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CIVIL ENGINEERING REPORT
PROPOSED WAREHOUSE DEVELOPMENT
5 SKYLINE CRESCENT,
BRINGELLY ROAD BUSINESS HUB,
HORNINGSEA PARK, NSW

henry&hymas

Revision 1.1

April 2022

Our Ref No. 21U79

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Project verification

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	Name	
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Disclaimer:
The information presented by Henry & Hymas in the Report has been collated and summarised from reporting by a variety of specialist consultants. Due to the current stage and nature of the project Henry & Hymas does not take responsibility for the information presented in this report other than those related to civil or stormwater design. Henry & Hymas strongly recommends the specialist reporting is reviewed in conjunction with any non-civil/stormwater related information presented.

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Preface

Henry & Hymas has been engaged by ESR Australia (ESR) to prepare this Civil Engineering Report (The Report) to satisfy civil engineering matters in support of the State Significant Development Application (Ref: SSD-37558583) for the proposed warehouse facility within the Bringelly Road Business Hub.

This Report aims to provide a summary of key civil engineering design elements of the proposed development application:

- General site locality, topography and existing characteristics;
- The proposed site works – earthworks and retaining walls;
- Stormwater management – flooding, water quality and quantity;
- Sediment and Erosion;
- Specific items raised in the Secretary's Environmental Assessment Requirements (SEARs) and authority submissions.

This Report has been prepared in conjunction with a set of Civil Engineering Drawings which show the general proposed civil and stormwater design for the development. The drawings are available for review in Appendix A of this Report.

The civil engineering design and strategy presented in this report have been designed to be consistent with the subdivision stormwater management concept documented in the Bringelly Road Business Hub Civil & Environmental Engineering Report by Northrop dated November 2014.

As the development is deemed a State Significant Development (SSD), the consenting authority is the NSW Department of Planning and Environment. The development is located within the local government area of Liverpool City Council and whilst the Council Development Control Plans (DCP) do not apply to the SSDA, the DCP and policy requirements pertaining to the Council were considered in the design.

The following principles have been adopted as part of the design process:

- Consideration of design intent in relation to functionality, expectations and requirements of the end user.
- Compliance with relevant Council and authority standards and policies.
- Compliance with the intent of the subdivision masterplan, refer above.
- Design coordination with the project team.
- A design philosophy sympathetic to the environment, terrain and landform.

The NSW Department of Planning, Industry and Environment has provided Secretary's Environmental Assessment Requirements (SEARs) dated 4th April 2022 (Ref: SSD 37558583). In addition to providing a general summary of civil engineering aspects of the project, this report addresses the relevant SEARs items relating to stormwater drainage, sediment and erosion control, and flooding. Detailed on how these SEARs items have been addressed can be found in Chapter 9 of this report.

1. Site overview

The site is located within the Horningsea Park industrial/retail subdivision, the Bringelly Road Business Hub, in the municipality of Liverpool City Council. The site is located in the south-western corner of the subdivision and identified by Lot 1, Deposited Plan 1266533 at 5 Skyline Crescent, Horningsea Park.

The surrounding land uses for the development are as follows:

- To the north of the site is an industrial development, part of the Bringelly Road Business Hub subdivision.
- To the east of the site is Skyline Crescent followed by a vacant lot.
- To the south of the site is further Infrastructure developments, Bringelly Road & Glenfield to Leppington Rail Line
- To the west of the site is Rural Residential land.

The site is an irregularly shaped area covering 12,892 m^2 and is bounded to the north and east by Skyline Crescent, to the south by Bringelly Road and to the west by the unformed Stuart Road. Current access to the site is through a gate off the western end of the Skyline Crescent cul-de-sac. A site survey was undertaken by Landpartners on the 20th of January 2022, an excerpt of the survey plan is shown below with a full-size copy in Appendix B.

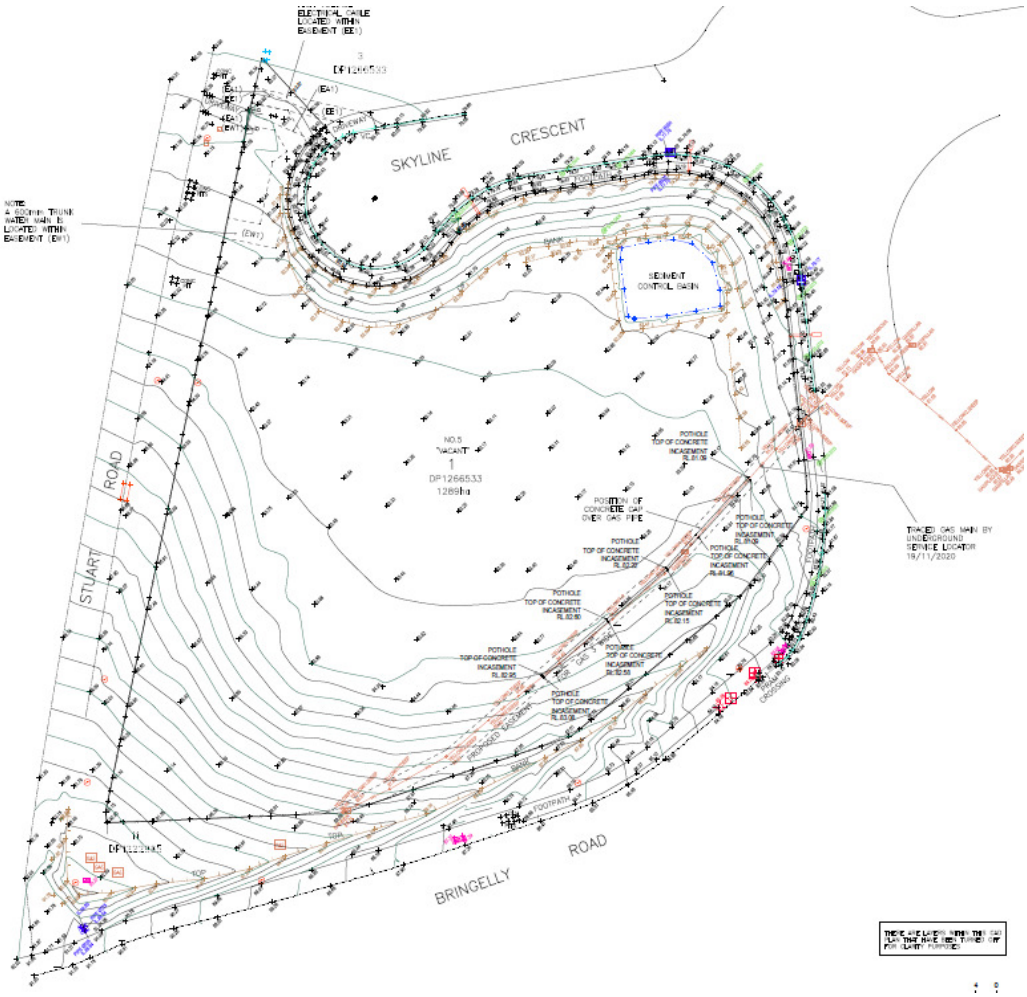

Figure 1: Survey Plan of the site. Landspartners 2022

The site was formed as a prepared pad site during the subdivision infrastructure works for the Bringelly Road Business Hub and is currently vacant. The site was subject to cutting and filling works during the subdivision construction. The site falls from the south and west to the north and east. The western and southern boundaries are graded as a smooth batter down to the average site levels sitting at approx RL 82.5 Australian height datum (AHD). The site currently drains to a temporary above-ground sediment control basin which discharges via scour protection to Skyline Cresent. During subdivision works a diameter 525mm stormwater stub line was installed as a stormwater discharge location for the development.

A large diameter high-pressure gas main traverses the southeast corner of the site at an approx depth of 2.5m to 1.5m. The high-pressure gas main is concrete-encased for a large portion of the line which sits within the subject site boundary. Additional services are located onsite and are shown on the site survey included in Appendix B of this report.

2. Proposed Development

The proposed development includes the construction of a new warehouse covering 4,470m^2 including associated offices, loading docks, car parking and truck access pavements across a total site area of approximately 12,800m^2. The warehouse will occupy the central part of the site with truck pavements and a loading dock on the northern side, and car parking along the western side. New vehicular crossovers will be provided to connect the site with the southern side of the Skyline Crescent cul-de-sac. The architectural plans were is undertaken by SBA Architects, an excerpt of the concept site plan is shown below with a full-size copy in Appendix C.

Figure 2: Architectural plan of the proposed development. SBA Architects 2022

3. Bulk Earthworks

Cut and fill earthworks are required to achieve the grades and levels required to produce a serviceable and marketable development that achieves vehicular and pedestrian access from Skyline Crescent. The cut and fill quantities for the site result in a site export/spoil of material in the order of 22,948m^3. The distribution of cut and fill throughout the site is shown on civil engineering drawings 21U79_DA_BE01, Appendix A. A smaller-scale figure is shown below, Figure 3. Green represents filling and red represents cutting.

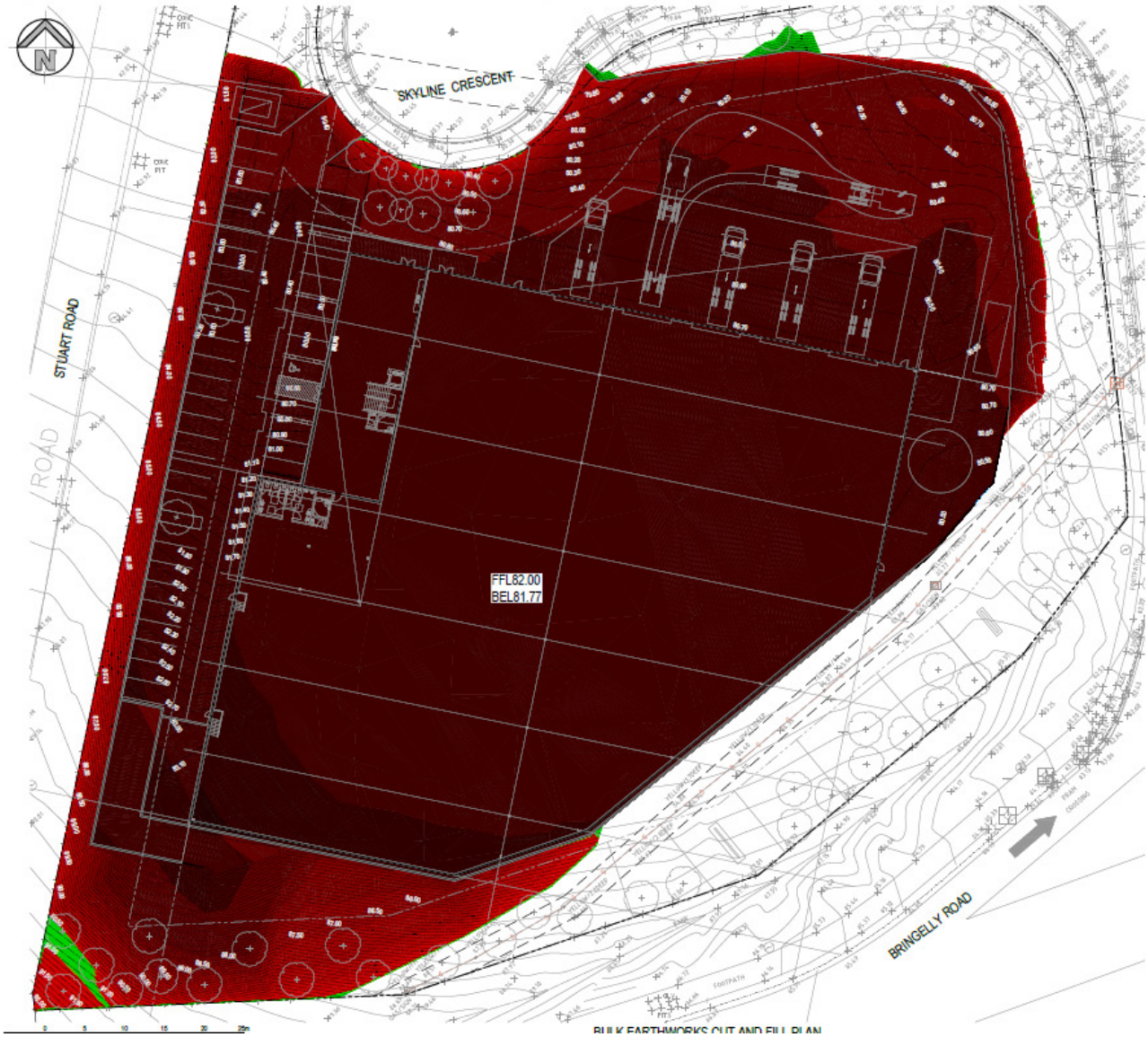

Figure 3: Bulk Earthworks Cutting and Filling Plan. Henry & Hymas 2022

Geotechnical investigations for the development were undertaken by Douglas Partners in April 2022. Site works, particularly earthworks and preparations of building and vehicular pavements, are proposed to be undertaken in accordance with the recommendations and findings of the geotechnical investigations.

4. Retaining Walls and Slope Stability

Earthworks batters are provided wherever possible as part of the grading design for the site. Earthworks batters will be provided at maximum slopes of 1(H) in 3(V) as per geotechnical advice by Douglas Partners and where short-term construction batters are implemented, these will be protected from erosion by appropriately installed sediment and erosion control measures.

Whilst earthworks batters will be provided wherever possible, retaining walls will be required in instances where there are significant level changes from existing boundary levels to the required floor level of RL 81.0m AHD. Given the current topography of the prepared subject site during subdivision planning, it is understood that significant retaining infrastructure works were intended to be undertaken during individual lot development to produce a serviceable development.

Retaining walls are proposed along the western boundary with Stuart Road and the southern/south-eastern boundary adjacent to the high-pressure Gas main. Retaining walls are proposed to be designed and constructed in a manner that is sympathetic to the surrounding infrastructure where movements and settlement of the retained soils are proposed to be limited to avoid adverse impacts to existing pavement surfaces and services.

Retaining wall plans and details are shown on the civil engineering drawings 21U79_DA_C300 and C310 in Appendix A.

5. Stormwater Management

5.1 Introduction

The proposed stormwater management system has been designed to reduce the overall impact of the development on the existing onsite and surrounding stormwater systems and flow regime. The proposed stormwater management system responds to the architectural layout and incorporates the natural topography and site constraints to produce a cost-effective layout that meets best industry practices and water quality and quantity objectives.

The stormwater management system for the proposed development has been designed to collect all concentrated flows from the proposed impervious areas such as roof, loading dock and car parking areas as well as stormwater runoff generated by pervious areas such as landscaping and earthworks batters. In accordance with Council guidelines, the in-ground stormwater pipe network has been designed to cater for the 20year ARI storm event. The system has also been designed in such a way that stormwater run-off generated by the 100yr ARI storm event will be conveyed via piped and overland flow paths with no impact on the subject development or surrounding developments/infrastructure. In the event of a total system blockage/failure, site grading is such that overland flow will be directed away from buildings with no impact on habitable areas.

The proposed stormwater system for the development will be designed in accordance and in consideration of the following:

- Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (1987 Edition), Volumes 1 and 2 (AR&R);
- AS 3500.3: National Plumbing and Drainage Code Part 3 – Stormwater Drainage;
- Liverpool City Council's relevant planning policies and control plans, specifically;
    - Liverpool City Council's Stormwater Drainage Design Specification D5
    - Liverpool City Council's Water Sensitive Urban Design Standard Drawings.
    - Liverpool City Council's Stormwater On-site Stormwater Detention Technical Specification (2003).

The stormwater management system is also designed to coordinate within the surrounding subdivision drainage system. As a prepared pad site, a stormwater connection line was provided in the north-east of the site and is proposed to be used as the stormwater connection and disposal location for the site.

The increased impervious surfaces (such as roads, roofs, driveways, etc) associated with the development will result in an increase in peak stormwater flows from the site during storm events. An On-site Stormwater Detention (OSD) system is proposed to be incorporated to control peak stormwater flows, refer to Chapter 5.2 for additional details.

Urban developments have the potential to increase gross pollutants, sediments, hydrocarbons and nutrient concentrations in stormwater runoff. To limit the impact on the downstream water quality, water quality measures at the pollutant source and end of line treatments have been provided, refer to Chapter 5.3 for additional details.

5.2 Water Quantity - On-site Stormwater Detention (OSD)

On-site Stormwater Detention (OSD) will be provided to control the peak stormwater flows from the site by temporarily detaining stormwater from major storms in an underground tank which is then discharged to the downstream drainage system at a controlled rate.

The proposed development should comply with the Liverpool City Council (LCC) OSD policy. In this case, OSD shall be provided to limit the peak post developed stormwater run-off flow to the pre-developed stormwater run-off flow for all storm events up until the 100-year ARI.

In accordance with the technical requirements outlined in Liverpool City Council's Stormwater On-site Stormwater Detention Technical Specification (2003), the hydraulic and hydrological modelling program DRAINS was used to determine the stormwater run-off flows in the pre-development and post-developed case, and thus calculate the required storage volume of OSD.

DRAINS Modelling Data

The DRAINS modelling software used the ARR 2019 procedures for rainfall and storm generation. The rainfall depths and temporal patterns were generated using the Bureau of Meteorology (BOM) and ARR Data hub websites respectively. The site location and co-ordinates used for the hydrological data generation is:

Site: Horningsea Park, NSW
Co-ordinates:
Latitude: 33.95071(S)
Longitude: 150.82962 (E)

Table 1 below summarises the impervious and pervious areas under pre-development and post-development scenarios. Times of concentration adopted in the DRAINS were calculated using Kinematic wave procedures.

Pre-developed and post-developed catchment plans that show the specific breakdown of sub-catchments can be found in the civil engineering drawings 21U79_DA_C250 and C251 including in Appendix A. A summary table, Table 1, is provided below:

	Pre - Development	Post – Development
Total Site Area (m2)	12,892	
Percentage of Impervious Area %)	0	64.4
Percentage of Pervious Area (%)	100	35.6

Table 1: Summary of site areas and factional impervious for OSD calculations

The following pre-developed and post-development stormwater run-off flows are calculated, refer to Table 2 below.

ARI	Pre-Development (L/s)	Post-Development (un-detained) (L/s)	Post-Development (detained) (L/s)	OSD Storage Volume Required (m^3)
5	188	314	188	82.9
20	323	463	236	228.5
100	466	574	448	291.1

Table 2: Peak flows for OSD sizing – pre-developed and post-development (detained) conditions

An OSD storage volume of 291.1m^3 is required to limit post-development stormwater run-off lows to less than pre-developed flows. OSD storage is proposed to be provided in the form of an underground tank located in the north of the development directly adjacent to the discharge location for the development. The location was chosen to limit catchment areas bypassing the OSD and provide an easily assessable location for maintenance. Detailed drawings and specifications of the proposed below ground OSD tank can be found on the civil engineering drawings 21U79_DA_C210 and C211 including in Appendix A.

5.3 Water Quality

Pollution and contamination dislodged or inherent to and in stormwater and stormwater run-off from urban developments have the potential to damage the ecology and health of local creeks and waterways. As such stormwater quality improvement devices (SQIDs) that aim to minimise pollution during construction and operation of the development have been incorporated into the overall stormwater management design. These devices have been sized, specified and designed in accordance with LCC's DCP, and LCC's Water Sensitive Urban Design Standards. A summary of the implements SQIDs can be seen in Chapter 5.4

The performance of the stormwater quality improvement devices (SQIDs) in mitigating pollution from urban development can be assessed by simulating a post developed pollutant reduction rate for the stormwater system as a whole. In accordance with LCC's DCP all commercial developments must achieve a minimum percentage reduction of the post developed average annual loads of pollutants in accordance with the Table 3 below:

Pollutant	% Post Development Reduction Target Liverpool City Council
Litter / Gross pollutants	90
Total Suspended Solids	85
Total Phosphorous	65
Total Nitrogen	45

Table 3: Post developed pollutant reduction targets

In order to better determine the conceptual design of the water quality treatment trains and to ensure the treatment trains satisfy the reduction parameters outlined in Table 3, a Model for Urban Stormwater Improvement Conceptualisation (MUSIC) was developed.

The MUSIC model was set up with the in-built rainfall station, time period data, evapotranspiration data, source node data, treatment node data and run-off parameters provided by the MUSIC link system, using the LCC MUSIC link feature. A schematic of the MUSIC model can be viewed below in Figure 4. The schematic illustrates the interrelationship between source nodes (catchments) and treatment nodes (water quality treatment measures) for the catchment. The MUSIC modelling catchment plan and detailed catchment plan relating to the site-specific topography used for the MUSIC model schematic layout are documented in civil engineering drawings available in Appendix A.

