SURFACE WATER ASSESSMENT

for

24 Davis Road, Wetherill Park |
Proposed Resource Recovery & Recycling Centre

in accordance with the Works Authorisation Deed for

RPS Australia East Pty Ltd

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1.0 INTRODUCTION

1.1 Project Overview

Northrop Consulting Engineers has been commissioned by RPS Australia East Pty Ltd on behalf of Bettergrow Pty Ltd (the Proponent) to prepare a Surface Water Assessment for a proposed resource recovery and recycling centre at 24 Davis Road, Wetherill Park, NSW (the Site).

The Proponent is seeking to construct and operate a resource recovery centre at the Site which would process up to 200,000 tonnes of waste per annum, comprising of hydro-excavation drill muds and fluids, garden organics and food waste and landscape supplies. The operation will complement the Proponent's existing operations throughout NSW and QLD as well as assist the NSW Government in diverting waste from landfill by providing the required processing infrastructure.

The development is to be assessed as a State Significant Development under Part 4 Division 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such an Environmental Impact Assessment (EIA) is required to be submitted to the Planning Assessment Commission. This Surface Water Assessment forms part of the EIA for the project.

1.2 Study Area

The Study Area for this Surface Water Assessment is comprised of Lot 18 on DP249417. The Site is located within an existing industrial precinct (Wetherill Park Industrial Area), immediately south of Prospect Reservoir, within the Fairfield City Local Government Area. The area is zoned as IN1 (General Industrial) under the Fairfield City Local Environment Plan 2013. The Site was previously occupied by an asphalt batching plant operated by Emoleum Australia Ltd, a division of Mobil Australia, which ceased operations in 2004. The general location of the Site is shown in Figure 1. A locality plan is shown in Figure 2.

1.3 Proposed Development

The proposed development intends to provide a facility for the receival of hydro-excavation drill muds and fluids, garden organics, commingled food and garden organics, food waste and bulk landscaping supplies. Waste is to be sorted, consolidated and removed from Site for further treatment or various uses. Outgoing products are to include structural fill and bulk landscaping supplies for distribution within surrounding areas and feedstock to be used within a soil conditioner and compost manufacturing facility also operated by the Proponent.

The proposed Site layout intends to integrate existing onsite infrastructure remnant from the Site's previous use as an asphalt batching plant. There are currently three distinct levelled areas onsite, including an upper, middle and lower level, which are connected by an internal roadway on the western side of the Site. The vegetated batters and retaining walls between the levels along with most the existing hardstand and roadways are to be retained. These segregated platforms have dictated the intended Site layout which proposes three distinct areas of operation. The areas of operation include:

- Sorting and Consolidation of Garden Organics and Food Waste on the upper level (comprising a Garden Organics (GO) / Mixed Food Garden Organics (FGO) Processing Facility Building and a Food Depackaging Facility Building;
- Bulk Landscaping Supplies on the middle level; and
- Separation and Consolidation of Hydro-Excavated Drill Muds and Fluids on the lower level.

It is proposed that approximately 100,000 tonnes of garden organics and food waste will be delivered to Site annually. The material will be sorted and consolidated before it is transferred offsite for recycling. All unloading, sorting and loading operations will be undertaken within two building enclosures referred to as the GO/FGO Processing Facility and Food Depackaging Facility.

The bulk landscaping supply operation is expected to receive approximately 40,000 tonnes / year with bulk loads of materials brought to the Site for dispatch into the immediate and surrounding areas. The Proponent proposes to utilise existing on Site infrastructure for the carrying out of this bulk materials receival and distribution operation. The existing Site provides hardstand concrete storage bays and a stabilised gravel work yard. The materials that will be received and redistributed will include soil, garden mixes, sands, rocks, gravels, bark and other inert products used in the landscape and home garden market.

It is estimated that approximately 60,000 tonnes of hydro-excavation drill muds and fluids will be received annually for separation and consolidation. The solids will be extracted from the liquid for distribution and would include dewatered mud, silt, sand, stone and ferrous metals. The extracted liquid will be transferred to sewer or removed offsite via truck.

1.4 Methodology and Scope of this Report

This document addresses the relevant requirements detailed in the Secretary's Environmental Assessment Requirements (SEARs). The key aspects addressed within the Surface Water Assessment are as follows:

- A description of the Site's existing surface water environment, surface water flow regimes, surface water quality and quantity, local and regional hydrology, surface water features and surrounding land uses;
- The proposed surface water management measures to be implemented to ensure minimal impact of the development on surface water resources;
- Development of a Site water balance to assist with the assessment of water security and predicted discharges;
- A description of the maintenance and monitoring measures to be implemented; and
- An assessment of the flooding regime and potential flood impacts of the development.

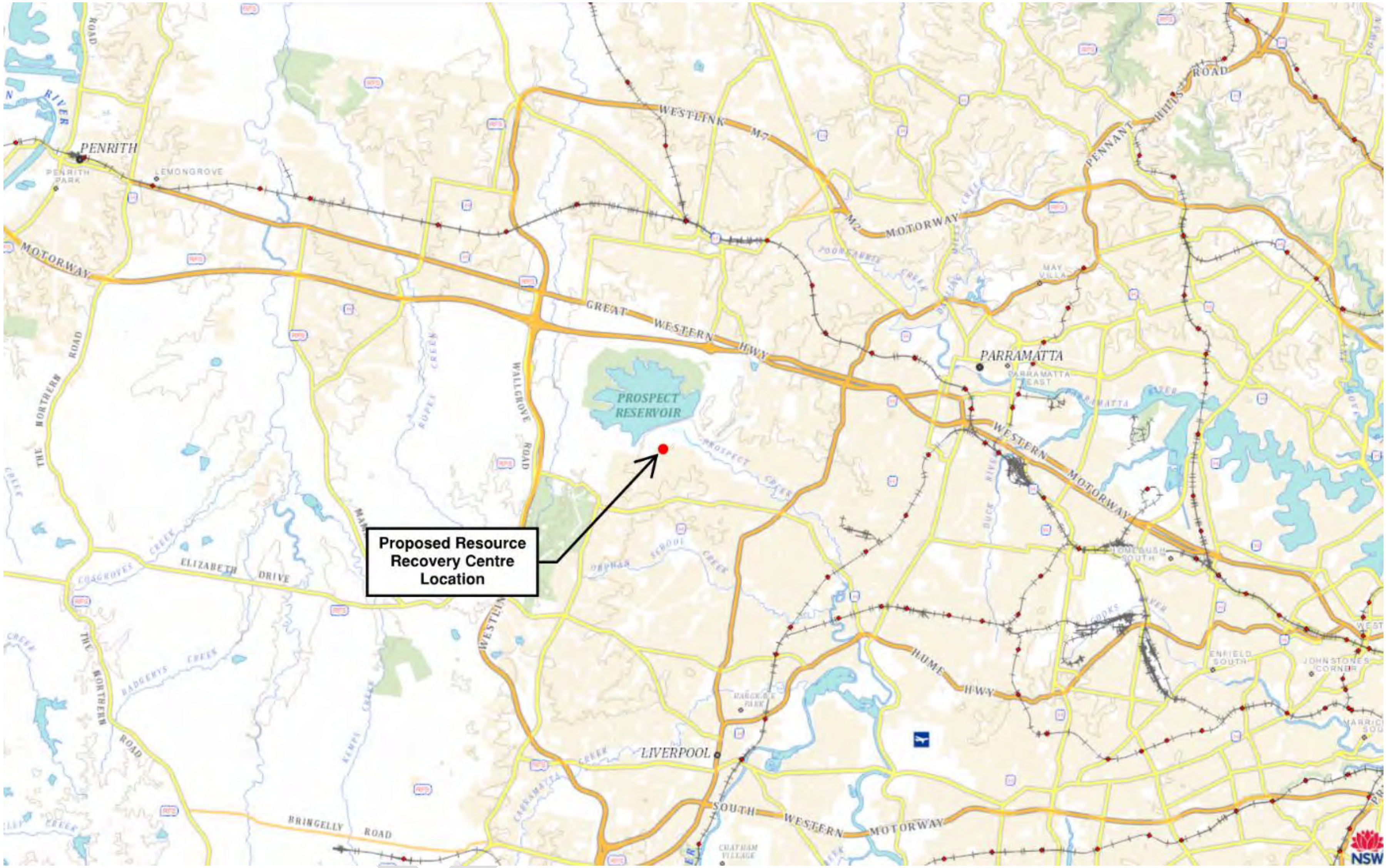

Figure 1 – Site Location

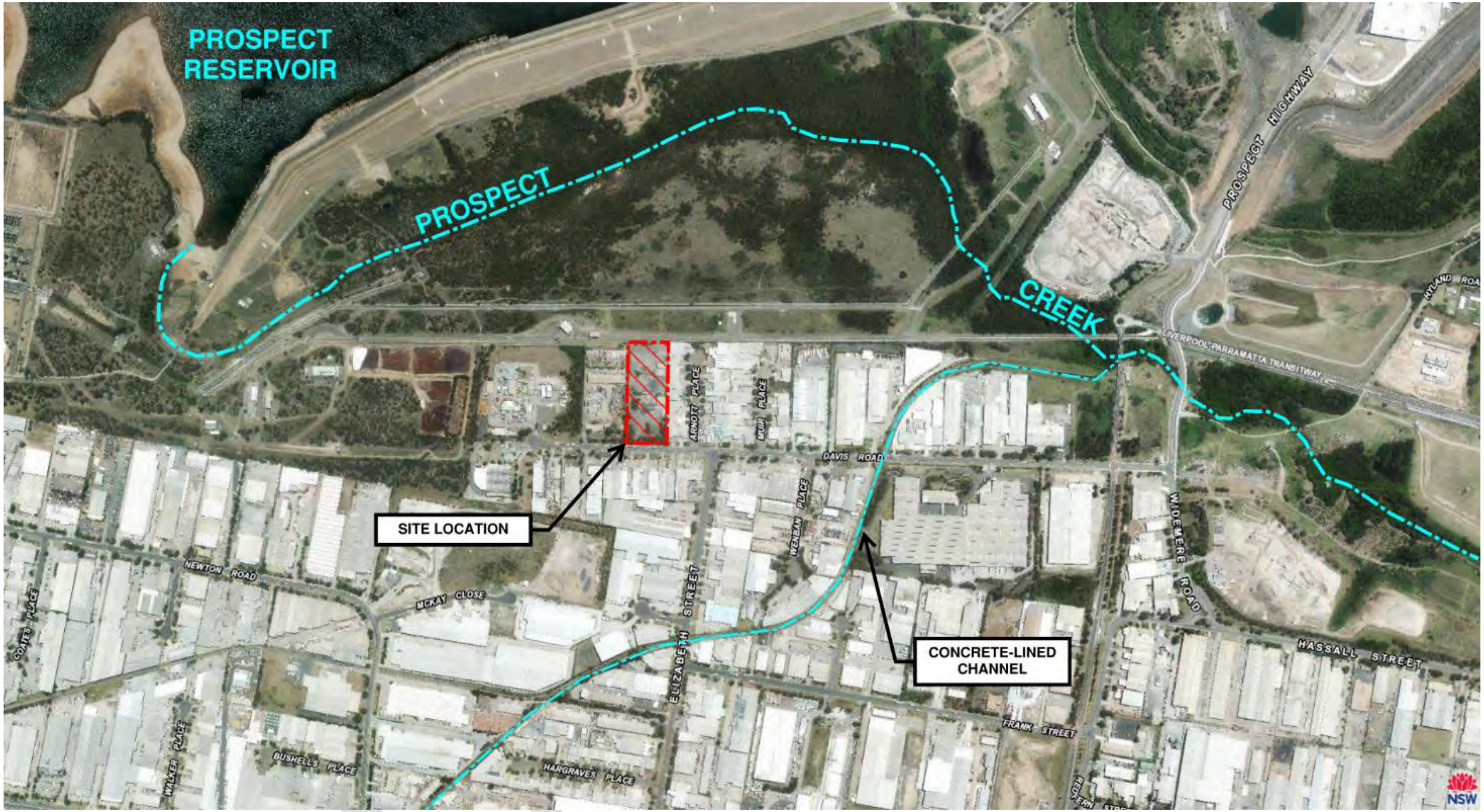

Figure 2 – Locality Plan and Existing Surface Water Environment

2.0 SECRETARY-GENERAL'S REQUIREMENTS

The Secretary's Environmental Assessment Requirements (SEARs) for the project were provided in a letter from the Department of Planning & Environment dated 23 November 2015. Table 1 provides a summary of SEARs relating to surface water and indicates where the specific issues have been addressed within this document.

Table 1 – Summary of SEARs Relevant to Surface Water Assessment

	Key issues	Northrop Response
	Dept. Planning and Environment	
	Soil and Water	
1	A quantitative assessment of existing flooding on the site, potential impacts from the development and proposed mitigation measures.	- Section 7
2	A description of water and soil resources, topography, hydrology, watercourses and riparian lands on or nearby to the site;	- Section 3
3	A detailed site water balance, including identification of water requirements for the life of the project, measures that would be implemented to ensure an adequate and secure water supply is available for the proposal and a detailed description of the measures to minimise the water use at the site;	- Section 6
4	Details of stormwater/ wastewater/ leachate management systems including the capacity of onsite detention systems, and measures to treat, reuse or dispose of water;	- Section 5
5	A description of erosion and sediment controls;	- Section 5
6	An assessment of potential impacts to soil and water resources, topography, drainage lines, watercourses and riparian lands on or nearby to the site.	- Section 5
	NSW EPA	
	Stormwater Treatment	
7	The EA must include a detailed description of how stormwater is managed on the site noting that storm water that comes into contact with waste must be captured and appropriately treated.	- Section 5
	The Proposal	
	General	
	Outline the production process including:	
8	a) the environmental "mass balance" for the process — quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer and stormwater).	- Section 5 and 6
9	c) proposed disposal methods for solid and liquid waste	- Section 5
10	e) water management system including all potential sources of water pollution, proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge.	- Section 5 and 6
	Outline construction works including:	
11	d) environment protection measures, including erosion and sediment control measures.	- Section 5

	Key issues	Northrop Response
	Water	
	Provide details of the project that are essential for predicting and assessing impacts to waters:	
12	a) including the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000)	- Section 5
13	b) the management of discharges with potential for water impacts	- Section 5
14	c) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal.	- Section 5 and 6
15	Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc.	- Section 5
16	Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.	- Section 5 and 6
	The Location	
	Water	
17	Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: htt0://www.environment.nsw.sov.au/ieo/index.htm should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.	- Section 3
	The Environmental Issues	
	Water	
	Describe Baseline Conditions	
18	Describe existing surface and groundwater quality — an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts). *Note. Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DEC 2004) or *be approved and analyses undertaken by accredited laboratories).*	- Section 3 for surface water. - Groundwater addressed in separate report by others.

	Key issues	Northrop Response
19	Provide site drainage details and surface runoff yield.	- Section 5
20	State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values *are* published on the website: http://www.environment.nsw.ciov.au/ieo/index.htm. The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice.	- Section 3
21	State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 *Guidelines for Fresh and Marine Water* Quality (http://www.environment.gov.au/water/publications/qualitv/nwqms-guidelines-4-vol1.html) http://www.environment.gov.au/water/publications/qualitv/nwqms-guidelines-4-vol1.html)(Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines). NB: While specific guidelines for groundwater are not available, the ANCECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater.	- Section 3
22	State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy Rivers Commission Inquiries or the NSW Salinity Strategy (DLWC, 2000) (http://www.environment.nsw.gov.au/salinity/government/nswstrategy.htm).	- Section 3
23	Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained.	N/A – There is no proposal to revise the trigger values
24	Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include: a) lake or estuary flushing characteristics b) specific human uses (e.g. exact location of drinking water offtake) c) sensitive ecosystems or species conservation values	- Section 3

	Key issues	Northrop Response
	d) a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc. e) an outline of baseline groundwater information, including, but not restricted to, depth to water table, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment f) historic river flow data where available for the catchment.	
	Assess impacts	
25	Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.	- Section 5
26	Include a rationale, along with relevant calculations, supporting the prediction of the discharges.	- Section 5 for stormwater - Section 6 for wastewater
27	Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater).	- Section 5
28	Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow).	N/A – Stormwater flows discharging offsite are not proposed to increase/decrease. Refer to Section 5 for further details.
29	Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.	N/A – Stormwater flows discharging offsite into Councils piped stormwater system are not proposed to increase/decrease. Refer to Section 5 for further details.
30	Containment of spills and leaks shall be in accordance with the technical guidelines section 'Bunding and Spill Management' of the Authorised Officers Manual (EPA, 1995) (httD://www.ePa.nsw.gov.au/mao/bundinqspill.htm) and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge.	- Section 5
31	The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered: a) will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and b) will the proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters.	- Section 5
32	Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water	N/A – No mixing zone is required nor proposed.

