31-33 Shepherd Street, Liverpool

Stormwater Management Plan & Civil Works Package

Prepared For: Lateral Estate

Date: June 2023.

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Project Ref: 0050

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1 Introduction

Enscape studio have been commissioned by Lateral Estate to prepare this Stormwater Management Report (SMR) and civil works package in support of the Development Application for the proposed development at 231-33 Shepherd Street, Liverpool. The sites real address is Lot 6, DP 247485 and Lot 2 DP 1266735.

This SMR outlines the conceptual DA level stormwater design and civil infrastructure for the proposed development on the site.

This SMR illustrates that the proposed development complies with the Liverpool City Council's DCP, Australian Rainfall and Runoff, Australian Standards and best engineering practise.

The purpose of this SMR is to evaluate the quantity and quality of stormwater associated with the proposed development plan so as to demonstrate to Council that an appropriate stormwater management strategy has been adopted.

The SMR specifically addresses the following items for both the construction and operational phases of the development:

- Stormwater runoff volumes and detention (Stormwater Quantity);
- Stormwater quality treatment measures (Stormwater Quality),
- Flood Impact Assessment,
- Erosion and Sedimentation Control.

The following will be achieved with the correct application of this SMR:

- Appropriate standards to be maintained on all aspects of stormwater within the site,
- Pollution control to be maintained,
- Establishment of a unified, clear and concise stormwater management strategy.

This report also includes civil plans for the layout and details of the proposed public road associated with the development.

2 Existing Site Characteristics

2.1 Property Detail

Address:	31-33 Shepherd Street, Liverpool
Real Property Description:	Lot 6, DP 247485 and Lot 2 DP 1266735
Total Site Area:	7,872m^2 (0.7872Ha)

The proposed development can be seen on the concept design drawings in Appendix A of this report.

The proposed development is situated within Liverpool City Council's LGA and will consist of two residential towers, buildings A and B. Building A comprises 142 residential apartments and building B comprises 199 residential apartments and 66 co-living (studio) rooms.

The site is bounded by:

- The Main Southern Railway Corridor to the west,
- The Georges River to the east,
- Mill Park to the south and,
- Residential development to the north

Refer to locality plan in figure 1.

Figure 1: Site Location Plan (Source: Nearmaps 2022)

2.2 Topography

The overall development site consists of two existing sites, the western site sits approximately 2m higher than the eastern site.

The western site generally falls to the north towards Shepherd Street, falling from RL15.50m at the southern boundary to RL13.30m at the Shepherd Street boundary.

The eastern site is generally flat with slight falls to the east towards the Georges River. The site falls from RL12.50m along the western boundary to RL12.20m along the eastern boundary.

2.3 Stormwater Catchments

Based on preliminary assessment of LIDAR data the rail corridor to the west of the site is likely to discharge onto the site in the event of a storm event creating rainfall runoff in excess of the rail corridors drainage network, however LIDAR data suggests that the rail corridor levels crest directly adjacent to the development site meaning that it is likely that runoff flows will flow north and south along the rail corridor towards lower sections of the corridor rather than through the development site.

It is likely that any runoff from the rail corridor will be limited to the local runoff from the corridor batters located directly adjacent to the sites western boundary. The contour extract below identifies the runoff directions.

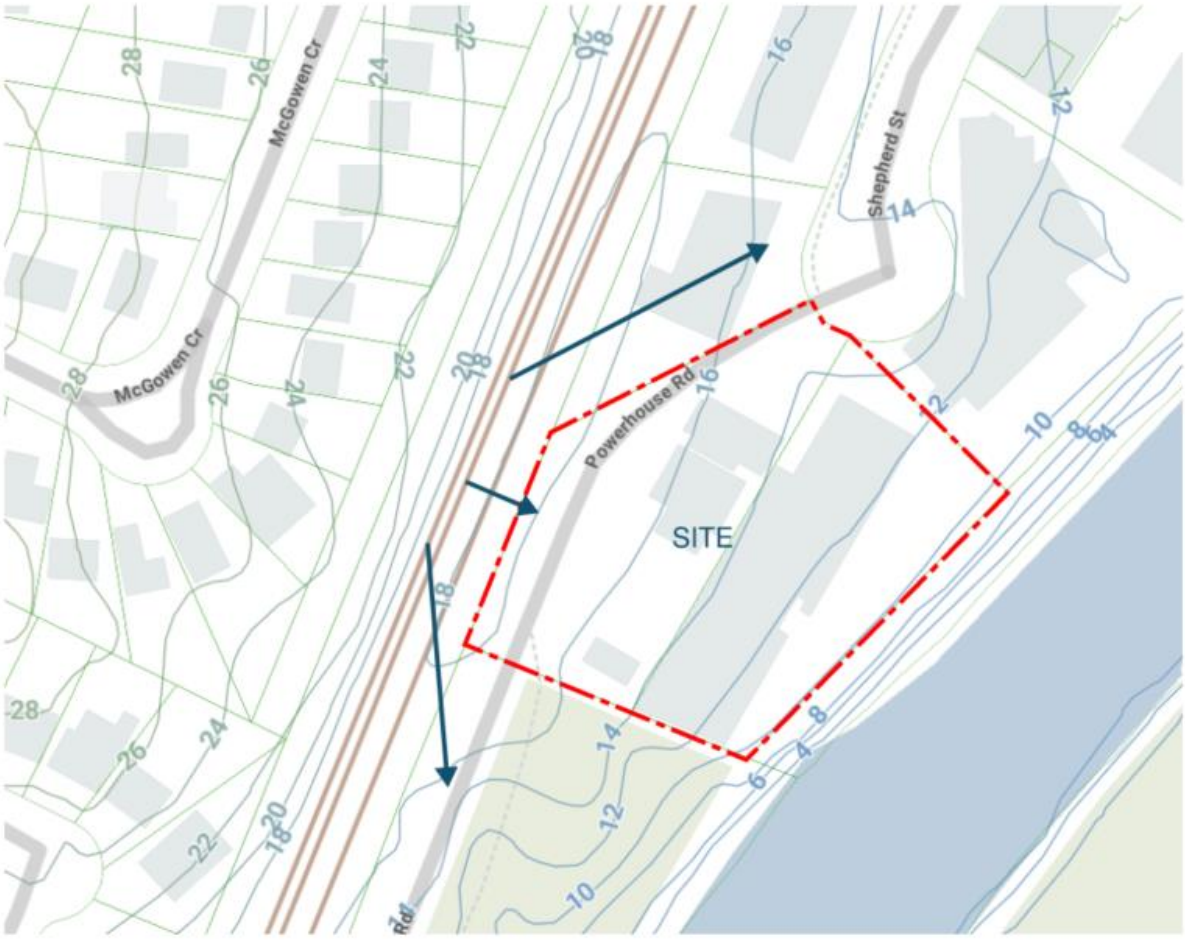


Figure 2: Upstream Catchment Plan (Source: Mecone Mosaic)

2.4 Existing Stormwater Discharge

Currently the western site drains through an inground drainage network that connects into the existing in ground drainage system in Shepherd Street.

The eastern site also has an inground drainage network, it appears that this network discharges directly into the Georges River as the levels are too low to drain into the Shepherd Street drainage network. Survey however has not identified the discharge point at this time as it is likely to be outside the boundary of the site.

The recently completed development along Shepherd Street all discharge directly into the Georges River.

3 Local Authority Requirements

The stormwater management requirements of the subject site is governed by the Liverpool City Council Development Control Plan (DCP). A summary of the key requirements for the development of the Stormwater management system for this development are summarised below.

3.1 Stormwater Conveyance Requirements

Council's DCP states that the following design storm Average Recurrence Intervals ARI's should be allowed for when designing the Stormwater runoff conveyance systems for the development.

Table 1: Stormwater Drainage Serviceability

Design Parameter	Design Storm ARI (Years)	Conveyance Method
Minor Drainage System	20	In Ground (Piped)
Major Drainage System	100	Overland

3.2 On Site Detention Requirements

It is proposed that stormwater run-off from the site will be discharged directly into the Georges River to the east of the site. Since the site is discharging directly to Georges River and the outlet pipe will be below the 100 year flood level, Council has advised that no on site detention is required.

3.3 Stormwater Quality Treatment

Council's Development Control Plan section 6 identifies the requirements for WSUD required for Council Approval. It states that (Section 6.4):

This sub-section applies to all development except for development applications for single dwelling houses and dual occupancy housing. Council requires that the post development water quality shall be reduced to the following targets when compared to pre development water quality:

- 45% reduction in the mean annual load of total nitrogen
- 65% reduction in the mean annual load of total phosphorous
- 85% reduction in the mean annual load of total suspended solids
- 90% reduction in gross pollutants

The modelling outcomes for the project are discussed in Section 7 of this report.

4 Flood Impact Assessment

When considering a new development, it is necessary to assess the impact of existing flooding on the proposed development and the potential flooding impact of the proposed development upon existing developments located upstream and downstream of the site.

4.1 Existing Flooding

4.1.1 Flood Related Development Controls

Council have confirmed in a Section 10.7 certificate for the development site that the site is not considered flood affected. The section 10.7 certificate states that the western site is not subject to flood related development controls but the eastern site is.

An extract from council's online mapping tools (shown below) indicates that the eastern fringe on the site is impacted by the PMF. This area of the site will not be developed other than for landscaping purposes meaning that the habitable areas of the development will not be impacted by flood water.

Figure 3: Council Flood Mapping

In reference to Liverpool City Council's Local Environmental Plan (LEP), clause 5.21 – Flood Planning the development responds to the clause objectives as follows:

a) To minimize the flood risk to life and property associated with the use of the land – The habitable areas on the development site have been located outside the flood areas as identified in council's mapping. Landscape areas situated in the flood areas are unlikely to be accessed during large storm events.
b) To allow development on land that is compatible with flood function and behavior on the land, taking into account projected changes as a result of climate change – As it is only the fringes of the development site that is impacted by the flood waters of the Georges River, the remainder of the site is deem suitable for development such as the proposed. The fringe areas that are impacted by flood waters will be used as landscaped areas.

c) To avoid adverse or cumulative impacts on flood behavior and the environment – Again as the development is primarily situated in areas that are not flood impacted then the development will not impact on the existing flood behavior. The areas which are flood affected are currently hardstand with high risk of pollutant runoff into the Georges River, following development these areas will be landscape which will reduce this risk to the environment.
d) To enable the safe occupation and efficient evacuation of people in the event of a flood. – As the habitable areas of the site are outside the flood extent then the development allows for safe occupation during flood events. Investigation works were undertaken for the previous developments on Shepherd Street in relation to evacuation and these investigations deemed that evacuation, if required in an emergency, from the site could be achieved via Shepherd Street.

In reference to Liverpool City Council's Development Control Plan (DCP), Part 1, Section 9 the development responds to the clause objectives as follows:

a) To minimise the potential impact of development and other activity upon the aesthetic, recreational and ecological value of the waterway corridors. – The development in no way negatively impacts the waterway corridor.
b) To ensure essential services and land uses are planned in recognition of all potential floods. – As the habitable areas of the proposed development are outside the flood extent flooding will not impact on the proposed land use on the development.
c) To reduce the risk to human life and damage to property caused by flooding through controlling development on land affected by potential floods. – No habitable areas are proposed within the flood impacted areas on the site.
d) To ensure that the economic and social costs which may arise from damage to property due to flooding is minimised and is not greater than that which can be reasonably managed by the property owner and general community. – The only areas on the site impacted by flooding are landscaped areas. This minimizes the potential cost associated with repair following a flood event as it will be limited to landscape works.
e) To limit developments with high sensitivity to flood risk (e.g. critical public utilities) to land with minimal risk from flooding. – This is not relevant to the development.
f) To prevent intensification of inappropriate use of land within high flood risk areas or floodways. – No habitable areas are proposed within the flood extent so there is no intensification in flood areas, the proposed development reduces the impact of the flood extent on habitable areas.
g) To permit development with a lower sensitivity to the flood hazard to be located within the floodplain, subject to appropriate design and siting controls. – Landscaping is proposed within the flood impacted areas on the site.
h) To ensure that development should not detrimentally increase the potential flood affectation on other development or properties either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain. – As no development is proposed in the flood impacted areas the development will have no adverse impact on the floodplain.
i) To ensure that development does not prejudice the economic viability of any Voluntary Acquisition Scheme. – This is not relevant for this project.

