Report

04 December 2024

To	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
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Dear Ruben

1. Introduction

Chairay Sustainable Plastics (Chairay) propose to develop a recyclable plastic material recycling facility at Canning Vale, Western Australia. A requirement for approval of the proposed activity is to address the requirements of WA Department of Fire and Emergency Services (DFES) Guidance Note 04: Fire Prevention and Management in a Recycling Facility (DFES Guidance Note GN04).

1.1 Purpose of this report

The purpose of this report is to assess the total volume of fire-fighting water required to be retained in order to meet DFES requirements (specifically, DFES Guidance Note GN04), and to provide a conceptual strategy of how to achieve the fire water containment requirement. DFES requires all fire water discharge from sprinklers and hydrants during a fire emergency event be contained on site.

The containment strategy considered a two stage assessment approach, with Option 1 being preferred, and Option 2 to be progressed if Option 1 was found to be unworkable:

Option 1. Bunding to contain fire water discharge from sprinklers and hydrants within the building footprint.

Option 2. Blind off all soak wells and provide external below ground storage and containment system for fire water discharge. Provide automated diversion on the stormwater drainage system linked to the fire alarm system to divert water from stormwater infiltration cells to the containment storage.

1.2 Assumptions

The below assumptions are made for the assessment:

– Internal firefighting is considered only.

– Fire water discharge from awning sprinklers and hydrant spray on the external portions of the building is not considered as part of this assessment, given Chairay have confirmed that feedstock and product storage outside the building and under the awning will not be a requirement for the Works Approval application.

1.3 Site description

The property is located at 204 Bannister Road, Canning Vale, Western Australia, as shown in Figure 1.

There are two (2) warehouses located at this address, with the frontmost building, referred to as Warehouse A, being the warehouse that is leased by Chairay for the proposed operations. Chairay are not leasing Warehouse B. Warehouse B therefore is not part of this review and excluded from further comment beyond this introductory section.

A site layout capturing both buildings is shown in Figure 2, noting that the loading area between the warehouses is exclusive to the use and tenancy of Warehouse A, and is provided with a garrison auto gate.

Figure 1 Location of the project site

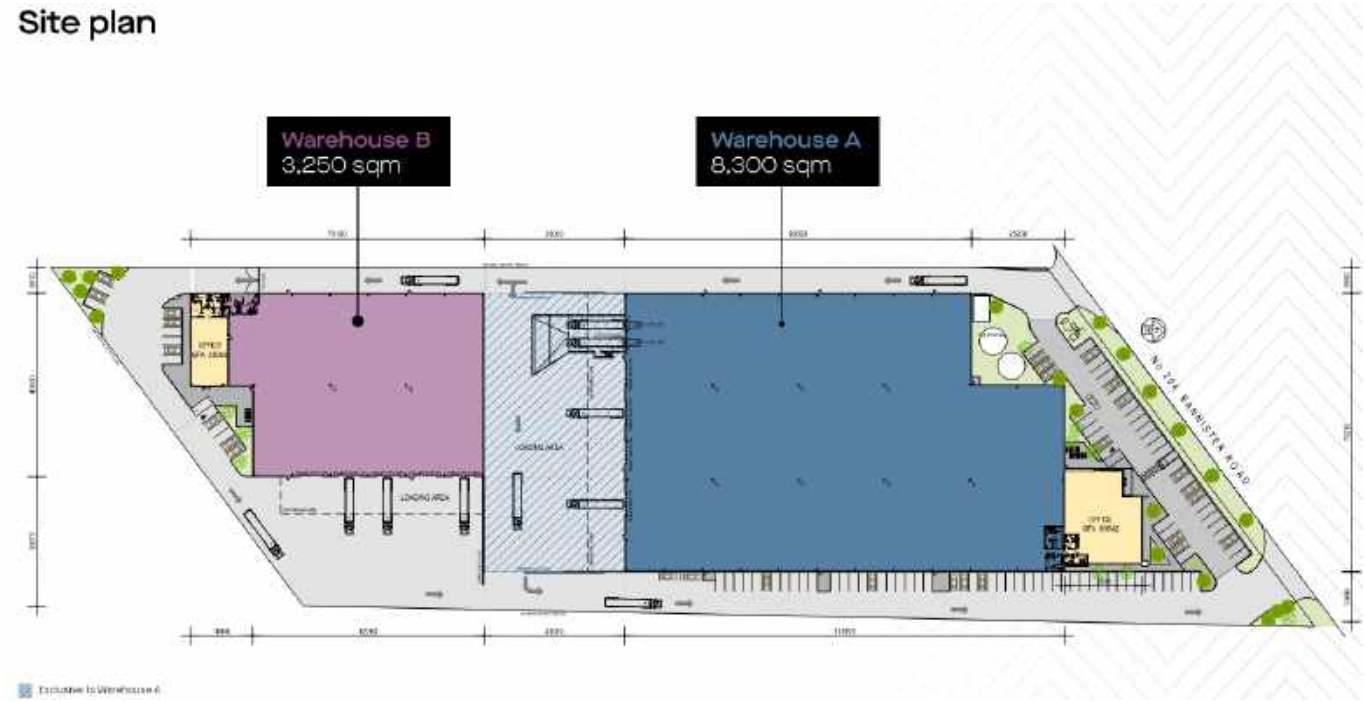

Figure 2 Site plan for 204 Bannister Road (Centuria, 2023)

Key firefighting infrastructure requiring access by DFES include the hydrant booster, sprinkler booster, water storage tanks, pumps and attack hydrants. The location of these systems is shown in .

