Integrated Water Cycle Management Strategy

Proposed Temporary Emergency Grain Storage Bunker

Prepared for
Manildra Group

Site address
Bolong Road & Hannigans Lane, Bomaderry

Date
November 2022

allen price & scarratts pty ltd
land and development consultants

Surveying

Town Planning

Civil Engineering

Project Management

allen price & scarratts pty ltd
land and development consultants

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ABN 62 609 045 972

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Rev	Date	Details
0	15 November 22	ISSUED FOR CLIENT REVIEW
1	21 November 22	ISSUED FOR APPROVAL

1.0 Introduction

Allen Price and Scarratts (APS) has been engaged by the Manildra Group to prepare an Integrated Water Cycle Management Strategy for a modification to the Shoalhaven Starches Expansion Project Approval for a Temporary Emergency Grain Storage.

The Temporary Emergency Grain Storage (TEGS) is within the existing Shoalhaven Starches' Environmental Farm Bolong, being on Lot 2 in DP 833181.

The provisions of Table 5 in section 6.1 of Chapter G2 of DCP2014 define this proposal as a large scale development.

This report references the following Shoalhaven City Council's (SCC) standards and technical advice:

- D5 Engineering Standards document and DCP2014
- G2 of DCP2014
- Supporting document *Sustainable Stormwater Technical Guidelines*.

2.0 Site & Locality

The site for the proposed TEGS is within the Shoalhaven Starches Environmental Farm in Bolong Road, Bomaderry. Access to the site is available from Hannigans Lane via the existing internal access roads.

The site is zoned part RU1 (Primary Production) and part RU2 (Rural Landscape) under the Shoalhaven Local Environment Plan 2014 (SLEP 2014).

The site location is presented in Figure 2.1.

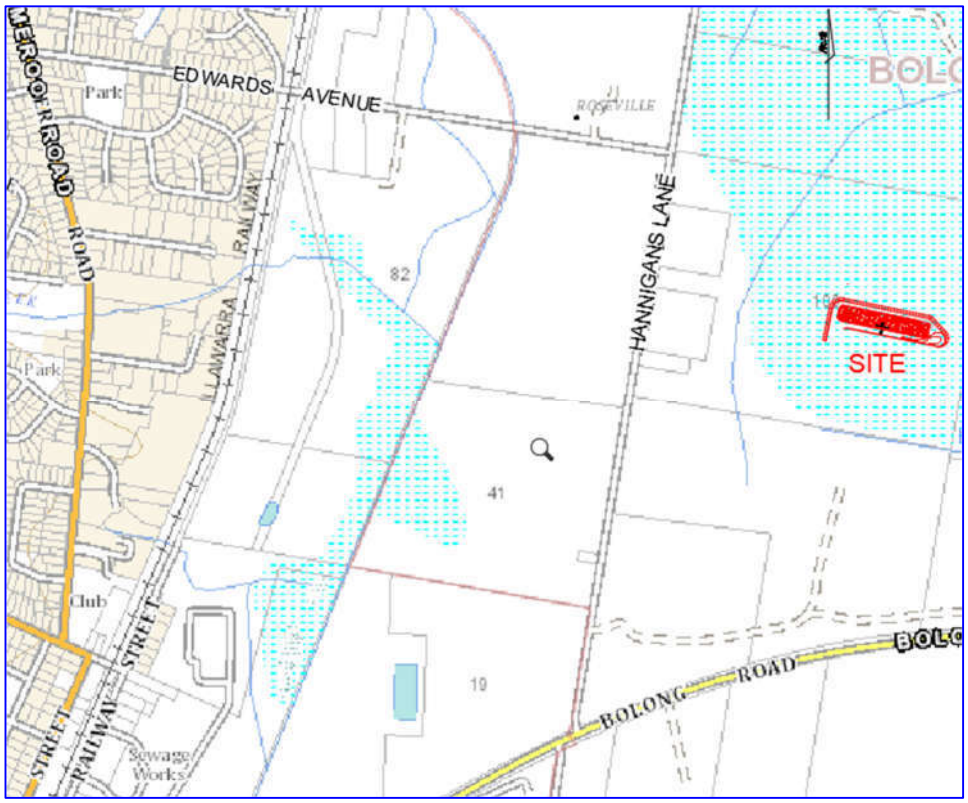


Figure 2.1
Locality Plan
(source: SIX Maps)

Flood advice issued by Shoalhaven City Council (ref 28112E dated 23 Sep 2015) nominates flood levels in the vicinity of the site as follows:

- 1% AEP flood level at RL 5.7 (2050) to RL5.8 (2100)
- 5% AEP flood level at RL4.8 (2050-2100)
- 10% AEP flood level at RL 3.4 (2050) to RL3.5 (2100)

2.1 Proposed Development

The proposal is for a Temporary Emergency Grain Storage Bunker and ancillary works which are within the Shoalhaven Starches' Environmental Farm in Bolong Road Bomaderry.

The works associated with the proposed Temporary Emergency Grain Storage Bunker are wholly within the existing Shoalhaven Starches' Environmental Farm and are not less than 400m from Hannigans Ln and not less than 700m from Bolong Rd.

The works are outlined in the Manildra Group plans MN7734 -101 to 103 and involve the following components:

2.1 Access Road Works
Earthworks to raise the elevation of part of the existing access road to not less than RL 5.4 AHD to meet the Grain Bunker Platform and service road.

2.2 Grain Bunker Platform and Service Road
Earthworks to create a service road and grain bunker platform to finished level at RL 5.4 AHD.

2.3 Construction of Grain Storage Bunker
Installation of waterproof liner, installation of prefabricated bunker edge components and storage area for waterproof covers.

2.4 Commissioning of Mobile Bunker Auger

3.0 Stormwater Quality

3.1 Construction Activity

The construction area of the access road, grain bunker platform and the service road is approximately 17,992 m^2.

Construction activity has the potential to generate sediment laden runoff in the event of a prolonged rainfall event. Short term, temporary stormwater quality impacts affecting the immediate works ares are likley during the during the construction phase.

Given the flat topography of the adjacent land and the remotness of public roads, it is highly unlikley that sediment laden runoff will leave the site. Conventional sediment and erosion controls in close proximity the earthworks will be effective to mitigate the potential for sediment laden runoff.

Conventional sediment and erosion control measures which are applicable to this site include the following:

a. Staged earthworks operations in order to minimise the extent of disturbed soil at any one time. It is recommended bulk earthworks be executed in four stages such that the existing access road acts as a stable site entry for the duration of the work.

b. Installation of sediment fence in close proximity to the perimeter of the works. Given the relatively flat topography to the west, north and east of the works area (elevation at approx RL 2.0), and the existing dam to the south of the works area, the installation of a perimeter sediment fence will effectively isolate the site and retain sediment laden runoff.

   The sediment fence can be installed as a perimeter fence around the entire works area or as a perimeter fence around each stage.

c. Progressive stabilisation of batters. Batters should be topsoiled and stabilised with a fast germinating cover crop as each earthworks stage is completed and prior to progressing to the next stage.

d. Dust suppression. Notwithstanding the site is more than 1.1 Km from the Bomaderry residential area, dust nuisance should be managed by:
   - employing water carts or a sprinkler system to apply water (potable or treated recycled water) to prevent dust becoming problematic.
   - ceasing earthworks operations in the event weather conditions prevent dust suppression
   - covering or stabilising temporary stockpiles

3.2 Operational Activity

Operational activity is unlikley to generate any stormwater quality impacts.

The stored grain will be protected by waterproof covers and any runoff generated can be directed onto the surrounding flood plain by way of stabilised table drains. Runoff generated during operational activity is unlikley to contain stormwater pollutants.

A concept Soil and Water Management Plan (SWMP) has been prepared to mitigate stormwater quality impacts during the construction phase. The concept SWMP is presented in Appendix A.

4.0 Stormwater Quantity Modelling

Calculations have been prepared by a qualified practicing engineer using DRAINS version 2022.012 and Australian Rainfall & Runoff 2016 Data.

Peak discharge from the site has been assessed for pre-development conditions and post-development conditions.

Lot 2 in DP833181 has a total area of 34.05 Ha.

The existing impervious fraction of Lot 2 is 0.9% to which the existing access road contibutes the impervious area.

When fully operational, the access road, service road and grain bunker will have an area of 17,992 m^2. The access road and service road are assumed to be 80% impervious and the grain bunker (when covered) is assumed to be 100% impervious. When the grain bunker is operational, the imperviious fraction of Lot 2 will be 4.3%.

The DRAINS model is presented on drawing 130150-106.

Table 4.1 presents a comparison of the pre-development peak runoff and post development peak runoff for Lot 2.

Table 4.1
Comparison of Pre-Development vs Post Development Discharge
Lot 2 in DP833181

Case	**1% AEP** (m^3/s)	**% Increase**	**20% AEP** (m^3/s)	**% Increase**
Pre Development	9.71		3.25	
Post Development	9.75	0.31	3.33	2.15

Figure 4.1 below indicates the scope and size of the Manildra Group landholding adjcent to the site. The area of the Manildra Group landholding is approximately 876 Ha. The incremental increase in impervious area relative to the Manildra landholding is 0.05%.

Runoff from the grain bunker site and associated service roads will discharge onto the existing flood plain. The flat topography of the flood plain, which falls to the North together the scope and size of the Manildra Group landholding will prevent the small increasein runoff from concentrating onto adjacent properties.