As can be noted above, the proposed development responds to the design intent of the LEP and DCP.

5 Stormwater Conveyance

This section of the report discusses the systems proposed to allow for stormwater to be conveyed across the site to the legal point of discharge.

As discussed in Section 3.1 of this report Council have set minimum design parameters for the flows they require to be conveyed through the in ground drainage system and what they will allow to be conveyed in a controlled manner overland across the site.

5.1 Surface Drainage

The surface areas will be drained through a variety of methods, discussed below, in accordance with AS3500.3:2015 and Council's stormwater drainage guidelines.

5.1.1 In-Ground Drainage

The in-ground drainage has been designed to meet the following criteria:

- In the minor design storm event (20 year) there will be no surcharging of the in ground drainage system and;
- In the major design storm event (100 year) there will be no uncontrolled discharge from the site onto the residential properties to the east of the site.

Surface runoff from the development sites will be directed to stormwater inlet structures using the design topography of these elements. The inlet structures have been designed to adequately convey the surface runoff into the in ground drainage network.

The runoff will then be conveyed underground across the site through a pit and pipe system and then to the legal point of discharge using gravity and the geometric falls of the pipe system.

5.2 Legal Point of Discharge

5.2.1 Development Site

The proposed legal point of discharge from the development will be into the Georges River via a headwall, this is identical to the recently completed developments along Shepherd Street. The location of the proposed connection is shown in the engineering drawings included in Appendix A of this report.

5.2.2 Public Road

The development includes the construction, embellishment and dedication of a new road to replace the existing easement for access. The proposed layout of the road can be reviewed in the enscape studio design drawings in Appendix A of this report.

The proposed public road will drain separately to the development site and will discharge into the existing Shepherd Street public drainage network. The location of the proposed connection is shown in the engineering drawings included in Appendix A of this report.

6 Stormwater Attenuation

As discussed in section 3.2 of this report there will be no requirement for On Site Detention for the site.

7 Stormwater Quality

This section of the report demonstrates the Stormwater Quality Improvement Devices (SQID's) to be implemented to reduce the flow of pollutants from the site.

7.1 Potential Pollutants

There are a wide range of potential stormwater pollutant sources which occur from urbanised catchments, many which can be managed through appropriate stormwater quality treatment. Typical urban pollutants may include:

- Atmospheric deposition
- Erosion (including that from subdivision and building activities)
- Litter and debris
- Traffic emissions and vehicle wear
- Animal droppings
- Pesticides and fertilisers
- Application, storage and wash-off of car oil, detergents and other household and commercial solvents and chemicals
- Solids accumulation and growth in stormwater systems
- Weathering of building

These pollutants in urban stormwater can be placed into various categories as follows. The pollutants underlined below are able to be readily modelled:

- Suspended Solids
- Litter
- Nutrients such as Nitrogen and Phosphorous
- Biological oxygen demand (BOD) and chemical oxygen demand (COD) materials
- Micro-organisms
- Toxic organics
- Trace metals
- Oils and surfactants

While only the key pollutants underlined above will be examined within the modelling, the stormwater Quality Improvement Devices implemented are expected to assist in reducing a wide range of pollutants. For example, heavy metals are commonly associated with, and bound to fine sediments. Thus reducing the discharge of fine sediment during the construction and operational phases will reduce the discharge of heavy metals to existing stormwater systems.

7.2 Pollutant Reduction System

In order to reduce the pollutants a series of treatment devices are proposed, which together, form a treatment train. The diagram below shows the proposed treatment train for this development.

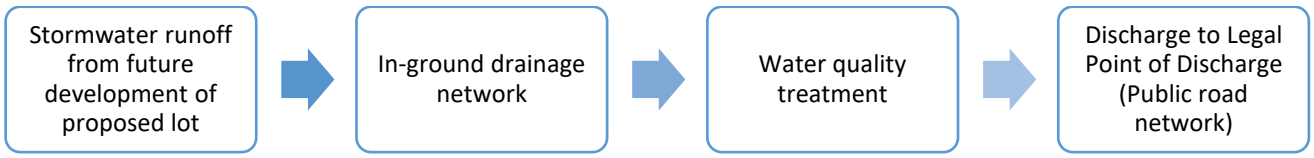


Figure 4: Proposed Water Quality Treatment Train

7.3 Pollutant Reduction Modelling

In order to demonstrate that the proposed treatment train meets the required reduction targets, pollutant reduction modelling is proposed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Software program Version 6.2 by eWater CRC. Pollutant export rates are currently only available for Total Suspended Solids (TSS), Total Nitrogen (TN), Total Phosphorous (TP) and Gross Pollutants (GP). Therefore only quantitative modelling for TSS, TN, TP & GP has been undertaken using MUSIC.

Modelling has only been undertaken on the post-development proposal with SQID's installed so as to demonstrate the percentage reduction for each pollutant type.

7.3.1 MUSIC Program Setup

This section explains the setup of the MUSIC model with the detailed pollutant reduction calculations being included in the MUSIC results in Appendix B.

The MUSIC model utilises the base data of Liverpool City Council's MUSICLink.

Table 2: Catchment modelling parameters

Node Description	Area (Ha)	Percentage Impervious (%) / Area Impervious (Ha)		Land Use Rainfall and Pollutant Parameters
Urban Landscape	0.403	50	0.202	Urban Mixed
Urban Roof	0.220	100	0.220	Urban Roof
	Total: 0.623Ha			

7.3.2 Pollutant Reduction Results

A number of management measures have been considered with a focus on reducing polluted runoff volumes from the site. The WSUD principals proposed for stormwater treatment includes:

- A Jellyfish JF1200-1-1 filter gartridge system for Building A;
- A Jellyfish JF1200-2-1 filter cartridge system and an Ocean save OS-0606 GPT for Building B;
- A 10kL rainwater tank for each of the buildings;

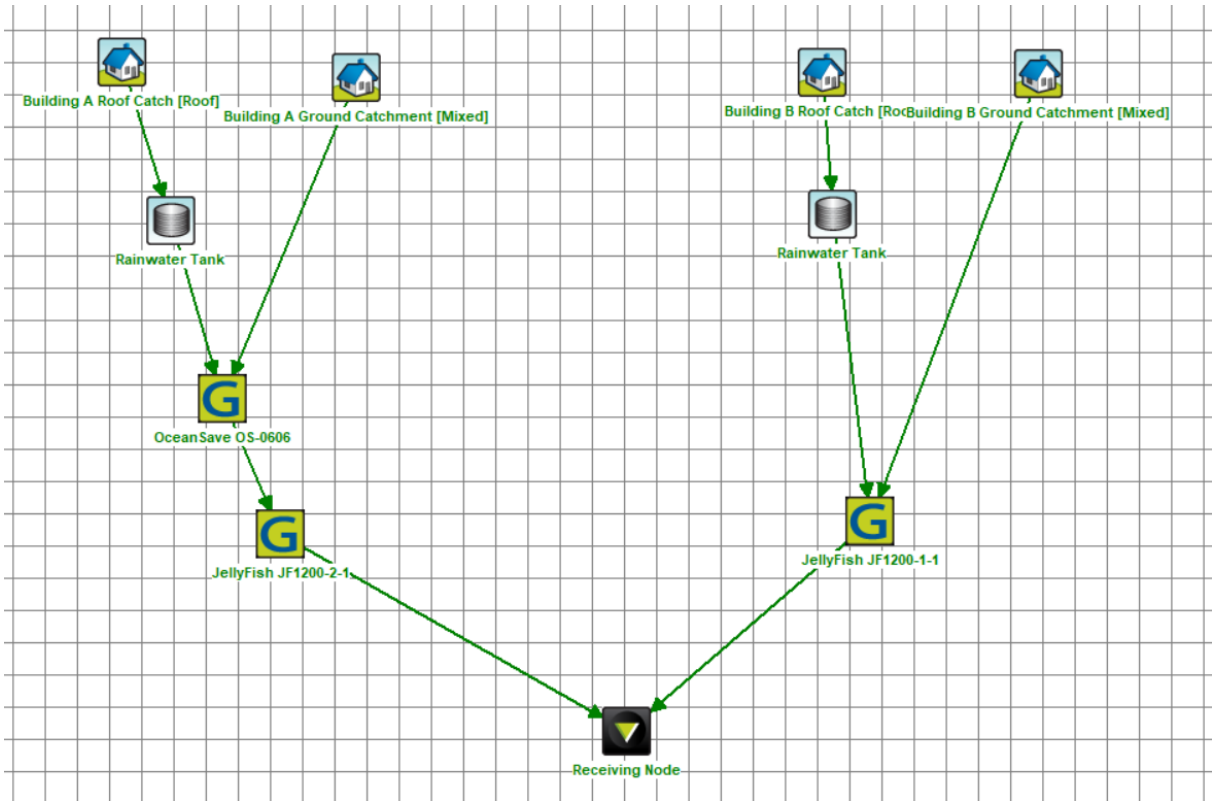


Figure 5 MUSIC Model

MUSIC Output

	Sources	Residual Load	% Reduction
Flow (ML/yr)	3.62	2.82	22.1
Total Suspended Solids (kg/yr)	339	35	89.7
Total Phosphorus (kg/yr)	0.772	0.268	65.2
Total Nitrogen (kg/yr)	7.79	3.31	57.6
Gross Pollutants (kg/yr)	106	1.48	98.6

Figure 6 MUSIC Results

The effectiveness of the treatment device proposed in the above section has been modelled using MUSIC with the overall treatment train efficiency results shown in Table 7 below.

Table 3: Treatment Train Efficiencies

Indicator	Total Site Reduction	Site Targets	Target Achieved
Gross Pollutants	98.6	90%	Yes
Total Suspended Solids (TSS)	89.7	85%	Yes
Total Phosphorus (TP)	65.2	65%	Yes
Total Nitrogen (TN)	57.6	45%	Yes

From the results presented above it can be seen that the proposed SQID's mean that the stormwater quality treatment meets with the reduction targets set for the development.

8 Erosion & Sedimentation Control

Landcom have published a design guide entitled “Managing Urban Stormwater - Soils and Construction” which is regarded as the standard to which erosion and sedimentation control should be designed to within NSW. Liverpool City Council specifies compliance with the Landcom design guide in there Stormwater and Floodplain Management Technical Manual.

The control of erosion and sedimentation describes the measures incorporated during and following construction of a new development to prevent the pollution and degradation of the downstream watercourse.

Stormwater Drainage Infrastructure Inlets

Risk:

- Sediment from the construction site washing into the existing stormwater drainage inlet infrastructure.

Consequence:

- The sediment will then be conveyed into the downstream waterbody by stormwater runoff, contaminating the waterbody.
- The sediment will build up blocking the stormwater infrastructure and preventing stormwater conveyance to the downstream waterbody and impacting drainage upstream.

Mitigation:

- Sandbag protection will be installed surrounding all existing stormwater drainage infrastructure inlets to prevent sediment entering the system.

Maintenance:

- Frequent inspection of the sandbags to ensure they are arranged in a manner that prevents sediment from accessing the drainage system. If sediment is building up on the sandbags they should be cleared of sediment and re-established.

Construction Exit Protection

Risk:

- Spoil such as soil being conveyed from the site on the wheels of vehicles.

Consequence:

- Spoil being tracked onto the public road corridors where it is then washed into the existing stormwater drainage infrastructure and is then washed downstream polluting the downstream waterbody.
- Spoil being tracked onto the public road creating dangerous driving conditions for other road users.

Mitigation:

- A shaker grid and wash down facility will be installed at all exits from the construction site. All vehicles leaving the site will have their wheels washed down and pass over the shaker grid to remove any spoil collected on their wheels and retaining the spoil on site.

Maintenance:

- Frequent inspection of the shaker grid to ensure it is clean and still functioning.

Downstream Site Boundaries

Risk:

- Rainfall runoff falling on the site collecting sediment from the construction site and conveying it overland onto downstream properties and waterbodies.

Consequence:

- Sediment discharge polluting downstream properties and waterbodies.

Mitigation:

- Installation of sediment fences on all downstream boundaries of the site to collect sediment and prevent it discharging onto downstream properties or waterbodies.

Maintenance:

- Regular inspection of the sediment fences to ensure they are functioning correctly and are intact.
- If sediment build up is present it should be removed to ensure correct functionality of the fences.

