Concept Soil and Water Management Plan
Hunter Indoor Sports Centre

for **Basketball Association of Newcastle**

June 2025

GROUNDSWELL
ENGINEERS

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A	Approval	Jordan Hoey	Andrew Brown	13/06/2025

Report Disclaimer

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Professional opinions and conclusions expressed herein are made in accordance with generally accepted engineering practice and the available data at the time of writing.

1. Introduction

Groundswell Engineers has been commissioned by Basketball Association of Newcastle Limited (BANL) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD- 65595459) for the proposed Hunter Indoor Sport Centre with courts, indoor stadium, amenities and associated civil and landscaping works, at 2 Monash Road and 24 Wallarah Road, New Lambton.

The purpose of this engineering report is to address civil engineering and stormwater items associated with the proposed development of the site. This report has been prepared with consideration to, and generally in accordance with, the City of Newcastle (CoN) Development Control Plan (DCP) 2024, in particular 'Section C4 – Stormwater' and Councils 'Stormwater and Water Efficiently for Development Technical Manual'.

Contained herein is a description of the subject site and development, stormwater conveyance strategy, summary of the water quality assessment, and the proposed soil management methodology. This document should be read in conjunction with the engineering drawings 250106-DA Series. This report intends to discuss items relating to the site at a level appropriate for a Development Application submission. It does not attempt to provide detailed design solutions to all issues; rather it will investigate the feasibility of solutions based on information gathered to date from various sources and intends to provide outcomes which will be developed further at the Construction Certificate and Construction phases of the project.

The contents of this report should also be read in conjunction with the Flood Impact Assessment (FIA) prepared by Torrent as part of the DA submission.

Table 1 below identifies the relevant SEAR's items and response locations. Please note these items have been dressed in coordination with other consultant reports referenced in the table below.

Table 1: [title]

Project SSD- 65595459	Section of report
15. Stormwater drainage and water quality The EIS must: Provide an Integrated Water Management Plan for the development that: a) is prepared in consultation with the local councils and any other relevant drainage or water authority. b) outlines the water-related servicing infrastructure required by the development (informed by the anticipated annual and ultimate increase in servicing demand) and evaluates opportunities to	a) Please refer to the below stormwater management section b) Please refer to the stormwater management section below c) Please refer to the stormwater management section below, as well as the associated concept engineering plans prepared by Groundswell to support the submission d) Please refer to the stormwater management section below, as well as the Flood Impact Assessment prepared by Torrent Consulting to support the submission.

Project SSD- 65595459	Section of report
reduce water demand (such as recycled water provision). c) details the proposed drainage design (stormwater and wastewater) for the site including any on-site treatment, reuse and detention facilities and their proposed locations, water quality management measures and nominated discharge points. d) demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse downstream impacts. e) where drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority. f) Address matters raised by Council at **Attachment B** .	e) Please refer to the stormwater management section below, as well as the associated concept engineering plans prepared by Groundswell to support the submission f) Please refer the stormwater management section below.
16. Ground and water conditions The EIS must: a) Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion, salinity and acid sulfate soils. Provide a Surface and Groundwater Impact Assessment that assesses potential impacts on: b) Surface water resources (quality and quantity) including related infrastructure, hydrology, dependent ecosystems,	In addition to the report prepared by Groundswell, please also refer to the geotechnical report prepared by Kleinfelder (dated 23 November 2023) for additional information regarding ground and water conditions. a) Please refer to the Soil Management section in the report below. b) Please refer to stormwater management section below, as well as the associated concept engineering plans prepared by Groundswell to support the submission.

Project SSD- 65595459	Section of report
drainage lines, downstream assets and watercourses. c) Groundwater resources in accordance with the Groundwater Guidelines.	c) Please refer to the stormwater management section below.

2. Site and Project Description

The site is located at 2 Monash Road and 24 Wallarah Road, New Lambton, within the Newcastle local government area (LGA). The site comprises multiple parcels of land and is legally described as:

- Lot 2380 DP755247
- Lot 2379 DP755247
- Lot 2378 DP755247
- Lot 2377 DP755247
- Lot 1 DP1304081

The project area also includes the land on which the existing amenities block is located.

The site is identified in the Figure 1 below.

Figure 1 – Site Location

Based on detail site survey, the existing site terrain is relatively flat, grading from the west to the east at a reasonably consistent grade of around 0.3%. The site has a maximum height of around RL9.65m AHD near the western boundary, and a low point of around RL 7.25m AHD near the south eastern corner.

The site is bordered by existing commercial, residential and education facilities to the north, Turton Road to the east, a Hunter Water concrete stormwater channel to the south and an existing sports field to the west.

There is an existing Hunter Water stormwater culvert that runs north to south into the existing stormwater channel. This culvert is proposed to be relocated around the development footprint. The grade of the culvert is generally maintained, and this allows for the culvert to still discharge to the existing stormwater channel.

As part of the development the following items are proposed:

- Access from Turton Road for vehicles (refer to Traffic Impact Assessment by SECA).
- Onsite stormwater management for stormwater quality, including;
    - Rainwater re-use tanks for re-using stormwater within the proposed development.
    - Raingardens for removal of pollutants from stormwater runoff.

The proposed site layout is provided in **Attachment A**.

As the development site has an area of approx. 3.78 ha, the development is categorised as large scale (>5000m^2) in accordance with the definitions in the CoN DCP. The proposed development scope categorises it as a Type 2 development in accordance with Table 1 in Part 7.06 of the CoN DCP, therefore the Development Application submission requires the following documentation:

- Water Cycle Management Plan.
- Soil and Water Management Plan.
- Broad Scale Development Assessment Checklist for WSUD.

This document combined with the Civil drawings intends to satisfy these documentation requirements.

3. Stormwater Management

The following stormwater management strategy has been completed in accordance with the CoN DCP 2024.

Flooding

As the development site is inundated during major storm events, the proposed levels and stormwater design has been developed with the below design criteria;

- Floor level for the building to be at or above the Flood Planning Level (FPL)
- Floodway and flood storage to be generally maintained to mitigate any offsite impacts from the development. The carpark levels have been lowered to accommodate this.
- Pit and pipe system to be provided for the development to discharge stormwater to the existing stormwater network (Hunter Water channel to the south and stormwater network within Turton Road)

A 3D surface for the finished design levels was completed and provided to Torrent for use in their developed case scenario. Please refer to the Flood Impact Assessment prepared by Torrent as part of the DA submission for additional information.

Stormwater Conveyance Strategy

Each stage of the development will include an inground stormwater network of pits and pipes to manage minor flows within the development. This system will discharge to the existing infrastructure that surrounds the site.

For larger events, site levels are proposed to generally fall away from the building towards the points of stormwater discharge. It is understood from the flood modelling that the site is inundated in events larger than the 10% AEP event.

Stormwater Quality Management Strategy

Site stormwater quality management has been modelled in MUSIC to assess whether the proposed treatment train for the development meets Council's stormwater pollution reduction targets. Modelling was completed in accordance with the "NSW MUSIC Modelling Guidelines" (BMT WBM, 2015). The model includes all area within the proposed site boundary. Areas for each source node were delineated based on the architectural plan view; with roof and pavement surface types considered.

3.1. Treatment Train

Stormwater runoff from each roof will be conveyed via gutters and downpipes to a rainwater reuse tank. Each stage of the building will include rainwater tanks as indicated in the drawings. Rainwater reuse will be reticulated internally and externally and has been sized in accordance with Section 4.1.3 of CoN's Stormwater and Water Efficiency Technical Manual. Rainfall data was sourced from the Bureau of Meteorology Nobbys Signal Station, with a mean annual rainfall of 1,118mm/year used for the 4-day draw down calculations. This rainfall, combined with the roof area of each building, was used to size the tank volume. The re-use demand quantities identified in Table 4.1 of

Council's Technical Manual as well as from first principles based on expected site usage by patrons. MUSIC modelling was sued to ensure each rainwater tank had a reuse demand efficiency met of greater than 80%.

