IC3 Super West

17-23 Talavera Road, Macquarie Park NSW

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	Sydney NSW 2000

Civil Report

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Table of Contents

1. Introduction

Northrop Consulting Engineers have been appointed by Macquarie Data Centres (MDC) to undertake the civil engineering design for the proposed development of the Macquarie Park Data Centre Campus IC3 Super West site at 17-23 Talavera Road, Macquarie Park.

This Civil Engineering Report serves to support the State Significant Development Application (SSDA) relating to the proposed development.

This report is to be read in conjunction with the following reports and documents:

1. Response to SEARs – 17 -23 Talavera Road Macquarie Park Data Centre – SSD- 24299707 letter prepared by City of Ryde dated 10 August 2021.
2. City of Ryde's Stormwater and Floodplain Technical Manual
3. City of Ryde's Development Control Plan (DCP) 2014
4. City of Ryde's Macquarie Park Public Domain Technical Manual

This Civil Engineering Report has been prepared by Northrop Consulting Engineers on behalf of Macquarie Data Centres (MDC) C/- GIDDIS Project Management.

The following Civil Engineering Report has been produced to support the Environmental Impact Statement (EIS) prepared by Willowtree Planning PTY Ltd (Willowtree Planning).

The EIS has been submitted to the New South Wales (NSW) Department of Planning, Industry and Environment (DPIE), in support of an application for State Significant Development (SSD), for the construction and operation of a data centre, involving earth works, provision of infrastructure and expansion of an existing data centre at 17 – 23 Talavera Road, Macquarie Park (Lot 527 DP 752035).

The proposal represents an extension to the approved data centre (LDA/2018/0322) to allow for additional data storage capacity at the subject site, improving the overall operational efficiencies and provision of technology services to customers and the wider locality.

The proposal involves the construction and operation of an expansion to an existing data centre located at 17-23 Talavera Road, Macquarie Park (Lot 527 in DP 752035), comprising:

- a seven (7) storey building plus ground floor
- ancillary office space and staff amenities
- a back-up power system
- associated infrastructure, car parking, loading docks and landscaping

The subject site is located within the City of Ryde Local Government Area (LGA). The proposal seeks to operate 24 hours per day, seven (7) days per week.

The particulars of this proposal are summarised below:

- Minor earthworks involving cut and fill works
- Infrastructure comprising civil works and utilities servicing
- Construction of a seven (7) storey building plus ground floor extension, comprising up to:

    - 15 data halls
    - 20 back up generators
    - Fitout of the building for use as a data centre (on an as-needs basis)

2. Site Description

The site is described as Lot 527 DP 752035, commonly known as 17 – 23 Talavera Road, Macquarie Park. The site has a total area of approximately 20,000m2, with access achieved via Talavera Road.

The site forms part of the Macquarie Park Corridor, which is the strategic centre of Macquarie Park, being a health and education precinct and an important economic and employment powerhouse in Sydney's North District.

The site is described through its current commercial setting as an existing Data Centre (LDA/2018/0322), adjoining surrounding commercial premises along Talavera Road, and forming part of the wider Macquarie Park Corridor.

The site is situated approximately 12.5 km northwest of the Sydney CBD and 11.3 km northeast of Parramatta. It is within close proximity to transport infrastructure routes (predominantly the bus and rail networks), as well as sharing direct links with the wider regional road network, including Talavera Road, Lane Cove Road, Epping Road and the M2 Motorway.

These road networks provide enhanced connectivity to the subject site and wider locality. Additionally, the site is located within close proximity to active transport links, such as bicycle routes, providing an additional mode of accessible transport available to the subject site

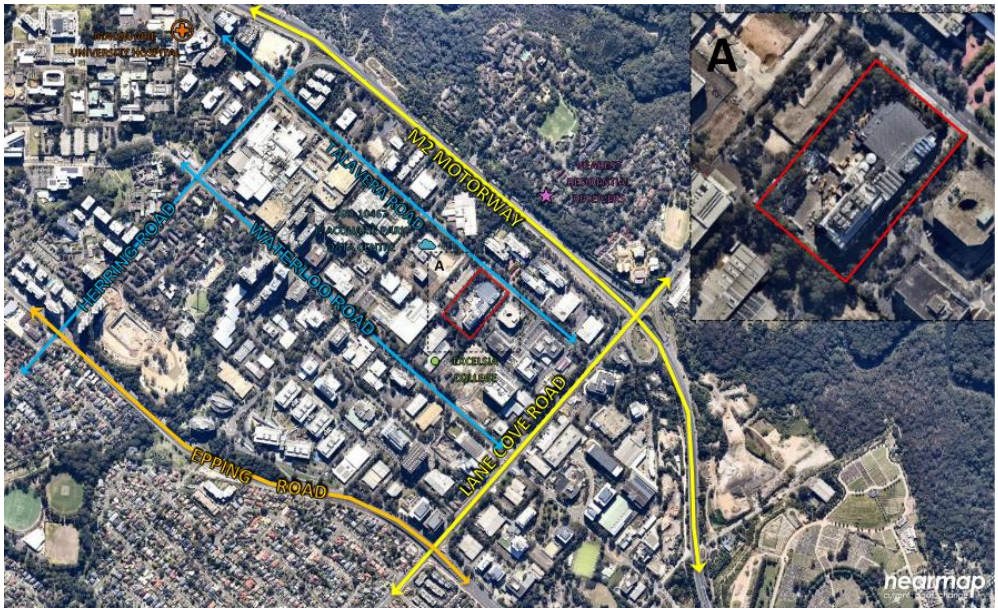

Figure 1: The site 17 – 23 Talavera Road, Macquarie Park, being Lot 527 DP 752035.

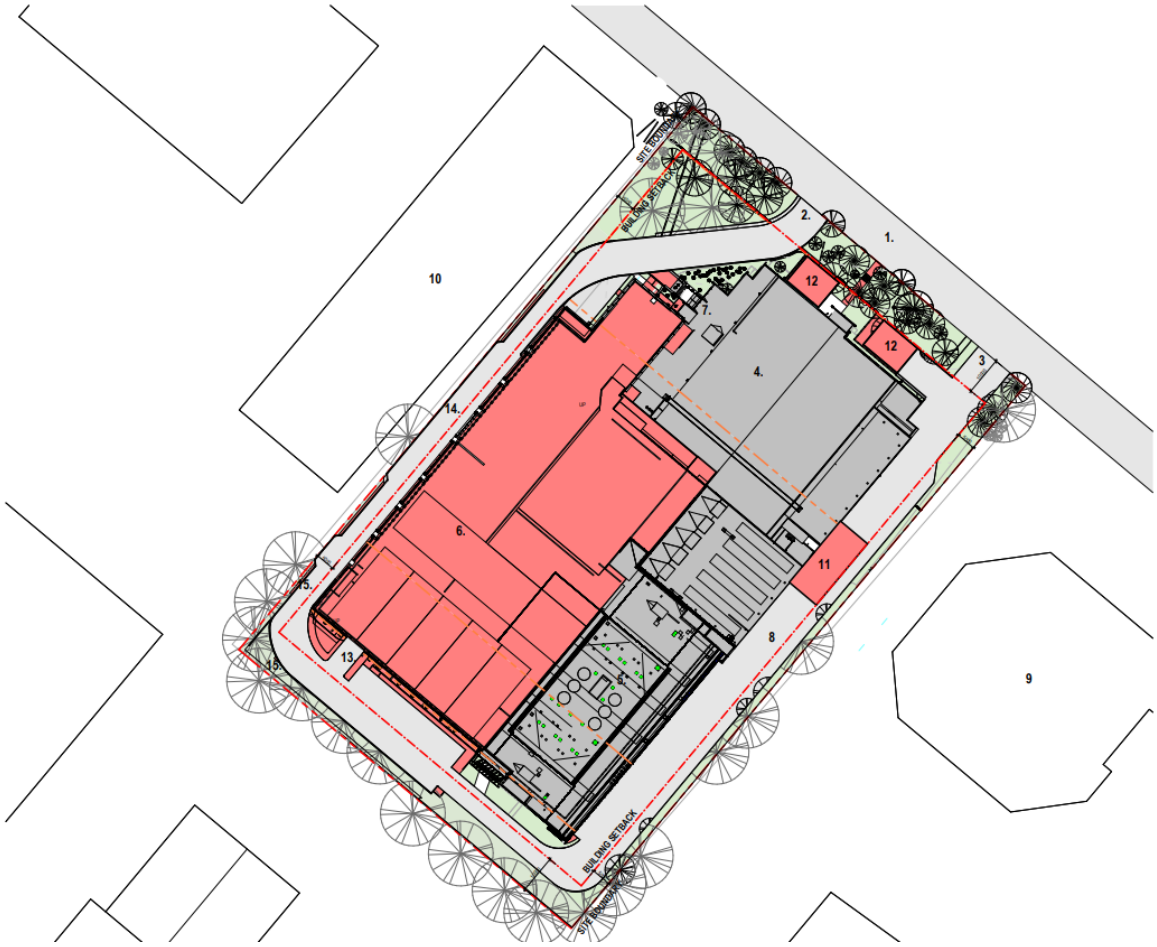

Figure 2: Proposed Extent of Works

The site falls within the Industrial Creek catchment. Industrial Creek generally flows south to North discharging into the Lane Cove River. Industrial Creek has been built over during development of Macquarie Park and now consists mainly of below ground pipes and culverts. Industrial Creek flows through an Ø1800 pipeline located with the site.

3. Secretary's Environmental Assessment Requirements

This Civil Engineering Report is prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs). The SEARs for the proposal outline Key Issues to be addressed as part of this EIS and includes:

The following Secretaries Environmental Assessment Requirements (SEARS) are addressed within Table 1 of this report.

Table 1:

SEARs Items	Secretary's Environmental Assessment Requirements	Response
Soils and Water	• details of all existing and proposed surface, stormwater and wastewater management systems (including on-site detention and/or reuse), and an assessment of any associated water quality treatment options	*Appendix 17 – Stormwater Management Report.*
	• a description of the proposed erosion and sediment controls during construction	

4. Existing Stormwater Conditions

The site falls within the Industrial Creek catchment. Industrial Creek generally flows south to North discharging into the Lane Cove River. Industrial Creek has been built over during development of Macquarie Park and now consists mainly of below ground pipes and culverts. Industrial Creek alignment is located within the site. Wider catchment stormwater runoff follows the alignment of Industrial Creek. Stormwater runoff is generally conveyed through the site via a Ø1800 reinforced concrete pipeline at a depth of 4 – 6m below the existing site surface levels. This pipeline is contained within a 3.5m wide easement for drainage benefitting the City of Ryde.

In larger rainfall events, typically the 1% AEP the site is affected by overland flow. Flood waters inundate the site, entering near the southeast corner and discharging to Talavera via the northern boundary. Northrop's Trunk Drainage System Report and Northrop Flood Assessment Report supporting the SSDA provide greater detail Council's the trunk drainage system and flooding impacts.

Easements for drainage benefitting the properties to the east and west of the site run parallel to the rear boundary connecting 3.5m wide easement benefitting Council.

The proposed development does not require any change to the existing easements

4.1 Existing Site Drainage System

The site consists of two (2) on-site detention tanks.

OSD tank 1 with a volume of approximately 92m^3 is located adjacent to the northern boundary fronting Talavera Road. It is understood that this OSD 1 collects stormwater runoff from the IC2 building roof, hardstand areas on the eastern side (driveway) of the site and northern landscaped area fronting Talavera Road.

There are two existing GPT's and a total of 10 stormwater filter cartridges in the existing OSD 1 treating the site. This system works to treat stormwater runoff prior to discharge from the site.

OSD Tank 2 is in the undercroft area of the already constructed IC3 East building. This tank has a capacity of approximately 210m^3. This tank was oversized in anticipation of the additional flows to be detained from the IC3 West building works. This tank currently collects stormwater runoff from the roof areas of IC3 East.

Stormwater runoff from the western hardstand areas drains to the outlet pipe from OSD 2 Tank via an GPT and connecting to Council's Ø1800 pipe adjacent to the front boundary.

Figure 3 shows the location key stormwater drainage features on the site.

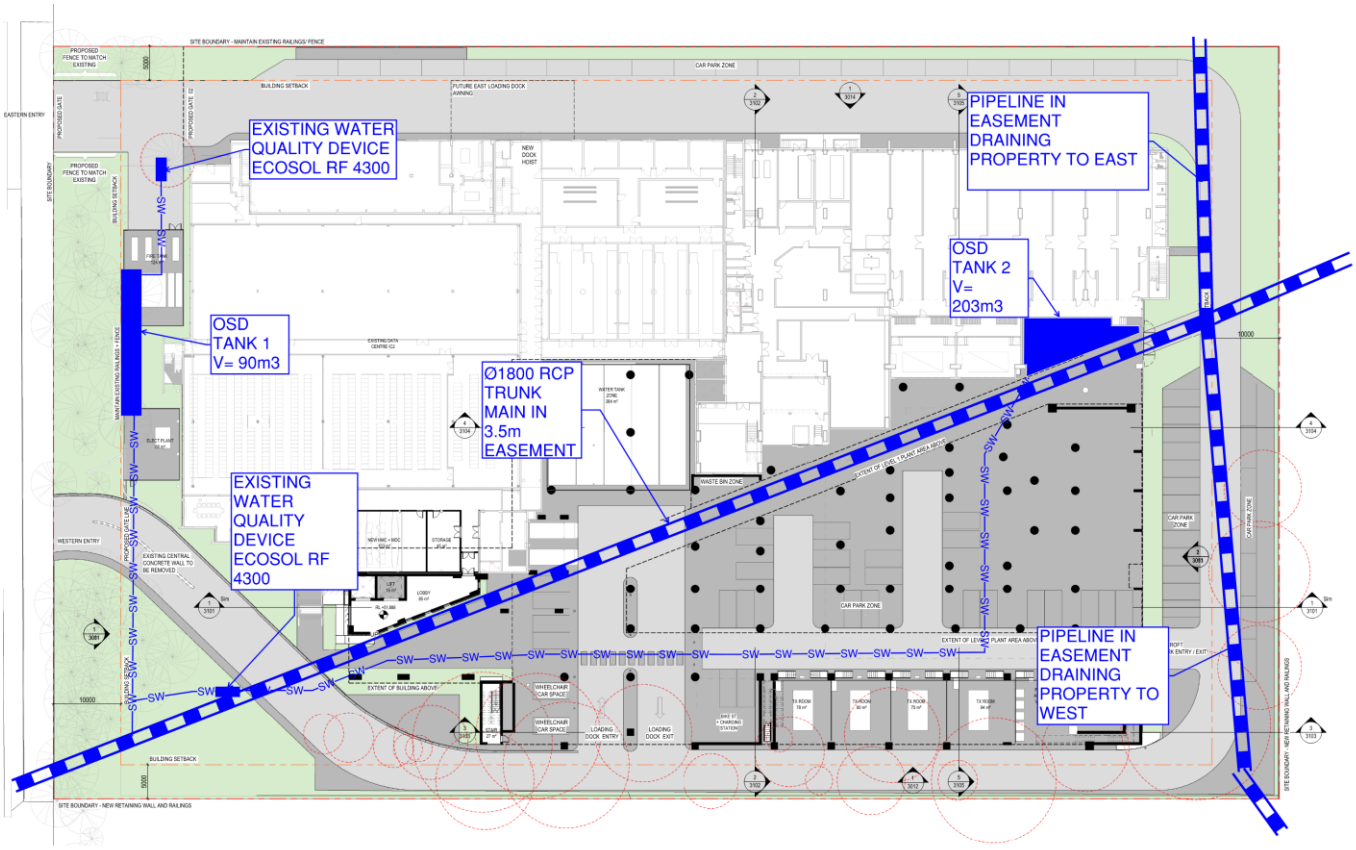

Figure 3 – Key Concept Stormwater Drainage Components

5. Proposed Easement

5.1 General information

As part of the initial discussions with Council, the proposal to relocate the existing easement to outside of the building under croft was explored. Subsequent various alignments for a new proposed easement were developed for Council's review. Consequently, the option to relocate from the middle of the site to be along the southern and western boundary was agreed upon with Council. Figure 4 shows the location of the existing easement and the proposed easement.

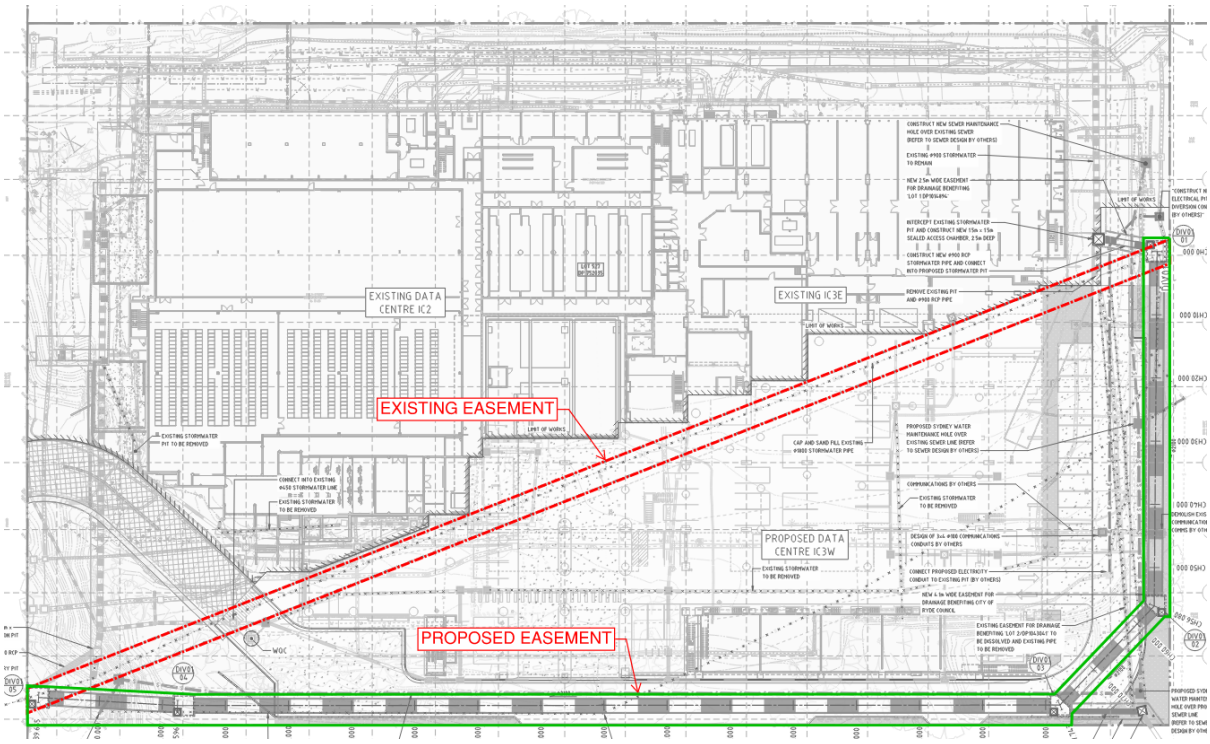

Figure 4 – Existing and Proposed Easement location

The proposed 4.1m wide easement is situated along the southern boundary intercepting the existing easement from the south. The easement the runs along the southern boundary and makes two 45 degree(approximate) turns via junction pits at the southwestern corner to then follow the western boundary line to reconnect to the original discharge location.