Waterbody

Risk:

- As the site is directly on the Georges River there is a risk that spoil and demolition refuse from the works pass directly into the waterbody.

Consequence:

- Direct pollution of the waterbody which is then dispersed into the entire waterbody.

Mitigation:

- Installation of a silt curtain in the waterbody surrounding the works to prevent further migration of sediment or spoil to the wider waterbody.

Maintenance:

- Regular inspection of the silt curtain to ensure it is functioning correctly and is intact.

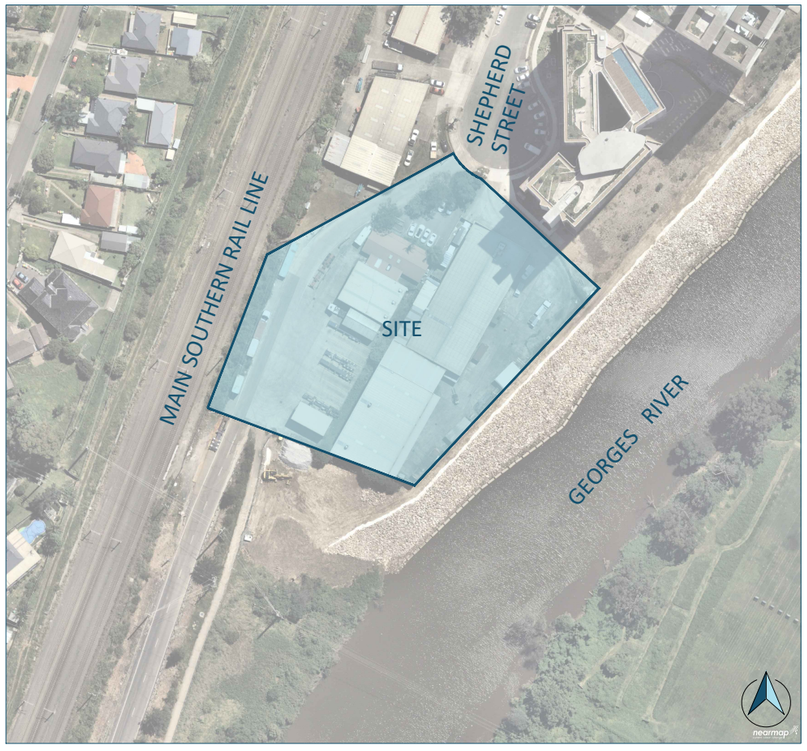
A Soil and Water Management Plan has prepared as part of the development application documentation and is included in Appendix A of this report.

The maintenance of these control measures throughout their intended lifespan will ensure that the risk of erosion and sedimentation pollution of the downstream watercourse will be minimized.

Appendix A – Civil Drawings

CIVIL ENGINEERING WORKS

DEVELOPMENT APPLICATION



SITE LOCATION PLAN

SCALE 1:1000

PROJECT SUMMARY

SITE ADDRESS:	31-33 SHEPHERD STREET, LIVERPOOL
LEGAL DESCRIPTION:	LOT 6, DP 247485 AND LOT 2 DP 1266735
LOCAL GOVERNMENT AREA:	LIVERPOOL CITY COUNCIL
SITE AREA:	7,874m²
DEVELOPMENT DESCRIPTION:	NEW PUBLIC ROAD & MULTISTOREY RESIDENTIAL DEVELOPMENT OVER BASEMENT CAR PARKING

DRAWING LIST

DRAWING NUMBER	DRAWING TITLE	REV
C-01	COVER SHEET	B
C-05	SEDIMENT & EROSION CONTROL PLAN	A
C-07	BULK EARTHWORKS PLAN	B
C-10	PUBLIC ROAD GENERAL ARRANGEMENT PLAN	B
C-12	ROAD LONG SECTION	B
C-13	ROAD CROSS SECTIONS - SHEET 1	B
C-14	ROAD CROSS SECTIONS - SHEET 2	B
C-15	ROAD CROSS SECTIONS - SHEET 3	B
C-20	STORMWATER MANAGEMENT PLAN - GROUND FLOOR	B
C-21	STORMWATER MANAGEMENT PLAN - BASEMENT LEVEL	B
C-25	STORMWATER MANAGEMENT DETAILS	A

LATERAL ESTATE

CLIENT

31-33 SHEPHERD STREET, LIVERPOOL

PROJECT

enscape studio
tel 0411 267 151
info@enscapestudio.com.au
ABN 91 649 181 171

0050

PROJECT No

C-01

DRAWING No

B

REV

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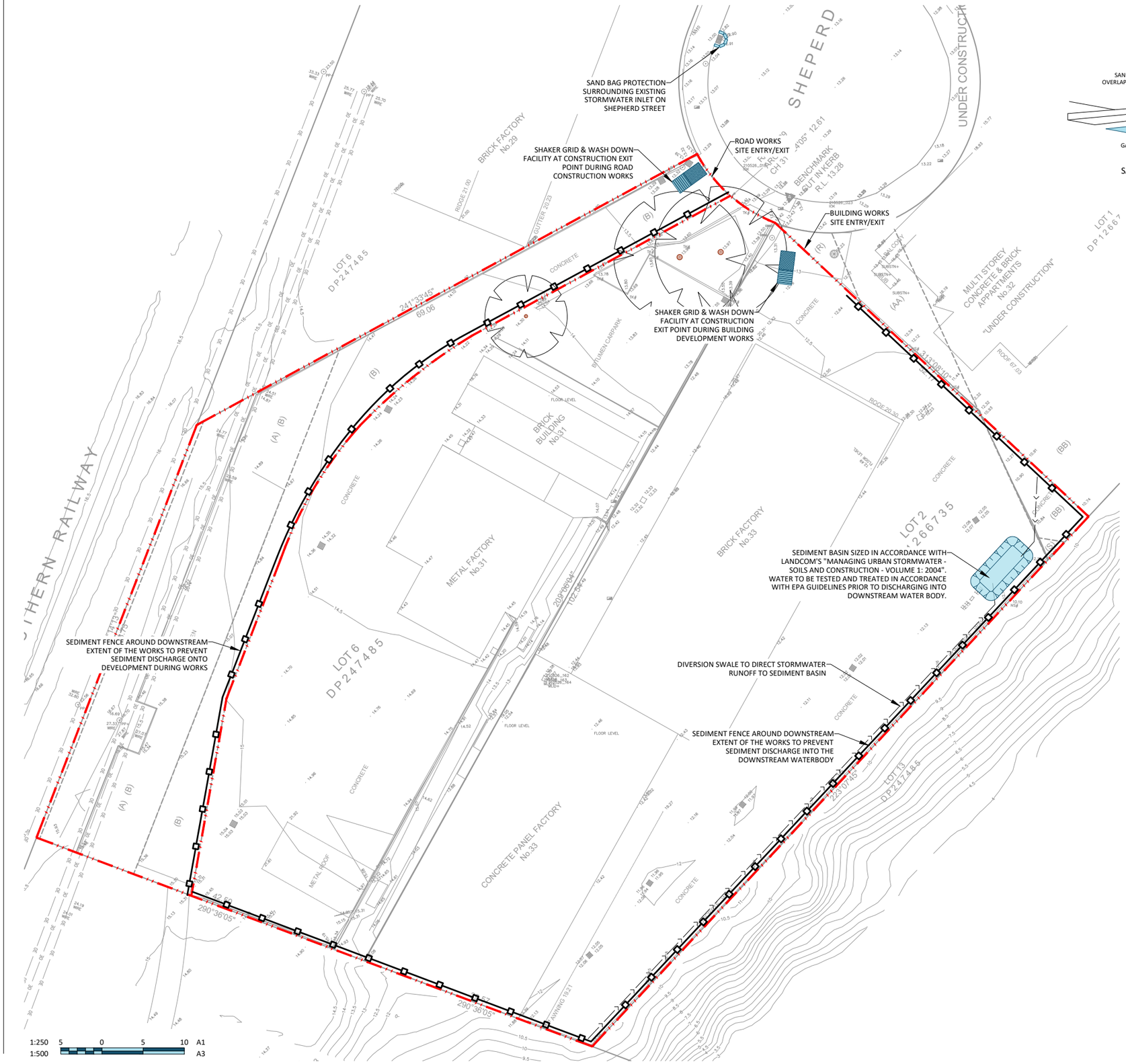
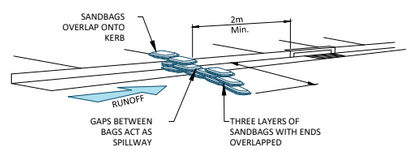




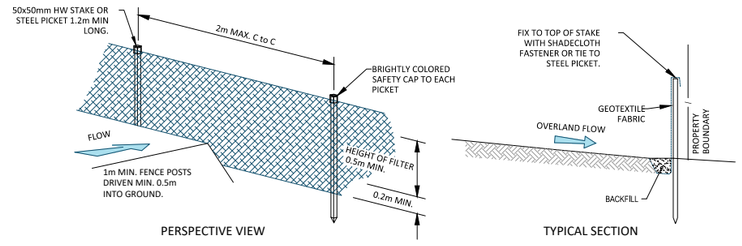
SANDBAG KERB INLET SEDIMENT TRAP

LEGEND

- SITE BOUNDARY
- PROPOSED SITE HOARDING
- VEHICLE SHAKEDOWN DEVICE
- PROPOSED SILT FENCE
- PROPOSED DIVERSION SWALE
- PROPOSED SEDIMENT BASIN
- PROPOSED SANDBAG PROTECTION

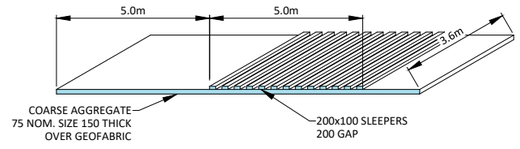
EROSION AND SEDIMENT CONTROL NOTES

1. ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE WITH:
   - LOCAL AUTHORITY REQUIREMENTS,
   - EPA - POLLUTION CONTROL MANUAL FOR URBAN STORMWATER,
   - DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT MANUAL- "URBAN EROSION & SEDIMENT CONTROL".
2. EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES ARE PROVIDED FOR THE WHOLE OF THE WORKS. SHOULD THE CONTRACTOR STAGE THESE WORKS THEN THE DESIGN MAY REQUIRE TO BE MODIFIED. VARIATION TO THESE DETAILS MAY REQUIRE TO BE APPROVED BY THE RELEVANT AUTHORITIES. THE EROSION AND SEDIMENT CONTROL PLAN SHALL BE IMPLEMENTED AND ADOPTED TO MEET THE VARYING SITUATIONS AS WORK ON SITE PROGRESSES.
3. MAINTAIN ALL EROSION AND SEDIMENT CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.
4. WHEN STORMWATER PITS ARE CONSTRUCTED PREVENT SITE RUNOFF ENTERING THE PITS UNLESS SILT FENCES ARE ERECTED AROUND PITS.
5. MINIMISE THE AREA OF SITE BEING DISTURBED AT ANY ONE TIME.
6. PROTECT ALL STOCKPILES OF MATERIALS FROM SCOUR AND EROSION. DO NOT STOCKPILE LOOSE MATERIAL IN ROADWAYS, NEAR DRAINAGE PITS OR IN WATERCOURSES.
7. ALL SOIL AND WATER CONTROL MEASURES ARE TO BE PUT BACK IN PLACE AT THE END OF EACH WORKING DAY, AND MODIFIED TO BEST SUIT SITE CONDITIONS.
8. CONTROL WATER FROM UPSTREAM OF THE SITE SUCH THAT IT DOES NOT ENTER THE DISTURBED SITE.
9. ALL CONSTRUCTION VEHICLES SHALL ENTER AND EXIT THE SITE VIA THE APPROVED CONSTRUCTION ENTRY/EXIT ROUTE.
10. ALL VEHICLES LEAVING THE SITE SHALL BE CLEANED AND INSPECTED BEFORE LEAVING.
11. MAINTAIN ALL STORMWATER PIPES AND PITS CLEAR OF DEBRIS AND SEDIMENT. INSPECT STORMWATER SYSTEM AND CLEAN OUT AFTER EACH STORM EVENT.
12. CLEAN OUT ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH STORM EVENT.
13. ALL DISTURBED AREAS SHALL BE REVEGETATED AS SOON AS THE RELEVANT WORKS HAVE BEEN COMPLETED.