Overflow from the rainwater tanks will be conveyed to the nearest stormwater pit. All stormwater inlet pits are to be fit with a proprietary pit insert to capture gross pollutants.

The secondary treatment proposed onsite is for raingradens around the hardstand for each stage. These raingardens have been integrated with landscaping to ensure a functional finish.

Figure 2 shows the proposed stormwater treatment train for the development as modelled in MUSIC. It is overlain on the development plan view.

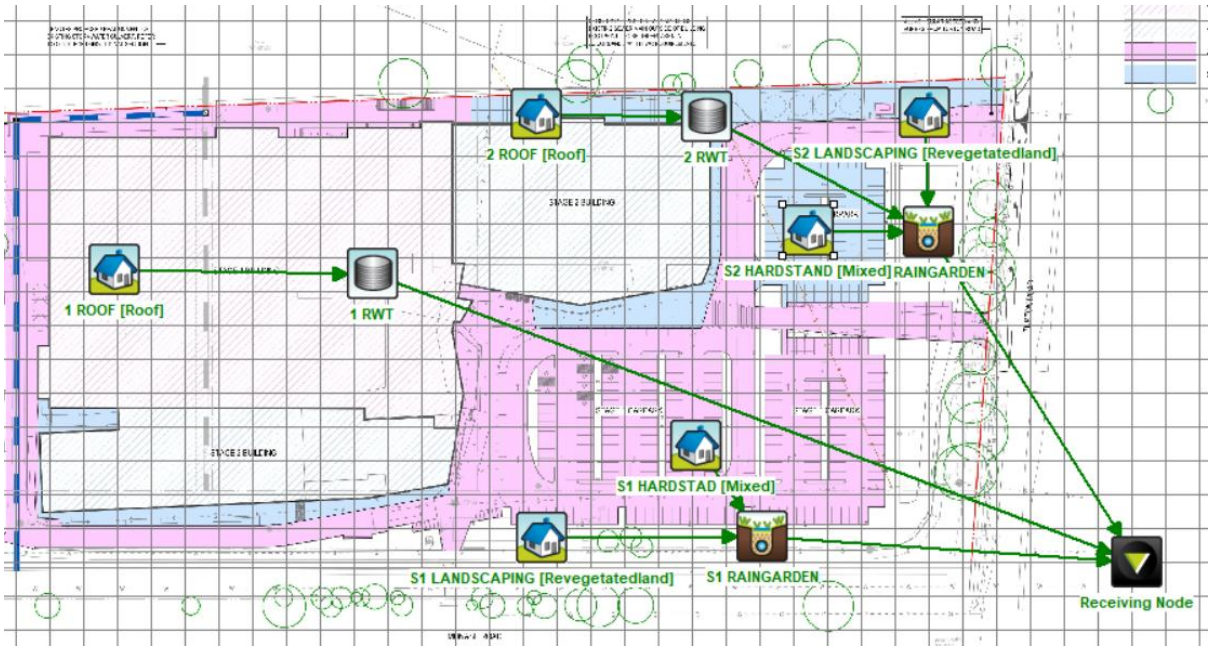

Figure 2 – Music Treatment Train

Table 2 summarises the results from the MUSIC model and compares the modelled reduction in pollutants to the council reduction targets from the NCC DCP Part 7.06, Table 4.

Table 2 : MUSIC modelling results

Pollutant	Sources (kg/yr)	Residual load (kg/yr)	Reduction (%)	Council Reduction Target (%)
Total Suspended Solids (TSS)	3640	499	86.3	85
Total Phosphorus (TP)	8.93	3.11	65.1	65
Total Nitrogen (TN)	80.3	39.9	50.3	45
Gross Pollutants (GP)	832	0	100	90

Table 2 shows the treatment train modelled in MUSIC is effective in meeting Council's reduction targets for reducing pollutants discharged from the development in stormwater runoff. A report

generated from MUSIC-link for Newcastle City Council has been included in Attachment B of this report. A copy of the MUSIC model is available on request.

WSUD Checklist

The broad scale assessment checklist for WSUD (Table 1.1 of the NCC Stormwater and Water Efficiency for Development Technical Manual) has been completed for the development and can be found in Attachment C.

Stormwater Quantity

Council's flood mapping shows the site is inundated during the 10% AEP storm events. It is also noted the site is immediately adjacent to the concrete stormwater channel that conveys runoff to the harbour. Considering the site constraints and the location of the development within the overall catchment, it was considered providing onsite detention may not have any benefit for the upstream or downstream stormwater network due to a detained runoff hydrograph having a peak that would coincide with the peak runoff from the upstream catchment. This theory was tested as part of the Torrent flood modelling, which demonstrated providing onsite detention in the events specified by Council during preliminary discussion did not have a benefit to the surrounding stormwater network and behaviour.

As such, no onsite stormwater detention is proposed as part of the development. Please refer to the Flood Impact Assessment by Torrent for additional information.

Table 3 : Average annual soil loss calculation (RUSLE)

Component (unit)	Value
Total catchment area (ha)	3.6
Soil texture group	D/F assumed (Disturbed Terrain Landscape)
Design rainfall depth (days)	5
Design rainfall depth (percentile)	85
Five-day, 80-percentile rainfall event (mm)	38.9 (Newcastle)
Rainfall intensity (mm/hr); 2-year, 6-hour storm	10.9
Rainfall erosivity (R-factor)	2590
Soil erodibility (K-factor)	0.016
Slope length (m)	250
Slope gradient (%)	0.5
Length/ gradient LS-factor	0.26
Erosion control practice P-factor	1.3
Ground cover C-factor	1
Soil loss (RUSLE) (t/ha/yr)	14
Soil loss class	1
Soil loss (m^3/year)	39.6 (<150)

In the event the proposed control devices are not functioning adequately, they shall be cleaned out and/ or repaired as required until they are able to complete their designed purpose. The contractor is responsible for ensuring the erosion and sediment controls are maintained and functioning, with a detailed record to be kept on site.

With regards to development impacts on groundwater, the design intent has endeavoured to incorporate as many opportunities as possible for groundwater recharge through raingardens and landscaping areas. There are no noted downstream ecosystems or watercourses that are dependent upon groundwater recharge from the subject site.

4. Conclusion

We trust the above meets your requirements; however, should you have any queries, please feel free to contact the undersigned on (02) 4070 9191.

Jordan Hoey
Civil Engineer - B Eng (Civil) B Surv
CPEng NER

Attachment A

Site Plans

HUNTER INDOOR SPORTS CENTRE

2 MONASH ROAD, BROADMEDOW, NSW, 2292

CIVIL ENGINEERING PACKAGE

IMAGE SOURCE : NEARMAPS

LOCALITY PLAN

DRAWING LIST

DRAWING	TITLE
250106-DA-000-01	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
250106-DA-030-01	GENERAL ARRANGEMENT PLAN
250106-DA-110-01	CONCEPT EROSION AND SEDIMENT CONTROL PLAN
250106-DA-130-01	CONCEPT EROSION AND SEDIMENT CONTROL DETAILS
250106-DA-210-01	BULK EARTHWORKS PLAN
250106-DA-310-01	CONCEPT CIVIL WORKS PLAN STAGE 1
250106-DA-320-01	CONCEPT CIVIL WORKS PLAN STAGE 2
250106-DA-360-01	CONCEPT ACCESS PLAN
250106-DA-980-01	SWEPT PATH PLAN - 14.5m BUS

REV	DESCRIPTION	ISSD	APP	DATE
A	ISSUED FOR INFORMATION	JH	JH	30.05.25
1	ISSUED FOR APPROVAL	JH	JH	03.06.25
2	ISSUED FOR APPROVAL	JH	JH	04.06.25
3	ISSUED FOR APPROVAL	JH	JH	10.06.25

PROJECT MANAGER: J.HOEY
DESIGNED: T.SQUIRES
DRAFTED: R.HUTCHISON
VERIFIED: TBD

CLIENT: **BASKETBALL ASSOCIATION OF NEWCASTLE**

ARCHITECT: EJE

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SCALE: 0 25 50 75 100m — SCALE 1:2500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