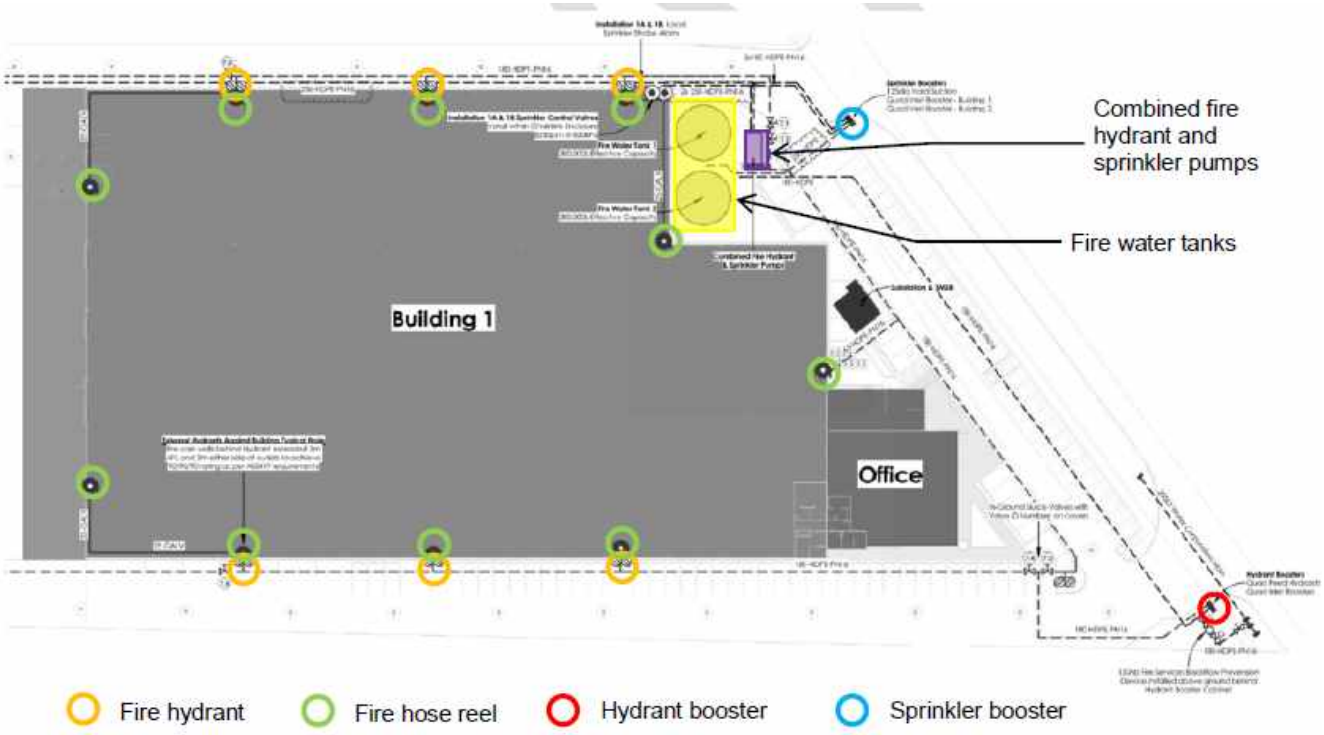

Figure 3.

Figure 3 Location of key fire service systems (Quick Response Fire Protection, 2023) – With markups

The facility is understood to discharge stormwater runoff to ground via two methods:

i. Infiltration via soak wells – several risers serve as both conveyance manholes and soak wells.

ii. Grid stormwater detention and infiltration system – Ecobloc drainage cells are installed under the carpark facing Bannister Road.

Excess stormwater is understood to be discharged to the municipal stormwater network, with the connection located on Bannister Road.

1.4 Scope and limitations

This report: has been prepared by GHD for Chairay Sustainable Plastic Co. Pty Ltd and may only be used and relied on by Chairay Sustainable Plastic Co. Pty Ltd for the purpose agreed between GHD and Chairay Sustainable Plastic Co. Pty Ltd as set out in section 1.1 of this report.