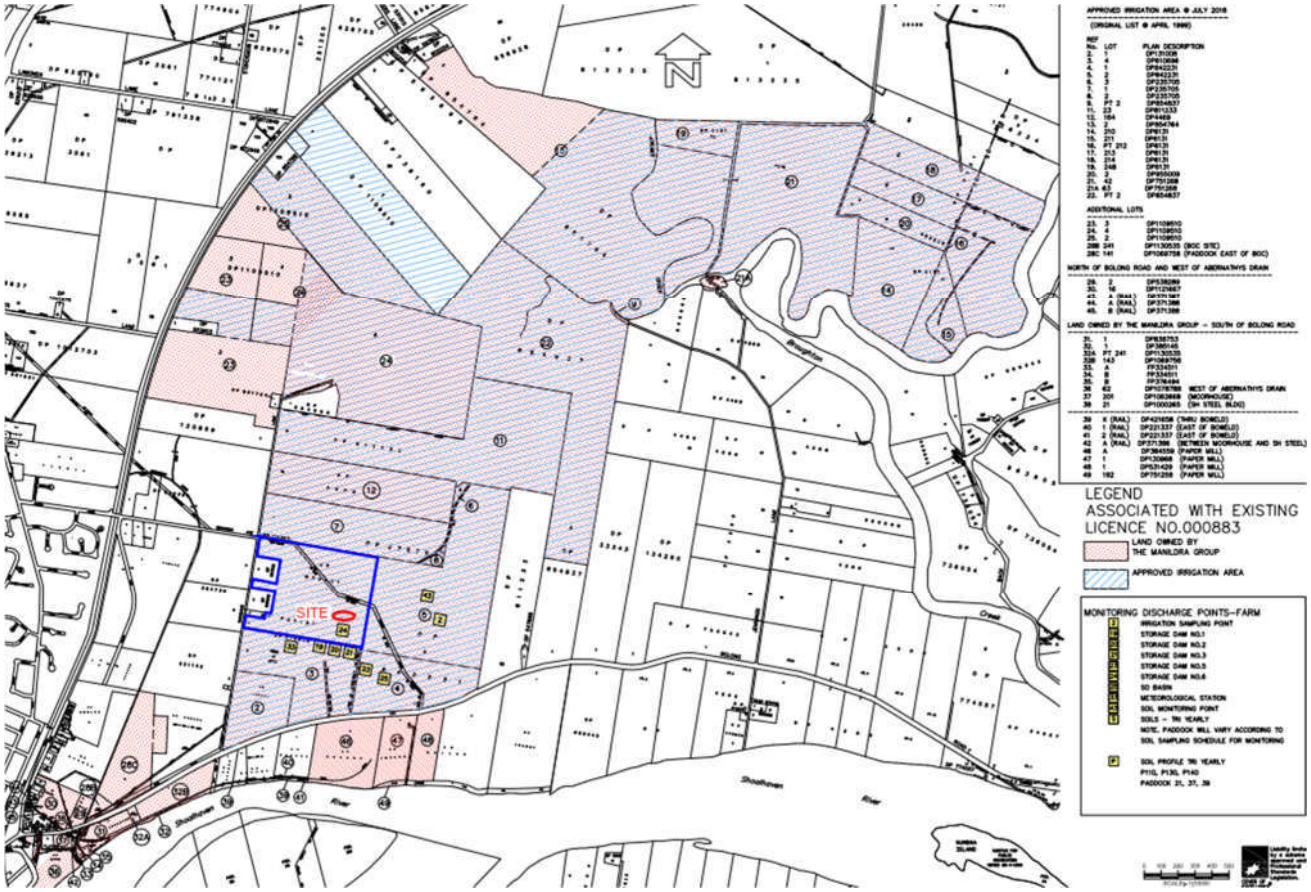


Figure 4.1
Manildra Group Landholding as at 13 July 2018
(not to scale)

5.0 DCP2014 Compliance Tables

The following table is prepared to demonstrate compliance with DCP2014 Chapter G2 – Sustainable Stormwater Management.

DCP2014 Chapter G2 – Sustainable Stormwater Management – 5 Controls	
5.1 Stormwater	
5.1.1 Minor and Major Systems Design	
Acceptable Solutions	Compliance
A1.1 Runoff from impervious areas must not be concentrated or directed onto neighbouring properties	The increase in discharge on Lot 2 from a 1% AEP design storm is 0.31%. The increase in discharge on Lot 2 from a 20% AEP design storm is 2.15%. The size of the Manildra landholding together with the topography of the flood plain will attenuate the small increase in runoff and will prevent concentration of runoff onto adjacent property Complies
A1.2 For residential and rural residential areas, the drainage must be designed to cater for a 5 year ARI event.	Not applicable for industrial development.
A1.3 For mixed residential/commercial and industrial development, the drainage must be designed to cater for a 10 year ARI event.	Runoff from the development site will be managed by way of table drains or via overland flow. Table drains can be designed to cater for a 10 year ARI design storm. No additional stormwater infrastructure is proposed. Complies
A1.4 Kerb and gutters are required if soil permeability is not sufficient to allow natural infiltration of stormwater runoff without causing adverse impacts onsite or to neighbouring properties.	Runoff drains onto to the existing flood plain and will therefore follow existing flow routes. The flood plain topography and scope of the Manildra landholdings (refer Fig 4.1) will prevent the concentration of runoff onto adjacent property. Runoff will remain on Manildra property. Complies.
A1.5 Runoff from roof gutters and downpipes can be directed to an existing or proposed stormwater system, when it can be proved that the systems design capacity is not exceeded.	No buildings nor roof gutters are proposed. Not applicable

A1.6 Where onsite infiltration/absorption is proposed for stormwater disposal, supporting geotechnical reports are submitted with a development application to assess the suitability of the proposal	No specific infiltration measures proposed. Not Applicable
A1.7 Stormwater inlet structures must be designed with a blockage factor provision in accordance with the latest version of Australian Rainfall and Runoff (ARR) guidelines	No stormwater structures are proposed other than table drains. Runoff will be discharged onto the existing flood plain. Blocking factors are Not Applicable
A1.8 Major system drainage must be designed for a 1:100 year ARI event	No major system stormwater drainage structures are proposed. Runoff will be discharged onto the existing flood plain. Not Applicable
A1.9 Trunk stormwater systems, which include open channels, large conduits and overland flow paths are designed for storms up to 100 year ARI event.	No trunk drainage structures are proposed. Runoff will be discharged onto the existing flood plain. Not Applicable
A1.10 The following overland flow paths shall be utilised as Major system flow routes; •Roadways including footpath; • Pathways; and • Parkland or open space.	Runoff from the site will discharge onto the existing flood plain. The flood plain will provide overland flow routes in the event of riverine flooding. Not applicable
A1.11 Flow paths must be designed to ensure a velocity depth product of less than 0.3m^2 /s for a 100 year ARI storm event.	Runoff from the access road will discharge into table drain and then onto the existing flood plain. Max v*d in the access road table drain for 1% AEP discharged is 0.23 m^2/s Complies
A1.12 The continuity of the overland flow paths must not be obstructed by fences, walls, footpaths and the like.	The proposed works will not impede overland flow through or onto the existing flood plain. Complies
5.1.2 Disposal of Stormwater from Development sites	

A2.1 Roof water collection and disposal.	No roofed structures are proposed. Not applicable
A2.2 Surface water from paved areas.	The existing access road and service road will be partially permeable. When covered the grain bunker will be 100% impervious. Runoff will be discharged to the flood plain by overland flow for the service road and via table drain for the access road. Complies
A2.3 Rainwater harvesting.	The grain bunker does not provide opportunity for rainwater harvesting. Not applicable
5.1.3 Climate Change Controls	
A3.1 Climate change impacts, such as changes to rainfall intensity, shall be considered in system design as per relevant policies and/or Australian Rainfall & Runoff (ARR) Guidelines.	The grain storage bunker does not require the installation of stormwater infrastructure. Climate impacts will not affect the stormwater design parameters at this site. Complies
A4.1 Where relevant major and minor system design must consider the impact of sea level rise.	The FSL of the grain bunker is RL 5.40 which is above the 2% AEP flood level of RL 5.3 m (existing and 2100) reported in the SCC flood certificate dated 23 Sep 2015 No habitable buildings are proposed. Sea level rise and climate change will not adversely increase the impact flood impact on the site. Complies
5.1.4 Onsite Stormwater Detention (OSD)	
A5.1 OSD is to be sized to match pre-development peak flow rates for the 5, 20 and 100 year ARI rain events for the site	The small incremental increase in runoff on Lot 2 in DP 833181 will be dissipated by the existing flood plain. No OSD is proposed Not applicable
A5.2 For development other than subdivision, pre and post-development peak flow calculations must be based on the impervious percentages (as outlined below) or the actual impervious surface area (whichever is greater) as detailed on development plans.	Actual impervious fractions have been used in the runoff calculations as follows: Access road / service road: 80% Grain bunker cover: 100% Grassed batter: 0% Farmland: 0%

A5.3 For subdivisions, pre and post-development peak flow calculations must be based on the impervious percentages as outlined below. Area impervious: • Open Space – 25% • Low and Med density residential – 80% • Industrial areas – 80% • Commercial areas – 90% • Half width road reserve – 95%	Will not generate any additional runoff. Not applicable
A5.4 OSD design must consider downstream boundary conditions for the 100 year ARI level of the receiving water.	No OSD proposed Not applicable for this development
A5.5 Detention storage must be located at a level above the 5 year ARI flood level	No OSD proposed Not applicable for this development
A5.6 If OSD is provided in landscaped areas, the desirable maximum depth of ponding under design conditions is 300mm.	No OSD proposed Not applicable for this development
A5.7 Despite A5.6 the desirable maximum depth of ponding can be increased to 1200mm provided that site slopes of the basin are ≥1:6, or the provided storage is fenced off.	No OSD proposed Not applicable for this development
A5.8 For subdivisions OSD shall be: • Designed at the subdivision stage • Constructed at the individual dwelling stage where OSD is proposed on each lot • Constructed at the subdivision stage where OSD is proposed to be provided through dedicated detention storage	No OSD proposed Not applicable for this development
A5.9 50% of any retention volume can contribute towards the OSD volume required for the development, provided the systems are interconnected.	No OSD proposed Not applicable for this development
5.2 Stormwater Quality and Waterway Protection	
5.2.1 Erosion and Sediment Control	

