

CIVIL ENGINEERING REPORT EARLY WORKS

PROPOSED EARTHWORKS LOT 3 & 4, BRINGELLY ROAD HORNINGSEA PARK

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1 INTRODUCTION

1.1 Introduction

ESR proposes to perform earthworks and retaining walls works over Lots 3 and 4 Bringelly Road, Horningsea Park, NSW to provide a benched earthworks site for future industrial development. The land has a combined area of 11.1 Ha and is currently undeveloped, however undergoing infrastructure construction works as part of an existing NSW DPE approval (SSD_6324).

1.2 Scope

Costin Roe Consulting Pty Ltd has been commissioned by ESR to prepare this Engineering Report in support of the proposed Early Works for the site.

This report provides a summary of the design principles and planning objectives for the following civil engineering components of the project:

- Earthworks
- Retaining Walls
- Erosion & Sediment Controls

The engineering objectives for the development are to create a site which responds to the topography and site constraints to provide a benched earthworks site including a flat pad for future industrial development which has good integration with the currently under construction Skyline Crescent.

A set of concept drawings have been prepared to show the proposed earthworks, retaining walls, erosion control and stormwater management during the early works.

1.3 Authority Jurisdiction

It is noted that as the site is located within the bounds of Liverpool City Council local government area that the requirements of the Liverpool City Council *Development Design Specification D1 through D9* will be considered in the design.

2 DEVELOPMENT SITE

2.1 Location

The proposed development is located in the suburb of Horningsea Park within the proposed Bringelly Road Business Hub at Lot 3 & 4, Bringelly Road as shown in **Figure 2.1**.



Figure 2.1. Locality Map (Source: Near Maps 2019)

2.2 Existing Site Description

The Bringelly Road Business Hub Estate is currently located on an undeveloped parcel of land. The proposed early works industrial facility occupies a land area of 4.1 Ha located on Lot 3 and 7.0 Ha on Lot 4 at the eastern portion of the Bringelly Road Business Hub Estate. The site is bounded by Stuart Road to the north and west, Lot 6 of the proposed Bringelly Road Business Hub to the east, and Bringelly Road and Skyline Crescent to the south.

The site is currently undergoing cut to fill earthworks as part of the SSD_6324 approval. Following completion of these works the site will drain to the waterway on the north of the site at grades of 1-2%. Runoff from the site currently flows from a high point on the south-western boundary of the site.

Access to the site will be available along the proposed Skyline Crescent.

2.3 Proposed Development

The proposed early works application is for works to the existing property in the form of earthworks and retaining walls to create a benched earthworks site, including a flat pad for future industrial development. The expected developments will be for single level warehouses, hardstand and parking areas which will be subject to separate future Development Application submissions.

The earthworks proposed as part of this application involve increasing the levels from those approved under SSD6324 to better integrate with the under-construction Skyline Crescent and to facilitate expected future development on the site.

3 SITE WORKS

3.1 Earthworks

The site is currently undergoing bulk earthworks as part of the SSD_6324 approval. The approved earthworks have a batter along the western and southern boundaries of the proposed subdivision where levels fall toward a sediment basin.

Earthworks will be performed for the current development to incorporate a single flat pad and nominal falls over the site for future development. Reference is to be made to drawings **Co11994.07-EW30, EW31, EW35 and EW36**, in **Appendix A**.

Soil Erosion and Sediment Control measures including sedimentation basins are to be placed in accordance with submitted drawings and the Soil and Water Management Plan in **Section 5** of this report.

3.2 Embankment Stability

To assist in maintaining embankment stability, slopes of permanent batters will be no steeper than 3 horizontal to 1 vertical while temporary batters will be no steeper than 2 horizontal to 1 vertical.

Permanent batters will also be adequately vegetated or turfed which will assist in maintaining embankment stability.

Stability of batters and reinstatement of vegetation shall be in accordance with the submitted drawings and the Soil and Water Management Plan in **Section 5**.

3.3 Supervision of Earthworks

All geotechnical testing and inspections performed during the earthworks operations will be undertaken to Level 1 geotechnical control, in accordance with AS3798-1996.

3.4 Retaining Walls

The civil engineering objective is to minimise retaining walls within the constraints of the architectural layout and allowable grading (as per AS2890.1 and AS2890.2) through paved areas and batters in landscaped areas.

Given the existing natural falls and nature of the industrial development, retaining walls will be required. Where possible, landscaped batters are proposed to limit and reduce retaining wall construction. Retaining will be provided as part of early works at boundary locations. The proposed method of construction will be reinforced concrete masonry, masonry faced reinforced earth retaining, pile and shot-crete, or other concrete or masonry type construction.

Location, heights and details of retaining walls are shown on drawing **Co11994.07-EW60, EW61, EW62 & EW65**.

4 STORMWATER DRAINAGE

4.1 Existing Site Drainage

The property is currently undeveloped with no formal in-ground drainage located on site.

The 11.1 Ha catchment on Lots 3 & 4 is drained to a Bringelly Road Business Hub Estate sediment basin located on the north. An interallotment drainage line is located along the north-western boundary of the site which discharges to the waterway on the north.

4.2 Proposed Site Drainage

Minor adjustments to the existing site drainage are proposed as part of this Early Works application. Discharge from Lot 3 is made via a proposed new pit in the northern corner of the site, connecting to the 675mm diameter stormwater inter-allotment drainage line constructed as part of the estate works. Discharge from Lot 4 is made via a new pit in the north of the site which connects via a 750mm diameter stormwater pipe to the estate inter-allotment drainage line to the north, and eventually discharges to the waterway to the north of the Bringelly Road Business Hub.

4.3 External Catchments & Flooding

There are no external catchments (including adjacent undeveloped industrial land) being directed through the development site.

For flooding information refer to report (*Ref: Co11994.06-02.rpt*) prepared by Costin Roe Consulting.

5 EROSION & SEDIMENT CONTROLS

An erosion and sediment control plan (ESCP) is shown on drawings **Co11994.07-EW20 & EW25**. These are conceptual plans only providing sufficient detail to clearly show that the works can proceed without undue pollution to receiving waters. A detailed plan will be prepared once consent is given and before works start.

5.1 General Conditions

- The ESCP will be read in conjunction with the engineering plans, and any other plans or written instructions that may be issued in relation to development at the subject site.
- Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in Landcom document *Managing Urban Stormwater, Soils and Construction (1998) – The Blue Book* and Liverpool City Council specifications.
- All subcontractors will be informed of their responsibilities in minimising the potential for soil erosion and pollution to down slope areas.

5.2 Land Disturbance

Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in **Table 5.1**

Land Use	Limitation	Comments
Construction areas	Limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the engineering plans.	All site workers will clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope), or similar materials.
Access areas	Limited to a maximum width of 5 metres	The site manager will determine and mark the location of these zones onsite. They can vary in position so as to best conserve existing vegetation and protect downstream areas while being considerate of the needs of efficient works activities. All site workers will clearly recognise these boundaries.
Remaining lands	Entry prohibited except for essential management works	

Table 5.1 Limitations to access

5.3 Erosion Control Conditions

- Clearly visible barrier fencing shall be installed as shown on the plan and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site only through the stabilised access points.
- Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils remain on the surface at the completion of works.
- Where practicable, schedule the construction program so that the time from starting land disturbance to stabilisation has a duration of less than six months.
- Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days.
- Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.
- Where practical, foot and vehicular traffic will be kept away from all recently established areas
- Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as low a gradient as practical but not steeper than:

2H:1V where slope length is less than 7 meters

2.5H:1V where slope length is between 7 and 10 meters

3H:1V where slope length is between 10 and 12 meters

4H:1V where slope length is between 12 and 18 meters

5H:1V where slope length is between 18 and 27 meters

6H:1V where slope length is greater than 27 meters

- All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event.
- During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind.

5.4 Pollution Control Conditions

- Stockpiles will not be located within 5 meters of hazard areas, including likely areas of high velocity flows such as waterways, paved areas and driveways.
- Sediment fences will:
 - Be installed where shown on the drawings, and elsewhere at the discretion of the site superintendent to contain the coarser sediment fraction (including aggregated fines) as near as possible to their source.

- Have a catchment area not exceeding 720 square meters, a storage depth (including both settling and settled zones) of at least 0.6 meters, and internal dimensions that provide maximum surface area for settling, and
- Provide a return of 1 meter upslope at intervals along the fence where catchment area exceeds 720 square meters, to limit discharge reaching each section to 10 litres/second in a maximum 20 year t_c discharge.
- Sediment removed from any trapping device will be disposed in locations where further erosion and consequent pollution to down slope lands and waterways will not occur.
- Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (i.e. the catchment area has been permanently landscaped and/or likely sediment has been treated in an approved device). Nevertheless, stormwater inlets will be protected.
- Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

5.5 Waste Management Conditions

Acceptable bind will be provided for any concrete and mortar slurries, paints, acid washings, lightweight waste materials and litter. Clearance service will be provided at least weekly.

5.6 Site Inspection and Maintenance

A self-auditing program will be established based on a Check Sheet. A site inspection using the Check Sheet will be made by the site manager:

- At least weekly.
- Immediately before site closure.
- Immediately following rainfall events in excess of 5mm in any 24 hour period.

The self audit will include:

- Recording the condition of every sediment control device
- Recording maintenance requirements (if any) for each sediment control device
- Recording the volumes of sediment removed from sediment retention systems, where applicable
- Recording the site where sediment is disposed
- Forwarding a signed duplicate of the completed Check Sheet to the project manager/developer for their information

In addition, a suitably qualified person will be required to oversee the installation and maintenance of all soil and water management works on the site. The person shall be required to provide a short monthly written report. The responsible person will ensure that:

- The plan is being implemented correctly
- Repairs are undertaken as required
- Essential modifications are made to the plan if and when necessary

- The report shall carry a certificate that works have been carried out in accordance with the plan.

Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.

Proper drainage will be maintained. To this end drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that,

No low points exist that can overtop in a large storm event

Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams or installing additional diversion upslope.

Blockages are cleared (these might occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).

Sand/soil/spoil materials placed closer than 2 meters from hazard areas will be removed. Such hazard areas include areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways.

Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.

Excessive vegetation growth will be controlled through mowing or slashing.

All sediment detention systems will be kept in good, working condition. In particular, attention will be given to:

- Recent works to ensure they have not resulted in diversion of sediment laden water away from them
- Degradable products to ensure they are replaced as required, and
- Sediment removal, to ensure the design capacity or less remains in the settling zone.

Any pollutants removed from sediment basins or litter traps will be disposed of in areas where further pollution to down slope lands and waterways should not occur.