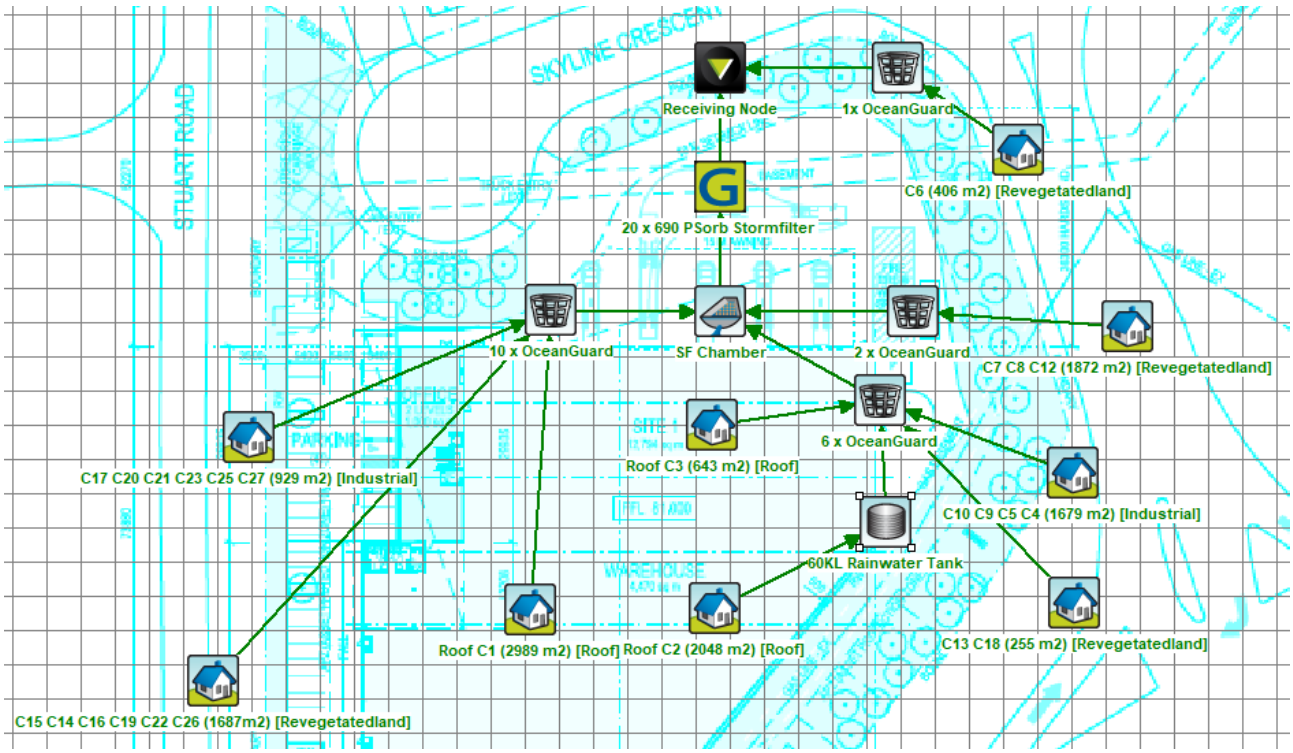

Figure 4: Schematic of Site Music Model

The resultant reduction in post developed pollutants calculated by the simulation are presented in Table 4 below. With the implementation of the following stormwater quality improvement (SQIDs) devices, the resultant post developed pollutant loads have been reduced below the reduction target for all targeted pollutants.

Pollutant	% Post Development Reduction Target Liverpool City Council	Resultant % Post Development Reduction Obtained
Litter / Gross pollutants	90	100
Total Suspended Solids	85	91.2
Total Phosphorous	65	67.4
Total Nitrogen	45	49.6

Table 4: Resultant post developed pollutant reduction targets obtained

5.4 Stormwater quality improvement devices (SQIDs)

Primary Treatment - Pit Baskets

As part of an effective treatment train for the site system, selected areas of the development or targeted removal zones (TRZs), will be pre-treated via passive screening pit baskets. To form a site-wide primary treatment system the TRZ for the development encompasses all external areas not beneath roofs and exposed to surface run-off. Target zones, mostly comprising of highly trafficked and hardstand areas that are subject to higher instances of pollution and litter, and stand most to benefit from effective pre-treatment and have been modelled individually in MUSIC to confirm overflow capacities of the basket inserts are accurately taken into account.

The pit basket proposed to be used is the “200-micron mesh Oceanguard” pit basket filter by OceanProtect. Pit baskets to be fitted with the “Oceanguard” bit basket are noted on drawing 21U79_DA_C200.

The maintenance of the pit baskets is important to ensure the effective removal of pollutants. As such, a maintenance schedule will be required to be detailed at the Construction Certificate stage. For this submission we have provided the generic maintenance schedule as prepared by Ocean Protect, refer to Appendix D.

Secondary treatment – Filter cartridges.

In order to meet the water quality requirements, and to achieve a successful implement a treatment train approach, a media filtration chamber is located at the end of the major stormwater drainage lines. The media filtration (P.sorb Stormfilter cartridges by Ocean Protect) targets the removal of gross pollutants, suspended solids, targeted nutrients and hydrocarbons within the stormwater run-off generated by the developed site areas and is proposed to be used in this development.

Media filtration will be incorporated into the stormwater system by the addition of a Stormfilter chamber into the belowground OSD tank. The OSD tank is proposed to house twenty (20) x 690mm P.sorb filter cartridges. Internal site stormwater will be directed to the filter chamber as shown on our the civil engineering plan 21U79_DA_100. Sections and details of the filter units including configuration and weir heights are documented on drawings 21U79_DA_C210-C211.

The maintenance of the filter cartridges is important to ensure the effective removal of pollutants. As such, a maintenance schedule will be required to be detailed at the Construction Certificate stage. For this submission we have provided the generic maintenance schedule as prepared by Ocean Protect, refer Appendix D.

5.5 Water Conservation – Rainwater Reuse

To assist with water conservation, water reuse is encouraged for all new developments as outlined in LCC's DCP. Water demand is proposed to allow for internal rainwater reuse at the rate of 0.1 KL/day per toilet/urinal and an external landscape watering (excluding turf areas) at the rate of 0.4 kL/year/m^2 modelled as PET-Rain.

The rainwater tank aims to capture and store stormwater run-off from the roof for toilet and urinal flushing as well as reuse for landscape watering.

A preliminary water quality MUSIC model was established to determine preliminary tank sizes and to assess the feasibility of provision of reuse onsite. The following assumptions are listed below and presented for review:

- Internal rainwater reuse at the rate of 0.1 KL/day per toilet/urinal.
- External landscape watering 0.4kL/year/m^2 for irrigation modelled as PET-Rain.
- Roof area (2048m^2) draining to the rainwater tank.
- Rainwater tank (RWT) size will be selected based on efficiency curves and to be fit-for-purpose considering the use of the development.

Preliminary water quality MUSIC modelling was performed in accordance with LCC MUSIC link feature, MUSIC modelling guidelines and the above assumptions listed above. The preliminary MUSIC modelling established an RWT volume of 60kL which satisfies approximately 36% of non-potable demand for the subject site. It should be noted there is significant landscape areas onsite which increase the landscape watering demand and reduce the percentage demand met.

6. Sediment and Erosion Control

During construction, appropriate sediment and erosion control measures need to be implemented to ensure that downstream receiving waters are not adversely impacted as a result of construction activities. As mentioned previously, a sediment control basin has already been implemented as part of subdivision works and is proposed to be maintained, and if required, augmented during construction. The engineering drawings 21U79_DA_SE01 (refer to Appendix A) by Henry & Hymas outline appropriately designed and detailed measures to mitigate against this risk. These measures have been designed in accordance with the requirements of the publication "Landcom – Managing Urban Stormwater - Soils and Construction, Volume 1, 4th Edition March 2004" and Liverpool City Council requirements.

7. Flooding

Urban development has the potential to disrupt the natural flow of floodwater during large storm events as well as be impacted by mainstream flooding. The existing site is not encumbered by any significant upstream overland flow paths. Building form, stormwater pipework and grading have been designed in a matter that does not impede existing stormwater run-off and, as such, no impact on the existing flow regime around or downstream of the property is expected. Upstream catchments that drain onto the subject site are present, however, are minor. The location and size of these catchments are shown on the civil engineering drawings 21U79_DA_C250. The site's stormwater system has been designed to capture and direct these minor upstream catchments to the intended downstream stormwater discharge location in a manner that is safe and does not pose risk to persons or property.

From a review of relevant flood studies for the Bringelly Road Business Hub subdivision, it is understood the site is not at risk of mainstream flooding. Comprehensive flood investigations were undertaken during the design of the subdivision with all pad sites found above the 100-year ARI flood level with a 500mm freeboard and allowance for climate change. The proposed development, located in the high regions of the subdivision, is located significantly above the Predicted Maximum Flood (PMF) mainstream flood level of the local floodplain. Refer to Bringelly Road Business Hub Civil & Environmental Engineering Report by Northrop dated November 2014 and Cabramatta Creek Floodplain Management Study & Plan by Bewsher Consulting Pty Ltd Floodplain Management Consultants dated October 2004 for additional details.

8. Conclusion

In general, the engineering objectives of civil design and stormwater management elements mentioned above are to create a system that is based on the architectural layout and incorporates the natural topography and site constraints to produce a cost-effective and appropriate drainage system that meets best industry practices and governing water quality and quantity objectives.

We trust the information provided in this report satisfies matters relating to bulk earthworks, retaining walls and stormwater matters such as On-site Stormwater Detention, water Quality Controls, water reuse and flooding.

9. Response to SEARS

The NSW Department of Planning and Environment has provided Secretary's Environmental Assessment Requirements (SEARs) dated 4th April 2022 (Ref: SSD 37558583). SEARs requirements relating to civil engineering (and stormwater) from relevant stakeholders and authorities are listed below, with a response from the civil engineering designer provide beneath:

Relevant Sears item 1: Stormwater management, excerpt below.

13. Stormwater and Wastewater

• Provide an Integrated Water Management Plan for the development that:

o is prepared in consultation with the local council and any other relevant drainage or water authority.

o details the proposed drainage design for the site including any on-site detention facilities, water quality management measures and the nominated discharge points, on-site sewage management, and measures to treat, reuse or dispose of water.

o demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties.

• 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.

Response:

This civil engineering report has been compiled to address matters relating to stormwater management. It is understood that significant consultation was undertaken with Liverpool City Council and relevant authorities during the design of the subdivision stormwater management concept documented in the Bringelly Road Business Hub Civil & Environmental Engineering Report by Northrop dated November 2014. The stormwater management strategy for the proposed development has been designed to be consistent with the subdivision stormwater management concept prepared in consultation with Council as well as Council's water management policies, including and not limited to:

- Liverpool City Council's Stormwater Drainage Design Specification D5
- Liverpool City Council's Water Sensitive Urban Design Standard Drawings.
- Liverpool City Council's Stormwater On-site Stormwater Detention Technical Specification (2003).

Details and specifications regarding the on-site stormwater detention facilities, water quality management measures, the nominated discharge point and measures to treat, reuse or dispose of water have been included in Chapter 5 of this report as well as the civil engineering drawings included in Appendix A of this report.

All proposed drainage works are located within the subject site and as such no drainage infrastructure is proposed to be dedicated to the local council (or any other drainage or water authority).

Relevant Sears item 2: Flood Risk, excerpt below.

14. Flooding Risk

• Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Floodplain Development Manual.

• Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.

Response:

From a review of relevant flood studies for the Bringelly Road Business Hub subdivision, it is understood the site is not at risk of mainstream flooding. Comprehensive flood investigations were undertaken during the design of the subdivision with all pad sites founded above the 100-year ARI flood level with a 500mm freeboard and allowance for climate change. The proposed development, located in the high regions of the subdivision, is located significantly above the Predicted Maximum Flood (PMF) mainstream flooding level of the local floodplain. With the development found significantly above the PMF flood level the development does not have any risk of mainstream flooding, nor any impacts on the existing flood regime and there are no changes to the flood risk on-site or off-site.

Refer to Bringelly Road Business Hub Civil & Environmental Engineering Report by Northrop dated November 2014 and Cabramatta Creek Floodplain Management Study & Plan by Bewsher Consulting Pty Ltd Floodplain Management Consultants dated October 2004 for additional details.

The existing site is not encumbered by any significant upstream overland flow paths. Building form, stormwater pipework and grading have been designed in a matter that does not impede existing stormwater run-off and, as such, no impact on the existing flow regime around or downstream of the proposed development is expected.

10. Appendices

Appendix A: Civil Engineering Drawings by Henry & Hymas Engineers

Appendix B: Detailed site survey by Land partners (2022)

Appendix C: Architectural concept plan by SBA Architects Revision P5 dated April 2022

Appendix D: Indicative maintenance manuals by Ocean Protect

Appendix A: Civil Engineering Drawings by Henry & Hymas Engineers

PROPOSED WAREHOUSE DEVELOPMENT
BRINGELLY ROAD, LEPPINGTON NSW
CIVIL ENGINEERING WORKS

LOCALITY SKETCH

SCALE: N.T.S.

DRAWING SCHEDULE	
21U79_DA_C000	COVER SHEET, DRAWING SCHEDULE AND LOCALITY SKETCH
21U79_DA_C010	NOTES
21U79_DA_C100	GENERAL ARRANGEMENT PLAN
21U79_DA_C120	SITE SECTIONS
21U79_DA_C200	STORMWATER MISCELLANEOUS DETAILS AND PIT LID SCHEDULE
21U79_DA_C201	STORMWATER MISCELLANEOUS DETAILS
21U79_DA_C210	OSD PLAN AND SECTION
21U79_DA_C211	OSD DETAILS
21U79_DA_C250	POST-DEVELOPMENT STORMWATER CATCHMENT PLAN
21U79_DA_C251	PRE-DEVELOPMENT STORMWATER CATCHMENT PLAN
21U79_DA_C300	RETAINING WALL PLAN
21U79_DA_C310	RETAINING WALL TYPICAL DETAILS
21U79_DA_SE01	SEDIMENT AND EROSION CONTROL PLAN
21U79_DA_SE02	SEDIMENT AND EROSION CONTROL TYPICAL SECTIONS AND DETAILS
21U79_DA_BE01	BULK EARTHWORKS CUT AND FILL PLAN - BULK LEVEL
21U79_DA_BE02	BULK EARTHWORKS CUT AND FILL PLAN - BULK DEPTH

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client
ESR

Architect
SBA ARCHITECTS

This drawing and design remains the property of Henry & Hymas and may not be copied in whole or in part without the prior written approval of Henry & Hymas.

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Project
PROPOSED WAREHOUSE DEVELOPMENT
BRINGELLY ROAD, LEPPINGTON NSW

Title
COVER SHEET, DRAWING SCHEDULE AND LOCALITY SKETCH

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 21U79_DA_C000
Revision: 01

GENERAL NOTES:

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL'S SPECIFICATION. CONTRACTOR TO OBTAIN AND RETAIN A COPY ON SITE DURING THE COURSE OF THE WORKS.
2. ALL NEW WORKS ARE TO MAKE A SMOOTH JUNCTION WITH EXISTING CONDITIONS AND MARRY IN A 'WORKMANLIKE' MANNER.
3. THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL SERVICES WITH EACH RELEVANT AUTHORITY. ANY DAMAGE TO SERVICES SHALL BE RECTIFIED BY THE CONTRACTOR OR THE RELEVANT AUTHORITY AT THE CONTRACTOR'S EXPENSE. SERVICES SHOWN ON THESE PLANS ARE ONLY THOSE EVIDENT AT THE TIME OF SURVEY OR AS DETERMINED FROM SERVICE DIAGRAMS. H & H CONSULTING ENGINEERS PTY. LTD CANNOT GUARANTEE THE INFORMATION SHOWN NOR ACCEPT ANY RESPONSIBILITY FOR INACCURACIES OR INCOMPLETE DATA.
4. SERVICES & ACCESSES TO THE EXISTING PROPERTIES ARE TO BE MAINTAINED IN WORKING ORDER AT ALL TIMES DURING CONSTRUCTION.
5. ADJUST EXISTING SERVICE COVERS TO SUIT NEW FINISHED LEVELS TO RELEVANT AUTHORITY REQUIREMENTS WHERE NECESSARY.
6. REINSTATE AND STABILISE ALL DISTURBED LANDSCAPED AREAS.
7. MINIMUM GRADE OF SUBSOIL SHALL BE 0.5% (1:200) FALL TO OUTLETS.
8. ALL TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS, EROSION AND SEDIMENTATION CONTROL PLAN AND LIVERPOOL CITY COUNCIL'S REQUIREMENTS WHERE APPLICABLE.
9. CONTRACTOR TO CHECK AND CONFIRM SITE DRAINAGE CONNECTIONS ACROSS THE VERGE PRIOR TO COMMENCEMENT OF SITE DRAINAGE WORKS.
10. PROPERTIES AFFECTED BY THE WORKS ARE TO BE NOTIFIED IN ADVANCE WHERE DISRUPTION TO EXISTING ACCESS IS LIKELY.

SURVEY NOTES

1. THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY THE SURVEYOR SPECIFIED IN THE TITLE BLOCK.
2. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. HENRY AND HYMAS PTY. LTD. DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.
3. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT HENRY AND HYMAS PTY. LTD. THE FOLLOWING NOTES HAVE BEEN TAKEN DIRECTLY FROM ORIGINAL SURVEY DOCUMENTS.

ORIGIN OF LEVELS	SSM 192186 (RL 79.008)
DATUM	A.H.D.

SITEWORKS NOTES

1. DATUM : A.H.D.
2. ORIGIN OF LEVELS : REFER TO BENCH OR STATE SURVEY MARKS WHERE SHOWN ON PLAN.
3. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
4. ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS & THE DIRECTIONS OF THE SUPERINTENDENT.
5. EXISTING SERVICES UNLESS SHOWN ON THE SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
6. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS ACHIEVED.
7. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
8. CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATION IS TO BE UNDERTAKEN OVER TELSTRA OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.
9. CONTRACTOR TO OBTAIN AUTHORITY APPROVALS WHERE APPLICABLE.
10. MAKE SMOOTH TRANSITION TO EXISTING SURFACES AND MAKE GOOD.
11. THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED LANDSCAPE, ARCHITECTURAL, STRUCTURAL, HYDRAULIC AND MECHANICAL DRAWINGS AND SPECIFICATIONS
12. OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED RELATING
13. TO DEVELOPMENT AT THE SITE.
14. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MINIMUM OF 50mm IN BITUMINOUS PAVING.
15. ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MINIMUM OF 500mm BEYOND EDGE OF PAVING.
16. GRADES TO PAVEMENTS TO BE AS IMPLIED BY RL'S ON PLAN . GRADE EVENLY BETWEEN NOMINATED RL'S. AREAS EXHIBITING PONDING GREATER THAN 5mm DEPTH WILL NOT BE ACCEPTED UNLESS IN A DESIGNATED SAG POINT.
17. ALL COVERS AND GRATES ETC TO EXISTING SERVICE UTILITIES ARE TO BE ADJUSTED TO SUIT NEW FINISHED SURFACE LEVELS WHERE APPLICABLE.

BULK EARTHWORKS/ SUBGRADE PREPARATION - SITEWORKS.

1. REFER TO GEOTECHNICAL INVESTIGATION REPORT OR INFORMATION RELATING TO EXISTING GROUND CONDITIONS, SITE TREATMENT AND SUPERVISION. REFERENCE GEOTECH REPORT BY DOUGLAS PARTNERS REFERENCE NUMBER 213088.00 DATED APRIL 2022 AND ALL RELEVANT PRECEDING REPORTS.
2. THE LOCATIONS OF UNDERGROUND SERVICES SHOWN ON THESE DRAWINGS HAVE BEEN PLOTTED FROM SURVEY AND AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE.
3. HENRY AND HYMAS PTY LTD CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS, ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN ARISING FROM ANY CAUSE WHATSOEVER.
CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION.
FOR COMMENCEMENT OF WORKS ON SITE, SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.
4. ALL SERVICES ARE TO BE LOCATED AND CUT OFF PRIOR TO THE COMMENCEMENT OF EXCAVATION AND FILLING OPERATIONS.
5. ALL TOP SOIL, ORGANIC MATTER AND FILL MATERIAL SHALL BE REMOVED FROM ALL AREAS UNDER BUILDING AND CARPARK LOCATIONS TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER. AREAS TO BE FULLY STRIPPED OF EXISTING FILL AND DARK BROWN BLACK UPPER ORGANIC ALLUVIUM, OR OBVIOUS UNSUITABLE MATERIAL.
6. EXCAVATE TO ACHIEVE SUBGRADE LEVELS WHERE NECESSARY.
7. THE EXPOSED SUBGRADE AFTER STRIPPING AND/ OR EXCAVATION IS TO BE PROOF ROLLED IN ACCORDANCE WITH GEOTECH ENGINEERS REQUIREMENTS UNDER THE SUPERVISION OF AN EXPERIENCED GEOTECHNICAL ENGINEER OR AN EXPERIENCED CIVIL ENGINEER. ANY AREAS ON THE SUBGRADE EXHIBITING EXCESSIVE DEFLECTION / MOVEMENT UNDER ROLLER TO BE EXCAVATED TO A MIN. DEPTH OF 0.5m AND REPLACED WITH APPROVED GRANULAR MATERIAL COMPACTED IN 250mm LOOSE LAYERS OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
8. ENGINEERED FILL FOR REPLACEMENT OF SOFT OR HEAVING AREAS OR FOR BULK FILLING TO COMPRISE ESSENTIALLY OF GRANULAR MATERIALS (EG. EXCAVATED SHALE), WITH A PARTICLE SIZE NOT GREATER THAN 75mm DIAMETER. ENGINEERED FILL TO BE PLACED IN LAYERS NOT EXCEEDING 250mm LOOSE THICKNESS AND COMPACTED TO 100% OF STANDARD MAXIMUM DRY DENSITY (SMDD) WITHIN ± 2% OF OPTIMUM MOISTURE CONTENT (OMC).
9. IMPORTED FILLING (IF REQUIRED) IS TO BE TO THE APPROVAL OF THE GEOTECHNICAL ENGINEER. THE CONTRACTOR IS TO NOMINATE THE SOURCE AND PROVIDE A SAMPLE FOR APPROVAL PRIOR TO IMPORTATION AND PLACEMENT ON SITE.
10. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING.
FREE FORM ORGANIC AND PERISHABLE MATTER
MAXIMUM PARTICLE SIZE = 75mm
MAXIMUM PLASTICITY INDEX = 15%
MIN CBR 5%

    ALL IMPORTED FILL MATERIAL SHALL BE IN ACCORDANCE WITH SPECIFICATIONS FROM GEOTECH REPORT BY DOUGLAS PARTNERS REFERENCE NUMBER 213088.00 DATED APRIL 2022 AND ALL RELEVANT PRECEDING REPORTS.
11. ALL EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH GEOTECH REPORT BY DOUGLAS PARTNERS REFERENCE NUMBER 213088.00 DATED APRIL 2022 AND ALL RELEVANT PRECEDING REPORTS.
12. IN-SITU DENSITY TESTING AND SUPERVISION MUST BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINTED WITHIN GEOTECH REPORT BY DOUGLAS PARTNERS REFERENCE NUMBER 213088.00 DATED APRIL 2022 AND ALL RELEVANT PRECEDING REPORTS.