DRAWING TITLE: COVER SHEET, DRAWING LIST AND LOCALITY PLAN

PROJECT - SET - DRAWING - SHEET: 250106-DA-000-01

REVISION: 3

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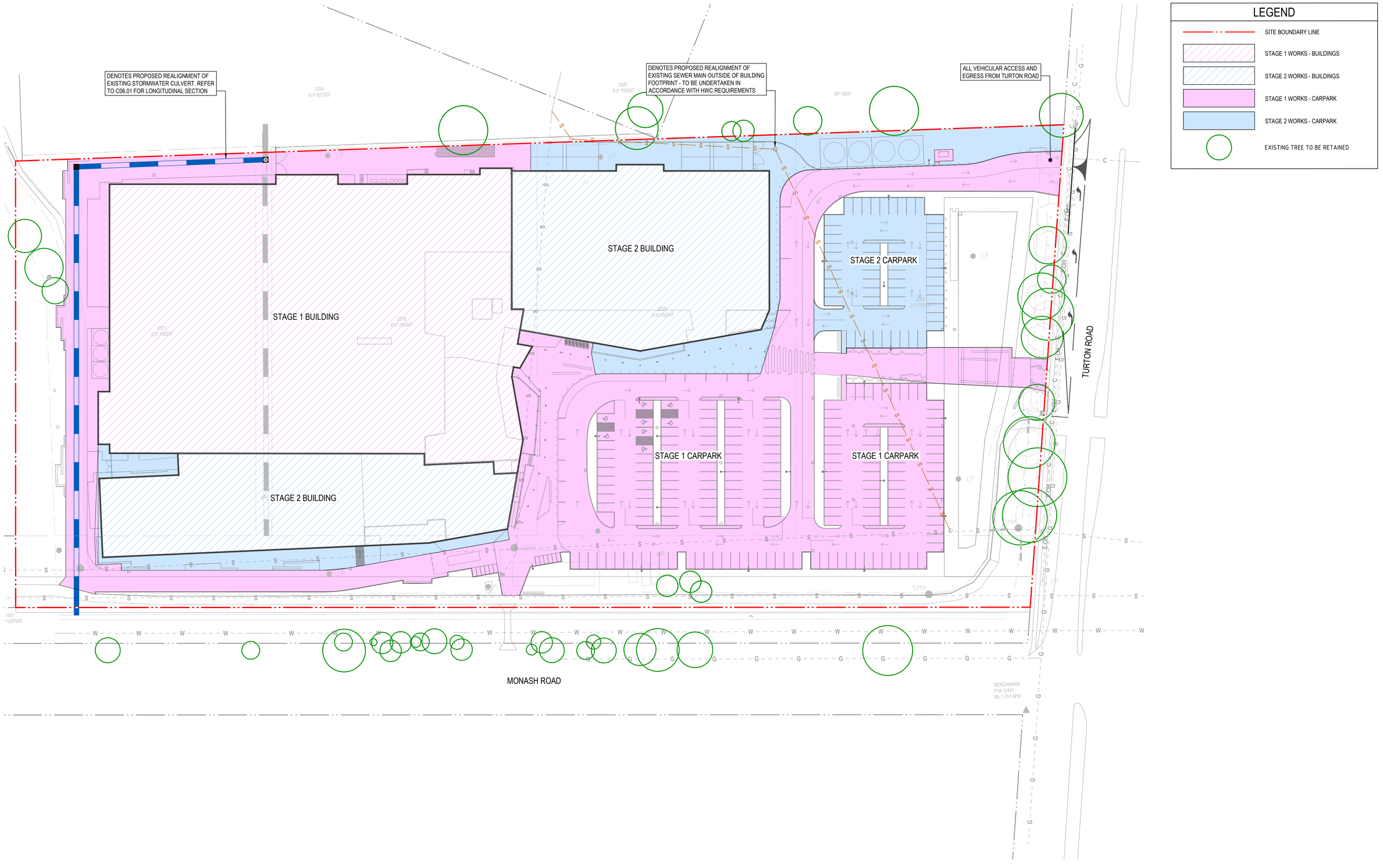

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SCALE: 0 5 10 15 20m
SCALE 1:500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

DRAWING TITLE: GENERAL ARRANGEMENT PLAN

STATUS: FOR INFORMATION ONLY
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REVISION: 3

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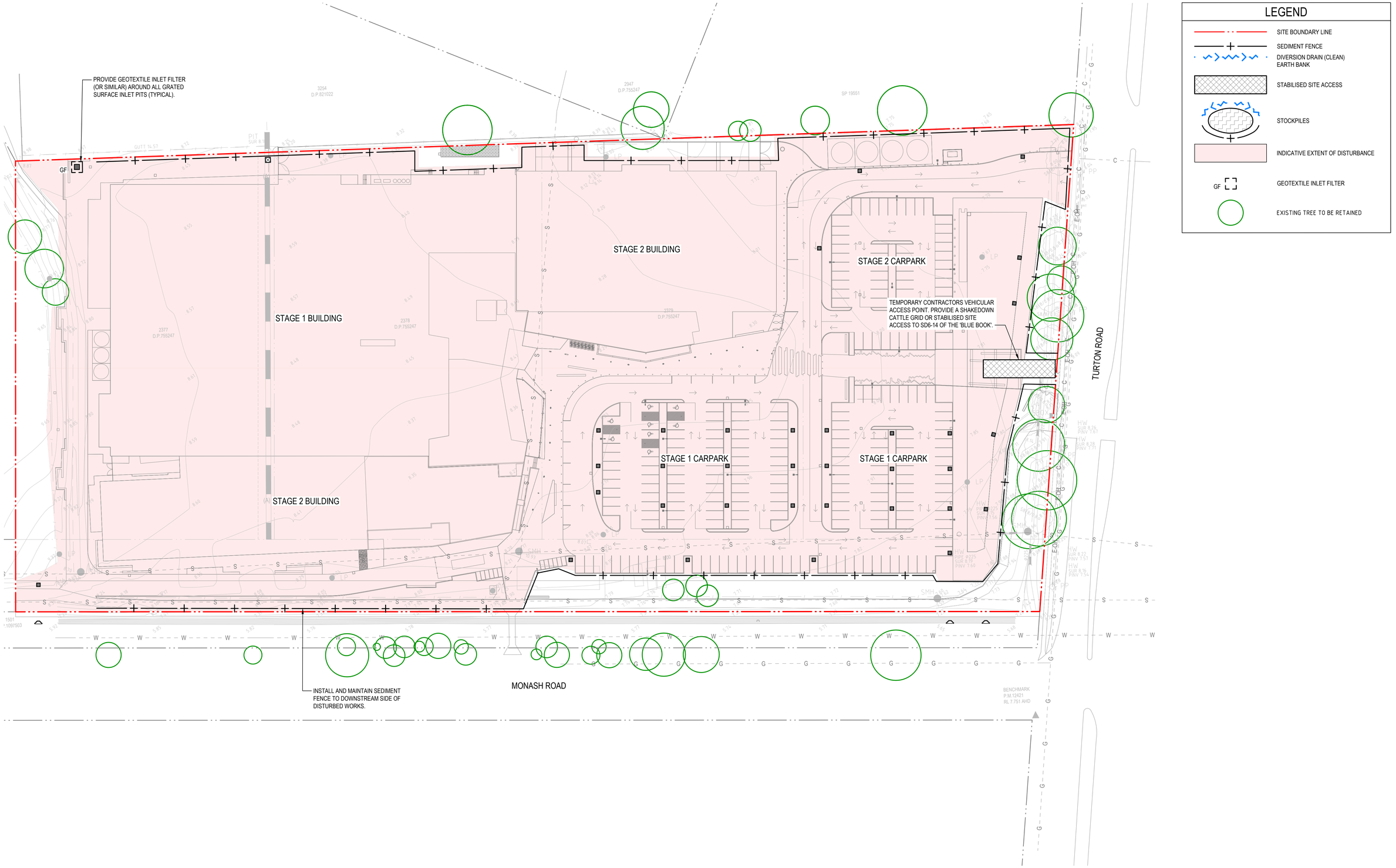