Additional erosion and/or sediment control works will be constructed as necessary to ensure the desired protection is given to down slope lands and waterways, i.e. make ongoing changes to the plan where it proves inadequate in practice or is subjected to changes in conditions at the work site or elsewhere in the catchment.

Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site stabilised

Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

6 CONCLUSION

This Civil Engineering Report has been prepared to support an Early Works Application for earthworks and retaining walls at Lot 3 and 4 in Bringelly Road Business Hub on Bringelly Road, Horningsea Park.

A civil engineering strategy for the earthworks and retaining walls have been developed which provides a best practice solution within the constraints of the existing landform, the approved SSD and under construction road works. This allows for a benched earthworks site to facilitate future industrial development of the land.

The engineering design includes a Sediment and Erosion Control Plan. This plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

Appendix A

DRAWINGS BY COSTIN ROE CONSULTING

PROPOSED FACILITY
ANGELLY ROAD, HORNINGSEA PA
EARLY WORKS PACKAGE

DRAWING LIST

DRAWING NO.	DRAWING TITLE
C011994.07-EW10	DRAWING LIST & GENERAL NOTES
C011994.07-EW15	KEY PLAN
C011994.07-EW20	EROSION AND SEDIMENT CONTROL PLAN
C011994.07-EW25	EROSION AND SEDIMENT CONTROL DETAILS
C011994.07-EW30	BULK EARTHWORKS CUT/FILL PLAN
C011994.07-EW31	BULK EARTHWORKS PLAN
C011994.07-EW35	BULK EARTHWORKS SECTIONS - SHEET 1
C011994.07-EW36	BULK EARTHWORKS SECTIONS - SHEET 2
C011994.07-EW60	RETAINING WALL PLAN
C011994.07-EW61	RETAINING WALL ELEVATIONS - SHEET 1
C011994.07-EW62	RETAINING WALL ELEVATIONS - SHEET 2
C011994.07-EW65	RETAINING WALL DETAILS

GENERAL NOTES:

- G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- G2 ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.
- G3 ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE.
ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT.
REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION.
- G4 DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED.
TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
- G5 UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.
- G6 ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.
- G7 DRAWING TO BE READ IN CONJUNCTION WITH ENGINEERING REPORT CO11994.01-05.rpt

ELECTRONIC INFORMATION NOTES:

1. THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.
2. THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT USE TO UNDERTAKE THE WORKS WILL BE SOLELY AT THE DISCRETION OF AND THE RISK OF THE CONTRACTOR.
3. THE CONTRACTOR IS REQUIRED TO HIGHLIGHT ANY DISCREPANCIES BETWEEN THE DIGITAL TERRAIN MODEL AND INFORMATION PROVIDED IN THE CONTRACT AND/OR DRAWINGS AND IS REQUIRED TO SEEK CLARIFICATION FROM THE SUPERINTENDANT.
4. THE ENGINEER WILL NOT BE LIABLE OR RESPONSIBLE FOR THE POSSIBLE ON-GOING NEED TO UPDATE THE DIGITAL TERRAIN MODEL, SHOULD THERE BE ANY AMENDMENTS OR CHANGES TO THE DRAWINGS OR CONTRACT INITIATED BY THE CONTRACTOR.

EROSION CONTROL NOTES

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERRECTED CONVEX TO THE CENTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS TO BE RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. 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, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200MM.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND PONDING AREAS EXCEPT WHERE EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

SITE PREPARATION NOTES:

1. ALL EARTHWORKS SHALL BE COMPLETED GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY PMS33212-003S REV D DATED 11 MAY 2017
2. EXISTING LEVELS ARE BASED ON INFORMATION PROVIDED BY REALSERVICE SURVEYORS AND GEOMAT ENGINEERING PTY LTD
3. STRIP ANY TOP SOIL OR DELETERIUM MATERIAL AND DISPOSE OF FROM SITE OR STORE AS DIRECTED.
4. COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADS/PAVEMENTS AND -0mm/-20mm ELSEWHERE. PREPARE STEEP SLOPES TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
5. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHMARKED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT. PROOF ROLLING TO BE INSPECTED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
7. SITE WON FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HALF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HALF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET. THE MOISTURE FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HALF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HALF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
8. ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 MM SIEVE. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289 S 4.1) OR HALF TEST METHOD (AS1289 S 7). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 MM SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 MM SIEVE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION.
10. ALL THE EARTHWORKS UNDERTAKEN AND THE SUBGRADE CONDITION IN THE CUT AREAS (IN THE STATED PERIOD) ARE DOCUMENTED IN THE REPORTS AND HAVE BEEN UNDERTAKEN IN ACCORDANCE WITH THE SPECIFICATION (EG. COSTIN REV SITE PREPARATION NOTES IN DWG C013003 05-EWC10)
11. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
12. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
13. MATCH EXISTING LEVELS AT BATTER INTERFACE.
14. CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTER LOCATIONS OR WHERE NO RETAINING WALLS ARE PRESENT. ANY DISCREPANCY BETWEEN DESIGN AND EXISTING LEVELS TO BE REFERRED TO THE ENGINEER FOR DIRECTION OR ADJUSTMENTS TO DESIGN LEVELS.

RETAINING WALL NOTES :

1. ALL COMPONENTS AND INSTALLATION SHALL COMPLY WITH A54678 AND THE STANDARDS REFERRED TO THEREIN.
2. MINIMUM BEARING CAPACITY OF FOUNDATION TO BE AS FOLLOWS :
 - a. H MAX. 2.0m = 100 kPa
 - b. H MAX. 3.5m = 150 kPa
 - c. H MAX. 5.0m = 200 kPaBEFORE COMMENCEMENT OF CONSTRUCTION THE FOUNDATION SHALL BE INSPECTED AND VERIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER.
3. WHERE MINIMUM BEARING IS NOT ACHIEVED OR NOT MEETING DESIGN REQUIREMENT, THE FOUNDATION MATERIAL IS TO BE ELAVATED AND REPLACED WITH APPROVED MATERIAL PLACED IN ACCORDANCE WITH THE FILLING SPECIFICATION TO A MINIMUM COMPACTION OF 100% SMD0 AND PLACED WITHIN 2% OF OMC.
4. MINIMUM SURCHARGE LOADS TO BE APPLIED AS FOLLOWS U.O.
5. ON PLAN :
 - a. LIVE LOAD = 20 kPa
 - b. DEAD LOAD = 5 kPa
 - c. CONSTRUCTION TRAFFIC LIVE LOAD = 10 kPa
6. MINIMUM WALL EMBEDMENT AT THE TOE OF THE WALL TO BE 300mm MINIMUM UNLESS NOTED OTHERWISE.
7. DESIGN LIFE OF STRUCTURE IS TO BE 100 YEARS.
8. TIED WALLS ARE TO BE TEMPORARILY PROPPED AT TOP UNTIL SUCH TIME THE TOP OF WALL IS TIED TO THE SLAB AND 28-DAY CONCRETE STRENGTH HAS BEEN ACHIEVED
9. CONSTRUCTION EQUIPMENT WEIGHING MORE THAN 500KG STATIC WEIGHT TO BE TIED TO THE 15m STRIP FROM THE REAR FACE OF THE WALL FACING UNITS. COMPACTION OF THE SELECT FILL MATERIAL WITHIN THE 15m STRIP ADJACENT TO THE WALL SHALL BE ACHIEVED BY LIGHT MECHANICAL TAMPERS (VIBRATING PLATE, TRENCH COMPACTOR OR SIMILAR) TO GIVE THE SAME DENSITY AS IN THE REMAINDER OF THE SELECT FILL.
10. ALL DESIGN AND CONSTRUCT WALL SYSTEM TO BE COMPLETED IN ACCORDANCE WITH THESE NOTES.

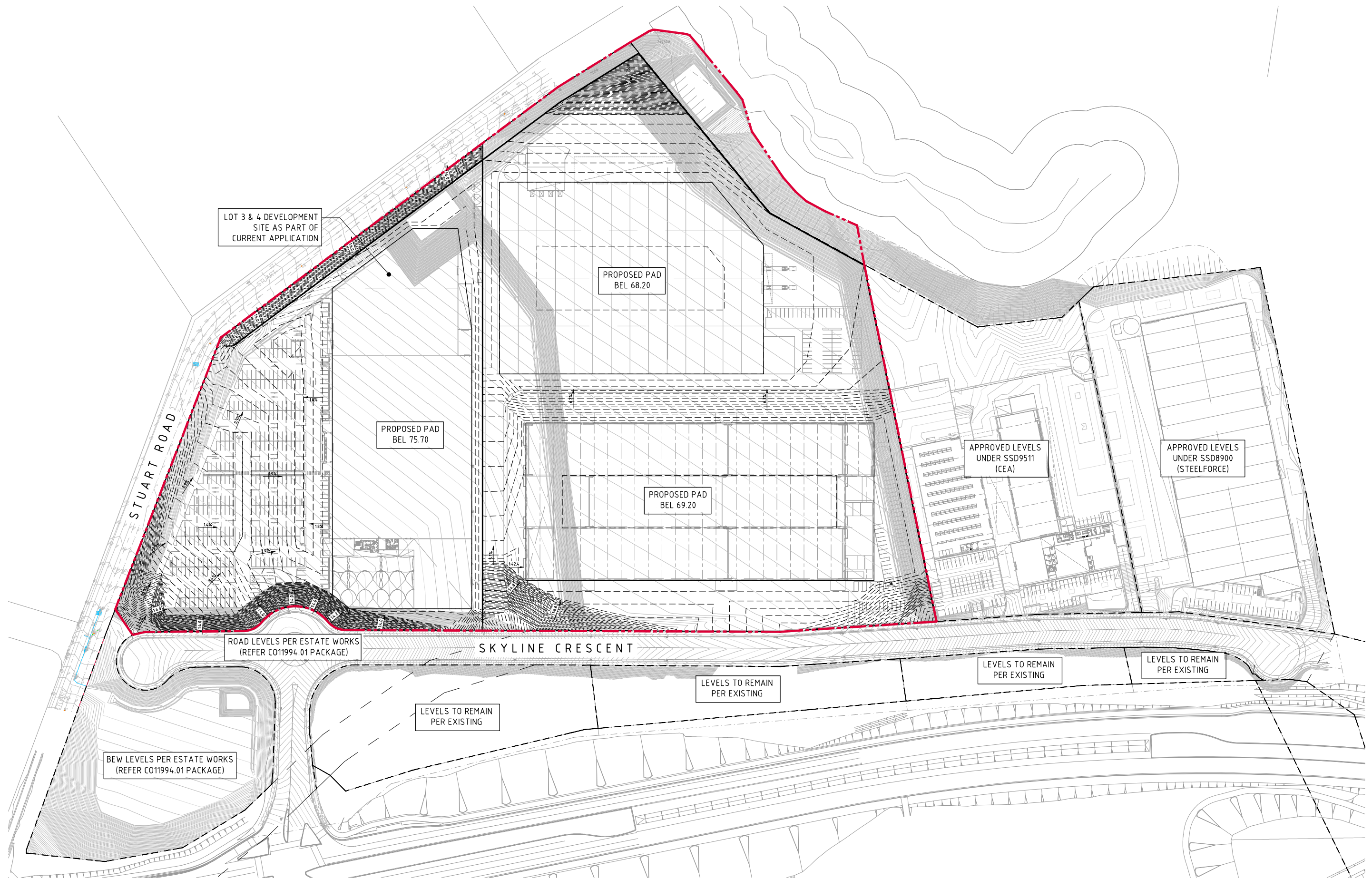
REINFORCED EARTH RETAINING WALL NOTES :