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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 sections 1.1 and 2.2.2 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

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Accessibility of documents

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2. Containment assessment

2.1 Containment requirement

The fire water run-off containment requirement is governed by DFES Guidance Note GN04, particularly Section 6.11:

> *"6.11.1. The waste facility should have effective and automatic means of containing fire water run-off with primary containment having a net capacity not less than the total hydraulic demand of the installed fire safety system.*

Note: the total hydraulic demand is the net discharge of water from both the fire hydrant and fire sprinkler system.

> *6.11.2. The containment system, which includes the base of any storage area, should be impermeable (i.e. sealed) and prevent fire water run-off from entering the ground or any surface water course (e.g. river, stream, lake, estuary, open sea).*
>
> *6.11.3. Pollution control equipment such as stormwater isolation valves, water diversion booms, drain mats, should be provided as necessary for the facility's emergency response procedures, and be kept readily accessible in the event of fire."*

The total hydraulic demand is stated as the net discharge of water from both the fire hydrant and fire sprinkler systems.

The Building 1 sprinkler design data is reproduced below in Figure 4.

Building 1 Sprinkler Design Data	
Date System Completed	2023
Highest Sprinkler above Install Gauge	12.7m
Plant Rooms	Ordinary Hazard 1 - 12 K8 @ 60lpm ea
External Awnings	Ordinary Hazard 3 - 18 K8 @ 60lpm ea
Concealed Spaces & Offices	Light Hazard - 6 K8 @ 67lpm ea
Warehouse Storage Areas	High Hazard Cat 1 to 4 + Cat 5C to 13.7m Ceiling Height. 12 K32 @ 350kPa (680lpm)
SCV1A Design Requirement @ SCV	**8208lpm @ 875kPa**
SCV1B Design Requirement @ SCV	**8209lpm @ 909kPa**

Figure 4 Building 1 sprinkler design data

The net hydraulic demand is analysed in the GHD DFES Guidelines Assessment (GHD, 2024), and is reproduced in Table 1.

Table 1 Fire Water Hydraulic Demand

Device	Duration of Operation	Fire Water Demand
2 x Hydrants @ 10 L/sec each	4 hr	288,000 L
High Hazard Sprinklers @8,209 LPM	1 hr	493,000 L
	Total	**781,000 L**

2.2 Option 1

2.2.1 Containment strategy

Should all fire water be able to be contained within the 8,300 m^2 building only, the resultant ponding would be ~ 94 mm, assuming no freeboard or loss of volume due to debris, equipment, stockpiled materials etc.

Total storage capacity of the loading dock (ramp and tanks/pits) is estimated to be approximately 250kL. Maximum fire water to be contained within building of 541kL requires perimeter bunding to a height of 66 mm if using the loading dock also for containment.

It is estimated that around 50% of the hydrant water would be sprayed over the external part of the building and would be lost to the site stormwater system (circa 144 kL). That is, 10 L/s to internal fire fighting and 10 L/s for external firefighting.

Actual containment required is therefore estimated to be 397 kL. Rounding this to 400 kL, it is calculated that perimeter bunding to a height of at least 49 mm will be required at doorways and entrances.

However, some aspects of the building's footprint will need some sealing/modification/treatment to address identified constraints and issues to facilitate effective containment.

Examples of containment constraints for the warehouse facility are included in Table 2 (noting that not every individual containment constraint is included in Table 2, rather just examples of specific constraints).

2.2.2 Loading dock constraints

Use of the loading dock as part of the fire water containment storage will require additional height (perimeter bunding) at the top of the ramp to prevent fire water flowing out, and stormwater flowing in.

The stormwater design drawings in the loading dock lower ramp area show three interconnected below ground cylindrical concrete tanks (each 1.8 m diameter and 1.2 m deep).

A follow-up site inspection on 20 November 2024, resulted in the following findings:

– There are 3 x interconnected soak wells in the loading dock, one with no grate and sealed under concrete
– The loading dock soak wells not connected to the site-wide civil infrastructure
– The loading dock soak wells accept a downpipe (DP) from the roof canopy above
– A number of other junction pits shown on the stormwater design drawings were confirmed to be soakwells.

In the event of a fire emergency and need for fire water containment, these soakwells would need to be capable of containing contaminated fire water and not permit infiltration into groundwater. Some further engineering controls are necessary.

It is therefore proposed that the soakwells in the loading dock will be modified accordingly (refer Section 2.3 and Appendix A).

Table 2 Fire water containment – Constraints for internal containment (per site observations 15 October 2024)

Description	Requirement	Photo
Entrance to staff room and amenities.	Bunding and/or ramp required at entrance, Or outside main entrance to offices - such that office floor area forms part of temporary containment.	
Sprinkler drain near entrance to staff room and amenities.	Provision for a hand wash trough (not installed). Requires blocking/isolation from the sanitary drainage system.	

Description	Requirement	Photo
Timber wall near the staff room and amenities.	Bunding offset from the wall OR Waterproofing of wall and connection with floor. Note that if office footprint becomes part of containment area, there would likely be no need to seal this.	
Emergency exit (picture 1 of 3).	Bunding and/or ramp required (outside PA door).	