PERSPECTIVE VIEW TYPICAL SECTION

SEDIMENT FENCE DETAIL



SHAKER GRID

REV	DESCRIPTION	DRAWN	APP'D	DATE
A	ISSUED FOR DA	IH	IH	05.12.22

Lateral Estate — CLIENT

mpa. — ARCHITECT

31-33 SHEPHERD STREET, LIVERPOOL — PROJECT

SEDIMENT & EROSION CONTROL PLAN — TITLE

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ABN 91 649 181 175

PRELIMINARY
NOT FOR CONSTRUCTION

AS NOTED	0050	C-05	A
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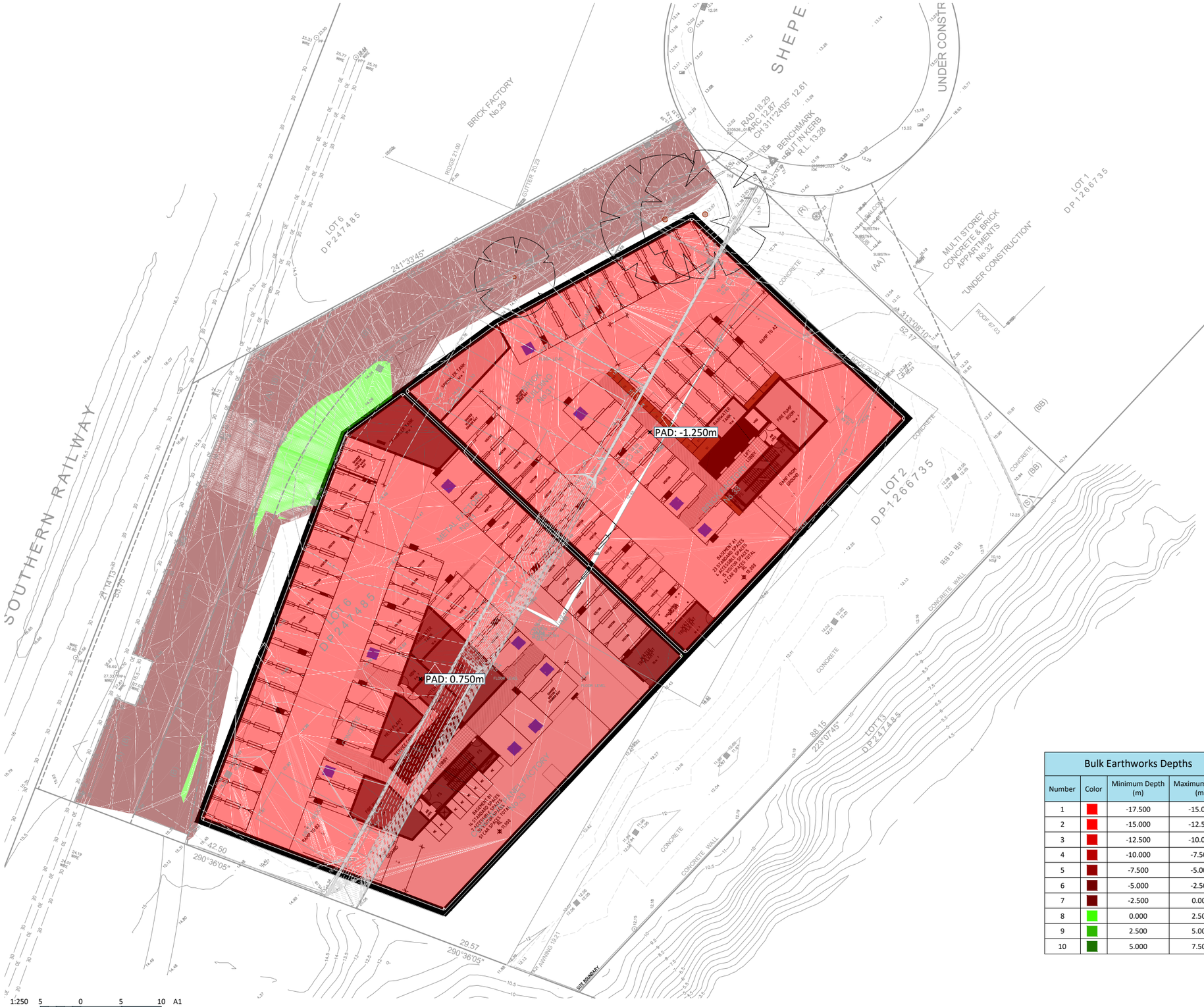

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED BUILDING OUTLINE
- PROPOSED RETAINING WALL
- BE10.00 — PROPOSED EARTHWORKS PAD LEVEL
- 10.00 — EXISTING SURFACE CONTOUR
- 10.00 — PROPOSED SURFACE CONTOUR
- PROPOSED BATTER EXTENT
- BE 10.00 — PROPOSED EARTHWORKS LEVEL

BULK EARTHWORKS VOLUMES

CUT (m^3)	FILL (m^3)	NET (m^3)
51,500	0	51,500 (CUT)

BULK EARTHWORKS VOLUME NOTES

1. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS.
2. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS ASSOCIATED WITH UTILITY TRENCHING OR FOUNDATIONS.
3. NO ALLOWANCE FOR TOPSOIL STRIP HAS BEEN MADE IN VOLUME CALCULATIONS.
4. THE FOLLOWING STRUCTURAL DEPTHS HAVE BEEN ASSUMED IN THE CALCULATION OF THE VOLUMES:
   - BUILDING GROUND FLOOR SLAB 250mm
   - ON GRADE VEHICLE PAVEMENT 300mm
   - LANDSCAPE AREAS n/a

BULK EARTHWORKS NOTES

1. ALL TREES AND SHRUBS (UNLESS NOTED TO BE PROTECTED ON THE LANDSCAPE PLANS), RUBBLE, EXISTING PAVEMENT AND EXISTING STRUCTURES WITHIN THE SITE SHALL BE REMOVED AND REUSED OR RECYCLED WHERE POSSIBLE. WHERE NOT POSSIBLE, THIS MATERIAL SHALL BE REMOVED FROM SITE AND DISPOSED OF AS PART OF THE CONTRACT.
2. ANY TREES WITHIN THE WORKS AREA WHICH, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, ARE UNSOUND OR WOULD CONSTITUTE A DANGER, SHALL BE CUT DOWN AND REMOVED (EXCEPT THOSE IDENTIFIED AS BEING PROTECTED). ALL STUMPS OF TREES CUT DOWN WITHIN THE BOUNDS OF THE CONSTRUCTION AREA WHICH ARE LARGER THAN 250mm IN GIRTH, SHALL BE COMPLETELY REMOVED.
3. ALL ROOTS SHALL BE REMOVED FOR A DEPTH OF 1m. CAVITIES FORMED BY THE REMOVAL OF ROOTS SHALL BE BACKFILLED AND COMPACTED.
4. AFTER CLEARING AND GRUBBING ARE COMPLETE, THE CONTRACTOR SHALL STRIP AND STOCKPILE TOPSOIL FROM THE CLEARED AREA (INCLUDING AREAS THAT HAVE BEEN CLEARED AND GRUBBED). REMOVAL OF TOPSOIL FROM ANY SECTION OF THE WORKS SHALL ONLY COMMENCE AFTER SEDIMENT AND EROSION CONTROLS HAVE BEEN IMPLEMENTED.
5. TOPSOIL SHALL BE STRIPPED FROM WITHIN THE FORMATION AREAS OF ROADS, PATHWAYS, BUILDING PADS AND MISCELLANEOUS PAVEMENTS, INCLUSIVE OF BATTERS, AND IS TO BE CONSERVED FOR THE TOP-DRESSING OF FORMED FOOTWAYS, BERMS AND BATTERS TO THE SPECIFIED DEPTH, OR WHERE NO DEPTH IS SPECIFIED TO A MINIMUM DEPTH OF 150mm, OR AS DETERMINED ON-SITE.
6. EXCAVATED FILL MATERIAL NOT SUITABLE FOR REUSE ON-SITE MUST BE REMOVED OFF-SITE OR OTHERWISE USED IN LANDSCAPING AREAS WHERE AGREED IN ADVANCE WITH ENGINEER.
7. EROSION AND SEDIMENT CONTROL MUST BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL CITY COUNCIL DCP, DA AND CC CONDITIONS, AND BE INSTALLED TO THE SATISFACTION OF THE ENGINEER.
8. THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO LIMIT THE CREATION OF DUST NUISANCE, WHICH MIGHT ARISE DURING THE EXECUTION OF THE WORKS.
9. FILL MATERIAL MUST BE PLACED IN MAXIMUM LAYERS OF 200mm (LOOSE) OR AS OTHERWISE GIVEN IN THE SPECIFICATION AND COMPACTED TO THE LEVELS AS SPECIFIED ON THE DRAWINGS.
10. COMPACTED FILL MUST BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF AS3798 AND AS GIVEN IN THE CIVIL SPECIFICATION.
11. BEFORE PLACING FILL, PROOF ROLL EXPOSED SUBGRADE WITH AN 12 TONNE (MIN) DEADWEIGHT SMOOTH DRUM VIBRATORY ROLLER TO DIRECT THEN REMOVE SOFT SPOTS (AREAS WITH MORE THAN 2mm MOVEMENT UNDER ROLLER. PROOF ROLLING SHALL COMPRISE 6 PASSES OF A MINIMUM.
12. FREQUENCY OF COMPACTION TESTING SHALL BE NOT LESS THAN :
    - 1 TEST PER 200m^3 OF FILL PLACED PER 200mm THICK LAYER OF FILL
    - 3 TESTS PER LAYER
    - 1 TEST PER 2000m^3 OF EXPOSED SUBGRADE
13. TESTING SHALL BE "LEVEL1" TESTING IN ACCORDANCE WITH AS 3798 (2007) AT CONTRACTOR EXPENSE.
14. NO FILLING SHALL TAKE PLACE TO EXPOSED SUBGRADE UNTIL THE AREA HAS BEEN PROOF ROLLED IN THE PRESENCE OF GEOTECHNICAL ENGINEER AND APPROVAL GIVEN IN WRITING THAT FILLING CAN PROCEED.
15. THE CONTRACTOR SHALL ALLOW FOR AND COORDINATE ALL MONITORING AND MAINTENANCE REQUIREMENTS IN RELATION TO SOIL AND GROUNDWATER CONDITIONS DURING CONSTRUCTION.
16. ALL LAND DISTRIBUTED BY EARTHWORKS SHALL BE HYDROMULCHED, OR SIMILARLY TREATED TO ESTABLISH GRASS COVER, SEED MIXTURES ARE TO BE APPROVED BY COUNCIL PRIOR TO SPRAYING ALL GRASSED AREAS SHALL BE REGULARLY WATERED AND MAINTAINED UNTIL EXPIRATION OF THE MAINTENANCE PERIOD.

Bulk Earthworks Depths

Number	Color	Minimum Depth (m)	Maximum Depth (m)
1		-17.500	-15.000
2		-15.000	-12.500
3		-12.500	-10.000
4		-10.000	-7.500
5		-7.500	-5.000
6		-5.000	-2.500
7		-2.500	0.000
8		0.000	2.500
9		2.500	5.000
10		5.000	7.500

REV	DESCRIPTION	DRAWN	APP'D	DATE
B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	05.12.22

CLIENT: Lateral Estate
ARCHITECT: mpa.