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SCALE: 0 5 10 15 20m
SCALE 1:500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

DRAWING TITLE: CONCEPT EROSION AND SEDIMENT CONTROL PLAN

STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

PROJECT - SET - DRAWING - SHEET: 250106-DA-110-01

REVISION: 3

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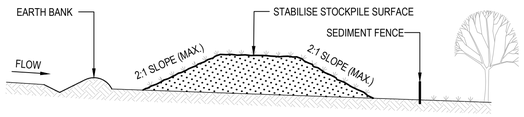
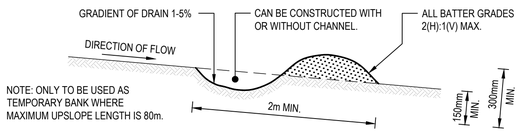


CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

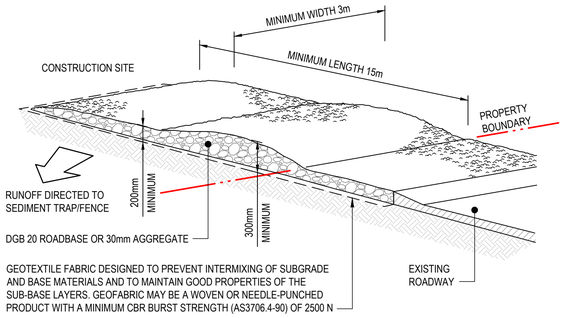


CONSTRUCTION NOTES

1. BUILD WITH GRADIENTS BETWEEN 1 AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

DIVERSION DRAIN (DIRTY) -	BORROW AREA TO BE ON DISTURBED SIDE OF DRAIN
DIVERSION DRAIN (CLEAN) -	PROVIDE GEOFABRIC LINING TO SECTION OF DRAIN

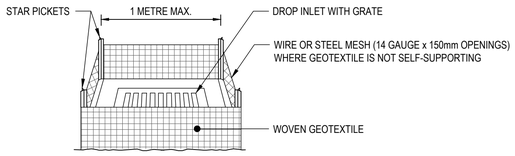
EARTH BANK - LOW FLOW (SD 5-5)

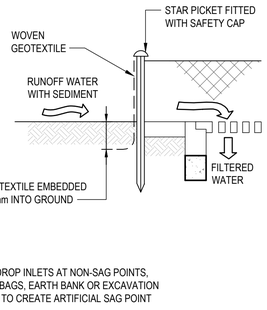


CONSTRUCTION NOTES

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.

STABILISED SITE ACCESS (SD 6-14)

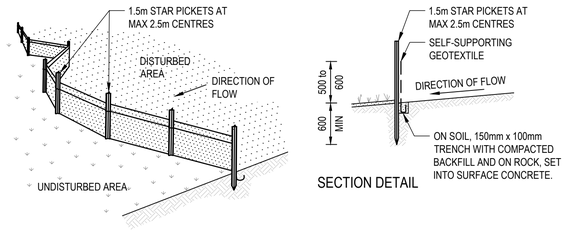




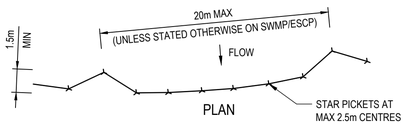
CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER (SD 6-12)



SECTION DETAIL



PLAN

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 1.5 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE 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 (SD 6-8)

REV	DESCRIPTION	ISSD	APP	DATE
A	ISSUED FOR INFORMATION	JH	JH	30.05.25
1	ISSUED FOR APPROVAL	JH	JH	03.06.25
2	ISSUED FOR APPROVAL	JH	JH	04.06.25
3	ISSUED FOR APPROVAL	JH	JH	10.06.25

PROJECT MANAGER: J.HOEY
DESIGNED: T.SQUIRES
DRAFTED: R.HUTCHISON
VERIFIED: TBD

CLIENT: **BASKETBALL ASSOCIATION OF NEWCASTLE**

ARCHITECT: EJE

SCALE: 0 5 10 15 20m — SCALE 1:500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

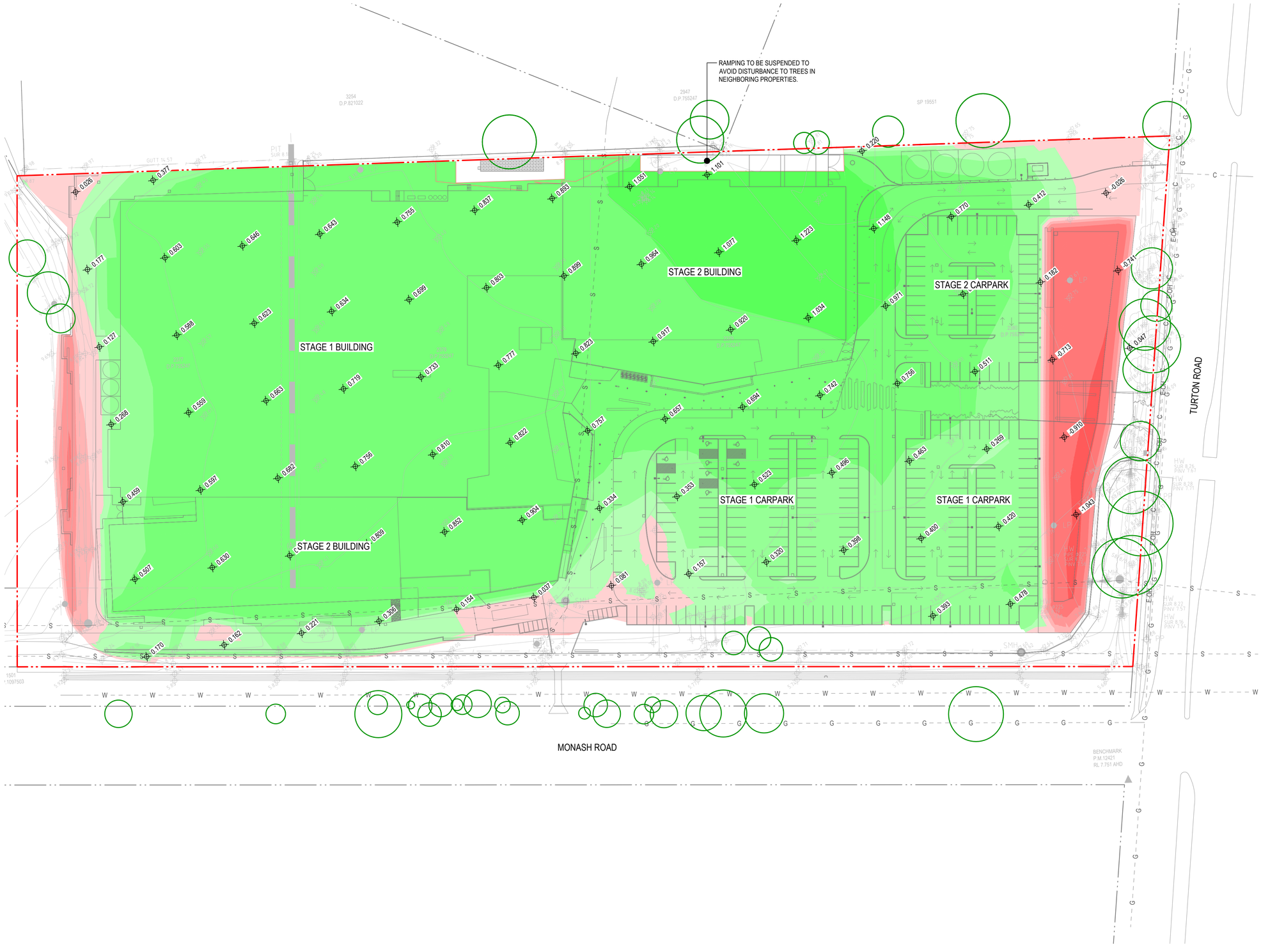
STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