	Key issues	Northrop Response
	quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment.	
33	Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines.	- Section 5 (trade waste approval). No Licenced Discharge is proposed.
34	Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.	- Section 5 (trade waste approval). No licenced discharge is proposed.
35	Reference should be made to list relevant guidelines e.g. Managing Urban Stormwater: Soils and Construction (DECC, 2008), Guidelines for Fresh and Marine Water Quality (ANZECC 2000), Environmental Guidelines: Use of Effluent by Irrigation (DEC, 2004).	- Section 4
	Describe Management and Mitigation Measures	
36	Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.	- Section 5 and 8
37	Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies.	- Section 5
38	Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements.	- Section 5
39	Outline pollution control measures relating to storage of materials, possibility of accidental spills (e.g. preparation of contingency plans), appropriate disposal methods, and generation of leachate.	- Section 5
	Describe hydrological impact mitigation measures including:	
40	a) Site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition)	- All proposed processing infrastructure (with the exception of the Site weighbridge needing to be located at the Site entry) is located outside of the proposed flood zone. Refer to Section 7 for further details
41	b) minimising runoff	- Section 5 and Section 6.
42	c) minimising reductions or modifications to flow regimes	- Section 5 and Section 6.
	Describe geomorphological impact mitigation measures including:	

	Key issues	Northrop Response
43	a) Site selection	- N/A – Site is located within an existing industrial estate
44	b) erosion and sediment controls	- N/A – Site is located within an existing industrial estate
45	c) minimising instream works	- N/A – Site is located within an existing industrial estate
46	d) treating existing accelerated erosion and deposition	- N/A – The Site is currently a hardstand area associated with past industrial practices being undertaken on the Site.
47	e) monitoring program.	- N/A – Site is located within an existing industrial estate
48	Any proposed monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004).	- N/A – Refer to Section 8 of the routine monitoring of the proposed mitigation measures.
	Soils and Contamination	
	Assess Impacts	
	Identify any likely impacts resulting from the construction or operation of the proposal, including the likelihood of:	
49	d) soil erosion	- Section 5
	Describe Management and Mitigation Measures	
	Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including:	
50	a) erosion and sediment control measures	- Section 5
	Waste and Chemicals	
	Assess Impacts	
51	Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute.	- Section 3
52	Assess the impact of the proposal against the long-term water quality objectives for the area or region.	- Section 5
53	Identify infrastructure requirements flowing from the proposal (e.g. water and sewerage services).	- Section 5 and 6
	Fairfield City Council	
54	Generally the scope of the proposed SEARs for the above mentioned proposal are considered acceptable. It is noted that the site is affected by the medium risk (1 in 100 yr ARI flood) associated with overland flooding. In this regard Council requests that; Given that Council has adopted the flood study for this catchment, it is required that this data be used by the engineer to carry out a flood impact assessment. In this regard, the flood data used in the flood study are required to be consistent with Council's Overland Flood Study and match the flood behaviour exhibited in Council's adopted model. A flood impact study is needed and the applicant is required to enter into a developer's agreement to obtain the flow rates and behaviour of the flooding affecting the site through a developer's agreement with Council's consultant, the new	- Section 7

	Key issues	Northrop Response
	building footprints may also be modelled in Council's adopted model by Councils consultant through the developers agreement to assess the resulting flood impact. The flood report shall address all planning consideration listed in schedule 6 of Chapter 11 of Councils DCP	
	Dept. Primary Industries	
	It is recommended that the EIS be required to include:	
55	Annual volumes of surface water and groundwater proposed to be taken by the activity (including through inflow and seepage) from each surface and groundwater source as defined by the relevant water sharing plan.	- Section 6 for surface water volumes - Groundwater volumes addressed in separate report by others.
56	Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project).	- N/A – No volumetric water licensing requirements are proposed.
57	The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.	- Section 6 – Additional water required for the development will be obtained from Sydney Water via the existing potable water mains located within Davis Road. A hydraulic application will be made to Sydney Water for this connection.
58	A detailed and consolidated site water balance.	- Section 6
59	Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.	- Section 5 for assessment of surface water sources. - Groundwater addressed in separate report by others.
60	Full technical details and data of all surface and groundwater modelling.	- Section 5
61	Proposed surface and groundwater monitoring activities and methodologies.	- Section 8
62	Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.	- N/A – The Site is located within an existing industrial estate with controls proposed to mitigate proposed impacts.
63	Consideration of relevant policies and guidelines.	- Section 4
64	A statement of where each element of the SEARs is addressed in the EIS (i.e. in the form of a table).	- Section 2 (this table)
	Surface Water Assessment	
	The predictive assessment of the impact of the proposed project on surface water sources should include the following:	
65	Identification of all surface water features including watercourses, wetlands and floodplains transected by or adjacent to the proposed project.	- Section 3
66	Identification of all surface water sources as described by the relevant water sharing plan.	- Section 3

	Key issues	Northrop Response
67	Detailed description of dependent ecosystems and existing surface water users within the area, including basic landholder rights to water and adjacent/downstream licensed water users.	- Section 3
68	Description of all works and surface infrastructure that will intercept, store, convey, or otherwise interact with surface water resources.	- Section 5
69	Assessment of predicted impacts on the following: • flow of surface water, sediment movement, channel stability, and hydraulic regime, • water quality, • flood regime, • dependent ecosystems, • existing surface water users, and • planned environmental water and water sharing arrangements prescribed in the relevant water sharing plans.	- Section 5
	Watercourses, Wetlands and Riparian Land	
70	The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal, including: • Scaled plans showing the location of: • wetlands/swamps, watercourses and top of bank; • riparian corridor widths to be established along the creeks; • existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);	- Section 3. It is noted that the Site is located within an existing industrial estate and stormwater reports to Councils piped drainage system.
	Office of Environment and Heritage	
	Flooding	
71	The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including: • Flood prone land • Flood planning area, the area below the flood planning level. • Hydraulic categorisation (floodways and flood storage areas).	- Section 7
72	The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.	- Section 7
73	The EIS must model the effect of the proposed project (including fill) on the flood behaviour under the following scenarios: a. Current flood behaviour for a range of design events as identified in 3.2 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall	- Section 7

	Key issues	Northrop Response
	intensity of flood producing rainfall events due to climate change.	
74	Modelling in the EIS must consider and document: a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood.	- Section 7
75	b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories.	- Section 7
76	c. Relevant provisions of the NSW Floodplain Development Manual 2005.	- Section 7
	The EIS must assess the impacts on the proposed project on flood behaviour, including:	
77	a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.	- Section 7
78	b. Consistency with Council floodplain risk management plans.	- Section 7
79	c. Compatibility with the flood hazard of the land	- Section 7
80	d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.	- Section 7
81	e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.	- Section 7
82	f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.	- Section 5
83	g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council.	- Section 7
84	h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council.	- Section 7
85	i. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES.	- Section 7
86	j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.	- Section 7
	Sydney Water	
	Sydney Water Requirements for Environmental Assessment	

	Key issues	Northrop Response
87	The proponent should include an integrated water management that considers water, wastewater and stormwater. It must also include alternative water supply, proposed end uses of potable and non-potable water, demonstration of water sensitive urban design and any water conservation measures. This will allow Sydney Water to determine the impact of the proposed project on its existing services and identify any augmentation requirements.	- Section 6
88	Strict requirements for Sydney Water's stormwater assets for certain types of development may apply. Consider the following in your submission, stormwater assets protection, building over and/or adjacent to stormwater assets, building bridges over stormwater assets, potential flood, water quality and heritage impacts and creation of easements.	- Section 5

3.0 EXISTING SURFACE WATER ENVIRONMENT

3.1 Surrounding Land Uses

The Site is located at the Northern edge of the Wetherill Park industrial estate, with surrounding land uses being predominately commercial and industrial. Neighbouring land uses include chemical manufacturing, petroleum product production and resource recovery. A water supply easement operated by Sydney water runs along the northern boundary of the property. Beyond this easement lies the Prospect Nature Reserve.

3.2 Existing Landform

The Site covers an area of 20,292 m^2 and slopes with an average grade of 5% from the northern rear boundary to the southern lot frontage on Davis Road. From approximately 1978 till 2004 the Site was the location of an asphalt batching plant operated by Mobil Oil Australia Pty Ltd.

The Site is divided into three distinct 'levels', each of which is made up of a relatively flat area of hardstand, left over from the Site's previous use as an asphalt plant. The lower portion of the Site is shown in Figure 3, the central storage bin area in Figure 4 and the topmost area of hardstand in Figure 5 below.

The northern boundary is a localised high point with all runoff flowing to the south towards Davis Road. The southern frontage is relatively flat along Davis Road with slight falls to the east. Within the greater catchment Davis Road acts as an overland flow path for upstream development, for further details on this overland flow path in relation to flooding refer to Section 7.

Figure 3 – Existing Site: Lower Level (Northern Aspect)

Figure 4 - Existing Site: Mid-Level (Northern Aspect)

Figure 5 - Existing Site: Top Level (North-western Aspect)

3.3 Surface Hydrology

3.3.1 Existing Site Drainage

Stormwater from the existing Site is conveyed from the high point in the north to Davis Road in the south via an existing pit and pipe network and overland flow paths (i.e. concrete kerbs, vegetated swales). The existing piped drainage system consisting of reinforced concrete and vitrified clay pipes remain onsite. A CCTV inspection of the system was carried out by Sure Search Pty Ltd on the 27th October 2015 to assess the condition of the existing network. The inspection report indicated that the system was in varying states of disrepair, including pipe cracking, sediment blockage and tree root invasion. The existing piped system also includes an oil and water separator located at the southern end of the Site adjacent the existing Site office.

3.3.2 Local Hydrology

The existing Council owned stormwater network within Davis Road conveys stormwater to the east discharging into an unnamed concrete-lined channel running from the south-west to the north-east of the Wetherill Park industrial estate. This concrete lined channel, shown in Figure 6, acts as the primary stormwater collector for the industrial precinct. The concrete channel discharges into Prospect Creek near Widemere Road, approximately 1 km east of the Site.

Figure 6 - Unnamed Concrete Lined Channel to the East of the Site on Davis Road

3.3.3 Regional Hydrology

The Site lies within the Georges River catchment which covers an approximate area of 960 km^2. The Georges River begins in the town of Appin approximately 60km south-west of Sydney, flowing north through South-Western Sydney, before deviating south then east at Chipping Norton Lakes to eventually discharge into Botany Bay. The primary tributary of the Georges River in the area is Prospect Creek which begins at Prospect Reservoir and flows for approximately 26km through the local government areas of Holroyd, Fairfield, Liverpool and Bankstown, before discharging into the Georges River downstream of Chipping Norton Lake. The Site is approximately 500m south of Prospect Creek and 800 metres south of Prospect Reservoir. Operated by the Sydney Catchment Authority (SCA), the Prospect Reservoir is a major source to Sydney Water's urban water supply. The concrete channel which the Site reports to joins Prospect Creek downstream of the Prospect Reservoir.

3.4 Existing Flow Regimes

The Prospect Creek catchment is highly urbanised, and the natural flow regime has been significantly altered. Historically, Prospect Creek was dammed to create Prospect Reservoir in the late 1800s. Since then, source flows have been limited to infrequent, controlled releases from the reservoir and downstream inflows of stormwater originating from urbanised sub-catchments along the length of the creek.

The lower and middle reaches of the Georges River west of Botany are similarly highly urbanised and convey a high volume of low quality stormwater from various tributaries. Lower portions of the Georges River are regularly flushed by tidal movements from Botany Bay, whereas upper portions of the catchment are flushed by stormwater runoff surges from urbanised catchments (GRCCC, 2015).

It is noted that the proposed development will not increase flow volumes to Prospect Creek, for further details on the Surface Water Impacts and Proposed Management Measures refer to Section 5.

3.5 Vegetation

The Site and much of surrounding land (to the west, south and east) have been extensively cleared and disturbed through commercial and industrial land uses. The scattered areas of vegetation which do exist across the Site primarily consist of small trees and shrubs. The widest strip of vegetation is across the Site frontage where larger trees provide screening. The extent of the existing onsite vegetation cover is shown in Figure 7. To the rear of the Site land between the northern boundary and the Prospect Reservoir remains undeveloped around Prospect Creek. This area consists primarily of disturbed grassland and pockets of sparse bushland as shown in Figure 2.

Prospect Creek is surrounded by generally poor quality disturbed riparian vegetation zones for the majority of its length (GRCCC, 2015). The unnamed concrete lined channel, which runoff from Site reports, has limited vegetation along either side of the concrete which is largely made up of grasses and scatted small trees and shrubs.

Figure 7 – Existing Site Vegetation Cover

3.6 Features of Conservation Significance

No features of conservation significance within the Site, nor located within 1km downstream have been identified. It is noted that Prospect Creek's surrounding riparian vegetation is subject to ongoing conservation efforts. One program funded by the NSW Environment Trust, which was finalised in 2013, saw several improvements made to the Prospect Creek riparian corridor, including revegetation work, water quality improvement measures and the implementation of ongoing creek cleaning programs. In the wider area, the Georges River catchment contains substantial riparian vegetation including significant areas of mangroves and critical areas of coastal saltmarsh near the River's terminus at Towra Point. This area represents the only remaining saltmarsh habitat in the Sydney metropolitan area (GRCCC, 2013).

3.7 Soils / Geology

The 1:100,000 Penrith Geological Sheet (9030, 1991) indicates that the Site is located within the Blacktown residual soil landscape area. The soil landscape is described as gently undulating rises on Wianamatta Group shales and Hawkesbury Sandstone (Douglas, 2016). This formation is characterised by units of shale, claystone, laminite and fine to medium-grained lithic sandstone. Prospect Creek is situated over medium-grained sand, clay and silt.

3.8 Surface Water Quality

3.8.1 Water Quality Assessment

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000) set standard objectives to assess the water quality of aquatic ecosystems. Under the ANZECC guidelines the Georges River Catchment, containing highly urbanised areas, falls into the category of 'highly disturbed ecosystems'. For these ecosystems, the philosophy of the ANZECC guidelines is that at worst, water quality should be maintained and ideally, the longer-term goal should be towards improved water quality (ANZECC, 2000).

Numerical trigger values derived from the ANZECC guidelines have been sourced from the Water Quality Objectives (WQOs) for the Georges River Catchment published by the Office of Environment and Heritage (where indicated). Total metal concentrations were taken directly from the relevant sections of the ANZECC guidelines. A selection of indicators and associated trigger values to improve water quality are provided below in Table 2.

Table 2 – Georges River Water Quality Trigger Values

Indicator	Trigger value for freshwater	Source
pH	6.5 – 8.5	Aquatic Ecosystem WQO (Lowland Rivers)
Conductivity (uS/cm)	125 – 2200	Aquatic Ecosystem WQO (Lowland Rivers)
Turbidity (NTU)	6 – 50	Aquatic Ecosystem WQO (Lowland Rivers)
Dissolved Oxygen (DO) (%)	85 – 110	Aquatic Ecosystem WQO (Lowland Rivers)
TN (ug/L)	350	Aquatic Ecosystem WQO (Lowland Rivers)
TP (ug/L)	25	Aquatic Ecosystem WQO (Lowland Rivers)
Surface films	"Oil and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour."	WQO Visual Amenity Objectives
Total Metals		
Arsenic (ug/L)	24	ANZECC Table 3.4.1 (Trigger values for toxicants, freshwater, 95% species protection)
Cadmium (ug/L)	0.2	ANZECC Table 3.4.1 (Trigger values for toxicants, freshwater, 95% species protection)
Copper (ug/L)	1.4	ANZECC Table 3.4.1 (Trigger values for toxicants, freshwater, 95% species protection)
Lead (ug/L)	3.4	ANZECC Table 3.4.1 (Trigger values for toxicants, freshwater, 95% species protection)

Indicator	Trigger value for freshwater	Source
Manganese (ug/L)	1900	ANZECC Table 3.4.1 (Trigger values for toxicants, freshwater, 95% species protection)
Zinc (ug/L)	8.0	ANZECC Table 3.4.1 (Trigger values for toxicants, freshwater, 95% species protection)
Iron (ug/L)	300	ANZECC 2000 Guidelines for Recreational Water Quality & Aesthetics

Completed in 2010, the Georges River Combined Councils' Committee (GRCCC) commissioned SMEC Pty Ltd to complete a *Georges River Data Compilation and Review Study*. As part of this study, a comparison was made between water quality data provided by Bankstown City Council from 1997 to 2009 against the relevant ANZECC 2000 trigger values. The results are summarised as a percentage of the time the trigger values recommended by ANZECC are exceeded. The values for Prospect Creek and the wider Georges River Catchment are summarised below in Table 3.

Table 3 – Percentage of Time Water Quality Indicators Exceed ANZECC 2000 Water Quality Triggers (SMEC 2010).

Indicator	Prospect Creek	Georges River Catchment
TN	67.10 %	57.15 %
TP	86.69 %	86.69 %
DO (%)	71.04 %	75.95 %
pH	37.11 %	14.21 %
Turbidity (NTU)	67.15 %	60.25 %
Chlorophyll a	42.90 %	59.17 %

From the data in Table 3, it is evident that both Prospect Creek and the wider Georges River Catchment do not meet ANZECC guidelines and record regular to frequent exceedances for all parameters.

In 2013, the GRCCC published the *Georges River Coastal Zone Management Plan* (GRCZMP) to provide strategic direction and guidance on future management actions for the Georges River catchment. The plan provides a set of additional trigger values as part of the *NSW Monitoring, Evaluation and Reporting Program* (MER). These are presented in Table 4.

Table 4 – GRCCC Trigger Values for Chlorophyll a and Turbidity (Georges River) (GRCCC 2013)

Indicator	Estuary Zone (Based on Salinity)	Trigger Value
Chlorophyll a (ug/L)	Upper <10 ppt salinity	3.4
	Middle 10-25 ppt salinity	2.9
	Lower >25 ppt salinity	2.3

Turbidity (NTU)	Upper <10 ppt salinity	13.7
	Middle 10-25 ppt salinity	8
	Lower >25 ppt salinity	5

In addition to the above, the GRCCC has released Georges River Health 'Report Cards' annually since 2009. The report cards provide a qualitative snap-shot of the health of various sub catchments of the Georges River. The report cards give a broad assessment of several river health indicators including water quality, based on a grading ranging from A+ (excellent condition) to F- (poor condition). The values can be compared each year to determine a net improvement or decline in river health. Water quality assessments for the past three years are provided in Table 5.

Table 5 – Georges River Report Card Results (Water Quality) (GRCCC)

Monitoring Period	Prospect Creek	Middle Georges River (Chipping Norton Lake)
2014 – 15	C (Fair)	B (Fair)
2013 – 14	B (Fair)	B (Fair)
2012 – 13	B+ (Good)	B- (Fair)

From the information in Table 5, Prospect Creek has generally seen a decline in water quality over the previous three-year period. Chipping Norton Lake has remained relatively constant from a water quality perspective. Overall results since 2012-13 have generally been considered 'fair' by GRCCC.

3.9 Groundwater Quality

Groundwater conditions at the Site were assessed by URS Pty Ltd between 2006 and 2013 as part of their commissioning by Mobil. Douglas Partners Pty Ltd has since been commissioned by the Proponent to undertake a Groundwater Assessment for the proposed development to address the relative SEARs. As outlined in their report (Report on Groundwater Assessment, Ref 85126.01, September 2016) Douglas identified the following objectives for the assessment;

- Assess the geological and hydrogeological conditions and likely groundwater quality at the Site and local area; and
- Assess the potential of the proposed development to impact groundwater or groundwater dependent ecosystems.

The assessment found the Site to be located within the Blacktown residual soil landscape area on Wianamatta Group shales and Hawkesbury Sandstone. Groundwater quality in the Wianamatta Group is generally saline with previous groundwater assessments reporting values in the range of 5,000 – 50, 000mg/L whilst groundwater salinity levels are low in the Hawkesbury Sandstone. Groundwater in the Hawkesbury Sandstone also often has naturally elevated concentrations of iron and manganese and is generally acidic with pH varying between 4.5 and 6.5 (Douglas, 2016).

Groundwater flow was inferred to be in a south-easterly direction toward an unnamed tributary of Prospect Creek (URS, 2006). Groundwater was generally encountered within the shale bedrock, although perched groundwater was encountered in filling or at the top of the natural soil in serval locations (URS, 2012). Various onsite-contamination sources were identified in relation to the use of the Site as an asphalt batching plant with several offsite contamination sources also identified in neighbouring industrial Sites (URS, 2006). Petroleum based contamination previously detected in groundwater at the Site however was not recorded as being spatially or temporally persistent, with all results less that the laboratory limits of reporting in the last monitoring round (Douglas, 2016). Elevated levels of metals previously detected in groundwater at the Site were also considered to be most likely attributed to background water quality (Douglas, 2016).

