Erosion and Sediment Control Plan - Ryman Village, Park Terrace

For Resource Consent

Prepared for Ryman Healthcare Ltd
Prepared by Beca Limited

26 February 2020

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Contents

1 Introduction 1

1.1 Site description 1

1.2 Receiving Environment 2

2 Development Description 3

3 Principles of Erosion and Sediment Control 4

4 General Erosion and Sediment Control Methods 5

4.1 General measures 5

4.2 Minor amendments 6

4.3 Decommissioning 6

5 Specific Erosion and Sediment Control Measures 7

5.1 Silt fences 7

5.2 Stabilised entranceway/s 7

5.3 Dirty water and clean water bunds / channels 8

5.4 Retention and Dewatering 8

5.5 Sediment Retention Ponds (SRP) and Decanting Earth Bunds (DEB) 9

5.6 Stormwater inlet protection 9

6 Monitoring and maintenance 10

6.1 Routine monitoring and maintenance 10

Appendices

Appendix A – Erosion and Sediment Control Plan Mark-up

Appendix B – Preliminary Basement Design

Appendix C – Example Dewatering Container

Revision History

Revision Nº	Prepared By	Description	Date
1	**Curtis Blyth**	Final for resource consent	28.02.20

Document Acceptance

Action	Name	Signed	Date
Prepared by	**Curtis Blyth**		28.02.20
Reviewed by	**Mhairi Rademaker**		28.02.20
Approved by	**Blaise Cummins**		28.02.20
on behalf of	Beca Limited		

1 Introduction

Beca Limited (Beca) has been engaged by Ryman Healthcare Limited (Ryman) to prepare an Erosion and Sediment Control Plan (ESCP). This ESCP describes the controls to be implemented for earthworks associated with the development of the Ryman Healthcare Park Terrace Retirement Village, Park Terrace, Christchurch. This plan has been prepared to support resource consent application to undertake land disturbance activities at the site.

The purpose of this ESCP is to outline the methods and practices to be implemented by Ryman Contractors onsite. Correct design and implementation will mitigate and minimise any potential effects of erosion, sediment generation, and sediment yield on the Ōtākaro (Avon) River and the stormwater network running from the site.

This ESCP will:

- Describe the project and the existing environment;
- Outline construction activities which avoid, remedy, or mitigate the effects of soil erosion and sediment discharge to Ōtākaro River;
- Outline the erosion and sediment control design philosophy and practices to be implemented;
- Detail procedures for the installation and decommissioning of erosion and sediment control measures;
- Identify erosion and sediment control monitoring and maintenance requirements;
- Identify roles and responsibilities in relation to this ESCP; and,
- Detail procedures for reviews and updates to this ESCP.

This plan has been prepared with reference to Environment Canterbury's Erosion and Sediment Control Toolbox for Canterbury (hereon referred to as the 'ECan Guidelines')

It is envisioned that this ESCP will be updated, or a new ESCP is prepared, after consent is granted, which will factor in Detailed Design and Construction Staging prepared by Ryman Healthcare.

1.1 Site description

The Park Terrace Retirement Village consists of two sites accessible off Park Terrace or Salisbury Street (**Figure 1**). Site 1, the larger or the two sites, is a ~1.3 ha site between Dorset St and Salisbury Street and currently holds the existing Bishopspark Retirement Village, which is being demolished. Site 2 is a ~0.5 ha site between Salisbury Street and Peterborough Street, which is currently a vacant gravelled lot with demolition of existing buildings already completed. Prior to construction commencing, both sites will have all existing structures demolished, except the historic Chapel situated within Site 1.

Both sites are flat and will largely consist of gravel-hardfilled surfaces following demolition of the existing buildings, with any overland stormwater flow across the sites being directed to stormwater infrastructure to discharge to Ōtākaro River. The primary stormwater lines running from the sites include beneath Dorset Street (Site 1 only) and Salisbury Street (Site 1 and Site 2).

Figure 1: Approximate extent of Park Terrace Retirement Village development, Site 1 and Site 2.
(*Source: Canterbury Maps Viewer*)

1.2 Receiving Environment

The site's stormwater will discharge to Ōtākaro River, which meanders through central Christchurch for approximately 16km before discharging to Avon Heathcote Estuary and the Pacific Ocean. Land Air Water Aotearoa describe the water quality of Ōtākaro River to be below average compared to other sites for nutrients and E.coli, but in the top 25% with respect to turbidity. Maintaining a high quality of water discharge from the site with minimal sediment concentration is therefore important to minimise any potential effect of the site's discharge on downstream receptors within the Ōtākaro River and Avon Heathcote Estuary.

2 Development Description

Development of the site is likely to be staged, allowing for the progressive completion (and stabilisation) of the project site with metal or concrete. Factoring in the areas to be stabilised during construction will benefit the site in minimising erosion and potential sediment discharge. Staging of construction will allow ESC measures to be catered to the appropriate size and treat areas that have exposed soil.

Final staging and programming of works will be provided by Ryman Contractors after resource consenting. This staging and programming may influence the ESC methods outlined in this plan and a revision to this plan may be required once staging is confirmed.

Initial enabling works include any vegetation removal, demolition of existing buildings, construction of the site office, salesroom and carparking areas, and the installation of erosion and sediment controls.

Both sites previously contained buildings and associated impervious surfaces (footpaths, driveways, etc.) with demolition of Site 1 still underway. Earthworks associated with the new development comprises the excavation of a basement within each site. Following site clearance, both sites will be largely covered in hardfill gravel to act as the working platform for machinery and are therefore predominantly stabilised from erosion.