The proposed site is a commercial data center with several service lines spreading across the frontage of the existing IC2 and IC3E buildings including (but not limited to) low voltage electricity (LV), high voltage electricity (HV), communications, sewer, and water. The design intent of the selected alignment is to avoid all utility conduits and pipes. Figure 5 shows a work in progress model (non-exhaustive) example of the number of existing utilities to be avoided as part of the coordination.

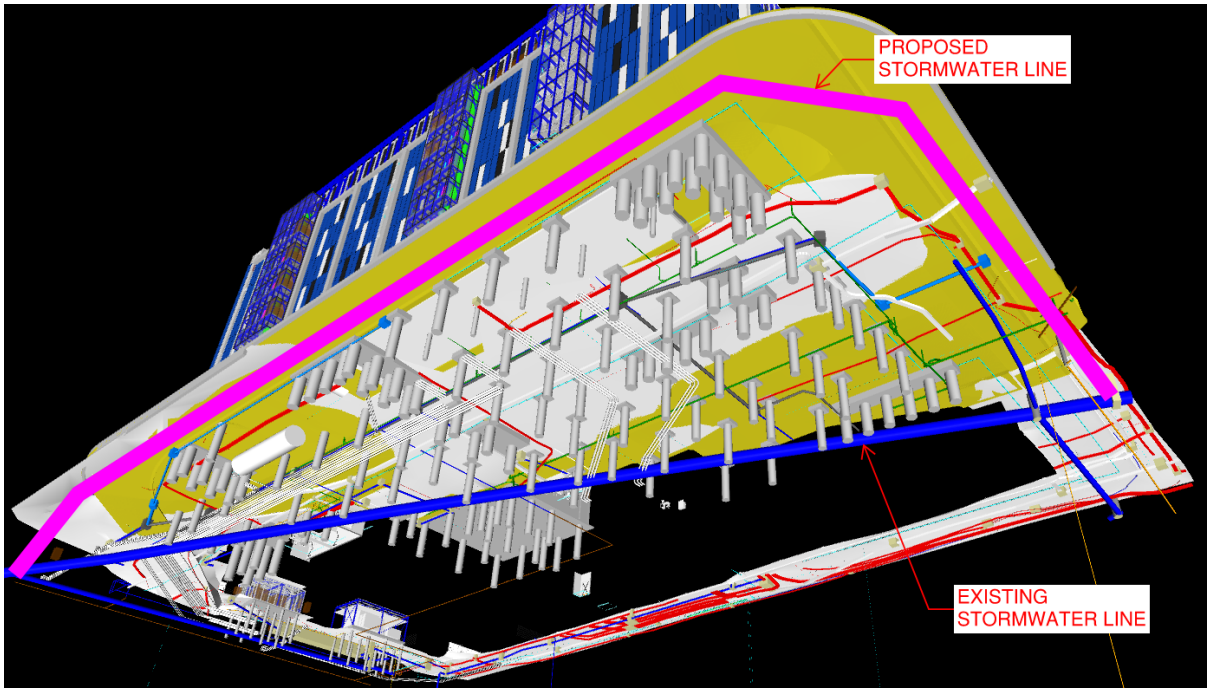

Figure 5 – Example subsurface utilities against the proposed/existing easement alignments

The option to place the alignment near the boundary was ultimately chosen to minimise the potential number of clashes with the existing services pipes. This alignment also provides Council with less obstructions for maintenance and access if required.

The alignment of the actual stormwater pipe has been coordinated to minimise encroachment into the western neighbouring boundary's tree protection zone (TPZ). Consideration of this alignment also took into consideration of 3m wide shoring widths for construction, which would have also encroached into the neighbouring TPZ's if not appropriately considered.

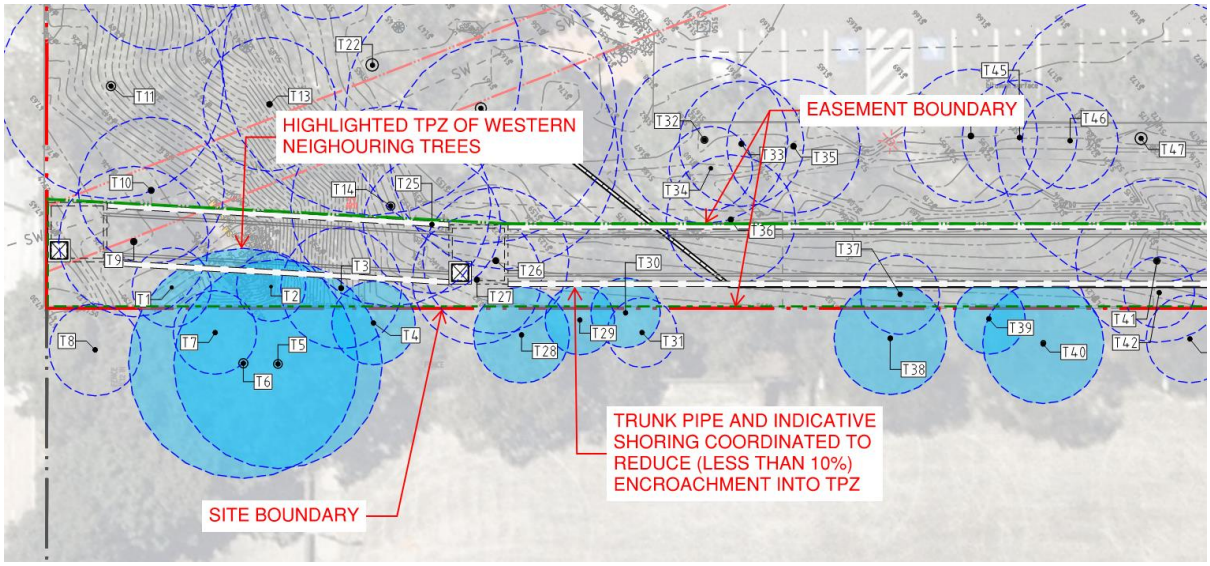

Figure 6 – Stormwater pipe Easement boundary markup and against TPZ

As part of the proposed easement pipe realignment, a new sewer main within proximity of the site is to be reconstructed to provide appropriate clearances to Sydney Water specifications. Figure 7 shows the approximate location of the new sewer lines and the proposed easement. The coordination of the sewer alignment is to avoid the proposed new trunk drainage alignment and also comply to Sydney

Water requirements which at the time of this report is being finalised by Cardno, the Water Servicing Coordinator (WSC).

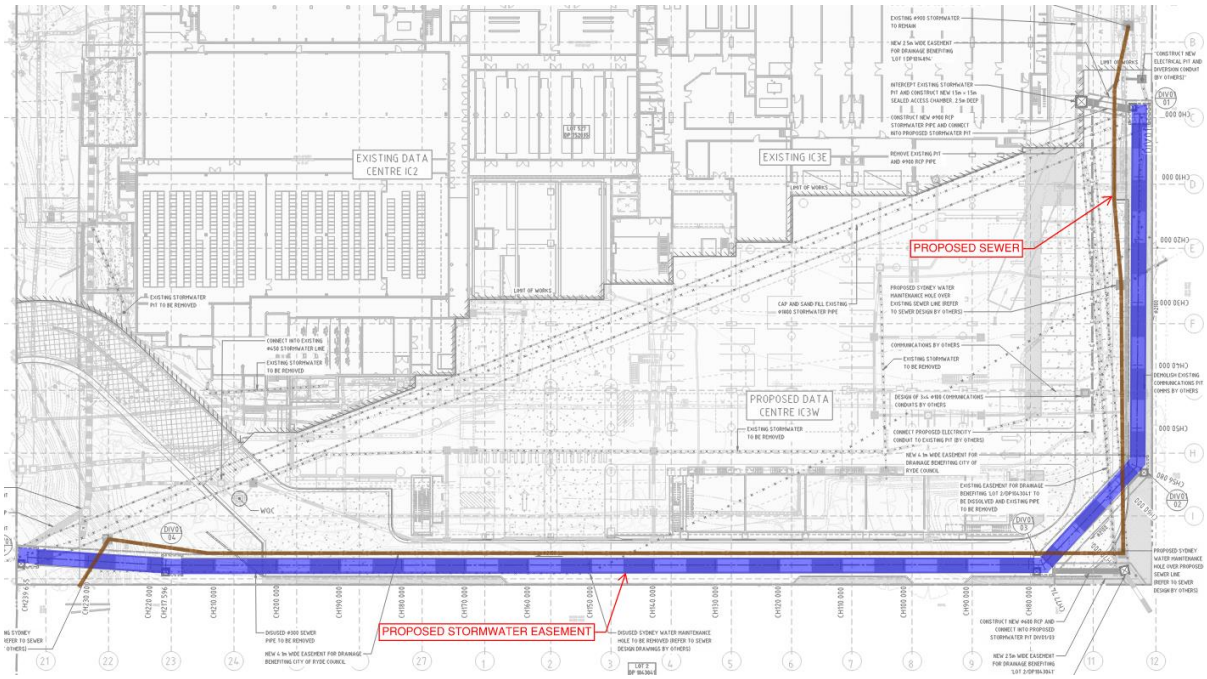

Figure 7 – Proposed sewer and easement alignment

5.2 Drainage component within Easement

The proposed new easement is 4.1m wide with a 2100mm stormwater pipe and 5 new stormwater pits. Table 2 shows the name of the pits and the description of the pits.

Table 2 – Pit Information

Pit Name	Description	Depth (m)
DIV01/01	3m x 3m	4.3m
DIV01/02	Custom chamfered pit	5.3m
DIV01/03	Custom chamfered pit	5m
DIV01/04	3m x 3m	5.2m
DIV01/05	3m x 3m	2.2m

Pit DIV01/01, DIV01/04 and DIV01/05 are regular square pits and DIV01/02 and DIV01/03 are pits with a chamfer corner. This is to provide a smoother connection for the turning pipes to avoid having skewed pipe opening as well as increase the hydraulic efficiency. Figure 8 shows an example of the two pits mentioned in Table 2.

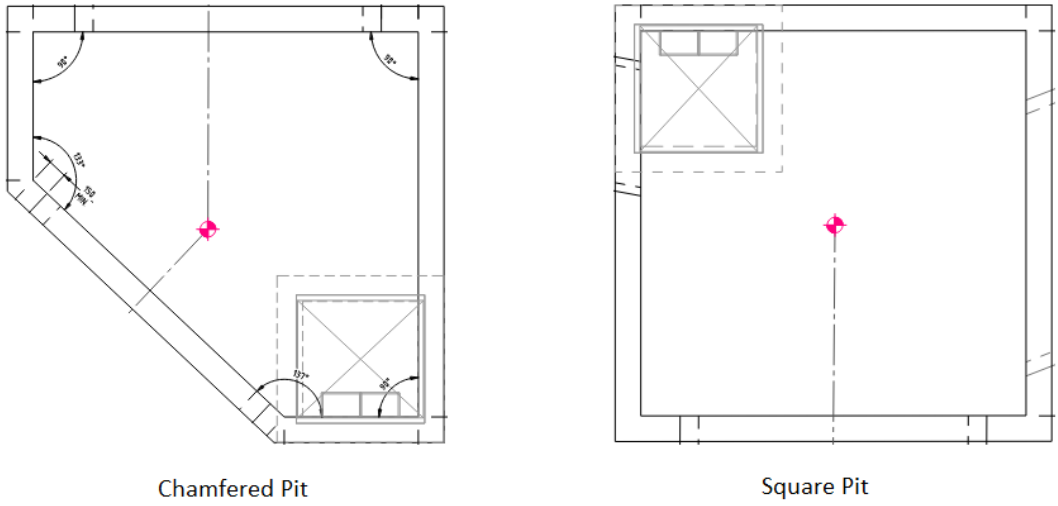

Figure 8 – Example pit drawing

The proposed pit and pipe have been designed to such depth due to the upstream existing incoming 1800 pipe invert level being approximately 5 metres deep. The downstream connection is also fixed at Talavera Road which requires the proposed pipe to be higher to allow sufficient fall to the downstream invert level. Figure 9 shows the long section of the pipe in the easement and the corresponding fixed connection points at each end.

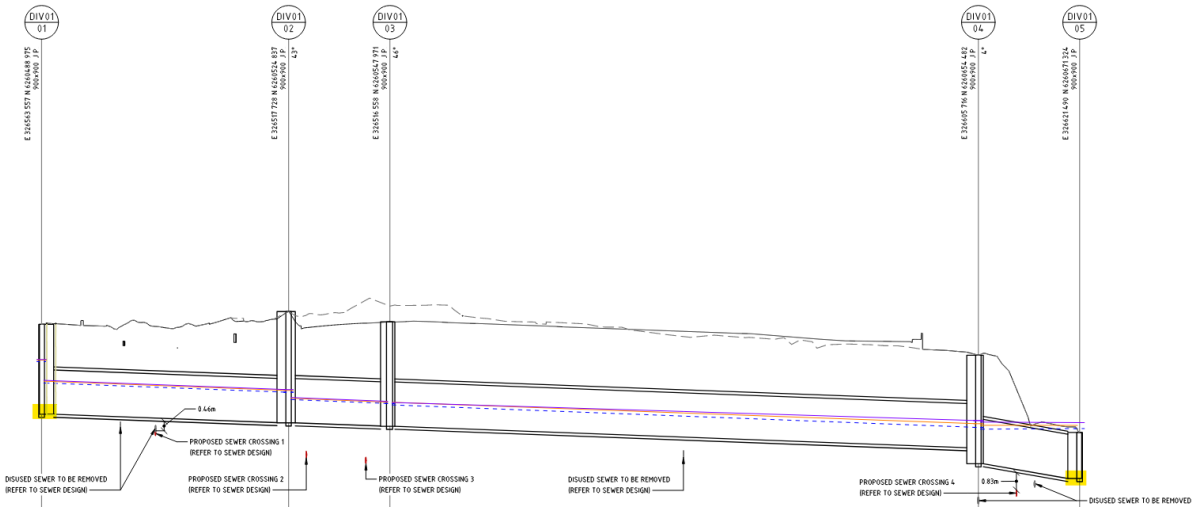

Figure 9 - Long Section view of the proposed 2100 trunk SW pipe

Note: Hydraulic Grade Line (HGL) will be discussed in detail in Section 6.

5.3 Construction Sequencing

The new 2100mm pipe and easement is proposed to replace the existing 1800mm pipe easement to continue convey flows across the site. The existing 1800mm pipe will continue to function until such time the new 2100 pipe alignment has been laid. There will be three main connection locations.

The first (1) connection point at the downstream northern boundary intercepting the 1800mm pipe is suggested. The most downstream end of the proposed 2100mm pipe can be constructed and ‘stubbed’ close to the future boundary pit. The 2100 pipe and intermediate pits can then be laid towards the upstream direction. Optionally, the northern boundary pit can be constructed to intercept the exiting 1800mmm pipe and the 2100mm pipe ‘blocked’ to ensure no backflow into the 2100mm

pipe trench. This continuous laying of the proposed 2100mm pipe can be stubbed at an appropriate distance at the southern boundary to the last and most upstream pit (refer to location 3 in Figure 10).

The second (2) point of connection at the southwestern corner pertains to the western neighbouring incoming easement. To convey the flow of the temporary private easement, a temporary diversion of the pipe can be constructed to connect into the closest pit until the 2100mm pipe and pit is live.

Lastly, the most upstream boundary pit (point 3) can be constructed over the existing 1800mm pipe. This sequence can be constructed within concurrently with the last segment of the 'stubbed' or 'blocked' downstream pit. Once points 1 and 3 are completed and connected, the removal or grout filling of the 1800mm pipe and easement can be removed and/or undertaken.

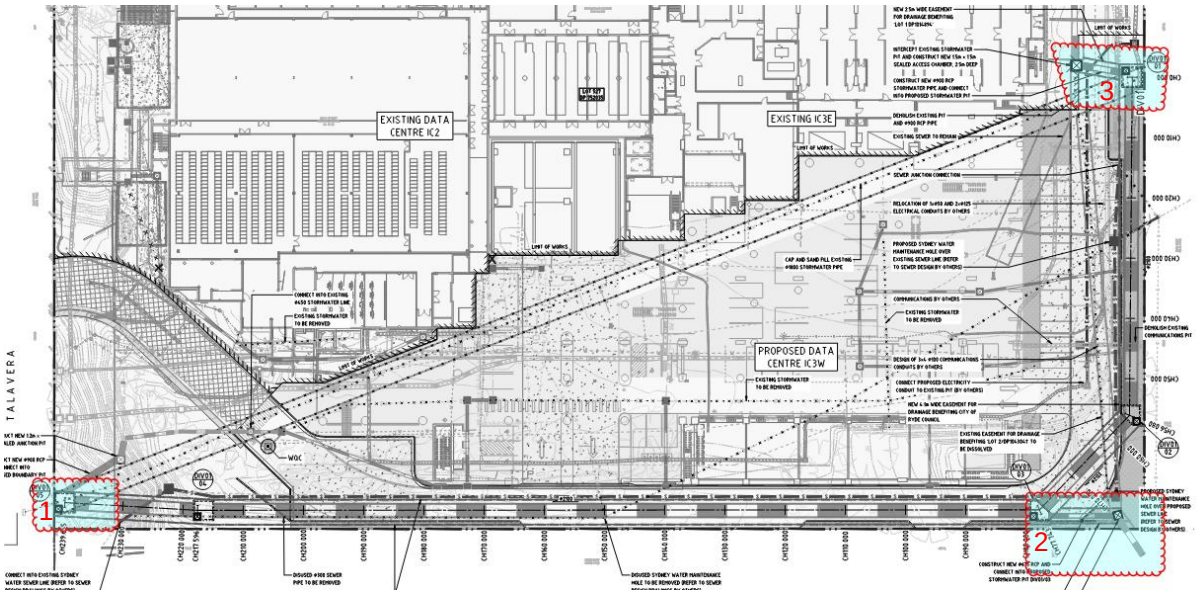

Figure 10 – Connection locations.