DRAWING TITLE: CONCEPT EROSION AND SEDIMENT CONTROL DETAILS

PROJECT - SET - DRAWING - SHEET: 250106-DA-130-01

REVISION: 3

Date : 10.06.2025 2:06 PM Plotted By : CIARAN WALKER HEALION Found : C:\Users\CiaranWalkerHealion\Groundswell Engineering\Intranet - Documents\Projects\250106 Hunter Indoor Sports Centre\G Drawings\Civil\2. CAD\DA\250106-DA-130 ESC DETAILS.dwg



LEGEND

- SITE BOUNDARY LINE
- BE XX.XX — BULK EARTHWORKS SPOT HEIGHT
- EXISTING TREE TO BE RETAINED

DEPTH OF CUT

- 3.0m	TO	- 20.0m
- 2.0m	TO	- 3.0m
- 1.5m	TO	- 2.0m
- 1.0m	TO	- 1.5m
- 0.5m	TO	- 1.0m
- 0.25m	TO	- 0.5m
- 0.1m	TO	- 0.25m
0.1m	TO	-0.1m

DEPTH OF FILL

0.1m	TO	0.25m
0.25m	TO	0.5m
0.5m	TO	1.0m
1.0m	TO	1.5m
1.5m	TO	2.0m
2.0m	TO	3.0m
3.0m	TO	20.0m

NOTES

1. BULK EARTHWORKS LEVELS AND VOLUMES ARE BASED ON A COMPARISON OF THE DESIGN BULK EARTHWORKS SURFACE AND THE EXISTING SURFACE LEVEL AS SURVEYED. NO ALLOWANCE FOR PAVEMENT OF BUILDING PAD.
2. NO ALLOWANCE HAS BEEN MADE FOR SELECT LAYERS OR UNSUITABLE MATERIAL THAT IS LIKELY TO BE PRESENT.
3. NO ALLOWANCE HAS BEEN MADE FOR TEMPORARY SEDIMENT DAMS
4. NO ALLOWANCE HAS BEEN MADE FOR SAND LEVELING LAYER BENEATH BUILDING PADS
5. NO ALLOWANCE HAS BEEN MADE FOR SERVICE TRENCHES, DRAINAGE TRENCHES, DRAINAGE INFRASTRUCTURE (PITS, CULVERTS, ETC) IN THE LEVELS OR VOLUMES PRESENTED ON THIS PLAN.
6. NO ALLOWANCE FOR ANY TEMPORARY BATTERS DURING WORKS.
7. NO BULKING FACTORS HAVE BEEN CONSIDERED/ALLOWED FOR.
8. APPROXIMATE BULK EARTHWORKS VOLUMES BASED ON THE NOTES ABOVE ARE AS FOLLOWS;
   - BULK CUT = 4, 215m^3
   - BULK FILL = 11, 642m^3
   - BULK CUT/FILL BALANCE = 7, 426m^3 (FILL)
9. ALL BULK EARTHWORKS TO BE UNDERTAKEN IN ACCORDANCE WITH SITE SPECIFIC GEOTECHNICAL REPORT AND BULK EARTHWORKS NOTES.
10. ABOVE ALLOWANCE INCLUDES PRELIMINARY TRENCH VOLUMES FOR SEWER AND CULVERT RELOCATIONS.

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3	ISSUED FOR APPROVAL	JH	JH	10.06.25

PROJECT MANAGER: J.HOEY
DESIGNED: T.SQUIRES
DRAFTED: R.HUTCHISON
VERIFIED: TBD

CLIENT: **BASKETBALL ASSOCIATION OF NEWCASTLE**

ARCHITECT: EJE

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SCALE: 0 5 10 15 20m — SCALE 1:500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

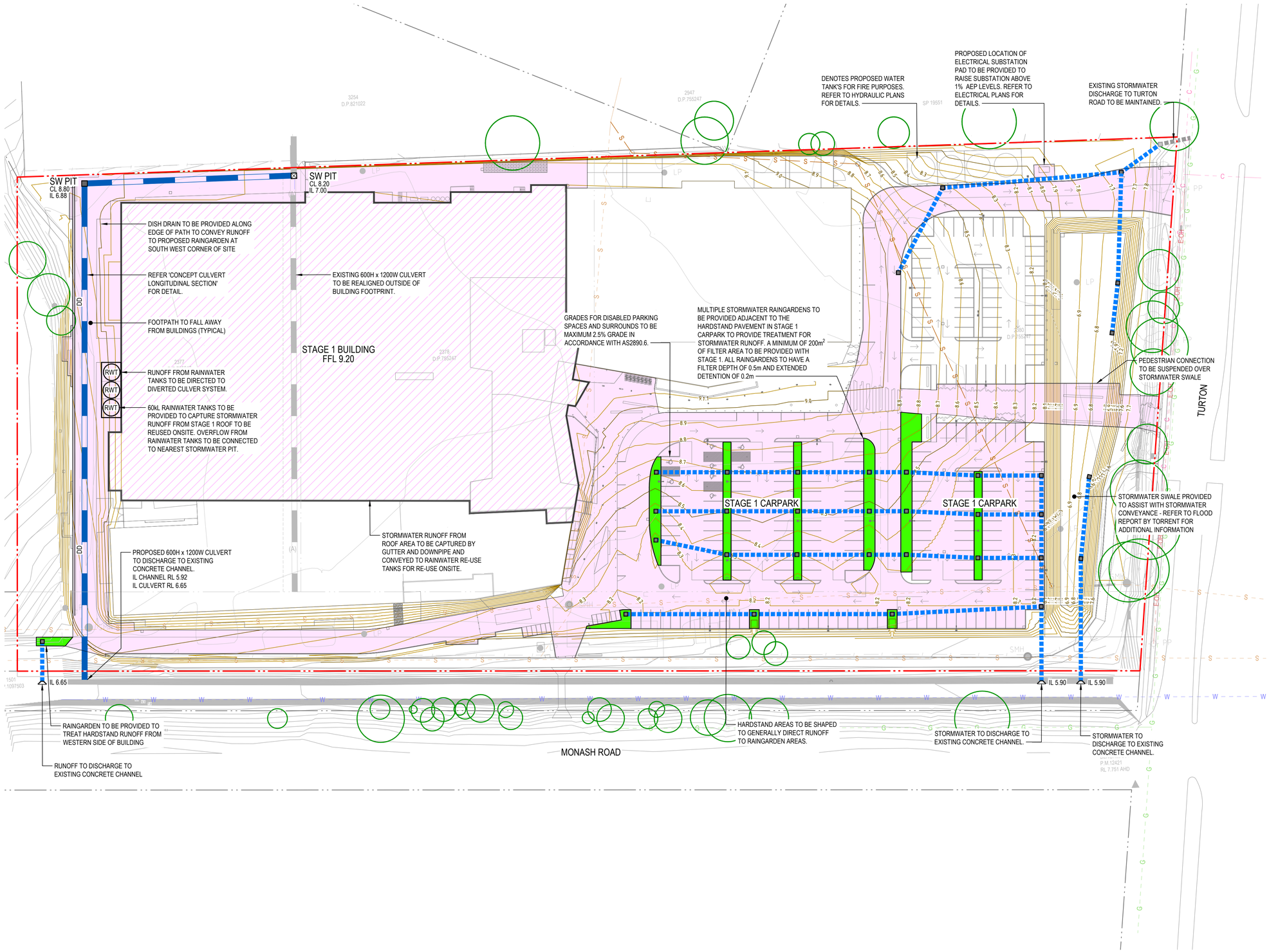
PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

