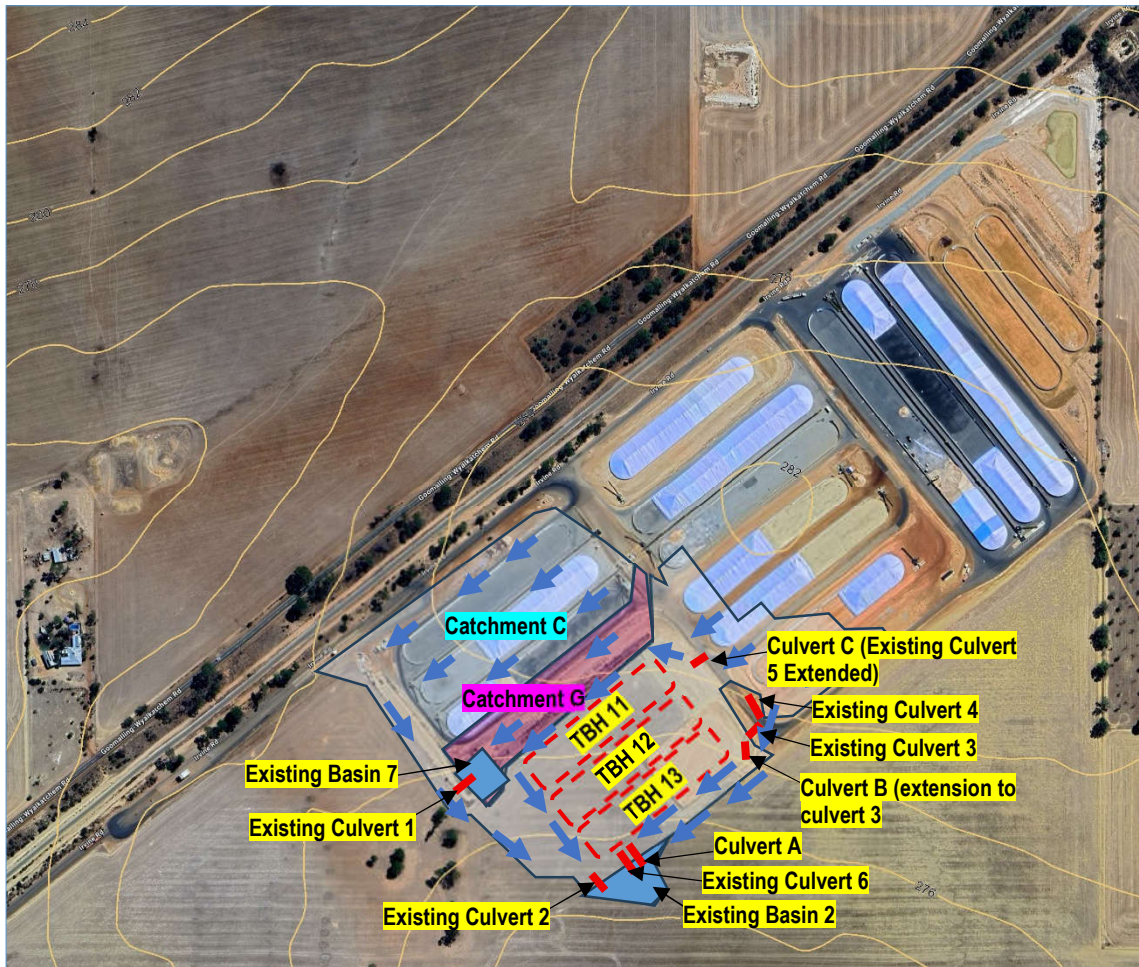


Figure 3: Proposed Drainage Strategy

3.2. Design Criteria and Modelling Assumptions

Based on the adopted strategy and CBH's design specifications, the key stormwater management design criteria and assumptions are summarised as follows:

- Adequately protect the site from inundation and flooding both from internal catchments and external upstream catchments.
- TBHs are designed for the 20% AEP event.
- Permanent culverts are designed for the 5% AEP event with 300mm freeboard to shoulder.
- Manage, control and convey the design ARI event post development event with a freeboard of 300mm.
~~(Consideration may be given to a reduction to 150mm when flooding does not present a risk to infrastructure and operations).~~
- Open drains are to be set at a minimum 300mm deep below the bottom of pavement, or 600mm below surface where no pavement is to be installed.