COMPACTION REQUIREMENTS

1. PREPARATION FOR PAVEMENT: CLEAR SITE, STRIP TOP-SOIL, CUT AND FILL AND PREPARATIONS OF SUB-GRADE SHALL BE AS DESCRIBED IN "SUBGRADE PREPARATION - SITEWORKS".
2. SUB-GRADE SHALL BE COMPACTED TO 98% STANDARD MAXIMUM DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1., TOP 300MM TO 100% SDD.
3. FOR A SAND SUBGRADE, COMPACTION SHALL BE TO MIN.90% DENSITY INDEX AS PER AS1289 E6.1
4. LOWER BASE COURSE SHALL BE CONSTRUCTED FROM CRUSHED ROCK COMPACTED TO 98% MODIFIED MAXIMUM DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1. OF THICKNESS NOTED ON DRAWINGS.
5. BASE COURSE SHALL BE CONSTRUCTED FROM FINE CRUSHED ROCK COMPACTED TO 98% MODIFIED MAXIMUM DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1 OF THICKNESS NOTED ON DRAWINGS.
6. WEARING SURFACE SHALL BE ASPHALTIC CONCRETE TO STANDARD SPECIFICATION
7. TESTING OF THE SUBGRADE AND PAVEMENT LAYERS SHALL BE CARRIED OUT BY APPROVED N.A.T.A. REGISTERED LABORATORY.

KERBING NOTES:

INCLUDES ALL KERBS, GUTTERS, DISH DRAINS, CROSSING AND EDGES.

1. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSING TO BE CONSTRUCTED ON MINIMUM 75mm GRANULAR BASE COURSE COMPACTED TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1.
2. EXPANSION JOINTS (EJ) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILTER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATION IN KERBS.
3. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
4. PROVIDE BROOMED FINISH TO ALL RAMPED AND VEHICULAR CROSSINGS, ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
5. IN THE REPLACEMENT OF KERBS:
EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm FROM LIP OF GUTTER. UPON COMPLETION OF NEW KERBS, NEW BASECOURSE AND SURFACE IS TO BE LAID 900mm WIDE TO MATCH EXISTING MATERIALS AND THICKNESS. EXISTING ALLOTMENT DRAINAGE PIPE'S ARE TO BE BUILT INTO NEW KERB WITH A 100mm DIA HOLE. EXISTING KERBS ARE TO BE COMPLETELY REMOVED WHERE NEW KERBS ARE SHOWN.

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR
Architect: SBA ARCHITECTS

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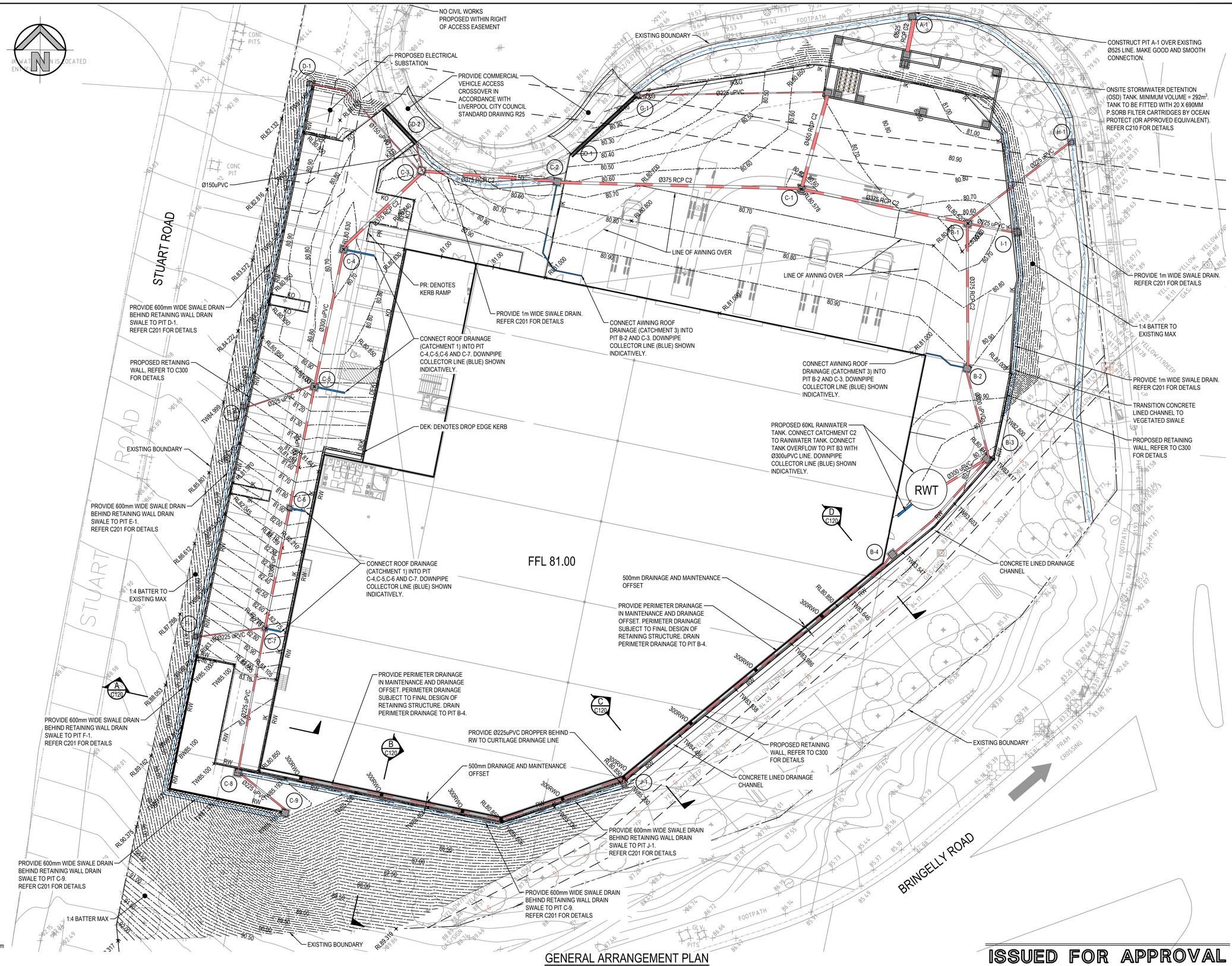
Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW
Title: NOTES

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 21U79_DA_C010
Revision: 01

LEGEND

- EXISTING BOUNDARY
- R — PROPOSED RIDGE LINE
- V — PROPOSED VALLEY LINE
- SS — PROPOSED SUBSOIL LINE
- PROPOSED JUNCTION PITS
- PROPOSED SURFACE INLET PITS
- 300RWO — PROPOSED SURFACE OUTLET
- A-1 — LINE LETTER / PIT NUMBER — PROPOSED PIT TAG
- 40.125 / Ø425RCP / 20.450m / 1.5% / 39.818 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED GRATED DRAIN
- PROPOSED STORMWATER PIPE
- PROPOSED DOWNPIPE COLLECTOR LINE
- 82.70 — EXISTING CONTOURS
- 83.40 — PROPOSED CONTOURS
- 83.40 — PROPOSED SPOT LEVEL
- K&G — PROPOSED KERB & GUTTER
- KO — PROPOSED KERB ONLY
- IK — PROPOSED INTEGRAL KERB
- DEK — PROPOSED DROP EDGE KERB
- G — EXISTING GAS LINE
- RW — PROPOSED RETAINING WALL
- PROPOSED SWALE



0 5 10 15 20 25m

5 4 3 2 1

SCALE 1:250

GENERAL ARRANGEMENT PLAN

SCALE: 1:250

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR

Architect: SBA ARCHITECTS

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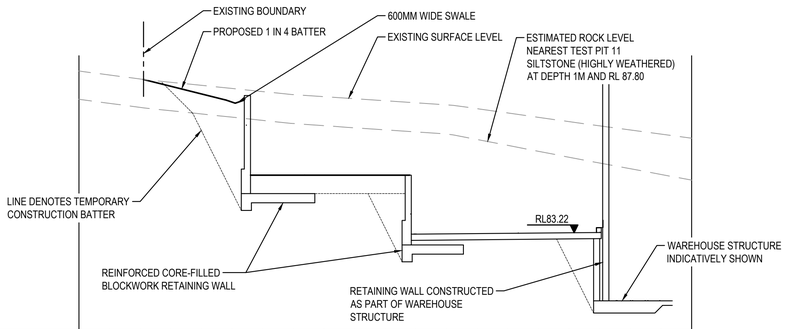
Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW

Title: GENERAL ARRANGEMENT PLAN

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:250

Drawing number: 21U79_DA_C100

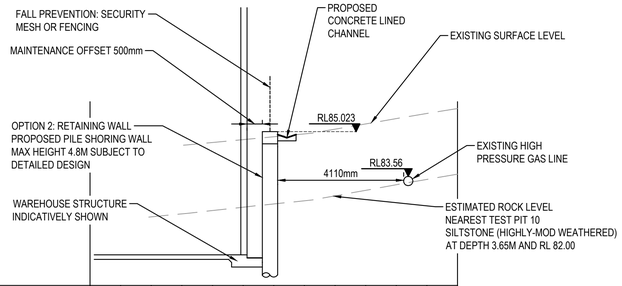
Revision: 01



DATUM R.L.80.00

DESIGN LEVELS				88.00	87.75	87.48	85.10	85.10	85.10	85.10	85.10	83.17	83.18	83.19	83.20	83.21	83.22	83.23	81.00	81.00	81.00
DESIGN LEVELS				87.90	87.65	87.38	85.00	85.00	85.00	85.00	85.00	83.07	83.08	83.09	83.10	83.11	83.12	83.13	80.77	80.77	80.77
EXISTING LEVELS	88.50	88.37	88.24	88.13	88.03	87.93	87.83	87.73	87.66	87.60	87.53	87.46	87.39	87.27	87.13	86.99	86.85	86.71	86.58	86.44	86.31
CHAINAGE	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000	16.000	17.000	18.000	19.000	20.000

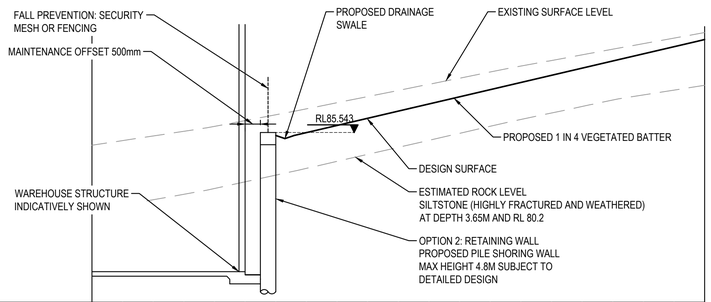
SECTION A C100
SCALE: 1:100



DATUM R.L.80.00

DESIGN LEVELS	81.00	81.00	81.00	81.00	81.00	81.00								
DESIGN LEVELS	80.77	80.77	80.77	80.77	80.77	80.77								
EXISTING LEVELS	84.34	84.42	84.50	84.58	84.67	84.76	84.85	84.95	85.10	85.27	85.45	85.61	85.78	
CHAINAGE	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000	

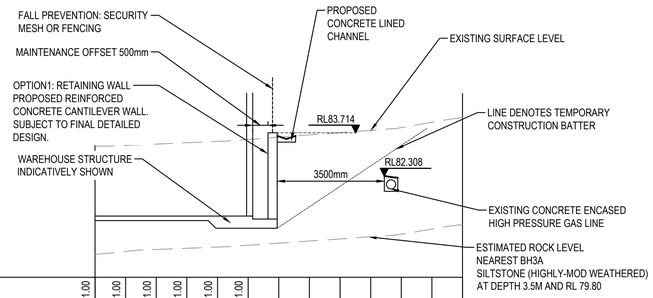
SECTION C C100
SCALE: 1:100



DATUM R.L.80.00

DESIGN LEVELS	81.00	81.00	81.00	81.00	81.00	81.00	85.27	85.54	85.77	86.00	86.24	86.47	86.71	86.94	87.17	87.41	87.64	87.87	88.11	88.34	88.57
DESIGN LEVELS	80.77	80.77	80.77	80.77	80.77	80.77	85.17	85.44	85.67	85.90	86.14	86.37	86.61	86.84	87.07	87.31	87.54	87.78	88.01	88.24	88.48
EXISTING LEVELS	85.13	85.28	85.43	85.58	85.74	85.93	86.12	86.31	86.51	86.71	86.91	87.11	87.31	87.52	87.71	87.89	88.08	88.26	88.44	88.62	88.80
CHAINAGE	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000	16.000	17.000	18.000	19.000	20.000

SECTION B C100
SCALE: 1:100



DATUM R.L.79.00

DESIGN LEVELS	81.00	81.00	81.00	81.00	81.00	81.00								
DESIGN LEVELS	80.77	80.77	80.77	80.77	80.77	80.77								
EXISTING LEVELS	83.28	83.30	83.35	83.39	83.44	83.50	83.57	83.65	83.72	83.80	83.89	84.06	84.22	
CHAINAGE	0.000	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	11.000	12.000	

SECTION D C100
SCALE: 1:100

0 2 4 6 8 10m
2 1
SCALE 1:100

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR
Architect: SBA ARCHITECTS

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Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW
Title: SITE SECTIONS

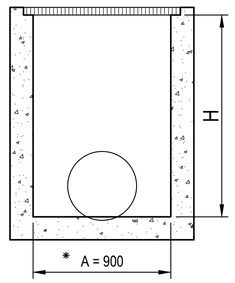
Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 21U79_DA_C120
Revision: 01

TYPICAL PIT CHAMBER SIZES

IT IS THE CONTRACTORS RESPONSIBILITY TO SELECT PIT CHAMBER SIZE WITH REGARDS TO PIPE SIZE, DEPTH TO INVERT AND SKEW ANGLE. REFER SKETCHES BELOW.

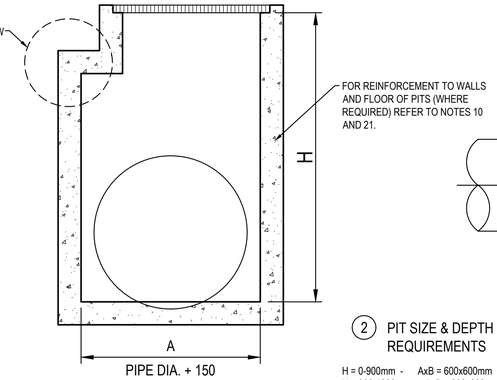
1. SELECT PIT CHAMBER USING THE STEPS BELOW:
2. SELECT PIT CHAMBER SIZE DEPENDING ON THE PIPE DIAMETERS.
3. CHECK PIT CHAMBER SIZE TO SATISFY DEPTH TO INVERT REQUIREMENTS.
   CHECK PIT CHAMBER DIMENSIONS TO SATISFY THE SKEW ANGLE IN THE TABLE.



SECTION
NTS

*A = 600 FOR PIPES UP TO 375 DIA.

1 PIT CHAMBER DIMENSIONS FOR PIPES UP TO 600 DIA.



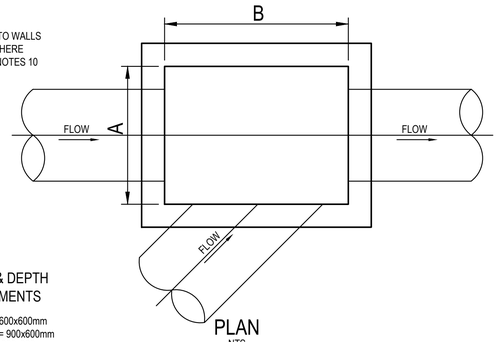
SECTION
NTS

1 PIT CHAMBER FOR PIPES GREATER THAN 600 DIA.

FOR B = 600mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 225mm
FOR B = 900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 375mm
FOR B = 1200mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 600mm
FOR B = 1500mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 825mm
FOR B = 1900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 1050mm

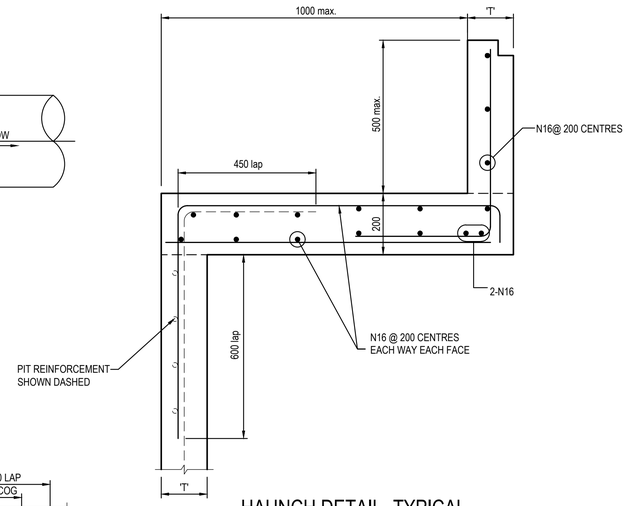
2 PIT SIZE & DEPTH REQUIREMENTS

H = 0-900mm - AxB = 600x600mm
H = 900-1200mm - AxB = 900x600mm
H = >1200mm - AxB = 900x900mm

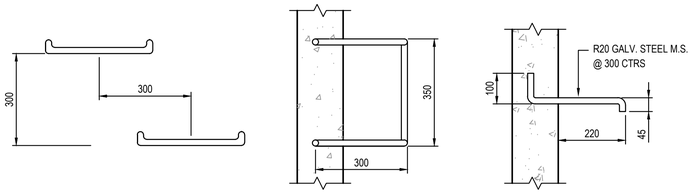


PLAN
NTS

3 PIT CHAMBER FOR SIDE ENTRY ON SKEW

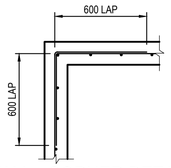


HAUNCH DETAIL -TYPICAL
SCALE 1:10

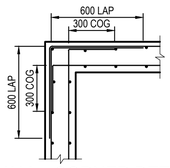


ELEVATION PLAN SECTION

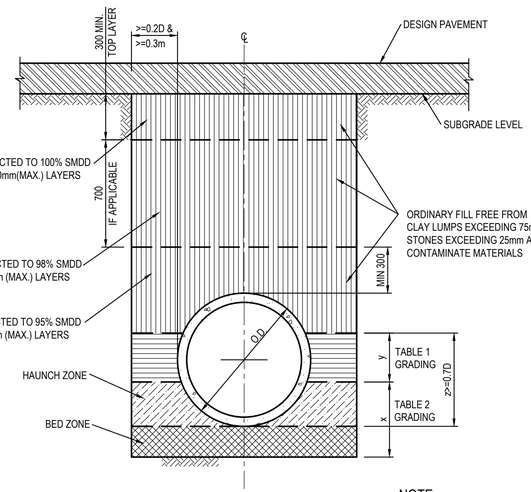
TYPICAL STEP IRON DETAIL
SCALE 1:10



150 WALL - CORNER DETAIL
SCALE 1:20

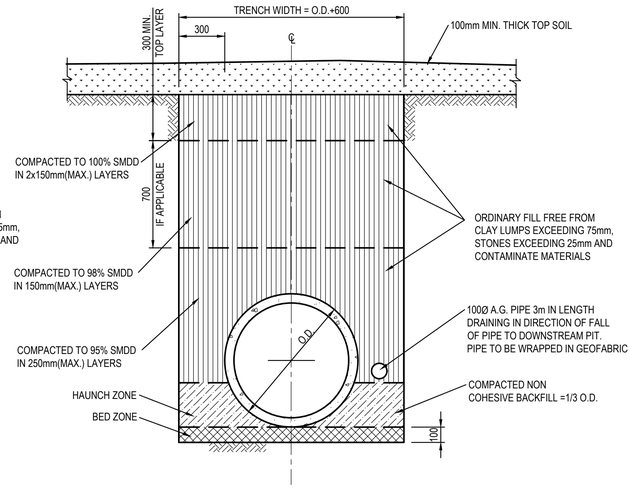


200 WALL - CORNER DETAIL
SCALE 1:20



PIPE TRENCH INSTALLATION BENEATH PAVEMENT
(HS SUPPORT TO BE USED UNDER ROADWAY)
SCALE 1:20

NOTE:
TYPE HS2 TO BE USED AS A TYPICAL SUPPORT FOR TRENCHES UNDER ROADWAY UNLESS SPECIFIED SEPERATELY



PIPE TRENCH INSTALLATION IN LANDSCAPE AREAS
(H1 & H2 SUPPORT)
SCALE 1:20

TABLE 1	
SIEVE SIZE (MM)	WEIGHT PASISNG (%)
75.0	100
9.5	100 TO 50
2.36	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

TABLE 2	
SIEVE SIZE (MM)	WEIGHT PASISNG (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

TABLE 3				
SUPPORT TYPE	BED ZONE X	HAUNCH ZONE Y	BED AND HAUNCH ZONES COMPACTION	MAX BEDDING FACTOR
HS1	100 IF D<=1500, OR 150 IF D>=1500	0.1D	50	2.0
HS2		0.3D	60	2.5
HS3		0.3D	70	4.0

PIT LID SCHEDULE

PIT/STRUCTURE NUMBER	DESCRIPTION
C-2 B-2 C-1 C-4 C-5 B-3 B-4 B-1	PROPOSED SURFACE INLET PIT WITH HINGED 900x900 HEAVY DUTY GRATED LID CLASS 'D' IN ACCORDANCE WITH LOCAL COUNCIL'S REQUIREMENTS.
C-6 C-7 G-1	PROPOSED SURFACE INLET PIT WITH HINGED 600x600 HEAVY DUTY GRATED LID CLASS 'D' IN ACCORDANCE WITH LOCAL COUNCIL'S REQUIREMENTS.
A-1 C-9 I-1 C-8	PROPOSED SURFACE INLET PIT WITH HINGED 900x900 LIGHT DUTY SURCHARGE STYLE GRATED LID CLASS 'B' IN ACCORDANCE WITH LOCAL COUNCIL'S REQUIREMENTS.
J-1 D-1 E-1 F-1 H-1	PROPOSED SURFACE INLET PIT WITH HINGED 600x600 LIGHT DUTY GRATED LID CLASS 'B' IN ACCORDANCE WITH LOCAL COUNCIL'S REQUIREMENTS.
GD-1 GD-2	PROPOSED 300mm WIDE GRATED DRAIN HEAVY DUTY CLASS 'D' IN ACCORDANCE WITH LOCAL COUNCIL'S REQUIREMENTS.
C-3	PROPOSED JUNCTION PIT WITH 900x900 MEDIUM DUTY SEALED LID CLASS 'C' IN ACCORDANCE WITH LOCAL COUNCIL'S REQUIREMENTS.