DRAWING TITLE: BULK EARTHWORKS PLAN

PROJECT - SET - DRAWING - SHEET: 250106-DA-210-01

REVISION: 3



LEGEND

- SITE BOUNDARY LINE
- STAGE 1 WORKS - BUILDINGS
- STAGE 1 WORKS - CARPARK
- STORMWATER PIPE
- EXISTING STORMWATER PIPE
- EXISTING 600 x 1200 CULVERT
- PROPOSED 600 x 1200 CULVERT
- SW PIT CL xx.xx IL xx.xx — STORMWATER PIT AND TAG COVER LEVEL / INVERT LEVEL
- RWT — PROPOSED RAINWATER TANK TO FUTURE DETAILS
- PROPOSED SEWER
- EXISTING SERVICES BASED ON SURVEY DATA SUPPLIED
- PROPOSED RAINGARDEN TO FUTURE DETAILS
- DESIGN CONTOURS (0.1m INTERVALS)
- EXISTING CONTOURS (0.1m INTERVALS)
- EXISTING TREE TO BE RETAINED

REV	DESCRIPTION	ISSD	APP	DATE
A	ISSUED FOR INFORMATION	JH	JH	30.05.25
1	ISSUED FOR APPROVAL	JH	JH	03.06.25
2	ISSUED FOR APPROVAL	JH	JH	04.06.25
3	ISSUED FOR APPROVAL	JH	JH	10.06.25
4	ISSUED FOR APPROVAL	JH	JH	13.06.25

PROJECT MANAGER: J.HOEY
DESIGNED: T.SQUIRES
DRAFTED: R.HUTCHISON
VERIFIED: TBD

CLIENT: **BASKETBALL ASSOCIATION OF NEWCASTLE**

ARCHITECT: EJE

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SCALE: 0 5 10 15 20m — SCALE 1:500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

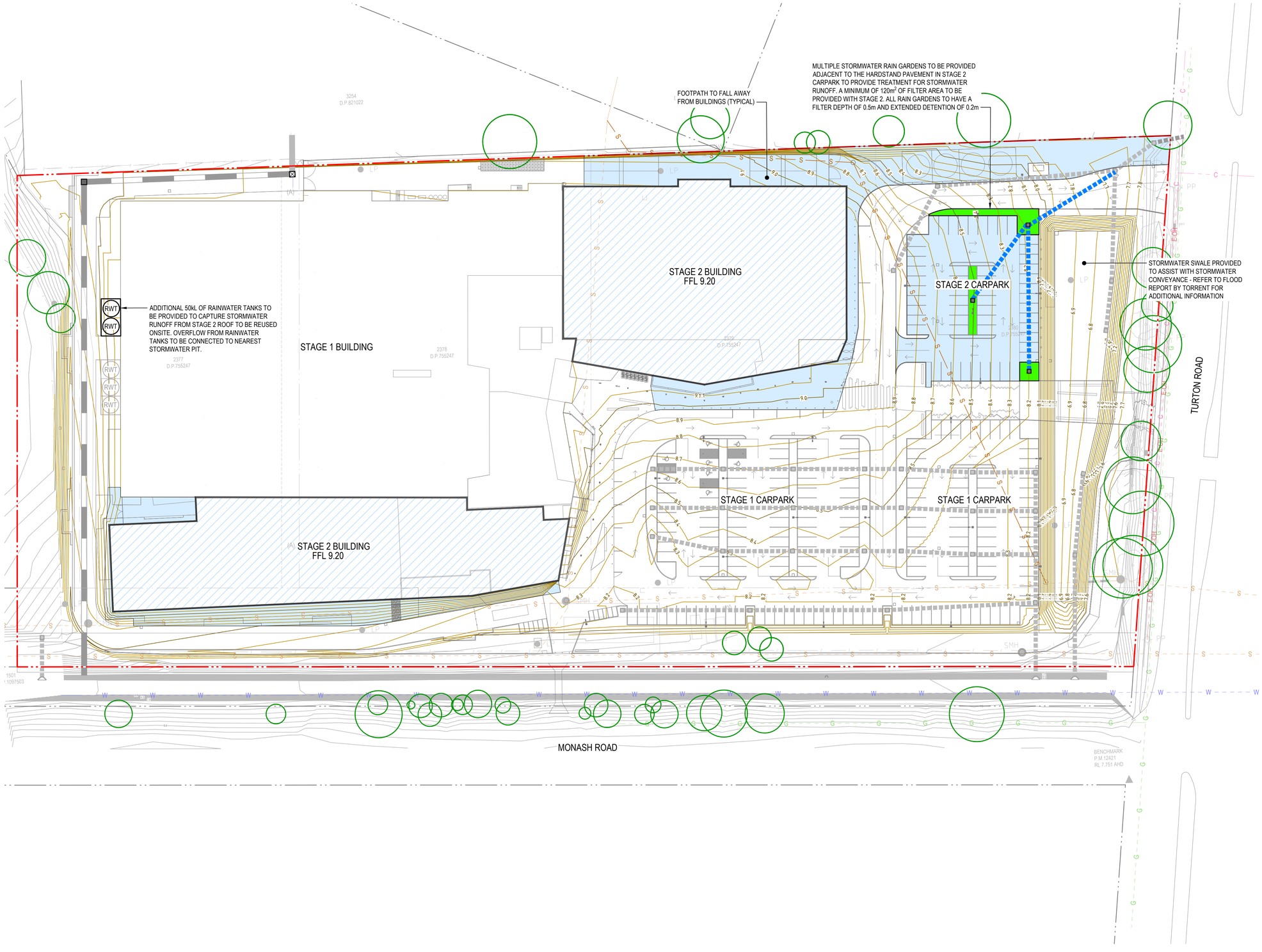
DRAWING TITLE: CONCEPT CIVIL WORKS PLAN STAGE 1

STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

PROJECT - SET - DRAWING - SHEET: 250106-DA-310-01

REVISION: 4

Date : 13.06.2025 1:56 PM Plotted By : JORDAN HOEY Found : C:\Users\JordanHoey\Groundswell Engineering\Intranet - Documents\Projects\250106 Hunter Indoor Sports Centre\G Drawings\Civil\2. CAD\DA\250106-DA-310 CIVIL WORKS STAGE 1.dwg



LEGEND

- SITE BOUNDARY LINE
- STAGE 2 WORKS - BUILDINGS
- STAGE 2 WORKS - CARPARK
- STORMWATER PIPE
- EXISTING STORMWATER PIPE
- EXISTING 600 x 1200 CULVERT
- PROPOSED 600 x 1200 CULVERT
- SW PIT CL xx.xx IL xx.xx — STORMWATER PIT AND TAG COVER LEVEL / INVERT LEVEL
- RWT — PROPOSED RAINWATER TANK TO FUTURE DETAILS
- PROPOSED SEWER
- EXISTING SERVICES BASED ON SURVEY DATA SUPPLIED
- PROPOSED RAINGARDEN TO FUTURE DETAILS
- DESIGN CONTOURS (0.1m INTERVALS)
- EXISTING CONTOURS (0.1m INTERVALS)
- EXISTING TREE TO BE RETAINED

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3	ISSUED FOR APPROVAL	JH	JH	10.06.25
4	ISSUED FOR APPROVAL	JH	JH	13.06.25

PROJECT MANAGER: J.HOEY
DESIGNED: T.SQUIRES
DRAFTED: R.HUTCHISON
VERIFIED: TBD

CLIENT: **BASKETBALL ASSOCIATION OF NEWCASTLE**

ARCHITECT: EJE

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SCALE: 0 5 10 15 20m — SCALE 1:500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

DRAWING TITLE: CONCEPT CIVIL WORKS PLAN STAGE 2

STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

PROJECT - SET - DRAWING - SHEET: 250106-DA-320-01

REVISION: 4

LEGEND

- SITE BOUNDARY LINE
- FOOTPATH TO BE PROVIDED IN ACCORDANCE WITH COUNCIL SD A1401
- DRIVEWAY TO BE PROVIDED IN ACCORDANCE WITH COUNCIL SD A1300
- VC — VEHICLE CROSSING TO BE PROVIDED IN ACCORDANCE WITH COUNCIL SD A1300
- G — EXISTING GAS
- W — EXISTING WATER
- S — EXISTING SEWER
- E-OH — EXISTING ELECTRICITY (OVERHEAD)
- C — EXISTING TELECOMMUNICATIONS
- EXISTING TREE TO BE RETAINED