The groundwater resource identified as most likely to be present beneath the Site comprises of a confined sandstone aquifer at a depth greater than 100m overlain by relatively low permeability aquitards of the Wianamatta Group. Whilst groundwater bearing zones may be present within fractures of the Wianamatta Group the potential for significant impact is considered to be low. Further to this no down-hydraulic gradient Groundwater Dependent Ecosystems (GDE) have been mapped within 10 kilometres of the Site and according to the DPI bore registerer groundwater is not being used within at least one kilometre of the Site (Douglas, 2016).

The assessment concluded that the proposed development will have a low risk of significantly impacting groundwater supply or quality. The development is considered to have negligible potential for significant interference with groundwater as it involves only minor changes to the potential for infiltration onsite and has a relatively low risk of discharging potential contaminants given the proposed management strategies (Douglas, 2016).

4.0 RELEVANT LEGISLATION, POLICY AND GUIDELINES

4.1 Introduction

A number of government policies, guidelines and legislation requirements relating to surface water quality are applicable to the project, and have been considered as part of this Surface Water Assessment. The relevant policies, guidelines and legislative requirements are summarised below.

4.2 Legislation

4.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the statutory framework for environmental assessment and planning approval in NSW. In accordance with Division 4.1 of Part 4 of the EP&A Act, this project is considered to be a 'State Significant Development' (SSD). This Surface Water Assessment has been prepared to demonstrate compliance with the relevant conditions (SEARs) provided by the Secretary of the Department of Planning and Environment, as well as complying with the requirements of the EP&A Regulation.

4.2.2 Water Management Act 2000

The Water Act 1912 and Water Management Act 2000 contains provisions for the licensing of water for capture and use. The Department of Primary Industries: Water considers the Georges River catchment to be an unregulated system, as there are no water storages that are licensed to water users. A water sharing plan exists for the Georges River under the Greater Metropolitan Region plan, which includes all tributaries including Prospect Creek. The focus of the plan is on the management of water quality, managing the riverbank for urban and industrial development, maintaining sufficient flows to maintain river health and to ensure future water demands of the urban population and industry can be met. The development considered in this assessment does not propose any form of pumping or water extraction.

4.2.3 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is relevant to the Project as it contains requirements relating to the prevention of the pollution of waters. Discharge of wastewater from the Site will need to be controlled to an agreed standard in order to reduce the potential for pollution of the receiving waters. It is noted that a licenced discharge point is not proposed for the development. The Stormwater runoff will be treated (via a sediment sump and proprietary treatment device) prior to release into Councils Stormwater system. Wastewater (leachate from the food/organics area) and drill mud fluids will be either removed from Site via truck to a licenced facility or released to sewer under a Trade Waste Agreement with Sydney Water. Refer to Section 5 for details of the stormwater and wastewater management systems.

4.3 Policies and Guidelines

4.3.1 ANZECC Guidelines

Water quality impacts will be assessed for aquatic ecosystems in accordance with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000). The watercourses and estuaries directly impacted by the proposed development including Prospect Creek are considered to be 'moderately to highly disturbed ecosystems' as described in the ANZECC Guidelines. The receiving waterway (the Georges River) can be classed in the *'lowland river ecosystem'* category. For the purposes of this assessment, the default ANZECC trigger values were used as the benchmark, as listed in Table 2.

4.3.2 NSW Water Quality and River Flow Objectives

NSW Water Quality and River Flow Objectives were established by the NSW Government in September 1999 for the majority of NSW rivers and estuarine catchments. Eleven water quality objectives (WQOs) were developed for NSW rivers and estuaries to act as guidelines to assist water quality planning and management. Relevant to this assessment, there are numerous WQOs for artificial watercourses (drainage channels) and urban waterways in general. The most relevant of these objectives for the Study Area are as follows:

(a) Even in areas greatly affected by human use, continuing improvement is needed towards healthier, more diverse aquatic ecosystems.

(b) Artificial watercourses should meet the objectives (including protection of aquatic ecosystems) applying to natural waterways at any point where water from the artificial watercourse flows into a natural waterway.

4.3.3 Erosion and Sediment Control

In NSW, the most relevant and comprehensive guideline for the designs of stormwater and sedimentation controls is contained in *Managing Urban Stormwater Volume 1 – Blue Book* (Landcom, 2004). The principles of surface water control, including the design of erosion and sediment control structures, have been adopted where applicable in this Surface Water Assessment.

4.3.4 Fairfield City Council Guidelines.

Fairfield City's Council (Council) City Wide Development Control Plan (DCP) (2013) outlines controls for Industrial Development within Chapter 9. There are no specific requirements listed for surface water under this Chapter. Is does state in this chapter that the development controls are to provide environmentally sustainable development with minimum impact on water quality.

Flood risk management is discussed in Council's DCP (2013) Chapter 11. This has been prepared by Council in response to the NSW Government Floodplain Development Manual (2005). In particular, Schedule 6 is applicable to this Site and assessment has been carried out accordingly. This is discussed in Section 7.

Council's guideline titled '*Urban Area On-Site Detention Handbook (February 1997)*' outlines under Section 1.3 that onsite detention is not required within the Wetherill Park Industrial Area. It is noted that there will be no increase in the impervious area as a result of the proposed development.

Council's Stormwater Drainage Policy (September 2012) outlines the requirements for stormwater drainage required for the Site and connection to Council's piped drainage system. Key requirements relevant to the proposed development include:

- Minor piped drainage system to convey the 5yr ARI event;
- Overland flow paths to convey the 100yr ARI event; and
- Stormwater disposal into Council's piped drainage system can be via connecting into an existing pit (preferred) or via the construction of a new pit to Council's specification.

4.3.1 Sydney Water – Industrial Wastewater Discharge Guidelines

The Sydney Water authority policy requires wastewater produced from industrial and commercial premises to be discharged from Site via a Trade Waste Agreement.

To minimise the operational, environmental and safety risks of accepting wastewater from industrial and commercial premises, Sydney Water's published acceptance standards limit the concentration of non-domestic substances in composite samples of trade wastewater discharge (Sydney Water, 2016). For substances that pose a particular health and safety risk, acceptance standards also apply to the concentration of substances in a discrete sample of trade wastewater discharge. The maximum concentrations permissible to discharge to Sydney Water are published in Sydney Water's *Industrial Customers – Acceptance Standards and Charging Rates* (2016-2017) guideline.

A Trade Waste Agreement will need to be sought by the Proponent for the release of water from the drill mud processing plant into Sydney Water's sewer infrastructure.

4.3.2 NSW EPA Spill Management Bunding & Leachate Management Guidelines.

In accordance with NSW EPA Guidelines bunds to limit the risk of spills reaching the natural environment are required around all facilities which store substances other than water or uncontaminated stormwater (NSW EPA, 2016). Under this guideline, a bund is defined as an impervious embankment of earth, or a wall of brick, stone, concrete or other suitable material, which may form part or all of the perimeter of a compound that provides a barrier to retain liquid.

Bunding is recommended if the area drains to the sewer or a wastewater treatment plant. Spillages in these areas can either pass through the waste treatment process to the environment or severely damage the waste treatment process, resulting in damage to the environment (NSW EPA, 2016).

The net capacity of a bunded compound in a tank storage facility must be at least 100% of the net capacity of the largest tank. If the area is uncovered an additional allowance for rainwater during a 1 in 20 year 24-hour storm event is to be made (NSW EPA, 2016).

4.3.3 NSW EPA – Drill Mud Resource Recovery Order

The NSW EPA enforce strict management and handling procedures for drill mud disposal to land applications outside of licenced waste facilities under the provisions of the 2014 Drill Mud Order and associated Exemption.

Through processing of the hydro-excavated drill muds and fluids, the separated solids can be supplied for application to land as engineering fill or use in earthworks if it meets the requirements outlaid in the *NSW EPA's Resourced Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The treated drilling mud order 2014*'.

Under the 2014 Drill Mud Order, the NSW EPA enforce average maximum and absolute maximum chemical concentrations of drill muds which can then be applied to land under the associated Exemption. The chemical concentrations designated under this Order are summarised below in Table 6.

Table 6– Drill Mud Chemical Concentrations (NSW EPA, 2014)

Chemical & Other Attributes	Maximum Average Concentration (mg/kg 'dry weight' unless otherwise specified)	Absolute Maximum Concentration (mg/kg 'dry weight' unless otherwise specified)
Mercury	0.5	1
Cadmium	0.5	1
Lead	50	100
Arsenic	20	40
Chromium (total)	50	100
Copper	50	100
Nickel	30	60
Zinc	100	200

Chemical & Other Attributes	Maximum Average Concentration (mg/kg 'dry weight' unless otherwise specified)	Absolute Maximum Concentration (mg/kg 'dry weight' unless otherwise specified)
Electrical Conductivity	1.5 dS/m	3 dS/m
pH	6 to 9	5.5 to 10
Total Polycyclic Aromatic Hydrocarbon (PAH's)	20	40
Benzo(a)pyrene	0.5	1
Total Petroleum Hydrocarbons (TPHs)	250	500
Total Contaminated Hydrocarbons	0.5	1

Strict adherence to these levels will need to be observed onsite where outgoing products are intended for various land applications. Should the processed mud not meet these requirements, it will be classified as a contaminated waste and need to be disposed of to a licenced facility. It is noted that drilling mud that can be applied to land under the order and exemption cannot originate from deep drilling for mineral, gas or coal exploration or drilling through contaminated soils, acid sulphate soils or potential acid sulphate soils.

4.3.4 NSW EPA – Liquid Food Waste Resource Recovery Order

Liquid food waste generated within the Food Depackaging Facility can be collected and supplied to consumers for application to land subject to the requirements outlaid in the *NSW EPA's Resourced Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The liquid food waste order 2014*' and associated Exemption.

5.0 SURFACE WATER IMPACTS AND PROPOSED MANAGEMENT MEASURES

5.1 Introduction

Urbanised development often results in significant modification to soils, topography, impervious percentages and vegetation. Surface water runoff volumes and pollutant concentrations from urban catchments are typically above pre-developed states and without management have the potential to convey increased runoff volumes and pollutant loads to downstream receiving waters. Unmanaged these increases can have detrimental impacts on stream stability, environmental ecology and flooding. This section of the report aims to convey the surface water impacts and management measures for the proposed development and should be read in conjunction with the engineering drawings found in Appendix A.

The purpose of the proposed management strategy is threefold:

i. Firstly, to outline the proposed Site layout, operation and potential surface water impacts;

ii. Secondly to establish the necessary stormwater, wastewater and erosion and sediment control measures required to mitigate the effects of the proposed development; and

iii. Thirdly to generally satisfy the requirements of the SEARs outlined by the Department of Planning & Environment in relation to surface water.

A number of factors were considered when developing the proposed Surface Water Management Plan including the following:

- The Site's topography and location of existing infrastructure in order to minimise earthworks and optimise the use of remnant structures;
- The variance in potential pollutants in the surface water runoff subject to the intended Site use to assess the required level of management and treatment; and
- The practical constraints of maintenance and operability in selection of the required water quality measures.

The proposed Surface Water Management Plan aims to deliver an integrated solution which considers the use and discharge of wastewater and stormwater throughout the lifespan of the facility. The proposal has considered required containment and treatment practices and aims to maximise the Site's onsite water reuse potential.

The surface water management plan outlined below has been separated into two distinct systems; The stormwater management system and the wastewater management system. The stormwater system deals with rainfall runoff from areas of the Site not considered to have atypical pollutant risks. The wastewater system covers the areas which have a higher chance of creating pollution that requires additional treatment and management procedures above and beyond standard urban stormwater runoff. For this Site, the wastewater system covers the Garden Organics and Food Waste area and the Hydro-Excavated Drill Muds and Fluids area.

5.2 Objectives

The objectives of the Surface Water Management Plan are to:

- Assess potential impacts to soil and water resources, drainage lines, watercourses and riparian lands on or near the Site;

- Identify the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment;
- Manage all discharges from Site which have potential surface water impacts; and
- Develop an integrated management plan which considers the use and discharge of wastewater and stormwater across the Site.

5.3 Potential Surface Water Impacts

Any development that proposes to change the existing land use has potential to directly impact on the catchments hydrologic regime and water quality characteristics. The deterioration of water quality, degradation of stream habitats and flooding are the most tangible of the resulting detrimental impacts. These consequences are due to the removal of vegetation, introduction of impervious surfaces and the introduction of pollutants of physical, chemical and biological origin from various anthropogenic activities (Thomas, 2003). With the existing Site of the proposed development already vastly absent of vegetation and covered by hardstand areas associated with its previous land use (asphalt plant), the proposed development has:

- A reduced likelihood of having a negative impact on the receiving environment subject to the proposed development implementing adequate controls and management principles; and
- A greater opportunity to improve the quality of stormwater leaving Site via upgrading the current infrastructure and implementing new devices to treat stormwater prior to leaving Site.

The most commonly identified surface water pollutants are Total Suspended Solids (TSS), Total Nitrogen (TN), Total Phosphorus (TP) and Gross Pollutants (GP), Heavy Metals and Hydrocarbons. A summary of the potential environmental effects of these pollutants is provided below in Table 7.

Table 7 – Potential Environmental Effects of Stormwater Pollutants

Pollutant	Potential Environmental Effect
TSS	TSS is the total concentration of filterable solids present in a water body in suspension. TSS can reduce light availability and physically coat aquatic life consequently limiting growth. High levels of TSS will increase water temperatures and decrease dissolved oxygen (DO) levels which can cause stratification of a water body. Stratification can lead to the water becoming too hypoxic for organisms to survive.
TP & TN	Whilst phosphorous and nitrogen exists naturally within the environment excessive levels of either within a waterway will cause accelerated growth of algae and other aquatic plants. This condition is termed eutrophication, where the excessive vegetation uses large amounts of oxygen and effectively ‘chokes’ the water body. Dissolved oxygen levels are then further reduced as the plant matter begins to decay often resulting in the death of aquatic life.
GP	Gross pollutants are defined as larger visible stormwater pollutants including organic debris, human derived litter and coarse sediment. Gross pollutants in urban waterways disturb physical habitats, attract vermin, impede hydraulic performance, can cause marine animal deaths, can release toxic chemicals, can take long time periods to break down and are visually unattractive.

Pollutant	Potential Environmental Effect
Heavy Metals	Heavy metals are naturally occurring elements that have a high atomic weight and a density at least 5 times greater than that of water. Their multiple industrial, domestic, agricultural, medical and technological applications have led to their wide distribution in the environment. Even at low concentrations they can be toxic or poisonous to most life forms, including humans, making their presence in receiving environments a major public health concern.
Hydrocarbons	Hydrocarbons are the simplest organic compound containing only carbon and hydrogen and are the major components of oil, natural gas and pesticides. When released into the environment, hydrocarbons can contribute to the greenhouse effect and global warming, deplete the ozone, increase occurrences of cancer and respiratory disorders, reduce the photosynthetic ability of plants and devastate ecosystems. Environmental pollution caused by petroleum is of great concern because petroleum hydrocarbons are toxic to all forms of life.

The transportation of waste materials onsite presents a potential risk of pollutants discharging to stormwater. The increased risk of higher levels of TP and TN leaving Site is a result of the proposed garden organics and food waste sorting facilities. Elevated risks of increased TSS, heavy metals, hydrocarbons and GP are a result of higher vehicle movements and receival of drill muds and bulk landscape supplies. Suitable containment methods in accordance with EPA guidelines will be required to ensure correct handling and storage procedures are observed onsite to manage the increased risks.

It is estimated that approximately 40,000 tonnes of bulk landscaping supplies will be received onsite annually for storage prior to redistribution. Products received will be pre-treated and sorted and are to be stored within the existing concrete lined bins. Whilst there is limited risk of pollutants being introduced via the incoming landscaping supplies the unsealed gravel work yard surface presents an increased risk of elevated TSS concentrations in rainfall runoff. As there are insufficient landscaped buffers to intercept such high loads of TSS from entering downstream waterways adequate measures will need to be installed to control this pollutant risk. As the materials that will be received and redistributed are soil, garden mixes, sands, rocks, gravels, bark and other inert products used in the landscape and home garden market, no leachate or wastewater runoff is expected to result from this operation and the area will be managed under the stormwater management system.

It is proposed that approximately 100,000 tonnes of garden organics and food waste will be delivered to Site annually. Stockpiles of raw organics and processed organics have the potential to pollute waters as a result of leachate runoff. Organics such as food, meat, fish and fatty or oily sludges usually contain sufficient quantities of moisture to generate leachate without extra water being added. Organics such as garden materials, wood and fibrous materials generally form leachates only when additional water, via irrigation or rainfall, is introduced. Leachates can be acidic, especially when they are generated under anaerobic conditions and can cause the dissolution of metals and metallic compounds that may be present. In addition to this, the leachates can be high in nutrients; making them favourable host media for bacteria and other microorganisms and giving them a high biological oxygen demand. (Department of Environment & Conservation NSW, 2004). This area will be managed under the wasterwater management system.

It is anticipated that on average 164 tonnes a day of hydro-excavated drill muds and fluids will be received onsite for separation and consolidation. The content and subsequent pollutants contained within the drill muds and fluids can vary depending upon the drilling operation. The average solids content of product delivered to Site is expected to be approximately 40%. Typically drilling fluid is a mixture of water and other chemicals additives including but not limited to bentonite, soda ash (sodium carbonate), sodium hydroxide, lime and polymers. The drilling mud is usually a mixture of naturally occurring rock and soil including but not limited to materials such as sandstone, shale, clay and drilling fluid generated during drilling operations such as horizontal directional drilling or potholing. Drilling waste testing has shown that spent drilling mud could potentially have elevated values of pH, solid materials, total dissolved solids, surfactants, chloride ions, sulphate ions, dissolved organic carbon (DOC), oil hydrocarbons, heavy metals such as arsenic, barium, cadmium, chromium, copper, mercury, nickel, lead, antimony, selenium, zinc, tin, and cobalt, and some radioactive materials from drilled shale formations (Uliasz, 2014). As the impact of such pollutants into receiving environments would be detrimental, the NSW EPA enforce strict management and handling procedures for drill mud disposal to land applications outside of licenced waste facilities under the provisions of the 2014 Drill Mud Order and associated Exemption (refer to Section 4). The separated liquid from the drill muds have the potential to contain similar pollutants and must therefore be contained and transferred offsite for further treatment. This area will be managed under the wastewater management system.