Description	Requirement	Photo
Emergency exit (picture 2 of 3).	Bunding and/or ramp required outside PA door.	
Emergency exit (picture 3 of 3).	Bunding and/or ramp required outside PA door.	

Description	Requirement	Photo
Cracking between the floor and wall slabs.	Repair cracking and fill/waterproof voids with suitable non-shrink sealant.	
Connection between the floor and wall slabs.	Fill/waterproof gaps/voids.	

Description	Requirement	Photo
Opening for conduits to switch boards.	Steel plate is required to remain accessible. Bunding (e.g. barrier kerb) required surrounding the switch board.	
Opening for conduits to switch boards.	Steel plate is required to remain accessible. Bunding (e.g. barrier kerb) required surrounding the switch board.	

Description	Requirement	Photo
Column example.	Fill/waterproof voids. Note this issue is consistent across the site and waterproofing/void filling will be required for all columns.	
Column example.	Fill/waterproof voids. Note this issue is consistent across the site and waterproofing/void filling will be required for all columns.	

Description	Requirement	Photo
Sealant failing between expansion joints.	Replace sealant.	
Sprinkler control valves	Sealing/waterproofing required around pipe connections to floor slab. Bunding also required around the door (per previous descriptions). Bunding would be most suitable around the control valve cage.	

Description	Requirement	Photo
Dock levelling platform. Note extra doors in the background.	Assume dock levelling platforms can be allowed to flood and water to spill to lower (loading dock) ramp area outside. Roller doors in the background require trafficable bunding and/or a ramp surrounding the inlet.	
Dock levelling platform.	Allow water to spill to loading dock ramp area.	

Description	Requirement	Photo
Service connection through the floor slab.	Waterproofing of the service hole.	
Wastewater inspection opening.	Waterproof wastewater inspection opening. Note it is assumed that this opening is infrequently accessed, and proposed sealant can be removed and reinstalled before and after undertaking wastewater inspections along this line.	

2.2.3 Containment assumptions

The analysis relies on several assumptions which require confirmation to confirm suitability. Should the assumptions be unworkable, alternative containment strategies will need to be considered. Alternatives may either result in a reduction in the building footprint available to be used for fire water containment or product storage, or may require alternative containment measures.

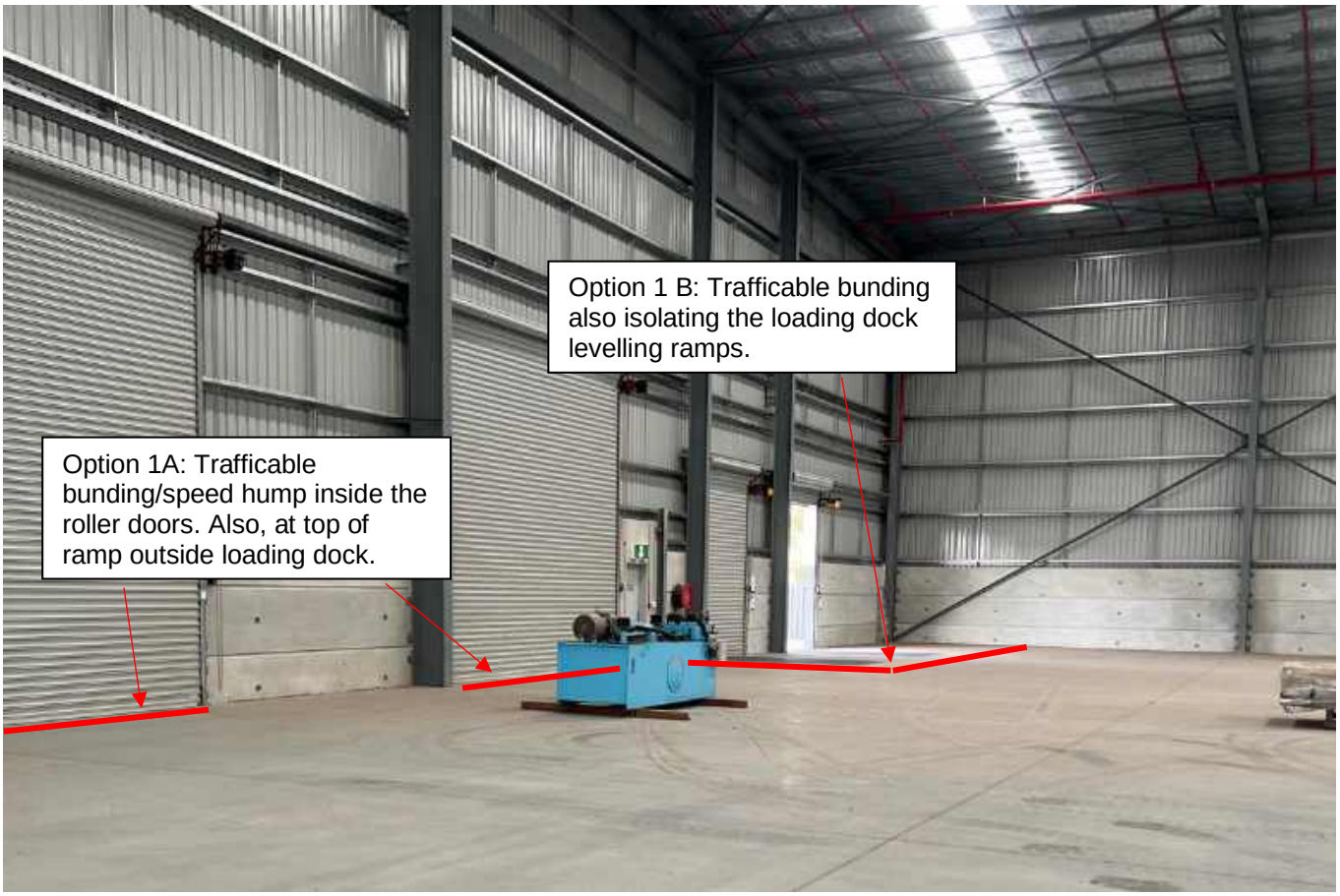
The critical assumptions for Option 1 containment include:

1. The levelling docks can be allowed to flood and spill water to the lower level ramp outside the building.
2. The roller doors require trafficable bunding to enable fire water containment at the doors.
3. Emergency exits, and the entrance to the amenities, require either:
    a. Raising of the floor level (will require some form of ramp for wheelchair access).
    b. Bunding offset outside the exit door (will require some form of ramp for wheelchair access).

Providing a containment solution near the roller doors and levelling dock would potentially complicate forklift vehicle access during operations, particularly for product loading and storage. Two options have been considered (refer Figure 5):

– Option 1A: A raised trafficable bund / speed hump inside the roller doors. A raised trafficable bund / speed hump outside the building at the top of the loading dock ramp to prevent overflow of fire water containment into the site stormwater system. This would require any vehicles to be able to drive over it if/when required.
– Option 1B: A raised trafficable bund / speed hump or ramp isolating the levelling ramps at the loading dock. A raised trafficable bund / speed hump outside the building at the top of the loading dock ramp would not be necessary. This would require forklifts to be able to drive over it if/when required (likely less preferred). Containment bunding would need to be higher than for Option A since loading dock and tanks would not contribute to fire water containment.

Figure 5 Fire water containment options at roller doors and loading dock levelling ramps



A markup of the containment requirements is included in Appendix A. The storage requirements for the two roller door options are detailed in Table 3.

Table 3 Fire water containment requirement

Fire water containment requirement	Ponding Area	Resulting Ponding[1]
Option 1A: Full building footprint with containment in loading dock and existing in-ground tanks (soakwells modified to prevent infiltration).	8,300 m^2	49 mm
Option 1B: With bunding proposed as per Option A – without bund at top of loading dock ramp outside building but trafficable bund added inside building to isolate loading dock levelling ramps and prevent spillage of fire water into loading dock and in-ground tanks.	7,940 m^2	98 mm

Other general assumptions include:

– The openings for conduits for switchboards require waterproofing and/or bunding.
– The sewer inspection opening requires waterproofing.
– Voids surrounding columns and expansion joints require waterproofing.
– Internal sprinkler drains require isolating.
– Plasterboard walls (and other non-waterproofed material) require waterproofing to the ponding height, unless office floor area considered part of fire water containment footprint and bunding and ramp installed outside office entrance.
– A freeboard, and allowance for lost volume due to debris, are to be added to the 'Resulting Ponding' level to determine the final height of the bund and associated measures.
– Soakwells in the loading dock can be sealed to prevent infiltration.

2.3 Engineering controls to be implemented

As described throughout this report, there will be a need to install perimeter bunding and localised sealing to contain fire water within the building footprint in the event of a fire emergency.

The three interconnected soakwells in the loading dock will require the following engineering controls to be implemented:

1. Sealing up to prevent infiltration
2. Installation of a submersible pump and rising main to transfer uncontaminated stormwater to the existing civil stormwater management system
3. Control interlock to automatically power off the submersible pump in a fire event (e.g. on activation of the fire sprinkler system).
4. Diversion of the DP from the canopy above the loading dock to the existing adjacent gravity draining stormwater system.

In the event of a fire emergency, fire water contained within the building perimeter and collected in the three interconnected tanks within the loading dock would be removed via vacuum truck, with the tanks effectively acting as a low-point collection sump for pump-out.

2.4 Next steps

The assumptions and proposed controls described as Option 1 in this report will be considered in conjunction with planned operational requirements and protocols. Based on site inspections and subsequent engineering assessment, it is considered that progression of Option 2 (external storage of firewater) is not required.

Following assessment of the environmental Works Approval application by DWER, it is proposed that detailed design of engineering controls for Option 1 would be progressed and implemented as described throughout this report, to achieve conformance with DFES Guidance Note GN04.