- As per CBH Peak Planning Specification, no scour protection or road kerb to be implemented.
- Culverts may have a minimum cover of 400mm (RCP Class 4 or HDPE).
- Minimum culvert size of 450mm diameter (except at basin outlets).
- Minimum drain fall of 0.3%.

An XPSTORM model was built for the proposed temporary works as shown in **Figure 4**. The following key assumptions were adopted:

- Design rainfalls and temporal patterns are based on ARR 2019.
- A nominal 50mm/day basin infiltration rate has been assumed to reflect seepage and evaporation.
- Basin Invert levels were assumed based on the batter grades
- Infiltration losses have been assumed as follows:
 - Pervious areas – 15mm initial loss, 0mm continuing loss.
 - Impervious areas (e.g. new/existing pavements) – nil losses (assumed).
- Based on WSP's geotechnical investigation report, an infiltration rate of 0.5m/day (20.83mm/hr) has been adopted for design purposes to reflect some seepage in basins.
- Model outcomes reflect the median event from the hydraulic model.
- Culvert entry/exit loss coefficients are assumed as 0.5/1.0 respectively.
- Mannings 'n' values assumed as follows:
 - Open drains – 0.022
 - Culverts – 0.012

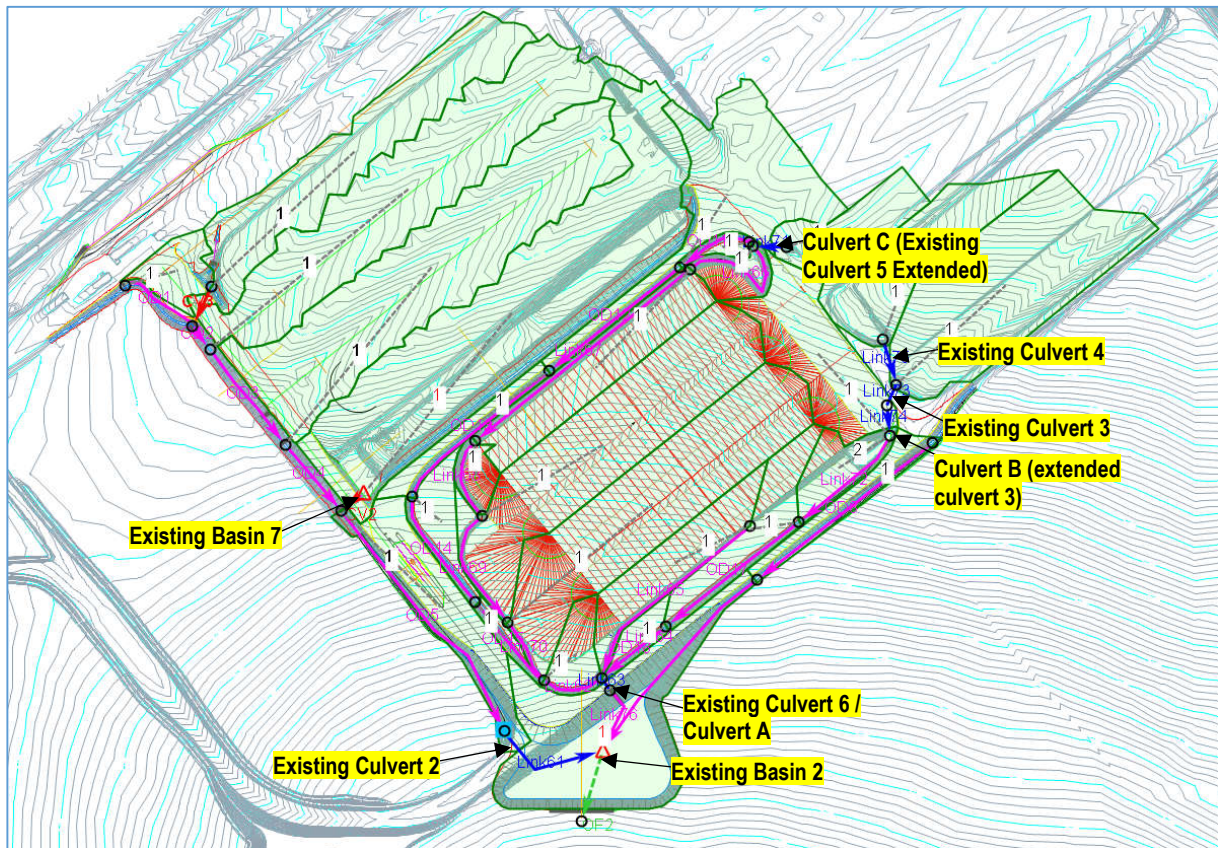


Figure 4: XPStorm Modelling & Analysis

3.3. Stormwater Quantity and Model Results

Table 1 to Table 3 provide a summary of the stormwater modelling results for the basins and culverts.

Table 1: Basin Modelling Results 5-Year ARI

Description	Existing Basin 2	Existing Basin 7