Note the abovementioned are suggested construction sequencing and do not absolve other parties responsibilities and duties.

6. Hydraulic Analysis

6.1 Design Flows

The proposed stormwater network is designed only to convey flows that that is carried by the existing 1800mm pipe.

To size the new stormwater network matching the existing, it is crucial to model with the existing flow carried by the existing 1800mm pipe. The flows used in the 12D model are extracted from a comprehensive flood study prepared for the subject site at earlier stage. The flood study calculated the upstream flows within the existing pipe network and overland flow across the site. Table 3 shows the Storm Events and their flow.

Table 3:

Storm Event	Flow rate (m^3/s)
1% AEP	5.927
5% AEP	5.881
20% AEP	5.718

Based on the long section drawing exported from 12D, the proposed 2100mm pipes are capable to replace the existing 1800mm pipe and convey the flows. Based on the location of the Hydraulic Grade Lines (HGL's) results shown on the long section, the propose 2100mm pipe still has capacity as the HGL's are below the obvert and the pipes do not appear to be running on under pressure or full capacity. Figure 11 shows the long section and the HGL's.

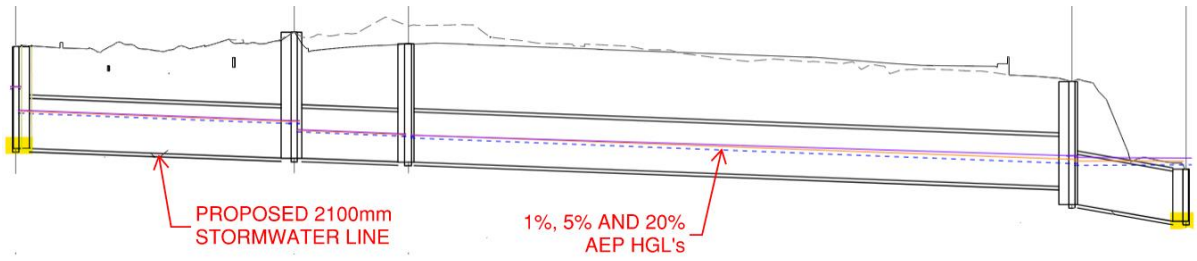

Figure 11: Long section of the proposed 2100mm pipe and 1% AEP, 5% AEP and 20% AEP HGL's

This system is not designed to take any additional flows or resolving any existing issues with flooding (to be discussed in the following section). The access lids on all five storm pits are sealed covers. Hence, there will be no additional flows or overland flows entering the new stormwater network.

6.2 HGL Behaviour and Tail water Conditions

The site is affected by flooding both upstream and downstream to the site. The HGL of the proposed stormwater line is dependent on the tail water level at the end of the stormwater network (located approximately at the same location of the proposed stormwater pit DIV01/05). Figure 12 shows the long section and the HGL's. At pit DIV01/05, the HGL's are above the surface level, due to tailwater conditions and not a result of upstream pressure head surcharge.

It is understood the existing downstream receiving pipe crossing Talavera Road are 2x1200mm pipes. This arrangement also impacts the outflow hydraulics and tailwater conditions of system. Evidently, the rise in HGL's at the downstream (Talavera Road) end indicates the constriction and flooding in which the downstream impact has on the proposed and existing hydraulics.

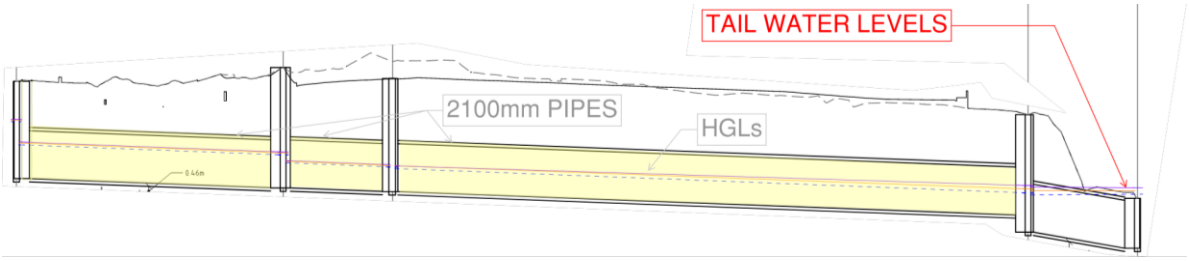

Figure 12: HGLs and tail water level

To replicate the identical existing network condition, the exact tail water condition was imported to 12D model to help with analysis the propose 2100mm pipes. The tail water levels adopted for this design are from the 2D flood study that was prepared for this site. Table 4 shows the Storm Events and the tail water level.

Table 4:

Storm Event	Tail Water Level (AHD)
1% AEP	47.80
5% AEP	47.67
20% AEP	47.52

6.3 Hydraulic loss through pits

The hydraulic loss values (Ku) for this analysis are generated by 12D Software by running numerical values on Missouri/Hare Charts. See Table 5. To be conservative, the Ku configuration used in this model is Fair (choosing from Preferred, Good, Fair and Poor).

Table 5:

Pit Name	Ku Values (1%AEP)	Ku Values (5%AEP)	Ku Values (20%AEP)
DIV01/01	8.04	8.12	8.39
DIV01/02	2.05	2.05	2.05
DIV01/03	2.10	2.10	2.10
DIV01/04	0.47	0.47	0.47

Table 6 shows the Ku value manually calculated from QUDM (1994).

Table 6:

Pit Name	Ku Values (1%AEP)
DIV01/01	1.8
DIV01/02	1.1
DIV01/03	1.1
DIV01/04	0.3

The values are quite different and larger Ku values are generated by 12D. Therefore, for this analysis, more conservative values we adopted i.e. the Ku values generated from 12D.

6.4 Pipe Friction Losses

Class 4 steel reinforced precast concrete pipes with rubber ring joints were used for the proposed 2100mm stormwater line within the easement.

Manning's equation has been used to conduct this analysis with the Manning's Roughness Coefficient '*n*' value 0.013 used in this model. This value is a recommended value for a concrete surface based on the recommended values on Table 5.5 in City of Ryde DCP (2014).

Whilst the '*n*' roughness coefficient of 0.013 was used for brand new concrete pipes, aging of the pipe was also considered in this analysis. In Eastwood & Terrys Creek FRMS&P Flood Study (*November 2008 Appendix B*), in section B3.4 Roughness of Floodplain and Creek, 0.016 was recommended for old concrete. This value was adopted to run a 1% storm event to check the sensitivity of the analysis. Figure 13 shows the long section and the two HGLS; one for new pipes (Red) and the other one is for the old pipes (Blue). As shown on Figure 13, the proposed pipe 2100mm and the corresponding HGL's have marginal capacity differentials.

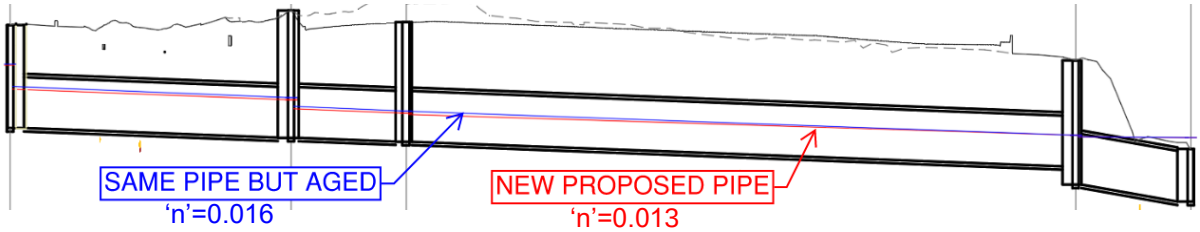

Figure 13: HGLs for the new pipe and the pipe in future (Aged)

6.5 Analysis Methodology

The information mention in previous sections is imported into the hydraulic modelling tool (12D) to generate the attached long sections and HGL's.

Under the analysis method (inside water network editor), ILSAX method was used to generate a more appropriately representative result.

6.6 Results

In conclusion, the hydraulic analysis generated the HGL's for each of the storm events; 1% AEP, 5% AEP and 20% AEP. From the long section, the HGL of the 1% AEP Storm Event indicates that the flow is well contained within the 2100mm pipe system.

The HGL shown to be above the finished surface level is not caused by pressure head from upstream flows surcharging. Rather, the overland flow and tailwater conditions appear to dictate the results and the flooding issues downstream along Talavera Road. The downstream hydraulics and tailwater levels are restricted to the existing pipe crossing on Talavera Road which is understood to be 2x1200mm RCP's under the road. Ultimately, the existing 2x1200mm pipes constrict outflow and the flood condition impose tailwater levels as indicated by the HGL modelling.

Consequently, the results showing the minimal flow differences in the 1% AEP, 5% AEP and 20% AEP storm events are due to the abovementioned overland flow, downstream pipe dimension, and resultant tailwater conditions downstream to the site.

6.6.1 Additional Results

Further information regarding to the tailwater level, and the flooding issues presented onsite and any other issues that impact the external area of the subject site are presented and discussed in detail in the flood report.

Noting that the flood report post development has used the same diverted strategy. Future details can be found in the flood report.

7. Stormwater Quantity Management

7.1 Requirement for On-site Detention

The City of Ryde DCP: Part 8.2 – Stormwater and Floodplain Management provides guidance on the requirement for On-site detention for development within the LGA. The proposed development is covered by this policy (applies to *all land within the City of Ryde.*) Section 1.4.1 of the Stormwater Management Technical Manual details instances to which OSD does not apply, with specific reference to:

- *Condition (f) – It is demonstrated that the property is subject to significant inundation (say over 50%) inundation of the site due to a 100yr ARI storm event) or that is id impractical to provide an OSD storage facility out of or above this flow when the site is partially inundated OR OSD will not be required where the site of the development is located within a Council established 1 in 100 year ARI floodplain and that it can be demonstrated that lesser storm events will also flood the site. Otherwise it will be necessary to provide OSD to control the runoff for the minor storm events.*

It has been inferred that OSD is not required for the development. The proposed development is located within the:

- Lower reaches of the Macquarie Park Catchment,
- Extent of the 100yr ARI (1% AEP) Flood event as described by the flood report prepared by Northrop (Figure 14).

With this considered, following review of relevant peak flood levels associated with Industrial Creek within the development site and comparison with the site-specific stormwater outlet peak flow hydrograph (outlet EX01/07) – any inclusion of OSD on the site would (Figure 14 below):

- Negatively impact flood levels within the vicinity of the development, as well as;
- Reduce the ability of the proposed stormwater network to drain the sit effectively in a range of storm events.

Figure 15 demonstrates the time difference between the time difference between the peak flood level of the receiving water body (Industrial Creek) and the peak outlet discharge rate from the proposed stormwater network. The inclusion of any OSD system would further delay the peak discharge (shown in red), inducing a higher tail-water effect (imposed by the flood level) on the system.

Note: The flood levels were obtained from Northrop for the proposed scenario and compared with the results of the outlet flow calculated by 12d 1D Dynamic drainage analysis for the largest outflow location.

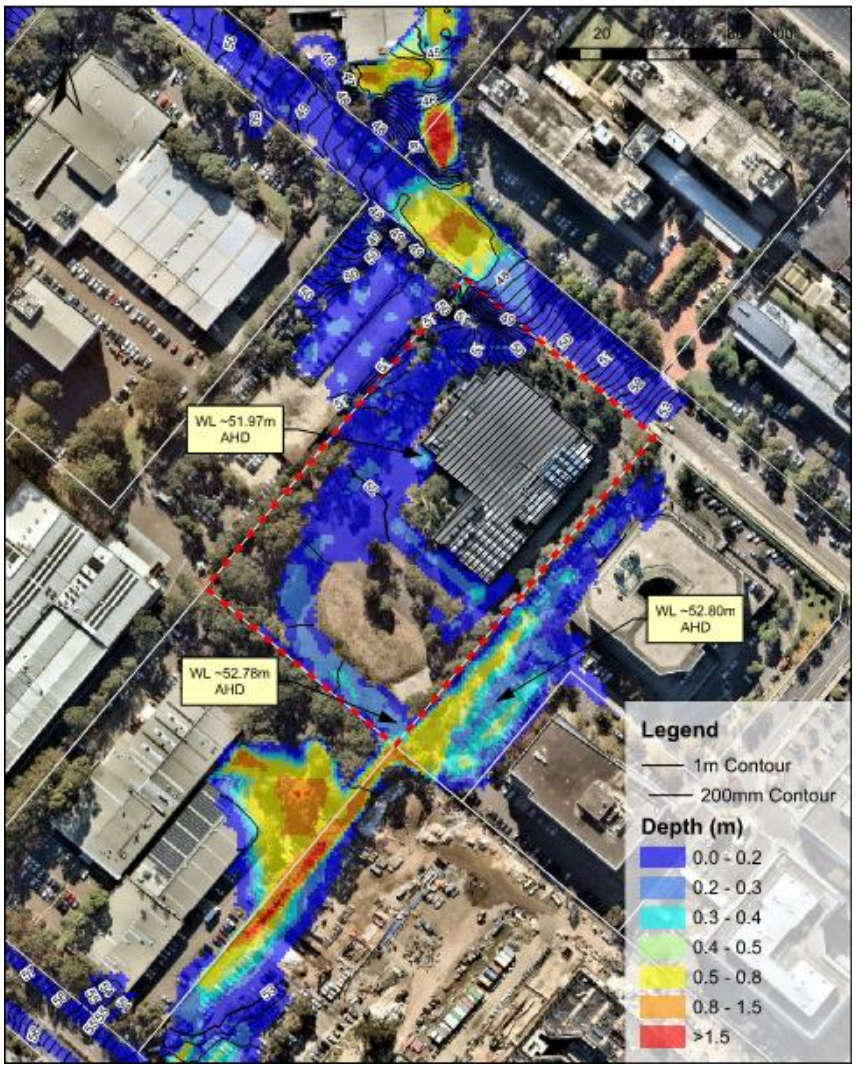

Figure 14 – Map of the Flood Extents of the 100yr ARI Flood event

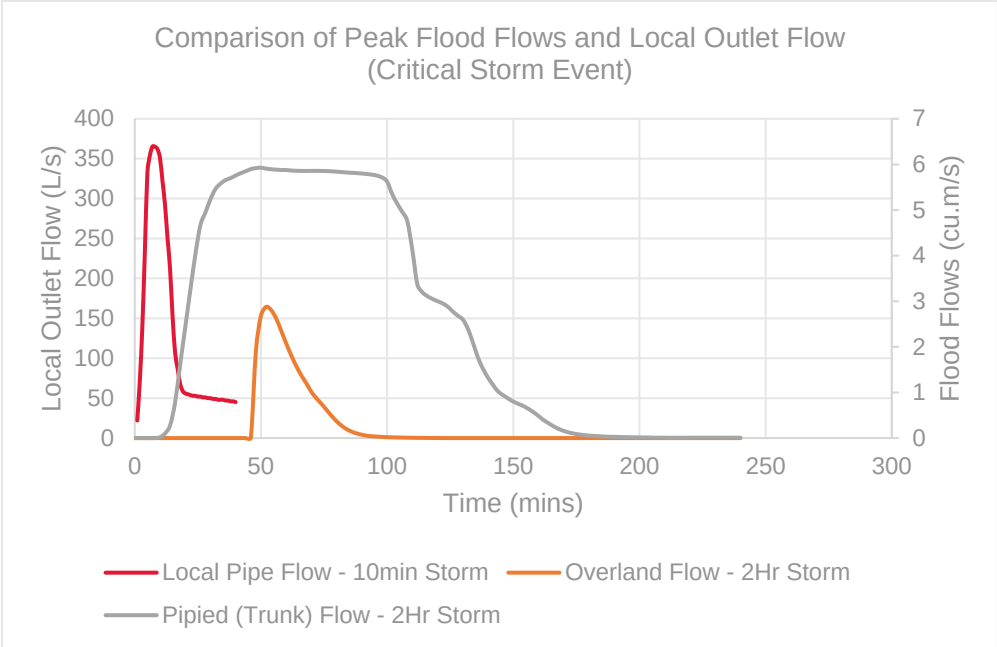

Figure 15 – Comparison of the Peak Flood Flows and Local Outlet Flow for the Critical Storm

7.2 Internal Stormwater Drainage System Design

The proposed internal site drainage is designed to convey all runoff from the 5% AEP event via a below ground pit and pipe network inclusive of an existing OSD tank (OSD 1). All new proposed roof areas are to drain via internal and external pipework to new above ground OSD tank (OSD 2) and subsequently connect into the localised site stormwater network prior to discharging to Council's stormwater system. The proposed pit and pipe network drains the site to the existing council stormwater network on Talavera Road.

The development proposes to use existing site drainage infrastructure. This can be achieved as the new building generally extends over existing hardstand area. Thus, the runoff from the new roof area is similar to it falling directly onto ground level paved areas.

To maintain consistency with the drainage system approved under LDA2018/0322 the same total roof area will be directed to OSD Tanks 1 and 2.

This is an area similar to the previously approved roof area and has been considered in the 12d model. The remainder of the roof runoff will bypass the existing OSD. It will be conveyed directly into the existing stormwater network via a pit and pipe network.

The external paved and landscaped area are also conveyed into the existing stormwater system via a proposed and existing pit and pipe network. A small area of the site (318 m^2) bypasses the proposed pit and piped network and will sheet flow into the adjacent Talavera Road.