[1] Pond depth only – final bund height will need to consider freeboard and displacement of structures, baled material stockpiles etc.

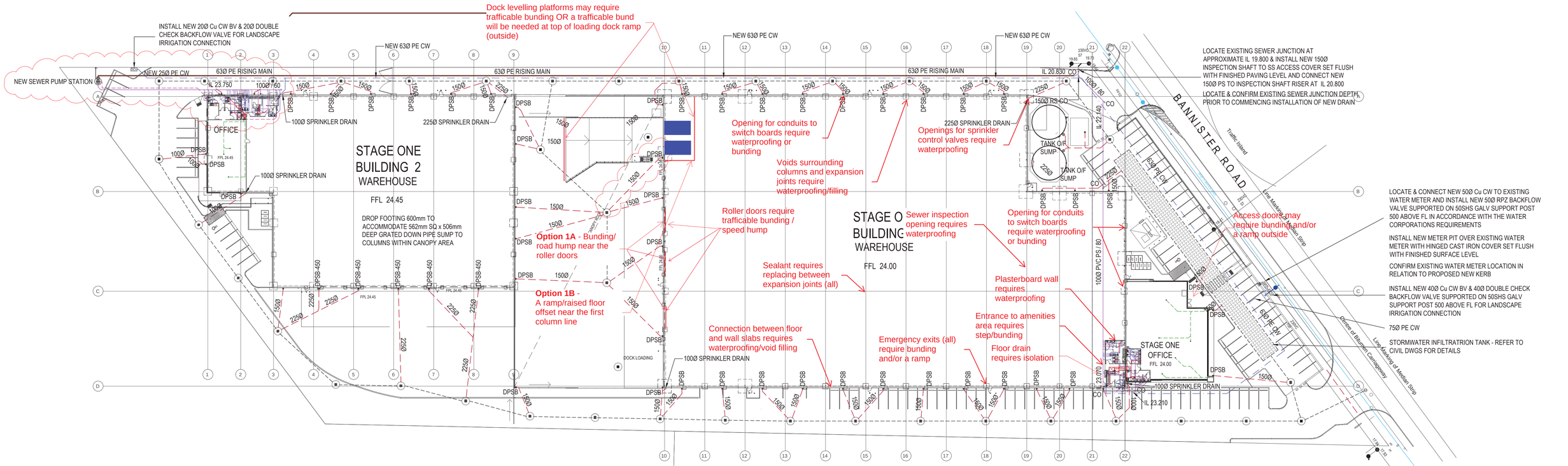
Appendices

Appendix A

Fire water containment sketch markups

APPENDIX A

CONSTRUCTION



STAGE 1 OVERALL SITE PLAN : HYDRAULIC SERVICES

SCALE 1:500 @ A1

ABBREVIATIONS

AS	AUSTRALIAN STANDARD
AFL	ABOVE FLOOR LEVEL
AAV	AIR ADMITTANCE VALVE
BV	BALL VALVE
CO	CLEAN OUT
CW	COLD WATER
CU	COPPER
C/S	CEILING SPACE
CV	CHECK VALVE
DIA	DIAMETER
DWC	DISABLED WATER CLOSET
DT	DISCONNECTOR TRAP
DWB	DISABLED WALL BASIN
DW	DISH WASHING UNIT
EX	EXISTING
FW	FLOOR WASTE
FL	FLOOR LEVEL
FSL	FINISHED SURFACE LEVEL
FWSB	FLOOR WASTE SUMP BOX
GL	GROUND LEVEL
HW	HOT WATER
HT	HOSE TAP
HDPE	HIGH DENSITY POLYETHYLENE
H&CW	HOT & COLD WATER
IW	INDUSTRIAL WASTE
IWT	INDUSTRIAL WASTE TRAP
IWSP	INDUSTRIAL WASTE SAMPLE POINT
IL	INVERT LEVEL
IS	INSPECTION SHAFT
I/G	IN GROUND
I/C	IN CAVITY
IO	INSPECTION OPENING
JU	JUMP UP
KS	KITCHEN SINK
M	METER
NPCW	NON POTABLE COLD WATER
O/F	OVER FLOW
ORG	OVER FLOW RELIEF GULLY
PS	PROPERTY SEWER
RPZD	REDUCED PRESSURE ZONE DEVICE
RWP	RAIN WATER PIPE
RC	REINFORCED CONCRETE
SW	STORMWATER
TD	TUNDISH
URL	URINAL
uPVC	POLYVINYL CHLORIDE
U/S	UNDER SLAB
VB	VANITY BASIN
V/BOX	VALVE BOX
VP	VENT PIPE
WP	WASTE PIPE
WB	WALL BASIN
WC	WATER CLOSET
WH	WATER HEATER
WCWA	WATER CORPORATION WA

GENERAL NOTES

READ THIS DRAWING IN CONJUNCTION WITH THE HYDRAULICS SECTION OF THE SPECIFICATION

READ THIS DRAWING IN CONJUNCTION WITH THE ARCHITECTURAL, STRUCTURAL, FIRE, ELECTRICAL & MECHANICAL DRAWINGS AND SPECIFICATIONS