Basin Base Level (m AHD)	271.80	277.71
Basin Base Area (m ²)	4120	21
Base Top Level (m AHD)	273.80	278.58
Basin Top Area (m ²)	5720	930
Basin TWL (m AHD)	272.73	277.97
Max Stored Volume (m ³)	4133	21
Total Basin Capacity (m ³)	9840	414
Freeboard to Top of Basin	1.07	0.61
Critical Event	12hr	15min

Table 2: Culvert Modelling Results 5-Year ARI

Culvert	Description	Type	U/S Shoulder Level (m AHD)	HW Level (m AHD)	Freeboard to shoulder Level (m)	Max Flow (m³/s)	Max Velocity (m³/s)
Existing Culvert 1	Existing Basin 7 Outlet	1x450RCP	278.58	277.98	0.60	0.102	1.12
Existing Culvert 2	Culvert Under Western Temporary Access Road	1x450HDPE	275.20	274.72	0.48	0.510	3.40*
Existing Culvert 3	Under Road East of TBH13	1x450RCP***	280.55	280.33	0.22**	0.188	1.17
Existing Culvert 4	Southwest of TBH94	1x450RCP***	280.97	280.35	0.62	0.061	0.53
Culvert A & Existing Culvert 6	South of TBH13 Under Access Road	2x525RCP 1x450RCP	275.89	275.29	0.70	0.640	0.43
Culvert B	Southeast of TBH13 under Access Road	1x450HDPE	280.64	280.19	0.45	0.185	1.22
Culvert C (Existing Culvert 5 Extended)	East of TBH11 Under Access Road	1x450RCP***	281.78	280.61	1.17	0.031	0.82

*This culvert has its outlet at the base of existing Basin 2, and as such the velocity of 3.4m/s would not result in any scouring of the batter.

** Existing infrastructure that is not being changed by the development of TBH 11-13.

***These culverts have been assumed to be 450RCP per CBH design specification, as they were not identified in the provided survey.