5.4 Proposed Stormwater Management System

The proposed Stormwater Management Strategy has been detailed on drawings C20 - C22 of the engineering plans provided in Appendix A. The adopted stormwater management philosophy can be summarised as follow;

- Roof water runoff is to be directed via downpipes to above ground rainwater harvesting tanks which have been size to maximise the Site's reuse potential. A total of 7 rainwater harvesting tanks have been proposed across the Site to provide a combined volume of 120kL. The harvested volume from the proposed Office, existing Amenities and existing Site Office buildings is to be internally reused through amenities connections with tank overflows reporting to the stormwater system. Harvested runoff from the proposed GO/FGO and Food Depackaging buildings is to be reused for internal wash down of the facilities and sprayed onto outgoing product. This water will then be managed under the wastewater management system.

- Surface water runoff from the hardstand areas in conjunction with the tank overflow is to be conveyed via the stormwater network in a southerly direction across the Site. The existing pit and pipe infrastructure is to be retained and incorporated into the new stormwater network where possible. Where existing hardstand areas and stormwater regimes are to remain the condition of all infrastructure is to be confirmed and restored as required.

- Surface water runoff from the Bulk Landscaping Supplies area is to be directed to a sediment trap with a minimum storage volume of 41kL. The system has been designed in accordance with NSW Managing Urban Stormwater: Soil's and Construction 'Blue Book' guidelines to capture sediment laden rainfall from across the area. Given the stabilised nature of the gravel surface with minimal fines, the trap has been sized as a type C basin to collect course sediment, assuming a peak runoff coefficient of 0.8. The dimensions of the proposed trap are 12.75m long, 5m wide and 0.8m deep with an access ramp for clean out and maintenance at a maximum grade of 1V:6H. Decanted runoff collected within the basin along with the overflow system is to be directed to stormwater. The sediment trap sizing calculation tables have been provided in Appendix C.

- Prior to release from Site, the piped stormwater network is to be directed to a proprietary STC-27 Humeceptor system. The Humeceptor system is an underground, precast concrete stormwater treatment solution that utilises hydrodynamic and gravitational separation to efficiently remove total suspended solids (≥ 10 microns) and entrained hydrocarbons (Humes, 2016). The proposed system has been designed to provide a storage volume of 27kL, including an emergency oil storage volume of approximately 4000L in case of onsite spillages.

- From the Humceptor, the existing outlet connection point of stormwater into Fairfield City Councils stormwater system along Davis Road will be maintained.

5.4.1 Onsite Stormwater Detention

Preliminary modelling has been undertaken using DRAINS software to simulate the expected stormwater runoff from the catchment for both the pre- and post-development conditions. Whilst Fairfield City Council's City Wide DCP Amendment 12 does not require developments within the Wetherill Park Industrial Area to provide onsite detention measures, modelling was used to quantify runoff flowrates. In doing so, a quantitative assessment of the proposed development could be undertaken to determine its effect on downstream catchments.

The Site was assessed using a lumped-node model. The pre-developed scenario was taken as the Site in its current developed form, which contains several existing buildings and large areas of concrete and asphalt hardstand. The post developed scenario incorporated all proposed surface changes into the existing Site model. The onsite gravel surfaces were considered impervious in both scenarios given its stabilised nature.

Rainfall IFD data was sourced from the Bureau of Meteorology Website. ILSAX antecedent moisture conditions and soil type parameters were based on the values recommended in the 2005 Blacktown City Council Engineering Guide for Development, as no preferred values have been published by Fairfield City Council. A 5 year ARI minor storm and 100 year ARI major storm were simulated, based on Fairfield City Council's stormwater design requirements.

The Site was split into three sub catchments for the pre- and post-developed models. Given the developed nature of both scenarios and catchment sizes, a time of concentration of 5 minutes was estimated for all sub-catchments. Despite having storage capacity, to be conservative, the proposed onsite water quality devices including the rainwater harvesting tanks and first flush basin were not modelled. It is noted however that these devices would effectively attenuate stormwater discharge during minor storm events. In the post developed scenario the bunded area surrounding the Drill Mud Processing Facility was excluded as it will discharge to sewer under the wastewater management system (see Section 5.5 for details). Figure 8 below illustrates the pre- and post-developed sub-catchment areas. A summary of the pre- and post-developed catchments is provided in Table 8.

Figure 8 – Sub-catchment Areas for Pre- and Post-Developed Scenarios.

Table 8 – DRAINS catchments.

Catchment	Total Catchment Area	Pre-developed Impervious Fraction	Post-developed Impervious Fraction
A GO/FGO Processing and Food Depackaging Area	6,361 m^2	88%	97%
B Bulk Material Storage and Drill Mud Processing Area	9,703 m^2 (8,832 m^2 post-developed)*	86%	85%
C Administration Building, Weigh bridge and car parking areas	4,250 m^2	55%	60%

* Total catchment area minus the proposed drill mud bunded area.

The increase in impervious fraction in Catchment A can be attributed to the addition of the GO/FGO Processing Facility and Food Depackaging Facility. Minor increases in impervious fraction throughout the remainder of the Site are largely due to the repair and formalisation of existing hardstand areas. Overall, the impervious fraction post-development will increase from 80 to 83%, however the total catchment area will shrink by 871m^2 due to construction of the bunded area.

The model was run for a range of storm events and durations from 5 minutes to 4.5 hours. The results from the peak storm events have been summarised below in Table 9.

Table 9 – Site Discharge Results

	Pre-developed Outflow (m^3/s)	Post-developed Outflow (m^3/s)	% Change
Peak 5 Year ARI Storm Event	0.66	0.64	3.0% decrease
Peak 100 Year ARI Storm Event	1.09	1.06	2.8% decrease

Note: DRAINS model can be provided upon request.

As shown in Table 9 the modelling indicates that the proposed development will result in a small net decrease in discharge flowrates and therefore would reduce the current effect of runoff from Site. Given the relatively small size of the Site compared to the receiving environments catchment, it is not expected that the small decrease would have any impact on the downstream hydrologic regime with no significant changes proposed to the frequency or magnitude of flow as a result of the proposed development.

5.4.2 Stormwater Quality

In order to minimise any adverse impacts upon the ecology and health of the downstream watercourses, stormwater treatment devices have been incorporated into the design of the development. The performance of the proposed stormwater management strategy has been assessed against the current state of the existing Site using the conceptual software MUSIC (Version 6).

MUSIC serves as a planning and decision support system that is used to estimate the efficiency of Stormwater Quality Improvement Devices (SQIDs) at capturing common stormwater pollutants including TSS, TN, TP and GP from stormwater runoff. Modelling involves the use of historical or synthesized long-term rainfall data and algorithms that can simulate the performance of stormwater treatment measures to determine stormwater pollution control.

The catchment area was broken down into sub-catchments based on surface type to effectively simulate the proposed treatment measures along the treatment train. A schematic of the MUSIC model can be seen below in Figure 9. In developing a MUSIC model, rainfall and evaporation records in the vicinity of the Site were sought. In addition, the catchment had to be categorised based on the proposed land use.

Figure 9 - MUSIC Model Schematic

Rainfall

In order to develop a model that could comprehensively assess the performance of the proposed stormwater management plan 6 minute pluviograph data from the BoM station 67006 located in Fairfield between 1961 and 1973 was used.

Evaporation

Monthly areal potential evapotranspiration (PET) rates for the Site was established form PET data provided by the Climate Atlas of Australia (BoM). The monthly average PET adopted for the MUSIC model are provided in Appendix B.

Catchment Categorisation

The catchment was split into four primary land use categories being 'Sealed Road', 'Unsealed Road', 'Roof', and 'Landscaping' with pollutant source data being obtained from the 'Draft NSW MUSIC Modelling Guidelines'.

Each of these land uses have varied Base and Storm Flow concentration parameters which have been adopted from the *Draft NSW MUSIC Modelling Guidelines, 2010*. Parameters for the source node inputs used are provided in Appendix B.

Adopted Treatment Train

Several factors were identified to select the most appropriate stormwater quality improvement devices (SQUIDs). Consideration to the existing onsite infrastructure which is to be retained largely dictated the feasibility of integrating a number of treatment options. In conjunction with the practical constraints of the existing Site layout; maintenance and operability were considered paramount to the design.

The treatment train presented incorporates onsite reuse as a primary treatment measure through the provision of rainwater harvesting tanks to collect roof water runoff. Reuse opportunities across the Site have been optimised within each of the facilities via a Site water balance as outlined in Section 6. In addition to this, also providing primary treatment is the Sediment Trap which will aid in the removal of coarse sediment and suspended solids from the unsealed bulk landscape storage area. Following this, secondary treatment is provided via the proposed proprietary Humeceptor. The Humeceptor is a hydrodynamic separator which has been specifically included to aid in the removal of total petroleum hydrocarbons (TPH) and fine suspended solids from stormwater runoff. The unit will also assist in containing spills and minimising non-point source pollution entering downstream waterways after release from Site. The following is a summary of the water quality treatment devices that have been utilised within the design:

- *Rainwater Harvesting Tanks* – Runoff from five of the individual roof areas is to be directed to above ground reuse tanks which are to be fitted with propriety first flush devices. By capturing the first portion of runoff from the roof the first flush devices will effectively remove dead insects, bird and animal droppings and concentrated tannic acids from the stormwater system. The rainwater tank will also provide treatment as it will act as a sediment trap, collecting fine sediments and attached nutrients. As detailed in Section 6 the tanks have been optimally sized to maximise the onsite reuse potential.
- *Sediment Trap* – Runoff from the gravel Bulk Landscaping Supplies storage area is to be directed to a sediment trap with a minimum storage volume of 41kL. The first flush collection system has been employed to capture and isolate the initial stormwater runoff that typically contains higher sediment and attached pollutant loads allowing them to settle. Decanted runoff collected within the trap will then be released into the piped stormwater network. Refer to Appendix C for trap sizing details.
- *Humeceptor* – Prior to the release of the piped stormwater from Site, the stormwater network is to be directed to an online proprietary STC-27 Humeceptor system. The proposed system has been designed to provide a storage volume of 27m^3 including an emergency oil storage volume of approximately 4000L in case of onsite spillages. The Humeceptor system is an underground, precast concrete stormwater treatment solution that utilises hydrodynamic and gravitational separation to efficiently remove total suspended solids (≥ 10 microns) and entrained hydrocarbons (Humes, 2016). Humes publishes the following average removal rate efficiencies for the system:

Table 10 - Publishes Humeceptor System Performance Summary (Humes, 2016)

Pollutant	Average Removal Efficiency (%)	Details
TSS	80	Laboratory and field results, stable, hardstand, roads, commercial and industrial Sites
TN	37	Field results
TP	53	Field results
Chromium	44	Field results
Copper	29	Field results
TPH	65	<10 ppm inflow concentration
	95	10 ppm - 50 ppm inflow concentration (typical stormwater)
	99	>500 ppm inflow concentration (emergency spills)

Results

The results calculated by the MUSIC model are shown in Table 11 below. These results are the pollutant load and removal efficiency for the developed Site.

Table 11 - Pollutant Removal Efficiency Results

Parameter	Pre-Developed Source Load	Post-Developed Source Load	Post-Developed Residual Load
TSS (kg/yr)	2150	3720	765
TP (kg/yr)	3.46	5.01	3.34
TN (kg/yr)	25.3	25.6	17.2
GP (kg/yr)	342	293	185

As summarised in Table 11, the proposed treatment train will effectively reduce all residual pollutant loads beneath the pre-developed source loads which are currently released into the downstream receiving waters. Further to this, as detailed in Section 5.5.1, the development is not expected to result in changes to the downstream hydrologic flow regime and as such is not expected to result in additional nutrient enrichment within downstream water bodies. From a regional perspective, given the net decrease in pollutant loads the development would be considered to have a beneficial impact on the water quality objectives.

5.5 Proposed Wastewater Management System

The proposed Wastewater Management Strategy has been detailed on drawings C20 - C22 of the engineering plans provided in Appendix A. An independent wastewater management system has been proposed for the food/organics and drill mud processing areas as detailed below.

5.5.1 Sorting and Consolidation of Garden Organics and Food Waste

It is anticipated that the Site will receive approximately 100,000 tonnes per year of garden organics, commingled garden and food organics and food waste for sorting and consolidation. To avoid the potential contamination risk of leachate generation, all unloading and storage of the raw organics will occur within the proposed building enclosures, with wash down facilities provided internally. Localised floor sumps and grated trench drains at all trafficable doorways will collect generated leachate and prevent flows leaving the covered facility. Leachate collected within the enclosed sumps of the GO/FGO facility will be applied to outgoing product. Should there be an excess of runoff build up within the sumps (not considered likely), the leachate would be transferred offsite via truck to an approved licenced facility.

Leachate collected from the Food Depackaging facility would be utilised via either:

- Transported via truck to approved farm Sites for land application in accordance with the EPA approved Liquid Food Waste Resource Recovery Exemptions and Orders;
- Transported via truck to a licenced composting facility for use in the composting process to add both nutrients and liquid;
- Transferred into the GO/FGO facility to add onto the outgoing product.

Consolidated solid waste will also be trucked from Site to a regional composting facility operated by the Proponent or farm for further processing or land application as applicable.

5.5.2 Separation and Consolidation of Hydro-Excavated Drill Muds and Fluids

Receival Procedures

It is estimated that on average 60,000 tonnes of hydro-excavation drill mud and fluids will be received annually for separation and consolidation. The Site will be manned 24 hours per day with one operator at all times dedicated to testing and monitoring all incoming loads.

To minimise potential contamination risks associated with the receival of hydro-excavation drill muds and fluids, the Proponent propose to implement the following operational procedures;

- Education of the drillers and excavation operators in what the Proponent will and will not accept. This includes consultation regarding the lubricant agents the drilling operators use;
- All loaded vehicles must enter the Site via the weighbridges located at the Site's entrance where they will be required to provide the following information before proceeding on each visit;
  - Company name
  - Origin of load (street and suburb)
  - Vehicle Registration Number
  - Description of load (i.e. drill water)
  - Customer reference (i.e. purchase order, job number, state if particular job, NBN etc.)
- A staff member will then be required to undertake the following;
  - Sight and confirm the above noted information;
  - Collect a material sample from the rear spout of the vehicle;
  - Visually inspect the appearance and colour of the load for any sign of oils or physical contamination;
  - Check for any obvious petroleum or oil odors or any strong smell not consistent with drilling mud; and
  - Complete and record results of pH and EC (electrical conductivity) testing.
- Once the staff member confirms the load complies with the Site's acceptance criteria, the driver is given permission to unload at the dill mud receiving pit. Should the load fail any of the above it will be rejected and the driver will be directed to a licensed facility capable of accepting contaminated material.

Process Description

The Proponent propose to install a proprietary CD-Enviro System to separate and consolidate the received hydro-excavation drill mud and fluids. The system is a turnkey recycling unit which can process up to 25 tonnes per hour of dewatered solids and is comprised of the following components;

- G:Max – The G:Max is a dual stage washing and recycling system used to classify and dewater the hydro-excavation drill mud and fluids deposited into the dump pits. The system effectively dewaters the waste and removes coarse sediment and grit from the product which protects downstream treatment processes from attrition and wear. The proposed output products from the system are as follows:
  - 0-5mm Washed Sand;

  - 5-20mm Washed Stone;
  - 20-40mm Washed Stone;
  - +40mm Oversize Washed Stone;
  - Dewatered Fines Cake;
  - Organic/Trash material;
  - Ferrous Metals; and
  - Wastewater.
- *Hydro:Flo* – The Hydro:Flo is a clarifier used to remove fine particles from the wastewater discharged from the G:Max unit. Polymers are mixed into the Hydro:Flo unit to bind solids causing them to settle allowing clear water to overtop a weir. This clear water can then be reused throughout the plant as required or appropriately discharged from the system. Solids are collected at the bottom of the unit and directed to the Centrifuge Decanter.
- *Co:Flo* – The Co:Flo is an advanced liquid and solid separation system used in conjunction with the Hydro:Flo to provide optimal water clarification and solids settlement. The unit provides a multi-stage chemical dosing and application process giving the Hydro:flo system the ability to treat ultra-fines and other elements that would otherwise not be settled in the process.
- Centrifuge Decanter – Settled sludge collected at the base of the Hydro:Flo are directed to the Centrifuge Decanter for further dewatering. The Centrifuge Decanter is a high speed continuous separator used to ensure the maximum recovery of water is achieved for recycling and effectively reduces the volume of outgoing solid material.

The Hydro:Flo, Co:Flo and Centrifuge Decanter will be located under cover within an existing onsite shed (Building 4) which will effectively contain any contamination risk. Due to operational benefits including access and maintenance, the G:Max is required to be uncovered. Thus, the unit is to be set down within a bunded area to contain all surface water runoff. The bunded containment volume has been sized in accordance with NSW EPA's Spill Management Bunding guidelines. A minimum containment volume of 224m^3 is to be provided via a minimum 280mm set down into the area. The volume comprises of the 2 x 40kL drill mud receival pits that receive the unprocessed drill muds brought to Site plus the runoff generated from the 1 in 20 year average reoccurrence interval (ARI) 24hr storm event (7.61mm/hr) over the 785m^2 bunded catchment. Wastewater runoff collected within the bunded area will be transferred into the dill mud pits for processing within the CD-Enviro system.

<u>Wastewater Discharge</u>

The Mud Processing Facility has been designed to optimise water recovery to minimise the water content in outgoing products. Wastewater discharge from the Site is unavoidable due to the high moisture content of the products processed within the facility. To avoid any potential stormwater contamination on downstream waterways, all extracted liquid from the Mud Processing Facility will be piped to 6 x 35kL holding tanks for discharged to sewer subject to the conditions outlaid below. The holding tanks will be bunded in accordance with the NSW EPA's Spill Management Bunding guidelines. This equates to a minimum containment volume of 243m^3 created via providing a set down around the tanks. The volume comprises of the 6 x 35kL holding tanks plus the runoff generated from the 1 in 20 year average reoccurrence interval (ARI) 24hr storm event (7.61mm/hr) over the estimated 180m^2 bunded catchment.

To discharge the wastewater to sewer, the Proponent will be required to obtain a Trade Waste Approval (TWA) from Sydney Water. The wastewater stored within the holding tanks will be tested in accordance the requirements laid out in the TWA to ensure compliance with acceptance standards prior to a metered release. Should the wastewater fail to meet the acceptance standards outlined by the TWA, it will need to be trucked from Site to a licensed facility capable of accepting contaminated material. Using flocculation agents and the centrifuge however, the process aims to concentrate any contaminants into the mud fraction leaving the water fraction suitable for sewer discharge rather than trucking offsite. Based on the results of the water balance (see Section 6), the holding tanks can store on average two days' volume of treated wastewater output from the Facility to allow time for required testing prior to discharge or to arrange trucks for transfer should there be any contamination issues. The connection to sewer will be the 225-diameter gravity main located on the northern side of Davis Road which then crosses under the Road to connect into the 300mm diameter trunk main. An application will need to be made by the Proponent to Sydney Water for this connection.