A6.1 Where vegetation exists on the site, buffer zones of vegetation shall be retained along the boundaries of the site where practicable, particularly those adjacent to creeks and street gutters	The grain bunker is on cleared agricultural land, remote from watercourses and will not require clearing of trees. Complies
A6.2 Sediment and erosion control measures shall not adversely impact on stormwater management measures of the site or any existing public drainage structures of systems	Soil and water management measures are wholly contained within the site Complies. A detailed soil and water management plan can be developed in conjunction with detailed design of the works. .
5.2.2 Stormwater Retention and re-use	
A7.1 The volume of retention storage provided is to be equal to or greater than: [storage depth*] X [increase in impervious surfaces compared to pre-development] *as outlined below (refer to Sustainable Stormwater Technical Guidelines for further details). • Alterations, additions, auxiliary structures & second storey additions (10mm) • Single dwelling & dual occupancy (10mm) • Medium Density (9mm) • High Density (8mm) • Industrial (6mm)	The proposed development will not generate any significant additional runoff. Runoff will discharge onto the existing flood plan and will not discharge into public stormwater infrastructure. Not applicable
A8.1 Residential development shall install rainwater tanks to meet a portion of supply such as outdoor use, toilets, laundry	Not applicable for this development
A8.2 Any overflow from rainwater tanks shall be directed into an existing stormwater system where possible, alternatively the overflow will be managed so that it does not cause nuisance to neighbouring properties	Not applicable. Rainwater tanks not proposed
5.2.3 Small/medium scale development – Not Applicable (Assessed as Large scale development)	

5.2.4 Large Scale Development	
A10.1 For development within Sydney's drinking water supply catchments, a neutral or beneficial effect must be demonstrated in accordance with the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011.	Not applicable Development is not within Sydney Water's drinking water supply catchments.
A10.2 For development outside Sydney's drinking water supply catchments, pollutant load reduction must be a minimum reduction of the load of the post development average annual load of pollutants in accordance with Table 3 and the following as relevant:	
• For greenfield sites or sites draining to a natural stream of 3rd order or lower, the 1.5 year ARI predevelopment peak discharge must be maintained.	The development discharges onto the flood plain and does not discharge directly into a 3rd order stream Not applicable
• For development discharging to a natural stream, the post development duration of stream forming flows must be no greater than a stream erosion index of 2	The development discharges onto the flood plain and does not discharge directly into a natural watercourse Not applicable
• For development discharging to a tidal area or natural watercourse, outlets must be designed to limit erosion and sedimentation at the discharge point	The development discharges onto the flood plain and does not discharge into a tidal area or natural watercourse Not applicable
• For development discharging to St Georges Basin, Swan Lake, Lake Conjola, Burrill Lake, Lake Tabourie, Willinga Lake and Wollumboola Lake a higher Total Phosphorus reduction target of 65% must be achieved	The site does not drain these areas Not applicable,
• For a development discharging into an area of significant biodiversity value, the post development residual pollutant concentrations must not exceed the ecological trigger values listed in the A & NZ guidelines for fresh and Marine Water Quality	The site does not drain to an area of significant biodiversity Not applicable,

• Un coated metal roofs, facades and/or downpipes are not supported	Uncoated metal roofs, facades or downpipes are not proposed Complies
5.2.5 Design and Maintenance of Stormwater Treatment Measures	
A11.1 Where practicable, trunk drainage is to be provided as a natural vegetated stable channel; and	Trunk drainage not required Not applicable
A11.2 Where practical due to adequate catchment area, constructed wetlands are preferred over the use of bio-retention basins and water quality ponds. The preference between a water quality pond and bioretention device will depend on site specific constraints	No increase in runoff with discharge to existing managed area. Not applicable Operational activity will not require permanent stormwater quality measures Short term construction impacts can be mitigated by soil and water management plan. Not applicable
A11.3 An Operation and Maintenance Plan is submitted to Council for all stormwater treatment measures proposed, whether remain in private ownership or to be handed over to Council; and	Not applicable
A11.4 System design allows for maintenance (i.e. access and room to operate safely) at all times; and	Not applicable
A11.5 Stormwater treatment measures must not be connected until the majority of catchment infrastructure is completed and landforms stabilised with impervious or fully established grassed surfaces. Bioretention devices and constructed wetlands must be established offline from inflows until they are fully established	Not applicable
A11.6 Where the development is staged, sacrificial zones must be included in the design of the stormwater treatment measures. Sacrificial zones are to be rectified upon completion of development at the developer's cost; and	Not applicable

A11.7 Structural stormwater treatment measures must be able to bypass flows in excess of the design discharge with negligible afflux resulting from over topping or blockage of the device; and	Not applicable
A11.8 Trash racks are generally preferred over proprietary GPT's by Council	Not applicable
A11.9 In the event of a stormwater discharge, structure stormwater treatment measures must not allow the release of any previously trapped material.	Not applicable
A11.10 Stormwater treatment measures must consider mosquito control in their design. Designs should consider: • Permanent water ponding; • Water depth; • Exposure to sunlight and wind; and • Proximity to residential development	Not applicable
A11.11 All filter media used in bioretention stormwater treatment measures must meet the current specifications of the Guidelines for filter media in adoption guidelines for biofiltration systems or a demonstrated equivalent, verified by a soil laboratory registered by the National Association of Testing Authorities; and	Not applicable
A11.12 Design of stormwater treatment measures is in accordance with Sustainable Stormwater Technical Guidelines.	Not applicable
A11.13 Development adjacent to a watercourse or stormwater drain addresses environmental impact upon the water body.	Soil and water management measures implemented during construction will address the short term impacts. Complies
A11.14 Constructed wetlands and bioretention basins must be located in a treatment train approach immediately downstream of a sediment basin/forebay.	Not applicable

A11.15 Bioretention devices must be designed in accordance with the latest version of the Adoption Guidelines for stormwater systems (CRC for water sensitive cities) and Facility for advancing water biofiltration (FAWB) Guidelines	Not applicable
5.3 Waterfront Land	
5.3.1 Development on Waterfront land	
A12.1 The minimum width of the core riparian zone is in accordance with Table 4 or as specified by the Water Management Act 2000	Not applicable.
A12.2 The core riparian zone must be maintained or restored or rehabilitated using appropriate local species with a range of canopy, understorey and ground cover species to enable a healthy and diverse ecosystem	Not applicable
A12.3 Topsoil shall be reused from the development site where it contains known or potential seedbank on the development site	Not applicable. Topsoil does not have the potential for seedbank of native or useful exotic species.
A12.4 Transport infrastructure and services (ie sewer, electricity, gas and communications) shall be located outside the core riparian zone	The proposed works are remote from a riparian zone. Not applicable
A12.5 Despite A12.4, where services must traverse the core riparian zone, the development application must demonstrate that there will be minimal impact on the function and integrity of the core riparian zone	The proposed works are remote from a riparian zone. Not applicable
A12.6 Pathways, cycleways and pervious recreational area shall be located outside core riparian zone unless all of the following is satisfied: • An opportunity exists for the community to connect with and explore the watercourse in a strategic location • There will be minimal impact on the riparian function • The integrity of the riparian land is maintained	The proposed works are remote from a riparian zone. Not applicable

A12.7 Bushfire asset protection zones shall be located outside the core riparian zone or vegetated buffer and should be incorporated into the development footprint	Not applicable
A12.8 Crossings of waterways or other activities must have regard to the minimum structure requirements for fish passage in accordance with relevant NSW state government guidelines	Not applicable
A12.9 Works carried out on waterfront land comply with the Water Management Act 2000	The proposed works are remote from a riparian zone. Not applicable
A12.10 Stormwater disposal over/across/through public waterfront reserves should be avoided to prevent erosion and need for remedial actions	The proposed works are remote from waterfront land. Not applicable
5.3.2 Coastal areas –development discharging to coastal cliffs or coastal dunes. This Section Is Not Applicable	

6.0 Conclusion

This report has assessed the stormwater quality and quantity impacts associated with the Temporary Emergency Grain Storage Bunker against Chapter G2 of the SCC DCP.

Flooding impacts have been assessed by others (WMA Water) and are not addressed by this report.

Potential short term stormwater quality impacts can be effectively mitigated by conventional Soil and Water Management measures such that the performance objectives and criteria in Ch G2 are satisfied.