Stormwater models for the proposed stormwater network have been produced in 12d 1D Dynamic Drainage Software (ILSAX) to determine the hydraulic performance of the post development network under a range of storms. Rainfall intensity duration and frequency data was adopted from the 2016 version of Australian Rainfall and Runoff. The model adopts the following parameters:

- Paved (impervious) area depression storage = 1mm
- Supplementary area depression storage = 0mm
- Grassed (pervious) area depression storage = 5mm
- Soil Type = 3
- AMC = 3

The proposed internal site drainage is designed to convey all runoff from the 20 year design ARI (5% AEP) event via a below ground pit and pipe network inclusive of an existing OSD tank. All new proposed roof areas are to drain via internal and external pipework to new above ground OSD tanks and subsequently connect into the localised site stormwater network prior to discharging to Council's stormwater system. The proposed pit and pipe network drains the site to the existing council stormwater network on Talavera Road.

The existing underground network is proposed to extend upstream to suit development works with new pits and pipes being constructed, while a portion of the network is to be removed. Water tanks are to be retained. The majority of the existing outdoor car parking catchment enters the internal stormwater network prior to entering an existing OSD tank which receives flow from the stormwater system along the south-west boundary of the site and the current roof catchment. All new roof areas will drain directly into a new OSD tank (OSD2) and the existing roof area will drain to a water quality treatment chamber prior to discharging to an OSD tank.

7.3 Internal Stormwater Quantity Design Calculation

The proposed OSD tank (OSD 2) will collect the proposed IC3 East building roof and IC3 west building roof and the IC3 west roof extension. The rest of the ground area will sheet flow off the site and bypass the OSD2. See Figure 16 and Table 7 for details.

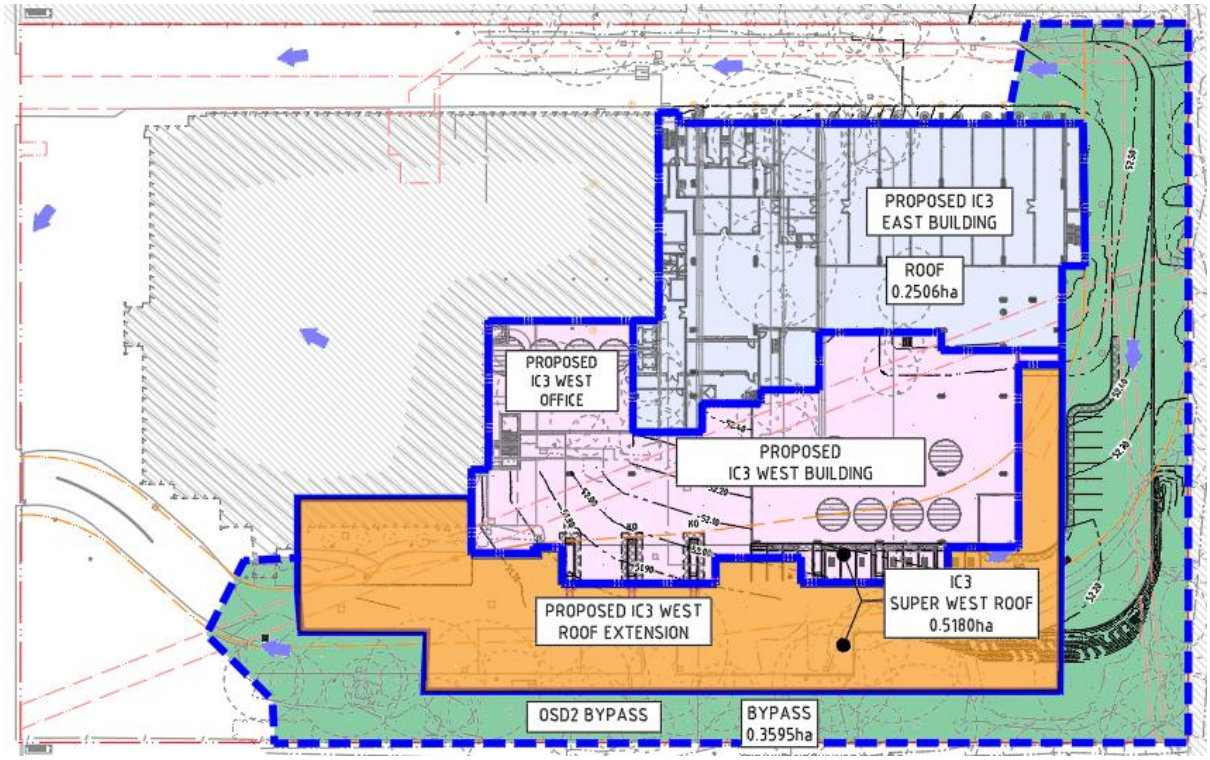

Figure 16 – Catchment areas used for OSD 2 analysis.

Development Scenario	Pre- Development (m^2)	Post Development (m^2)
Surface Area by passing OSD	11,281	3,595
IC3 East Roof Area		2,506
IC3 Super West Roof Area		5,180
Total Catchment Area	**11,281**	**11,281**

Table 7: OSD2 Catchment Summary

In the post development scenario, the surface area bypassing OSD2 is inundated by overland flow during 1% AEP (Refer to Flood Report).

Taking in the inundation situation mentioned above and approximately 210m^3 of storage and an outlet orifice of 150mm, the following peak flows were calculated for three events 20% AEP, 5% AEP and 1% AEP. Refer to Table 8 for the results.

	Rainfall Event		
	20% AEP	5% AEP	1% AEP
Pre-development			
Peak Discharge (L/s)	253	387	539
Post Development (IC3 East + Super West)			
OSD 2 Orifice Discharge	76	88	95
OSD 2 Bypass	102	139	188
OSD 2 Overflow	NA	NA	147
Total Peak Discharge (L/s)	174	227	430

Table 8: OSD2 Analysis Results Table.

For all three storm events the post development discharge is less than the predevelopment discharge. For the 20% AEP and 5% AEP, the post development discharge is less than the pre-development 5% AEP discharge flow rate which satisfies the councils requirements for the on-site detention tank.

The site is affected by flood inundation and overland flow. The final location of the OSD tank will need to be lifted above the floodway located adjacent to the data storage equipment room.

7.4 Conclusion

In conclusion, the On-site detention tank (OSD2) limits post development discharge to less than 20% AEP pre-development discharge for the 5% and 20% AEP events.

The 1% AEP peak discharge is larger than pre-development 20% AEP. However, it is understood under the City of Ryde Council's Stormwater and Floodplain Management Technical Manual states OSD may be exempted if the site is significantly inundated. The proposed OSD tank (OSD2) provided additional stormwater detention reducing peak site flows by 20% therefore is in accord with the intent of Council's stormwater management requirements.

8. Stormwater Quality Management

City of Ryde requires a Water Sensitive Urban Design strategy to be submitted for land located in mixed use business zone or industrial zone with development area greater than 1,500 m^2.

The *City of Ryde Development Control Plan Section 8.2.3.3 WSUD Controls* specifies the pollutant load reductions required for stormwater runoff for the required new developments. These values are shown in Table 9 below.

One existing GPT has been proposed to be removed to maintain appropriate 150mm freeboard to the pits in the minor event (5% AEP). The other GPT is situated further east of the site and not proposed to be altered. A total of 30 (including 10 in the existing OSD 1 treating IC2) stormwater filter cartridges are proposed to treat stormwater runoff prior to discharge from the site.

Table 9 – City of Ryde's specified Pollutant Load Reductions

Pollutant	% Pollutant Reduction
Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorus	60%
Total Nitrogen	45%

To achieve these targets a treatment train has been designed using MUSIC software for the site consisting of a few WSUD treatment measures to capture and retain pollutants.

The treatment train consists of:

- Existing Ecosol Gross Pollutant Trap
- EviroPod 200 Pit inserts
- OceanProtect PSORB (MMC) StormFilter Cartridges

Note – the system has been designed so the low flows at the splitter pit located at EX01/06 are directed to the Water Quality Chamber (containing PSORB StormFilter Cartridges) whilst high flows bypass this chamber. We note 400 m^2 of paved area and 1.050 m^2 of landscaped area bypasses the proposed treatment train however, this has been included within the MUSIC Model.

Figure 17 provides a depiction of the treatment train design adopted in MUSIC stormwater quality modelling software. The results of the MUSIC model presented in Table 10 demonstrate that the stormwater quality measures will achieve the water quality targets stated in the Council DCP.

Table 10

Pollutant	Source	Residual Load	% Reduction	Objective	Compliance
Gross Pollutants	301	8.21	97.3	90%	OK
Total Suspended Solids	1380	199	85.6	85%	OK
Total Phosphorus	3.15	0.948	69.9	60%	OK
Total Nitrogen	25	12.3	50.9	45%	OK

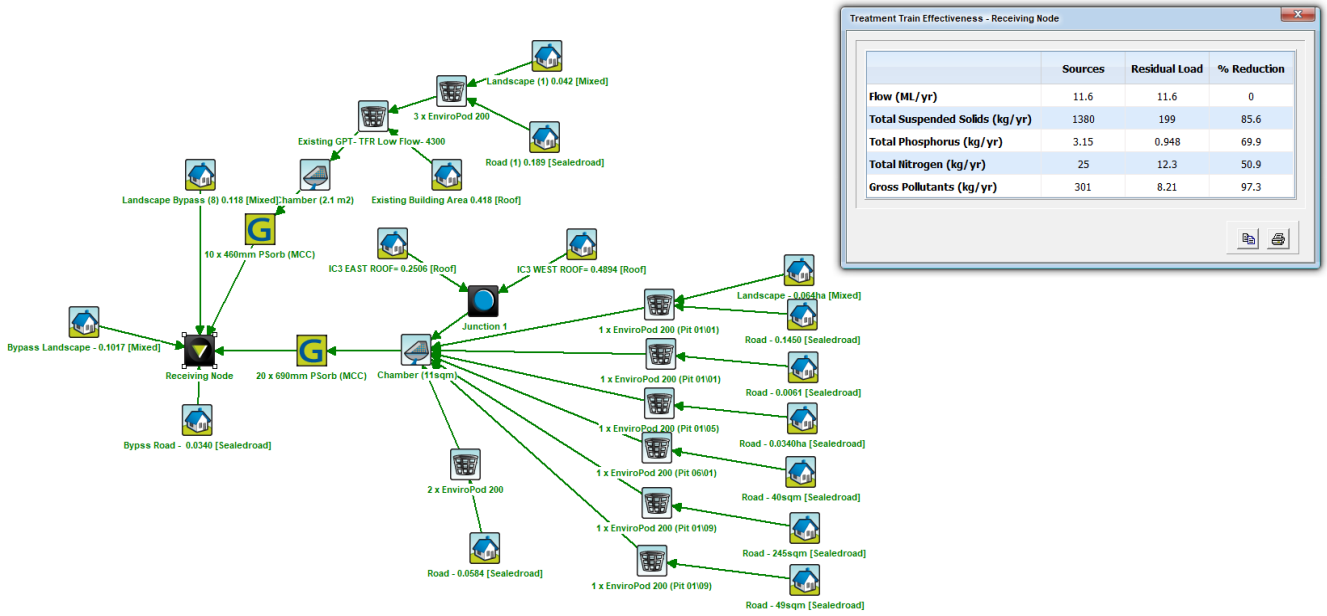

Figure 17 – Stormwater Treatment Train design for the site in MUSIC

The existing stormwater quality treatment system for IC2 will remain – which includes 1 x Ecosol RF4300 gross pollutant trap and 10 x PSORB stormfilter cartridges and Enviropod 200 pit inserts.

The proposed IC3 stormwater quality system will include 20 x PSORB filter cartridges and Enviropod 200 pit inserts (in the nominated pits) to achieve the treatment rates nominated by Council.

9. Erosion and Sediment Control

An erosion and sediment control plan has been prepared for the proposed development. The works will be undertaken in areas where extensive hardstand pavement is already in place. Extensive excavation of the site is not required to achieve site levels. Excavation is generally limited to the southwest corner where excavation depth ranges from 200 to 600mm.

The erosion and sediment control plan considers these conditions and consists of system of downstream sediment fences, wire mesh and gravel inlet filters and drop inlet sediment traps to prevent sediment entering the stormwater drainage system.

Erosion is also prevented by the existing pavements on site that will remain in place for the duration of construction. The erosion and sediment control plan is presented in Appendix A of this report.

10. Conclusion

Northrop Consulting Engineers (Northrop) has prepared this report to support the proposed data centre development at 17-21 Talavera Road, Macquarie Park.

Stormwater models have been produced in 12D 1D Dynamic Drainage Software (ILSAX) to determine the hydraulic performance of the post development network under a range of flood events (1% AEP, 5% AEP and 20% AEP). The modelling indicates that the proposed OSD tanks will preserve the permissible site discharge rates from new roof catchment areas for the range of AEP's as required by City of Ryde Council's Stormwater and Floodplain Management Technical Manual. For further detailed design refer to Northrop's Civil Engineering Drawings presented in Appendix A of this report.

In accordance with Council's Development Control Plan (DCP), the site is required to achieve stormwater pollutant load reductions. A treatment train has been developed using MUSIC software to demonstrate stormwater quality objectives and pollutant load reduction targets are satisfied as per City of Ryde's Water Sensitive Urban Design (WSUD) Guidelines. Northrop note that the stormwater system will require the incorporation of new proprietary treatment devices (as outlined earlier in the report) in conjunction with existing stormwater quality measures in order to sufficiently remove pollutants.

Appendix

Civil Engineering Drawings

IC3 WEST DATA CENTER 17-23 TALAVERA ROAD, MACQUARIE PARK

CIVIL ENGINEERING PACKAGE
SSDA

LOCALITY PLAN

SOURCE: NEARMAPS 2021

CIVIL DRAWING SCHEDULE

DWG No.	DRAWING TITLE
C201.01	COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN
C201.02	SPECIFICATION NOTES
C202.01	SEDIMENT AND SOIL EROSION CONTROL PLAN
C203.01	LEVEL DIFFERENCE PLAN
C204.01	SITEWORKS AND STORMWATER MANAGEMENT PLAN
C204.21	STORMWATER LONGITUDINAL SECTION - SHEET 01
C204.22	STORMWATER LONGITUDINAL SECTION - SHEET 02
C204.51	STORMWATER CATCHMENT PLAN
C208.01	RETAINING WALL ALIGNMENT CONTROL PLAN
C208.02	RETAINING WALL LONGITUDINAL SECTION - SHEET 01

DRAWN: M. MAI
DESIGNED: J. GRINSELL
JOB MANAGER: M. LEE
VERIFIER: .

NOT FOR CONSTRUCTION

REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR SSD APPROVAL	AP		ML	26.10.22

CLIENT: macquarie DATA CENTRES

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT: HDR

ALL DIMENSIONS TO BE VERIFIED ON SITE BEFORE COMMENCING WORK.
NORTHROP ACCEPTS NO RESPONSIBILITY FOR THE USABILITY, COMPLETENESS OR SCALE OF DRAWINGS TRANSFERRED ELECTRONICALLY.
THIS DRAWING MAY HAVE BEEN PREPARED USING COLOUR, AND MAY BE INCOMPLETE IF COPIED TO BLACK & WHITE.

SCALE 1:5000@B1 — 0 50 100 150 200 250m

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Ph (02) 9241 4188 Email: sydney@northrop.com.au
ABN 81 094 433 100

PROJECT: IC3 WEST DATA CENTER 17-23 TALAVERA ROAD, MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN

JOB NUMBER: 170095-02

DRAWING NUMBER: C201.01

REVISION: 01

DRAWING SHEET SIZE = B1

NOTE: ALL CIVIL ENGINEERING CONSTRUCTION WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CITY OF RYDE DEVELOPMENT GUIDELINES .THE AFOREMENTIONED GUIDELINES INCLUSIVE OF ALL SPECIFICATIONS TAKE PRECEDENCE OVER NOTES PROVIDED BELOW.

ENGINEERING CERTIFICATION

1. TO CERTIFY THE CONSTRUCTED CIVIL WORKS, A QUALIFIED EXPERIENCED ENGINEER IS TO VISIT THE SITE TO OBSERVE CONSTRUCTION TECHNIQUES AND VARIOUS ELEMENTS THAT MAY BE CONCEALED WHEN THE WORKS ARE COMPLETE.

2. THIS SPECIFICATION ALLOWS FOR CERTIFICATION OF WORKS CONTROLLED BY A PRIVATE CERTIFIER FOR LAND DEVELOPMENT WORKS. THIS SPECIFICATION DOES NOT COVER CERTIFICATION REQUIREMENTS FOR AUTHORITIES SUCH AS COUNCIL, TfNSW OR WATER NSW. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE AND PROVIDE ALL PROJECT SPECIFIC CONSTRUCTION COMPLIANCE (WORKS AS EXECUTED) INFORMATION TO THE SATISFACTION OF THE STAKEHOLDER / AUTHORITY. DISCREPANCIES BETWEEN THIS SPECIFICATION AND SPECIFICATIONS OF OTHER EXTERNAL STAKEHOLDERS / AUTHORITIES IS TO BE REPORTED TO THE SUPERINTENDENT FOR CLARIFICATION.

3. THE CONTRACTOR IS TO AGREE WITH THE ENGINEER AN APPROPRIATE SITE VISIT SCHEDULE AND FEE ARRANGEMENT PRIOR TO COMMENCEMENT OF THE WORKS. THE CONTRACTOR SHALL ENSURE THAT THE ENGINEER CAN SAFELY ACCESS ALL CIVIL ELEMENTS TO BE REVIEWED. SITE VISITS ARE CONDUCTED DURING NORMAL BUSINESS HOURS. WE REQUIRE TWO (2) WORKING DAY NOTICE FOR ANY SITE VISIT.