5.6 Sediment and Erosion Control Measures

The soils across the Site have been largely striped of their topsoil and covered with either unsealed stabilised gravel, AC bitumen or concrete left over from the Site's previous us as an asphalt plant. The development proposes to utilise these existing hardstand areas which are broken up into three distinct 'levels' or 'pads' Slopes are very gentle across the Site as a result of the terracing/retaining walls installed via previous Site occupants.

5.6.1 Construction Phase

There are some minor changes to the levels proposed across the three pads to direct stormwater runoff to the new stormwater layout and provide adequate bunding and separation of the wastewater system. As a result, the potential for significant amount of sediment to leave Site during construction works are expected to be minimal. Despite this, an Erosion and Sediment Control Plan has been prepared to minimise erosion during construction activities.

Drawing NL151740_C00 outlines the Erosion and Sediment Control measures to be implemented during construction of the prosed development. It has been prepared in accordance with *Managing Urban Stormwater Volume 1 – Blue Book* (Landcom, 2004). The principles include:

- Minimising the amount of disturbance (limited to required changes in surface levels only);
- Installation of upslope 'clean water' diversions where possible to divert runoff around the proposed disturbance areas to minimise the generation of sediment laden water; and
- Treatment of sediment laden runoff from disturbance areas via installation of downslope sediment controls.

5.6.2 Operational Phase

Once the construction activities have finalised, the potential for significant erosion across the Site is considered negligible with the majority of areas sealed. There is the potential for sediment generation from vehicle movements and from the bulk landscape storage area. The proposed stormwater management system includes treatment measures to minimise any sediment leaving Site as outlined above.

6.0 SITE WATER BALANCE

6.1 Introduction

This section examines the water usage requirements of the Site and the water management strategies adopted. The overarching philosophy for the Site water usage is to minimise the reliance on potable water sources by taking advantage of rainwater harvesting measures via collecting roof runoff in rainwater tanks and wastewater recycling. A daily time step water balance model was developed utilising 129 years of rainfall data from the region. The data sources for the model inputs and result analysis are described in the following sections.

6.2 Key Assumptions

The following assumptions and exclusions were used in developing the daily time step water balance:

- The effects of evaporation and groundwater seepage were not considered;
- Standard potable water consumption (drinking water and showers) were not considered. Only potable water used for processing requirements and toilet flushing was included;
- All leachate collected within the GO/FGO Processing Facility and Food Depackaging Facility will be removed from Site via outgoing products to approved facilities (farms/compost) and therefore has not been modelled; and
- On average, 60,000 tonnes of hydro-excavated drill muds and fluids will be brought to Site annually for processing. The drill mud will be on average 60% fluid.

6.3 Water Balance Systems

There were a total six (6) different closed system water balance models created for the Site based on the catchment areas and re-use opportunities. They were as follows:

- GO/FGO Processing Facility (Closed System A);
- Food Depackaging Facility (Closed System B);
- Proposed Office Building (Closed System C);
- Existing Amenities Building 1 (Closed System D);
- Existing Site Office Building (Closed System E) and
- Drill Mud Processing Facility (Closed System F).

These closed system areas are shown in Plan in Figure 10 below.

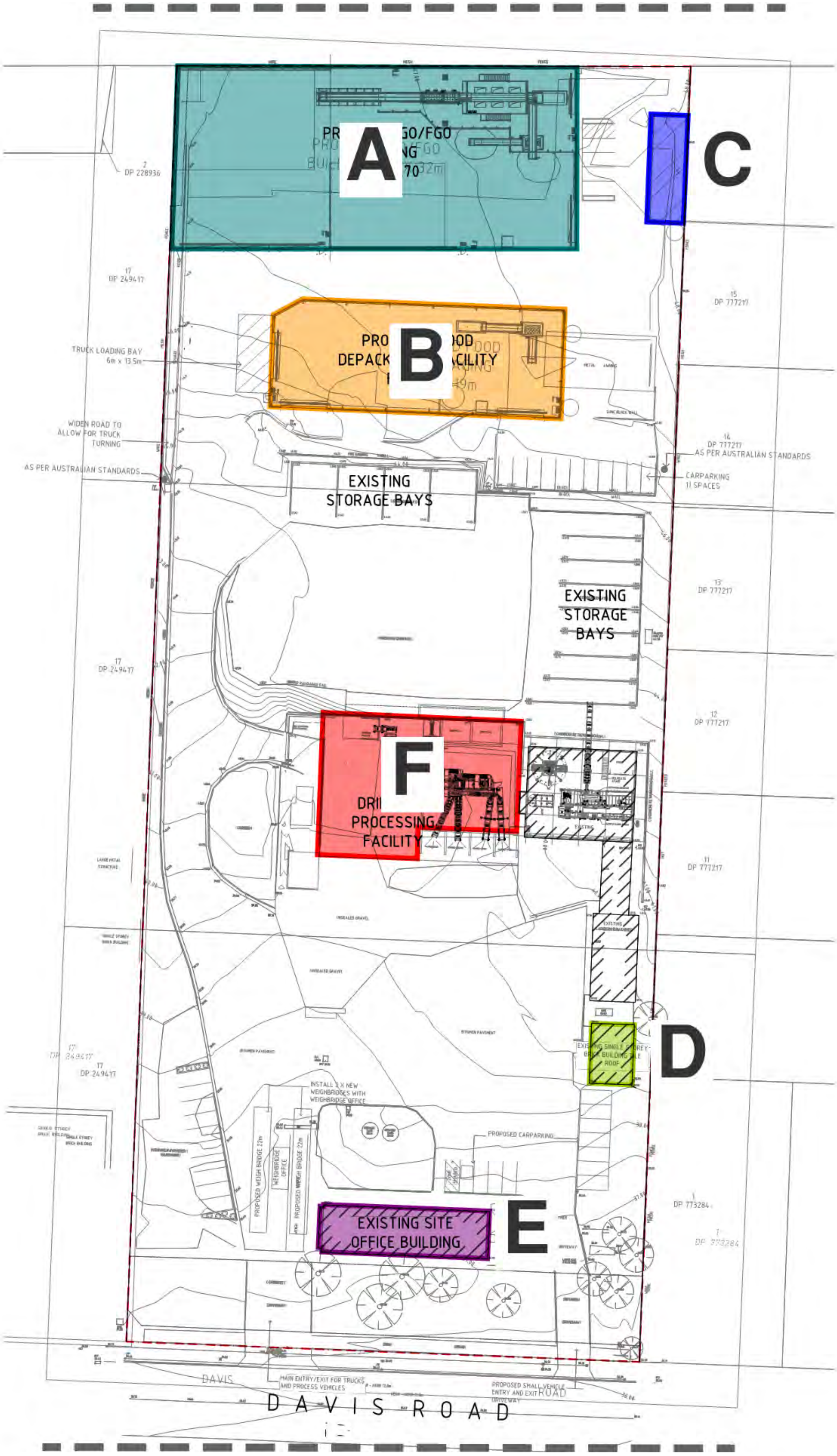

Figure 10 - Closed Water Balance Systems

For Systems A to E (inclusive), the proposed process is to capture roof runoff from the proposed and existing buildings, store within rainwater tanks and then reuse for machinery wash down, dust suppression and staff amenities (toilets). Any excess water reporting to the rainwater tanks will overflow to the stormwater system. Water (leachate) collected within the sumps of the GO/FGO Processing and Food Depackaging Facilities will be utilised in a variety of ways as outlined further below.

System F involves recycling of water within the drill mud processing plant and discharge of treated water to the sewer system under a trade waste agreement (refer to Section 5 for details). In addition system F is subject to additional water input from rainfall. All storages are sized to prevent overflow to the stormwater system for rainfall events up to the 20yr ARI, 24hr duration rainfall event.

6.4 Water Sources (Model Inputs)

A summary of water inputs for each system is given in Table 12.

Table 12 – Water Inputs

Water Balance System	Water Inputs
A – GO/FGO Processing Facility	• Rainfall (collected from the roof) • Potable Water (when rainwater tanks fall below 10% capacity)
B – Food Depackaging Facility	• Rainfall (collected from the roof) • Potable Water (when rainwater tanks fall below 10% capacity)
C – Proposed Office Building	• Rainfall (collected from the roof) • Potable Water (when rainwater tanks fall below 10% capacity)
D – Existing Amenities Building 1	• Rainfall (collected from the roof) • Potable Water (when rainwater tanks fall below 10% capacity)
E – Existing Site Office Building	• Rainfall (collected from the roof) • Potable Water (when rainwater tanks fall below 10% capacity)
F – Drill Mud Processing Facility	• Rainfall (direct rainfall falling over the process equipment's bunded area of 785m^2) • Daily Input of Drill Muds (60% liquid) • Additional Water Required for Processing (Potable Water)

6.4.1 Rainfall Input Calculation

Long-term rainfall data was obtained from the Prospect Reservoir BOM station (station number 67019), located approximately 2 km north of the Site. Quality controlled climate data is available from this Site from 1887 – 2015.

The statistical dry, median and wet years from the Prospect Reservoir station are:

- 10^{th} Percentile (dry year): 572 mm
- 50th Percentile (median year): 862 mm
- 90th Percentile (wet year): 1178 mm

The daily rainfall data from this station were used to generate probable rainfall inflows for this Site. The results of the full 129 years were averaged to determine the effectiveness of water storage measures and average daily water demand for the Site.

Surface runoff was modelled using a simple depth-area calculation which assumed an initial loss of 0.3 mm (obtained from the Draft-NSW MUSIC Modelling Guidelines: Clause 3.6.4.2 Impervious Area Parameters and Table 3-6 Default Rainfall Threshold Values (RT)) and a continuing loss of 0mm.

The catchment areas considered were comprised of the roof areas of all proposed and existing buildings, as well as the bunded area associated with the drill mud processing area. Roof water from each building is to be directed via charged downpipes to above-ground reuse tanks.

6.4.2 Potable Water Inputs

The Site has access to potable water with a 200mm diameter Sydney Water watermain located along the northern side of Davis Road. A Section 73 application will be made by the Proponent to obtain permission from Sydney Water to re-establish the connection into this system. It was assumed that rainwater tanks which fall below 10% capacity will be topped up by external potable water sources to 40% capacity. Potable water will also be used for the mixing of polymers within the Drill Mud Processing Facility (see below).

It is also noted that potable water will be used for kitchen facilities and drinking water, but this was excluded from the water balance due to the small, routine volumes used.

6.4.3 Drill Mud Processing Facility Inputs (System F)

Raw water enters this system via the Dill Muds received from trucks, rainfall over the footprint of the bunded processing equipment area and the potable water required for the polymer mixing. This water is then processed through the treatment facility. On average, the incoming Drill Muds are expected to be 60% liquid. The average daily usage of potable water required for polymer mixing is 12kL/day.

6.5 Storages

A summary of storage volumes provide for each system is given in Table 13.

Table 13 – Storages

Water Balance System	Water Storages
A – GO/FGO Processing Facility	• 2 x 22.7 kL Rainwater Tank
B – Food Depackaging Facility	• 2 x 22.7 kL Rainwater Tank
C – Proposed Office Building	• 1 x 10 kL Rainwater Tank
D – Existing Amenities Building 1	• 1 x 10 kL Rainwater Tank
E – Existing Site Office Building	• 1 x 10 kL Rainwater Tank
F – Drill Mud Processing Facility	• Bunded area (224kL) • Liquid waste storage tanks (2 x 40kL) • Treated water storage tanks (6 x 35kL)

6.6 Water Losses and Usage (Model Outputs)

A summary of water usage and losses for each system is given in Table 14.

Table 14 – Water Losses and Usage

Water Balance System	Water Usage and Losses
A – GO/FGO Processing Facility	• Hosing and dust suppression (2 kL/day) • Overflows from the rainwater tank to the stormwater system • Leachate within collection sump lost via spraying onto outgoing product. Unexpected build-up of leachate in excess of the sump capacity would be removed from Site to a licenced facility via truck.
B – Food Depackaging Facility	• Depackaging facility hosing and dust suppression (1 kL/day) • Bulk landscaping hosing dust suppression (1 kL/day) • Overflows from the rainwater tank to the stormwater system • Leachate within collection sump lost via adding to outgoing GP/FGO product, taken directly to approved farm Sites or licenced compost facilities via truck
C – Proposed Office Building	• Amenities (0.224 kL/day) • Overflows from the rainwater tank to the stormwater system
D – Existing Amenities Building 1	• Amenities (0.224 kL/day) • Overflows from the rainwater tank to the stormwater system
E – Existing Site Office Building	• Amenities (0.224 kL/day) • Overflows from the rainwater tank to the stormwater system
F – Drill Mud Processing Facility	• All treated water discharged to the sewer under a trade waste agreement. Should the water quality not meet trade waste requirements, it will be transported offsite via truck to a licenced facility. • Residual water within the outgoing solid products.

6.6.1 GO/FGO and Food Depackaging Facilities (System A – B)

Water demands from dust suppression and machinery wash down activities were approximated based on the ground area to be managed and was typically 1-2 kL/day per facility.

Leachate collected within the enclosed sumps of the GO/FGO facility will be applied to outgoing product. Should there be an excess build-up of leachate (not anticipated to occur), the leachate will be removed from Site to a licenced facility via truck. Should there be an excess of runoff build up within the sumps (not considered likely), the leachate would be transferred offsite via truck to an approved licenced facility.

Leachate collected from the Food Depackaging facility would be utilised via either:

- Transported via truck to approved farm Sites for land application in accordance with the EPA approved Liquid Food Waste Resource Recovery Exemptions and Orders;
- Transported via truck to a licenced composting facility for use in the composting process to add both nutrients and liquid; and

- Transferred into the GO/FGO facility to add onto the outgoing product.

6.6.2 Rainwater Tank Systems (System C – E)

The estimated total water usage from amenities was based on an estimated water usage of 41 L/day/person and an average 16.38 equivalent persons onsite over a 24-hour period. Assuming three main amenity locations, this equated to 0.224 kL/day per amenity.

6.6.3 Drill Mud Processing Facility (System F)

Most of the water from this processing facility will be transferred to sewer via a trade waste agreement. Some water will also be lost via the remnant moisture in the outgoing products. It has been assumed that the outgoing grit, sand and organics (comprising of 15% by weight of the incoming drill mud) would have a moisture content of 10%. The outgoing mud (comprising of 25% by weight of the incoming drill mud) would have a moisture content of 30%. It is noted that the plant will be capable of processing up to 25,000L per hour of fluid.

6.7 Water Balance Results

Water balance results for Systems A to E are presented based on the percentage of days' reuse demand is met by the proposed rainwater harvesting measures. A sensitivity analysis was performed on the systems to determine peak efficiency storage volume of harvested rainfall given the harvest catchment area and reuse opportunity within each system. The results also present the required potable water use for tank top ups. Water balance results are given in Table 15.

Table 15 - System A-E Water Balance Results.

Water Source	Average Annual Total Water Usage (kL/year)	Average Annual Potable Water Usage (kL/year)	Average Annual Potable Water Use of the Total Average Annual Demand (%)
A – GO/FGO Processing Facility	730	127	17.4
B – Food Depackaging Facility	730	256	35.1
C – Proposed Office Building	82	16	19.5
D – Existing Amenities Building 1	82	14	17.1
E – Existing Site Office Building	82	6	7.3

The daily time step water balance for the Drill Mud Processing Facility (System F) was used to determine the amount of water that would need to be released to sewer under a trade waste agreement (TWA) with Sydney Water. As stated previously, the connection point is proposed to be the 225mm diameter gravity sewer main located on the northern side of Davis Road. Table 16 below outlined some key results of this water balance based on a bunded catchment area of 785m^2.

Table 16 - Drill Mud Processing Facility (System F) Water Balance Results.

Parameter	Volume (kL/day)
Average Daily Volume to Sewer	103.4
Maximum Daily Volume to Sewer *(coincides with largest rainfall event over the 129yr modelled period)*	353.4
10th percentile Daily Volume to Sewer	101.6
90th percentile Daily Volume to Sewer	105.9

6.8 Conclusions

The implementation of rainwater harvesting measures in the form of rainwater tanks to collect roof runoff from some of the proposed and existing Site buildings is predicted to reduce the amount of potable water usage by between 65%-90% within those systems. The collected water will be used for washing down equipment within the GO/FGO Processing and Food Depackaging Facilities as well as toilet flushing. Potable water will still be required to meet the water demands from these systems during dry periods.

Water extracted from the drill mud processing plant combined with the rainfall collected within the bunded area and potable water input of the polymers will result on average 103.4kL/day needing to be released to sewer under a TWA with Sydney Water. This rate is based on 7 days per week operation with 164 tonnes of hydro-excavated dill muds and fluids received at the Site per day.

6.9 Recommendations

It is recommended that water usage is monitored once operations commence to ensure reuse measures are operating as expected. This will also enable the water balance model to be updated and/or calibrated after 12 months of operation to gain a better understand of water usage throughout the Site and where both operational and environmental improvements can be made.

7.0 FLOOD IMPACT ASSESSMENT

A qualitative flood impact assessment has been undertaken to satisfy the flooding requirements of the SEARs. The assessment was based on a flood information sheet obtained from Council, and a review of the Wetherill Park Overland Flood Study. The detailed assessment is included in Appendix D and is summarised below.

The subject Site is marginally affected by the PMF and 1%AEP flood extent, with levels for the 1% AEP event ranging from approximately 36.4 to 36.9 m AHD. The extent from Council's mapping is shown below in Figure 11. Mapping based on detailed survey has been undertaken and this is included with the detailed assessment in Appendix D.