Table 3: Culvert Modelling Results 20-Year ARI

Culvert	Description	Type	U/S Shoulder Level (m AHD)	HW Level (m AHD)	Freeboard to shoulder Level (m)	Max Flow (m³/s)	Max Velocity (m³/s)
Culvert A & Existing Culvert 6	South of TBH13 Under Access Road	2x525RCP 1x450RCP	275.89	275.46	0.43	0.941	0.63



Appendix A – CBH Concept Plan



EXISTING SAMPLE PLATFORM

EXISTING WEIGHBRIDGE

TOTAL SITE STORAGE 580,405 t

AREA OF NEW WORKS 35,300m²

NEW TEMPORARY ENTRY/EXIT ROADS, DRAINAGE & WEIGHBRIDGE (BLUE STRINGS) AREA IS UNDER CONSTRUCTION

NEW RAIL FACILITY ROADS, DRAINAGE & EQUIPMENT (MAGENTA STRINGS) AREA IS UNDER CONSTRUCTION

500tph D.O.G. STACKER (NUMBER OF STACKERS INDICATIVE)

EXISTING OPEN BULKHEAD - OBH 05

EXISTING OPEN BULKHEAD - OBH 02

EXISTING OPEN BULKHEAD - OBH 04

EXISTING OPEN BULKHEAD - OBH 01

EXISTING OPEN BULKHEAD - OBH 03

EXISTING OPEN BULKHEAD - TBH 97

EXISTING OPEN BULKHEAD - TBH 98

EXISTING OPEN BULKHEAD - TBH 99

EXISTING OPEN BULKHEAD - TBH 94

EXISTING OPEN BULKHEAD - TBH 09

EXISTING OPEN BULKHEAD - TBH 10

EXISTING OPEN BULKHEAD - OBH 06

EXISTING OPEN BULKHEAD - OBH 07

EXISTING OPEN BULKHEAD - OBH 08

EXISTING OPEN BULKHEAD - TBH 95

EXISTING OPEN BULKHEAD - TBH 96

EXISTING DRAINAGE BASIN

EXTEND CULVERT

(TBH 11) 1.8m STEEL FRAMED OBH 205m x 35m (26,855t)

(TBH 12) 1.8m STEEL FRAMED OBH 205m x 35m (26,855t)

(TBH 13) 1.8m STEEL FRAMED OBH 205m x 35m (26,855t)

30m

TO BE FILLED REVERSE TRAFFIC FLOW

EXISTING DRAINAGE BASIN TO BE FILLED IN

PROPOSED CULVERTS (TBC IN DESIGN)

TIE INTO NEW DESIGN LEVELS

EXISTING DRAINAGE BASIN

RAIL FACILITY BASIN TO BE CONSTRUCTED. MAY REQUIRE ENLARGEMENT TO SUIT NEW TEMP. PEAK PLANNING OPEN BULKHEADS.

PEAK PLANNING DRAINAGE TO TIE INTO RAIL PROJECT DRAINAGE

NOTE:
TRAFFIC TO NEW PEAK PLANNING OBHS TO BE REVERSED WHEN FILLING SOUTHWEST END. TRAFFIC TO BE MANAGED ONSITE.

1:2500 @ A1(TTTT)

NOTE:
TRAFFIC TO NEW PEAK PLANNING OBHS TO BE REVERSED WHEN
FILLING SOUTHWEST END. TRAFFIC TO BE MANAGED ONSITE.



CBH GROUP
ABN 29 256 604 947

CBH GROUP
LEVEL 6
240 ST GEORGE'S TERRACE
PERTH W.A. 6000
PH (08) 9237 9600
FAX (08) 9322 3942

									SCALE 1:2500	DRAWN	J. Butlingham	29.07.26	TITLE DOWERIN WEST 2026 PEAK PLANNING 3 x ADDITIONAL OPEN BULKHEADS CONCEPTUAL LAYOUT No. 2		
									SHEET A1	CHECKED					
									PROJECT	DESIGNED					
									CO-ORDINATE SYSTEM DOWERIN2020	DESIGN APPR					
-	--	A	29.07.26	ISSUED AS CHECK PRINT AND FOR REVIEW				JB		PROJECT APPR			DRG NO 361-ENG-CI-DCO-0028	SHEET 1 OF 1	REV. A
REF DRAWING No.	REFERENCE DRAWING TITLE			REV	DATE	REVISION DESCRIPTION			BY	CHK'D	APP'D				