PROJECT: 31-33 SHEPHERD STREET, LIVERPOOL
TITLE: BULK EARTHWORKS PLAN

enscape studio
tel 0411 267 151
info@enscapestudio.com.au
ABN 91 649 181 171

PRELIMINARY
NOT FOR CONSTRUCTION

SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0050	C-07	B

0050-C-07.dwg
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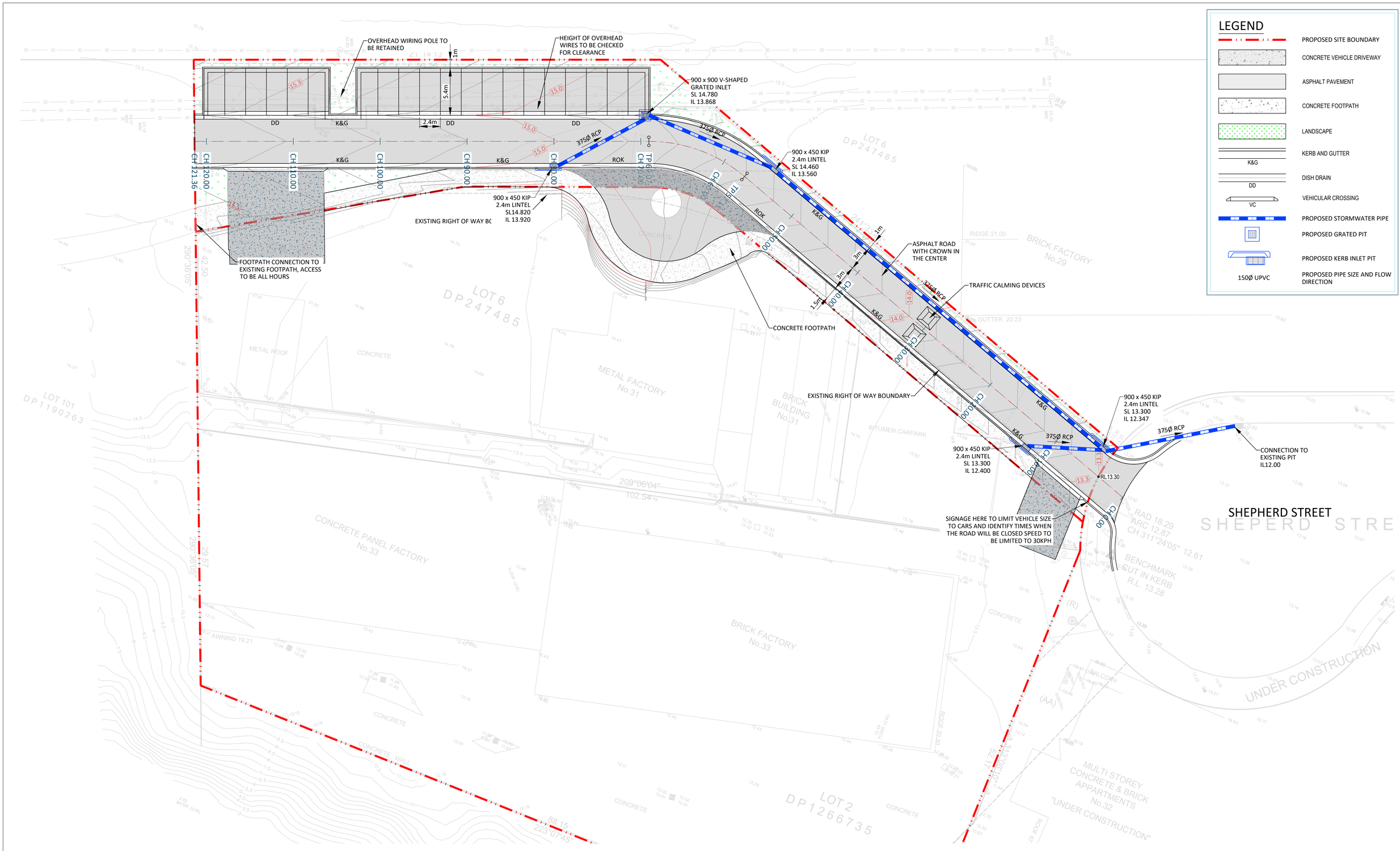

REV	DESCRIPTION	DRAWN	APP'D	DATE
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C	ISSUED FOR DA	IH	IH	14.03.23
B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	20.12.22

Lateral Estate
CLIENT

mpa.
ARCHITECT

31-33 SHEPHERD STREET, LIVERPOOL
PROJECT

PUBLIC ROAD GENERAL ARRANGEMENT PLAN
TITLE

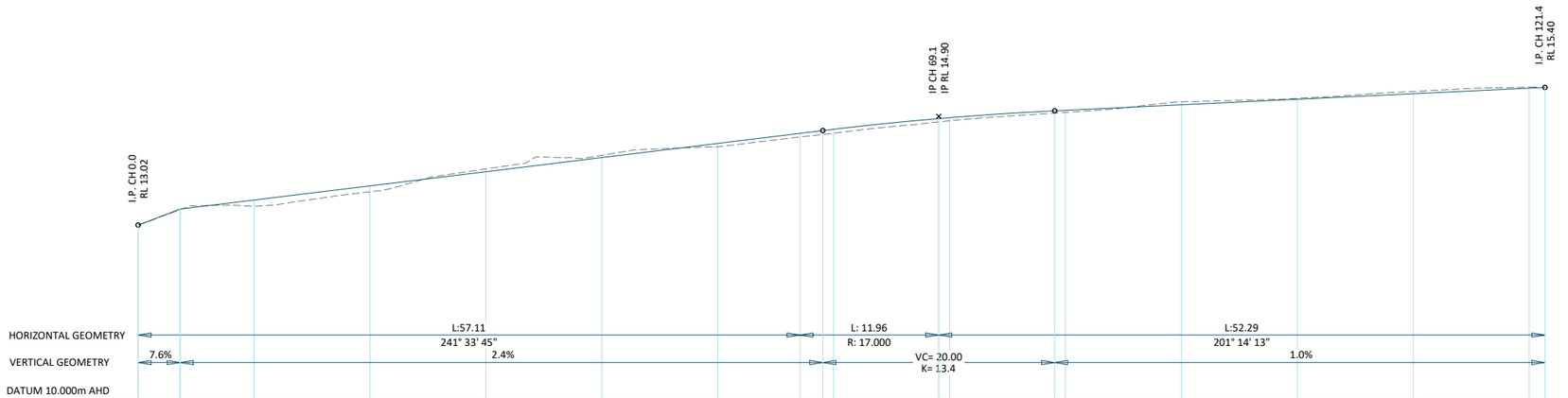
0050-C-10.dwg

enscape studio
tel 0411 267 151
info@enscapestudio.com.au
ABN 91 649 181 171

FOR INFORMATION
NOT FOR CONSTRUCTION

AS NOTED	0050	C-10	C
SCALE @ A1	PROJECT No	DRAWING No	REV

14/03/2023 12:57:52 PM



DESIGN LEVELS	13.02	13.30	13.46	13.70	13.94	14.19	14.43	14.61	14.66	14.68	14.86	14.88	15.00	15.00	15.10	15.20	15.29	15.39	15.40				
EXISTING LEVELS	13.02	13.29	13.35	13.60	13.99	14.23	14.38	14.54	14.59	14.61	14.81	14.82	14.96	14.97	15.15	15.21	15.33	15.40					
CUT / FILL	0.00	0.01	0.11	0.10	-0.05	-0.04	0.06	0.06	0.07	0.07	0.06	0.05	0.04	0.04	-0.05	-0.02	-0.04	-0.02					
CHAINAGE	0.0	3.6	10.0	20.0	30.0	40.0	50.0	57.1	59.1	60.0	69.1	70.0	79.1	80.0	90.0	100.0	110.0	120.0	121.4	121.4			

POWERHOUSE ROAD CL - LONG SECTION

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50

1:250 5 0 5 10 A1
1:500 A3
HORIZONTAL

1:50 1 0.5 0 1 2 A1
1:100 A3
VERTICAL

REV	DESCRIPTION	DRAWN	APP'D	DATE
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B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	05.12.22

Lateral Estate
CLIENT

mpa.
ARCHITECT

31-33 SHEPHERD STREET, LIVERPOOL
PROJECT

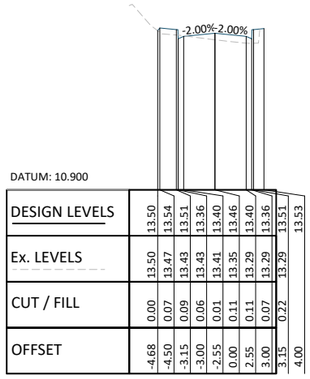
ROAD LONGSECTION
TITLE

enscape studio
tel 0411 267 151
info@enscapestudio.com.au
ABN 91 649 181 171

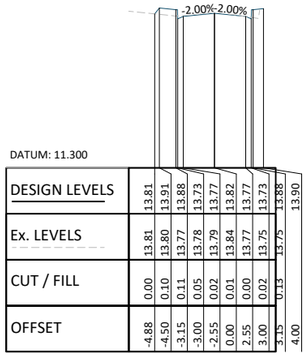
PRELIMINARY
NOT FOR CONSTRUCTION

SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0050	C-12	B

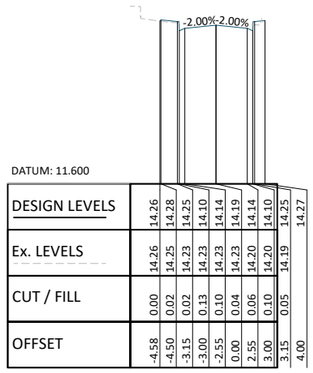
0050-Shepherd St Model.dwg
9/02/2023 11:14:58 AM



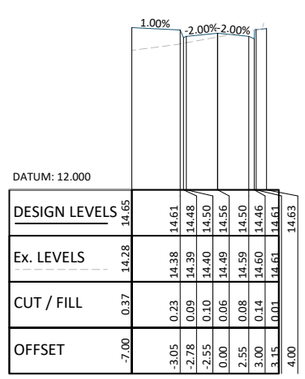
Powerhouse Road CL - CH 10.000



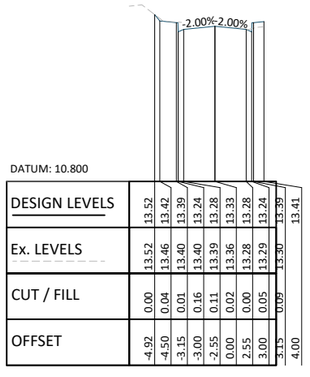
Powerhouse Road CL - CH 25.000



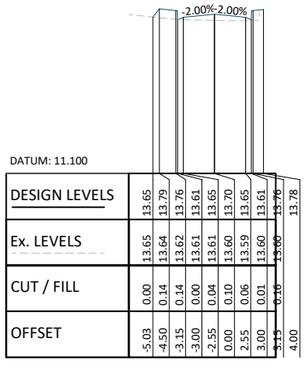
Powerhouse Road CL - CH 40.000



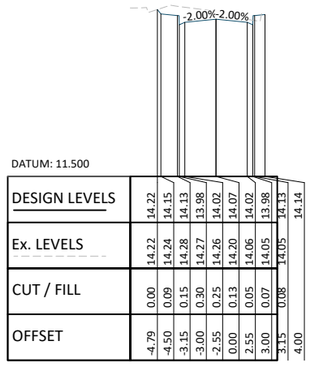
Powerhouse Road CL - CH 55.000



Powerhouse Road CL - CH 05.000



Powerhouse Road CL - CH 20.000



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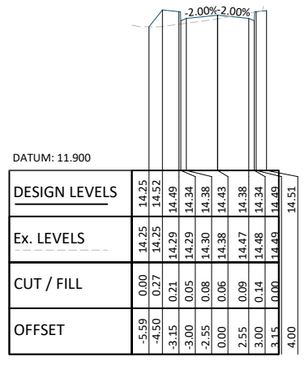
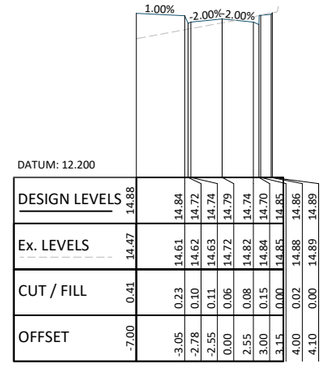
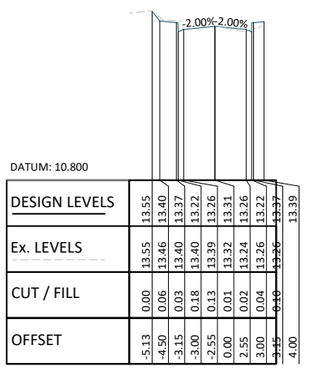