NOTES

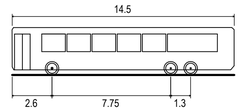
1. LIGHTING DESIGN ASSESSMENT TI BE UNDERTAKEN AS PART OF DETAILED DESIGN PROCESS
2. DETAILED PAVEMENT, SIGNAGE & LINEMARKING PLANS TO BE PROVIDED AS PART OF DETAILED DESIGN PROCESS

VEHICLE MOVEMENTS

FORWARD MOVEMENT

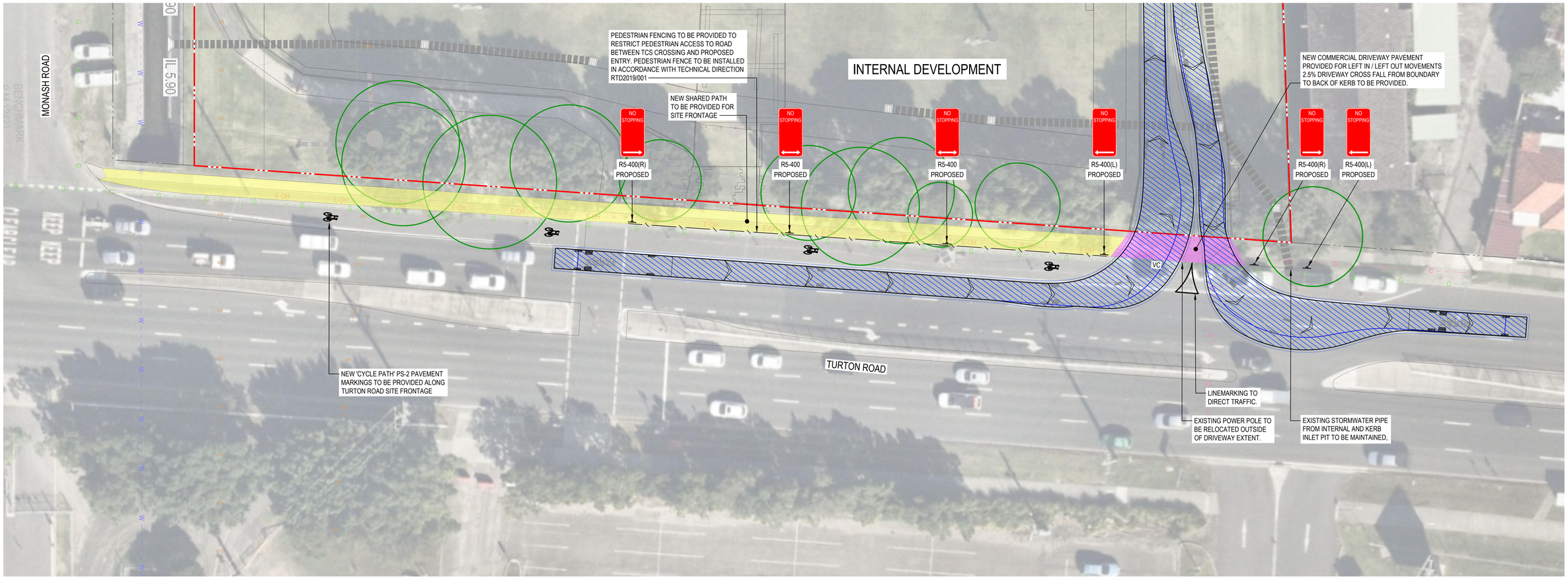
- VEHICLE BODY
- VEHICLE WHEELS
- ADDITIONAL CLEARANCE OFFSET

VEHICLE PROFILE



LONG RIGID BUS (14.5m)

OVERALL LENGTH	14.500m
OVERALL WIDTH	2.500m
OVERALL BODY HEIGHT	3.102m
TRACK WIDTH	2.500m
LOCK-TO-LOCK TIME	6.00s



REV	DESCRIPTION	ISSD	APP	DATE
A	ISSUED FOR INFORMATION	JH	JH	30.05.25
1	ISSUED FOR APPROVAL	JH	JH	03.06.25
2	ISSUED FOR APPROVAL	JH	JH	04.06.25
3	ISSUED FOR APPROVAL	JH	JH	10.06.25

PROJECT MANAGER: J.HOEY
DESIGNED: T.SQUIRES
DRAFTED: R.HUTCHISON
VERIFIED: TBD

CLIENT: **BASKETBALL ASSOCIATION OF NEWCASTLE**

ARCHITECT: EJE

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SCALE: 0 2.5 5 7.5 10m
SCALE 1:250

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

DRAWING TITLE: CONCEPT ACCESS PLAN

STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

PROJECT - SET - DRAWING - SHEET: 250106-DA-360-01

REVISION: 3

Date : 10.06.2025 2:07 PM Plotted By : CIARAN WALKER HEALION Found : C:\Users\CiaranWalkerHealion\Groundswell Engineering\Intranet - Documents\Projects\250106 Hunter Indoor Sports Centre\G Drawings\Civil\2. CAD\DA\250106-DA-360 EXT.dwg

VEHICLE MOVEMENTS

FORWARD MOVEMENT

- VEHICLE BODY
- VEHICLE WHEELS
- ADDITIONAL CLEARANCE OFFSET (0.3m FROM BODY)

REVERSE MOVEMENT

- VEHICLE BODY
- VEHICLE WHEELS
- ADDITIONAL CLEARANCE OFFSET (0.3m FROM BODY)

DISCLAIMER

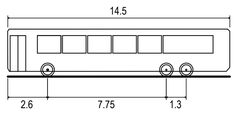
THE VEHICLE SWEPT PATHS / TEMPLATES PROVIDED HAVE BEEN PRODUCED USING SIMULATION SOFTWARE AND ARE TO BE USED AS A GUIDE ONLY. THESE SIMULATIONS MAY NOT REFLECT ACTUAL DRIVER BEHAVIOUR AND / OR EXPERIENCE UNDER ACTUAL DRIVING CONDITIONS.

IT IS GROUNDSWELL'S INTENTION TO UTILISE STANDARD VEHICLES NOMINATED IN AS2890 / AUSTROADS FOR ALL DESIGN / CHECKING VEHICLE SIMULATIONS AT AN IDEAL MOVEMENT SPEED OF 10 km/h WITH A MINIMUM VEHICLE BODY OFFSET OF 0.3m.

IF THE USE OF SPECIFIC VEHICLES (NOT DETAILED UNDER AS2890 / AUSTROADS) IS REQUESTED, IT IS TO BE NOTED THAT THEIR DIMENSIONS AND MANOEUVRING CHARACTERISTICS HAVE BEEN INTERPRETED INTO THE SIMULATION SOFTWARE FROM INFORMATION PROVIDED BY SERVICE PROVIDERS AND VEHICLE MANUFACTURES. GROUNDSWELL ACCEPTS NO RESPONSIBILITY OF THE ACCURACY THESE VEHICLE MOVEMENTS, AND ANY MANOEUVRES PROVIDED SHOULD ONLY BE USED AS A GUIDE WITH ACTUAL DESIGN BEING BASED AROUND ENGINEERING ADVICE AND AUSTRALIAN STANDARDS.

AT ALL TIMES, STANDARD VEHICLE SWEPT PATHS / TEMPLATES ARE TO TAKE DESIGN PRECEDENCE OVER ALL SPECIFIC VEHICLES. UNDER NO CIRCUMSTANCE DOES THE SIMULATION PROVIDED RELIEVE ANY PARTY OF THEIR ROLE AND RESPONSIBILITY FOR PROVIDING DESIGN SOLUTIONS IN ACCORDANCE WITH GOOD DESIGN PRACTICES.