4. TO PROVIDE CERTIFICATION THE ENGINEER MUST VISIT THE SITE TO OBSERVE.
   - 4.1. PAVEMENTS
     - 4.1.1. POOR SUBGRADE CONDITIONS
     - 4.1.2. PROOF ROLLING OF SUB-GRADE
     - 4.1.3. PLACEMENT OF SUB-BASE COURSE, BASE COURSE AND WEARING COURSE.
     - 4.1.4. PLACEMENT OF STEEL REINFORCEMENT , DOWELS AND JOINT CRADLES PRIOR TO POURING OF CONCRETE
   - 4.2. EARTHWORKS
     - 4.2.1. TOPSOIL STRIP
     - 4.2.2. EARTHWORKS BATTER
     - 4.2.3. FILLING
   - 4.3. STORMWATER DRAINAGE
     - 4.3.1. DRAINAGE TRENCHES PRIOR TO BACKFILLING
     - 4.3.2. LEGAL POINT OF CONNECTION PRIOR TO BACKFILLING
     - 4.3.3. ANY OTHER DRAINAGE STRUCTURE THAT MAY BE CONCEALED DURING THE COURSE OF THE WORKS
   - 4.4. CONCRETE STRUCTURES
     - 4.4.1. PLACEMENT OF ANY STEEL REINFORCEMENT PRIOR TO CONSTRUCTION.

5. THE CONTRACTOR SHALL PROVIDE SURVEYED LEVELS, PREPARED BY A QUALIFIED SURVEYOR FOR SUBGRADE, SUB-BASE COURSE, BASE COURSE AND WEARING COURSE.

6. THE CONTRACTOR SHALL PROVIDE WORKS AS EXECUTED (WAE) DOCUMENTATION PREPARED BY A QUALIFIED PRACTISING SURVEYOR. THE WAE DRAWINGS SHALL CLEARLY SHOW, STORMWATER GRATE/ COVER LEVELS, STORMWATER PIT INVERT LEVELS AND CORRESPONDING INVERT LEVELS OF ANY INCOMING OR OUTGOING PIPES, DIAMETER OF ALL PIPES, DIMENSIONS AND VOLUME OF ON-SITE DETENTION FACILITIES, INVERT LEVELS OF ORIFICE PLATES, OVERFLOW WEIRS, BASE OF TANK FINISHED LEVELS OF PAVEMENTS. THE WAE SHALL SHOW WHERE THE SIZE OR ALIGNMENT OF CIVIL ENGINEERING ELEMENTS WHEN THEY DEVIATE FROM THE DESIGN DOCUMENTATION.

7. THE WAE DRAWINGS SHALL BE STAMPED WITH THE FOLLOWING STATEMENT "THESE WAE DRAWINGS HAVE BEEN PREPARED BY [COMPANY NAME] AND ARE A TRUE AND ACCURATE REPRESENTATION OF THE CONSTRUCTED WORKS". EACH DRAWING SHALL BE SIGNED AND DATED BY THE SURVEYOR WHO PREPARED THE DRAWINGS.

THESE WAE DRAWINGS HAVE BEEN PREPARED BY [COMPANY NAME} AND ARE A TRUE AND ACCURATE REPRESENTATION OF THE CONSTRUCTED WORKS.

SIGNED.. DATE..

NAME..

POSITION....................................

8. WAE SHALL BE PROVIDED IN BOTH AUTOCAD AND PDF FORMAT. NORTHROP CONSULTING ENGINEERS WILL PROVIDE ENGINEERING PLANS TO THE CONTRACTOR IN AUTOCAD FORMAT TO AID PREPARATION OF WAE DOCUMENTATION.

9. IF THE WORKS ARE SUBJECT TO APPROVAL BY THE UPPER PARRAMATTA RIVER CATCHMENT TRUST (UPRCT) THE CONTRACTOR IS TO ABIDE BY THE UPRCT APPROVAL CHECKLIST.

10. CONTRACTOR IS TO UNDERTAKE A CCTV INSPECTION OF ALL STORMWATER DRAINAGE PIPELINES AND PROVIDE TO THE ENGINEER FOR APPROVAL.

11. THE CONTRACTOR SHALL PROVIDE ALL RELEVANT TEST CERTIFICATES PROGRESSIVELY THROUGHOUT THE DURATION OF THE WORKS. ALL TEST CERTIFICATES SHALL BE PREPARED BY A NATA REGISTERED LABORATORY. TEST CERTIFICATES ARE REQUIRED FOR PROOF ROLLING, SUBGRADE COMPACTION, COMPACTION OF PAVEMENT LAYERS, COMPACTION OF FILLING OPERATIONS, CONCRETE SLUMP TEST, AND CONCRETE STRENGTH TESTS. THE CONTRACT SHALL PROVIDE ALL RELEVANT VALIDATIONS BY A GEOTECHNICAL ENGINEER FOR ALL IMPORTED FILL

12. EACH TEST CERTIFICATE WILL NOMINATE THE DATE AND TIME OF THE TEST AND PROVIDE A LOCATION OF WHERE THE TEST SAMPLE WAS TAKEN FROM.

13. THE CONTRACTOR SHALL ARRANGE FOR THE ENGINEER TO CONDUCT A FINAL VISIT TO REVIEW OF THE CONSTRUCTED WORKS. THIS WILL REVIEW WILL NOT TAKE PLACE UNTIL THE WAE DOCUMENTATION AND RELEVANT TEST CERTIFICATES HAVE BEEN RECEIVED.

14. IF DEFECTIVE OR INCOMPLETE WORK IS FOUND DURING THE FINAL INSPECTION ANOTHER INSPECTION MAY BE REQUIRED AT THE CONTRACTORS EXPENSE TO VERIFY THE RECTIFICATION WORKS HAVE BEEN COMPLETED.

STORMWATER DRAINAGE

1. ALL PIPES SHALL BE CLASS 4 RUBBER-RING JOINTED RCP U.N.O. WHERE uPVC PIPES HAVE BEEN SPECIFIED, THE FOLLOWING CLASS PIPEWORK IS TO BE ADOPTED U.N.O. Ø100mm OR LESS TO BE CLASS 'SN10' AND ABOVE Ø100mm TO BE CLASS 'SN8'. CLASS 6 PIPES ARE TO BE USED WHERE COVER OVER THE PIPE IS BELOW 600mm AND BENEATH A TRAFFICABLE PAVEMENT.

2. uPVC STORMWATER LINES PASSING UNDER FLOOR SLABS TO BE CONCRETE ENCASED.

3. FRC PIPES EQUAL TO THAT OF THE STEEL REINFORCED CONCRETE PIPE CLASS SPECIFIED ON THE DRAWINGS MAY BE USED SUBJECT TO APPROVAL FROM THE SUPERINTENDENT.

4. ALL PIPE ARE TO BE LAID AT 1.0% MIN GRADE U.N.O.

5. COVERS
   - 5.1. USE HOT DIPPED GALVANISED COVERS AND GRATES COMPLYING WITH RELEVANT COUNCIL AND AUSTRALIAN STANDARDS.
   - 5.2. ALL COVERS AND GRATES TO BE POSITIONED IN A FRAME AND MANUFACTURED AS A UNIT.
   - 5.3. ALL COVERS AND GRATES TO BE FITTING WITH POSITIVE COVER LIFTING KEYS
   - 5.4. OBTAIN SUPERINTENDENTS APPROVAL FOR THE USE OF CAST IRON SOLID COVERS AND GRATES. CAST IRON SOLID COVERS (IF APPROVED) TO CONSIST OF CROSS-WEBBED, CELLULAR CONSTRUCTION WITH THE RIBS UPPERMOST TO ALLOW INFILLING WITH CONCRETE. INSTALL POSITIVE COVER LIFTING KEYS AND PLASTIC PLUGS.
   - 5.5. UNLESS DETAILED OR SPECIFIED OTHERWISE, COVERS AND GRATES TO BE CLASS 'D' IN VEHICULAR PAVEMENTS AND CLASS 'B' ELSEWHERE.
   - 5.6. ALL GRATED TRENCH DRAINS SHOULD BE 'CLASS D' CAST IRON WITHIN VEHICULAR PAVEMENTS AND CLASS 'B' HEEL SAFE WITHIN PEDESTRIAN PAVEMENTS.

6. ALL PIPE BENDS, JUNCTIONS, ETC ARE TO BE PROVIDED USING PURPOSE MADE FITTINGS OR STORMWATER PITS.

7. ALL CONNECTIONS TO EXISTING DRAINAGE STRUCTURES SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND CEMENT RENDERED TO ENSURE A SMOOTH FINISH.

8. ENSURE A SEALED FINISH AT PIPE CONNECTIONS BY HAND APPLYING MINIMUM 150mm THICK CONCRETE AROUND PIPE AT THE EXTERNAL FACE OF THE PIT. ENSURE CONCRETE DOES NOT AFFECT THE INTEGRITY OF THE SUBSOIL DRAINAGE CONNECTED TO THE PIT.

9. ENSURE A SMOOTH SEALED FINISH AT PIPE CONNECTIONS BY HAND APPLYING CONCRETE AROUND THE PIPE ON THE INTERNAL FACE OF THE PIT TO FILL IN ANY VOIDS AT PIPE CONNECTIONS.

10. ENSURE PIPEWORK DOES NOT PROTRUDE BEYOND THE INSIDE FACE OF THE PIT WALL. PIPEWORK IS TO FINISH FLUSH WITH INTERNAL WALL (UNLESS OTHERWISE NOTED OR DETAILED). CONNECTION TO BE RENDERED AND MADE NEAT ON THE INSIDE FACE OF THE PIT

11. THE CONTRACTOR SHALL SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION BETWEEN DISSIMILAR PIPEWORK.

12. U.N.O. MATERIAL USED FOR BEDDING OF PIPES SHALL BE APPROVED NON-COHESIVE GRANULAR MATERIAL HAVING HIGH PERMEABILITY AND HIGH STABILITY WHEN SATURATED AND FREE OF ORGANIC AND CLAY MATERIAL.

13. BEDDING SHALL BE U.N.O TYPE HS2 UNDER ROADS AND H2 UNDER GENERAL AREAS IN ACCORDANCE WITH CURRENT RELEVANT INDUSTRY STANDARDS AND GUIDELINES.

14. THE CONTRACTOR SHALL ENSURE AND PROTECT THE INTEGRITY OF ALL STORMWATER PIPES DURING CONSTRUCTION. ANY AND ALL DAMAGE TO THESE PIPES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT AND AT NO EXTRA COST TO THE CONTRACT.

15. NOTE THAT THE PIT COVER LEVEL NOMINATED IN GUTTERS ARE TO THE INVERT OF THE GUTTER WHICH ARE 40mm LOWER THAN THE PAVEMENT LEVEL AT LIP OF GUTTER. REFER KERB DETAILS FOR CONFIRMATION.

16. SUBSOIL DRAINAGE

17. Ø100mm SUBSOIL DRAINAGE LINES WITH NON-WOVEN GEOTEXTILE FILTER SOCK SURROUND SHALL BE CONNECTED TO A STORMWATER DRAINAGE PIT (AT MIN 1% LONGITUDINAL GRADE) AND PROVIDED IN THE FOLLOWING LOCATIONS;
   - 17.1. THE HIGH SIDE OF PROPOSED TRAFFICKED PAVEMENT AREAS.
   - 17.2. ALL PLANTER AND TREE BEDS PROPOSED ADJACENT TO PAVEMENT AREAS.
   - 17.3. BEHIND RETAINING WALLS (IN ACCORDANCE WITH RETAINING WALL DETAILS).
   - 17.4. UPSTREAM OF STORMWATER PITS
   - 17.5. BENEATH FLEXIBLE PAVEMENT ALONG A SAG PROFILE
   - 17.6. ALL OTHER AREAS SHOWN ON DRAWINGS.
   - 17.7. CONTRACTOR IS TO MAKE ALLOWANCE IN BOTH TENDER AND CONSTRUCTION COSTING TO ALLOW FOR SUBSURFACE DRAINAGE BEHIND ALL RETAINING WALLS / ABOVE LOCATIONS AND TO MAKE CONNECTION TO STORMWATER SYSTEM.

18. WHERE SUBSOIL DRAINAGE PASSES BENEATH BUILDINGS / PAVED AREAS AND/OR PAVEMENTS. CONTRACTOR TO ENSURE Ø100mm CLASS 'SN10' uPVC DRAINAGE LINE IS USED AND THAT PROPRIETARY FITTINGS ARE USED TO RECONNECT SUBSOIL DRAINAGE LINE.

19. THE CONTRACTOR SHALL INSTALL INSPECTION OPENINGS / CLEAROUTS TO ALL SUBSOIL DRAINAGE LINES AND DOWNPIPE LINES AS SPECIFIED ON DRAWINGS AND IN ACCORDANCE WITH COUNCIL SPECIFICATIONS. HOWEVER AS A MINIMUM THEY ARE TO BE PLACED AT MAXIMUM 30m CENTRES AND AT ALL UPSTREAM ENDPOINTS.

20. PROVIDE 3.0m LENGTH OF Ø100 SUBSOIL DRAINAGE LINE WRAPPED IN NON-WOVEN GEOTEXTILE FILTER FABRIC TO THE UPSTREAM SIDE OF STORMWATER PITS, LAID IN STORMWATER PIPE TRENCHES AND CONNECTED TO DRAINAGE PIT.

21. IN AREAS WHERE DUMPED / HAND PLACED ROCK IS USED AS A MEANS OF SCOUR PROTECTION, CONTRACTOR IS TO EXCAVATE A MINIMUM OF 100mm FROM PROPOSED SURFACE, LEVEL AND COMPACT SUBGRADE AS SPECIFIED. ROCK TO THEN BE PLACED ON GEOTEXTILE FILTER FABRIC A34.

22. THE CONTRACTR IS TO ENSURE THAT A MINIMUM 150mm CLEARANCE IS PROVIDED BETWEEN THE INTERNAL FACE OF PIPE AND ADJACENT INTERNAL PIT WALLS

23. WHERE TRENCHES ARE IN ROCK, THE PIPE SHALL BE BEDDED ON A MIN 50mm CONCRETE BED (OR 75mm THICK BED OF 12mm BLUE METAL) UNDER THE BARREL OF THE PIPE. THE PIPE COLLAR AT NO POINT SHALL BEAR ON THE ROCK. (E.G. CLEAN 5-12mm AGGREGATE)

STORMWATER DRAINAGE

24. THE GROUT COMPOSITION MUST ENSURE THAT THE FOLLOWING PROPERTIES ARE ATTAINED:
   - 24.1. WHERE IT IS NECESSARY TO FILL A DISUSED OR REDUNDANT PIPELINE, LOW STRENGTH GROUT (≤5 MPA) OR SIMILAR MATERIAL SHALL BE USED.
   - 24.2. THE GROUT MUST BE IN A FLOWABLE STATE AT THE TIME OF PLACEMENT.
   - 24.3. THE GROUT MUST PROVIDE AN EFFECTIVE STOPPAGE OF WATER INGRESS AND CREATE A PERMANENT SEAL ALONG THE PIPE
   - 24.4. THE GROUT MUST NOT UNDERGO ANY SHRINKAGE
   - 24.5. THE CURED GROUT MUST BE IMPERMEABLE AND NOT DEVELOP MICRO CRACKS AND PATHS FOR WATER FLOW
   - 24.6. THE ADHESIVE PROPERTIES OF THE GROUT MUST ENSURE NO SHEAR MOVEMENT EXISTS BETWEEN THE CARRIER PIPE AND THE GROUT.
   - 24.7. THE GROUT MUST REMAIN STRUCTURALLY SOUND OVER THE LONG TERM
   - 24.8. THE GROUT COMPOSITION MUST ALLOW FOR EASE AND CONFIDENCE OF PLACEMENT AT THE REQUIRED LOCATION
   - 24.9. THE GROUT COMPOSITION MUST HAVE NO ADVERSE EFFECT ON THE PIPE
   - 24.10. THE GROUT MUST BE COMPATIBLE WITH THE SITE CONDITIONS AND HAVE TO ADVERSE EFFECT ON THE ENVIRONMENT.

25. IT IS REQUIRED TO DEMONSTRATE THAT THE PROPOSED GROUT MIXTURE(S) MEET THE REQUIREMENTS OF THIS SPECIFICATION AND MUST INCLUDE THE PROVISION OF MATERIAL DATA SHEETS FOR THE PROPOSED GROUTING MATERIALS TO BE USED. THE METHOD TO ACHIEVE THE GROUTING AT THE SPECIFIED LOCATIONS MUST ENSURE COMPLETE FILLING OF THE PIPE.

TREE PROTECTION

1. REFER TO LANDSCAPE / ARCHITECTS/NORTHROPS PLAN FOR TREES TO BE RETAINED AND PROTECTED.

2. ANY EXISTING/PROPOSED TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN SHALL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY;
   - 2.1. PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIP LINE.
   - 2.2. ENSURING THAT NOTHING IS NAILED TO ANY PART OF THE TREE.
   - 2.3. CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY. COUNCILS AND/OR INDEPENDENT ARBORISTS TO BE CONSULTED WHERE TREE ROOTS ARE TO BE REMOVED AND/OR CUT.

LANDSCAPING

1. REFER TO DRAWINGS BY OTHERS FOR DETAILS OF PROPOSED LANDSCAPING TREATMENT.

2. IF NO LANDSCAPING PLANS EXIST OR PLANS DO NOT SPECIFY GENERAL SURFACE STABILISATION THEN ALL DISTURBED SURFACE TO BE TEMPORARILY STABILISED WITH HYDROMULCH UPON COMPLETION OF WORKS. A 500mm STRIP OF TURF (CT2 COUCH) IS TO BE PLACED BEHIND ALL NEW KERB.

ACCESS AND SAFETY

1. THE CONTRACTOR SHALL COMPLY WITH ALL STATUTORY AND INDUSTRIAL REQUIREMENTS FOR PROVISION OF A SAFE WORKING ENVIRONMENT INCLUDING TRAFFIC CONTROL.

2. THE CONTRACTOR SHALL PROVIDE TRAFFIC MANAGEMENT PLANS FOR THE PROPOSED WORKS COMPLETED BY A SUITABLY QUALIFIED PERSON AND APPROVED BY COUNCIL / REGULATORY AUTHORITY. WORK IS NOT TO COMMENCE ON SITE PRIOR TO APPROVAL OF TRAFFIC MANAGEMENT SCHEME.

3. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES ACCESS TO BUILDINGS ADJACENT THE WORKS IS NOT DISRUPTED.

4. WHERE NECESSARY THE CONTRACTOR SHALL PROVIDE SAFE PASSAGE OF VEHICLES AND/OR PEDESTRIANS THROUGH OR BY THE SITE.

5. THE CONTRACTOR SHALL ENSURE PUBLIC ACCESS EXTERNAL TO THE SITE IS IN ACCORDANCE WITH COUNCILS / AUTHORITY / SITE MANAGERS REQUIREMENTS.