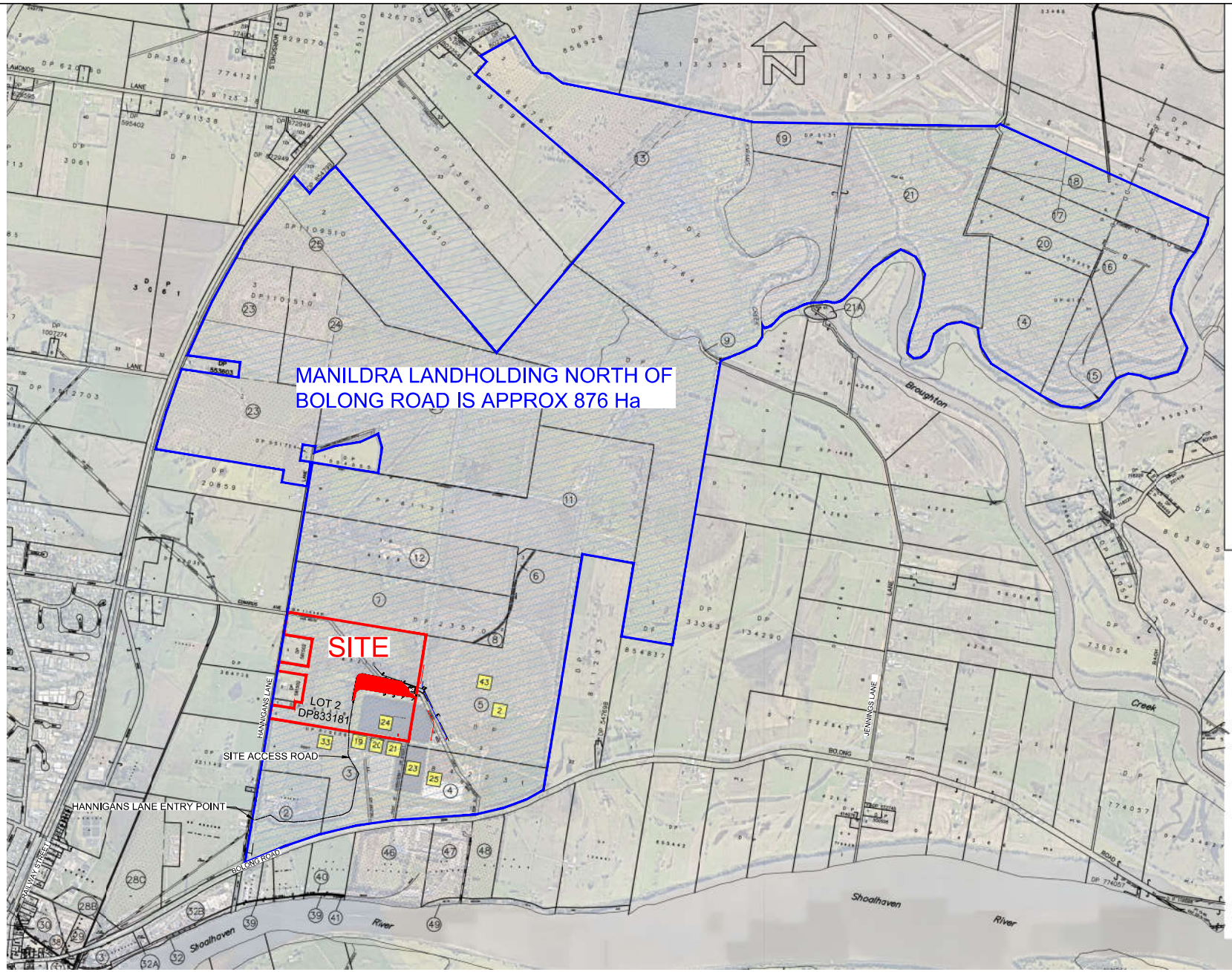
The size and scope of the Manildra landholdings will effectively attenuate the insignificant increase in runoff from the development site such that the stormwater quantity performance objectives and criteria in Ch G2 are generally satisfied.

The proposal is considered acceptable from a stormwater management perspective and is recommended to be supported by Shoalhaven City Council.

Wal Mullany
BE, Grad Dip LGE, ME(Hons), MCP, MIE Aust, CPEng, NER

Allen, Price & Scarratts Pty Ltd
15 Nov 2022

APPENDIX A – Concept Stormwater & Engineering



(ORIGINAL LIST @ APRIL 1999)

REF No.	LOT	PLAN DESCRIPTION	
2.	1	DP131008	
3.	4	DP610696	
4.	1	DP842231	
5.	2	DP842231	
6.	3	DP235705	
7.	1	DP235705	
8.	2	DP235705	
9.	PT 2	DP854837	
11.	23	DP811233	
12.	164	DP4469	
13.	2	DP854764	
14.	210	DP6131	
15.	211	DP6131	
16.	PT 212	DP6131	
17.	213	DP6131	
18.	214	DP6131	
19.	248	DP6131	
20.	2	DP955009	
21.	42	DP751268	
21A	63	DP751268	
22.	PT 2	DP854837	
ADDITIONAL LOTS			
23.	3	DP1109510	
24.	4	DP1109510	
25.	2	DP1109510	
28B	241	DP1130535	(BOC SITE)
28C	141	DP1069758	(PADDOCK EAST OF BOC)
NORTH OF BOLONG ROAD AND WEST OF ABERNATHYS DRAIN			
29.	2	DP538289	
30.	16	DP1121667	
43.	A (RAIL)	DP371387	
44.	A (RAIL)	DP371388	
45.	B (RAIL)	DP371388	
LAND OWNED BY THE MANILDRA GROUP – SOUTH OF BOLONG ROAD			
31.	1	DP638753	
32.	1	DP385145	
32A	PT 241	DP1130535	
32B	143	DP1069758	
33.	A	FP334511	
34.	B	FP334511	
35.	B	FP376494	
36	62	DP1078788	WEST OF ABERNATHYS DRAIN
37	201	DP1062668	(MOORHOUSE)
38	21	DP1000265	(SH STEEL BLDG)
39	X (RAIL)	DP421658	(THRU BOWELD)
40	1 (RAIL)	DP221337	(EAST OF BOWELD)
41	2 (RAIL)	DP221337	(EAST OF BOWELD)
42	A (RAIL)	DP371386	(BETWEEN MOORHOUSE AND SH STEEL)
46	A	DP384559	(PAPER MILL)
47	1	DP130968	(PAPER MILL)
48	1	DP531429	(PAPER MILL)
49	192	DP751258	(PAPER MILL)

LEGEND
ASSOCIATED WITH EXISTING LICENCE NO.000883

LAND OWNED BY THE MANILDRA GROUP

APPROVED IRRIGATION AREA

MONITORING DISCHARGE POINTS–FARM

2	IRRIGATION SAMPLING POINT
19	STORAGE DAM NO.1
20	STORAGE DAM NO.2
21	STORAGE DAM NO.3
23	STORAGE DAM NO.5
24	STORAGE DAM NO.6
25	SO BASIN
33	METEOROLOGICAL STATION
43	SOIL MONITORING POINT
S	SOILS – TRI YEARLY
	NOTE. PADDOCK WILL VARY ACCORDING TO SOIL SAMPLING SCHEDULE FOR MONITORING
P	SOIL PROFILE TRI YEARLY P110, P130, P140 PADDOCK 21, 37, 39

BASE PLAN TAKEN FROM APS DRAWING 23134B DATED 13 JULY 18

SITE LOCALITY PLAN
SHOWING MANILDRA LANDHOLDING AS AT JULY 2018
SCALE: 1:10,000

0 100 200 300 400 500
SCALE:- 1:10000

PROFESSIONAL STANDARDS SCHEME
Liability limited by a scheme approved under Professional Standards Legislation

RATIO: 1:10,000 (AT A1 ORIGINAL)

DATUM: AUSTRALIAN HEIGHT DATUM
ORIGIN: PM32610 RL: 3.25 AHD
DATE OF PLAN: NOVEMBER 22

		REV	DESCRIPTION	BY	DATE
SURVEY	-	=			
DESIGN	WRM				
DRAWN	WRM				
CHECK'D	MAK				

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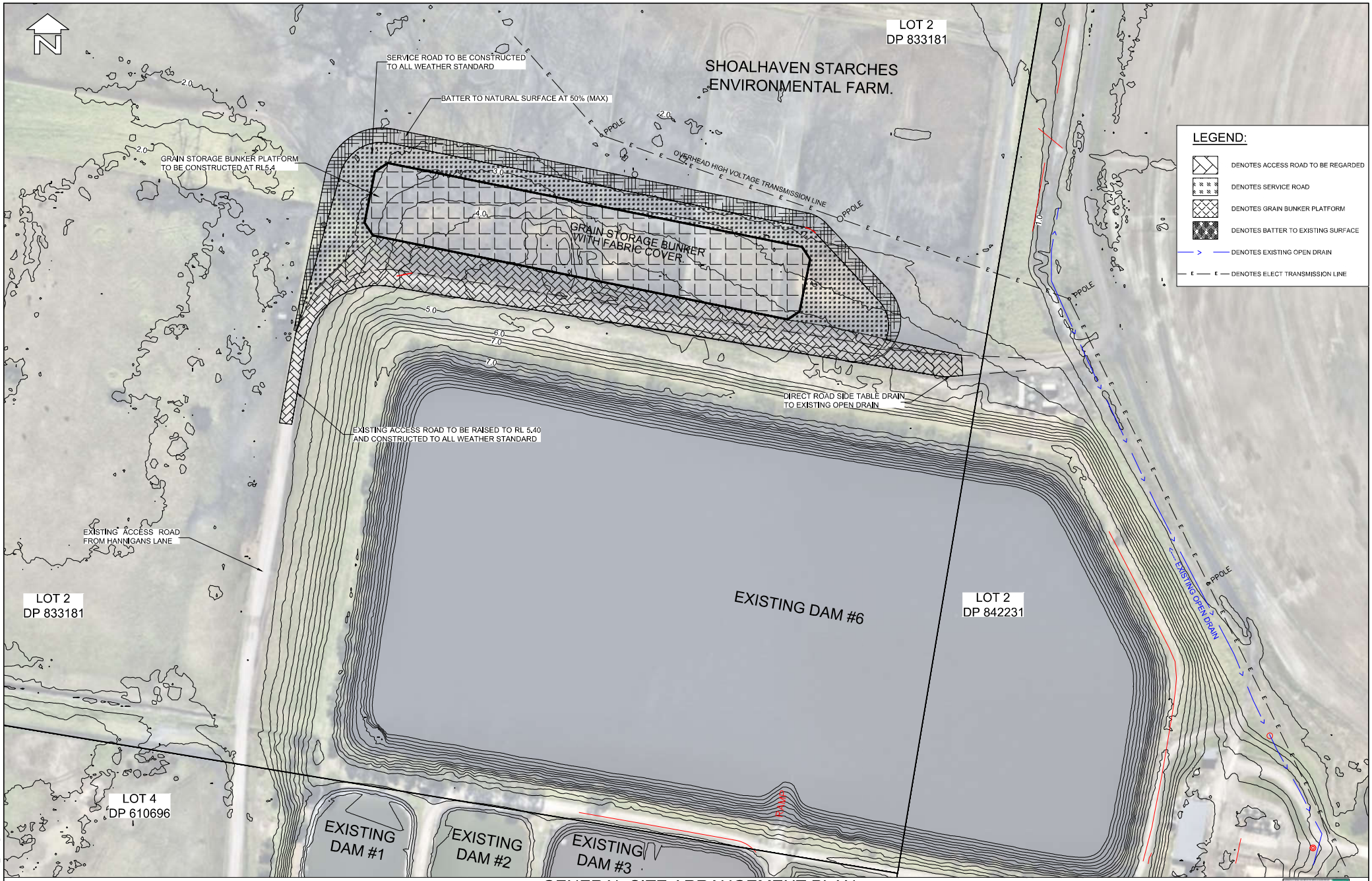
SITE LOCALITY PLAN & MANILDRA LANDHOLDING
INTEGRATED WATER CYCLE MANAGEMENT STRATEGY
TEMPORARY EMERGENCY GRAIN STORAGE BUNKER
LOT 2 IN DP833181 AT HANNIGANS LANE, BOMADERRY
FOR: MANILDRA GROUP