1. ALL COMPONENTS AND INSTALLATION SHALL COMPLY WITH AS4678 AND THE STANDARDS REFERRED TO THEREIN.
2. MINIMUM HEIGHT (H) TO GEOGRID REINFORCEMENT LENGTH (L) TO BE 10.
3. MINIMUM BEARING CAPACITY OF FOUNDATION (BASED ON MINIMUM H/V RATIO OF 10) TO BE AS FOLLOWS :
 - a. H MAX. 2.0m = 100 kPa
 - b. H MAX. 3.5m = 150 kPa
 - c. H MAX. 5.0m = 200 kPa
- BEFORE COMMENCEMENT OF CONSTRUCTION THE FOUNDATION SHALL BE INSPECTED AND VERIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER.
4. WHERE MINIMUM BEARING IS NOT ACHIEVABLE OR NOT MEETING DESIGN REQUIREMENT, THE FOUNDATION MATERIAL IS TO BE EXCAVATED AND REPLACED WITH APPROVED MATERIAL PLACED IN ACCORDANCE WITH THE FILLING SPECIFICATION TO A MINIMUM COMPACTION OF 100% SMD AND PLACED WITHIN 2m.
5. MINIMUM SURCHARGE LOADS TO BE APPLIED AS FOLLOWS U.N.O. ON PLAN:
 - a. LIVE LOAD = 20 kPa
 - b. DEAD LOAD = 5 kPa
 - c. CONSTRUCTION TRAFFIC LIVE LOAD = 10 kPa
6. THE GEOGRIDS SHALL BE OF THE TYPE AND INDEX STRENGTH NOMINATED ON THE DRAWINGS. THE MINIMUM GEOGRIDS SHALL BE A SINGLE LENGTH IN THE DIRECTION OF DESIGN TENSION, NOT LAPPED, MAKING PROVISION FOR CONNECTION TO THE FACING ACROSS THE WHOLE WIDTH OF THE FACING AND PROVIDING FOR THE SPECIFIED ANCHORAGE WITHIN THE DESIGNATED ANCHORAGE ZONE. GEOGRIDS SHALL COVER THE WHOLE OF THE PLAN AREA BEHIND THE WALL FOR THE SPECIFIED ANCHORAGE LENGTH AND SHALL BE LAPPED WITH ADJACENT SECTIONS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. MINIMUM WALL EMBEDED AT THE TOE OF THE WALL TO BE 300mm.
8. DESIGN LIFE OF STRUCTURE IS TO BE 100 YEARS.
9. SELECT BACKFILL MATERIAL WITHIN THE REINFORCED SOIL BLOCK SHALL BE SOUND GRANULAR MATERIAL OF NATURAL OR INDUSTRIAL ORIGIN, NON-EXPANSIVE, FREE FROM ORGANIC OR OTHER DELETERIOUS MATERIAL CONFORMING TO THE PHYSICAL, CHEMICAL AND ELECTROCHEMICAL LIMITS AS SPECIFIED AND SHALL NOT BE SUBJECT TO BREAKDOWN UNDER COMPACTION. THE SELECT BACKFILL MATERIAL IS TO HAVE THE FOLLOWING PARAMETERS:
 - a. MINIMUM INTERNAL FRICTION, $\phi = 34^\circ$
 - b. EFFECTIVE COHESION, $C' = 0$ kPa
 - c. UNIT WEIGHT = 21 kN/m^3
 - d. PH BETWEEN 4 AND 9.
10. SELECT BACKFILL IS TO BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 300mm (LOOSE) COMPACTION TO NOT LESS THAN 100% SMD WILL BE ACHIEVED AND MATERIAL PLACED WITHIN 2% OF OMC. DESIGN TESTS SHALL BE PERFORMED IN EACH COMPACTED LIFT IN ACCORDANCE WITH AS3798.
11. PROVIDE A DRAINAGE LAYER DIRECTLY BEHIND THE FACING UNITS IN A MINIMUM 300mm wide 12-20mm AGGREGATE LAYER. FACING UNIT VOIDS TO BE FILLED WITH AGGREGATE. PROVIDE 100mm MINIMUM AG. DRAIN IN GEOTEXTILE SOCK AT TOE OF WALL FACING AND CONNECT TO DRAINAGE SYSTEM AT 30m MAX. SPACING.
12. THE NEED FOR A CHIMNEY DRAIN OR DRAINAGE AT THE REAR OF THE MASS/ SOIL BLOCK IS TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER AND DESIGNER FOLLOWING PREPARATION OF THE FOUNDATION AND PRIOR TO CONSTRUCTION OF THE MASS SOIL BLOCK.
13. CONSTRUCTION EQUIPMENT WEIGHING MORE THAN 500kg STATIC WEIGHT IF TO BE KEPT BACK 15m FROM THE REAR FACE OF THE WALL FACING UNITS. CONSTRUCTION OF THE SELECT BACKFILL MATERIAL WITHIN THE 15m STRIP ADJACENT TO THE WALL SHALL BE ACHIEVED BY LIGHT MECHANICAL TAMPERS (VIBRATING PLATE, TRENCH COMPACTOR OR SIMILAR) TO GIVE THE SAME DENSITY AS IN THE REMAINDER OF THE SELECT FILL.
14. ALL DESIGN AND CONSTRUCT WALL SYSTEM TO BE COMPLETED IN ACCORDANCE WITH THESE NOTES.



SITE PLAN
N.T.S.

				PROJECT				CLIENT				ARCHITECT			
												Costin Roe Consulting Pty Ltd. Consulting Engineers			
FOR DEVELOPMENT APPLICATION 14.11.19 C ADDED LOT 4 TO WORKS 27.09.19 B ISSUED FOR INFORMATION 05.09.19 A								LOT 3&4 EARLY WORKS LOT 3&4, BRINGELLY ROAD BUSINESS HUB MORNINGSSEA PARK, NSW				Level 1, 8 Wadswill Street Mable Bay, Sydney NSW 2000 Tel: (02) 8561-7000 Fax: (02) 8561-3721 Email: mail@costinroe.com.au ©			
AMENDMENTS DATE ISSUE AMENDMENTS DATE ISSUE AMENDMENTS DATE ISSUE				AMENDMENTS DATE ISSUE AMENDMENTS DATE ISSUE AMENDMENTS DATE ISSUE				DESIGNED DRAWN DATE CHECKED M.H.W. L.D. M.H.W. A.S. G.D.W.				CAD REVISIONS M.H.W. G.D.W.			
DRAWING TITLE				DRAWING LIST & GENERAL NOTES				DRAWING NO				ISSUE			
C011994.07-EW10				C011994.07-EW10				C011994.07-EW10				C011994.07-EW10			



KEY PLAN
SCALE 1:750

NOTE:
ARCHITECTURAL LAYOUT SHOWN IN GREYSCALE INDICATIVE ONLY
FOR FUTURE DEVELOPMENT. FINAL LAYOUT TO BE CONFIRMED IN
SEPERATE DEVELOPMENT APPLICATIONS.

6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

FOR DEVELOPMENT APPLICATION

										ARCHITECT										CLIENT										PROJECT										DRAWING TITLE																																																																															
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SEDIMENTATION BASIN NOTE:

FOR SEDIMENT & EROSION CONTROL DETAILS REFER TO DRAWING C011994.07-EW25.
SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF "SOILS AND CONSTRUCTION, MANAGING URBAN STORMWATER-THE BLUE BOOK".
CAPACITY BASED UPON 5 DAY RAINFALL DEPTH AT 85th PERCENTILE INTENSITY (24.4mm).

APPROXIMATE AREA OF DISTURBED SITE = 4. ha

SEDIMENT BASIN A:
CATCHMENT AREA = 4.097ha
REQUIRED BASIN VOLUME = 750m³
BASE DIMENSIONS (L X W) = 14m x 23.0m
TOP DIMENSIONS (L X W) = 23.0m x 32.0m
MAX SIDE SLOPE = 1V:3H
DEPTH = 1.5m
PROVIDED BASIN VOLUME = 772m³

SEDIMENT BASIN B:
CATCHMENT AREA = 6.98ha
REQUIRED BASIN VOLUME = 1277m³
BASE DIMENSIONS (L X W) = 18m x 34.0m
TOP DIMENSIONS (L X W) = 27.0m x 43.0m
MAX SIDE SLOPE = 1V:3H
DEPTH = 1.5m
PROVIDED BASIN VOLUME = 1308m³

SEDIMENTATION BASINS TO COLLECT RUN-OFF IN EXTREME RAINFALL EVENTS.
COLLECTED RUN-OFF TO BE ASSESSED BY A QUALIFIED LABORATORY FOR DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.

EACH BASIN IS TO HAVE A MARKER PLACED AS PER THE DETAIL TO INDICATE WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED AND DEWATERED PRIOR TO REMOVAL FROM SITE.

ALLOWANCE TO BE MADE DURING BENCHING OF SITE TO ENSURE RUN-OFF IS DIRECTED TO SEDIMENTATION BASINS.