VEHICLE PROFILE



LONG RIGID BUS (14.5m)

OVERALL LENGTH	14.500m
OVERALL WIDTH	2.500m
OVERALL BODY HEIGHT	3.102m
TRACK WIDTH	2.500m
LOCK-TO-LOCK TIME	6.00s
KERB TO KERB TURNING RADIUS	15.000m
TRAVELLING SPEED	10 km/h

REV	DESCRIPTION	ISSD	APP	DATE
A	ISSUED FOR INFORMATION	JH	JH	30.05.25
1	ISSUED FOR APPROVAL	JH	JH	03.06.25
2	ISSUED FOR APPROVAL	JH	JH	04.06.25
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PROJECT MANAGER: J.HOEY
DESIGNED: T.SQUIRES
DRAFTED: R.HUTCHISON
VERIFIED: TBD

CLIENT: **BASKETBALL ASSOCIATION OF NEWCASTLE**

ARCHITECT: EJE

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SCALE: 0 5 10 15 20m — SCALE 1:500

NORTH

SHEET SIZE A1
SETOUT TBD

GROUNDSWELL ENGINEERS
54 HUDSON STREET, HAMILTON NSW 2303

PROJECT TITLE: HUNTER INDOOR SPORTS CENTRE
2 MONASH ROAD, BROADMEDOW, NSW, 2292

DRAWING TITLE: SWEPT PATH PLAN - 14.5m BUS

STATUS: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

PROJECT - SET - DRAWING - SHEET: 250106-DA-980-01

REVISION: 3

Date : 10.06.2025 2:05 PM Plotted By : CIARAN WALKER HEALION Found : C:\Users\CiaranWalkerHealion\Groundswell Engineering\Intranet - Documents\Projects\250106 Hunter Indoor Sports Centre\G Drawings\Civil\2. CAD\DA\250106-DA-980 SWEPT PATHS.dwg

GROUNDSWELL ENGINEERS

Attachment B

MUSIC-link Report

THE CITY OF NEWCASTLE

MUSIC-*link* Report

Project Details		Company Details	
Project:	250106 HISC	**Company:**	Groundswell
Report Export Date:	13/06/2025	**Contact:**	Jordan Hoey
Catchment Name:	250106 HISC DM01A	**Address:**	
Catchment Area:	3.362ha	**Phone:**	0401915000
Impervious Area*:	90.66%	**Email:**	JHoey@gseng.com.au
Rainfall Station:	61078 WILLIAMTOWN		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1995 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	1125mm		
Evapotranspiration:	1735mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.34		
Study Area:	Newcastle		
Scenario:	Newcastle		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	11.5%	Rain Water Tank Node	2	Urban Source Node	6
TSS	86.3%	Bio Retention Node	2		
TP	65.1%				
TN	50.3%				
GP	100%				

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	S1 RAINGARDEN	Hi-flow bypass rate (cum/sec)	None	None	1
Bio	S1 RAINGARDEN	PET Scaling Factor	2.1	2.1	2.1
Bio	S2 RAINGARDEN	Hi-flow bypass rate (cum/sec)	None	None	1
Bio	S2 RAINGARDEN	PET Scaling Factor	2.1	2.1	2.1
Rain	1 RWT	% Reuse Demand Met	70	None	81.53
Rain	2 RWT	% Reuse Demand Met	70	None	81.67
Receiving	Receiving Node	% Load Reduction	None	None	11.5
Receiving	Receiving Node	GP % Load Reduction	90	None	100
Receiving	Receiving Node	TN % Load Reduction	45	None	50.3
Receiving	Receiving Node	TP % Load Reduction	65	None	65.1
Receiving	Receiving Node	TSS % Load Reduction	85	None	86.3
Urban	1 ROOF	Area Impervious (ha)	None	None	0.893
Urban	1 ROOF	Area Pervious (ha)	None	None	0
Urban	1 ROOF	Total Area (ha)	None	None	0.893
Urban	2 ROOF	Area Impervious (ha)	None	None	0.635
Urban	2 ROOF	Area Pervious (ha)	None	None	0
Urban	2 ROOF	Total Area (ha)	None	None	0.635
Urban	S1 HARDSTAD	Area Impervious (ha)	None	None	1.223
Urban	S1 HARDSTAD	Area Pervious (ha)	None	None	0
Urban	S1 HARDSTAD	Total Area (ha)	None	None	1.223
Urban	S1 LANDSCAPING	Area Impervious (ha)	None	None	0
Urban	S1 LANDSCAPING	Area Pervious (ha)	None	None	0.157
Urban	S1 LANDSCAPING	Total Area (ha)	None	None	0.157
Urban	S2 HARDSTAND	Area Impervious (ha)	None	None	0.297
Urban	S2 HARDSTAND	Area Pervious (ha)	None	None	0
Urban	S2 HARDSTAND	Total Area (ha)	None	None	0.297
Urban	S2 LANDSCAPING	Area Impervious (ha)	None	None	0
Urban	S2 LANDSCAPING	Area Pervious (ha)	None	None	0.157
Urban	S2 LANDSCAPING	Total Area (ha)	None	None	0.157

Only certain parameters are reported when they pass validation

Attachment C

Broad Scale Assessment Checklist for Water Sensitive Urban Design

Broad Scale Development Self-Assessment Checklist: Water Sensitive Urban Design

City of Newcastle

This is a self-assessment checklist against the design criteria for water sensitive design in Newcastle Development Control Plan 2012 – Section 7.06 Stormwater and Section 7.07 Water Efficiency. A completed checklist is a mandatory submission requirement for developments of a scale greater in intensity than dual occupancies. However a completed checklist may be requested for other developments in particular circumstances.

Site/Project Name:	Hunter Indoor Sport Centre
Applicant:	Northrop Consulting Engineers

ITEM		Y	N	NA
1	**Integration of the whole water cycle**			
	Stormwater Management and WSUD principles have been integrated into the proposed development.	☑	☐	☐
	Opportunities for on-site water re-use have been identified and utilised.	☑	☐	☐
2	**Management and minimisation of hydrologic impacts**			
	Hydrologic Objectives have been identified and addressed (impervious areas shown, design events indicated, conveyance requirements identified, peak flows shown, appropriately sized on-site retention etc.).	☑	☐	☐
	High flows have been catered for (bypass structures, overland flow paths, overflow disposal to legal point of discharge shown etc.).	☑	☐	☐
	Impacts upon receiving environment have been determined and minimised (erosion protection, dissipation of concentrated flows).	☑	☐	☐
3	**Management and minimisation of ecological impacts**			
	Water Quality Management Objectives have been identified and addressed (MUSIC modelling results submitted, site discharge controls in accordance with DCP)	☑	☐	☐
	A treatment train approach has been developed where practicable (larger developments).	☑	☐	☐
	Appropriate use of source controls to minimise the generation of excessive runoff/pollution at or near its source.	☑	☐	☐
4	**Maintenance and/or enhancement of visual and social amenity**			
	WSUD has been integrated into landscape form.	☑	☐	☐
	Multiple use assets and/or corridors are proposed (verge side swales, bio-retention ponds, constructed wetlands etc.).	☑	☐	☐
	Public health and safety issues considered and addressed (batter slopes, water depths/velocities, stagnant water etc.).	☑	☐	☐
5	**Minimisation of whole of life asset costs**			
	Maintenance requirements are considered (maintenance plans provided, maintenance access point for vehicles identified).	☐	☐	☑
	Asset life cycle cost determined.	☐	☐	☑
	Asset ownership and responsibility defined and agreed.	☐	☐	☑
	Cost effectiveness of strategy evaluated and maximised.	☐	☐	☑
6	**Provision of alternative sources of water/mains water use reduced**			
	Rainwater harvesting consistent with expected reuse opportunity & DCP (number of people using site, type of development etc.).	☑	☐	☐
	Water tank reticulated to new toilets, laundry and taps where appropriate (water reuse fit for purpose).	☑	☐	☐
	Water reused in industrial/commercial developments where practicable. (e.g. vehicle washing, landscaping, irrigation).	☑	☐	☐