DRAWING STATUS: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DRAWING NUMBER: 130153-101
SHEET 1 OF 6
REVISION P0

C:\1 Working File\1 Jobs\130153\130153_SWCMS_P0.dwg



NOTES:
1. CONTOURS GENERATED FROM LiDAR DATA AND ARE SHOWN AT 0.5m INTERVAL
2. TEMPORARY EMERGENCY GRAIN STORAGE BUNKER DETAILS OBTAINED FROM MANILDRA DRAWINGS MN7734-101 & 102

GENERAL SITE ARRANGEMENT PLAN

SCALE: 1:800

0 10 20 30 40 50
SCALE:- 1:800

PROFESSIONAL STANDARDS SCHEME
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RATIO: 1:800 (AT A1 ORIGINAL)	DATUM: AUSTRALIAN HEIGHT DATUM ORIGIN: PM32610 RL: 3.25 AHD DATE OF PLAN: NOVEMBER 22	SURVEY	-	REV	DESCRIPTION	BY	DATE
		DESIGN	WRM	=			
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		CHECK'D	MAK				

allen price & scarratts pty ltd
land and development consultants
Nowra Office: 75 Plunkett Street, Nowra NSW 2541
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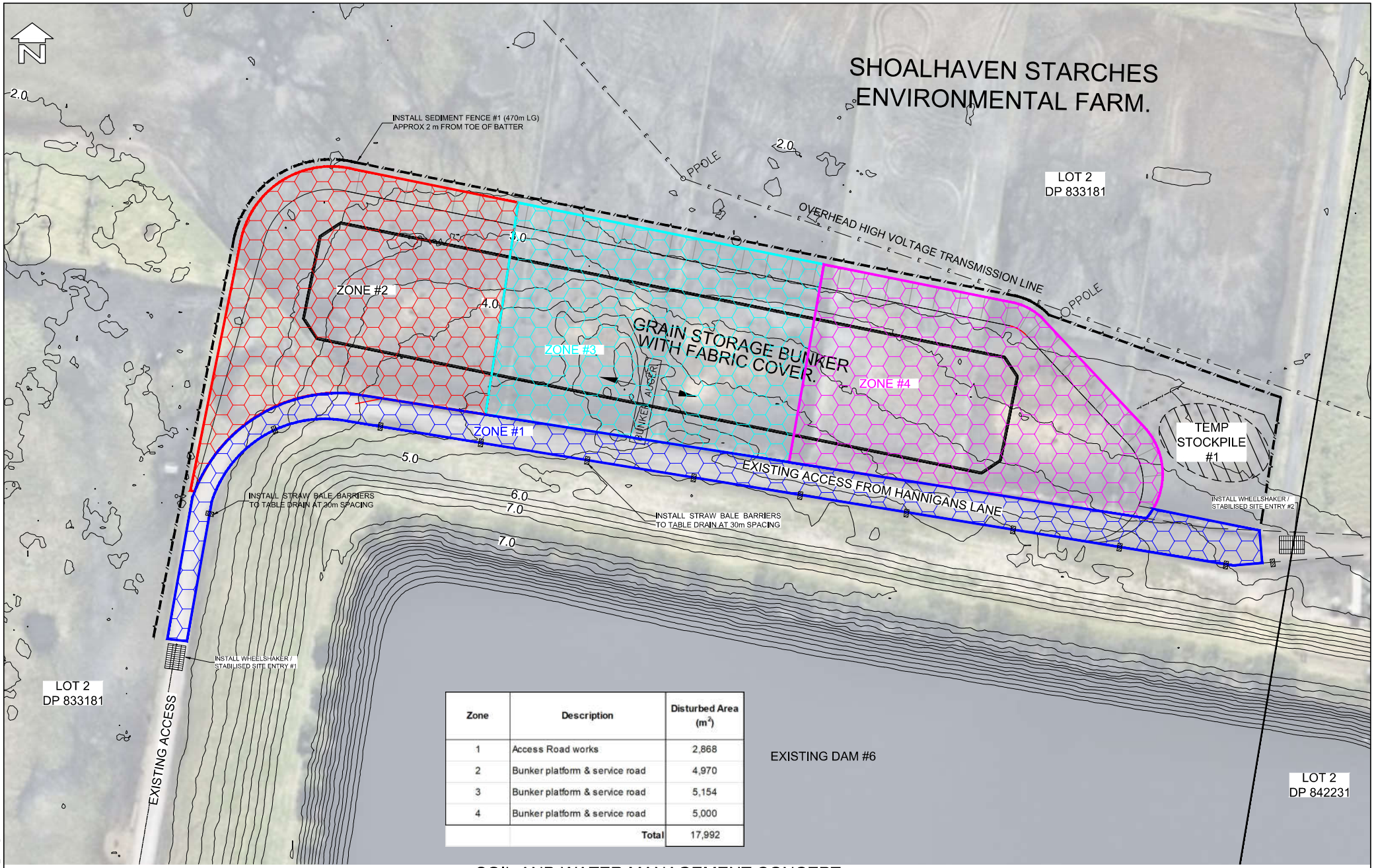
GENERAL SITE ARRANGEMENT
INTEGRATED WATER CYCLE MANAGEMENT STRATEGY
TEMPORARY EMERGENCY GRAIN STORAGE BUNKER
LOT 2 IN DP833181 AT HANNIGANS LANE, BOMADERRY
FOR: MANILDRA GROUP

DRAWING STATUS: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DRAWING NUMBER: 130153-102
SHEET: 2 OF 6
REVISION: P0



Zone	Description	Disturbed Area (m^2)
1	Access Road works	2,868
2	Bunker platform & service road	4,970
3	Bunker platform & service road	5,154
4	Bunker platform & service road	5,000
	Total	17,992

SOIL AND WATER MANAGEMENT CONCEPT

SCALE: 1:500

SCALE:- 1:500

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CONCEPT SOIL AND WATER MANAGEMENT PLAN
INTEGRATED WATER CYCLE MANAGEMENT STRATEGY
TEMPORARY EMERGENCY GRAIN STORGARE BUNKER
LOT 2 IN DP833181 AT HANNIGANS LANE, BOMADERRY
FOR: MANILDRA GROUP

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DRAWING NUMBER: 130153-103
SHEET 3 OF 6
REVISION P0

ZONE 1 SOIL AND WATER MANAGEMENT NOTES

1. ACCESS TO ZONE 1 WORKS AREA SHALL BE VIA THE EXISTING INTERNAL ACCESS ROAD FROM HANNIGANS LANE.
2. PRIOR TO COMMENCING WORKS IN THE ZONE 1 AREA, THE CONTRACTOR SHALL ESTABLISH THE FOLLOWING SOIL AND WATER MANAGEMENT MEASURES:
   A. INSTALL SEDIMENT FENCE #1 APPROX 470 m LG.
   B. ESTABLISH TEMPORARY STOCKPILE #1
   C. INSTALL WHEEL SHAKER #1 AND WHEEL SHAKER #2.
3. COMMENCE ROAD WORKS IN ZONE #1 (AREA 2,868 m^2)
   A. STRIP TOPSOIL AND PLACE IN TEMP TOPSOIL STOCKPILE #1 OR WHERE PRACTICAL, PROGRESSIVELY REMOVE EXCESS TOPSOIL TO THE AUTHORISED DISPOSAL AREA ON MANILDRA ENVIRONMENTAL FARM
   B. UNDERTAKE ROAD WORKS IN ZONE #1 TO ACHIEVE NEW ROAD SUBGRADE LEVEL.
   C. CONSTRUCT NEW PAVEMENT TO ACHIEVE NEW FINISHED SURFACE LEVEL.
   D. CONSTRUCT AND TRIM DRAIN ON SOUTHERN SIDE OF ACCESS ROAD TO ACHIEVE GRADE OF NOT LESS THAN 0.5%. STABILISE TABLE DRAIN WITH GRASS SEEDING OR TURF.
   E. STABILISE BATTERS AS REQUIRED ON SOUTHERN SIDE OF ROADWORKS WITH GRASS SEEDING.
   F. PROCEED TO ZONE #2.