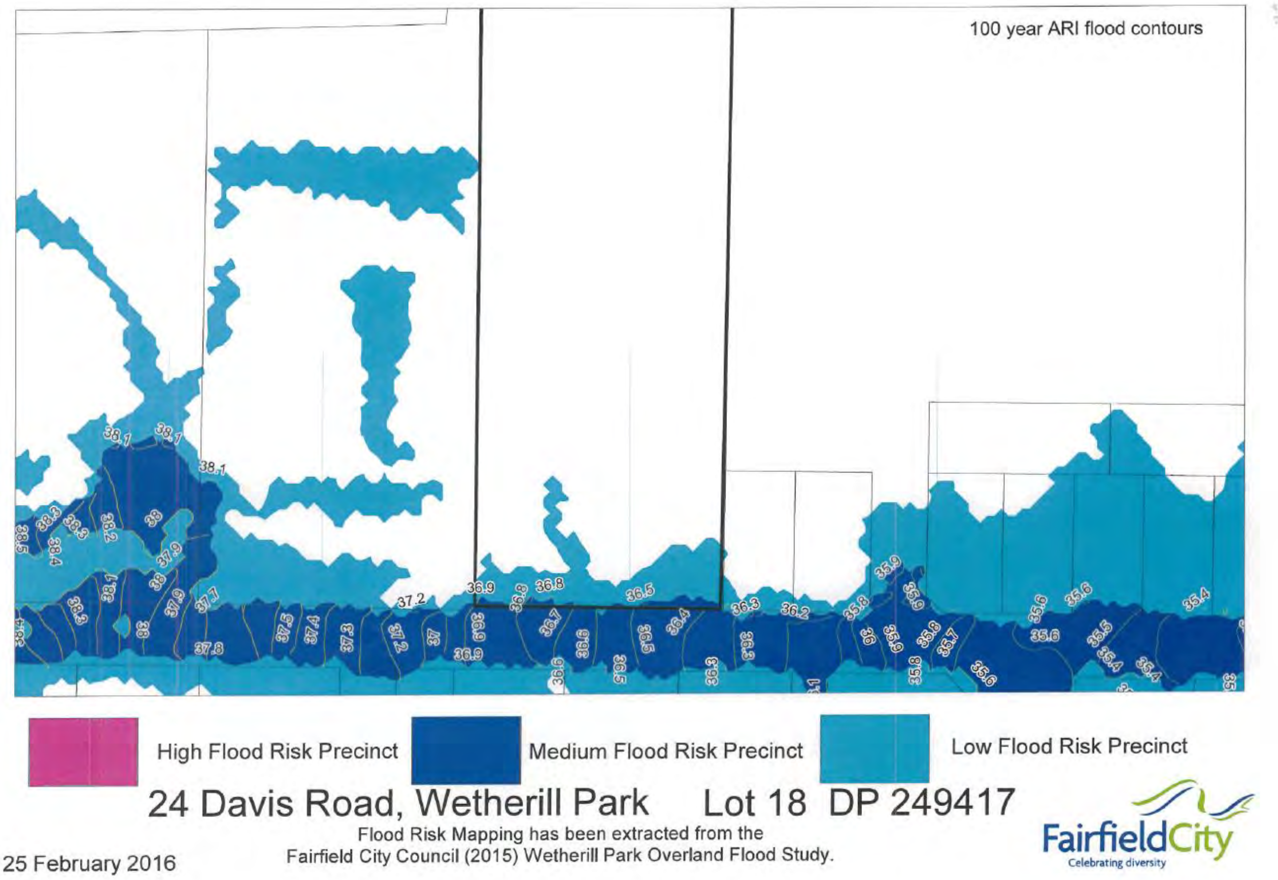

Figure 11 - 1% AEP Contours and PMF Extent

The only new structures are the weighbridges and associated office located within the PMF extent. These elements are to be raised slightly from the ground and are expected to have a negligible impact on the flood behaviour and impact in the vicinity of the subject Site.

As a result it is considered all items raised by Council and OEH in the SEARs can be adequately addressed and the proposed development complies with the intent of Council's DCP Chapter 11 – Flood Risk Management.

8.0 MAINTENANCE PROGRAM

8.1 Introduction

The purpose of this section is to describe the procedures required for the maintenance of the stormwater quality improvement devices discussed in Section 5. Frequent monitoring and maintenance of the devices will be critical in ensuring the stormwater quality management system functions as designed.

8.2 Monitoring and Maintenance Activities

8.2.1 Maintenance Timeframes

A summary of key indicators to be monitored and the maintenance actions required are provided for each SQID in Table 17. In general, it is recommended that all listed inspections be carried out at three-monthly intervals for the first year of operation. Any major problems encountered during this time should be documented and communicated to the owner of the device to seek appropriate action. It is also recommended that inspections take place as soon as possible after heavy rainfall or major storm events. All inspection and maintenance records must be kept onsite for inspection by the approval authority if necessary. Alterations to this proposed maintenance schedule may be implemented depending on the inspection outcomes.

After the initial twelve month period suitable timeframes for each maintenance activity should be adopted to ensure regular monitoring practices remain in place for the life of the development.

8.2.2 Maintenance Summary

A summary of the items to be considered during monitoring with the associated consequences and recommended actions to be taken is provided in Table 17. These items have been separated into general considerations and device-specific monitoring. The general items listed would be visually apparent during day to day activities.

Table 17 – Monitoring and Maintenance Summary

Item to be Monitored	Monitoring Task	Purpose of Monitoring	Maintenance Action
		GENERAL	
Sediment Build Up	• Check for excessive built up of sediment in stormwater system including pits, pipes and bunds. • If sediment build up is noted, identify source of sediment.	• If sediment accumulates in stormwater pits and pipes, capacity reduction can occur. • Excessive build-up of sediments in gross-pollutant trap can reduce the effectiveness of the device over time. • Erosion and sedimentation of stored waste material may contribute to increased transport of pollutants.	• Once sediment source has been identified and stabilised, remove accumulated sediment by flushing the system and/or emptying the gross-pollutant trap.
Erosion or Scour	• Check for erosion and scour around the structures. • If scour is noted check for source of scour.	• Erosion impairs filtration systems by preventing uniform distribution of flow through the system. • If left untreated, small concentrations of erosion can quickly spread over large areas becoming costly to repair.	• Once source of damage is identified and rectified, infill any holes with appropriate filter media. • Provide energy dissipation if required. • Replace any damaged plants to meet the design plant schedule.
Litter (Anthropogenic)	• Check for litter in and around treatment areas and structures.	• Litter can potentially block inlet and outlet structures resulting in flooding, as well as detract from the system's visual amenity.	• Address source of litter with appropriate action. • Remove litter.
Litter (Organic)	• Check for litter in and around treatment areas.	• Organic litter can provide an additional source of nutrients to the filtration systems. • Accumulated organic matter can also create offensive odours and can reduce percolation of water into the filter media.	• Identify and address source of organic litter with appropriate action. • Remove litter.
Inlet and Outlet Pits	• Ensure inflow areas and grates over pits are clear of litter and are in good/safe condition. • Check for dislodged or damaged pit covers and ensure safety and general structural integrity.	• If the pits become blocked it is likely to greatly reduce the proposed stormwater management system. • Dislodged or damaged pit covers can be a safety hazard.	• Remove debris and repair any structural damage as required.

Item to be Monitored	Monitoring Task	Purpose of Monitoring	Maintenance Action
DEVICES			
Humeceptor	Follow the devices maintenance manual. Monitoring tasks may include: • Ensure the sediment collection chamber is not full. • Check for dislodged or damaged covers and ensure general structural integrity of the device.	• If the trash collection chamber becomes full, the GPT will be unable to collect further gross pollutants from Site runoff. • Dislodged or damaged pit covers can be a safety hazard.	Follow the devices maintenance manual. Maintenance tasks may include: • Contact the appropriate authority to organise a vacuum truck to clean the unit. • Contact the appropriate authority to repair any structural damage.
Rainwater Harvesting Tanks	• Ensure downpipe leaf eaters, first flush devices and litter screens are unblocked and are operating correctly. • Regularly check the structural integrity of the tanks. • Check for any accumulated litter, sediment or debris on or within the tanks.	• If any of the fixtures are not operating correctly, it is likely that sediment and debris will accumulate in the tank and reduce water quality. • If the tank is not structurally sound, it is likely to fail. A sudden release of water will potentially cause property damage.	• Remove any litter, sediment or debris from the devices. • Repair or replace any damaged components. • If any accumulation is found within the tank drain and flush the tank with potable water.
Bunded Areas and Leachate Collection Sump	• Ensure bunds and collection sumps are free from debris, sediment wash-off and other pollutants. • Check for damage to integrity of bund walls.	• If a bunded area or collection sump has a reduced capacity, pollutant runoff risk is increased. • Damage to bund walls will allow captured pollutants to escape.	• Clean out bunded areas. • Contact the appropriate authority to repair any structural damage.
Sediment Trap	• Ensure the trap is cleaned regularly and are free from excessive debris and sediment build up. • Check for damage to the sediment trap (including the outlet pipe).	• A reduction in the storage capacity of a sediment trap reduces the detention time of incoming runoff resulting in a reduced settlement time and subsequent increase in outgoing suspended solids during rainfall.	• Remove any litter, sediment or debris from the device. • Repair or replace any damaged components. • Ensure the outlet system is free of blockages.

9.0 CONCLUSION

In conclusion, the proposed resource recovery and recycling centre at 24 Davis Road, Wetherill Park will effectively meet the outlined Secretary's Environmental Assessment Requirements for surface water based on the proposed management systems. As detailed above, the development is not expected to impact negatively on the surrounding surface water environment, flow regimes, quality, quantity, features, local or regional hydrology.

The proposed development intends to provide a facility capable of the receival of up to 200,000 tonnes of waste per annum, comprising of hydro-excavation drill muds and fluids, garden organics, food waste and landscape supplies. The proposed Surface Water Management Plan will deliver an integrated solution for the use and discharge of wastewater and stormwater throughout the lifespan of the facility. The proposal has considered required containment and treatment practices through the identification of potential pollution and contamination risks and has been developed to maximise onsite reuse. The implementation of rainwater harvesting measures to the proposed facilities is predicted to reduce the amount of potable water usage by between 65%-90% within the individual systems.

Generated pollutant loads conveyed in stormwater runoff are to be mitigated via the proposed treatment train consisting of rainwater harvesting tanks, a sediment trap and a proprietary hydrodynamic separator. Adoption of regular monitoring and maintenance practices will ensure the proposed devices within the stormwater management system function as designed.

Wastewater leachate generated within the GO/FGO facility will be managed within a closed system, either applied to outgoing product or trucked from Site for use at licenced facilities. A proprietary CD-Enviro System is to be installed to separate and consolidate the received hydro-excavation drill muds and fluids. The Mud Processing Facility has been designed to optimise water recovery to minimise the water content in outgoing products. To avoid any potential stormwater contamination all wastewater from the Mud Processing Facility will be stored onsite within holding tanks for testing prior to its release to either sewer or trucked from Site.

Finally, a qualitative flood impact assessment has been undertaken to satisfy the flooding requirements of the SEARs. New structures located within the PMF extent are expected to have a negligible impact on the flood behaviour and impact in the vicinity of the subject Site. As a result, it is considered all items raised by Council and OEH in the SEARs can be adequately addressed and the proposed development complies with the intent of Council's DCP Chapter 11 – Flood Risk Management.

10.0 REFERENCES

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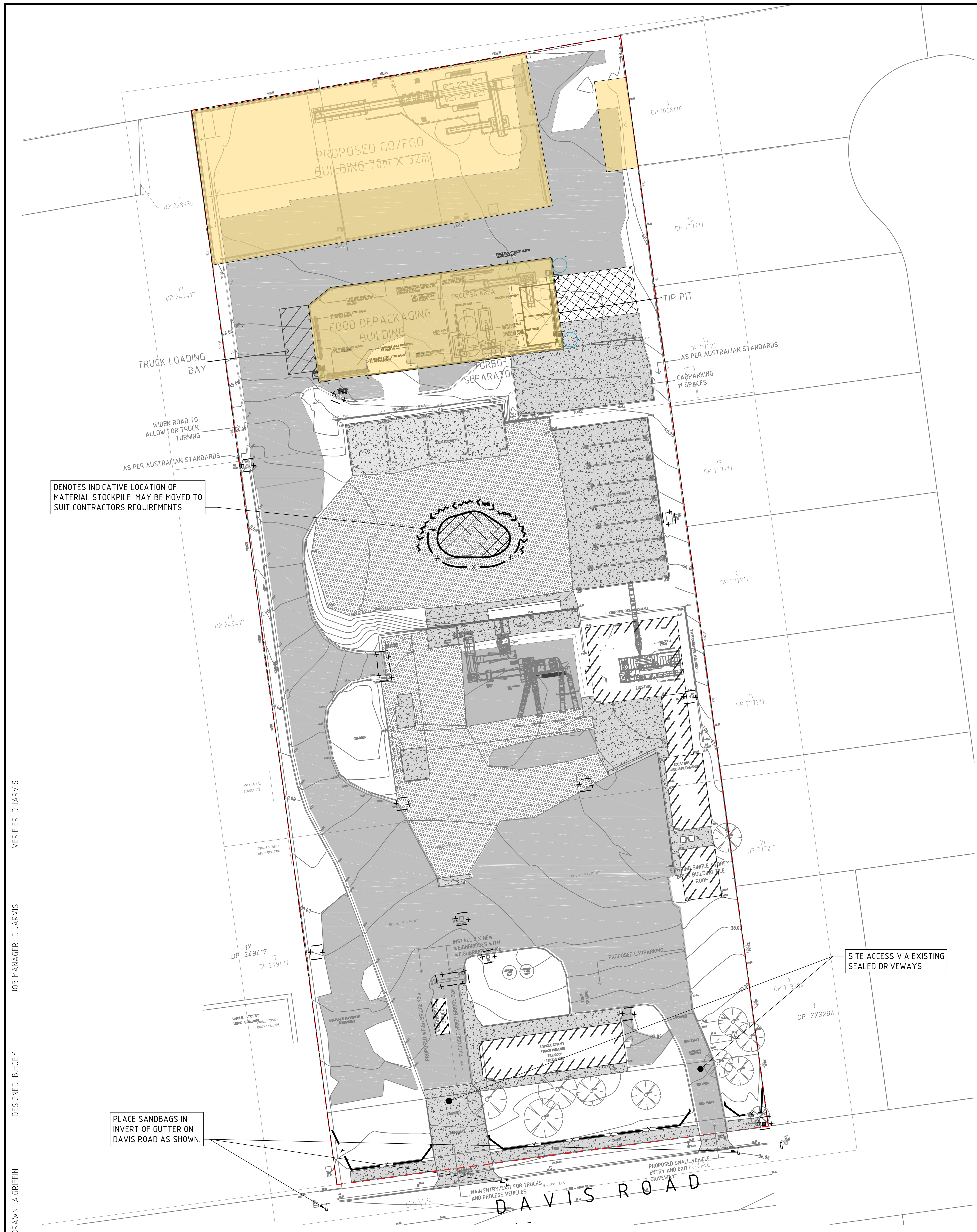
APPENDIX A – CIVIL ENGINEERING DRAWINGS



LEGEND

- DENOTES CUT OFF SWALE.
- DENOTES SEDIMENT CONTROL FENCE.
- DENOTES PROPOSED STOCKPILE LOCATION.
- DENOTES SANDBAG OR GEOTEXTILE SOCK FILLED WITH NO FINES GRAVEL, PLACED AND AROUND EXISTING PITS.
- RW — DENOTES EXTENT OF EXISTING RETAINING WALL.
- DENOTES EXTENT OF PROPOSED BUILDING OUTLINE.
- DENOTES EXTENT OF EXISTING BUILDING OUTLINE TO BE RETAINED.
- DENOTES EXTENT OF EXISTING BUILDING OUTLINE TO BE REMOVED.
- DENOTES EXTENT OF EXISTING BITUMENT PAVEMENT.
- DENOTES EXTENT OF EXISTING CONCRETE PAVEMENT.
- DENOTES EXTENT OF STABALISED GRAVEL SURFACE.

NOTE: PRIOR TO UNDERTAKING DISTURBANCE ACTIVITIES, INSTALL TEMPORARY UPSLOPE DIVERSIONS (I.E. SANDBAGS) TO DIVERT UP SLOPE WATER AROUND THE PROPOSED DISTURBANCE AREA TO MINIMISE SEDIMENT LAIDEN WATER GENERATION.

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PROJECT: RESOURCE RECOVERY CENTRE

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JOB NUMBER: NL151740

DRAWING NUMBER: C00 REVISION: B

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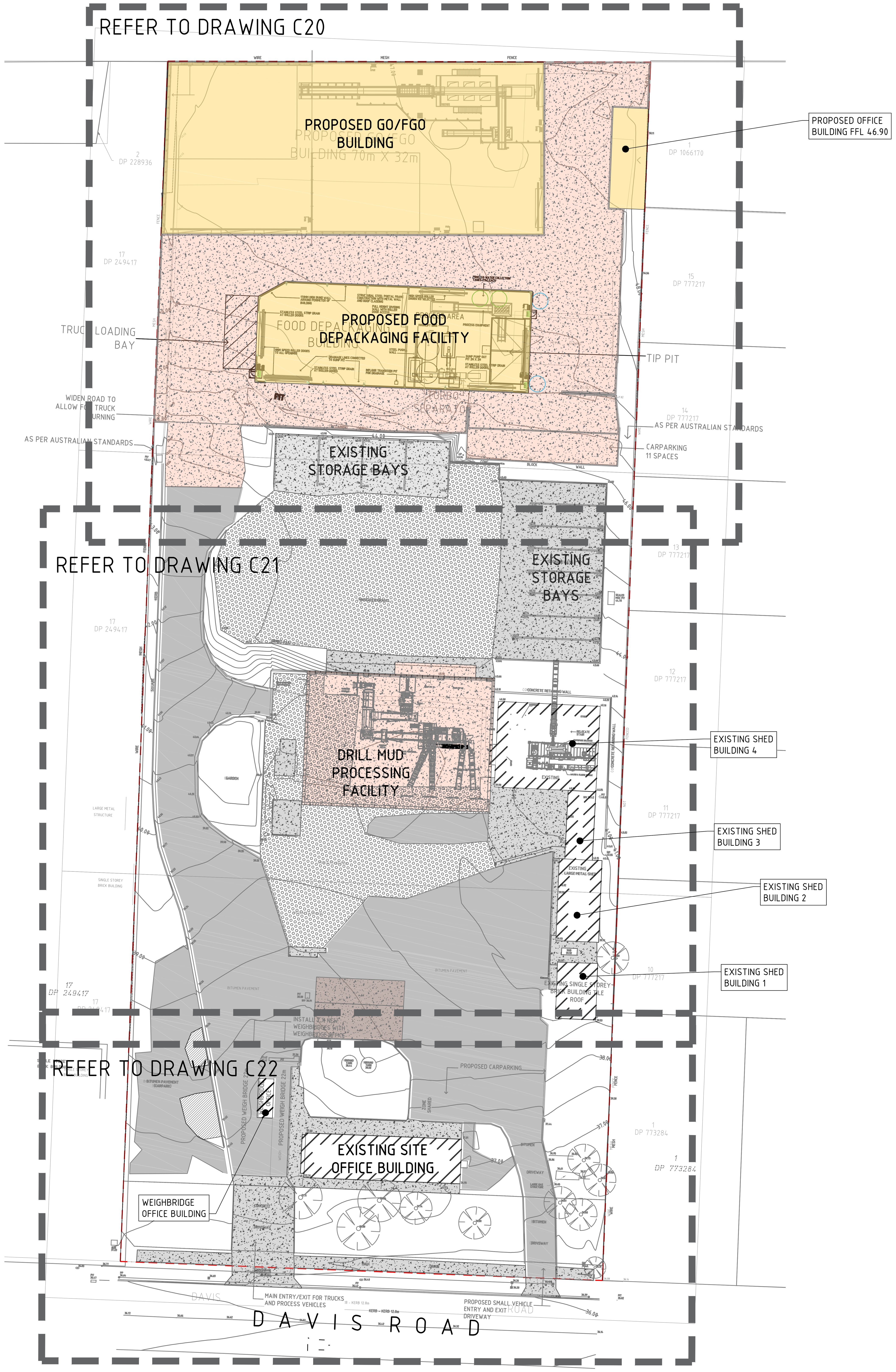

LEGEND

- DENOTES EXTENT OF PROPOSED BUILDING OUTLINE.
- DENOTES EXTENT OF EXISTING BUILDING OUTLINE TO BE RETAINED.
- DENOTES EXTENT OF EXISTING BITUMEN PAVEMENT TO BE RETAINED.
- DENOTES PROPOSED BITUMEN PAVEMENT.
- DENOTES EXTENT OF PROPOSED CONCRETE PAVEMENT.
- DENOTES EXTENT OF EXISTING CONCRETE PAVEMENT TO BE RETAINED.
- DENOTES EXTENT OF STABALISED GRAVEL SURFACE.