EXISTING SERVICES

1. ALL UTILITY SERVICES INDICATED ON THE DRAWINGS ORIGINATE FROM SUPPLIED DATA OR DIAL BEFORE YOU DIG SEARCHES, THEREFORE THEIR ACCURACY AND COMPLETENESS IS NOT GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE AND CONFIRM 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. NOTE SERVICE AUTHORITY REQUIREMENTS FOR LOCATING OF SERVICES PRIOR TO COMMENCEMENT OF WORKS.

2. CARE TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER COMMUNICATION, GAS OR ELECTRICAL SERVICES. HAND EXCAVATION ONLY IN THESE AREAS.

3. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING SERVICES THAT ARE TO BE RETAINED IN THE VICINITY OF THE PROPOSED WORKS. ANY AND ALL DAMAGE TO THESE SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT AT THE CONTRACTORS EXPENSE.

4. THE CONTRACTOR SHALL ALLOW IN THE PROGRAM FOR THE ADJUSTMENT (IF REQUIRED) OF EXISTING SERVICES IN AREAS AFFECTED BY WORKS.

5. THE CONTRACTOR SHALL ALLOW IN THE PROGRAM FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF EXISTING SERVICES IN AREAS AFFECTED BY WORKS UNLESS DIRECTED OTHERWISE ON THE DRAWINGS OR BY THE SUPERINTENDENT.

6. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS ARE NOT AFFECTED BY THE WORKS AND ARE MAINTAINED AND NOT DISRUPTED.

7. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN APPROVAL OF THE PROGRAM FOR THE RELOCATION AND/OR CONSTRUCTION OF TEMPORARY SERVICES AND FOR ANY ASSOCIATED INTERRUPTION OF SUPPLY.

8. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.

9. THE CONTRACTOR IS TO ALLOW TO POTHOLE ANY SERVICES WITHIN A PUBLIC RESERVE WITHIN THE EXTENT OF WORKS (E.G. STORMWATER CROSSINGS).

SITEWORKS

1. ALL WORKS TO BE IN ACCORDANCE WITH RELEVANT LOCAL COUNCIL / REGULATORY AUTHORITIES REQUIREMENTS, ALL SPECIFICATIONS AND AUSTRALIAN STANDARDS. CONFLICTS BETWEEN SAID DOCUMENTS SHALL BE REFERRED TO THE SUPERINTENDENT FOR DIRECTION.

2. THE CONTRACTOR IS TO REVIEW THE DRAWINGS PRIOR TO PRICING AND COMMENCEMENT AND REPORT ANY DISCREPANCIES TO NORTHROP

3. ANY PRODUCTS SPECIFIED OR USED TO BE VERIFIED BY THE CONTRACTOR AS BEING SAFE AND APPROPRIATE FOR USE. NORTHROP DO NOT TAKE ANY RESPONSIBILITY FOR THE USE OF UNSAFE PRODUCTS

4. THE CONTRACTOR IS TO DESIGN, OBTAIN APPROVALS AND CARRY OUT REQUIRED TEMPORARY TRAFFIC CONTROL PROCEDURES DURING CONSTRUCTION IN ACCORDANCE WITH ALL REGULATORY AUTHORITIES, INCLUSIVE OF LOCAL COUNCIL REGULATIONS AND REQUIREMENTS.

5. THE CONTRACTOR IS TO OBTAIN ALL AUTHORITY APPROVALS AS REQUIRED PRIOR TO COMMENCEMENT OF WORKS.

6. RESTORE ALL PAVED, COVERED, GRASSED AND LANDSCAPED AREAS TO THEIR ORIGINAL CONDITION OR AS DIRECTED BY THE SITE SUPERINTENDENT ON COMPLETION OF WORKS. WHERE PLANTING OF NEW GRASS IS NECESSARY REFER TO LANDSCAPE ARCHITECT AND / OR ARCHITECT DOCUMENTATION.

7. ON COMPLETION OF ANY TRENCHING WORKS, ALL DISTURBED AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR AS DIRECTED BY THE SITE SUPERINTENDENT, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL, GRASSED AREAS AND ROAD PAVEMENTS.

8. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR PRIOR TO COMMENCEMENT OF WORKS.THE CONTRACTOR IS TO ENSURE THAT SURVEY BOUNDARIES ARE DERIVED FROM A CADASTRAL SURVEY RATHER THAN A DETAIL SURVEY.

9. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING LEVELS ONSITE PRIOR TO LODGMENT OF TENDER AND ONSITE WORKS. THE PRICE AS TENDERED SHALL BE INCLUSIVE OF ALL WORKS SHOWN ON THE TENDER PROJECT DRAWINGS. ADDITIONAL PAYMENTS FOR WORKS SHOWN ON THE TENDER PROJECT DRAWINGS WILL NOT BE APPROVED.

10. DO NOT OBTAIN DIMENSIONS BY SCALING DRAWINGS.

11. IN CASE OF DOUBT OR DISCREPANCY REFER TO SUPERINTENDENT FOR CLARIFICATION OR CONFIRMATION PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

12. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED. MAKE SMOOTH TRANSITION TO EXISTING FEATURES AND MAKE GOOD WHERE JOINED.

13. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MIN 50mm IN BITUMINOUS PAVING.

14. ALL CIVIL ENGINEERING DESIGN HAS BEEN DOCUMENTED UNDER THE ASSUMPTION THAT ALL NECESSARY SITE CONTAMINATION REMEDIATION WORKS HAVE BEEN SATISFACTORILY COMPLETED (IF APPLICABLE) AND THAT THE SITE IS NOT AFFECTED BY ANY SOIL STRATA OR GROUNDWATER TABLE CONTAMINATION.

15. NOTES ON DETAILS PROVIDED TAKE PRECEDENCE OVER SPECIFICATION NOTES UNLESS IN CONTRADICTION WITH COUNCIL/AUTHORITY SPECIFICATIONS/DETAILS. CONTRACTOR TO CONSULT WITH NORTHROP FOR ANY DISCREPANCIES.

16. IF THE CONTRACTOR DISCOVERS HAZARDOUS/CONTAMINATED MATERIAL THE CONTRACTOR SHALL CONSULT WITH AN ENVIRONMENTAL SPECIALIST.

17. THE CONTRACTOR IS RESPONSIBLE FOR DEALING WITH COMMUNITY COMPLAINTS ASSOCIATED WITH THE WORKS UNDER THE CONTRACT AND TO COMPENSATE FOR/RECTIFY ANY DAMAGE REASONABLY CAUSED BY THE CONTRACTOR.

18. THE TERM 'MAKE GOOD' OR 'MAKE NEAT' IS IN REFERENCE TO THE SATISFACTION OF NORTHROP OR CERTIFYING ENGINEER. THE CONTRACTOR IS TO SEEK CLARIFICATION FROM NORTHROP OR THE CERTIFYING ENGINEER IF NECESSARY

19. TOLERANCES TO BE IN ACCORDANCE WITH COUNCIL/AUTHORITY REQUIREMENTS.

SERVICE TRENCHES

20. SAWCUT EXISTING SURFACES PRIOR TO EXCAVATION. BACKFILL ALL TRENCHES UNDER EXISTING ROADS, PAVEMENTS AND PATHS WITH STABILISED SAND 5% CEMENT OR DGS40 MATERIAL (5% CEMENT) COMPACTED IN 200mm THICK LAYERS TO 98% MMDD TO UNDERSIDE OF PAVEMENT.

21. BACKFILL ALL TRENCHES NOT UNDER ROADS, PAVEMENTS, PATHS AND BUILDINGS WITH APPROVED EXCAVATED OR IMPORTED MATERIAL COMPACTED TO 95% SMDD.

EARTHWORKS

1. AT THE COMMENCEMENT OF FILLING OPERATIONS FOR BULK EARTHWORKS A GEOTECHNICAL ENGINEER IS TO VISIT THE SITE & CONFIRM THE SUITABILITY OF THE METHODOLOGY OF ACHIEVING THE REQUIRED COMPACTION EARTHWORKS REQUIREMENTS.

2. STRIP TOPSOIL, VEGETABLE MATTER AND RUBBLE TO EXPOSE NATURALLY OCCURRING MATERIAL AND STOCKPILE ON SITE AS DIRECTED BY THE SUPERINTENDENT.

3. WHERE FILLING IS REQUIRED TO ACHIEVE DESIGN SUBGRADE, PROOF ROLL EXPOSED NATURAL SURFACE WITH A MINIMUM OF TEN PASSES OF A VIBRATING ROLLER (MINIMUM STATIC WEIGHT OF 10 TONNES) IN THE PRESENCE OF THE SUPERINTENDENT OR CERTIFYING ENGINEER.

4. THE CONTRACTOR IS TO ALLOW FOR A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER TO PROVIDE ADVICE AND CERTIFICATION OF ANY WORKS ASSOCIATED WITH TREATING OR MANAGING UNSUITABLE GROUND CONDITIONS THROUGHOUT THE CONTRACT (e.g. STABILITY OF EXCAVATIONS, POOR SUBGRADE, THE EXISTING QUARRY AREA etc).

5. ALL SOFT, WET OR UNSUITABLE MATERIAL IS TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS BELOW.

6. PROVIDE CERTIFICATES VERIFYING THE QUALITY OF IMPORTED MATERIAL FOR THE SUPERINTENDENTS APPROVAL.

7. ALL FILL MATERIAL SHALL BE PLACED IN MAXIMUM 200mm THICK LAYERS (LOOSE) AND COMPACTED AT OPTIMUM MOISTURE CONTENT (+ OR - 2%) TO ACHIEVE A DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1289.2.1.1, AS1289.5.7.1 AND AS1289.5.8.8 OF NOT LESS THAN THE FOLLOWING STANDARD MINIMUM DRY DENSITY;

LOCATION	COMPACTION REQUIREMENT
LANDSCAPED AREAS	98% SMDD
ROADS	100% SMDD (IN ACCORDANCE WITH COUNCIL SPECIFICATIONS)
PAVED AREAS	100% SMDD (IN ACCORDANCE WITH COUNCIL SPECIFICATIONS)

8. TESTING OF THE SUBGRADE SHALL BE CARRIED OUT BY AN APPROVED N.A.T.A. REGISTERED LABORATORY AT THE CONTRACTORS EXPENSE UNLESS AGREED DIFFERENTLY WITH THE PRINCIPAL.

9. ALLOW THE FOLLOWING COMPACTION TESTING BY N.A.T.A. REGISTERED LABORATORY FOR PLATFOTfNSW AND FILL LAYERS IN ACCORDANCE WITH THE LATEST VERSION OF AS3798. (MINIMUM 3 TESTS PER LAYER) OR 1 TEST PER MATERIAL TYPE PER 2500sq.m OR 1 TEST.

10. WHERE TEST RESULTS ARE BELOW THE SPECIFIED COMPACTION, RECOMPACT (TYNING FIRST AS NECESSARY) AND RETEST UNTIL SPECIFIED COMPACTION STANDARDS ARE ACHIEVED, OTHERWISE SUBGRADE REPLACEMENT IS REQUIRED IF COMPACTION STANDARDS ARE NOT ACHIEVED.

11. ALLOW FOR EXCAVATION IN ALL MATERIALS AS FOUND U.N.O. NO ADDITIONAL PAYMENTS WILL BE MADE FOR EXCAVATION IN WET OR HARD GROUND.

12. WHERE THERE IS INSUFFICIENT EXCAVATED MATERIAL SUITABLE FOR FILLING OR SUBGRADE REPLACEMENT, THE CONTRACTOR IS TO ALLOW TO IMPORT FILL. IMPORTED FILL SHALL COMPLY WITH THE FOLLOWING;
   - 12.1 BE OF VIRGIN EXCAVATED NATURAL MATERIAL OR
   - 12.2 CONTRACTOR TO PROVIDE EVIDENCE IMPORT IS SUITABLE FOR USE
   - 12.3 PLASTICITY INDEX BETWEEN 2-15% AND CBR > 8
   - 12.4 FREE FROM ORGANIC AND PERISHABLE MATTER
   - 12.5 MAXIMUM SIZE 50mm, PASSING 75 MICRON SIEVE (<25%)

13. THE CONTRACTOR SHALL PROGRAM THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS, ROLLERS MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED AT THEIR COST.

14. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE AND MAINTAIN THE INTEGRITY OF ALL SERVICES, CONDUITS AND PIPES DURING CONSTRUCTION, SPECIFICALLY DURING THE BACKFILLING AND COMPACTION PROCEDURE. ANY AND ALL DAMAGE TO NEW OR EXISTING SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST.

DEEP EXCAVATIONS

15. PRIOR TO THE COMMENCEMENT OF EXCAVATION WORKS GREATER THAN 1.5m IN DEPTH, THE CONTRACTOR SHALL OBTAIN THE SERVICES OF A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER TO DETERMINE THE STABILITY OF MATERIAL BEING EXCAVATED AND BENCHING REQUIREMENTS / MINIMUM BATTER SLOPES.

16. THE CONTRACTOR MUST PROVIDE THE SUPERINTENDENT AND OR THE DESIGN ENGINEER WITH A COPY OF THE GEOTECHNICAL ENGINEERS REPORT PRIOR TO PRACTICAL COMPLETION.

17. THE CONTRACTOR IS TO PROVIDE SAFETY BARRIERS, FENCING AND THE LIKE IN ACCORDANCE WITH OH&S AND REGULATORY AUTHORITY REQUIREMENTS AND TO ENSURE THE WORK SITE IS SAFE AT ALL TIMES.

DRAWN: M. MAI
DESIGNED: J. GRINSELL
JOB MANAGER: M. LEE
VERIFIER: .

NOT FOR CONSTRUCTION

REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR SSDA APPROVAL	AP		ML	26.10.22

CLIENT: macquarie DATA CENTRES

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT: HDR

ALL DIMENSIONS TO BE VERIFIED ON SITE BEFORE COMMENCING WORK. NORTHROP ACCEPTS NO RESPONSIBILITY FOR THE USABILITY, COMPLETENESS OR SCALE OF DRAWINGS TRANSFERRED ELECTRONICALLY. THIS DRAWING MAY HAVE BEEN PREPARED USING COLOUR, AND MAY BE INCOMPLETE IF COPIED TO BLACK & WHITE

NORTHROP
Sydney
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Ph (02) 9241 4188 Email: sydney@northrop.com.au
ABN 81 094 433 100

PROJECT: IC3 WEST DATA CENTER, 17-23 TALAVERA ROAD, MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

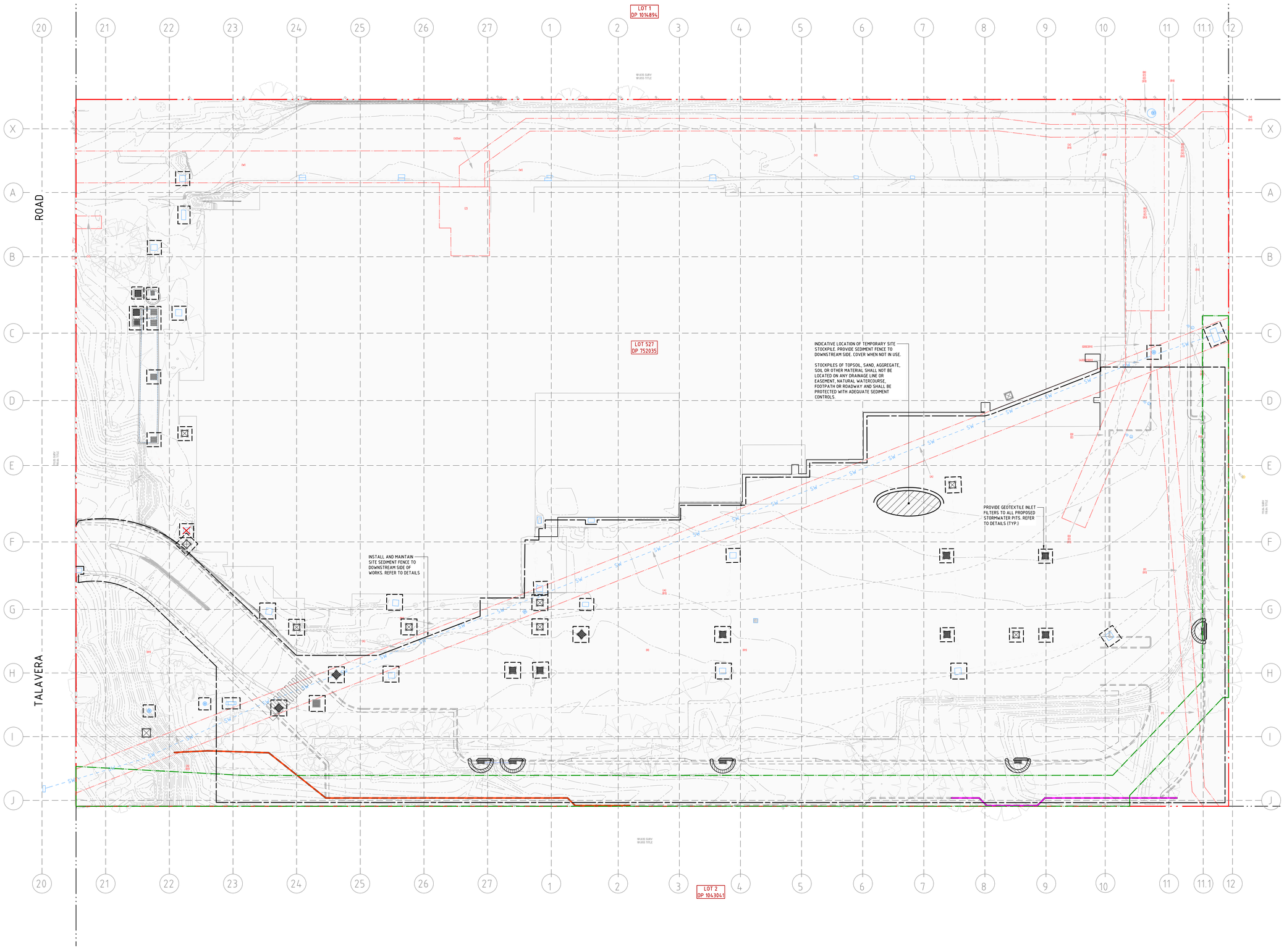
SPECIFICATION NOTES

JOB NUMBER: 170095-02

DRAWING NUMBER: C201.02

REVISION: 01

DRAWING SHEET SIZE = B1



LEGEND

- SITE BOUNDARY
- ADJOINING BOUNDARY LINE
- EASEMENT LINE
- EXISTING STORMWATER
- DESIGN LINEWORK
- EXISTING CONTOURS
- SEDIMENT FENCE
- WIRE MESH AND GRAVEL INLET FILTERS
- DROP INLET SEDIMENT TRAP
- STABILISED SITE ACCESS
- STOCKPILE
- LIMIT OF WORKS

NOTES

1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
2. ALL SEDIMENT AND EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE 'BLUE BOOK'. CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.