C-2 B-2 C-1 C-4 C-5 B-3 B-4 B-1 F-1 C-6 C-7 G-1 A-1 C-9 I-1 C-8 J-1 D-1 E-1 H-1	PITS TO BE INSTALLED WITH OCEANGUARD 200 MICRON BASKET, REFER C201 FOR DETAILS AND SIZING

DRAINAGE NOTES:

1. ALL STORMWATER WORK TO COMPLY WITH AS 3500 PART 3.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE MINIMUM COVER OF 600mm ON ALL PIPES.

3. PROTECTION OF PIPES DUE TO LOADS EXCEEDING W7 WHEEL LOAD SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

4. BEDDING TYPE SHALL BE TYPE H2 FOR RCP. WHERE NECESSARY THE OVERLAY ZONE SHALL BE REDUCED TO ACCOMMODATE PAVEMENT REQUIREMENTS. REFER TO THIS DRAWING FOR DETAILS.

5. MINIMUM COVER OVER EXISTING PIPES FOR PROTECTION DURING CONSTRUCTION SHALL BE 800mm.

6. NO CONSTRUCTION LOADS SHALL BE APPLIED TO PLASTIC PIPES.

7. FINISHED SURFACE LEVELS SHOWN ON LAYOUT PLAN DRGS TAKE PRECEDENCE OVER DESIGN DRAINAGE SURFACE LEVELS.

8. ALL PIPES UP TO AND INCLUDING 300 DIA. SHALL BE SOLVENT OR RUBBER RING JOINTED PVC CLASS SH PIPE TO AS1260. ALL OTHER PIPES TO BE RCP USING CLASS 2 RUBBER RING JOINTED PIPE. HARDIES FRC PIPE MAY BE USED IN LIEU OF RCP IF DESIRED IN GROUND. ALL AERIAL PIPES TO BE PVC CLASS SH.

9. ALL PITS IN NON TRAFFICABLE AREAS TO BE PREFABRICATED POLYESTER CONCRETE "POLYCRETE" WITH "LIGHT DUTY" CLASS B GALV. MILD STEEL GRATING AND FRAME.
ALL PITS IN TRAFFICABLE AREAS (CLASS "D" LOADING MAX) TO HAVE 150mm THICK CONCRETE WALLS AND BASE CAST IN-SITU fc=32 MPa, REINFORCED WITH N12-200 BOTH LOADING WAYS CENTRALLY PLACE .U.N.O. ON SEPARATE DESIGN DRAWINGS IN THIS SET. GALV.MILD STEEL GRATING AND FRAME TO SUIT DESIGN LOADING. PRECAST PITS, RECTANGULAR OR CIRCULAR IN SHAPE, MAY BE USED IN LIEU AND SHALL COMPLY WITH RELEVANT AUSTRALIAN STANDARDS.

10. ALL PITS, GRATINGS AND FRAMES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION AND TO BE IN ACCORDANCE WITH AS3500.3 AND AS3996.
11. PIT CHAMBER DIMENSIONS ARE TO BE SELECTED TO SATISFY THE FOLLOWING:
- PIPE SIZE
- DEPTH TO INVERT
- SKEW ANGLE
  REFER TYPICAL PIT CHAMBER DETAILS BELOW
IF PIT LID SIZE IS SMALLER THAN THE PIT CHAMBER SIZE THEN THE PIT LID IS TO BE CONSTRUCTED ON THE CORNER OF THE PIT CHAMBER WITH THE STEP IRONS DIRECTLY BELOW. ALTERNATIVELY THE PIT LID TO BE USED, IS TO BE THE SAME SIZE AS THE PIT CHAMBER.

12. FOR PIPE SIZES GREATER THAN Ø300mm, PIT FLOOR IS TO BE BENCHED TO FACILITATE FLOW.

13. GALVANISED STEP IRONS SHALL BE PROVIDED AT 300 CTS FOR PITS HAVING A DEPTH EXCEEDING 1200mm. SUBSOIL DRAINAGE PIPE SHALL BE PROVIDED IN PIPE TRENCHES ADJACENT TO INLET PIPES. (MINIMUM LENGTH 3m).

14. ALL SUBSOIL PIPES SHALL BE 100mm SLOTTED PVC IN A FILTER SOCK, UNO, WITH 3m INSTALLED UPSTREAM OF ALL PITS.

15. ALL PIPEWORK SHALL HAVE MINIMUM DIAMETER 100.

16. MINIMUM GRADE FOR ROOFWATER DRAINAGE LINES SHALL BE 1%.

17. ALL PIPE JUNCTIONS AND TAPER UP TO AND INCLUDING 300 DIA. SHALL BE VIA PURPOSE MADE FITTINGS.

18. ALL ROOF DRAINAGE TO BE INSTALLED IN ACCORDANCE WITH AS3500, PART 3. TESTING TO BE UNDERTAKEN AND REPORTS PROVIDED TO THE SUPERINTENDENT.

19. LOCATION OF THE DIRECT DOWN PIPE CONNECTIONS MAY VARY ON SITE TO SUIT SITE CONDITIONS, WHERE CONNECTION SHOWN ON LONG SECTIONS CHAINAGES ARE INDICATIVE ONLY.

20. PITS IN EXCESS OF 1.5 m DEEP TO HAVE WALL AND FLOOR THICKNESS INCREASED TO 200mm. REINFORCED WITH N12@200 CTS CENTRALLY PLACED BOTH WAYS THROUGHOUT U.N.O.ON SEPARATE DESIGN DRAWINGS IN THIS SET. IF DEPTH EXCEEDS 5m CONTACT ENGINEER.

21. SUBSOIL DRAINAGE LINES FOR LANDSCAPE AREA NOT SHOWN ON THESE DRAWINGS. REFER TO LANDSCAPING PLANS FOR DETAILS.

22. ALL STORMWATER PITS TO HAVE Ø100 uPVC SLOTTED SUBSOIL PIPES CONNECTED TO THEM. THESE SUBSOILS TO EXTEND 3m UPSTREAM OF THE PIT AT A MINIMUM GRADE.

ISSUED FOR APPROVAL

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

0 200 400 600 800 1000mm
200 100
SCALE 1:10

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client
ESR

Architect
SBA ARCHITECTS

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Project
PROPOSED WAREHOUSE DEVELOPMENT
BRINGELLY ROAD, LEPPINGTON NSW

Title
STORMWATER MISCELLANEOUS DETAILS AND PIT LID SCHEDULE

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 21U79_DA_C200
Revision: 01

SUBSOIL DRAINAGE NOTES

1. GENERALY PROVIDE SUBSOIL DRAINS TO INTERCEPT GROUNDWATER SEEPAGE AND PREVENT WATER BUILD-UP BEHIND WALLS AND UNDER FLOORS AND PAVEMENTS. CONNECT SUBSOIL TO SURFACE DRAINS OR TO THE STORMWATER DRAINAGE SYSTEM AS APPLICABLE.

2. PIPE DEPTH:
PROVIDE THE FOLLOWING MINIMUM CLEAR DEPTH, MEASURED TO THE CROWN OF THE PIPE, WHERE THE PIPE PASSES BELOW THE FOLLOWING ELEMENTS:

- 100mm BELOW FORMATION LEVEL OF THE PAVEMENT, KERB OR CHANNEL.
- 100mm BELOW THE AVERAGE GRADIENT OF THE BOTTOM OF FOOTINGS.

3. JOINTING:
AT JUNCTIONS OF SUBSOIL PIPES PROVIDE TEES, COUPLINGS OR ADAPTORS TO AS2439.1.

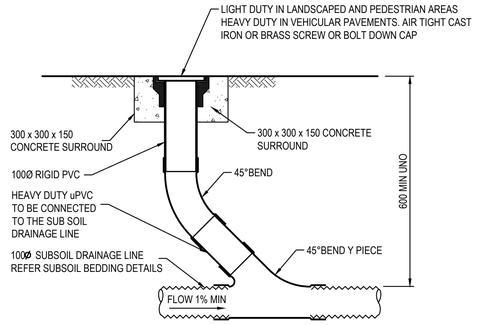
4. TRENCH WIDTH MINIMUM 300mm.

5. PIPE UNDERLAY
GENERAL: GRADE THE TRENCH FLOOR EVENLY TO THE GRADIENT OF THE PIPELINE. IF THE TRENCH FLOOR IS ROCK, CORRECT ANY IRREGULARITIES WITH COMPACTED BEDDING MATERIAL. BED PIPING ON A CONTINUOUS UNDERLAY OF BEDDING MATERIAL, AT LEAST 75mm THICK AFTER COMPACTION. LAY THE PIPE WITH ONE LINE OF PERFORATIONS AT THE BOTTOM.

CHASES: IF NECESSARY TO PREVENT PROJECTIONS SUCH AS SOCKETS AND FLANGES FROM BEARING ON THE TRENCH BOTTOM OR UNDERLAY.

6. PIPE SURROUNDS:
GENERAL: PLACE THE MATERIAL IN THE PIPE SURROUND IN LAYERS SMALLER THAN OR EQUAL TO 200mm LOOSE THICKNESS, AND COMPACT WITHOUT DAMAGING OR DISPLACING PIPING.
DEPTH OF OVERLAY: TO THE UNDERSIDE OF THE BASE OF OVERLYING STRUCTURES SUCH AS PAVEMENTS, SLABS AND CHANNELS TO WITHIN 150mm OF THE FINISHED SURFACE OF UNPAVED OR LANDSCAPED AREAS.

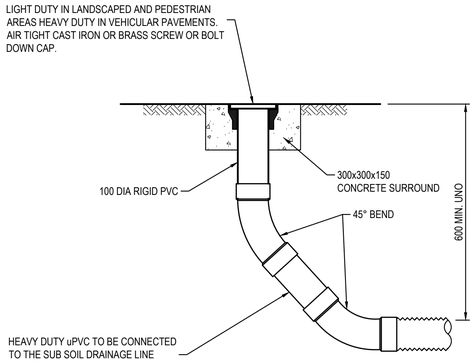
7. FILTER SOCKS:
PROVIDE POLYESTER PERMEABLE SOCKS CAPABLE OF RETAINING PARTICLES OF 0.25mm SIZES. SECURELY FIT OR JOIN THE SOCK AT EACH JOINT.



INTERMEDIATE RISER (IR)

SCALE 1:10

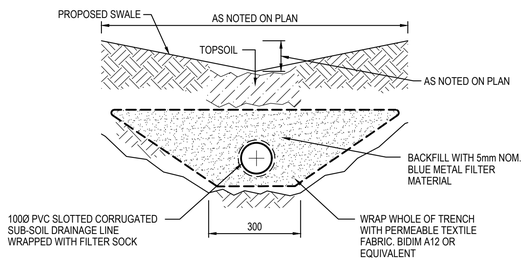
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



FLUSHING POINT (FP)

SCALE 1:10

NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



SUBSOIL DRAIN DETAIL IN SWALES

SCALE 1:10

PLAN ID	MAXIMUM PIT PLAN DIMENSIONS
S	450mm x 450mm
M	600mm x 600mm
L	900mm x 900mm
XL	1200mm x 1200mm

DEPTH ID	BAG DEPTH	OVERALL DEPTH
1	170	270
2	300	450
3	600	700

		DEPTH ID		
		1	2	3
PLAN ID	S	■		
	M	■	■	
	L	■	■	■
	XL	■	■	■

GENERAL NOTES

1. THE MINIMUM CLEARANCE DEPENDS ON THE CONFIGURATION (SEE NOTE 2) AND THE LOCAL COUNCIL REQUIREMENTS.

2. CLEARANCE FOR ANY PIT WITHOUT AN INLET PIPE (ONLY USED FOR SURFACE FLOW) CAN BE AS LOW AS 50mm. FOR OTHER PITS, THE RECOMMENDED CLEARANCE SHOULD BE GREATER OR EQUAL TO THE PIPE OBVERT SO AS NOT TO INHIBIT HYDRAULIC CAPACITY.

3. OCEAN PROTECT PROVIDES TWO FILTRATION BAG TYPES:- 200 MICRON BAGS FOR HIGHER WATER QUALITY FILTERING AND A COARSE BAG FOR TARGETING GROSS POLLUTANTS.

4. DRAWINGS NOT TO SCALE.

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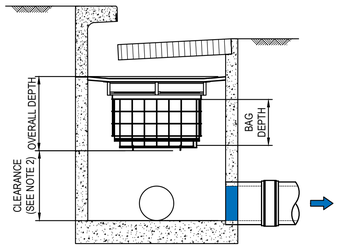
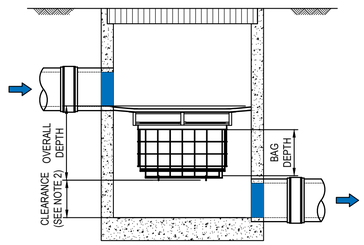
TYPCIAL ARRANGEMENTS
SPECIFICATION DRAWING



SURFACE FLOW CONFIGURATION

SCALE: 1:20



PIPE FLOW CONFIGURATION

SCALE: 1:20

0 200 400 600 800 1000mm
200 100
SCALE 1:10

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR

Architect: SBA ARCHITECTS

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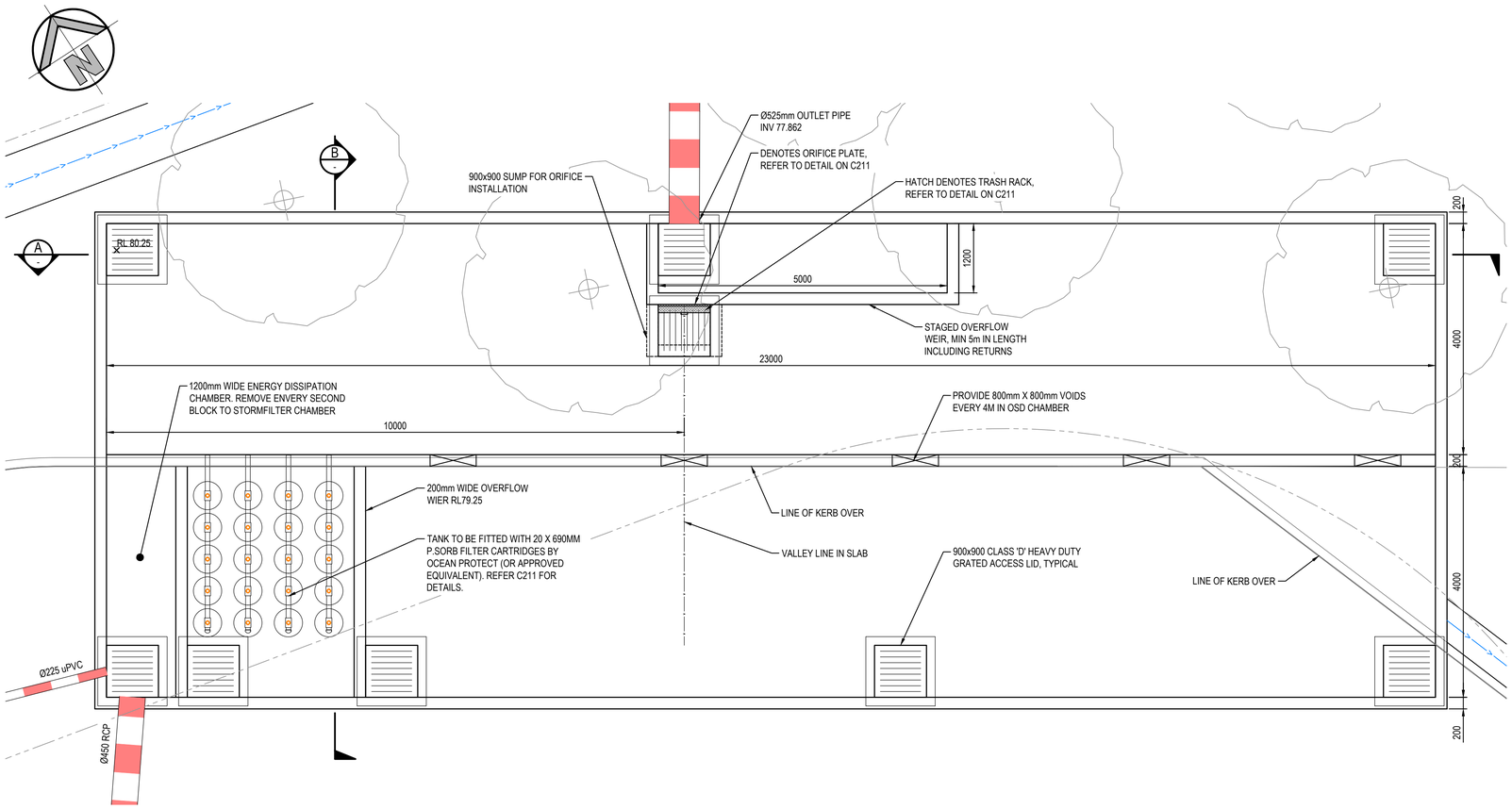
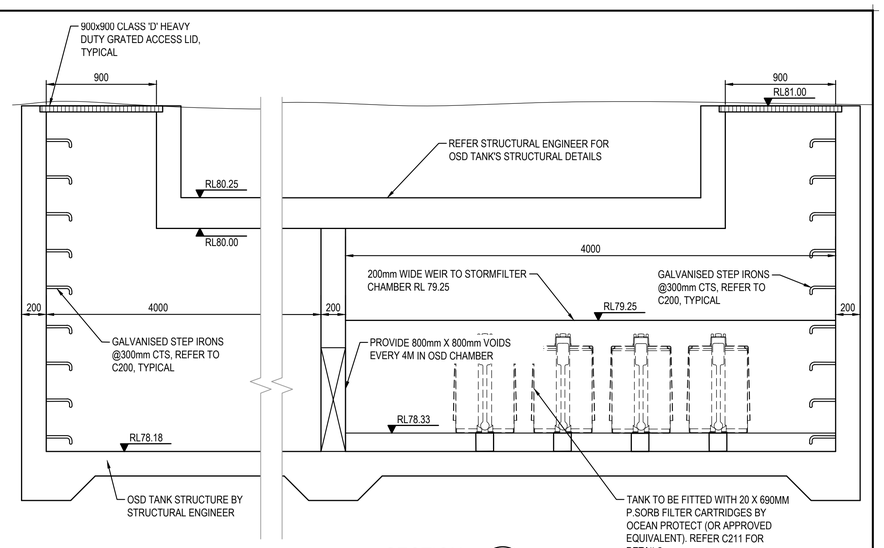
Project			
PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW	Drawn: S.Chen	Designed: N.Wetzlar	Date: Feb 2022
	Checked: N.Wetzlar	Approved: A.Francis	Scale @A1: AS NOTED
Title: STORMWATER MISCELLANEOUS DETAILS	Drawing number: 21U79_DA_C201		Revision: 01