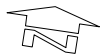
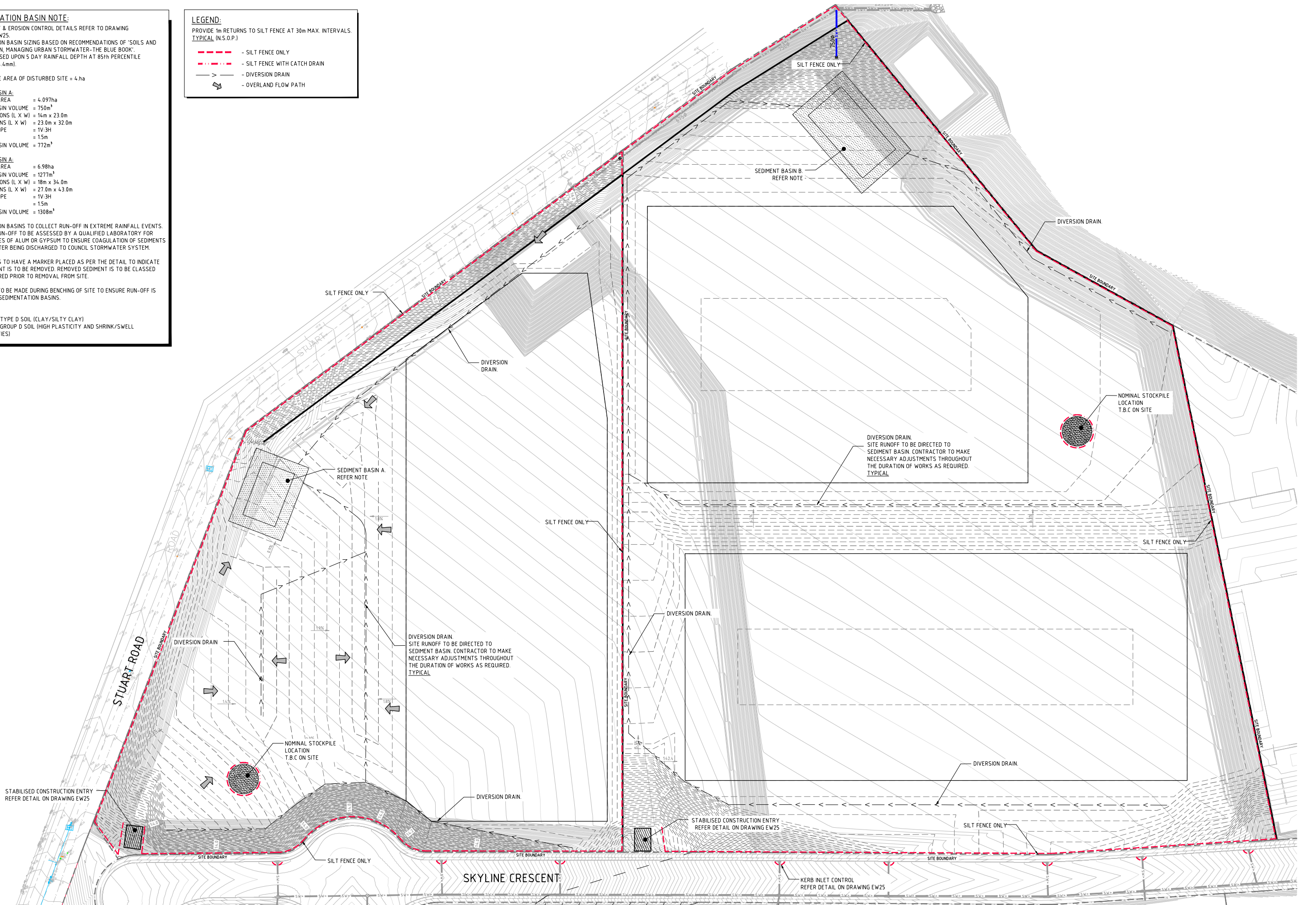
NOTES:

1. ASSUME TYPE D SOIL (CLAY/SILTY CLAY)
2. ASSUME GROUP D SOIL (HIGH PLASTICITY AND SHRINK/SWELL PROPERTIES)

LEGEND:

PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS
TYPICAL (N.S.O.P.)

- SILT FENCE ONLY
- SILT FENCE WITH CATCH DRAIN
- DIVERSION DRAIN
- OVERLAND FLOW PATH

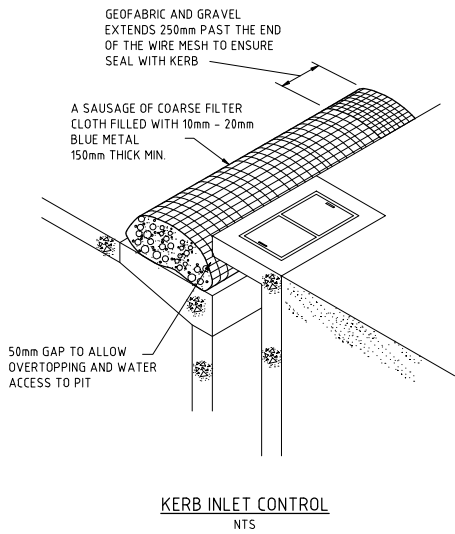


EROSION & SEDIMENT CONTROL PLAN
SCALE 1:500

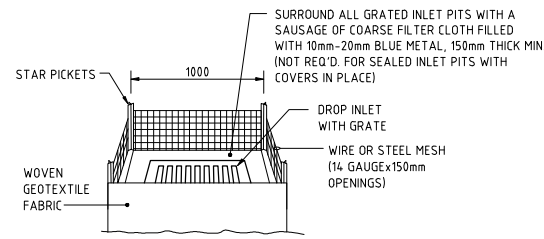
FOR DEVELOPMENT APPLICATION

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

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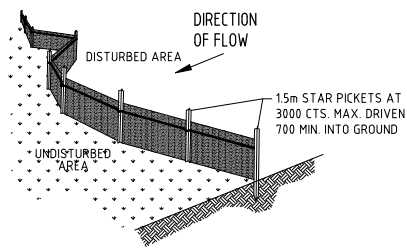


KERB INLET CONTROL
N.T.S.

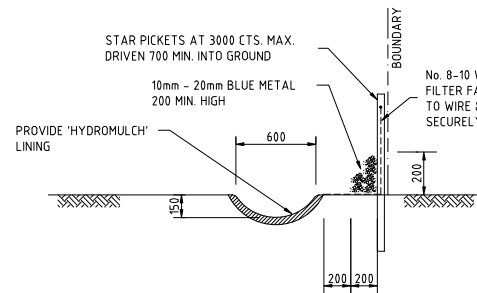


GRADED INLET PIT FILTER DETAIL
N.T.S.

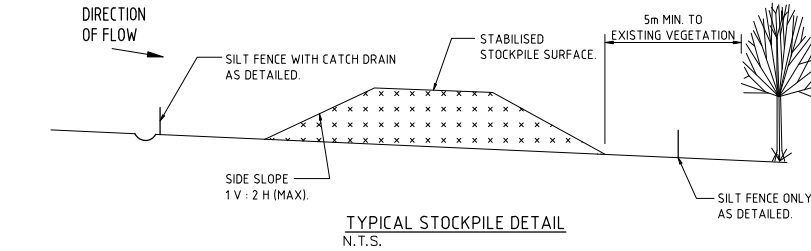
NOTE: ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.



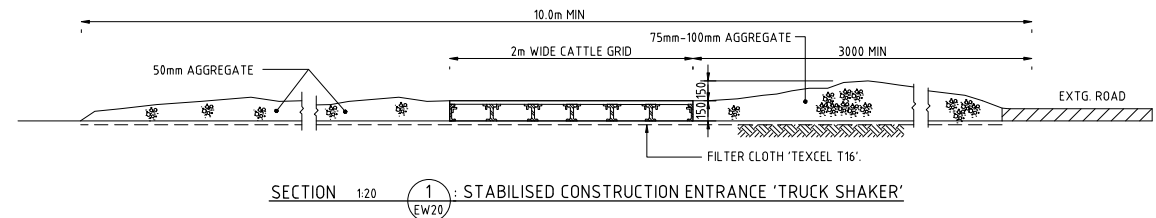
TYPICAL SILT FENCE DETAIL
N.T.S.
PROVIDE 1m RETURNS AT 30m INTERVALS.
TYPICAL



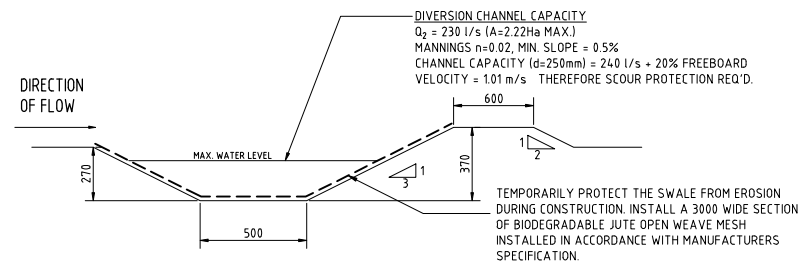
TYPICAL OPEN DRAIN & SILT FENCE
SCALE 1:20



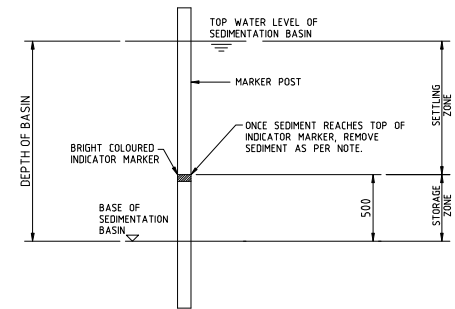
STOCKPILE NOTES
1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.



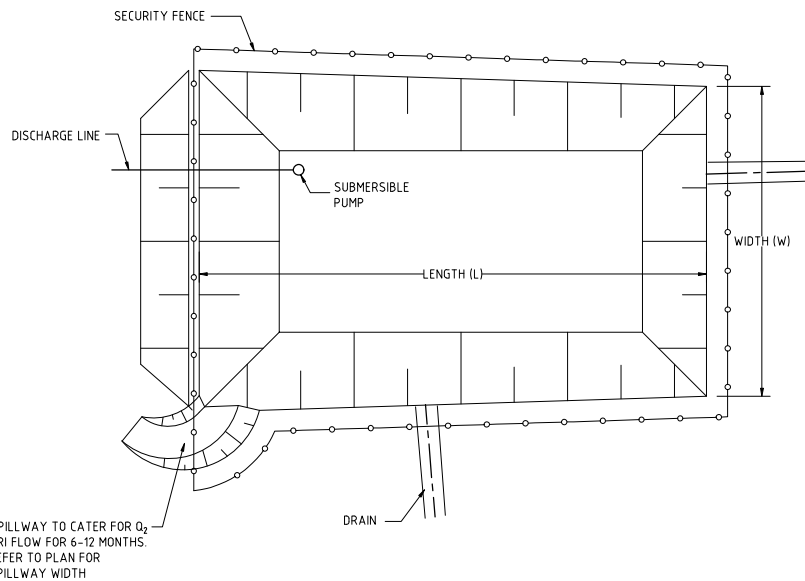
SECTION 1:20
1
EW20
STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'