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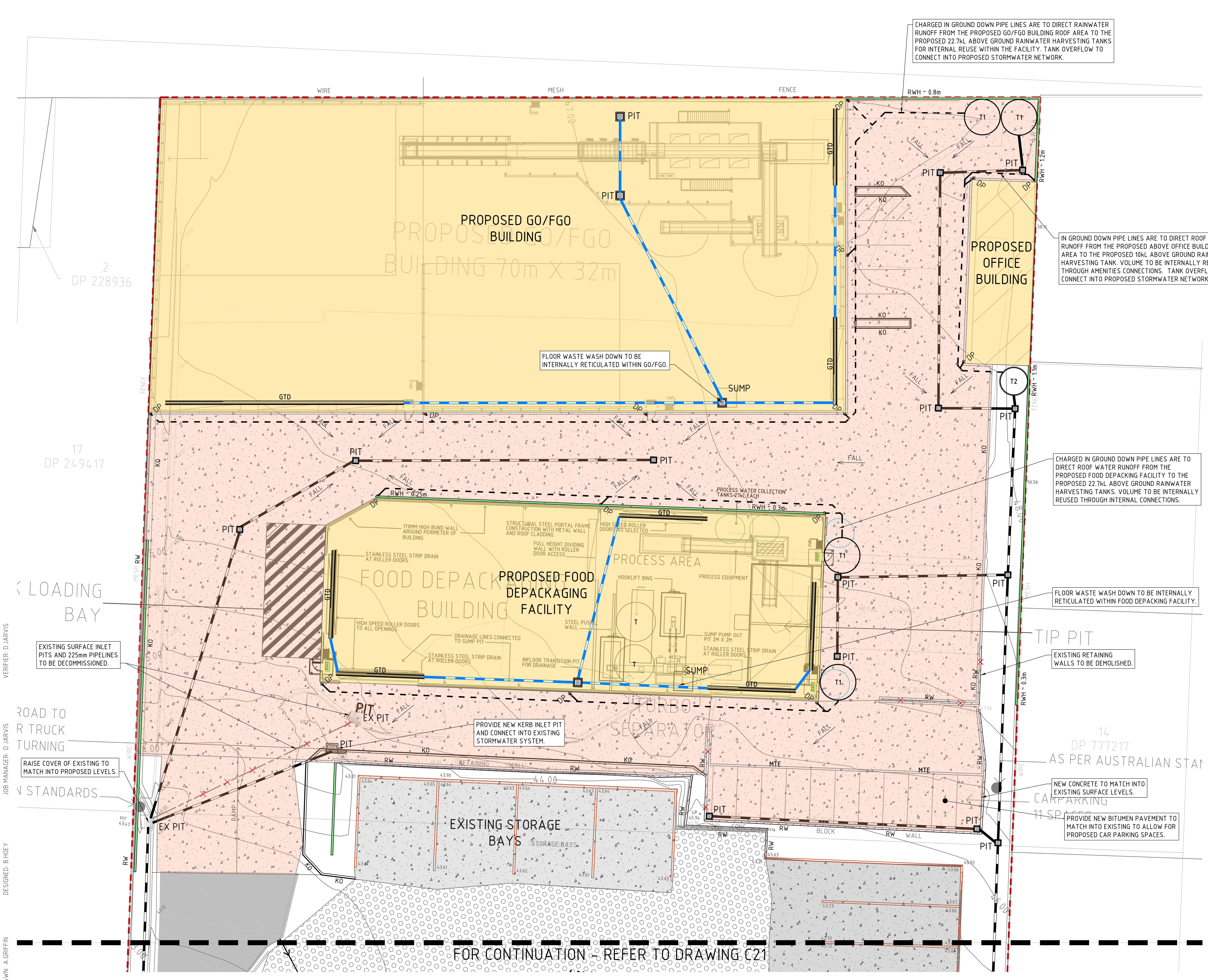

LEGEND

- PIT CL.46.30 — DENOTES PROPOSED STORMWATER PIT AND COVER LEVEL. DETAILS & PIT SCHEDULE TO BE PROVIDED AT CC STAGE.
- EX PIT — DENOTES EXISTING STORMWATER PIT.
- SUMP CL.46.65 — DENOTES PROPOSED SUMP WITH PUMP AND COVER LEVEL. DETAILS & PIT SCHEDULE TO BE PROVIDED AT CC STAGE.
- DENOTES PROPOSED STORMWATER DRAINAGE PIPE.
- DENOTES PROPOSED WASTE WATER DRAINAGE PIPE.
- DENOTES EXISTING STORMWATER PIPE WHICH IS TO BE DECOMISSIONED.
- DENOTES EXISTING STORMWATER PIPE WHICH IS TO REMAIN.
- DENOTES PROPOSED CONCRETE DISH DRAIN.
- DENOTES EXISTING 0.5m CONTOURS.
- FALL — DENOTES PROPOSED DIRECTION OF FALL IN FINISHED SURFACE.
- DP — DENOTES INDICATIVE LOCATION OF DOWN PIPES & TYPE. REFER TO ARCHITECTS & HYDRAULIC ENGINEERS PLANS FOR FINAL LOCATIONS. DETAILS TO BE PROVIDED AT CC STAGE.
- DENOTES PROPOSED DOWNPIPE LINE, Ø150 UNLESS NOTED OTHERWISE. PROVIDE MIN COVER OF 300mm & LAY WITH MIN 0.5% GRADE TO OUTLET.
- DENOTES CAST INSITU GRATED TRENCH DRAIN (ACO OR SIMILAR) WITH HEEL GUARD CLASS D GALVANISED STEEL GRATE AND FRAMES.
- RW — DENOTES EXISTING EXTENT OF RETAINING WALL TO BE RETAINED.
- RW — DENOTES EXISTING EXTENT OF RETAINING WALL TO BE REMOVED.
- RW — DENOTES EXTENT OF PROPOSED RETAINING WALL.
- DENOTES EXISTING EXTENT OF EXISTING CONCRETE STORAGE BAY WALLS.
- T1 — DENOTES PROPOSED 22.7kL ABOVE GROUND REUSE TANK.
- T2 — DENOTES PROPOSED ABOVE GROUND 10kL REUSE TANK.
- T3 — DENOTES PROPOSED 35kl ABOVE GROUND WASTEWATER HOLDING TANK.
- HUMECEPTOR — DENOTES PROPOSED HUMECEPTOR STC27 OR APPROVED EQUIVALENT INSTALLED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
- KO — DENOTES PROPOSED KERB ONLY. DETAILS TO BE PROVIDED AT CC STAGE.
- MTE — DENOTES MATCH TO EXISTING LEVELS.
- DENOTES EXTENT OF PROPOSED BUILDING OUTLINE.
- DENOTES EXTENT OF EXISTING BUILDING OUTLINE TO BE RETAINED.
- DENOTES EXTENT OF EXISTING BITUMEN PAVEMENT TO BE RETAINED.
- DENOTES PROPOSED BITUMEN PAVEMENT.
- DENOTES EXTENT OF PROPOSED CONCRETE PAVEMENT.
- DENOTES EXTENT OF EXISTING CONCRETE PAVEMENT TO BE RETAINED.
- DENOTES EXTENT OF STABALISED GRAVEL SURFACE.
- DENOTES EXTENT OF PROPOSED SET DOWN BUNDED CONTAINMENT AREA.

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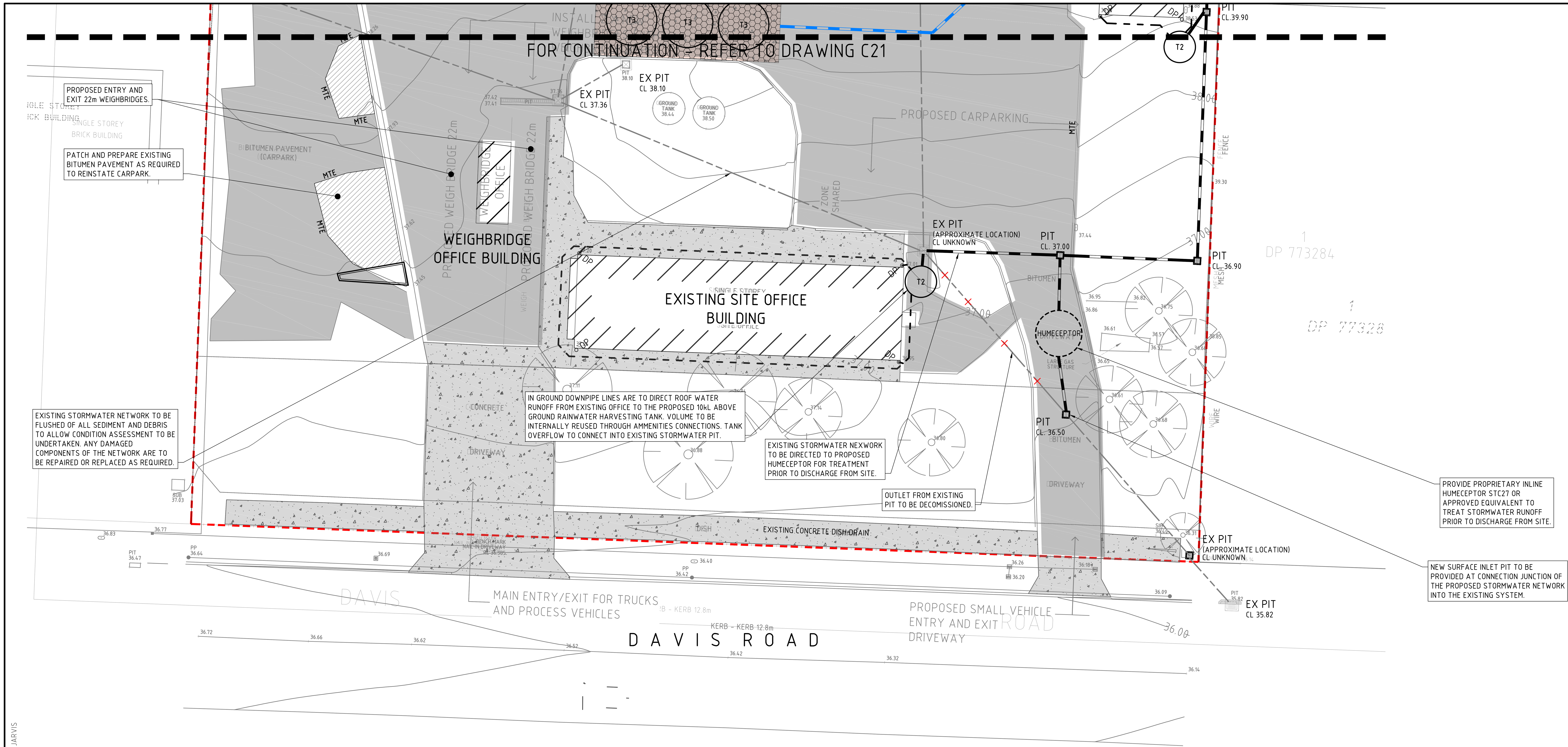

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APPENDIX B – MUSIC MODELLING PARAMETERS

Table 18 - Potential Evapotranspiration

Month	Areal Potential Evapotranspiration (mm/month)
January	160.89
February	120.12
March	106.95
April	72.90
May	48.98
June	36.90
July	38.13
August	54.87
September	72.00
October	115.01
November	135.90
December	145.08

Table 19 - Pervious Area Properties

(Source: Tables 3-6, 3-7 & 3-8 Draft NSW MUSIC Modelling Guidelines)

Parameter	Value
Soil Storage Capacity (mm)	54
Initial Storage (% of Capacity)	25
Field Capacity (mm)	51
Infiltration Capacity Coefficient –a	180
Infiltration Capacity Exponent –b	3

Table 20 - Ground Water Properties

(Source: Tables 3-6, 3-7 & 3-8 Draft NSW MUSIC Modelling Guidelines)

Parameter	Value
Initial Depth (mm)	10
Daily Recharge Rate (%)	25
Daily Baseflow Rate (%)	25
Daily Deep Seepage Rate (%)	0

Table 21 - Storm Flow Concentration Parameters for Total Suspended Solids (TSS)

(Source: Tables 3-9 & 3-10 Draft NSW MUSIC Modelling Guidelines)

Total Suspended Solids	Sealed Road	Unsealed Road	Roof	Landscaping
Baseflow Concentration Parameters				
Mean (log mg/L)	1.200	1.200	1.100	1.200
Std Dev (log mg/L)	0.170	0.170	0.170	0.170
Storm Flow Concentration Parameters				
Mean (log mg/L)	2.430	3.000	1.300	2.150
Std Dev (log mg/L)	0.320	0.320	0.320	0.320

Table 22 - Storm Flow Concentration Parameters for Total Phosphorus (TP)

(Source: Tables 3-9 & 3-10 Draft NSW MUSIC Modelling Guidelines)

Total Suspended Solids	Sealed Road	Unsealed Road	Roof	Landscaping
Baseflow Concentration Parameters				
Mean (log mg/L)	-0.850	-0.850	-0.820	-0.850
Std Dev (log mg/L)	0.190	0.190	0.190	0.190
Storm Flow Concentration Parameters				
Mean (log mg/L)	-0.300	-0.300	-0.890	-0.600
Std Dev (log mg/L)	0.250	0.250	0.250	0.250

Table 23 - Storm Flow Concentration Parameters for Total Nitrogen (TN)

(Source: Tables 3-9 & 3-10 Draft NSW MUSIC Modelling Guidelines)

Total Suspended Solids	Sealed Road	Unsealed Road	Roof	Landscaping
Baseflow Concentration Parameters				
Mean (log mg/L)	0.110	0.110	0.320	0.110
Std Dev (log mg/L)	0.120	0.120	0.120	0.120
Storm Flow Concentration Parameters				
Mean (log mg/L)	0.340	0.340	0.300	0.300
Std Dev (log mg/L)	0.190	0.190	0.190	0.190

APPENDIX C – SEDIMENT TRAP SIZING

Table 24 – Soil Loss Summary

Areas	Value
Total catchment area (ha)	0.2320
Disturbed catchment area (ha)	0.0995
Rainfall data	
Design rainfall depth (days)	5
Design rainfall depth (percentile)	80
x-day, y-percentile rainfall event	19
Rainfall intensity: 2-year, 6-hour storm	10.4
RUSLE Factors	
Rainfall erosivity (R-factor)	2380
Soil erodibility (K-factor)	0.038
Slope length (m)	50
Slope gradient (%)	1
Length/gradient (LS-factor)	0.17
Erosion control practice (P-factor)	1.3
Ground cover (C-factor)	1
Calculations	
Soil loss (t/ha/yr)	19.9872
Soil Loss Class	1
Soil loss (m3/ha/yr)	15.3748
Sediment basin storage volume, m3	0

Table 25 – Peak Flow Summary

ARI (Years)	1	5	10	20	50	100
Rainfall intensity, I, mm/hr (5min T_c)	80.1	131	147	169	197	218
Frequency Factor (F_y)	0.8	0.95	1	1.05	1.15	1.2
Peak flows (m^3/s)	0.0331	0.0642	0.0758	0.0916	0.1169	0.1350

Table 26 – Sediment Trap Volume

Type C - Total Basin Volume	Value
Q tc, 0.25 (m^3/s)	0.017
Area Factor	4100
Basin Surface Area (m^2)	68
Depth of Settling Zone (m^3)	0.6
Settling Zone Volume (m^3)	41
Sediment Storage Volume (m^3)	0
Total Basin Volume	41

APPENDIX D - DETAILED FLOOD IMPACT ASSESSMENT

The following assessment has been undertaken in response to the flooding related SEARs issued for the proposed Bettergrow Pty Ltd facility at 24 Davis Road in Wetherill Park. Our assessment has been based on the Flood Information Sheet received from Council and a review of the Wetherill Park Overland Flood Study (February 2015).

Agency: Fairfield City Council

Extract from Andrew Moody's Letter (Dated 9/12/15)	Northrop Response
Generally, the scope of the proposed SEARs for the above mentioned proposal are considered acceptable. It is noted that the Site is affected by the medium risk (1 in 100 year ARI flood) associated with overland flooding. In this regard Council requests that; Given that Council has adopted the flood study for this catchment, it is required that this data be used by the engineer to carry out a flood impact assessment. In this regard, the flood data used in the flood study are required to be consistent with Council's Overland Flood Study and match the flood behaviour exhibited in Council's adopted model. A flood impact study is needed and the applicant is required to enter into a developer's agreement to obtain the flow rates and behaviour of the flooding affecting the Site through a developer's agreement with Council's consultant, the new building footprints may also be modelled in Council's adopted model by Councils consultant through the developers agreement to assess the resulting flood impact. The flood report shall address all planning consideration listed in schedule 6 of Chapter 11 of Councils DCP	The flood levels estimated by Council in their flood study have been obtained via a Flood Information Sheet (Section 149 (2)(5) Certificate), which has been attached. These have been compared with the detailed Site survey and plotted on Figure 1, attached, to demonstrate the extent of flood prone land and the extent of the medium (below the 1%AEP) and low risk precincts (between 1%AEP and PMF levels) identified by Council. It is noted that no fill is proposed within the flood prone land. Two weighbridges and a weighbridge office is proposed within the PMF extent, but above the flood planning level. These are to be suspended to allow water to flow underneath and as such it is not expected that flood behaviour will be significantly affected. Given a flood study has already been prepared, and the development is not considered to have a significant impact on flood behaviour, no additional modelling has been undertaken. Schedule 6 appended to Chapter 11 of Council's DCP is addressed below.

Determination of Flood Risk Precinct

The Site is exposed to both low and medium flood risk precincts. The majority of flood prone land on-Site is classified low risk precinct, being above the 1%AEP but below the PMF level. The requirements for a commercial/ industrial development are the same except for Evacuation. Given the lowest existing habitable building is located within the low flood risk precinct, and no new habitable buildings are proposed within flood prone land, the requirements for the low risk precinct have been adopted.