DRAWN: M. MAI
DESIGNED: J. GRINSELL
JOB MANAGER: M. LEE
VERIFIER:

NOT FOR CONSTRUCTION

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SCALE 1:250@B1 (0 2 4 6 8 10 12m)

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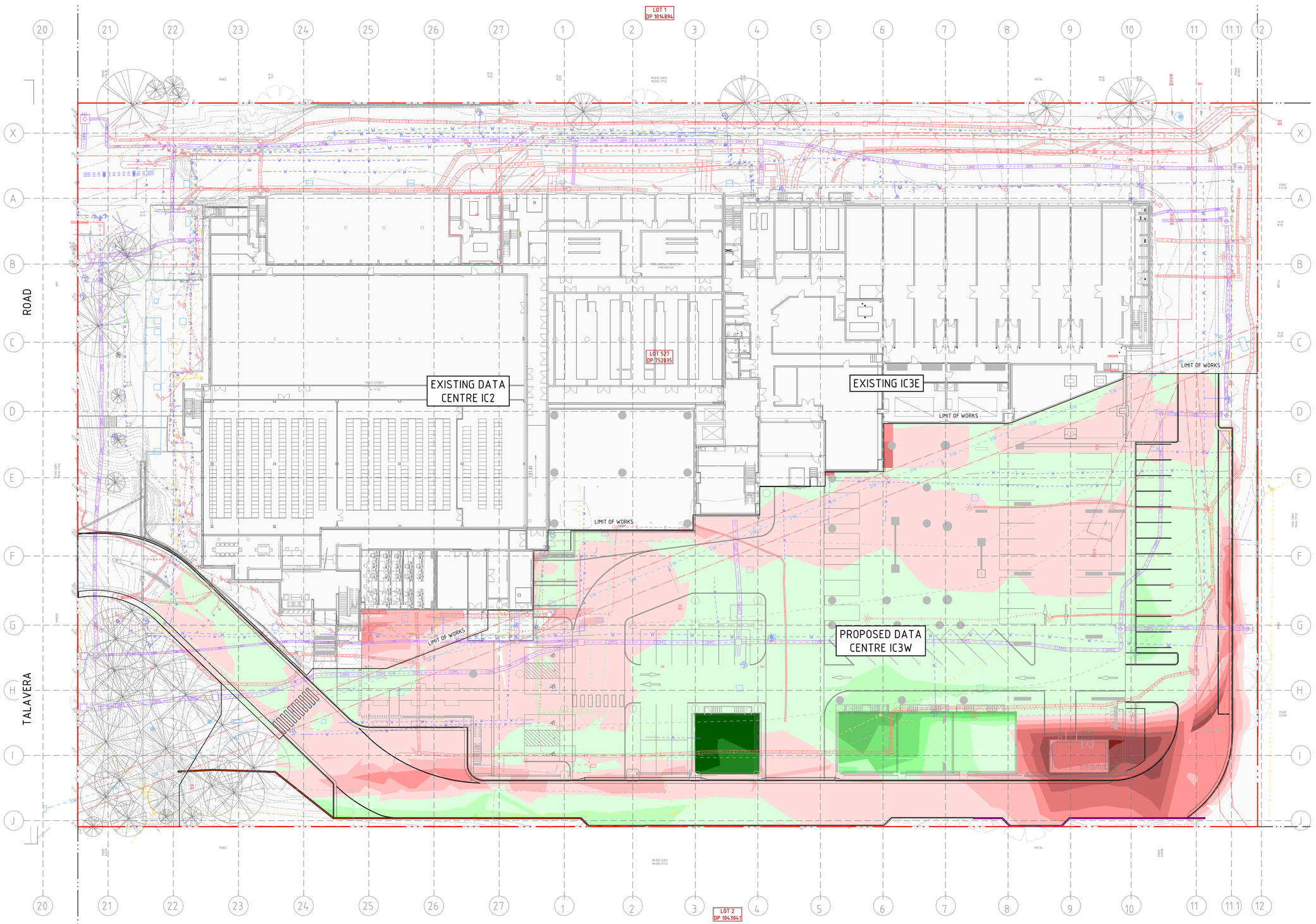
PROJECT: IC3 WEST DATA CENTER
17-23 TALAVERA ROAD,
MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

SEDIMENT AND SOIL EROSION CONTROL PLAN

JOB NUMBER: 170095-02
DRAWING NUMBER: C202.01
REVISION: 01
DRAWING SHEET SIZE = B1



LEGEND

- SITE BOUNDARY
- ADJOINING BOUNDARY LINE
- E — EXISTING ELECTRICITY
- COMS — EXISTING COMMUNICATIONS
- G — EXISTING GAS
- S — EXISTING SEWER
- FH — EXISTING FIRE HYDRANT
- SW — EXISTING STORMWATER
- ? — EXISTING UNKNOWN SERVICE

DEPTH OF CUT

- GREATER THAN -2.0m
- -2.0m TO -1.5m
- -1.5m TO -1.25m
- -1.25m TO -1.0m
- -1.0m TO -0.75m
- -0.75m TO -0.5m
- -0.5m TO -0.25m
- -0.25m TO -0.0m

DEPTH OF FILL

- 0.0m TO 0.25m
- 0.25m TO 0.5m
- 0.5m TO 0.75m
- 0.75m TO 1.0m
- 1.0m TO 1.25m
- 1.25m TO 1.5m
- 1.5m TO 2.0m

GENERAL NOTES

APPROXIMATE CUT TO VALUES AS FOLLOWS;

1.1.	CUT	-799 cu.m
1.2.	FILL	692 cu.m
1.3.	BALANCE	-107 cu.m (EXPORT)

DRAWN: M MAI
DESIGNED: J GRINSELL
JOB MANAGER: M LEE
VERIFIER:

NOT FOR CONSTRUCTION

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01	ISSUED FOR SSD APPROVAL	AP		ML	26.10.22

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ARCHITECT: HDR

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SCALE 1:250@B1 (0 2 4 6 8 10 12m)

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PROJECT: IC3 WEST DATA CENTER
17-23 TALAVERA ROAD,
MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

LEVEL DIFFERENCE PLAN

JOB NUMBER: 170095-02
DRAWING NUMBER: C203.01
REVISION: 01
DRAWING SHEET SIZE = B1

LOT 1
DP 1014894

LOT 527
DP 752035

LOT 2
DP 1043041

RELOCATE EXISTING
ø300 STORMWATER PIPE

CONSTRUCT NEW 600x600 G.S.I.P.
TO INTERCEPT EXISTING ø300
STORMWATER LINE
OUTGOING RL51.86
IL51.10

2x ø300 DOWNPIPE LOCATIONS TO
BE RELOCATED AND ALIGNED TO
CONNECT TO NEW PIT LOCATION

PROPOSED GROUND
FLOOR ELECTRICAL
PLANT SLAB EXTENT.

CONSTRUCT NEW 900x900 G.S.I.P. TO
ACCOMMODATE 2x ø300 DOWNPIPES AND
INTERCEPT EXISTING STORMWATER LINE
RL51.67
IL51.18

EXISTING ECOSL GPT IS TO
BE REMOVED. RECONSTRUCT
THE PIPE BETWEEN THE WQC
OUTLET AND PIT EX04/02

CONSTRUCT NEW 1.2m x 1.2m
SEALED JUNCTION PIT

CONSTRUCT NEW ø900
RCP AND CONNECT INTO
PROPOSED BOUNDARY PIT

CAST IN SITU WATER QUALITY
CHAMBER (QWC) WITH 20x690 PSORB
STORMFILTERS. DIMENSION AND
LAYOUT ARE SUBJECT TO CHANGE

CONNECT INTO
EXISTING PIT

LEGEND

- SITE BOUNDARY
- ADJOINING BOUNDARY LINE
- EASEMENT LINE
- PROPOSED COUNCIL EASEMENT
- ROOF OUTLINE
- E — EXISTING ELECTRICITY
- COMS — EXISTING COMMUNICATIONS
- G — EXISTING GAS
- S — EXISTING SEWER
- FH — EXISTING FIRE HYDRANT
- SW — EXISTING STORMWATER
- ? — EXISTING UNKNOWN SERVICE
- DESIGN LINEWORK
- KG — KERB AND GUTTER
- KO — KERB ONLY
- FK — FLUSH KERB
- IDD — INTEGRAL DISH DRAIN
- FDW — FLOOD DIVERSION WALL
- RW — EXTENDED HEIGHT KERB
- SSD — SSD — SUB SOIL DRAINAGE LINE
- CO• — SUB SOIL DRAINAGE CLEAROUT
- øXX — STORMWATER PIPE
- øXX — EXISTING STORMWATER PIPE
- GRATED INLET PIT (NEW / EXISTING)
- KERB INLET PIT (NEW / EXISTING)
- JUNCTION PIT (NEW / EXISTING)
- WQC — WATER QUALITY CHAMBER
- X / XX — STORMWATER PIT TAG LINE ID / STRUCTURE No
- XX.XX — CONTOURS
- XX.XX — EXISTING CONTOURS

VERIFIER:
JOB MANAGER: M LEE
DESIGNED: J GRINSELL
DRAWN: M MAI

NOT FOR CONSTRUCTION

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ARCHITECT: HDR

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SCALE 1:250@B1 (0 2 4 6 8 10 12m)

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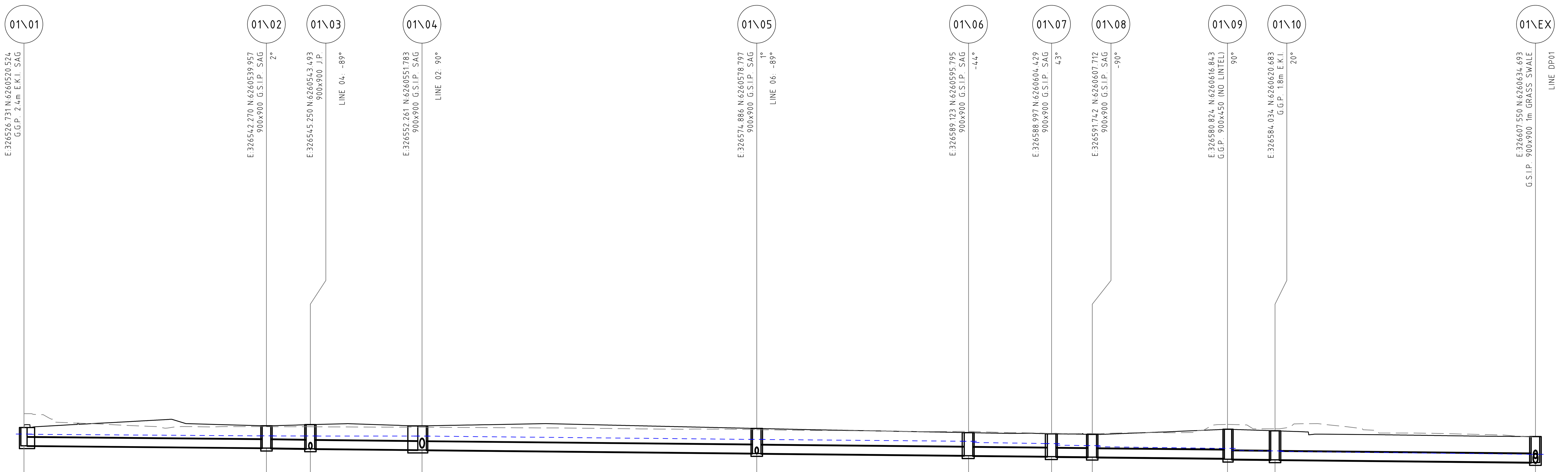
PROJECT: IC3 WEST DATA CENTER
17-23 TALAVERA ROAD,
MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

SITEWORKS AND STORMWATER MANAGEMENT PLAN

JOB NUMBER: 170095-02
DRAWING NUMBER: C204.01
REVISION: 01
DRAWING SHEET SIZE = B1



	01\01–01\02	01\02–01\03	01\03–01\04	01\04–01\05	01\05–01\06	01\06–01\07	01\07–01\08	01\08–01\09	01\09–01\10	01\10–01\EX
PIPE CLASS	RRJ4	RRJ4	RRJ4	RRJ4	RRJ4	RRJ4	RRJ4	RRJ4	RRJ4	RRJ4
PIPE GRADE (%)	0.5%	0.7%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
PIPE SIZE (mm)	450	450	450	450	450	450	450	450	450	450
MINIMUM COVER (m)	0.43	0.81					0.79	0.79	1.12	0.92
Vf (MINOR) - FULL PIPE VELOCITY (m/s)	Vf=0.69	Vf=0.64	Vf=0.54	Vf=1.09	Vf=1.01	Vf=1.00	Vf=1.00	Vf=1.03	Vf=1.05	Vf=1.14
Q (MINOR) - PIPE FLOW (L/s)	Q=83	Q=82	Q=82	Q=146	Q=159	Q=159	Q=159	Q=159	Q=166	Q=168

DATUM RL 31.0

	01\01	01\02	01\03	01\04	01\05	01\06	01\07	01\08	01\09	01\10	01\EX
H.G.L. 5%AEP	51.649 51.639	51.555 51.555 51.553	51.552 51.552 51.548	51.545 51.545 51.543	51.369 51.369 51.366	51.272 51.272 51.207	51.151 51.151 51.068	51.042 51.042 50.985	50.895 50.895 50.797	50.765 50.765 50.740	50.583 50.583 50.458
FINISHED SURFACE	51.995	52.084	52.147	52.083	51.946	51.726	51.663	51.638	51.904	51.823	51.517
NATURAL SURFACE	52.728	52.040	52.036	52.014	51.881	51.792	51.691	51.678	52.160	51.928	51.488
PIPE INVERT LEVEL	51.035	50.918 50.908	50.882 50.872	50.818 50.808	50.636 50.626	50.519 50.509	50.470 50.460	50.443 50.433	50.366 50.323	50.303 50.293	50.160 50.150
DEPTH TO INVERT	0.960	1.166 1.176	1.264 1.274	1.265 1.275	1.310 1.320	1.207 1.217	1.193 1.203	1.195 1.205	1.538 1.581	1.520 1.530	1.357 1.367
CHAINAGE	0.000	25.531	30.156	41.913	77.150	99.445	108.194	112.473	126.707	131.712	159.136

LINE 01

VERIFIER:

JOB MANAGER: M. LEE

DESIGNED: J. GRINSELL

DRAWN: M. MAI

NOT FOR CONSTRUCTION

REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR SSD APPROVAL	AP		ML	26.10.22

CLIENT: macquarie DATA CENTRES

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ARCHITECT: HDR

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SCALE 1:100 @ (V) B1 — 0 1 2 3 4 5m
SCALE 1:500 @ (H) B1 — 0 5 10 15 20 25m

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ABN 81 094 433 100

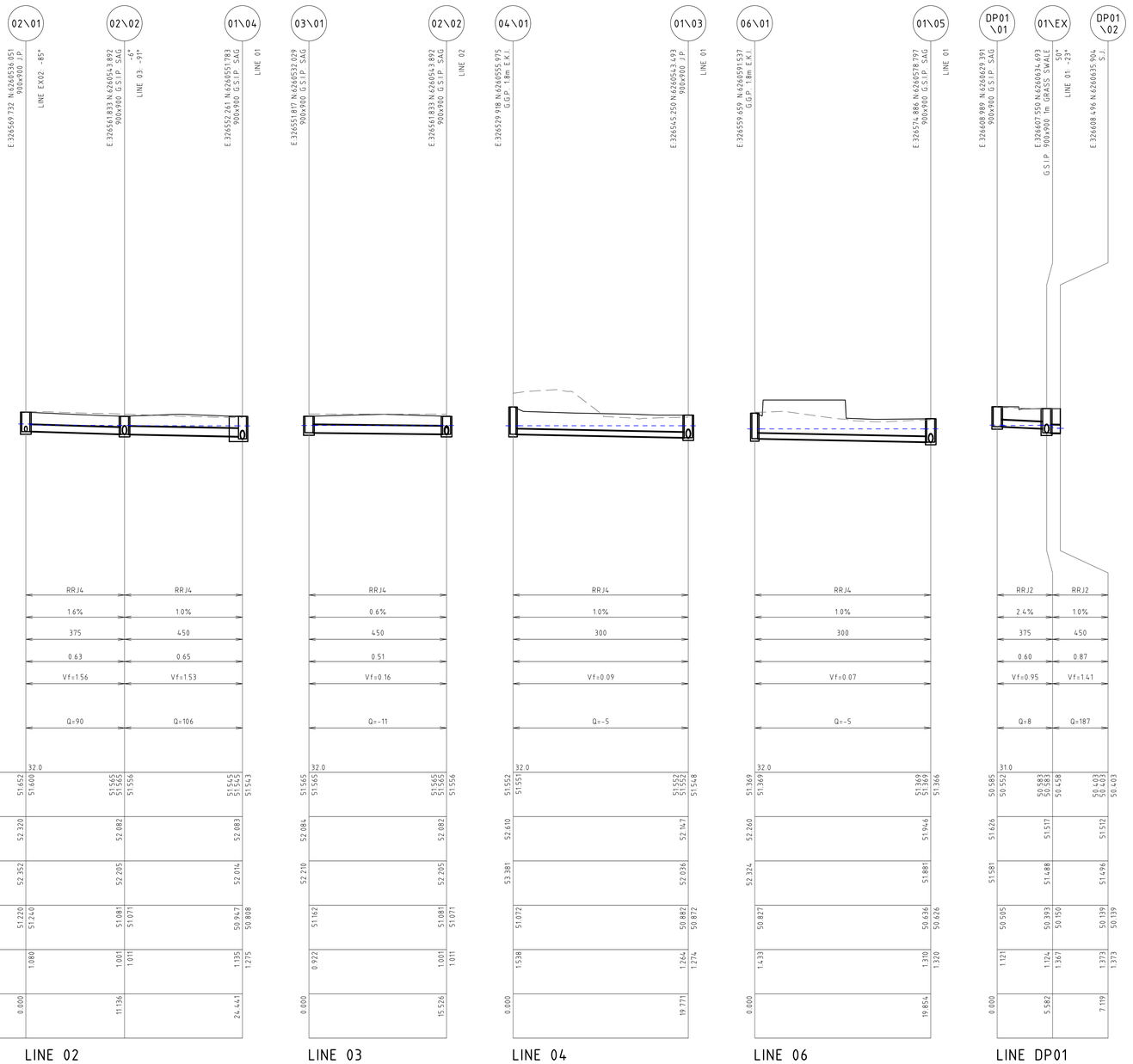
PROJECT: IC3 WEST DATA CENTER, 17-23 TALAVERA ROAD, MACQUARIE PARK — SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE — STORMWATER LONGITUDINAL SECTION - SHEET 01