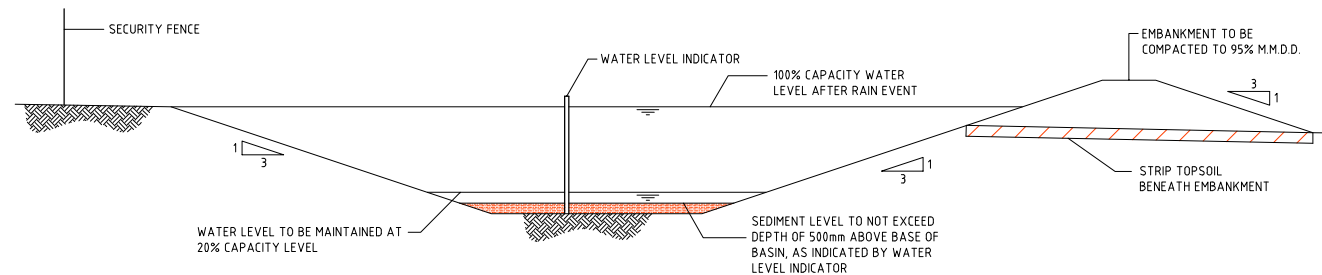
DIVERSION DRAIN SECTION
SCALE 1:20



SEDIMENT STORAGE MARKER
SCALE 1:20

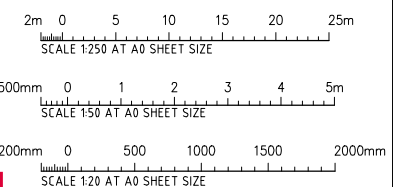


TYPICAL SEDIMENT CONTROL POND PLAN
SCALE 1:250



TYPICAL SEDIMENT CONTROL BASIN SECTION
SCALE 1:50

NOTES:
ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.
MINIMISE DISTURBED AREAS.
ROADS & FOOTPATHS TO BE SWEEPED DAILY.
12m TURF TO BE PLACED BEHIND KERBS.
DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER AS REQUIRED OR AS DIRECTED BY THE EPA.



EARTHWORKS VOLUMES ESTIMATE

EARTHWORKS VOLUMES:

CUT MATERIAL = - 28,900m³
FILL MATERIAL = + 173,700m³
RETAINING WALL FILL = - 6,500 m³

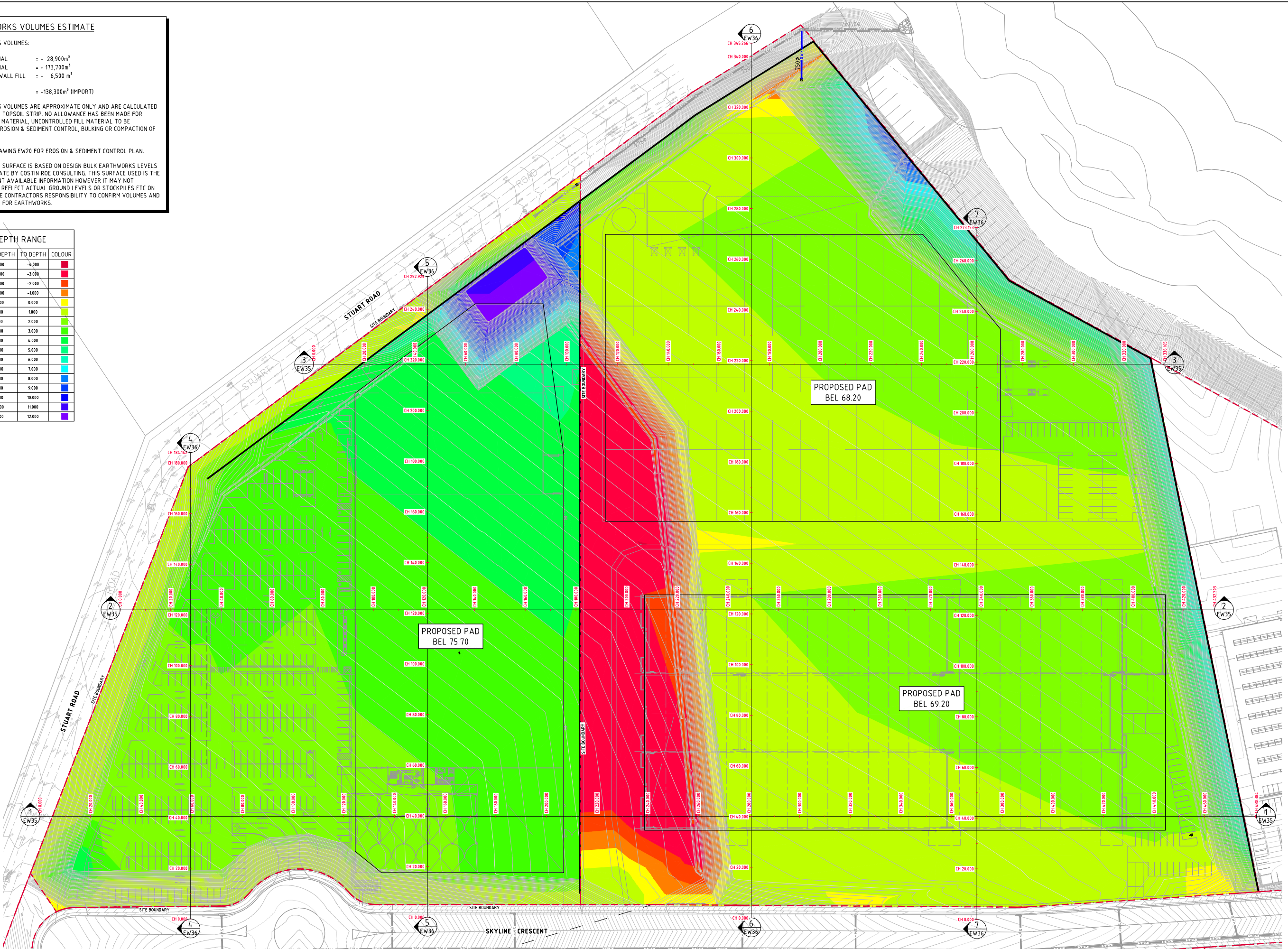
BALANCE = +138,300m³ (IMPORT)

EARTHWORKS VOLUMES ARE APPROXIMATE ONLY AND ARE CALCULATED ASSUMING NO TOPSOIL STRIP. NO ALLOWANCE HAS BEEN MADE FOR DELETERIOUS MATERIAL, UNCONTROLLED FILL MATERIAL TO BE REWORKED, EROSION & SEDIMENT CONTROL, BULKING OR COMPACTION OF FILLED SOILS.

REFER TO DRAWING EW20 FOR EROSION & SEDIMENT CONTROL PLAN.

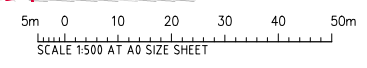
THE EXISTING SURFACE IS BASED ON DESIGN BULK EARTHWORKS LEVELS FOR THE ESTATE BY COSTIN ROE CONSULTING. THIS SURFACE USED IS THE MOST CURRENT AVAILABLE INFORMATION HOWEVER IT MAY NOT ACCURATELY REFLECT ACTUAL GROUND LEVELS OR STOCKPILES ETC ON SITE. IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM VOLUMES AND ALLOWANCES FOR EARTHWORKS.

DEPTH RANGE			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	-5.000	-4.000	Red
2	-4.000	-3.000	Orange
3	-3.000	-2.000	Yellow
4	-2.000	-1.000	Light Green
5	-1.000	0.000	Green
6	0.000	1.000	Light Green
7	1.000	2.000	Green
8	2.000	3.000	Light Green
9	3.000	4.000	Green
10	4.000	5.000	Light Green
11	5.000	6.000	Green
12	6.000	7.000	Light Green
13	7.000	8.000	Green
14	8.000	9.000	Light Green
15	9.000	10.000	Green
16	10.000	11.000	Light Green
17	11.000	12.000	Green



BULK EARTHWORKS CUT/FILL PLAN
SCALE 1:500

FOR DEVELOPMENT APPLICATION



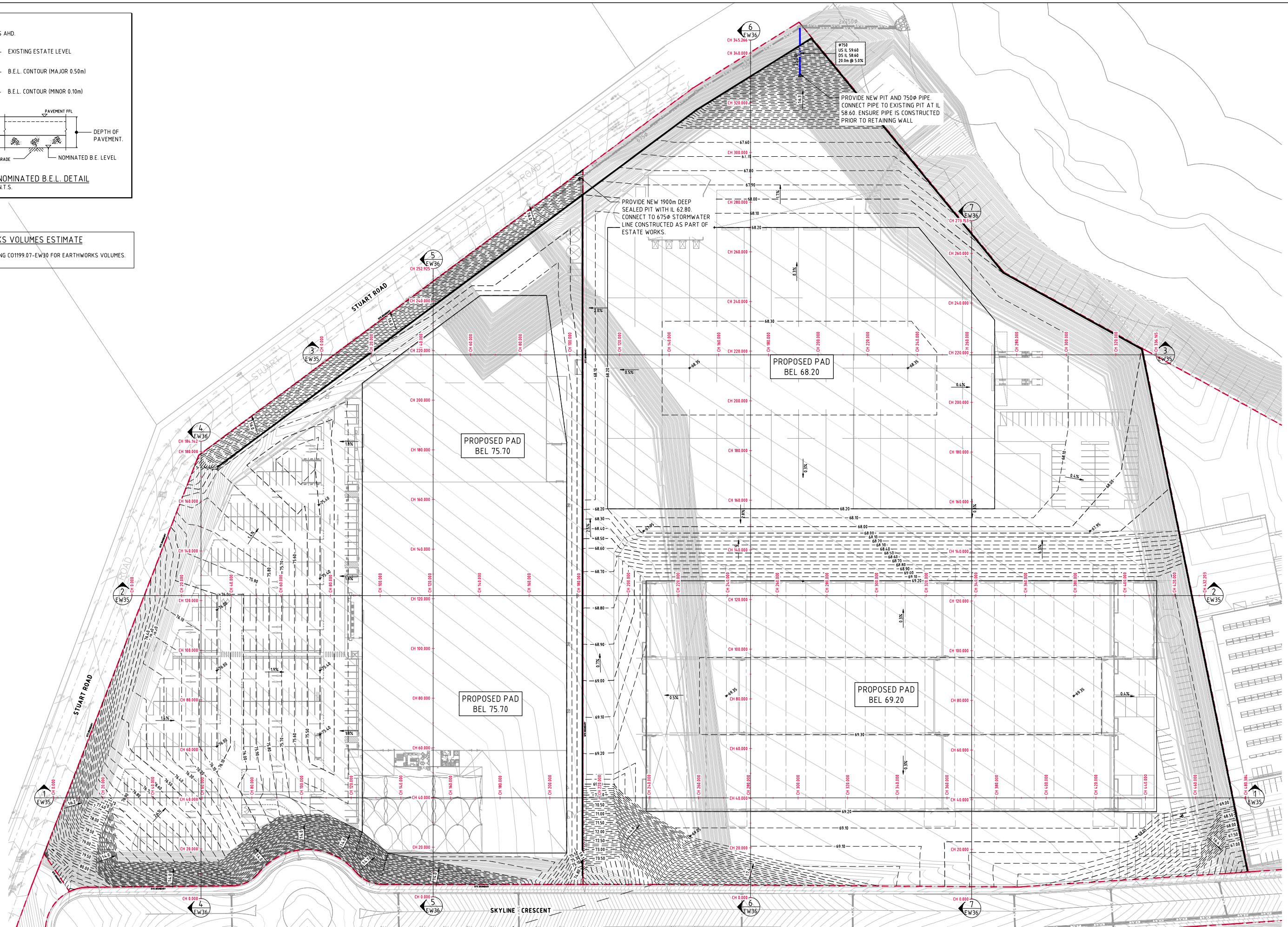
LEGEND
LEVELS DATUM IS AHD.