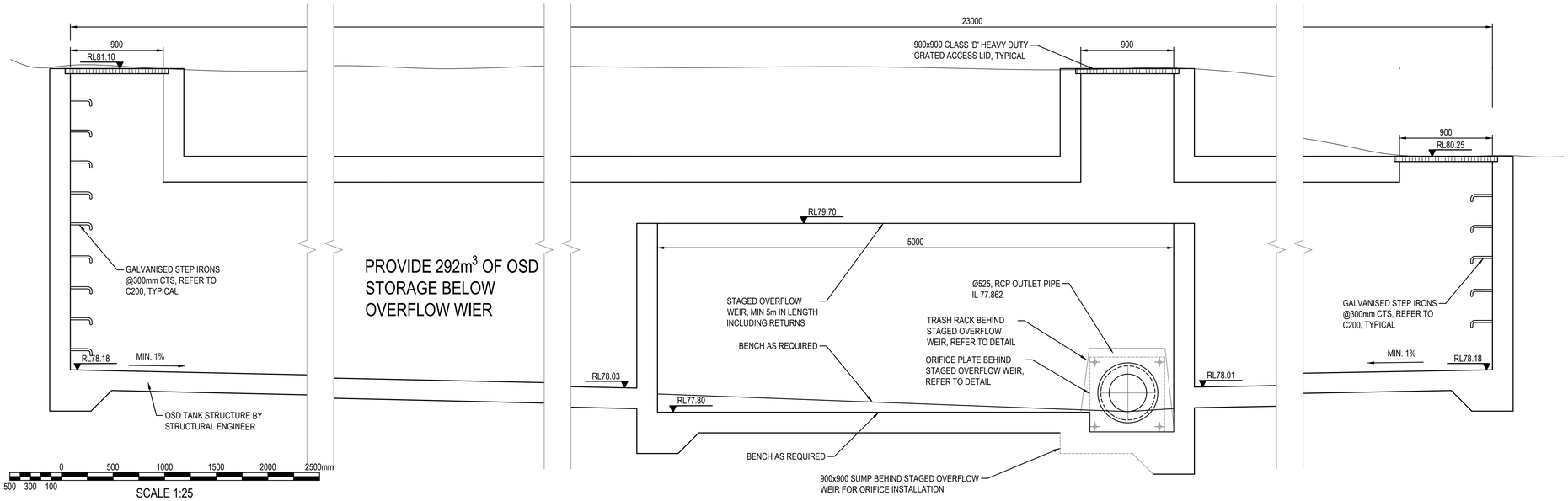
OSD PLAN

SCALE: 1:50



SECTION B

SCALE: 1:25



SECTION A

SCALE: 1:25

0 500 1000 1500 2000 2500mm
500 300 100
SCALE 1:25

0 1000 2000 3000 4000 5000mm
1000 600 200
SCALE 1:50

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR

Architect: SBA ARCHITECTS

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Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW

Title: OSD PLAN AND SECTIONS

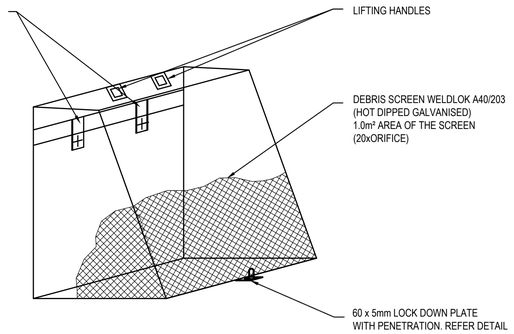
Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 21U79_DA_C210

Revision: 01

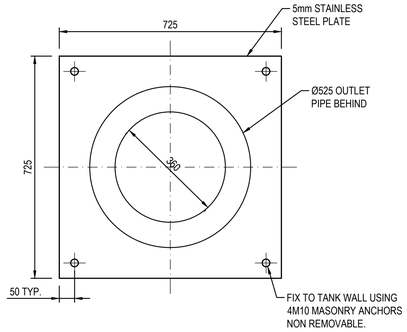
100 x 16 MOUNTING BAR WITH BRACKETS, SCREEN TO BE ATTACHED (GENERALLY ON A SLIDING MECHANISM) TO THE WALL, BUT SHOULD BE REMOVABLE (WITHOUT THE USE OF TOOLS) TO PERMIT CLEANSING AND EASY INSPECTION OF THE OUTLET CONTROL. ALL STEEL TO BE HOT DIPPED GALVANISED.

SCREEN TYPE WELDLOK A40/203 IS RECOMENDED FOR ORIFICES LARGER THAN 150mm AND SCREEN AREA 20 x THE ORIFICE AREA FOR THAT TYPE OF SCREEN



DEBRIS SCREEN DETAIL

NOT TO SCALE
ALL STEEL TO BE HOT DIPPED GALVANISED



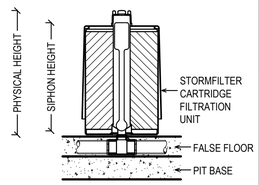
ORIFICE PLATE DETAIL

SCALE 1:10

STORMFILTER DESIGN TABLE

- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED.
- THE STANDARD CONFIGURATION IS SHOWN. ACTUAL CONFIGURATION OF THE SPECIFIED STRUCTURE(S) PER CERTIFYING ENGINEER WILL BE SHOWN ON SUBMITTAL DRAWING(S).
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF-CLEANING. RADIAL MEDIA DEPTH SHALL BE 178mm.

CARTRIDGE NAME / SIPHON HEIGHT (mm)	690
CARTRIDGE PHYSICAL HEIGHT (mm)	840
TYPICAL WEIR HEIGHT [H] (mm)	920
CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)	0
CARTRIDGE FLOW RATE FOR PSORB MEDIA (L/s)	0.9



STORMFILTER
CARTRIDGE DETAIL

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	[ ]
NUMBER OF CARTRIDGES REQ'D	20
SIPHON HEIGHT (310 / 460 / 690)	[690]
MEDIA TYPE (ZPG / PSORB)	[PSORB]
WATER QUALITY FLOW RATE (L/S)	[18]
HYDRAULIC CAPACITY (L/S)	-

PIPE DATA:	I.L.	MATERIAL	DIAMETER
INLET PIPE #1	[ ]	[ ]	[ ]
INLET PIPE #2	[ ]	[ ]	[ ]
INLET PIPE #3	[ ]	[ ]	[ ]
OUTLET PIPE	[ ]	[ ]	[ ]

PRECAST MANHOLE WEIGHT	12,000kg
PRECAST LID WEIGHT	4,500kg

GENERAL NOTES

1. PRECAST STRUCTURE SUPPLIED WITH CORE HOLES TO SUIT OUTER DIAMETER OF NOMINATED PIPE SIZE / MATERIAL.
2. PRECAST STRUCTURE SHALL MEET W80 WHEEL LOAD RATING ASSUMING A MAXIMUM EARTH COVER OF 2.0m AND A GROUND WATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. CERTIFYING ENGINEER TO CONFIRM ACTUAL GROUNDWATER ELEVATION. PRECAST STRUCTURE SHALL BE IN ACCORDANCE WITH AS3600.
3. IF THE PEAK FLOW RATE, AS DETERMINED BY THE SITE CERTIFYING ENGINEER, EXCEEDS THE PEAK HYDRAULIC CAPACITY OF THE SYSTEM, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.
4. ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
5. SITE SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED ON PLACEMENT OF ORDER.
6. DRAWING NOT TO SCALE.

INSTALLATION NOTES

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY CERTIFYING ENGINEER.
2. CONTRACTOR TO PROVIDE ALL EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING DETAIL PROVIDED SEPARATELY).
3. CONTRACTOR TO APPLY SEALANT TO ALL JOINTS AND TO PROVIDE, INSTALL AND GROUT INLET AND OUTLET PIPES.

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OCEAN PROTECT
20 CARTRIDGE STORMFILTER SYSTEM
CUSTOM OSD TANK DESIGN
SPECIFICATION DRAWING

0 500 1000 1500 2000 2500mm
500 300 100
SCALE 1:25

0 1000 2000 3000 4000 5000mm
1000 600 200
SCALE 1:50

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR
Architect: SBA ARCHITECTS

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Project: PROPOSED WAREHOUSE DEVELOPMENT
BRINGELLY ROAD, LEPPINGTON NSW

Title: OSD DETAILS

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 21U79_DA_C211
Revision: 1

PRE-DEVELOPMENT STORMWATER CATCHMENT PLAN

SCALE: 1:400

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR

Architect: SBA ARCHITECTS

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Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW

Title: PRE - DEVELOPMENT STORMWATER CATCHMENT PLAN

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:400

Drawing number: 21U79_DA_C250

Revision: 01

LEGEND

LANDSCAPE AREA
100% PERVIOUS
AREA =4596m²

HARDSTAND AREA
100% IMPERVIOUS
AREA =2615m²

ROOF AREA
100% IMPERVIOUS
AREA =5681m²

PERVIOUS AREA (EXTERNAL)
AREA = 1716m²

POST DEVELOPMENT CATCHMENT			
CATCHMENT #	TYPE	TO PIT	AREA [m²]
C1	ROOF	C-4,C-5,C-6,C-7	2989
C2	ROOF	RAINWATER TANK	2048
C3	ROOF	B-3	643
C4	HARDSTAND	GD-1, G-1	530
C5	HARDSTAND	C-1	427
C6	LANDSCAPE (BYPASS)	A-1	406
C7	LANDSCAPE	I-1	186
C8	LANDSCAPE	H-1	627
C9	HARDSTAND	B-1	415
C10	HARDSTAND	B-3	307
C12	LANDSCAPE	I-1	1059
C13	LANDSCAPE	J-1	225
C14	LANDSCAPE	C-9	617
C15	LANDSCAPE	C-10	461
C16	LANDSCAPE	F-1	73
C17	HARDSTAND	C-7	101
C18	HARDSTAND	C-1	30
C19	LANDSCAPE	E-1	114
C20	HARDSTAND	C-6	172
C21	HARDSTAND	C-5	182
C22	LANDSCAPE	D-1	164
C23	HARDSTAND	C-4	411
C24	LANDSCAPE	BYPASS	384
C25	HARDSTAND	GD-2	45
C26	LANDSCAPE	C-2	258
C27	HARDSTAND	C-2	18

0 8 16 24 32 40m
8 6 4 2
SCALE 1:400

POST-DEVELOPMENT STORMWATER CATCHMENT PLAN

SCALE: 1:400

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

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Client: ESR
Architect: SBA ARCHITECTS

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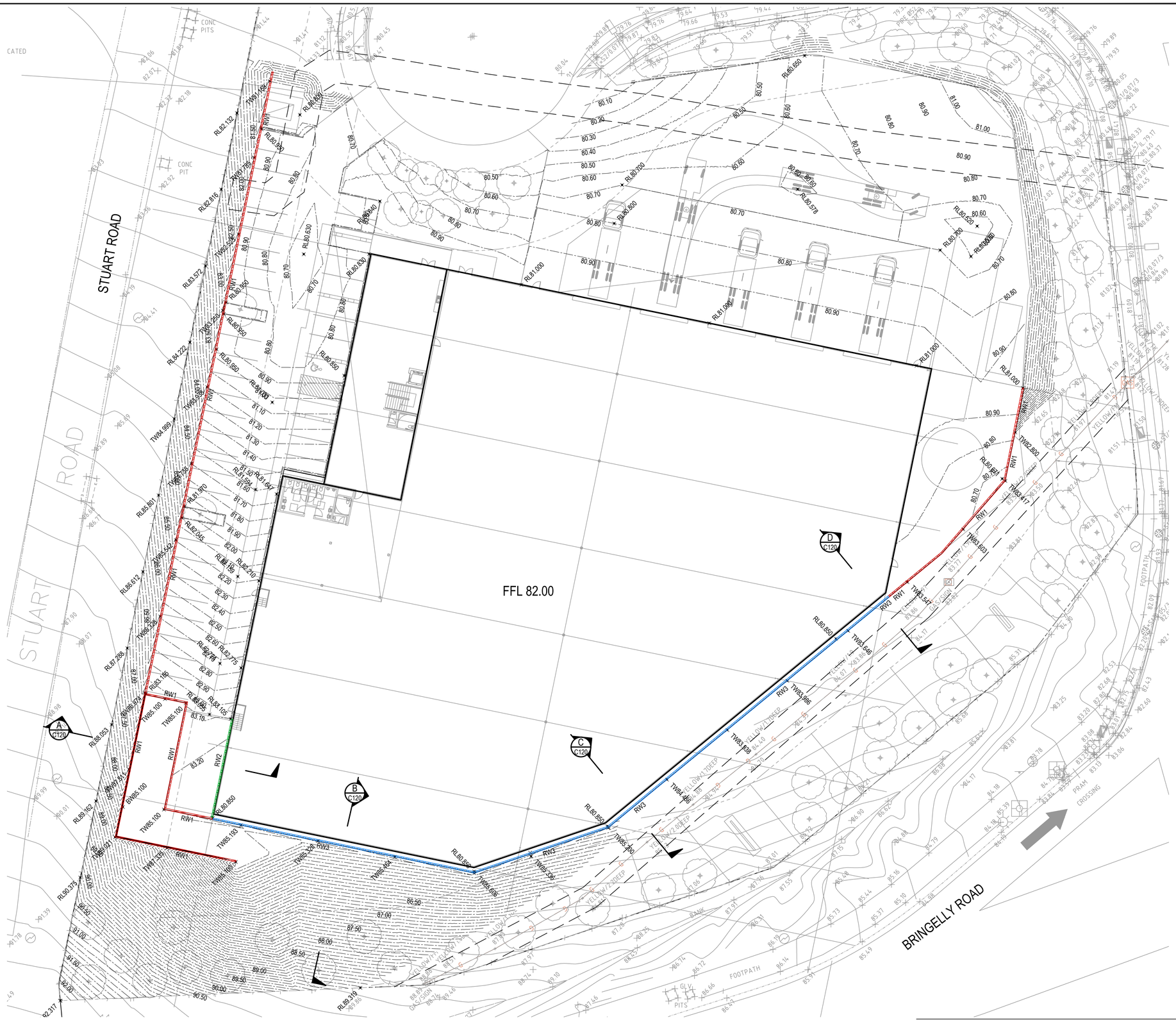
Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW
Title: POST - DEVELOPMENT STORMWATER CATCHMENT PLAN

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:400

Drawing number: 21U79_DA_C251
Revision: 01

LEGEND

	EXISTING BOUNDARY
82.70	EXISTING CONTOURS
83.40	PROPOSED CONTOURS
RW1	PROPOSED REINFORCED BLOCKWORK CANTILEVER RETAINING WALL, REFER DETAIL ON C310
RW2	PROPOSED RETAINING ELEMENT IN BUILDING STRUCTURE. DETAILS TO BE PROVIDED DURING DETAILED DESIGN
RW3	PROPOSED PILE SHORING WALL OR REINFORCED CONCRETE CANTILEVER WALL. DETAILS TO BE PROVIDED DURING DETAILED DESIGN



0 5 10 15 20 25m

5 4 3 2 1

SCALE 1:250

RETAINING WALL PLAN

SCALE: 1:250

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client
ESR

Architect
SBA ARCHITECTS

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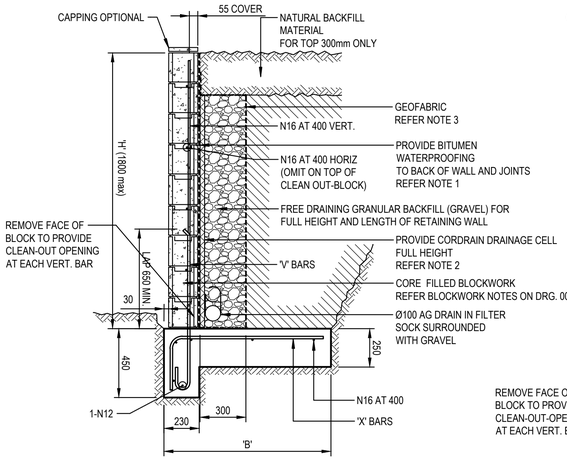
Project
PROPOSED WAREHOUSE DEVELOPMENT
BRINGELLY ROAD, LEPPINGTON NSW

Title
RETAINING WALL PLAN

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:250

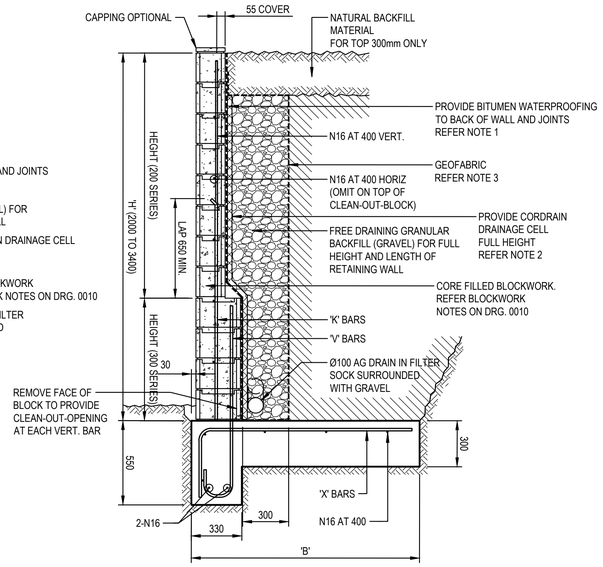
Drawing number: 21U79_DA_C300

Revision: 01



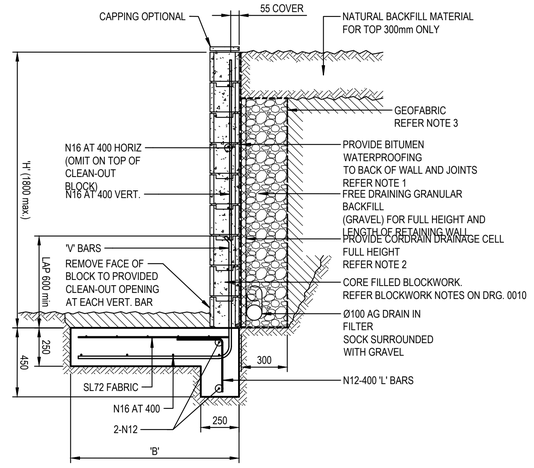
150 AND 200 SERIES BLOCK WALL

5.0 kPa SURCHARGE



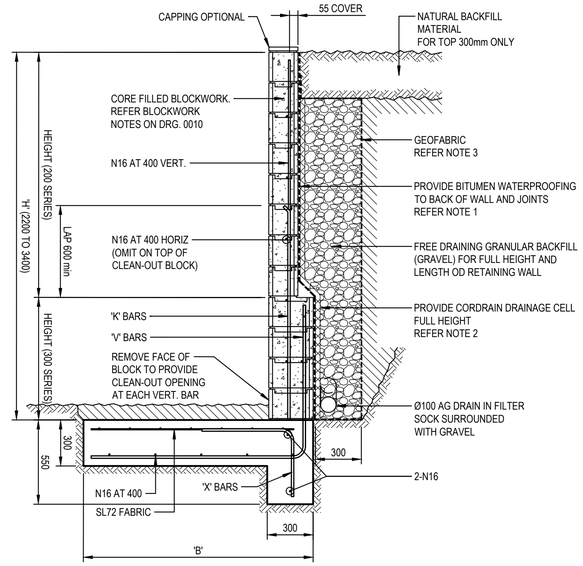
200 AND 300 SERIES BLOCK WALL

5.0 kPa SURCHARGE



150 OR 200 SERIES BLOCK WALL

5.0 kPa SURCHARGE



200 OR 300 SERIES BLOCK WALL

5.0 kPa SURCHARGE

RETAINING WALL SECHEDULE

TOTAL HEIGHT 'H' (mm)	HEIGHT OF BLOCK TYPE			'B' (mm)	'V' & 'X' BARS	'K' BARS
	150 SERIES	200 SERIES	300 SERIES			
800	800	-	-	800	N12 AT 400	-
1000	1000	-	-	900	N12 AT 400	-
1200	1200	-	-	1000	N12 AT 400	-
1400	-	1400	-	1100	N16 AT 400	-
1600	-	1600	-	1200	N16 AT 400	-
1800	-	1800	-	1400	N16 AT 400	-
2000	-	1400	600	1600	N16 AT 200	N16 AT 200
2200	-	1400	800	1800	N16 AT 200	N16 AT 200
2400	-	1600	800	2000	N16 AT 200	N16 AT 200
2600	-	1600	1000	2100	N16 AT 200	N16 AT 200
2800	-	1800	1000	2200	N16 AT 200	N16 AT 200
3000	-	2000	1000	2400	N16 AT 200	N16 AT 200
3200	-	2000	1200	2600	N20 AT 200	N16 AT 200
3400	-	2000	1400	2800	N20 AT 200	N16 AT 200

NOTES:

1. ENSURE REAR FACE OF RETAINING WALL IS FULLY WATERPROOFED. USE EMER-PROOF ECOFLEX OR APPROVED EQUIVALENT IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION. EG: 2 COATS min. APPLIED IN OPPOSITE DIRECTIONS AND ALLOWED TO CURE FOR 7 DAYS. (TO BE CONIRMED BY THE ARCHITECT)
2. INSTALL FULL HEIGHT DRAINAGE CELL TO REAR OF WALL, USE NYLEX CORDRAIN/18 OR APPROVED EQUIVALENT, AT 1500 CENTRES.
3. PROVIDE GEOFABRIC MATERIAL AS SEPARATION BETWEEN GRANULAR BACKFILL (GRAVEL) AND NATURAL BACKFILL MATERIAL. USE BIDIM A24 OR APPROVED EQUIVALENT.
4. MINIMUM ALLOWABLE BEARING PRESSURE AT BASE = 100 kPa

RETAINING WALL SCHEDULE

TOTAL HEIGHT 'H' (mm)	HEIGHT OF BLOCK TYPE			'B' (mm)	'V' & 'X' BARS	'K' BARS
	150 SERIES	200 SERIES	300 SERIES			
800	800	-	-	800	N12 AT 400	-
1000	1000	-	-	900	N12 AT 400	-
1200	1200	-	-	1000	N12 AT 400	-
1400	-	1400	-	1100	N16 AT 400	-
1600	-	1600	-	1400	N16 AT 400	-
1800	-	1800	-	1600	N16 AT 400	-
2000	-	1400	600	1800	N16 AT 200	N16 AT 200
2200	-	1400	800	2000	N16 AT 200	N16 AT 200
2400	-	1600	800	2200	N16 AT 200	N16 AT 200
2600	-	1600	1000	2400	N16 AT 200	N16 AT 200
2800	-	1800	1000	2600	N16 AT 200	N16 AT 200
3000	-	2000	1000	3000	N16 AT 200	N16 AT 200
3200	-	2000	1200	3300	N20 AT 200	N16 AT 200
3400	-	2000	1400	3600	N20 AT 200	N16 AT 200

NOTES:

1. ENSURE REAR FACE OF RETAINING WALL IS FULLY WATERPROOFED. USE EMER-PROOF ECOFLEX OE APPROVE EQUIVALENT IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS. EG: 2 COATS min. APPLIED IN OPPOSITE DIRECTIONS AND ALLOWED TO CURE FOR 7 DAYS.
2. INSTALL FULL HEIGHT DRAINAGE CELL TO REAR OF WALL, USE NYLEX CORDRAIN/18 OR APPROVED EQUIVALENTS.
3. PROVIDE GEOFABRIC MATERIAL AS SEPARATION BETWEEN GRANULAR BACKFILL (GRAVEL) AND NATURAL BACKFILL MATERIAL. USE BIDIM A24 OR APPROVED EQUIVALENT.