ALL SET OUT DIMENSIONS AND LEVELS SHALL BE TAKEN FROM THE ARCHITECTURAL DRAWINGS

INSPECT THE SITE AND ALLOW FOR ALL EXISTING CONDITIONS AND CONSTRAINTS THAT MAY AFFECT THE INSTALLATION OF THIS SECTION OF THE WORK

LIAISE WITH ALL OTHER TRADES AND CO-ORDINATE THE INSTALLATION OF EACH SECTION OF WORK PRIOR TO COMMENCING

PIPE IDENTIFICATION

SOIL PIPE
WASTE PIPE
VENT PIPE
COLD WATER SERVICE
HOT WATER SERVICE
RAINWATER PIPE

N

REV	DESCRIPTION	DATE
5	SITE PLAN BACKGROUND UPDATED	13/02/23
5	1 x DOWN PIPE RELOCATED TO CLEAR LOADING DOCK	13/02/23
5	SEWER PUMP STATION RELOCATED	13/02/23
4	FIRE HYDRANT REMOVED - REFER TO FIRE SERVICE DWGS	07/02/23
3	SEWER PUMP STATION & 63Ø PE RISING MAIN ADDED	27/01/23
2	ISSUED FOR CONSTRUCTION	12/12/22
1	ISSUED FOR BUILDING PERMIT	26/10/22
0	ISSUED FOR PRICING	06/09/22

Centuria

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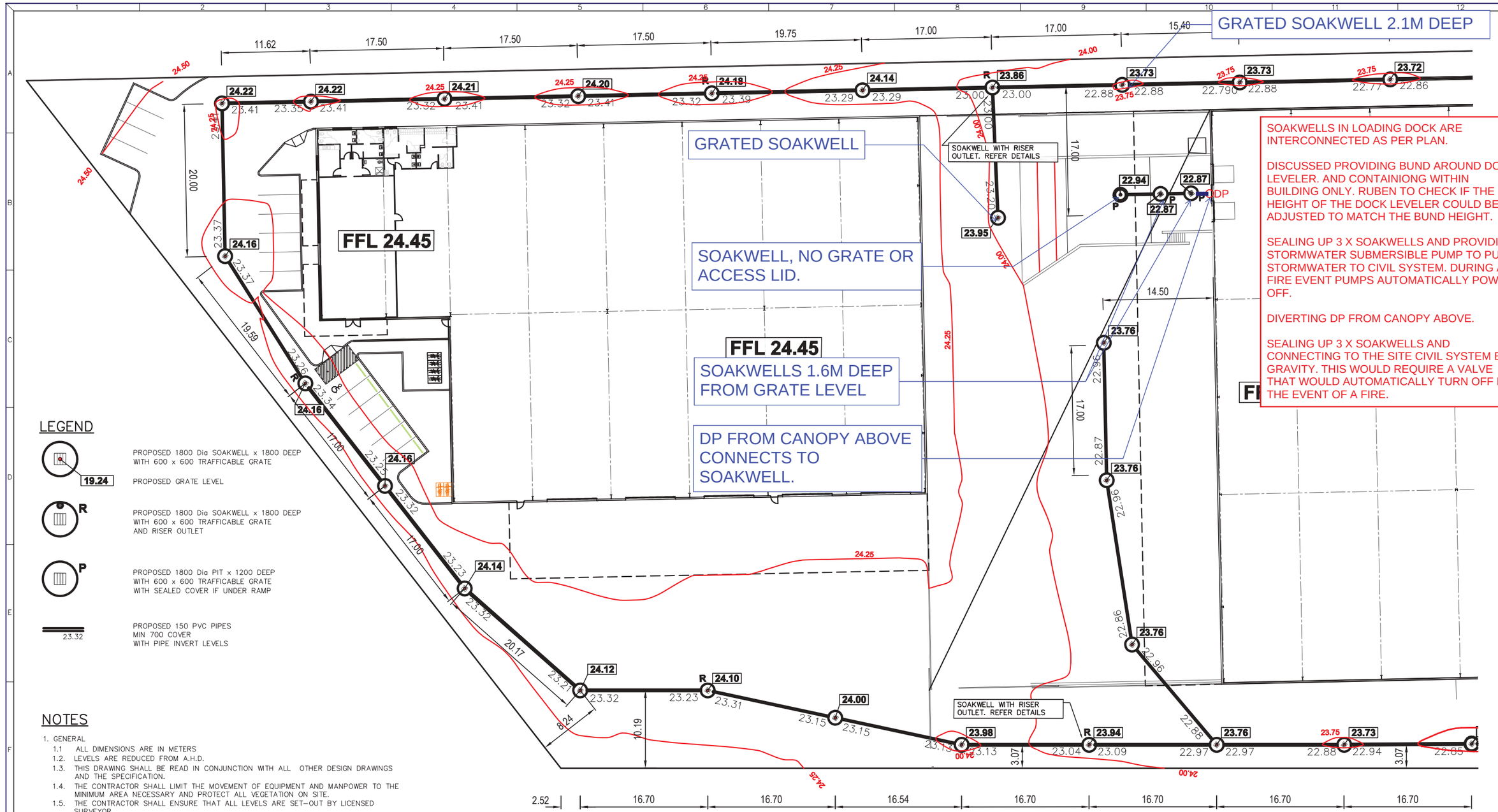
Hydraulics Design Australia