— 73.00 — — EXISTING ESTATE LEVEL
— 73.00 — — B.E.L. CONTOUR (MAJOR 0.50m)
— 73.10 — — B.E.L. CONTOUR (MINOR 0.10m)

PAVEMENT
PAVEMENT FFL
DEPTH OF PAVEMENT.
BASE/ SUBBASE COURSES
SUBGRADE
NOMINATED B.E. LEVEL

NOMINATED B.E.L. DETAIL
N.T.S.

EARTHWORKS VOLUMES ESTIMATE
REFER TO DRAWING C01199.07-EW30 FOR EARTHWORKS VOLUMES.



BULK EARTHWORKS PLAN
SCALE 1:250

FOR DEVELOPMENT APPLICATION

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

										ARCHITECT										CLIENT										PROJECT										CONSULTING ENGINEERS										DRAWING TITLE																																																																					
ISSUED FOR DEVELOPMENT APPLICATION										14.11.19										D																				LOT 3&4 EARLY WORKS										CONSULTING ENGINEERS										BULK EARTHWORKS PLAN																																																											
REVISED AS CLOUDED										06.11.19										C																				LOT 3&4, BRINGELLY ROAD BUSINESS HUB										Level 1, 8 Windmill Street																																																																					
LOT 4 WORKS ADDED										27.09.19										B																				HORNINGSEA PARK, NSW										Wahbi Bay, Sydney NSW 2000																																																																					
ISSUED FOR INFORMATION										05.09.19										A																														Tel: (02) 8246-7669 Fax: (02) 8241-3721										email: mail@costinroe.com.au ©																																																											
AMENDMENTS										DATE										ISSUE										AMENDMENTS										DATE										ISSUE										AMENDMENTS										DATE										ISSUE																																							



Costin Roe Consulting Pty Ltd.
Consulting Engineers
Level 1, 8 Windmill Street
Wahbi Bay, Sydney NSW 2000
Tel: (02) 8246-7669 Fax: (02) 8241-3721
email: mail@costinroe.com.au ©

PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING NO C011994.07-EW31

ISSUE D

LEGEND:

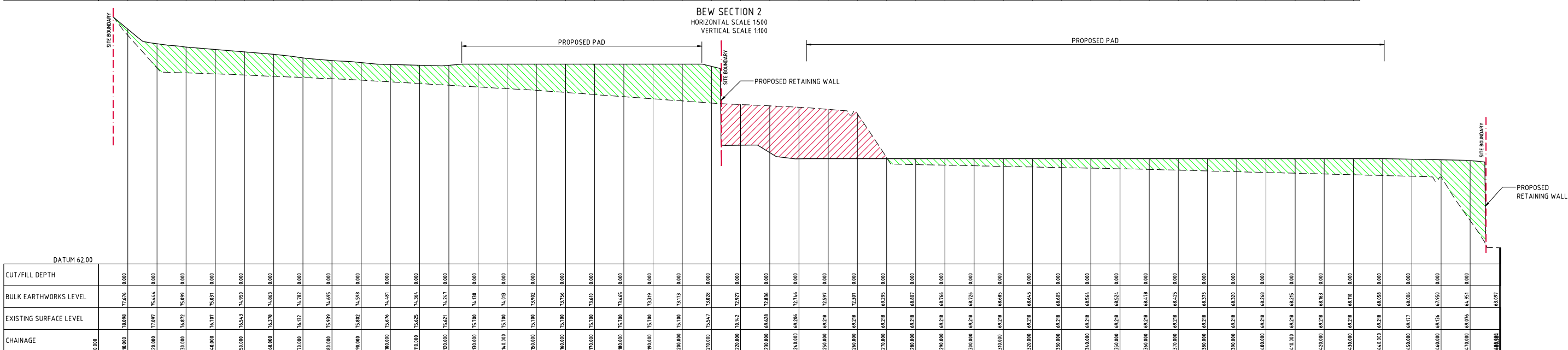
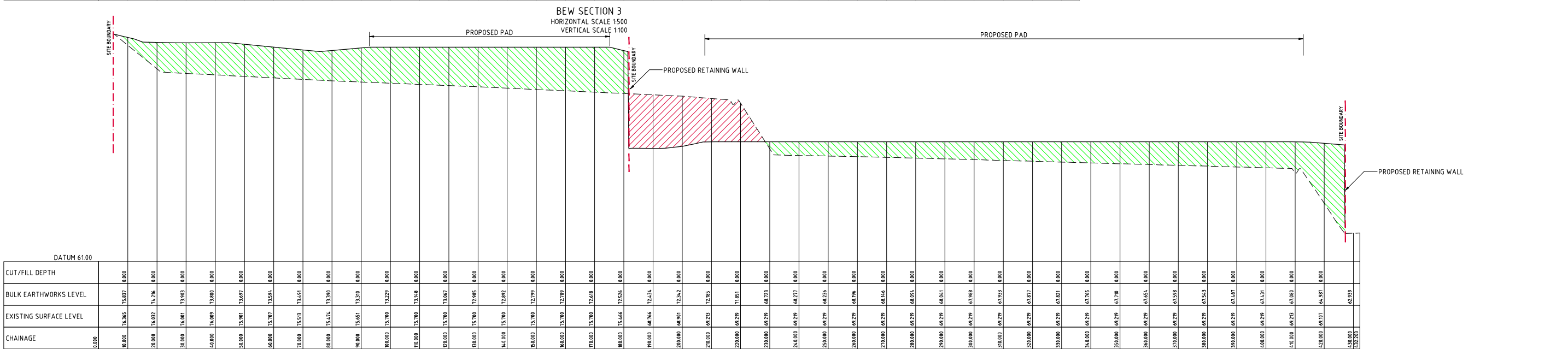
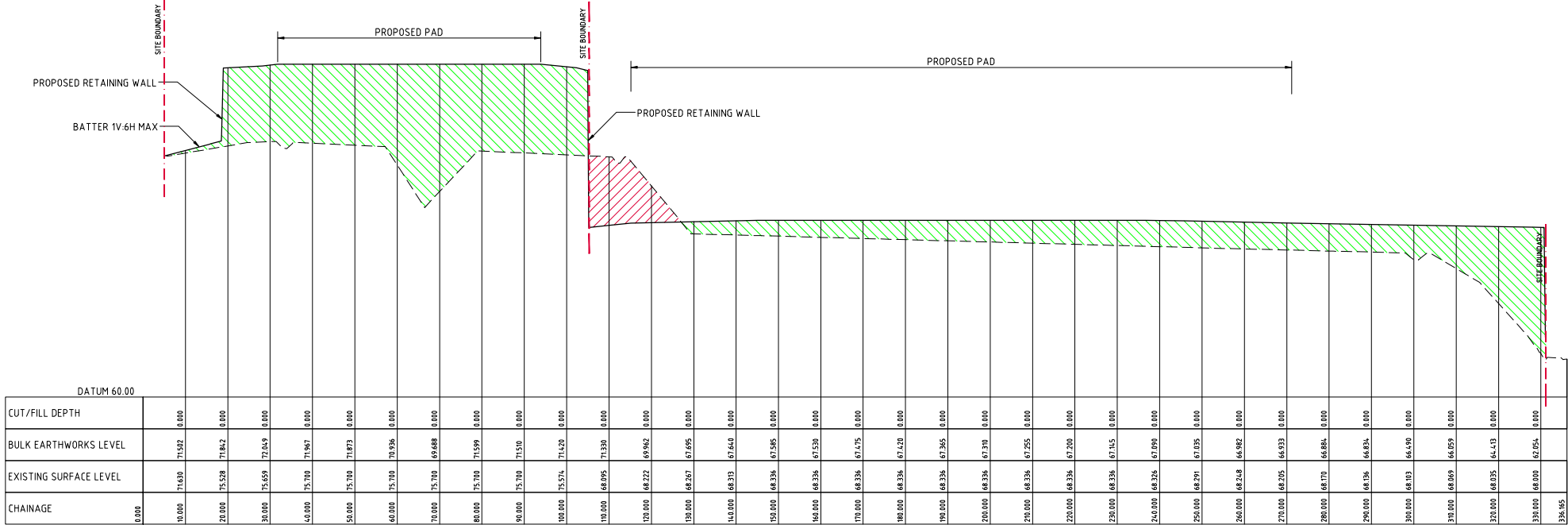
- DENOTES BULK EARTHWORKS SURFACE

- DENOTES EXISTING ESTATE SURFACE

- DENOTES PREDEVELOPED SURFACE

- DENOTES AREA IN CUT

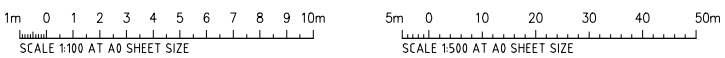
- DENOTES AREA IN FILL



BEW SECTION 1

HORIZONTAL SCALE 1:500

VERTICAL SCALE 1:100



FOR DEVELOPMENT APPLICATION

ISSUED FOR DEVELOPMENT APPLICATION

14.11.19

C

LOT 4 WORKS ADDED

27.09.19

B

ISSUED FOR INFORMATION

05.09.19

A

AMENDMENTS

ARCHITECT

CLIENT

PROJECT

LOT 3&4 EARLY WORKS

LOT 3&4, BRINGELLY ROAD BUSINESS HUB

HORNINGSEA PARK, NSW

DESIGNED

DATE

CHECKED

DATE

SIZE

SCALE

AS SHOWN

CAD REF:

C011994.07-EW35

COSTIN ROE CONSULTING PTY LTD.