NOTES:

1. UNLESS OTHERWISE NOTED ON PLAN JOINTS SHALL BE LOCATED AT 8000 CENTRES max. AND 4000 FROM CORNERS.
2. PROVIDE SILICON SEALANT BOTH FACES IN ALL JOINTS, USE PARCHEM EMER-SEAL CR OR AN APPROVED EQUIVALENT.

MASONRY CONSTRUCTION:

ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3700 AND AS NOTED ON THE DRAWINGS.

BRICK AND BLOCK COMPRESSIVE STRENGTH (f'uc) SHALL BE 15 MPa MINIMUM UNO. STRENGTH GRADE SHALL BE CLEARLY INDICATED ON THE DELIVERY DOCKETS.

JOINT MORTAR SHALL BE OF CLASS M3 WITH 1:1:6 (CEMENT: LIME: SAND) PROPORTIONS BY VOLUME AND COMPLY WITH AS3700. MORTAR JOINTS SHALL BE 10 mm THICK AND HAVE A MAXIMUM TOOLED DEPTH OF 3 mm UNO.

NON-LOAD BEARING WALLS SHALL BE SEPARATED FROM THE LOAD-BEARING ELEMENTS BY 15 mm THICK 'CANEITE' OR EXPANDED POLYSTYRENE UNO AT BOTH HORIZONTAL AND VERTICAL FACES.

NON-LOAD BEARING WALLS SHALL BE TIED TO THE SOFFITS OF BEAMS OR SLABS OVER BY USING 'MET 4-1' TIES (OR APPROVED EQUIVALENT), AT 800 mm MAX. CENTRES, UNO ON THE DRAWINGS, TO MANUFACTURER'S SPECIFICATIONS

WHERE CONCRETE SLABS BEAR ON UNREINFORCED MASONRY, INCLUDING CLAY BRICKS, RENDER THE BEARING SURFACE OF THE MASONRY WALL WITH 1:3 (CEMENT : SAND) MORTAR TO ACHIEVE A LEVEL SURFACE AND PLACE A PRE-GREASED METAL SLIP JOINT PROTECTED BY 0.2 mm POLYETHYLENE SHEET TAPED TO THE FORMWORK BEFORE PLACING CONCRETE. SPECIAL DETAILS SUCH AS WATER-PROOFING MAY APPLY FOR ROOF SLABS OR SIMILARLY EXPOSED ELEMENTS.

CONTROL JOINTS

CONTROL JOINTS SHALL BE PROVIDED IN MASONRY WALLS AS PER THE TABLE BELOW UNLESS CLOSER SPACINGS ARE SPECIFIED ELSEWHERE IN THE DOCUMENTATION.

MASONRY TYPE	LOCATION	JOINT SIZE (mm)	SPACING (m)
CONCRETE MASONRY	- EXTERNAL	10	7.0
	- EXTERNAL (WITH OPENINGS > 900mm IN HEIGHT)	10	5.0
	- INTERNAL (FACE FINISHED)	10	6.0
	- INTERNAL (RENDERED)	10	5.0
LIGHT-WEIGHT MASONRY	- INTERNAL / EXTERNAL	10	6.0
CLAY MASONRY	- INTERNAL / EXTERNAL	15	6.0 *
	- PARAPET WALLS	15	4.0

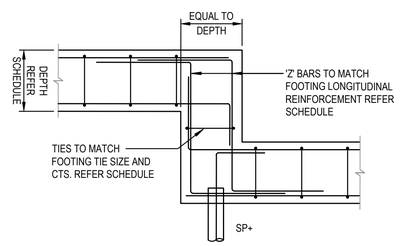
* - FOR REACTIVE ' CLASS M' SITES ONLY. REFER TABLE 4.3 OF AS3700.2011 FOR ARTICULATION JOINTS IN CLAY MASONRY.

2. CONTROL JOINTS SHALL BE PLACED AT HALF THE SPECIFIED SPACING FROM A CORNER. PROVIDE JOINTS TO MATCH JOINTS IN THE SUPPORTING STRUCTURE.
3. CONTROL JOINTS MUST BE KEPT FREE OF MORTAR AND SEALED WITH A POLYETHYLENE FOAM BACKING ROD SQUEEZED INTO THE GAP AND A GUNNED-IN MASTIC SEALANT. IF THE WALL IS TO BE FIRE-RATED, A FIRE-RATED SEALING SYSTEM WILL BE REQUIRED INSTEAD.

B7 BLOCKWORK

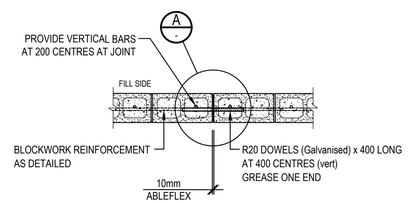
1. IN CORE-FILLED BLOCKWORK, EXCESS MORTAR PROTRUDING INTO THE CORES SHALL BE REMOVED BY RODDING AFTER EACH COURSE IS LAID. EVERY CORE FILLED WITH GROUT SHALL HAVE A CLEANOUT BLOCK IN THE BOTTOM COURSE.
2. REINFORCEMENT SHALL BE PLACED AND SECURELY TIED IN POSITION AS SHOWN ON THE DRAWINGS. STARTER BARS SHALL BE HELD IN PLACE BY TYING TO HORIZONTAL BARS AT CLEANOUT BLOCKS. PROVIDE COVER TO REINFORCEMENT AS SHOWN IN THE DETAILS.
3. CORE FILLING GROUT SHALL BE AS NOTED IN CONCRETE NOTES IN LIFTS NO MORE THAN 1200mm IN HEIGHT.

Element	Slump	Max. Agg. Size	Cement Type	Exposure Classifn.	Min. Conc. Grade (f'c) MPa U.N.O	Conc. Cover (U.N.O.)
Core Filling Grout	230±30	10	GP	-	20	-

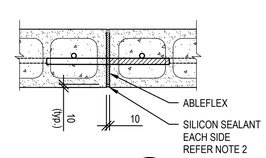


TYPICAL FOOTING STEP DETAIL

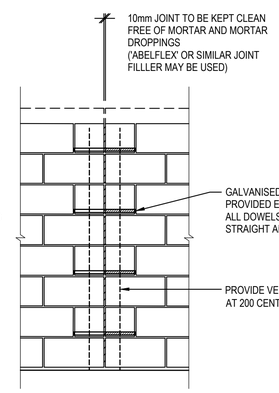
SCALE 1:20



PLAN



DETAIL A



ELEVATION

TYPICAL BLOCKWORK VERTICAL EXPANSION JOINT

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
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Client: ESR

Architect: SBA ARCHITECTS

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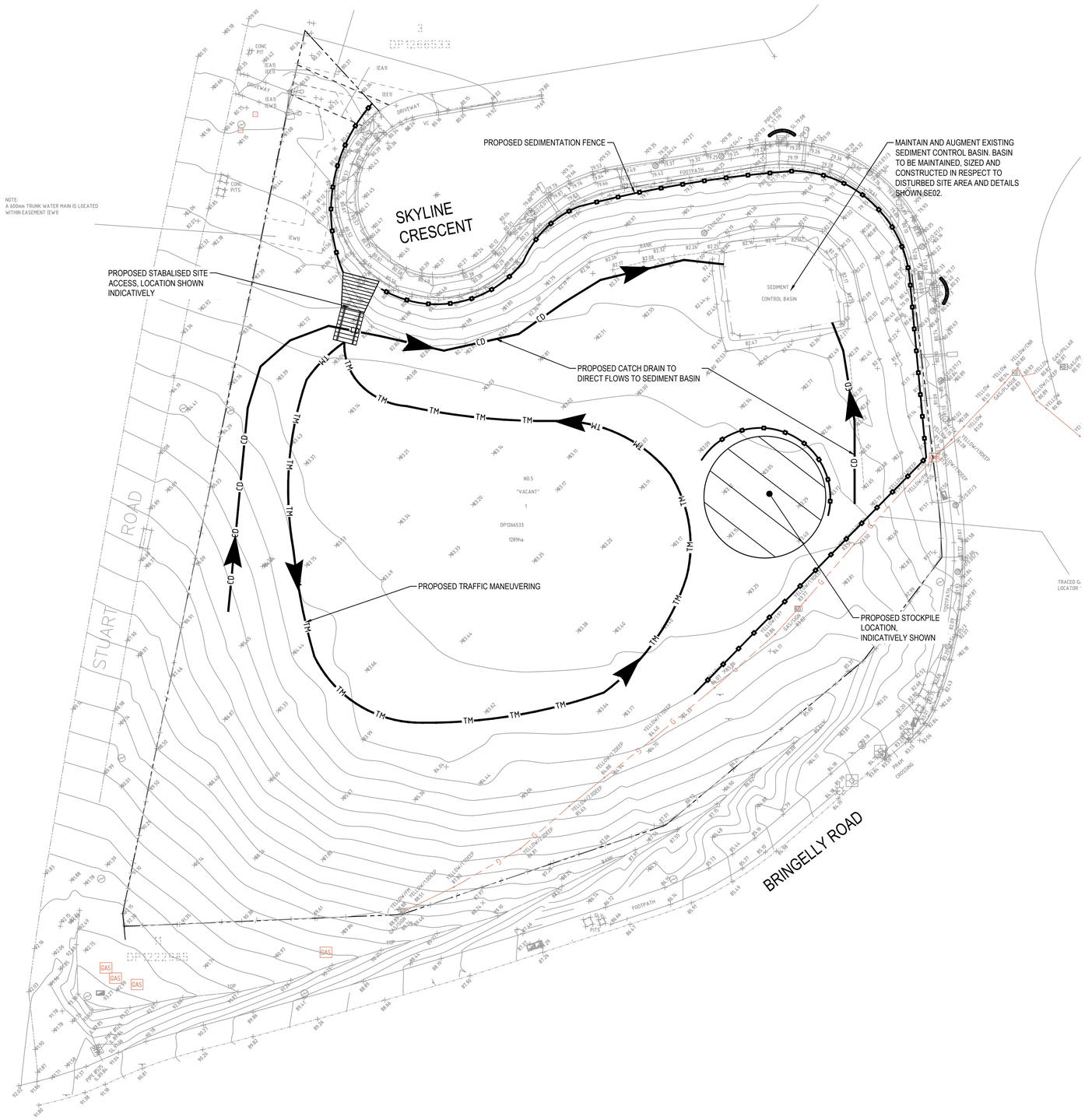
Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW

Title: RETAINING WALL TYPICAL DETAILS

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 21U79_DA_C310

Revision: 01



LEGEND

- EXISTING BOUNDARY
- CATCH DIVERSION DRAIN
- TRAFFIC MANOEUVRING
- PROPOSED SEDIMENTATION FENCE
- PROPOSED VEHICLE SHAKER GRID
- PROPOSED STABILISED SITE ACCESS
- PROPOSED STOCKPILE LOCATION
- PROPOSED MESH & GRAVEL INLET FILTER

SEDIMENT & EROSION CONTROL NOTES

- ALL SEDIMENT CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL'S SPECIFICATIONS AND LANDCOM'S "SOIL AND CONSTRUCTION" MANUAL.
- ALL PERIMETER & SILTATION CONTROL MEASURES ARE TO BE PLACED PRIOR TO, OR AS THE FIRST STEP IN EARTH WORKS AND/OR CLEARING.
- THE SEDIMENT & EROSION CONTROL PLAN MAY REQUIRE FUTURE ADJUSTMENT TO REFLECT CONSTRUCTION STAGING. IT IS ALSO THE CONTRACTORS RESPONSIBILTY TO PREPARE THEIR OWN SEDIMENT AND EROSION CONTROL PLAN WHICH SUITS THE DESIGNED CONSTRUCTION STAGING.
- FILTRATION BUFFER ZONES ARE TO BE FENCED OFF AND ACCESS PROHIBITED TO ALL PLANT AND MACHINERY.
- ALL TEMPORARY EARTH BERMS, DIVERSIONS & SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED & MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
- ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING. TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE LOCATION.
- ALL TOPSOIL IS TO BE STOCKPILED ON SITE FOR REUSE (AWAY FROM TREES AND DRAINAGE LINES). MEASURES SHALL BE APPLIED TO PREVENT EROSION OF THE STOCKPILES.
- ALL EARTHWORK AREAS SHALL BE ROLLED EACH EVENING TO SEAL THE EARTHWORKS.
- ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND STRAW MULCHED WITHIN 14 DAYS OF COMPLETION OF FORMATION U.N.O. BY LANDSCAPE ARCHITECTS.
- UPON COMPLETION OF ALL EARTHWORKS OR AS DIRECTED BY COUNCIL SOIL CONSERVATION TREATMENTS SHALL BE APPLIED SO AS TO RENDER AREAS THAT HAVE BEEN DISTURBED, EROSION PROOF WITHIN 14 DAYS.
- EROSION AND SILT PROTECTION MEASURES ARE TO BE MAINTAINED AT ALL TIMES.
- THESE DRAWINGS SHOW THE INITIAL STAGES OF THE SITE CONSTRUCTION AND EROSION CONTROLS. AS CONSTRUCTION CONTINUES IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL PITS ARE PROGRESSIVELY FITTED WITH MESH AND GRAVEL INLET FILTERS AS REQUIRED
- ALL EXISTING COUNCIL PITS WITHIN 50m OF THE SITE BOUNDARIES ARE TO BE FITTED WITH MESH AND GRAVEL INLET FILTERS

0 8 16 24 32 40m
8 6 4 2
SCALE 1:400

SEDIMENT AND EROSION CONTROL PLAN

SCALE: 1:400

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR
Architect: SBA ARCHITECTS

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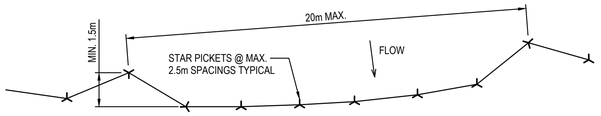
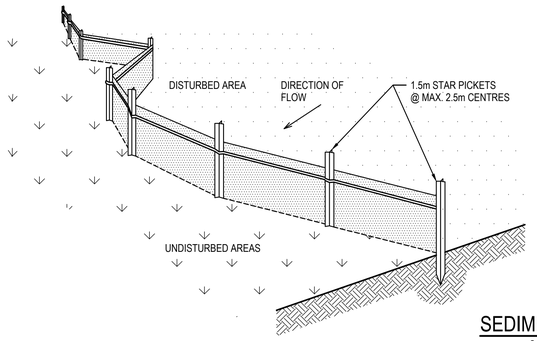
Project	Drawn	Designed	Date
PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW	S.Chen	N.Wetzlar	Feb 2022
	Checked: N.Wetzlar	Approved: A.Francis	Scale @A1: 1:400
Title: SEDIMENT AND EROSION CONTROL PLAN	Drawing number: 21U79_DA_SE01		Revision: 01

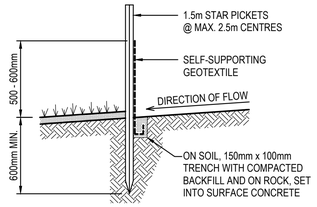


PLAN



SEDIMENT FENCE

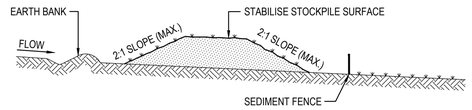
SCALE N.T.S.



SECTION DETAIL

SEDIMENT FENCE CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. 3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND @ 2.5m INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. 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. 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.

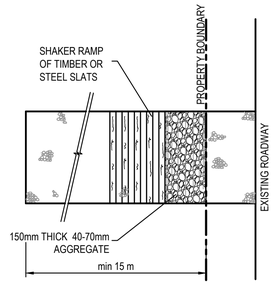


STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES 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 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACED FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED E.S.C.P. OR S.W.M.P. TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

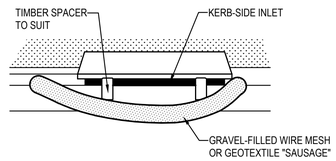
STOCKPILES

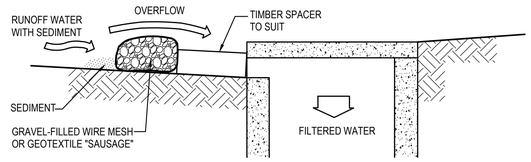
SCALE N.T.S.



PLAN
STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.



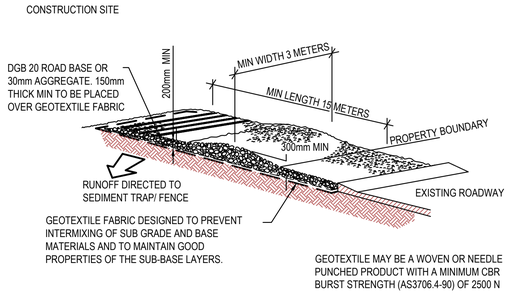


MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

1. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
3. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
4. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
5. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY CAN FIRMLY ABUT EACH OTHER AND SEDIMENT / LADEN WATERS CANNOT PASS BETWEEN.

MESH & GRAVEL INLET FILTER

SCALE N.T.S.



STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.

NOTES:

1. THIS DEVICE IS TO BE LOCATED AT ALL EXITS FROM CONSTRUCTION SITE.
2. THIS DEVICE IS TO BE REGULARLY CLEANED OF DEPOSITED MATERIAL SO AS TO MAINTAIN A 50mm DEEP SPACE BETWEEN PLANKS.
3. ANY UNSEALED ROAD BETWEEN THIS DEVICE AND NEAREST ROADWAY IS TO BE TOPPED WITH 100mm THICK 40-70mm SIZE AGGREGATE.
4. ALTERNATIVELY, THREE(3) PRECAST CONCRETE CATTLE GRIDS (AS MANUFACTURED BY "HUMES CONCRETE MAY BE USED. 1, 2 & 3 ABOVE ALSO APPLY.

SEDIMENT BASIN SIZING

1. THE SEDIMENT BASIN SHALL BE CONSTRUCTED ON A RATE PER HECTARE BASIS AND HAS BEEN IN ACCORDANCE WITH THE REQUIREMENTS OF THE LANDCOM MANUAL "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION", FOR SEDIMENTATION **TYPE D** SOILS. THE DISTURBED AREA WITHIN THIS CATCHMENT AT ANY ONE TIME SHOULD BE LIMITED TO AN AREA FOR WHICH EACH SEDIMENT BASIN CAN HANDLE. EACH BASIN SHALL BE SIZED IN ACCORDANCE WITH THE TABLE BELOW.