ZONE 2 SOIL AND WATER MANAGEMENT NOTES

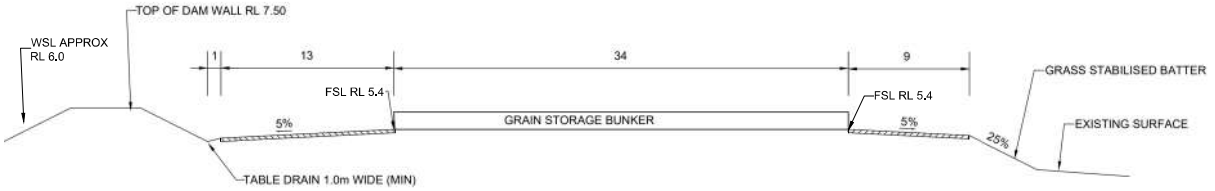
1. ACCESS TO ZONE #2 WORKS AREA SHALL BE VIA THE EXISTING INTERNAL ACCESS ROAD FROM HANNIGANS LANE.
2. PRIOR TO COMMENCING WORKS IN THE ZONE #2 THE CONTRACTOR SHALL CHECK SEDIMENT FENCE #1 AND AND REFURBISH AS REQUIRED TO ENSURE SERVICEABILITY.
3. COMMENCE EARTHWORKS ON ZONE #2 (AREA 4,970 m^2) AS FOLLOWS:
   A. STRIP TOPSOIL AND PLACE IN TEMP TOPSOIL STOCKPILE #1. WHERE PRACTICAL, PROGRESSIVELY REMOVE EXCESS TOPSOIL TO THE AUTHORISED DISPOSAL AREA ON MANILDRA ENVIRONMENTAL FARM
   B. UNDERTAKE BULK EARTHWORKS IN TO BRING THE SERVICE ROAD TO SUBGRADE LEVEL.
   C. CONCURRENTLY UNDERTAKE BULK EARTHWORKS TO BRING GRAIN STORAGE BUNKER TO DESIGN LEVEL.
   D. CONSTRUCT PAVEMENT TO SERVICE ROAD.
   E. SPREAD TOPSOIL TO BATTERS AND STABILISE WITH GRASS SEEDING
4. PROCEED TO ZONE #3.

ZONE 3 SOIL AND WATER MANAGEMENT NOTES

1. ACCESS TO ZONE #3 WORKS AREA SHALL BE VIA THE EXISTING INTERNAL ACCESS ROAD FROM HANNIGANS LANE AND FROM THE COMPLETED ZONE #2 AREA..
2. PRIOR TO COMMENCING WORKS IN ZONE #3 THE CONTRACTOR SHALL CHECK SEDIMENT FENCE #1 AND AND REFURBISH AS REQUIRED TO ENSURE SERVICEABILITY.
3. COMMENCE EARTHWORKS ON ZONE #3 (AREA 5,154 m^2) AS FOLLOWS:
   A. STRIP TOPSOIL AND PLACE IN TEMP TOPSOIL STOCKPILE #1. WHERE PRACTICAL, PROGRESSIVELY REMOVE EXCESS TOPSOIL TO THE AUTHORISED DISPOSAL AREA ON MANILDRA ENVIRONMENTAL FARM
   B. UNDERTAKE BULK EARTHWORKS IN TO BRING THE SERVICE ROAD TO SUBGRADE LEVEL.
   C. CONCURRENTLY UNDERTAKE BULK EARTHWORKS TO BRING GRAIN STORAGE BUNKER TO DESIGN LEVEL.
   D. CONSTRUCT PAVEMENT TO SERVICE ROAD.
   E. SPREAD TOPSOIL TO BATTERS AND STABILISE WITH GRASS SEEDING
4. PROCEED TO ZONE #4.

ZONE 4 SOIL AND WATER MANAGEMENT NOTES

1. ACCESS TO ZONE #1 WORKS AREA SHALL BE VIA THE EXISTING INTERNAL ACCESS ROAD FROM HANNIGANS LANE AND FROM THE COMPLETED ZONE #3 AREA..
2. PRIOR TO COMMENCING WORKS IN ZONE #4 THE CONTRACTOR SHALL CHECK SEDIMENT FENCE #1 AND AND REFURBISH AS REQUIRED TO ENSURE SERVICEABILITY.
3. COMMENCE EARTHWORKS ON ZONE #4 (AREA 5,000 m^2) AS FOLLOWS:
   A. STRIP TOPSOIL AND PLACE IN TEMP TOPSOIL STOCKPILE #1. WHERE PRACTICAL, PROGRESSIVELY REMOVE EXCESS TOPSOIL TO THE AUTHORISED DISPOSAL AREA ON THE MANILDRA ENVIRONMENTAL FARM.
   B. UNDERTAKE BULK EARTHWORKS IN TO BRING THE SERVICE ROAD TO SUBGRADE LEVEL AND COMPLETE THE LINKAGE TO THE MAIN ACCESS ROAD.
   C. CONCURRENTLY UNDERTAKE BULK EARTHWORKS TO BRING GRAIN STORAGE BUNKER TO DESIGN LEVEL.
   D. UNDERTAKE FINAL TRIM OF THE ENTIRE GRAIN BUNKER SUBGRADE.
   E. INSTALL GRAIN BUNKER FOUNDATION LAYER.
   F. CONSTRUCT PAVEMENT TO SERVICE ROAD WITHIN ZONE #4 ROAD.
   G. SPREAD TOPSOIL TO BATTERS AND STABILISE WITH GRASS SEEDING
4. DECOMMISSION TEMPORARY STOCKPILE #1 AND DISPOSE OF EXCESS TOPSOIL TO THE AUTHORISED DISPOSAL AREA ON THE MANILDRA ENVIRONMENTAL FARM.
5. DECOMMISSION WHEEL SHAKERS #1 AND #2
6. MAINTAIN SEDIMENT FENCE UNTIL THE BATTERS HAVE ACHIEVED NOT LESS THAN 80% GRASS COVER.
7. INSTALL BUNKER WALLS AND MOBILE GRAIN HANDLER (THIS WORK IS TO BE DONE BY OTHERS AND IS NOT INCLUDED IN THIS PLAN).



GRAIN BUNKER TYPICAL SECTION

1:200

0 10 20 30 40 50
SCALE:- 1:800

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SHEET: 4 OF 6
REVISION: P0

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GENERAL NOTES

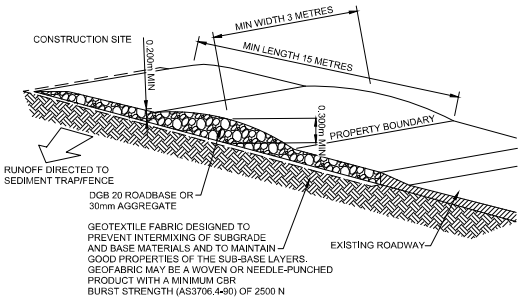
1. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE WORK HEALTH AND SAFETY ACT 2011, WHICH REQUIRES EMPLOYERS AND EMPLOYEES TO ENSURE THE HEALTH, SAFETY AND WELFARE OF EMPLOYEES AND PERSONS IN THE VICINITY OF THE WORK SITE.
2. SEDIMENT AND EROSION CONTROL MEASURES ARE TO BE IMPLEMENTED PRIOR TO CONSTRUCTION WORK COMMENCING AND MAINTAINED DURING THE CONSTRUCTION PHASE. SEDIMENT AND EROSION CONTROL MEASURES ARE TO INCORPORATE THOSE AS DETAILED ON THESE PLANS.
3. THE CONTRACTOR IS TO GAIN APPROVAL UNDER SECTION 138 OF THE ROADS ACT 1993 PRIOR TO COMMENCING CONSTRUCTION WITHIN ALL ROAD RESERVES. TRAFFIC CONTROL PLAN IS TO BE SUBMITTED WITH SECTION 138 APPLICATION PRIOR TO CONSTRUCTION WORK COMMENCING.
4. TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH AS 1742.3 ARE TO BE IN PLACE AND MAINTAINED AT ALL TIME.
5. THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING FOR INSPECTIONS BY COUNCIL'S AUTHORISED REPRESENTATIVE AT THE TIMING AND FOLLOWING THE PROCEDURE OUTLINED IN COUNCIL'S LETTER OF APPROVAL.
6. THE CONTRACTOR SHALL ENSURE THAT THE RESIDENTS ADJACENT TO THE CONSTRUCTION ZONE ARE NOT AFFECTED BY DUST OR UNDUE NOISE DURING CONSTRUCTION AND ARE NOT DEPRIVED OF ALL WEATHER ACCESS NOR ARE SUBJECTED TO ADDITIONAL STORM WATER RUNOFF AT ALL TIMES DURING CONSTRUCTION.
7. TO LIMIT THE IMPACT OF THE CONSTRUCTION ON ADJOINING OWNERS, ALL WORKS SHALL BE RESTRICTED TO THE HOURS OF 7am-6pm MONDAY TO FRIDAY AND 8am-3pm SATURDAY. NO WORK SHALL TAKE PLACE ON SUNDAYS OR PUBLIC HOLIDAYS.
8. ALL WORK SHALL BE SET OUT BY THE SURVEYOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, UPON REQUEST, TWO (2) DAYS NOTICE REQUIRED.
9. THE CONTRACTOR SHALL NOT DISTURB ANY SURVEY CONTROL MARKS. SHOULD ANY SURVEY CONTROL MARK BE DISTURBED OR OBLITERATED, THE CONTRACTOR SHALL NOTIFY THE SUPERINTENDENT IMMEDIATELY. THE CONTRACTOR SHALL HAVE THE MARKS REPLACED AT THEIR EXPENSE.
10. PRIOR TO COMMENCEMENT OF EXCAVATION THE CONTRACTOR SHALL DETERMINE THE LOCATION OF ALL SERVICES AND WILL BE RESPONSIBLE FOR ADJUSTMENT OF SERVICES AND REPAIR OF ANY DAMAGE TO COUNCIL'S INFRASTRUCTURE. SUCH REPAIR OR REINSTATEMENT TO BE CARRIED OUT IMMEDIATELY TO THE SATISFACTION OF THE COUNCIL'S DEVELOPMENT MANAGER OR DELEGATE.