OFFICE - WAREHOUSE FACILITY
No 204 LOT 165 BANNISTER ROAD
CANNING VALE WESTERN AUSTRALIA

STAGE ONE - SITE PLAN
HYDRAULIC SERVICES

DRAWN: QO	DATE: AUG 2022	DRAWING No.: H.01	REV.: 5
HDA PROJ No.: 22173	SCALE: 1:500 @ A1		

THIS IS A CADD DRAWING
DO NOT AMEND MANUALLY



LEGEND

- 19.24 — PROPOSED GRATE LEVEL
- PROPOSED 1800 Dia SOAKWELL x 1800 DEEP WITH 600 x 600 TRAFFICABLE GRATE
- R — PROPOSED 1800 Dia SOAKWELL x 1800 DEEP WITH 600 x 600 TRAFFICABLE GRATE AND RISER OUTLET
- P — PROPOSED 1800 Dia PIT x 1200 DEEP WITH 600 x 600 TRAFFICABLE GRATE WITH SEALED COVER IF UNDER RAMP
- 23.32 — PROPOSED 150 PVC PIPES MIN 700 COVER WITH PIPE INVERT LEVELS

NOTES

1. GENERAL
   - 1.1 ALL DIMENSIONS ARE IN METERS
   - 1.2. LEVELS ARE REDUCED FROM A.H.D.
   - 1.3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER DESIGN DRAWINGS AND THE SPECIFICATION.
   - 1.4. THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND MANPOWER TO THE MINIMUM AREA NECESSARY AND PROTECT ALL VEGETATION ON SITE.
   - 1.5. THE CONTRACTOR SHALL ENSURE THAT ALL LEVELS ARE SET-OUT BY LICENSED SURVEYOR.
   - 1.6. THE CONTRACTOR SHALL MAINTAIN ACCESS TO EXISTING OCUPANCIES AT ALL TIMES THROUGHOUT THE ENTIRE CONSTRUCTION PROCESS.
   - 1.7. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES IN THE DESIGN DRAWINGS OR CLASHES WITH OTHER SERVICES AS SOON AS PRACTICALLY POSSIBLE TO THE SUPERINTENDENT.
   - 1.8. THE CONTRACTOR SHALL LOCATE AND PROTECT ALL SERVICES.
   - 1.9. FOR SETOUT REFER TO ARCHITECTURAL DRAWINGS
2. DRAINAGE
   - 2.1. DRAINAGE GRATE LEVELS ARE 10mm LOWER THAN ASPHALT LEVELS.
   - 2.2. 150 PIPES TO HAVE 700mm COVER AT UPSTREAM SOAKWELL.
   - 2.3. SOAKWELLS 1800 x 1800 DEEP WITH 600 x 600 TRAFFICABLE

PLAN

SITE INSPECTION NOTES
RH
20.11.2024.

1: 250
0 2.5m 5 7.5 10 12.5 15 17.5 20 22.5 25 27.5 30 32.5 35 37.5

REV	REVISION DESCRIPTION	DATE	DRN	CHK
A	ISSUE FOR REVIEW	10/07/22	JO	JO
B	ISSUE FOR REVIEW	16/07/22	JO	JO
C	ISSUE FOR REVIEW	29/08/22	JO	JO
D	ISSUE FOR REVIEW	5/02/23	JO	JO
0	ISSUE FOR CONSTRUCTION	13/02/23	JO	JO

DIAL 1100 BEFORE YOU DIG

WARNING
BEWARE OF UNDERGROUND SERVICES
The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.

ISSUED FOR CONSTRUCTION

[redacted]

CLIENT: CLOUD HEIGHT PTY LTD

PROJECT: PROPOSED WAREHOUSE
204 BANNISTER ROAD
CANNING VALE

DRAWING TITLE: CIVIL WORKS
PROPOSED DRAINAGE LAYOUT
SHEET 2 OF 2

DATE:	DRAWN:	DESIGNED:	CHECKED:	SCALE:	
10/07/2022	JO	JO	JO	AS SHOWN	A1

SURVEY DATUM:	WAPC NUMBER:	DRAWING NUMBER:	REVISION:
DATUM	WAPC	OE0121 - C401	0

Project name	Chairay DWER Environmental Licence Application
Document title	Report | Fire Water Containment Assessment
Project number	12615011
File name	12615011-REP-Chairay Hydraulic Assessment.docx

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	202 4

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