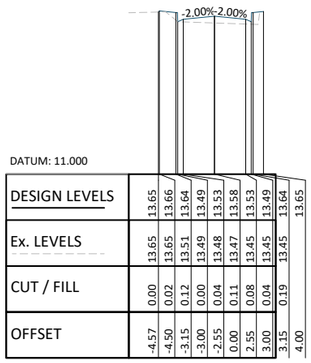
Powerhouse Road CL - CH 50.000



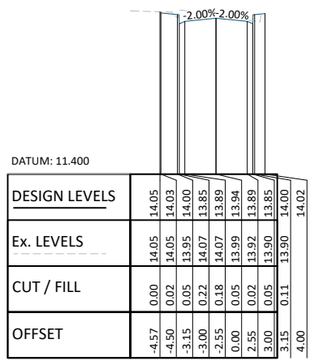
Powerhouse Road CL - CH 65.000



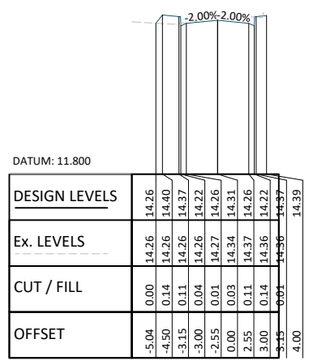
Powerhouse Road CL - CH 04.076



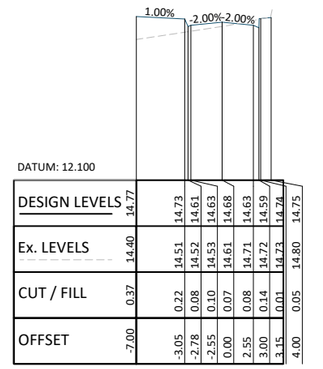
Powerhouse Road CL - CH 15.000



Powerhouse Road CL - CH 30.000



Powerhouse Road CL - CH 45.000



Powerhouse Road CL - CH 60.000

1:250 5 0 5 10 A1
1:500 A3
HORIZONTAL

1:50 1 0.5 0 1 2 A1
1:100 A3
VERTICAL

REV	DESCRIPTION	DRAWN	APP'D	DATE
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B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	20.12.22

Lateral Estate
CLIENT

mpa.
ARCHITECT

31-33 SHEPHERD STREET, LIVERPOOL
PROJECT

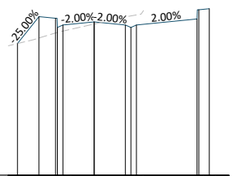
ROAD CROSS SECTIONS SHEET 1
TITLE

enscape studio
tel 0411 267 151
info@enscapestudio.com.au
ABN 91 649 181 171

PRELIMINARY
NOT FOR CONSTRUCTION

AS NOTED	0050	C-13	B
SCALE @ A1	PROJECT No	DRAWING No	REV

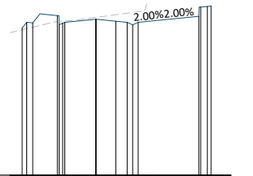
0050-Shepherd St Model.dwg
9/02/2023 11:15:04 AM



DATUM: 12.500

DESIGN LEVELS	14.65	15.09	15.06	14.91	14.95	15.00	14.95	14.91	14.95	15.05	15.20	15.22
Ex. LEVELS	14.65	14.74	14.82	14.83	14.85	14.97	15.08	15.10	15.12			
CUT / FILL	0.00	0.35	0.24	0.08	0.10	0.04	0.13	0.19	0.16			
OFFSET	-6.26	-4.50	-3.15	-3.00	-2.55	0.00	2.55	3.00	3.45	8.40	8.55	9.40

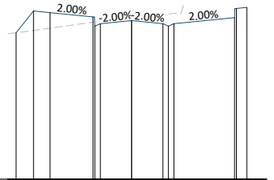
Powerhouse Road CL - CH 80.000



DATUM: 12.600

DESIGN LEVELS	15.01	15.10	15.09	15.21	15.06	15.10	15.15	15.10	15.06	15.10	15.20	15.35	15.36	15.36
Ex. LEVELS	14.98	14.99	15.02	15.11	15.11	15.12	15.12	15.18	15.25	15.26	15.27			
CUT / FILL	0.03	0.10	0.07	0.10	0.06	0.03	0.02	0.03	0.15	0.20	0.17			
OFFSET	-6.02	-5.65	-5.16	-3.15	-3.00	-2.71	-2.55	0.00	2.55	3.00	3.45	8.40	8.55	9.40

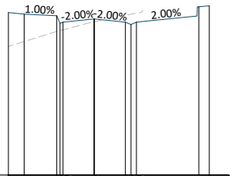
Powerhouse Road CL - CH 95.000



DATUM: 12.700

DESIGN LEVELS	15.09	15.45	15.42	15.35	15.20	15.24	15.29	15.24	15.20	15.24	15.34	15.49	15.51
Ex. LEVELS	15.09	15.13	15.17	15.26	15.27	15.28	15.33	15.39	15.40	15.41			
CUT / FILL	0.00	0.32	0.25	0.09	0.07	0.04	0.04	0.15	0.20	0.17			
OFFSET	-9.43	-8.01	-6.66	-3.15	-3.00	-2.55	0.00	2.55	3.00	3.45	8.40	8.55	9.40

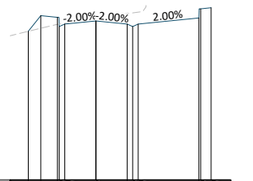
Powerhouse Road CL - CH 110.000



DATUM: 12.400

DESIGN LEVELS	15.06	15.03	15.00	14.88	14.90	14.95	14.90	14.86	14.90	15.17
Ex. LEVELS	14.50	14.58	14.75	14.76	14.77	14.90	15.01	15.03	15.04	
CUT / FILL	0.55	0.45	0.26	0.12	0.13	0.05	0.11	0.17	0.15	
OFFSET	-7.00	-5.71	-3.05	-2.78	-2.55	0.00	2.55	3.00	3.45	9.40

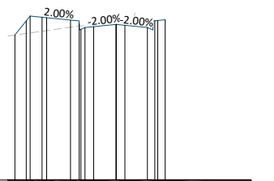
Powerhouse Road CL - CH 75.000



DATUM: 12.500

DESIGN LEVELS	14.93	15.19	15.16	15.01	15.05	15.10	15.05	15.01	15.05	15.15	15.30	15.32
Ex. LEVELS	14.93	14.98	15.04	15.05	15.07	15.15	15.22	15.23	15.24			
CUT / FILL	0.00	0.20	0.12	0.04	0.02	0.05	0.17	0.22	0.19			
OFFSET	-5.52	-4.50	-3.15	-3.00	-2.55	0.00	2.55	3.00	3.45	8.40	8.55	9.40

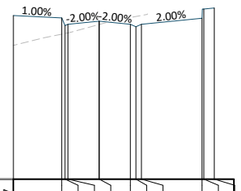
Powerhouse Road CL - CH 90.000



DATUM: 12.700

DESIGN LEVELS	15.07	15.30	15.38	15.36	15.35	15.31	15.26	15.16	15.19	15.21	15.24	15.23	15.19	15.30	15.31	15.32
Ex. LEVELS	15.07	15.10	15.10	15.13	15.14	15.20	15.21	15.22	15.22	15.23	15.27	15.29				
CUT / FILL	0.00	0.21	0.28	0.23	0.21	0.12	0.05	0.05	0.03	0.03	0.03	0.06				
OFFSET	-8.27	-7.34	-7.03	-6.05	-5.68	-3.73	-3.02	-2.87	-2.55	-1.84	0.00	0.71	2.55	3.15	3.39	4.00

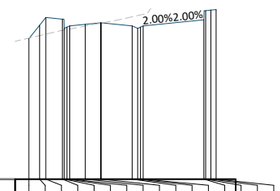
Powerhouse Road CL - CH 105.000



DATUM: 12.300

DESIGN LEVELS	14.97	14.93	14.81	14.83	14.88	14.83	14.79	14.83	14.93	15.08	15.09
Ex. LEVELS	14.48	14.67	14.68	14.69	14.82	14.94	14.95	14.97			
CUT / FILL	0.49	0.27	0.13	0.14	0.05	0.11	0.17	0.14			
OFFSET	-7.00	-3.05	-2.78	-2.55	0.00	2.55	3.00	3.45	8.40	8.55	9.40

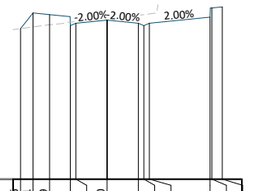
Powerhouse Road CL - CH 70.000



DATUM: 12.500

DESIGN LEVELS	14.79	15.01	15.14	15.11	14.96	14.98	15.00	15.03	15.05	14.96	15.00	15.10	15.25	15.26	15.27
Ex. LEVELS	14.80	14.84	14.87	14.93	14.93	14.94	14.95	15.00	15.05	15.15	15.17	15.19			
CUT / FILL	0.01	0.17	0.27	0.18	0.03	0.04	0.05	0.03	0.01	0.15	0.21	0.19			
OFFSET	-5.89	-5.01	-4.50	-3.15	-3.00	-2.78	-2.55	-1.28	0.00	2.55	3.00	3.45	8.40	8.55	8.98	9.40

Powerhouse Road CL - CH 85.000



DATUM: 12.600

DESIGN LEVELS	15.00	15.31	15.29	15.10	15.14	15.20	15.14	15.10	15.14	15.24	15.39	15.41
Ex. LEVELS	15.00	15.08	15.12	15.16	15.17	15.21	15.27	15.28	15.30			
CUT / FILL	0.00	0.23	0.17	0.06	0.03	0.02	0.13	0.18	0.15			
OFFSET	-7.07	-6.04	-4.69	-3.00	-2.55	0.00	2.55	3.00	3.45	8.40	8.55	9.40

Powerhouse Road CL - CH 100.000

1:250 5 0 5 10 A1
1:500 A3
HORIZONTAL

1:50 1 0.5 0 1 2 A1
1:100 A3
VERTICAL

REV	DESCRIPTION	DRAWN	APP'D	DATE
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B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	20.12.22

Lateral Estate
CLIENT

mpa.
ARCHITECT

31-33 SHEPHERD STREET, LIVERPOOL
PROJECT

ROAD CROSS SECTIONS SHEET 2
TITLE

enscape studio
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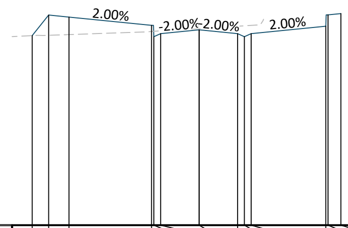
info@enscapestudio.com.au
ABN 91 649 181 171

PRELIMINARY
NOT FOR CONSTRUCTION

AS NOTED	0050	C-14	B
SCALE @ A1	PROJECT No	DRAWING No	REV

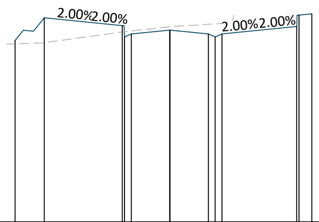
0050-Shepherd St Model.dwg
9/02/2023 11:15:10 AM



DATUM: 12.800

DESIGN LEVELS	15.31	15.58	15.56	15.45	15.30	15.34	15.39	15.34	15.30	15.34	15.43	15.58	15.60
Ex. LEVELS	15.31	15.31	15.32	15.37	15.37	15.37	15.40	15.43	15.44	15.45			
CUT / FILL	0.00	0.27	0.23	0.08	0.07	0.04	0.02	0.10	0.14	0.11			
OFFSET	-11.06	-9.97	-8.62	-3.15	-3.00	-2.55	0.00	2.55	3.00	3.45	8.40	8.55	9.40

Powerhouse Road CL - CH 120.000



DATUM: 12.800

DESIGN LEVELS	15.20	15.50	15.40	15.25	15.29	15.34	15.31	15.29	15.25	15.29	15.34	15.39	15.54	15.55
Ex. LEVELS	15.16	15.17	15.31	15.32	15.33	15.38	15.40	15.42	15.42	15.43				
CUT / FILL	0.04	0.33	0.08	0.07	0.04	0.04	0.09	0.13	0.17	0.14				
OFFSET	-10.25	-8.32	-3.15	-3.00	-2.55	0.00	1.27	2.55	3.00	3.45	5.92	8.40	8.55	9.40

Powerhouse Road CL - CH 115.000

1:250 5 0 5 10 A1
1:500 A3
HORIZONTAL

1:50 1 0.5 0 1 2 A1
1:100 A3
VERTICAL

REV	DESCRIPTION	DRAWN	APP'D	DATE
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B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	20.12.22