SITE FILLING NOTES

1. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S DEVELOPMENT CONSTRUCTION SPECIFICATION AND ENGINEERING DESIGN SPECIFICATION(D6).
2. ALL WORKS ARE TO BE CONDUCTED TO THE REQUIREMENTS OF THE DEVELOPMENT MANAGER OR DELEGATE.
3. EXISTING TOPSOIL IN AREA OF PROPOSED FILLING WORKS IS TO BE STRIPPED AND STOCKPILED IN AN AREA APPROVED BY THE SUPERVISOR. TOPSOIL IS TO BE USED FOR RE-SPREADING OVER THE FILLED AREA AT THE COMPLETION OF WORKS.
4. FILL MATERIAL IS TO BE APPROVED BY THE SUPERVISOR.
5. ALL FILLING WORKS TO BE PLACED AND COMPACTED IN LAYERS NO GREATER THAN 150mm IN THICKNESS.
6. ALL FILL WITHIN PROPOSED BUILDING ENVELOPES IS TO BE PLACED UNDER LEVEL 1 SUPERVISION IN ACCORDANCE WITH AS3798.
7. ALL LOTS SHALL HAVE A GEOTECHNICAL ASSESSMENT FOR LOT CLASSIFICATION IN ACCORDANCE WITH AS2870.
8. THE CONTRACTOR IS TO ENSURE COMPACTION IS CARRIED OUT TO A MINIMUM 95% STANDARD PROCTOR AND PROVIDE THE SUPERINTENDENT WITH SUITABLE GEOTECHNICAL EVIDENCE.
9. THIS SITE IS TO BE RE-GRADED TO DESIGN CONTOURS AND/OR SPOT LEVELS AS SHOWN ON PLAN
10. IN THE AREA OF PROPOSED FILLING AND/OR RE-GRADING EXISTING VEGETATION IS TO BE CLEARED. ALL EXISTING VEGETATION AFFECTED BY CONSTRUCTION WORK AND LARGE TREES AS IDENTIFIED BY THE SUPERVISOR ARE TO BE REMOVED AND DISPOSED OF OFF SITE OR MULCHED ON SITE. NO GREEN WASTE TO BE BURNT ON SITE.
11. CARE IS TO BE TAKEN TO PROTECT STOCKPILES AND DISTURBED AREAS THAT HAVE HAD TOPSOIL TYPE MATERIAL REMOVED ESPECIALLY DURING PERIODS OF HIGH WIND.
12. ALL DISTURBED AREAS ARE TO BE GRASS SEEDED AND FERTILISED AT THE COMPLETION OF THE WORKS WITH PARKLAND MIX.

SEDIMENT AND EROSION CONTROL

1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH LANDCOM'S SOILS AND CONSTRUCTION VOLUME 1, 4TH EDITION, MARCH 2004.
2. SEDIMENT AND EROSION CONTROL MEASURES AS DETAILED ON THIS PLAN ARE TO BE IMPLEMENTED PRIOR TO CONSTRUCTION WORK COMMENCING.
3. THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO MINIMISE THE EFFECTS OF DUST EMISSIONS FROM THE SITE INCLUDING THE SPREADING OF MULCH IN AREAS WHERE CONSTRUCTION HAS BEEN COMPLETED.
4. ALL TOPSOIL FROM THE CONSTRUCTION AREAS IS TO BE STRIPPED AND STOCKPILED.
5. STOCKPILES OF TOPSOIL ARE TO BE GRASS SEEDED OR MULCHED.
6. TOPSOIL STOCKPILES ARE TO BE LOCATED OUTSIDE AREAS OF CONCENTRATED STORMWATER RUNOFF. STOCKPILES ARE TO BE PLACED IN LOTS OUTSIDE THE BUILDING AREA WHERE POSSIBLE OR IN PROPOSED PUBLIC RESERVES. REFER TO TYPICAL TOPSOIL DETAIL.
7. THE MOVEMENT OF MACHINERY OVER THE SITE IS TO BE LIMITED TO THE CONSTRUCTION AREAS, UNLESS AUTHORIZED BY THE SUPERINTENDENT, TO AVOID DISTURBANCE TO EXISTING VEGETATED AREAS. NO-GO AREAS, AS NOTED ON THE PLAN, ARE TO BE MARKED OFF PRIOR TO COMMENCEMENT OF WORKS.
8. AREAS OF THE SITE THAT ARE DISTURBED BY CONSTRUCTION WORKS ARE TO BE TOPSOILED, SEEDED AND FERTILIZED IMMEDIATELY AFTER CONSTRUCTION WORKS IN THE PARTICULAR AREA HAVE FINISHED AND NOT LEFT TILL THE END OF THE OVERALL CONSTRUCTION.
9. CONSTRUCTION AREAS SHALL NOT BE LEFT IN AN OPEN AND DISTURBED STATE FOR MORE THAN FOURTEEN (14) DAYS. AREAS EXPECTED TO BE LEFT OPEN FOR PERIODS LONGER THAN THIS ARE TO BE SEEDED.
10. STORMWATER PITS ARE TO HAVE TEMPORARY SEDIMENT CONTROL DEVICES PLACED AROUND THE TOP DURING CONSTRUCTION. THIS WILL TAKE THE FORM OF STRAWBALES OR MESH AND GRAVEL FILTERS, PLACED TO PREVENT SEDIMENT FROM THE CONSTRUCTION AREAS LEAVING THE SITE. THESE ARE TO REMAIN UNTIL THE ABOVE COVERAGE IS ACHIEVED OR THE ROADS ARE OPENED TO THE PUBLIC, WHICHEVER OCCURS FIRST.
11. ANY EXISTING BARE OR DISTURBED AREAS OF THE SITE NOT AFFECTED BY THE CONSTRUCTION WORKS ARE TO BE TOPSOILED, SEEDED AND FERTILIZED AND MAINTAINED TO PROMOTE GROWTH.
12. TEMPORARY MESH AND GRAVEL SEDIMENT BARRIERS ARE TO BE PLACED AT KERB INLET PITS AFTER THE ROAD WORKS HAVE BEEN COMPLETED UNTIL GRASS COVER ON THE FOOTPATHS HAS BEEN ESTABLISHED.
13. SEDIMENT & EROSION CONTROL STRUCTURES ARE TO BE MAINTAINED ON A DAILY BASIS DURING CONSTRUCTION AND ON A MINIMUM OF WEEKLY BASIS DURING THE SIX MONTH LIABILITY PERIOD (OR AS REQUIRED DEPENDING UPON WEATHER CONDITIONS AND STABILISATION LEVEL). ALL MATERIAL REMOVED FROM THE TRAPS IS TO BE SPREAD AND GRASS SEEDED OR DISPOSED OF OFF SITE IN AN APPROVED MANNER. UPON THE SALE OF EACH INDIVIDUAL LOT TO A THIRD PARTY PURCHASER, THE RESPONSIBILITY OF THE STABILISATION OF THE LOT BECOMES THE RESPONSIBILITY OF THE NEW PROPERTY OWNER.
14. ALL IMPORTED FILL IS ASSUMED TO BE A MATERIAL OTHER THAN DISPERSIVE CLAY. ALL FILL MATERIAL IS TO BE TESTED FOR DISPERSABILITY PRIOR TO PLACEMENT ON THE SITE AND IF FOUND TO BE DISPERSIVE THE SUPERINTENDENT IS TO BE NOTIFIED PRIOR TO PLACEMENT OF ANY FILL FOR ADVICE ON TREATMENT OF DISPERSIVE SOILS.
15. ALL ACCESS TO SITE MUST BE VIA "STABILIZED SITE ACCESS".
16. TEMPORARY STRAWBALE SEDIMENT FENCES TO BE PLACED EVERY 100m DURING BOXING OUT OF PAVEMENT WHEN PAVEMENT WORKS ARE NOT TAKING PLACE OR SITE IS INACTIVE. SECURE STRAWBALES WITH STAKES.

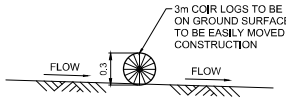


STABILISED SITE ACCESS

SCALE: N.T.S.

STABILISED SITE ACCESS NOTES

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200MM THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30MM AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.



TYPICAL COIR LOG SEDIMENT TRAP

SCALE N.T.S

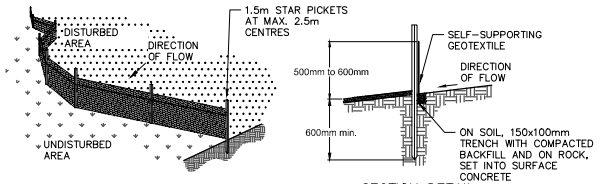
LEGEND:

EXISTING

- EXISTING CONTOURS
- EXISTING CADASTRAL
- EXISTING EASEMENTS
- EXISTING ROAD CENTRELINE
- EXISTING KERB AND GUTTER
- EXISTING BATTERS
- EXISTING FENCE
- EXISTING STORMWATER PIPE
- EXISTING STORMWATER PIT
- EXISTING WATER MAIN
- EXISTING TELECOMMS
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING FIBRE OPTIC
- EXISTING POST AND WIRE FENCE

PROPOSED

- PROPOSED CONTOURS
- PROPOSED ROAD CENTRELINE
- PROPOSED KERB AND GUTTER
- PROPOSED STORMWATER PIPE
- PROPOSED STORMWATER PIT
- PROPOSED STORMWATER HEADWALL
- OVERLAND FLOW ROUTE
- PROPOSED SUB SOIL LINE
- PROPOSED WATER SERVICE
- PROPOSED TELECOMS SERVICE
- PROPOSED ELECT SERVICE
- PROPOSED SEDIMENT FENCE
- PROPOSED STRAW BALE BARRIER
- PROPOSED SEDIMENT TRAPS
- PROPOSED TREE PROTECTION FENCE
- PROPOSED ORANGE PARA-WEB FENCE

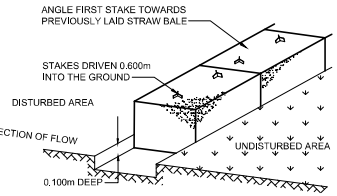


CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND AT 2.5m INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

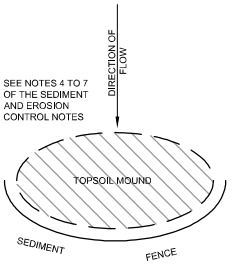
SEDIMENT FENCE SD6-8

SCALE: N.T.S.