SEDIMENT BASIN SIZING TYPE D SOILS	
VOLUMETRIC RUNOFF COEFFICIENT, CV	0.51 (APPENDIX F - TABLE F2)
75TH PERCENTILE 5 DAY TOTAL RAINFALL DEPTH, R	32.2mm
CATCHMENT AREA, A	1 Ha (UNIT AREA)
SETTLING ZONE VOLUME (PER HECTARE) 10 CV A R	164.22 m^3
DISTURBED CATCHMENT AREA	1 Ha (UNIT AREA)
R K LS P C	264 m^3
SEDIMENT ZONE VOLUME (0.17 A (R K LS P C)/1.3	34.5 m^3 < 50% SETTLING VOL
TOTAL SEDIMENT BASIN VOLUME REQUIRED :	246.33 m^3/Ha

* (LANDCOM MANAGING URBAN STORMWATER MANUAL REFERENCE)

2. THE FOLLOWING DESIGN PARAMETERS HAVE BEEN ASSESSED FOR THE SITE:

CONSTRAINT	VALUE	(SOURCE)*
RAINFALL EROSIVITY (R-FACTOR)	2500	APPENDIX B - MAP 10
LENGTH/SLOPE GRADIENT FACTOR, LS	2.14	APPENDIX A - TABLE A1
SOIL ERODIBILITY (K-FACTOR)	0.038	(TABLE C19 - LUDDENHAM CL GROUP)
EROSION CONTROL PRACTICE FACTOR (P-FACTOR)	1.3 (COMPACTED)	APPENDIX A - TABLE A2
COVER FACTOR (C-FACTOR)	1.0 (DURING EARTHWORKS)	APPENDIX A - FIGURE A5
CALCULATED SOIL LOSS, A (RUSLE EQUATION)	264.22 t/Ha/YR	A = R K LS P C
SOIL HYDROLOGIC GROUP	GROUP C	APPENDIX C TABLE 19
SEDIMENT TYPE	TYPE D	APPENDIX C TABLE 19
75TH PERCENTILE 5-DAY RAINFALL EVENT	32.2mm (LIVERPOOL)	TABLE 6.3A

* (LANDCOM MANAGING URBAN STORMWATER MANUAL REFERENCE)

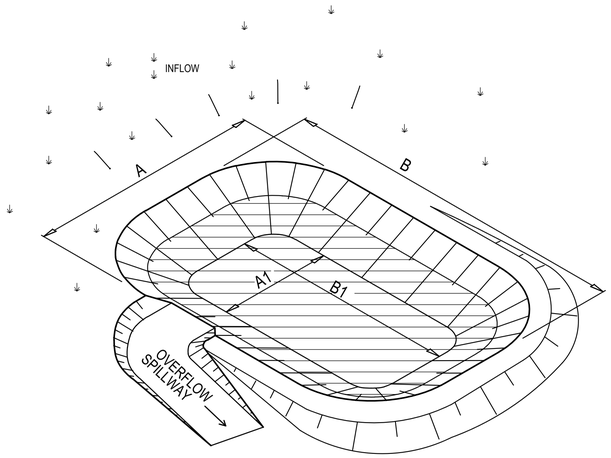
BASIN MANAGEMENT

1. THE CAPTURED STORMWATER IN THE SETTLING ZONE SHOULD BE DRAINED TO MEET THE MINIMUM STORAGE CAPACITY REQUIRED WITHIN A FIVE (5) DAY PERIOD FOLLOWING RAINFALL, PROVIDED THE ACCEPTABLE WATER QUALITY (NFR) AND TURBIDITY HAVE BEEN ACHIEVED.
2. CHEMICAL FLOCCULENT SUCH AS GYPSUM MAY BE DOSED TO AID SETTLING WITHIN 24 HOURS OF CONCLUSION OF EACH STORM. THE APPLIED DOSING RATES SHOULD ACHIEVE THE TARGET QUALITY WITHIN 36 TO 72 HOURS OF THE STORM EVENT.
3. INSPECT THE SEDIMENT BASINS AFTER EACH RAINFALL EVENT AND/OR WEEKLY. ENSURE THAT ALL SEDIMENT IS REMOVED ONCE THE SEDIMENT STORAGE ZONE IS FULL (REFER TO PEGS INSTALLED IN BASINS IN ACCORDANCE WITH THE SWMP). ENSURE THAT OUTLET AND EMERGENCY SPILLWAY WORKS ARE MAINTAINED IN A FULLY OPERATIONAL CONDITION AT ALL TIMES.

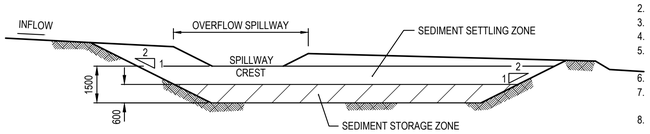
SOWING SEASON	SEED MIX
AUTUMN/WINTER	OATS@40KG/Ha + JAPANESE MILLET@10kg/Ha
SPRING/SUMMER	OATS@20kg/Ha + JAPANESE MILLET@20kg/Ha

4. THE LONG TERM GROUND COVER FACTORS FOR THE CONSTRUCTION WORKS IS NOT TO EXCEED THE FOLLOWING LIMITS:

LAND	MAXIMUM C-FACTOR	REMARKS
WATERWAYS AND OTHER AREAS OF CONCENTRATED FLOWS, POST CONSTRUCTION	0.05	APPLIES AFTER TEN WORKING DAYS OF COMPLETION OF FORMATION AND BEFORE CONCENTRATED FLOWS ARE APPLIED. FOOT AND VEHICULAR TRAFFIC IS PROHIBITED IN THIS AREA AND 70% GROUND COVER IS REQUIRED.
STOCKPILES, POST CONSTRUCTION	0.10	APPLIES AFTER TEN WORKING DAYS FROM COMPLETION OF FORMATION. 60% GROUND COVER IS REQUIRED.
ALL LANDS, INCLUDING WATERWAYS AND STOCKPILES, DURING CONSTRUCTION.	0.15	APPLIES AFTER 20 DAYS OF INACTIVITY, EVEN THOUGH WORKS MAY BE INCOMPLETE. 50% GROUND COVER IS REQUIRED.



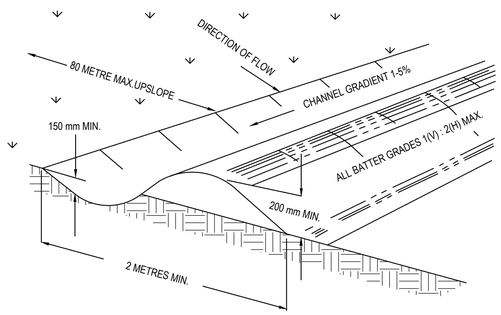
PERSPECTIVE VIEW



TYPICAL SECTION

TYPE 'D' & 'F' SEDIMENTATION BASIN

N.T.S.



NOTE: ONLY TO BE USED AS TEMPORARY BANK WHERE MAC.UPSLOPE LENGTH IS 80 METERS.

CATCH DRAIN CONSTRUCTION NOTES:

1. CONSTRUCT ALONG GRADIENT AS SPECIFIED.
2. MAXIMUM SPACING BETWEEN BANKS SHALL BE 80 METRES.
3. DRAINS TO BE OF PARABOLIC OR TRAPEZOIDAL CROSS SECTION NOT V-SHAPED.
4. EARTH BANKS TO BE ADEQUATELY COMPACTED IN ORDER TO PREVENT FAILURE.
5. CONSTRUCTION IS OF A TEMPRORARY NATURE AND SHALL BE COMPACTED AT THE END A DAYS WORK OR IMMEDIATELY PRIOR RAIN.
6. ALL OUTLETS FROM DISTURBED LANDS ARE TO FEED INTO SEDIMENT BASIN OR SIMILAR.
7. DISCHARGE RUNOFF COLLECTED FROM UNDISTURBED LANDS ONTO EITHER A STABILISED OR AN UNDISTURBED DISPOSAL AISTE WITHIN THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED.
8. COMPACT WITH A SUITABLE IMPLEMENT IN SITUATIONS WHERE THEY ARE REQUIRED TO FUNCTION FOR MORE THAN FIVE DAYS.
9. EARTH BANKS TO BE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT WILL IMPEDE NORMAL FLOW.

CATCH DRAINS

SCALE N.T.S.

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR
Architect: SBA ARCHITECTS

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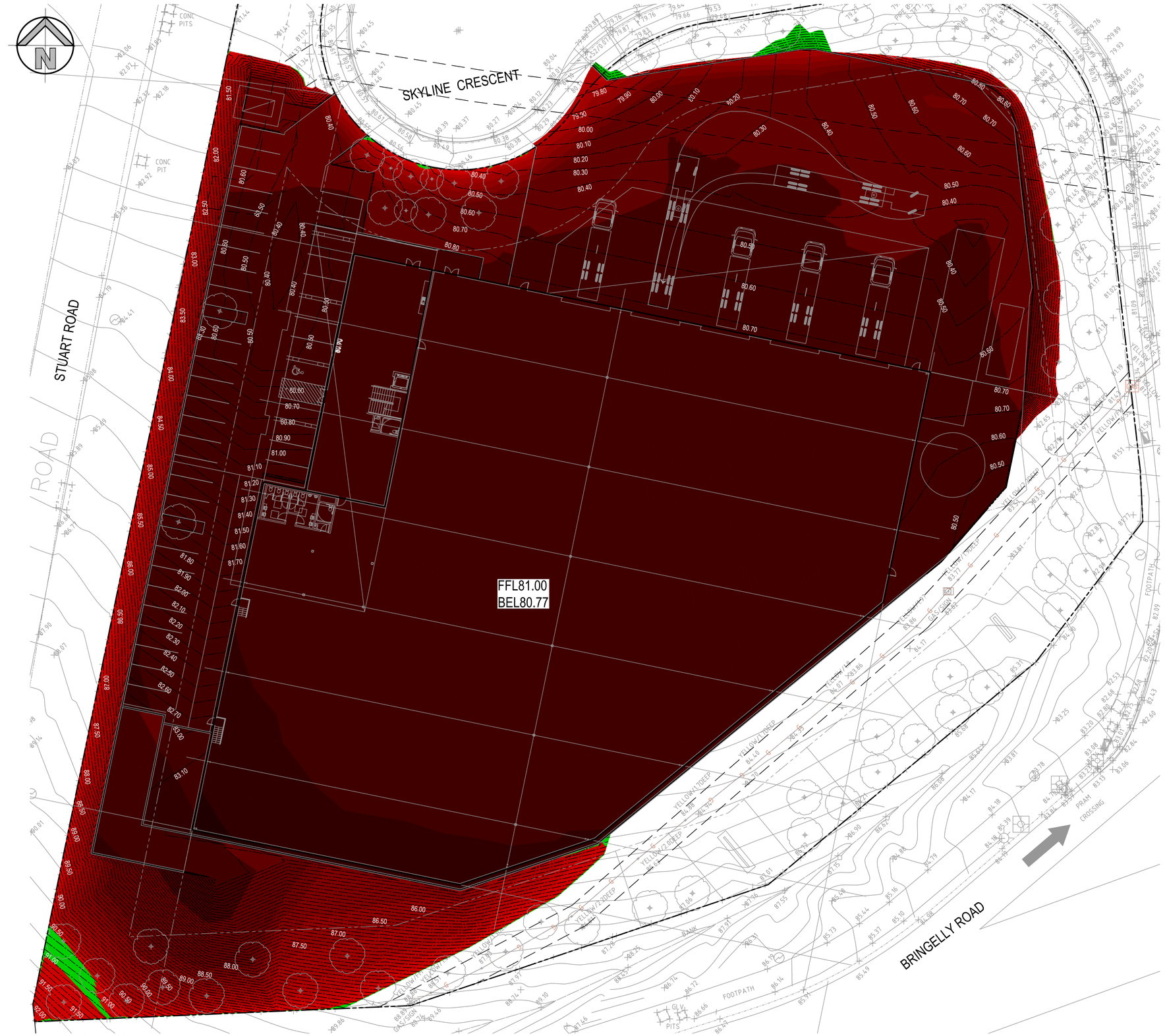
Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW
Title: SEDIMENT AND EROSION CONTROL TYPICAL DETAILS AND SECTIONS

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:250

Drawing number: 21U79_DA_SE02
Revision: 01



BULK EARTHWORKS CUT AND FILL PLAN

SCALE: 1:250

LEGEND

DEPTH OF CUT & FILL RANGE				
LOWER VALUE		UPPER VALUE		COLOUR
-8.00	to	-6.00	m	
-6.00	to	-4.00	m	
-4.00	to	-2.00	m	
-2.00	to	-1.00	m	
-1.00	to	-0.80	m	
-0.80	to	-0.60	m	
-0.60	to	-0.40	m	
-0.40	to	-0.20	m	
-0.20	to	-0.10	m	
-0.10	to	-0.05	m	
-0.05	to	0.00	m	
0.00	to	0.05	m	
0.05	to	0.10	m	
0.10	to	0.20	m	
0.20	to	0.40	m	
0.40	to	0.60	m	
0.60	to	0.80	m	
0.80	to	1.00	m	
1.00	to	2.00	m	
2.00	to	4.00	m	

LEGEND

81.00 CONTOURS BE

BULK EARTHWORKS QUANTITIES		
TOTAL AREA (10,329m²)		
CUT	22,950	m³
FILL	2	m³
EXCESS OF CUT OVER FILL	22,948	m³
EXCAVATION FOR RETAINING WALLS NOT INCLUDED IN CALCULATION		
EXCAVATION FOR SERVICE TRENCHES NOT INCLUDED IN CALCULATION		
VOLUME HAS BEEN CALCULATED AFTER STRIPPING THE SITE OF TOPSOIL - ASSUMED TOPSOIL DEPTH 100mm. STRIPPED MATERIAL NOT INCLUDED IN ABOVE QUANTITIES		

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022					

Client: ESR

Architect: SBA ARCHITECTS

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henry&hymas

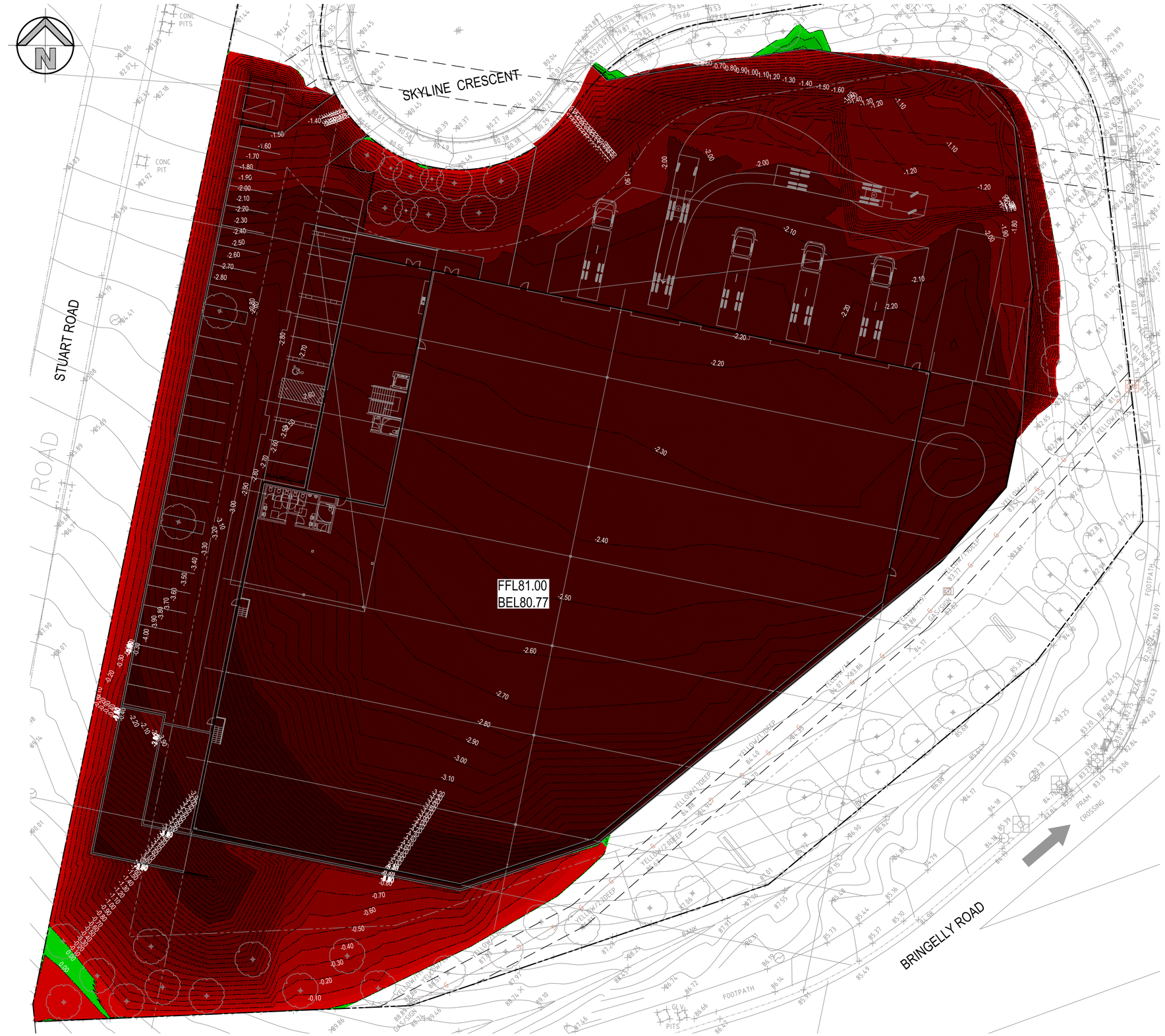
Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW

Title: BULK EARTHWORKS CUT AND FILL PLAN BULK LEVEL

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:250

Drawing number: 21U79_DA_BE01

Revision: 01



SCALE 1:250

BULK EARTHWORKS CUT AND FILL PLAN

SCALE: 1:250

LEGEND

DEPTH OF CUT & FILL RANGE				
LOWER VALUE		UPPER VALUE		COLOUR
-8.00	to	-6.00	m	
-6.00	to	-4.00	m	
-4.00	to	-2.00	m	
-2.00	to	-1.00	m	
-1.00	to	-0.80	m	
-0.80	to	-0.60	m	
-0.60	to	-0.40	m	
-0.40	to	-0.20	m	
-0.20	to	-0.10	m	
-0.10	to	-0.05	m	
-0.05	to	0.00	m	
0.00	to	0.05	m	
0.05	to	0.10	m	
0.10	to	0.20	m	
0.20	to	0.40	m	
0.40	to	0.60	m	
0.60	to	0.80	m	
0.80	to	1.00	m	
1.00	to	2.00	m	
2.00	to	4.00	m	

LEGEND

-0.50 DEPTH CONTOURS BE

BULK EARTHWORKS QUANTITIES		
TOTAL AREA (10,329m²)		
CUT	22,950	m³
FILL	2	m³
EXCESS OF CUT OVER FILL	22,948	m³
EXCAVATION FOR RETAINING WALLS NOT INCLUDED IN CALCULATION		
EXCAVATION FOR SERVICE TRENCHES NOT INCLUDED IN CALCULATION		
VOLUME HAS BEEN CALCULATED AFTER STRIPPING THE SITE OF TOPSOIL - ASSUMED TOPSOIL DEPTH 100mm. STRIPPED MATERIAL NOT INCLUDED IN ABOVE QUANTITIES		

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LANDPARTNERS
DATUM: AHD
ORIGIN OF LEVELS: SSM 192186 RL 79.008

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA	SC	NW	20.04.2022

Client: ESR

Architect: SBA ARCHITECTS

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henry&hymas

Project: PROPOSED WAREHOUSE DEVELOPMENT BRINGELLY ROAD, LEPPINGTON NSW

Title: BULK EARTHWORKS CUT AND FILL PLAN BULK DEPTH

Drawn	Designed	Date
S.Chen	N.Wetzlar	Feb 2022
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:250

Drawing number: 21U79_DA_BE02

Revision: 01

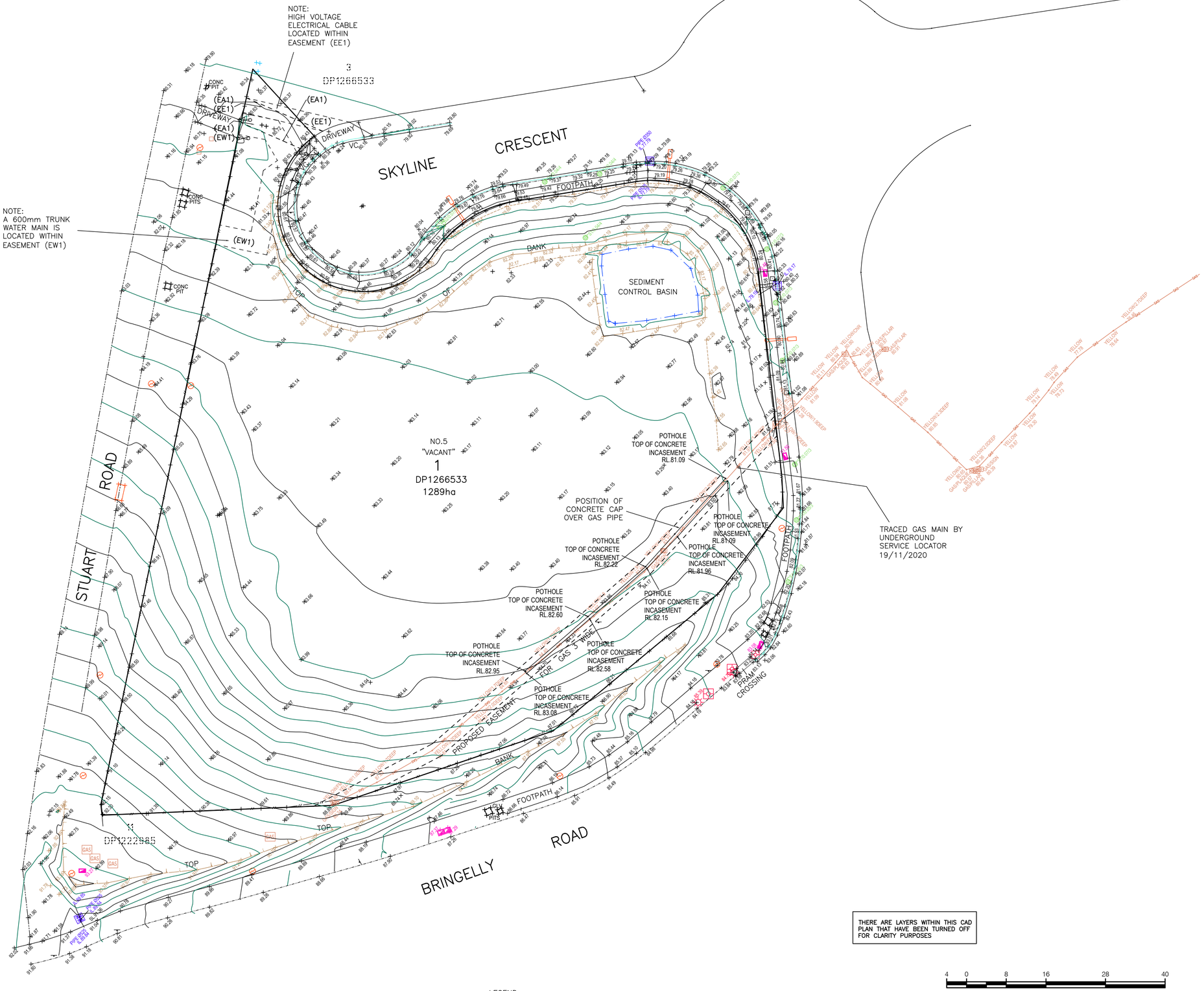
Appendix B: Detailed site survey by Land partners (2022)

M.G.A

GDA2020

DIAL BEFORE YOU DIG www.1100.com.au

A Dial Before You Dig enquiry must be lodged at least two business days prior to starting any excavation or work site project.