Lateral Estate
CLIENT

mpa.
ARCHITECT

PROJECT: 31-33 SHEPHERD STREET, LIVERPOOL

TITLE: ROAD CROSS SECTIONS SHEET 3

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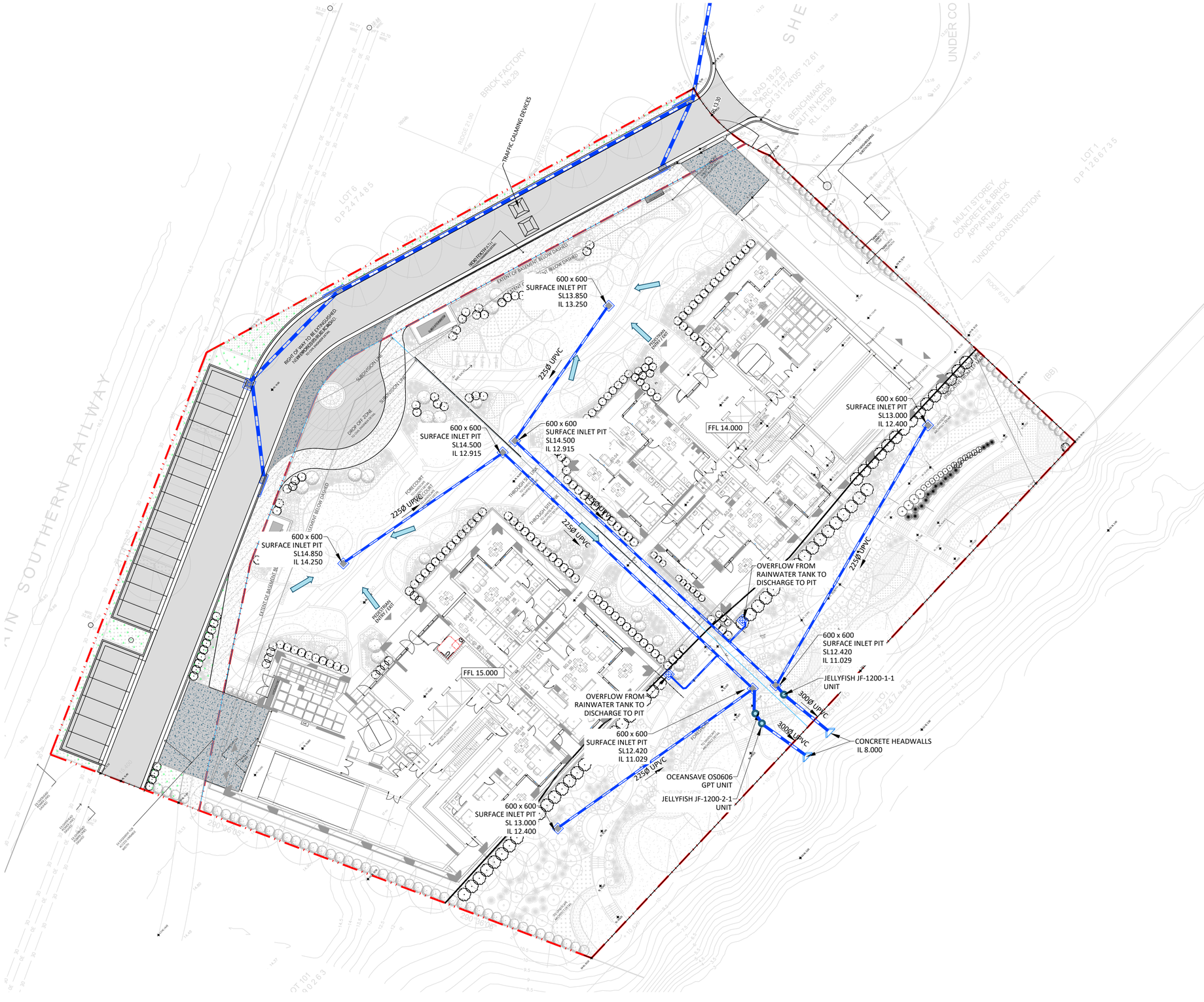
PRELIMINARY
NOT FOR CONSTRUCTION

SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0050	C-15	B

0050-Shepherd St Model.dwg
9/02/2023 11:15:12 AM



1:250 5 0 5 10 A1
1:500 A3

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED STORMWATER PIPE
- PROPOSED GRATED PIT
- WATER TREATMENT DEVICE
- PROPOSED GRATED DRAIN
- BASEMENT PUMPOUT PIT
- 150Ø UPVC — PROPOSED PIPE SIZE AND FLOW DIRECTION
- OVERLAND FLOW
- RISING MAIN
- SUBSOIL DRAINAGE

STORMWATER MANAGEMENT NOTES

SITE INFORMATION

ADDRESS:	31-33 SHEPHERD STREET, LIVERPOOL
LOCAL GOVERNMENT AREA:	LIVERPOOL CITY COUNCIL
SITE AREA:	7,874m²

DEVELOPMENT CONTROL REQUIREMENTS

GOVERNING DOCUMENT:	LIVERPOOL CITY COUNCIL DCP
DESIGN STORMS:	MINOR = 20 YEAR MAJOR = 100 YEAR

DISCHARGE ATTENUATION REQUIREMENT:

1. SITE IS DIRECTLY ADJACENT TO GEORGES RIVER SO NO FLOW ATTENUATION IS PROPOSED.

WATER QUALITY TREATMENT REQUIREMENTS:

- 90% REMOVAL OF GROSS POLLUTANTS (> 5MM);
- 85% REMOVAL OF TOTAL SUSPENDED SOLIDS;
- 65% REMOVAL OF TOTAL PHOSPHOROUS; AND
- 45% REMOVAL OF TOTAL NITROGEN.

REV	DESCRIPTION	DRAWN	APP'D	DATE
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C	ISSUED FOR DA	IH	IH	17.05.23
B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	20.12.22

CLIENT: Lateral Estate
ARCHITECT: mpa.

PROJECT: 31-33 SHEPHERD STREET, LIVERPOOL
TITLE: STORMWATER MANAGEMENT PLAN - GROUND FLOOR

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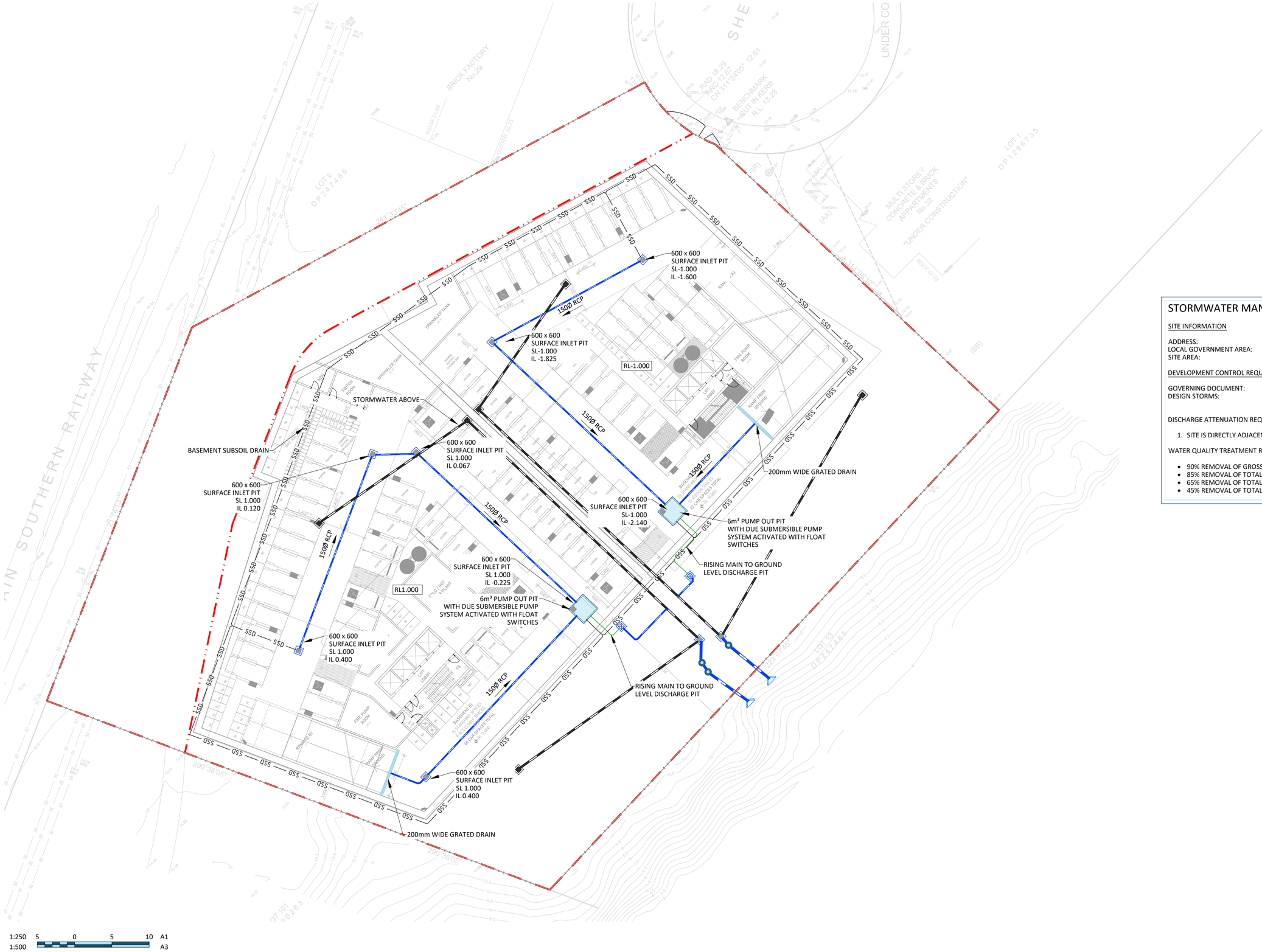
ABN 91 649 181 171

PRELIMINARY
NOT FOR CONSTRUCTION

SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0050	C-20	C

0050-C-20.dwg
17/05/2023 9:34:09 AM



1:250 5 0 5 10 A1
1:500 A3

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED STORMWATER PIPE
- PROPOSED GRATED PIT
- WATER TREATMENT DEVICE
- PROPOSED GRATED DRAIN
- BASEMENT PUMPOUT PIT
- 150Ø UPVC — PROPOSED PIPE SIZE AND FLOW DIRECTION
- OVERLAND FLOW
- RM — RM — RISING MAIN
- SSD — SSD — SUBSOIL DRAINAGE

STORMWATER MANAGEMENT NOTES

SITE INFORMATION

ADDRESS:	31-33 SHEPHERD STREET, LIVERPOOL
LOCAL GOVERNMENT AREA:	LIVERPOOL CITY COUNCIL
SITE AREA:	7,874m²

DEVELOPMENT CONTROL REQUIREMENTS

GOVERNING DOCUMENT:	LIVERPOOL CITY COUNCIL DCP
DESIGN STORMS:	MINOR = 20 YEAR MAJOR = 100 YEAR

DISCHARGE ATTENUATION REQUIREMENT:

1. SITE IS DIRECTLY ADJACENT TO GEORGES RIVER SO NO FLOW ATTENUATION IS PROPOSED.

WATER QUALITY TREATMENT REQUIREMENTS:

- 90% REMOVAL OF GROSS POLLUTANTS (> 5MM);
- 85% REMOVAL OF TOTAL SUSPENDED SOLIDS;
- 65% REMOVAL OF TOTAL PHOSPHOROUS; AND
- 45% REMOVAL OF TOTAL NITROGEN.