Floor Level

Reference Number*	Criteria	Northrop Response
5	The level of habitable floor areas to be equal to or greater than the 100year (1%AEP) plus freeboard. If this level is impractical for a development in a Business zone, the level should be as high as possible.	The floor level of the existing building is approximately 37.25m AHD, which is approximately 540mm above the 1%AEP adjacent to the building and 350mm above the highest 1%AEP level calculated on-Site. The natural ground level is outside the flood planning area (1%AEP plus 500mm freeboard) in the location of the weighbridge office. It is proposed to elevate the weighbridge office building to interface with the weighbridges and as such the floor level will be above the minimum requirement.
6	Non-habitable floor levels to be equal to or greater than the 100year (1%AEP) level plus freeboard where possible, or otherwise no lower than the 20year (5%AEP) flood level unless justified by Site assessment.	No non-habitable floor space is proposed at or below the 1%AEP flood level.
7	A restriction is to be placed on the title of the land, pursuant to S. 88B of the Conveyancing Act, where the lowest habitable floor area is elevated more than 1.5m above finished ground level, confirming that the under croft area is not to be enclosed.	No buildings are raised more than 1.5m above the adjacent ground level.

Building Components and Method

1	All structures to have flood compatible building components below the 100year (1%AEP) flood level plus freeboard.	The existing building on-Site is constructed of flood compatible material (masonry) below this level. The weighbridge and office will be constructed of steel and only subject to PMF inundation.

**Fairfield City Council's Floodplain Risk Management Matrix*

Structural Soundness

1	Applicant to demonstrate that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 100year (1%AEP) plus freeboard, or a PMF if required to satisfy evacuation criteria (see below). An engineer's report may be required.	The current 1% AEP does not impact the existing building. Should the flood level be at the current 1% AEP plus 500mm, the water level would not be over the floor level and would be approximately 100mm max adjacent to the structure. Given this low depth, it is not expected the building would be subjected to impact load from floating debris, or buoyancy. Furthermore, the building would be capable of withstanding loads from floodwater at this depth.

Flood Effects

2	The flood impact of the development to be considered to ensure that the development will not increase flood effects elsewhere, having regard to (i) loss of flood storage, (ii) changes in flood levels and velocities caused by alterations to the flood conveyance, and (iii) the cumulative impact of multiple potential development in the floodplain. An engineer's report may be required.	Given no new buildings or fill are proposed below the 1%AEP level, it is considered there will be no change to the flood behaviour in this event due to the proposed development. Below the PMF, the only new structures proposed are two weighbridges and associated office. Given this area appears to be flood storage, and the structures will be elevated, we expect the changes in flood behaviour will be minimal and contained to the Site only.

Car Parking and Driveway Access

1	The minimum surface level of open car parking spaces or carports shall be as high as practical and not below (i) the 20year (5% AEP); or (ii) the level if the crest of the road at the location where the Site has access; (whichever is the lower). In the case of garages; the minimum surface level shall be as high as practical, but no lower than the 20year (5% AEP) flood.	No carparking is proposed within the 1%AEP flood extent.
3	Garages capable of accommodating more than 3 motor vehicles on land zoned for urban purposes, or enclosed car parking must be protected from inundation by floods equal to or greater than the 100year (1%AEP) flood.	No garages are proposed within the PMF extent.
5	Where the level of the driveway providing access between the road and parking space is lower than 0.3m below the 100year (1%AEP) flood; the following condition must be satisfied. The depth of inundation on the driveway during a 100year (1% AEP) shall not be greater than he larger of (i) the depth at the road, and (ii) the depth at the car parking space. A lesser standard may be accepted for single detached dwelling houses where it can be demonstrated that risk to human life would not be compromised.	The depth of water during the 1% AEP is less than 300mm on-Site.

6	Enclosed car parking and car parking areas accommodating more than 3 vehicles (other than on Rural zoned land), with a floor level below the 20year (5%AEP) flood level or more than 0.8m below the 100year (1%AEP) flood level shall have adequate warning systems, signage and exits.	No car parking or garages proposed at or below these levels.
7	Restraints or vehicle barriers to be provided to prevent floating vehicles leaving a Site during a 100year (1%AEP) flood.	No car parking is proposed below the 1%AEP flood.

Evacuation

2	Reliable access for pedestrians or vehicles is required from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF level, or a minimum of 20% of the gross floor area of the dwelling to be above the PMF.	The existing office building has a level of approximately 37.25m AHD, which is above the 1%AEP but not the PMF. The weighbridge office will also be surrounded in the PMF. Given the low depths and velocities (the area is noted as flood storage), reliable access from these buildings is available to the staff amenities, storeroom and workshop, which are located well above the calculated PMF level.
3	The development is to be consistent with any relevant flood evacuation strategy or similar plan.	The area surrounding the Site is noted as being in a Medium Flood Risk Precinct "where there are no significant evacuation difficulties". In order to link with other major commercial or residential areas, however, pedestrian or vehicles may have to traverse the High Risk Precinct. Shelter in place would therefore be recommended if evacuation is deemed not practical by the SES Local Controller or the occupants in the absence of this agency's advice. Large refuge areas are available on-Site above the PMF and as such it is considered this approach is consistent with the SES Fairfield City Local Flood Plan (2005).

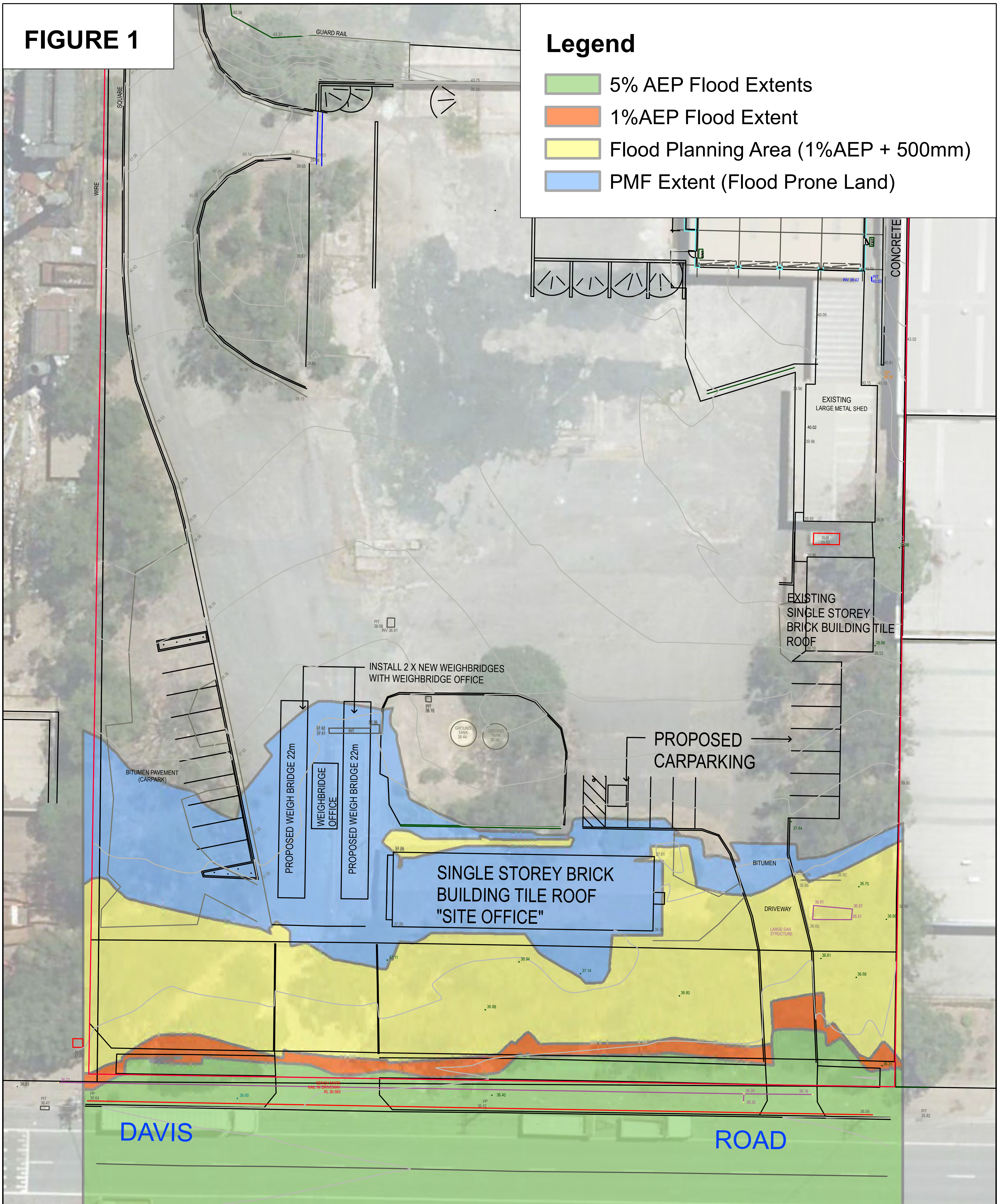
Design and Management

2	Site Emergency Response Flood Plan required where the floor levels are below the design floor level.	The existing office building and the weighbridge office both have floor levels above the 1%AEP + 500mm freeboard. On this basis, a Site Emergency Response Flood Plan is not required.
3	Applicant is to demonstrate that area is available to store goods above the 100year (1%AEP) flood plus freeboard	The store room is located above 39.9m AHD, clear of the PMF.
5	No storage of materials below the design floor level which may cause pollution or be potentially hazardous during any flood.	No storage of material is proposed below the 1%AEP flood level.

Agency: OEH

Key Issues to be Addressed	Northrop Response
The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including: • Flood prone land • Flood planning area, the area below the flood planning level. • Hydraulic categorisation (floodways and flood storage areas).	Fairfield City Council has prepared an Overland Flood Study for the Wetherill Park Catchment which includes the subject Site. Data included in the Flood Information Sheet has been used to describe the flood prone land and also the flood planning area in Figure 1 attached. The hydraulic categorization has been inferred from the depth and velocities outlined in the flood study itself. Specifically, the floodway is contained within the road reserve where the majority of the conveyance is. We note due to the depths of water on-site (less than 400mm) the Site is classified as a flood fringe area. The Flood Information Sheet also notes the Site is within a low hydraulic hazard area.
The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.	No flood modelling has been undertaken as part of the EIS, rather the existing flood study prepared by Council has been used. The study prepared by Council has been undertaken in TUFLOW and reviewed by BMT WBM. Events provided in the Flood Information Sheet include the 5%AEP (1 in 20yr ARI), 1%AEP (1 in 100yr ARI) and PMF. No more frequent events were considered since the 5% AEP did not significantly affect the property.
The EIS must model the effect of the proposed project (including fill) on the flood behaviour under the following scenarios: • Current flood behaviour for a range of design events as identified in 3.2 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.	No fill is proposed as part of the development. Levels and buildings within the front portion of the Site will remain largely unaffected. Two weighbridges and associated office have been proposed at a level above the 1%AEP flood level. Given that no modifications to surface level are proposed within the 1%AEP flood extents and only minor modifications within the flood prone portion of the Site it is considered the impacts from the proposed development will be negligible. On this basis no comparative flood modelling has been undertaken.
Modelling in the EIS must consider and document: The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood.	As above.

FIGURE 1



Title	Flood Extents and Categorisation
Job Name	Bettergrow Facility 24 Davis Rd, Wetherill Park
Date	23 September 2016
Revision	B - Approval

N

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NORTHROP

Newcastle

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Flood
Information Sheet

Fairfield City Council
Administration Centre
86 Avoca Road
WAKELEY NSW 2176
PO Box 21
FAIRFIELD NSW 1860
Telephone: (02) 9725 0222
Facsimile: (02) 9609 3257

Applicant's Details:

Applicant's Name	**Northrop Consulting Engineers Pty Ltd**
Postal Address	**PO Box 180 CHARLESTOWN NSW 2290**
Phone	
Fax	

Property Particulars:

House No.	**24**
Street & Suburb	**Davis Road WETHERILL PARK**
Lot Description	**Lot 18 DP 249417**

Council has adopted a policy on flooding which may restrict the development of land. The Fairfield City-Wide Development Control Plan 2013 (which includes provisions for flood management) applies to all of the Fairfield Local Government area.

Part or all of this land may be affected by local overland flooding.

LOCAL OVERLAND FLOODING

Description

This parcel is identified as being partly within a **Medium** Flood Risk Precinct, partly within a **Low** Flood Risk Precinct as a result of overland flooding and partly **not affected** by local overland flooding.

Local Overland Flood Details

Size of Flood	Flood Level (m AHD)
Probable Maximum Flood (PMF)	38.0 – 37.0
100 Year ARI	36.9 – 36.4
20 Year ARI	36.8 – 36.3

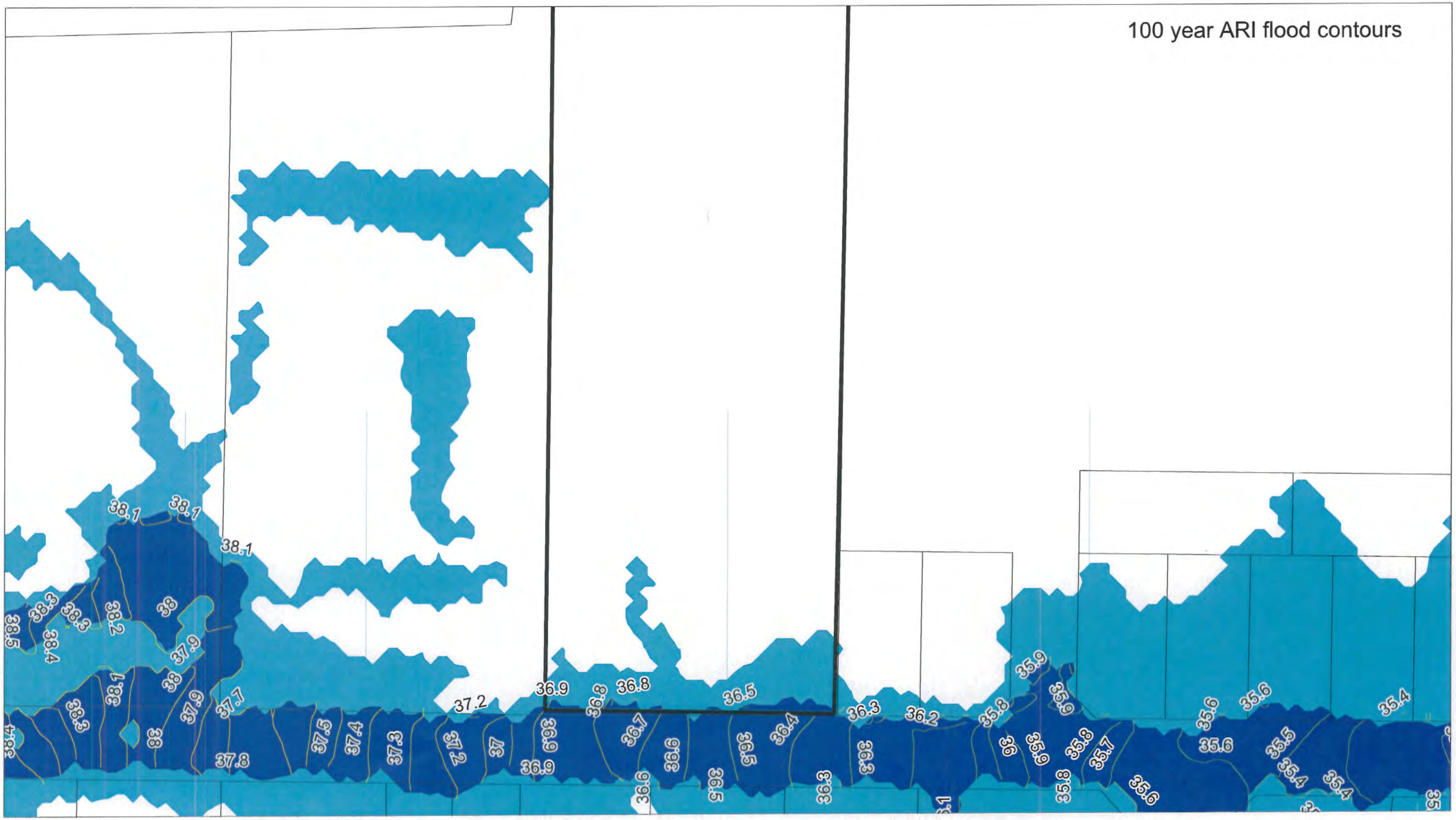
Local overland flood levels in the vicinity of the above property have been extracted from the Fairfield City Council (2015) *Wetherill Park Overland Flood Study*.

12/02/2016

Glossary over page

GLOSSARY

m AHD	metres Australian Height Datum (AHD).
Australian Height Datum (AHD)	A common national plane of level approximately equivalent to the height above sea level. All flood levels, floor levels and ground levels are normally provided in metres AHD.
Average Recurrence Interval (ARI)	The long term average number of years between the occurrence of a flood as big as the selected event. For example, floods with a discharge as great as the 20 year ARI event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
flood	A relatively high stream flow that overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam. It also includes local overland flooding associated with major drainage before entering a watercourse, or coastal inundation resulting from raised sea levels, or waves overtopping the coastline.
flood risk precinct	An area of land with similar flood risks and where similar development controls may be applied by a Council to manage the flood risk. The flood risk is determined based on the existing development in the precinct or assuming the precinct is developed with normal residential uses. Usually the floodplain is categorised into three flood risk precincts 'low', 'medium' and 'high', although other classifications can sometimes be used. **High Flood Risk:** This has been defined as the area of land below the 100-year flood event that is either subject to a high hydraulic hazard or where there are significant evacuation difficulties. **Medium Flood Risk:** This has been defined as land below the 100-year flood level that is not within a High Flood Risk Precinct. This is land that is not subject to a high hydraulic hazard or where there are no significant evacuation difficulties. **Low Flood Risk:** This has been defined as all land within the floodplain (i.e. within the extent of the probable maximum flood) but not identified within either a High Flood Risk or a Medium Flood Risk Precinct. The Low Flood Risk Precinct is that area above the 100-year flood event.
local overland flooding	The inundation of normally dry land by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
mainstream flooding	The inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
probable maximum flood (PMF)	The largest flood that could conceivably occur at a particular location.
zone of significant flow	That area of the floodplain where a significant discharge of water occurs during floods. Should the area within this boundary be fully or partially blocked, a significant distribution of flood flows or increase in flood levels would occur.



High Flood Risk Precinct

Medium Flood Risk Precinct

Low Flood Risk Precinct

24 Davis Road, Wetherill Park Lot 18 DP 249417

Flood Risk Mapping has been extracted from the
Fairfield City Council (2015) Wetherill Park Overland Flood Study.

25 February 2016

FairfieldCity
Celebrating diversity