Consulting Engineers

Level 1, 8 Macquarie Street

Wahroonga, Sydney NSW 2000

Tel: (02) 8551-7889 Fax: (02) 8541-3721

email: mail@costinroe.com.au

PRECISION

COMMUNICATION

ACCOUNTABILITY

DRAWING TITLE

BULK EARTHWORKS SECTIONS

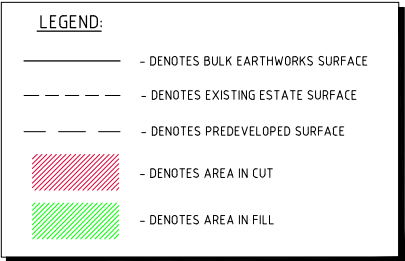
SHEET 1

DRAWING NO.

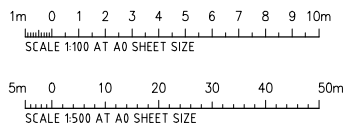
C011994.07-EW35

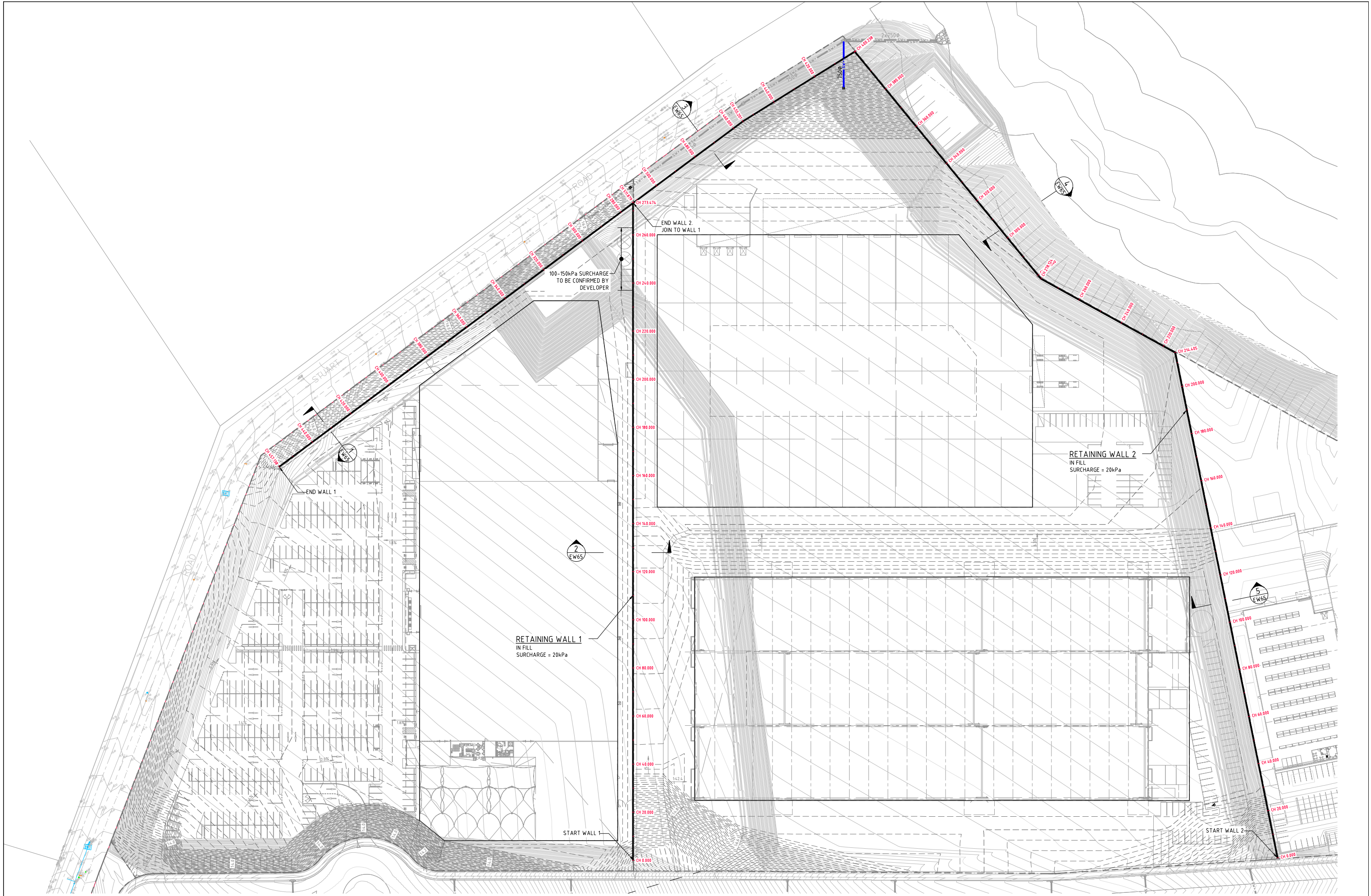
TABLE

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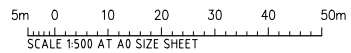
BEW SECTION 7
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100



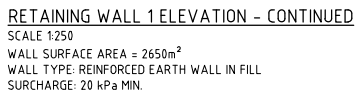
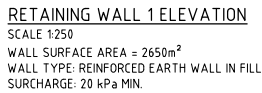


RETAINING WALL PLAN
SCALE 1:500

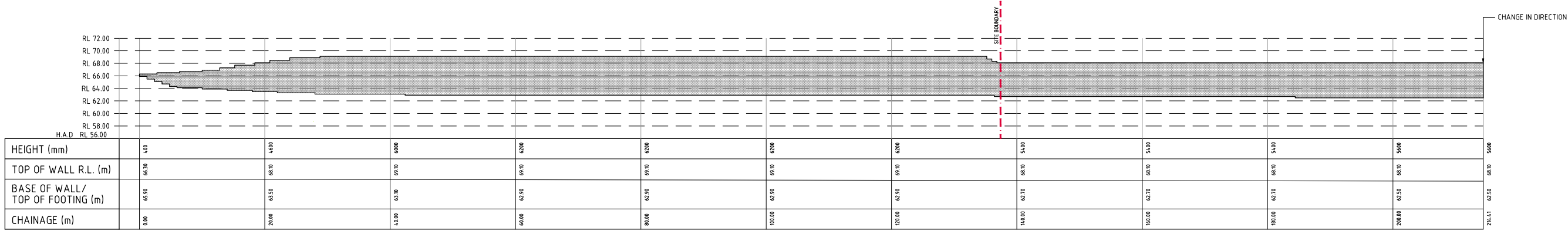
FOR DEVELOPMENT APPLICATION



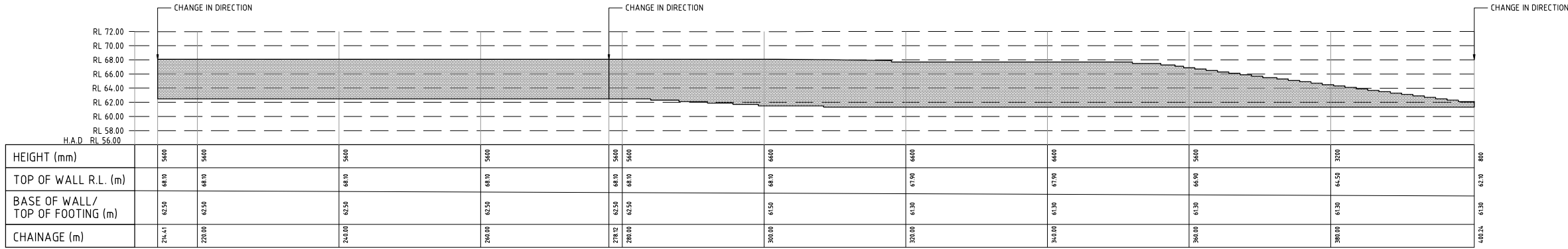
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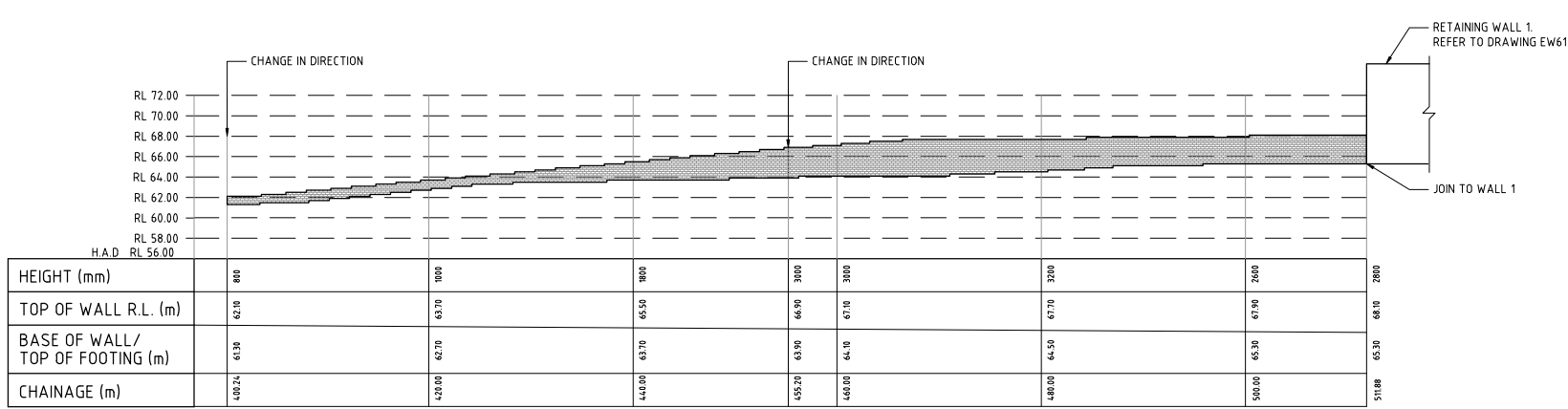
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RETAINING WALL 2 ELEVATION
SCALE 1:250
WALL SURFACE AREA = 2450m²
WALL TYPE: REINFORCED EARTH WALL IN FILL
SURCHARGE: 20 kPa MIN.