JOB NUMBER: 170095-02

DRAWING NUMBER: C204.21 | REVISION: 01

DRAWING SHEET SIZE = B1



LINE 02 LINE 03 LINE 04 LINE 06 LINE DP01

VERIFIER:

JOB MANAGER: M. LEE

DESIGNED: J. GRINSELL

DRAWN: M. MAI

NOT FOR CONSTRUCTION

REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR SSD APPROVAL	AP		ML	26.10.22

CLIENT: macquarie DATA CENTRES

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ARCHITECT: HDR

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SCALE 1:100 @ (V) B1 0 1 2 3 4 5m
SCALE 1:500 @ (H) B1 0 5 10 15 20 25m

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PROJECT: IC3 WEST DATA CENTER 17-23 TALAVERA ROAD, MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

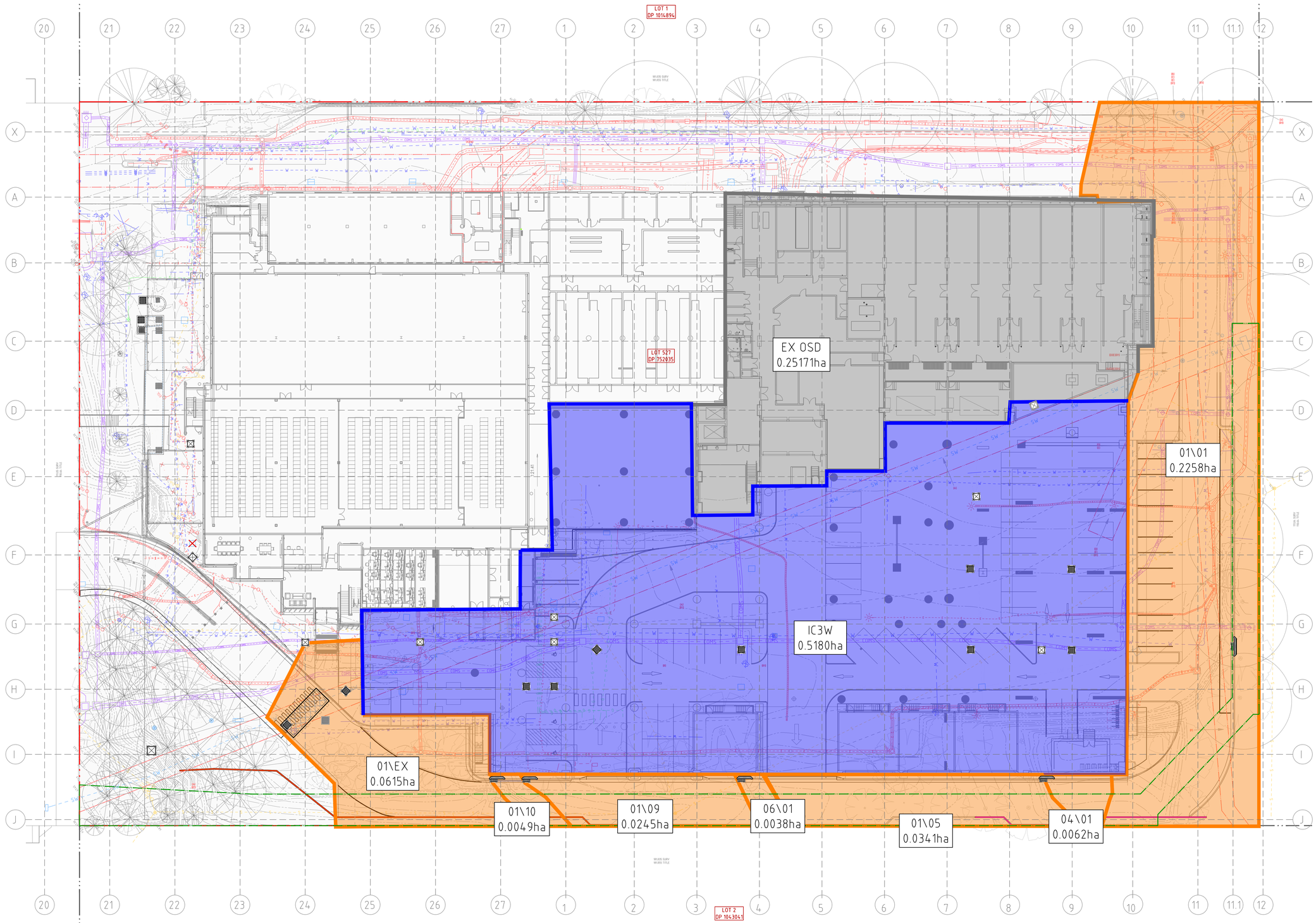
STORMWATER LONGITUDINAL SECTION - SHEET 02

JOB NUMBER: 170095-02

DRAWING NUMBER: C204.22

REVISION: 01

DRAWING SHEET SIZE = B1



LEGEND

- SITE BOUNDARY LINE
- ADJOINING BOUNDARY LINE
- EASEMENT LINE
- GRATED INLET PIT (NEW / EXISTING)
- KERB INLET PIT (NEW)
- JUNCTION PIT (NEW / EXISTING)
- CATCHMENT AREA BYPASSING OSD
- CATCHMENT AREA DRAINING TO OSD
- CATCHMENT AREA DRAINING TO EXISTING OSD

DESIGNED: J. GRINSELL
DRAWN: M. MAI
JOB MANAGER: M. LEE
VERIFIER:

NOT FOR CONSTRUCTION

REV.	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR SSD APPROVAL	AP		ML	26.10.22

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ARCHITECT: HDR

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SCALE 1:250@B1 (0 2 4 6 8 10 12m)

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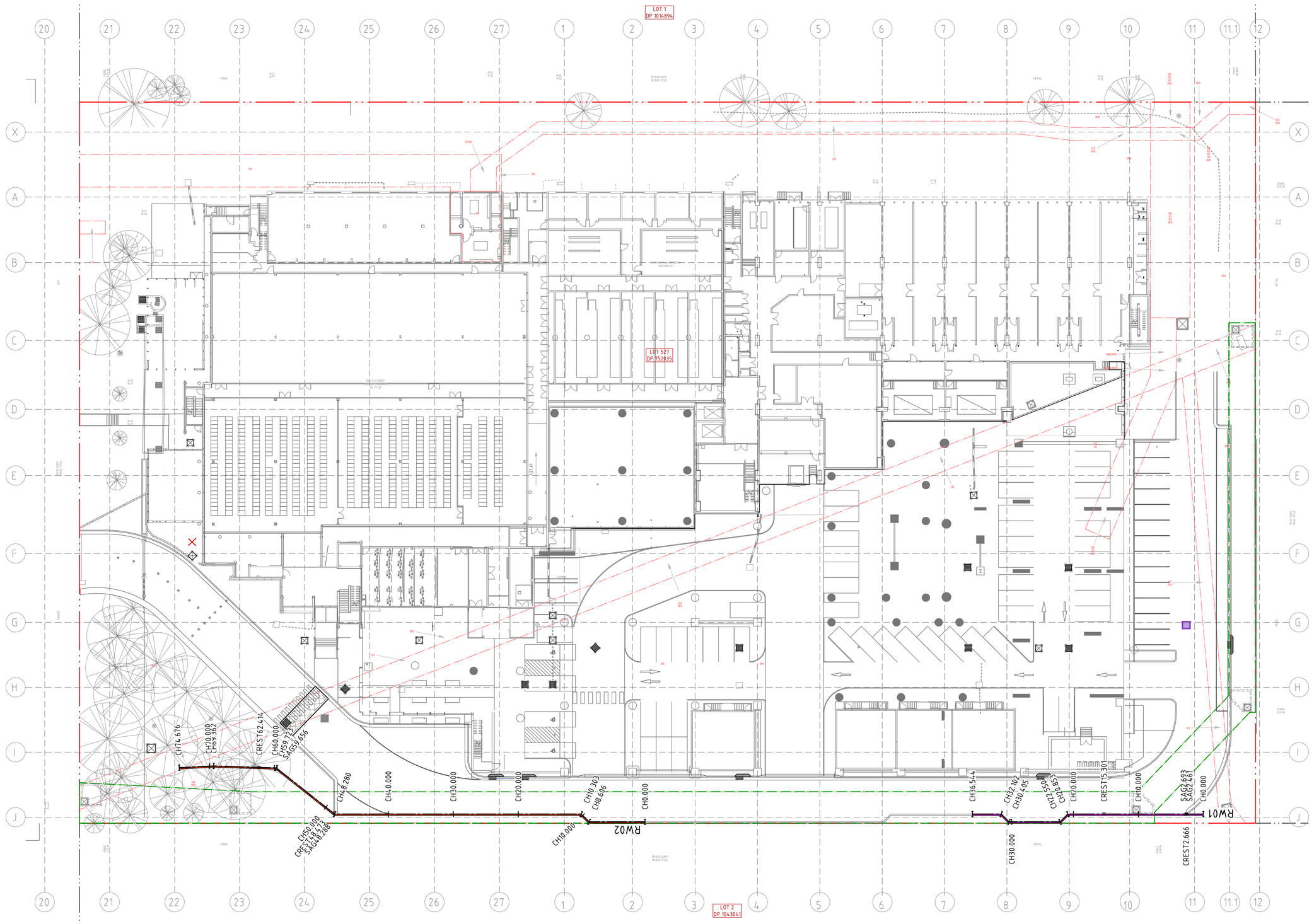
PROJECT: IC3 WEST DATA CENTER
17-23 TALAVERA ROAD,
MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

STORMWATER CATCHMENT PLAN

JOB NUMBER: 170095-02
DRAWING NUMBER: C204.51
REVISION: 01
DRAWING SHEET SIZE = B1



LEGEND

- SITE BOUNDARY
- ADJOINING BOUNDARY LINE
- EASEMENT LINE
- PROPOSED COUNCIL EASEMENT
- RW01 — CONTROL LINE
- CH0.000 — CHAINAGE

DRAWN: M MAI
DESIGNED: J GRINSELL
JOB MANAGER: N LEE
VERIFIER:

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REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR SSD APPROVAL	AP		ML	26.10.22

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ARCHITECT
HDR

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SCALE 1:250@B1 (0 2 4 6 8 10 12m)

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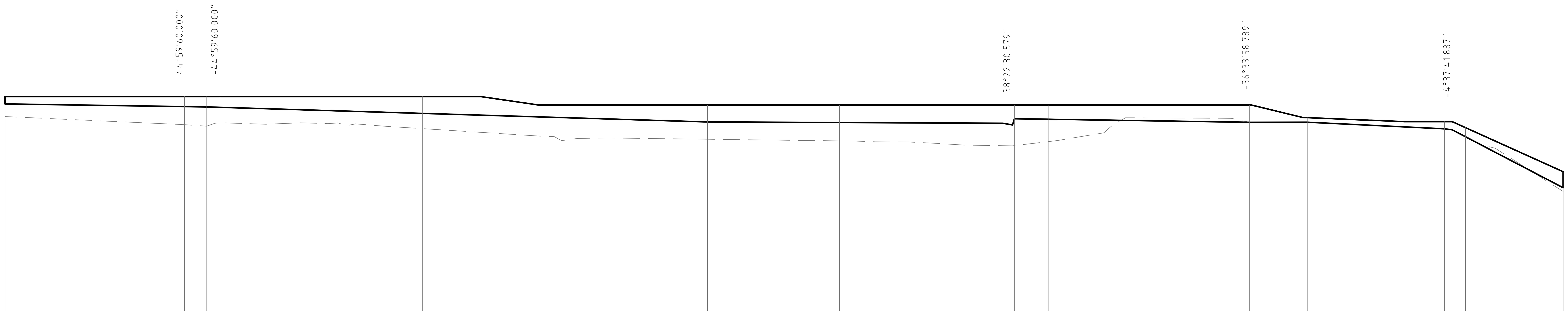
PROJECT
IC3 WEST DATA CENTER
17-23 TALAVERA ROAD,
MACQUARIE PARK

SSDA PACKAGE

DRAWING TITLE
CIVIL ENGINEERING PACKAGE

RETAINING WALL ALIGNMENT CONTROL PLAN

JOB NUMBER 170095-02
DRAWING NUMBER C208.01
REVISION 01
DRAWING SHEET SIZE = B1

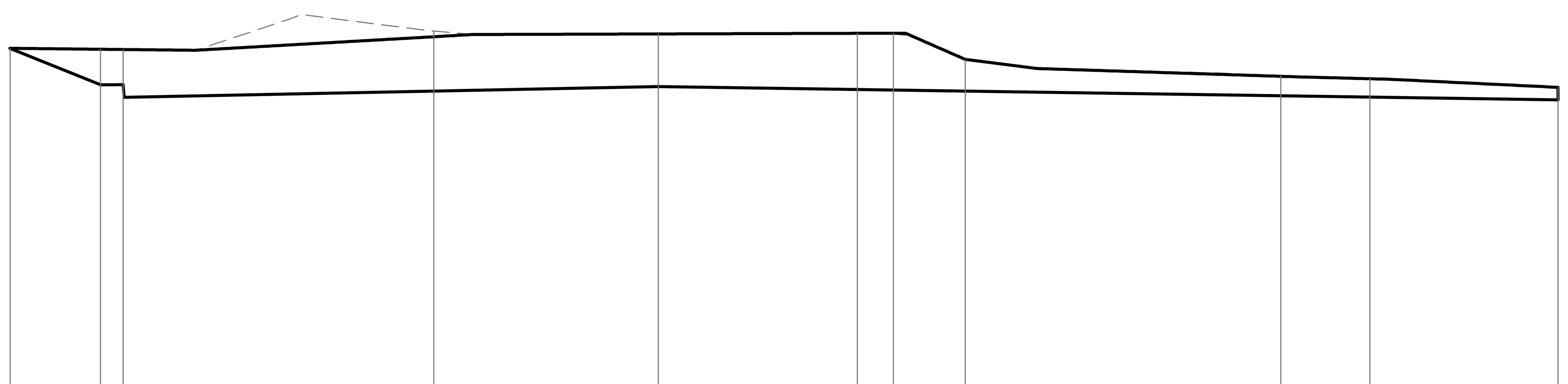


DATUM RL47

EXISTING SURFACE	51.822	51.628	51.591	51.672	51.532	51.302	51.279	51.239	51.124	51.126	51.221	51.685	51.686	51.528	51.348	50.028
HEIGHT (FSL-FSL)	0.17	0.24	0.25	0.26	0.40	0.35	0.41	0.42	0.44	0.33	0.34	0.41	0.11	0.17	0.22	0.38
RETAINING WALL TOP FSL	52.30	52.30	52.30	52.30	52.30	52.10	52.10	52.10	52.10	52.10	52.10	52.10	51.80	51.70	51.56	50.50
RETAINING WALL BOTTOM FSL	52.13	52.06	52.05	52.04	51.90	51.75	51.69	51.68	51.66	51.77	51.76	51.69	51.69	51.53	51.34	50.12
CHAINAGE	0.00	8.61	9.67	10.30	20.00	30.00	33.67	40.00	47.83	48.38	50.00	59.66	62.41	68.99	70.00	74.68

SCALE 1:100 HORIZ 1:50 VERT

ELEVATION OF RW02 FLOOD WALL



DATUM RL49

EXISTING SURFACE	53.1	53.084	53.082	53.303	53.267	53.274	53.269	52.969	52.773	52.746	52.636
HEIGHT (FSL-FSL)	0.00	0.42	0.41	0.64	0.62	0.66	0.67	0.37	0.23	0.22	0.15
RETAINING WALL TOP FSL	53.10	53.09	53.09	53.24	53.27	53.28	53.28	52.97	52.77	52.74	52.64
RETAINING WALL BOTTOM FSL	53.10	52.67	52.67	52.60	52.65	52.61	52.61	52.59	52.54	52.52	52.49
CHAINAGE	0.00	2.13	2.67	10.00	15.30	20.00	20.85	22.55	30.00	32.10	36.54

SCALE 1:100 HORIZ 1:50 VERT

ELEVATION OF RW01 EXTENDED HEIGHT KERB

DRAWN: M. MAI
DESIGNED: J. GRINSELL
JOB MANAGER: M. LEE
VERIFIER:

NOT FOR CONSTRUCTION

REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
01	ISSUED FOR SSD APPROVAL	AP		ML	26.10.22

CLIENT: macquarie DATA CENTRES

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SCALE 1:50 @ (V) B1 0.0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:100 @ (H) B1 0 1 2 3 4 5m

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PROJECT: IC3 WEST DATA CENTER, 17-23 TALAVERA ROAD, MACQUARIE PARK — SSDA PACKAGE

DRAWING TITLE: CIVIL ENGINEERING PACKAGE — RETAINING WALL LONGITUDINAL SECTION - SHEET 01

JOB NUMBER: 170095-02
DRAWING NUMBER: C208.11
REVISION: 01
DRAWING SHEET SIZE = B1