REV	DESCRIPTION	DRAWN	APP'D	DATE
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C	ISSUED FOR DA	IH	IH	17.05.23
B	ISSUED FOR DA	IH	IH	09.02.23
A	ISSUED FOR DA	IH	IH	05.12.22

Lateral Estate — CLIENT

mpa. — ARCHITECT

31-33 SHEPHERD STREET, LIVERPOOL — PROJECT

STORMWATER MANAGEMENT PLAN - BASEMENT — TITLE

0050-C-21.dwg

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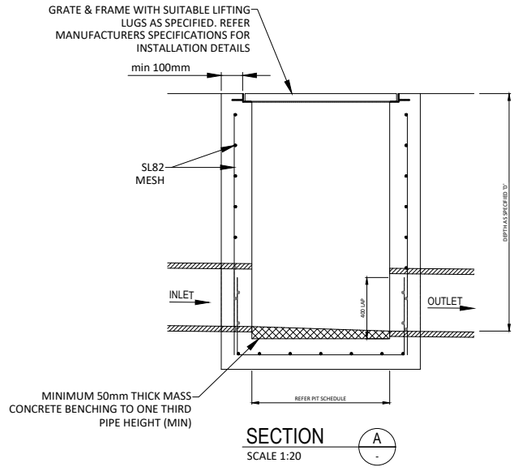
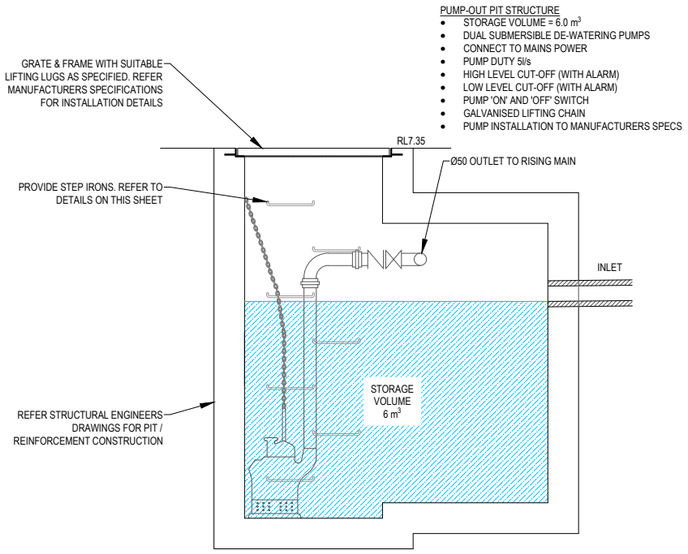
PRELIMINARY
NOT FOR CONSTRUCTION

AS NOTED	0050	C-21	C
SCALE @ A1	PROJECT No	DRAWING No	REV

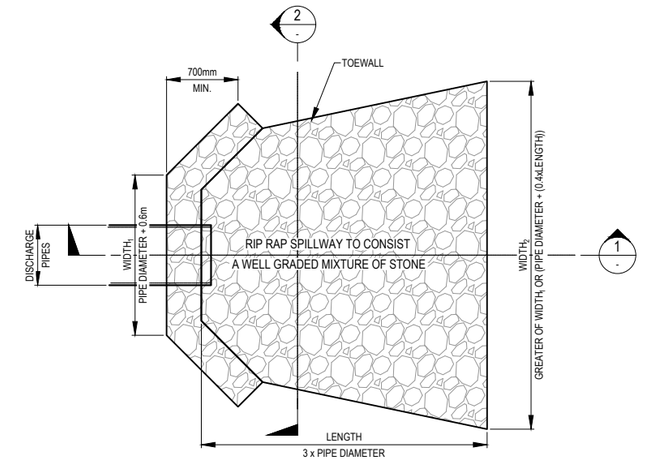
17/05/2023 9:38:44 AM



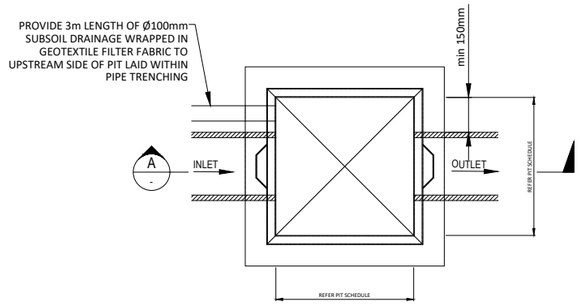
SECTION A
SCALE 1:20



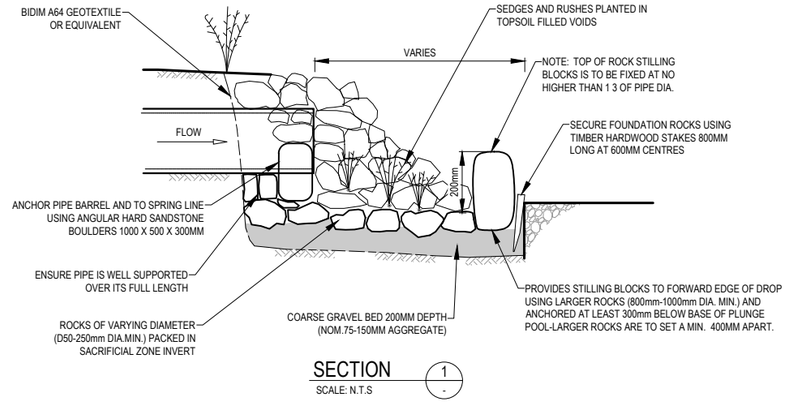
PUMP-OUT PIT DETAIL - BASEMENT DRAINAGE
SCALE 1:20



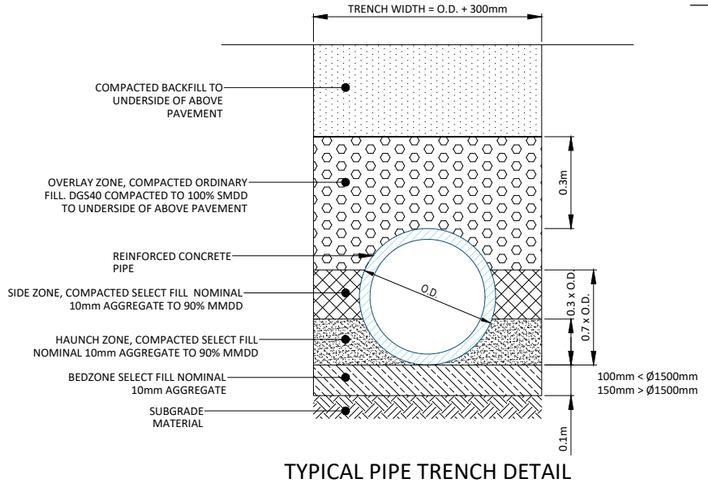
PLAN
TYPICAL HEADWALL TREATMENT
SCALE: NTS



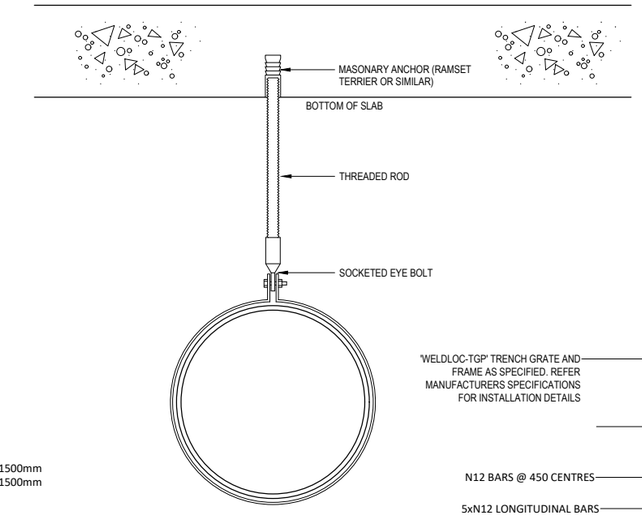
JUNCTION PIT DETAIL
SCALE 1:20



SECTION 1
SCALE: N.T.S

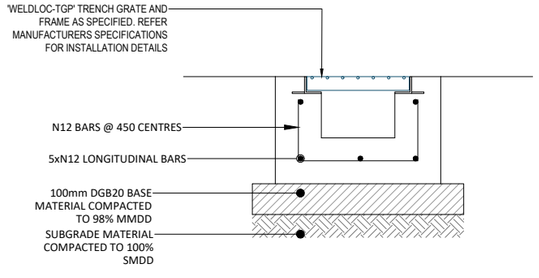


TYPICAL PIPE TRENCH DETAIL
SCALE 1:10

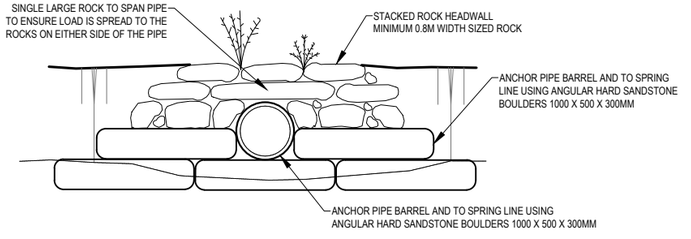


SUSPENDED PIPE BRACKET
SCALE: N.T.S.

NOTE:
1. THREADED ROD SIZES:
   Ø150 AND Ø100 PIPE - 10mm ROD
   Ø80 TO Ø40 PIPE - 8mm ROD
2. ALL FITTINGS SHALL BE INSTALLED TO MANUFACTURER'S RECOMMENDATIONS



GRATED DRAIN DETAIL
SCALE 1:10



SECTION 2
SCALE: N.T.S

1:100 2 1 0 2 4 A1
1:200 A3
HORIZONTAL

1:40 0.4 0 0.4 0.8 1.2 1.6 2 A1
1:80 A3
VERTICAL

REV	DESCRIPTION	DRAWN	APP'D	DATE
A	ISSUED FOR DA	IH	IH	05.12.22

Lateral Estate — CLIENT
mpa. — ARCHITECT

31-33 SHEPHERD STREET, LIVERPOOL — PROJECT
STORMWATER MANAGEMENT DETAILS — TITLE

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ABN 91 649 181 171

PRELIMINARY
NOT FOR CONSTRUCTION

AS NOTED	0050	C-25	A
SCALE @ A1	PROJECT No	DRAWING No	REV

0050-C-25.dwg
6/12/2022 10:38:48 AM

Appendix B – MUSICLink Output

LIVERPOOL CITY COUNCIL

music@link

MUSIC-*link* Report

Project Details		Company Details	
Project:		**Company:**	
Report Export Date:	9/02/2023	**Contact:**	
Catchment Name:	0050_31-33 Shepherd St_MUSIC Model_No Road	**Address:**	
Catchment Area:	0.651ha	**Phone:**	
Impervious Area*:	67.28%	**Email:**	
Rainfall Station:	67035 LIVERPOOL(WHITLAM		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1967 - 31/12/1976 11:54:00 PM		
Mean Annual Rainfall:	857mm		
Evapotranspiration:	1171mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.34		
Study Area:	Liverpool Sandy Loam Soil		
Scenario:	Liverpool Development		

* 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	22.1%	Rain Water Tank Node	2	Urban Source Node	4
TSS	89.7%	Generic Node	3		
TP	65.2%				
TN	57.6%				
GP	98.6%				

Comments

rt

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Rain	Rainwater Tank	% Reuse Demand Met	None	None	27.7166
Rain	Rainwater Tank	% Reuse Demand Met	None	None	29.86
Receiving	Receiving Node	% Load Reduction	None	None	22.1
Receiving	Receiving Node	GP % Load Reduction	90	None	98.6
Receiving	Receiving Node	TN % Load Reduction	45	None	57.6
Receiving	Receiving Node	TP % Load Reduction	65	None	65.2
Receiving	Receiving Node	TSS % Load Reduction	85	None	89.7
Urban	Building A Ground Catchment	Area Impervious (ha)	None	None	0.1095
Urban	Building A Ground Catchment	Area Pervious (ha)	None	None	0.1095
Urban	Building A Ground Catchment	Total Area (ha)	None	None	0.219
Urban	Building A Roof Catch	Area Impervious (ha)	None	None	0.101
Urban	Building A Roof Catch	Area Pervious (ha)	None	None	0
Urban	Building A Roof Catch	Total Area (ha)	None	None	0.101
Urban	Building B Ground Catchment	Area Impervious (ha)	None	None	0.1035
Urban	Building B Ground Catchment	Area Pervious (ha)	None	None	0.1035
Urban	Building B Ground Catchment	Total Area (ha)	None	None	0.207
Urban	Building B Roof Catch	Area Impervious (ha)	None	None	0.124
Urban	Building B Roof Catch	Area Pervious (ha)	None	None	0
Urban	Building B Roof Catch	Total Area (ha)	None	None	0.124

Only certain parameters are reported when they pass validation

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E: info@enscapestudio.com.au