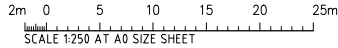


RETAINING WALL 2 ELEVATION - CONTINUED
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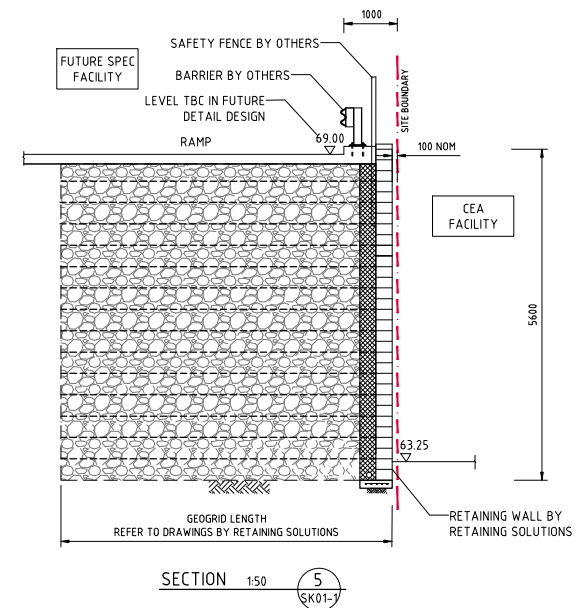
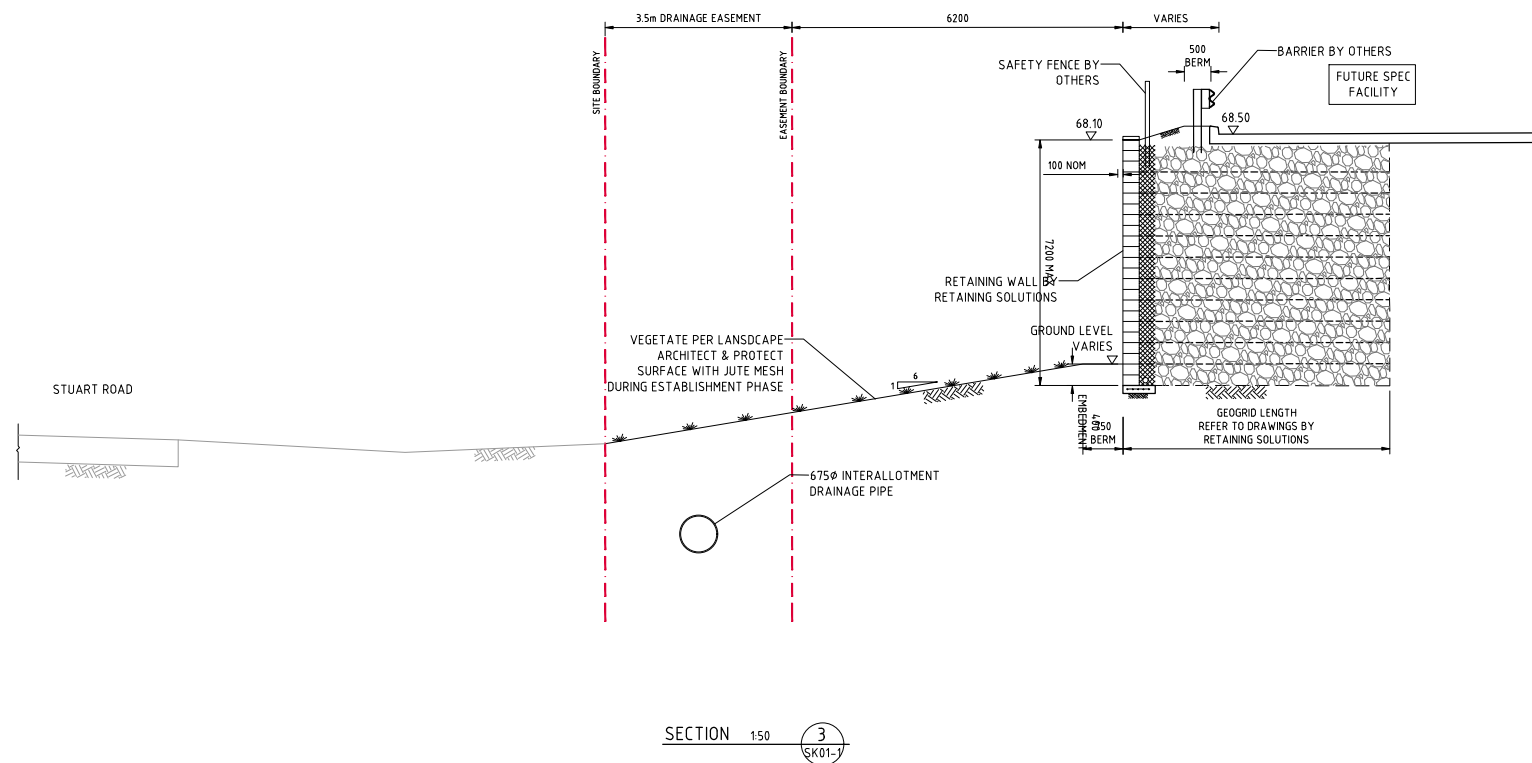
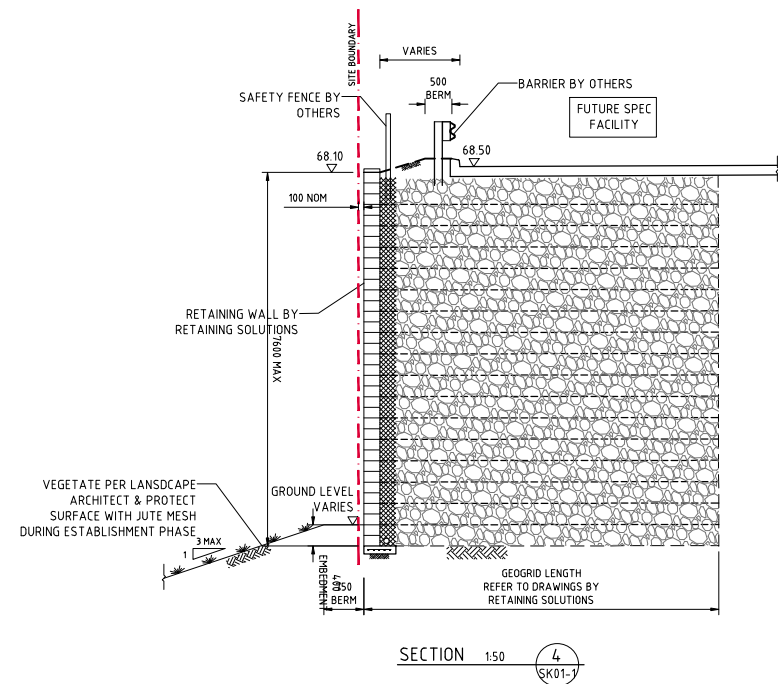
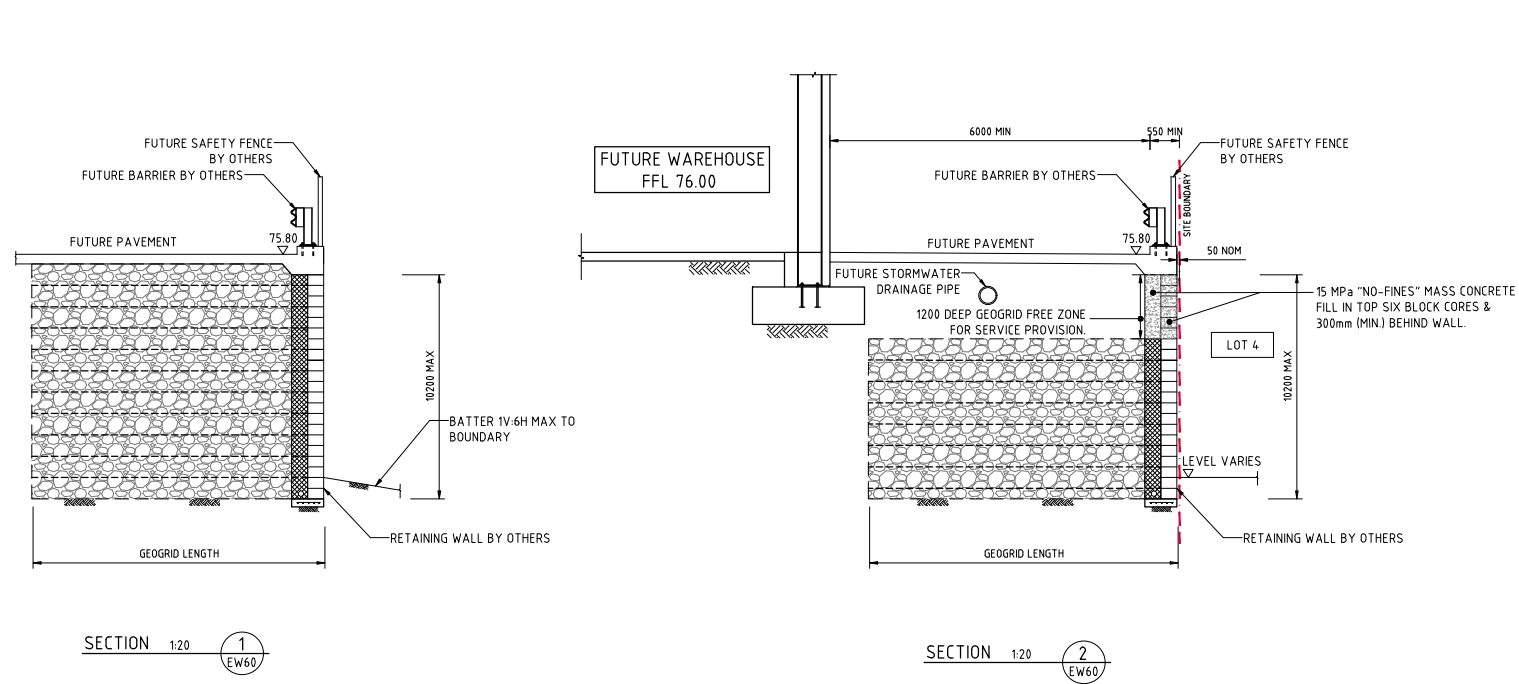


RETAINING WALL 2 ELEVATION - CONTINUED
SCALE 1:250
WALL SURFACE AREA = 2450m²
WALL TYPE: REINFORCED EARTH WALL IN FILL
SURCHARGE: 20 kPa MIN.

FOR DEVELOPMENT APPLICATION



ISSUED FOR DEVELOPMENT APPLICATION			14.11.19			C			ARCHITECT			CLIENT			PROJECT			Costin Roe Consulting Pty Ltd.			DRAWING TITLE		
REVISED AS CLOUDED			05.11.19			B									LOT 3&4 EARLY WORKS			Consulting Engineers			RETAINING WALL ELEVATIONS		
ISSUED FOR INFORMATION			27.09.19			A									LOT 3&4, BRINGELLY ROAD BUSINESS HUB			Level 1, 8 Widdowall Street			SHEET 2		
AMENDMENTS			DATE			ISSUE			AMENDMENTS			DATE			ISSUE			PRECISION COMMUNICATION ACCOUNTABILITY			DRAWING No		
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FOR DEVELOPMENT APPLICATION

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