THERE ARE LAYERS WITHIN THIS CAD PLAN THAT HAVE BEEN TURNED OFF FOR CLARITY PURPOSES

4 0 8 16 28 40

SCALE 1:400

(EW1) EASEMENT FOR FOR WATER SUPPLY PURPOSES 4 WIDE & VARIABLE (DP1264336)
(EA1) RIGHT OF ACCESS 5 WIDE (DP1264336)
(EE1) EASEMENT FOR UNDERGROUND CABLES 3 WIDE (DP1264336)

LEGEND:
IL INVERT LEVEL
Ø PIPE DIAMETER
SL TOP OF PIT LEVEL
GLV GALVANIZED LID
VC VEHICLE CROSSING

CLIENT

ESR

PROJECT

DETAIL SURVEY
OF
LOT 1 IN DP1266533
NO.5 SKYLINE CRESCENT
HORNINGSEA PARK

NOTES
Tree sizes are estimates only.
Only visible services have been located in this survey.
Service and utilities shown on plan have been located by physical evidence on site only and may not have been opened to verify the type of utility.
Neither excavation nor potholing have been carried out to confirm underground location. Service details should be confirmed with the relevant service authority during design and prior to any construction.
All dimensions must be verified on site prior to any construction.
The position of surveyed data has been located and is shown to topographic accuracies. If clearances to boundaries or other features are critical and dimensions are not shown further survey may be required.
The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.
Any construction on or near boundaries will require further survey in order that marks defining boundaries can be placed.

TREE DETAIL
HEIGHT (m) ie 12 = 12m
TRUNK (m) ie 0'3 = ø0.3m DIAMETER
SPREAD (m) ie 52 = 2m SPREAD
TREE SYMBOLS ARE A TRUE REPRESENTATION OF THE SPREAD ie SYMBOL SIZE 2 (X - Y VALUE) = 2m SPREAD
2m DIAMETER SPREAD

2	GKO	147/03/2022	POTHOLING IN PROPOSED GAS EASEMENT ADDED
1	GKO	31/01/2022	INITIAL ISSUE

SYM	CODE	DESCRIPTION	SYM	CODE	DESCRIPTION
	APB	AUSPOST BOX		OFM	OPTICAL FIBRE MARKER
	BM	BENCH MARK		OFP	OPTICAL FIBRE PIT
	BO	BOLLARD		TDP	TELECOM DIST PILLAR
	DJM	DRAINAGE MANHOLE		TPL	TELECOM POLE
	GUL	DRAINAGE GULLY PIT		TSP	TELECOM SINGLE PIT
	ELP	ELEC GARDEN LIGHT		TTP	TELECOM TWIN PIT
	EL	ELEC GREEN PILLAR		SLH	SEWER LAMP HOLE
	LPL	ELEC LIGHT POLE		SMH	SEWER MANHOLE
	EP	ELECT SINGLE PIT		SVP	SEWER VENT PIPE
	SPL	ELEC STAY POLE		TM	PALM TREE
	PP	ELEC POWER POLE		TS	SHRUB
	PLP	POWER POLE/LIGHT		T	TREE
	PTR	ELE POLE/TRANSFORM		CAM	SPEED CAMERA
	ETP	ELEC TWIN PIT		SCL	TRAFFIC CONTROLLER
	EFP	ELEC FUSE BOX		SJX	TRAFFIC JUNCTION BOX
	GMR	GAS METER		SGL	TRAFFIC LIGHT
	GAS	GAS VALVE		BUS	BUS STOP SIGN
	GM	GAS MAIN		SI	TRAFFIC SIGN
	MBX	MAIL BOX		US	UNKNOWN SERVICE
	BIN	BIN		WHY	WATER HYDRANT
	BOR	BOREHOLE		WMR	WATER METER
	FD	FUEL DIP		WEP	WATER PUMP
	SE	SEAT		WSV	WATER STOP VALVE
	FLG	FLAG POLE		WAV	WATER AIR VALVE
	AG	GATE		WTP	WATER TAP

Symbols shown are indicative only. The symbol size and orientation does not necessarily represent the real size or orientation of the feature.

DRAINAGE PIPE U/G — SV
DRAIN — D
ELECT. CABLE A/G — E
ELEC. CABLE U/G — E
GAS PIPE — GAS
FENCE LINE —
SEWERAGE PIPE — S
TELSTRA CABLE — T
WATER PIPE — W

LANDPARTNERS Surveyors and Planners

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ISO 9001 Quality Management

HEIGHT DATUM: AHD	LOCAL AUTHORITY: LIVERPOOL
HEIGHT ORIGIN: SSM192186 RL 79.008 (BY DP1266533)	SCALE: 1:400 (A1)
MERIDIAN: MGA ZONE 56	CONTOUR INTERVAL: 0.5 Metre
CO-ORD SYSTEM: GDA 2020	SURVEYOR: DH, BB — DATE OF SURVEY: 20/01/2022, 15/03/2022
CCAD FILE: 73409	DRAWN: SF — DATE: 17/03/2022
AUTOCAD FILE: SY73409.001.4.2	CHECKED: DH — DATE: 17/03/2022
ARCHIVE FILE	APPROVED: GKO — DATE: 17/03/2022

PLAN NUMBER: SY73409.001.4.2

SHEET 01 OF 01

PD:GKO

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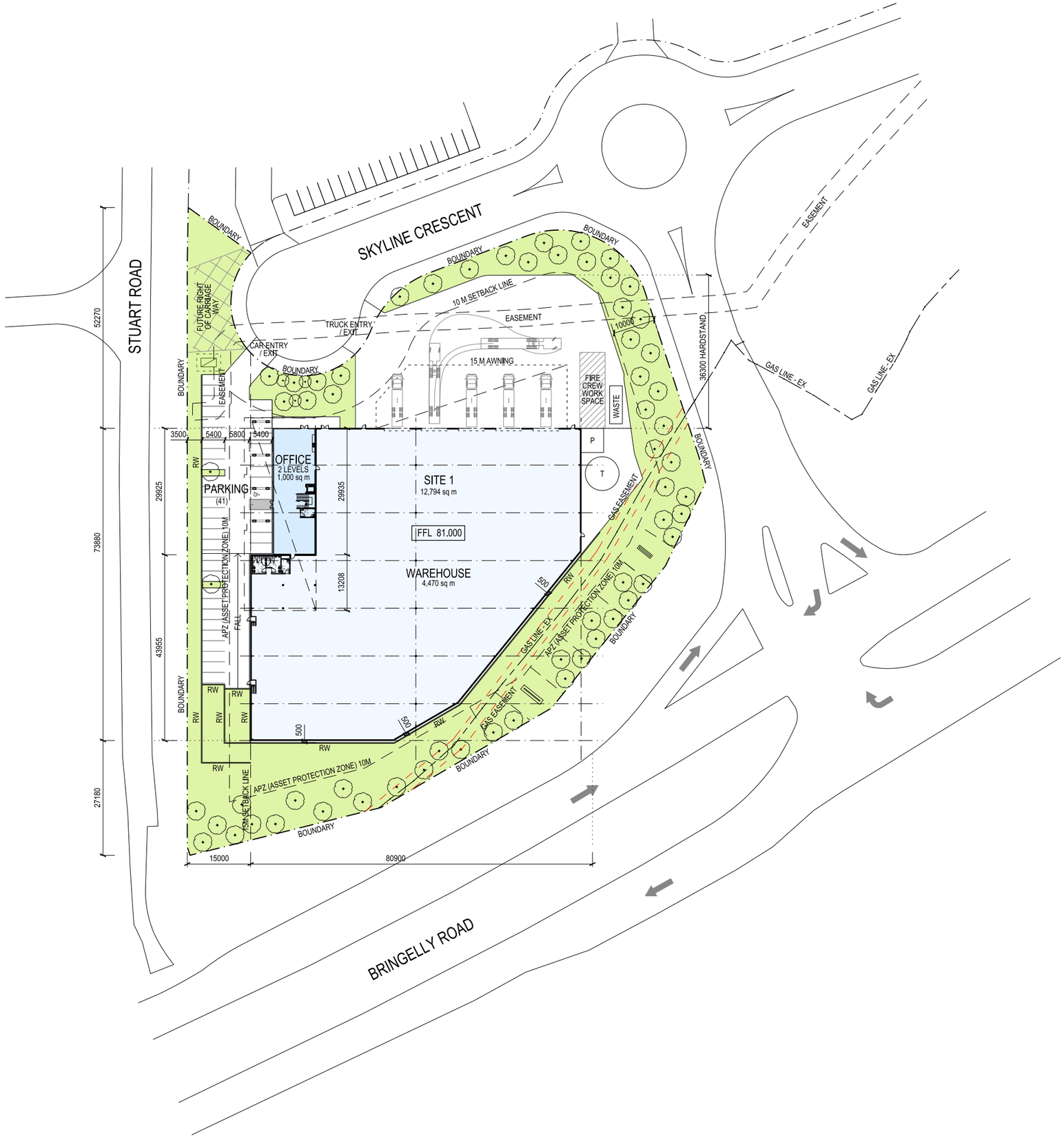
Appendix C: Architectural concept Plan by SBA Architects Revision P5 dated April 2022

ESR



AREA SCHEDULE

SITE AREA	12,892m2
WAREHOUSE AREA	4,470m2
OFFICE (2 LEVELS)	1,000m2
TOTAL GFA	5,470m2
FLOOR SPACE RATIO	0.42:1
SITE COVERAGE	37%
LANDSCAPE AREA	4,664m2
PARKING REQURIED	41
PARKING PROVIDED	41

DEVELOPMENT APPLICATION

SBA ARCHITECTS

Commercial Industrial Residential Retail Interior Design

Suite 702, 83 Mount Street, North Sydney NSW 2060
T 02 9929 9988 F 02 9929 8899
E info@sbaarch.com.au W www.sbaarch.com.au

ISSUE	REV.	DESCRIPTION	DATE
	P6	ISSUED FOR REVISED D.A.	05.04.2022
	P5	ISSUED FOR DA	29.03.2022
	P4	ISSUED FOR DA	21.03.2022
	P3	ISSUED FOR DA	18.03.2022
	P2	ISSUED FOR CO-ORDINATION	14.03.2022
	P1	ISSUED FOR CO-ORDINATION	09.03.2022

PROPOSED INDUSTRIAL DEVELOPMENT

LOT 1 - BRINGELLY ROAD BUSINESS HUB, NSW

NORTH

DRAWING TITLE

SITE PLAN

DATE	SCALE	JOB NO.	DRAWING NO.	
FEB 2022	1:1000 @ A3 1:500 @ A1	22118	DA 03	P6

Appendix D: Indicative maintenance manuals by Ocean Protect

OCEAN PROTECT

OceanGuard™

Operations & Maintenance Manual

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Rev: *1* ***Last Updated:*** *March 2019*

Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes as recommended by the manufacturer.

The OceanGuard technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of Filtration liners, designed to remove gross pollutants, total suspended solids and attached pollutants as either a standalone technology or as part of a treatment train with our StormFilter or Jellyfish Filtration products. OceanGuard pit baskets are highly effective, easy to install and simple to maintain.

Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the OceanGuard.

Health and Safety

Access to pits containing an OceanGuard typically requires removing (heavy) access covers/grates, but typically it is not necessary to enter into a confined space. Pollutants collected by the OceanGuard will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or sharp objects such as broken glass and syringes. For these reasons, there should be no primary contact with the waste collect and all aspects of maintaining and cleaning your OceanGuard require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the OceanGuard pit insert, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

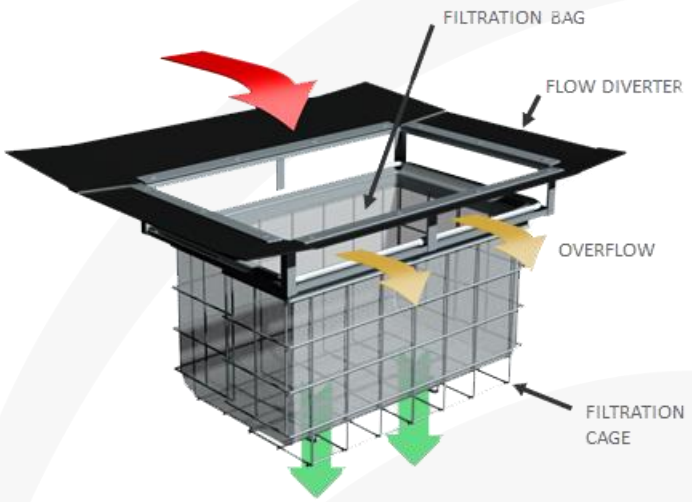
- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

The OceanGuard pit insert is designed to be maintained from surface level, without the need to enter the pit. However depending on the installation configuration, location and site specific maintenance requirements it may be necessary to enter a confined space occasionally. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry.

How does it Work?

OceanGuard is designed to intercept stormwater as it enters the stormwater pits throughout a site. The OceanGuard has diversion panels that sit flush with the pit walls, this ensures that as stormwater enters at the top of the pit it is directed to the middle of the insert where the Filtration bag is situated. The filtration bag allows for screening to occur removing 100% of pollutants greater than the opening of the filtration material (200micron, 1600micron bags available).



During larger rain events the large flows overflow slots in the flow diverter of the OceanGuard ensure that the conveyance of stormwater is not impeded thus eliminating the potential for surface flooding. As the flow subsides, the captured pollutants are held in the OceanGuard Filtration bag dry. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

Maintenance Procedures

To ensure that each OceanGuard pit insert achieves optimal performance, it is advisable that regular maintenance is performed. Typically the OceanGuard requires 2-4 minor services annually, pending the outcome of these inspections additional maintenance servicing may be required.

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the OceanGuard.

	Description of Typical Activities	Frequency
Minor Service	Filter bag inspection and evaluation Removal of capture pollutants Disposal of material	2-4 Times Annually
Major Service	Filter Bag Replacement Support frame rectification	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to return the OceanGuard device back to optimal operating performance. This type of service can be undertaken either by hand or with the assistance of a Vacuum unit.

Hand Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Use two lifting hooks to remove the filtration bag
4. Empty the contents of the filtration bag into a disposal container
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Vacuum Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Vacuum captured pollutants from the filtration bag
4. Remove filtration bag
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Major Service (Filter Bag Replacement)

For the OceanGuard system, a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event from Minor Service	Maintenance Action
Filtration bag inspection reveals damage	Replace the filtration bag[1]
Component inspection reveals damage	Perform rectification works and if necessary replace components[1]

[1] Replacement filtration bags and components are available for purchase from Ocean Protect.

Additional Reasons of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, all OceanGuard pits that potentially received flow should be inspected and cleaned. Specifically all captured pollutants from within the filtration bag should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. All filtration bags should be rejuvenated (replaced if required) and re-installed.

Blockages

The OceanGuards internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. In the unlikely event that flooding occurs around the stormwater pit the following steps should be undertaken to assist in diagnosing the issue and implementing the appropriate response.

1. Inspect the OceanGuard flow diverter, ensuring that they are free of debris and pollutants
2. Perform a minor service on the OceanGuard
3. Remove the OceanGuard insert to access the pit and inspect both the inlet and outlet pipes, ensuring they are free of debris and pollutants

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the OceanGuard pit insert after a major storm event. The inspection should focus on checking for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants disposed.

Disposal of Waste Materials

The accumulated pollutants found in the OceanGuard must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filtration bag has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanGuard system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement filter bags.

For more information please visit www.OceanProtect.com.au

OCEAN PROTECT

StormFilter

Operations & Maintenance Manual

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Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the StormFilter as recommended by the manufacturer.

The StormFilter is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including fine solids, soluble heavy metals, oil, and soluble nutrients) using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and, through ongoing product enhancements, the design continues to be refined for ease of use and improved performance.

Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the StormFilter.

Health and Safety

Access to a StormFilter unit requires removing heavy access covers/grates, and it is necessary to enter into a confined space. Pollutants collected by the StormFilter will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your StormFilter require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the StormFilter, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

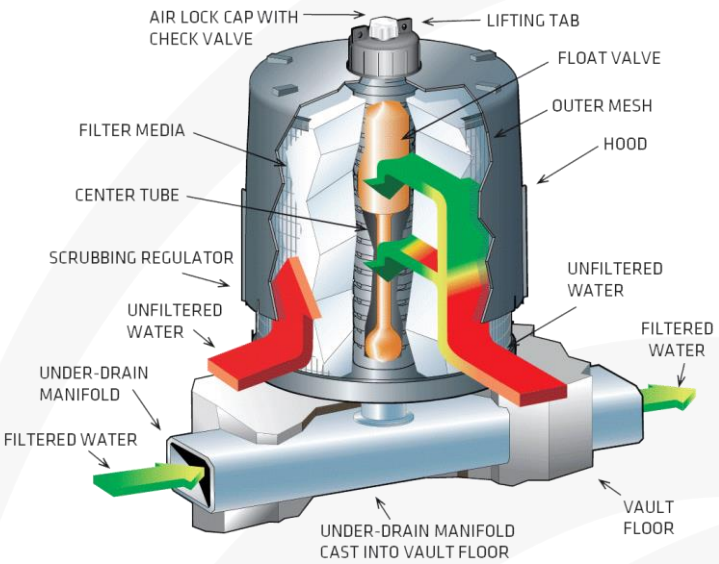
- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of StormFilter maintenance can be performed from surface level, there will be a need to enter the StormFilter system (confined space) during a major service. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

How does it Work?

Stormwater enters the cartridge chamber, passes through the filtration media and begins filling the cartridge center tube. When water reaches the top of the cartridge the float valve opens and filtered water is allowed to drain at the designed flow rate. Simultaneously, a one-way check valve closes activating a siphon that draws stormwater evenly throughout the filter media and into the center tube. Treated stormwater is then able to discharge out of the system through the underdrain manifold pipework.



As the rain event subsides, the water level outside the cartridge drops and approaches the bottom of the hood, air rushes through the scrubbing regulators releasing the water column and breaking the siphon. The turbulent bubbling action agitates the surface of the cartridge promoting trapped sediment to drop to the chamber floor. After a rain event, the chamber is able to drain dry by way of an imperfect seal at the base of the float valve.

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the StormFilter requires an inspection every 6 months with a minor service at 12 months. Additionally, as the StormFilter cartridges capture pollutants the media will eventually become occluded and require replacement (expected media life is 1-3 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the StormFilter.

	Description of Typical Activities	Frequency
Inspection	Visual Inspection of cartridges & chamber Remove larger gross pollutants Perform minimal rectification works (if required)	Every 6 Months
Minor Service	Evaluation of cartridges and media Removal of accumulated sediment (if required) Wash-down of StormFilter chamber (if required)	Every 12 Months
Major Service	Replacement of StormFilter cartridge media	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Inspection

The purpose of the inspecting the StormFilter system is to assess the condition of the StormFilter chamber and cartridges. When inspecting the chamber, particular attention should be taken to ensure all cartridges are firmly connected to the connectors. It is also an optimal opportunity to remove larger gross pollutants and inspect the outlet side of the StormFilter weir.

Minor Service

This service is designed to ensure the ongoing operational effectiveness of the StormFilter system, whilst assessing the condition of the cartridge media.

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. Evaluate StormFilter cartridge media (if exhausted schedule major service within 6 months)
4. Measure and record the level of accumulated sediment in the chamber
   (if sediment depth is less than 100 mm skip to step 9)
5. Remove StormFilter cartridges from the chamber
6. Use vacuum unit to removed accumulated sediment and pollutants in the chamber
7. Use high pressure water to clean StormFilter chamber
8. Re-install StormFilter cartridges
9. Replace access cover(s)

Major Service (Filter Cartridge Replacement)

For the StormFilter system a major service is reactionary process based on the outcomes from the minor service, specifically the evaluation of the cartridge media.

Trigger Event	Maintenance Action
Cartridge media is exhausted[1]	Replace StormFilter cartridge media[2]

[1] Multiple assessment methods are available, contact Ocean Protect for assistance
[2] Replacement filter media and components are available for purchase from Ocean Protect.

This service is designed to return the StormFilter device back to optimal operating performance

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. By first removing the head cap, remove each individual cartridge hood to allow access to the exhausted media.
4. Utilise a vacuum unit to remove exhausted media from each cartridge
5. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
6. Use high pressure water to clean StormFilter chamber
7. Inspect each empty StormFilter cartridges for any damage, rectify damage as required
8. Re-fill each cartridge with media in line with project specifications
9. Re-install replenished StormFilter cartridges
10. Replace access cover(s)

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the StormFilter unit should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess them for contamination, depending on the type of spill event it may be necessary to replace the filtration media.

Blockages

In the unlikely event that flooding occurs upstream of the StormFilter system the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure (if applicable) ensuring that it is free of debris and pollutants
2. Inspect the StormFilter unit checking the underdrain manifold as well as both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the StormFilter after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the StormFilter must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter media has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

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For more information please visit www.OceanProtect.com.au