STRAW BALE SEDIMENT BARRIER

SCALE: N.T.S.



TYPICAL TOPSOIL STOCKPILE DETAIL

SCALE: N.T.S.

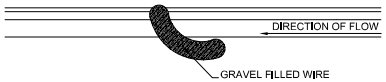
SUGGESTED SEED MIX FOR VEGETATION OF DISTURBED AREAS

SOUTH COAST MIX-PARKLAND (OR EQUIVALENT)

SUMMER(SEPT-MAR):	WINTER(APR-AUG):
60% TALL FESCUE	80% PERENNIAL RYEGRASS
20% PERENNIAL RYEGRASS	10% CHEWINGS FESCUE
16% CREEPING RED FESCUE	5% BENT GRASS
4% UN-HULLED COUCH	5% UN-HULLED COUCH

SEED RATE: 3-5KG/100m2 OR BROADACRE 25KG/ACRE
PLUS MULTIGROW FERTILISER @ 200KG/HA

FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH
FILL THE SLEEVE WITH 25MM TO 50MM GRAVEL.
FORM AN ELLIPTICAL CROSS SECTION ABOUT 150MM HIGH X 400MM WIDE.
FORM A SEAL WITH THE KERBING OR EXISTING SURFACE AND PREVENT SEDIMENT BYPASSING THE FILTER.



MESH AND GRAVEL FILTER TYPE D - KERB FILTER

SCALE N.T.S

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SHEET 5 OF 6
REVISION P0

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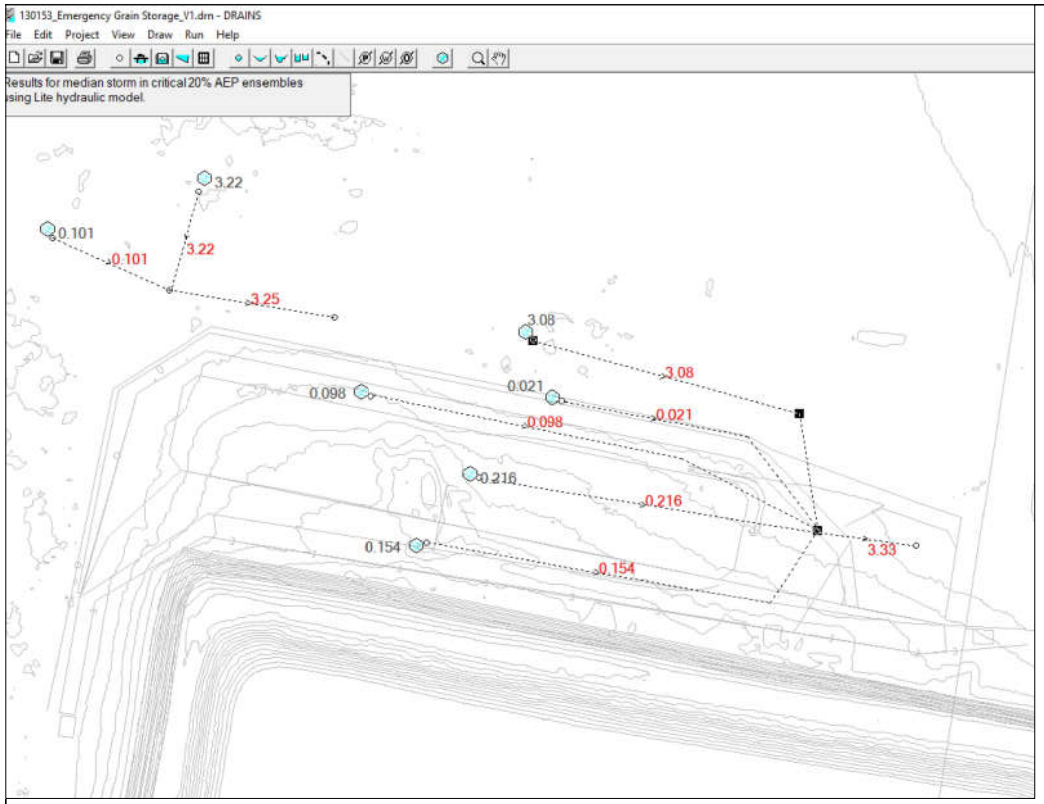
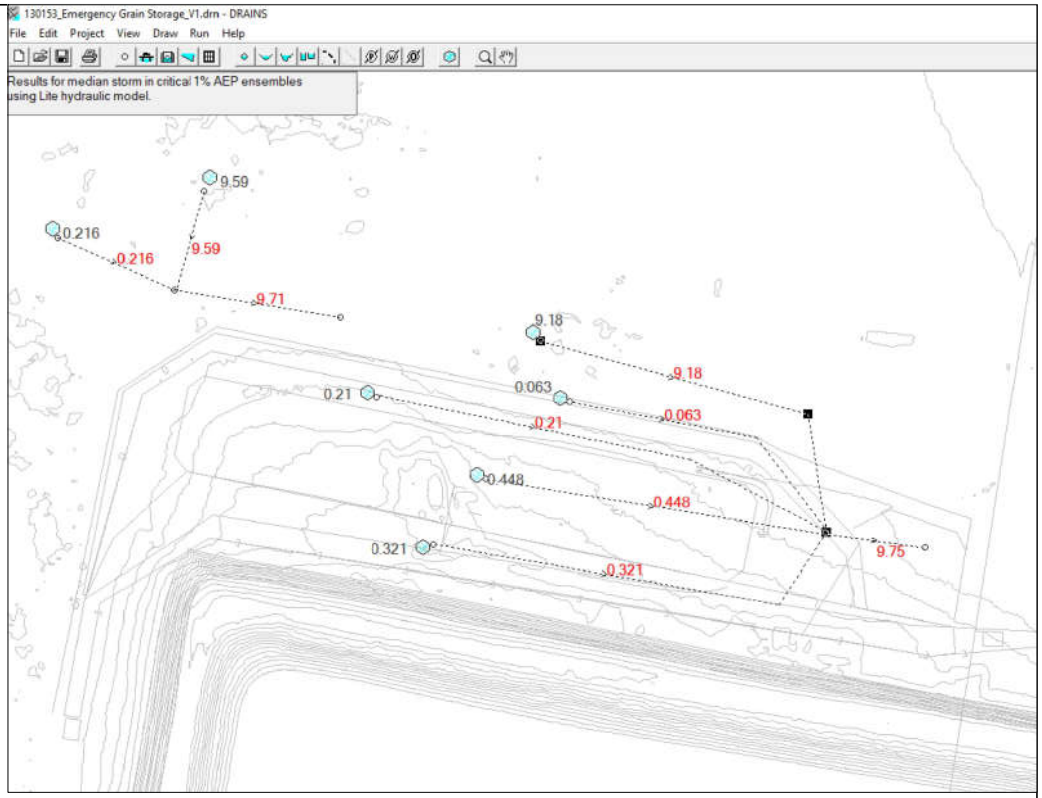


DRAINS MODEL 20% AEP

NTS



DRAINS MODEL 1% AEP

NTS

PRE-DEVELOPMENT (Lot 2 in DP833181)			
COMPONENT	AREA (ha)	IMPERVIOUS FRACTION (%)	IMPERVIOUS AREA (ha)
Lot 2 DP	33.6652	0	0
Access Road	0.3848	80	0.30784
Service Road	0	0	0
Grain Bunker	0	0	0
Batter	0	0	0
Total	**34.05**		**0.30784**
		% Impervious	**0.90**

POST-DEVELOPMENT (Lot 2 in DP833181)			
COMPONENT	AREA (ha)	IMPERVIOUS FRACTION (%)	IMPERVIOUS AREA (ha)
Lot 2 DP	32.472	0	0
Access Road	0.517	80	0.41344
Service Road	0.379	80	0.30328
Grain Bunker	0.682	0	0
Batter	0	0	0
Total	**34.05**		**0.71672**
		% Impervious	**2.10**

OVERALL INCREASE IN IMPERVIOUS AREA	
MANILDRA LANDHOLDING (Ha)	876
IMPERVIOUS INCREMENT (Ha)	0.409
IMPERVIOUS INCREMENT (%)	**0.05**

PROFESSIONAL STANDARDS SCHEME
Liability limited by a scheme approved under Professional Standards Legislation

RATIO: AS SHOWN (AT A1 ORIGINAL)

DATUM: AUSTRALIAN HEIGHT DATUM
ORIGIN: PM32610 RL: 3.25 AHD
DATE OF PLAN: NOVEMBER 22

		REV	DESCRIPTION	BY	DATE
SURVEY	-				
DESIGN	WRM				
DRAWN	WRM				
CHECK'D	MAK				

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DRAINS MODEL
INTEGRATED WATER CYCLE MANAGEMENT STRATEGY
TEMPORARY EMERGENCY GRAIN STORAGE BUNKER
LOT 2 IN DP833181 AT HANNIGANS LANE, BOMADERRY
FOR: MANILDRA GROUP

DRAWING STATUS: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DRAWING NUMBER: 130153-106
SHEET: 6 OF 6
REVISION: P0

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