Pile methodology is yet to be confirmed but will likely involve the operation at the current ground surface (pre-excavation). Basement excavation will then involve the excavation of material and placement in trucks for removal from site. It is likely temporary stockpiles will be required to allow the loading of material onto trucks for ease of removal from site.

Given the proposed basement excavation methodology and likely minimal exposed surfaces subject to erosion, Ryman currently plan to continue works over the winter months and will discuss this with ECan Compliance Officers visiting site. Prior approval may be required with ECan for the months of operation between May – October (winter works approval). Additional management and maintenance of ESC devices over this time will be required.

The final ESC methodology will take into consideration any staging and subsequent progressive stabilisation, as discussed in the sections below.

3 Principles of Erosion and Sediment Control

The key principles to be employed in an erosion and sediment control plan are to undertake land disturbing activities in a manner that reduces the potential for erosion of bare soils to occur (erosion control) and to employ devices to treat sediment laden water prior to discharge from the site (sediment control). The twelve basic principles of erosion and sediment control outlined in Environment Canterbury's Erosion and Sediment Control Toolbox ('ECan Guidelines') will be applied to the development (as appropriate):

- **Minimise disturbance:** Only work those areas required for construction to take place.
- **Stage construction:** Carefully plan works to minimise the area of disturbance at any one time.
- **Protect steep slopes:** Protect steep slopes from erosion.
  - No steep slopes exist in this site
- **Protect watercourses:** Map all water bodies before works commence and ensure clean water diversions are protected and maintained.
  - Discharge from the site is to the stormwater network, which then discharges to Ōtākaro River.
- **Stabilise exposed areas rapidly:** Methods range from sowing grass to mulching or temporary methods such as polymer application and geotextiles
  - The construction of buildings and importation of hardfill will allow the majority of the site to be stabilised progressively.
- **Consider the weather:** Checking weather forecasts allows works to be planned and allows planning of additional controls or temporary stabilisation.
- **Install perimeter controls:** Divert clean water away from areas of disturbance and divert runoff from areas disturbed to sediment control measures.
- **Employ detention devices:** Treat runoff by methods that allow sediment to settle out.
- **Mix and match your tools:** Addressing erosion and sediment control using multiple methods will allow for the most effective retention.
- **Make sure the ESCP evolves**: As construction progresses and the nature of land disturbing activities change, the ESCP needs to be modified to reflect the changing conditions on the site.
- **Inspect and maintain:** Inspect, monitor, and maintain control measures.
- **Train and develop:** Undertake training exercises onsite to increase awareness and quality of ESC methods and devices.

4 General Erosion and Sediment Control Methods

All erosion and sediment control measures will be designed, constructed, and maintained in accordance with ECan Guidelines.

The following proposed measures are indicative of the types, location and design of measures required for the site. As the works progress, there may be a need to move, alter, or remove measures to allow effective and efficient management of sediment runoff. Any changes should be discussed with the ECan Compliance Officer prior to implementation and through the duration of earthworks.

Specific ESC measures relating to the construction methodology are outline in Section 5.

4.1 General measures

The general erosion and sediment control measures below (**Table 1** and **Table 2**) will be applied to all areas of construction as appropriate. Specific controls are discussed in the following section.

Table 1: Erosion control measures

Control	Description
Timing of works	• The Contractor shall endeavour to complete bulk earthworks during the summer season. Approvals may be required if wanting to work through winter, as agreed with ECan Compliance Officers through the duration of works.
Stabilised entrance	• Stabilised entrances reduce tracking of sediment onto public roads and will be installed at site access points in accordance to ECan Guidelines.
Clean water diversions	• Clean water diversions reduce the amount of upslope runoff entering the site and therefore minimise erosion and the volume of water requiring treatment. • Given the site's surrounding impervious surfaces, clean water diversions will be in the form of existing roadside kerbs or temporary asphalt bunds which will prevent ingress of cleanwater.
Progressive stabilisation	• Minimising open / un-stabilised areas reduces sources of erosion. It also reduces the source of dust nuisance. • Wherever possible, within two weeks of completion of any area of earthworks that area will be stabilised. • Stabilisation can include top-soiling, seeding / hydroseeding, polymer application, mulching or finishing with the designed hardfill surface. The most appropriate method will be chosen based on the weather, soil conditions and construction progress/design. • Areas should also be stabilised where they are not completed by the end of an earthworks season or where they will remain untouched for a significant period (unless otherwise agreed with ECan). • All material deposited in temporary stockpiles will be in areas specified by the contractor with temporary bunds in place. Stockpiles should be stabilised if they are to stay for the duration of works or over the winter months.
Site contouring	• Where possible, all areas of cut or fill will be worked so that they slope towards the retention area within the basement excavation.
Diversion bunds/channels	• Diversion channels may be used to direct runoff to retention areas in a controlled manner. Given the flat site and utilisation of the basement excavation as a retention area, bunds are unlikely required.

Control	Description
Dust control	• Dust will generally be controlled with water spray as required. Other dust control measures as outlined in the MfE Dust Management Guidelines will be used as appropriate. Use of polymer application will also be considered.

Table 2: Sediment control measures

Control	Description
Sediment retention ponds	• No Sediment retention ponds (SRP) are included in the initial ESCP for both sites, however, should an SRP be required, it will be designed in accordance with ECan Guidelines to primarily act as a dewatering treatment device.
Decanting earth bunds	• Decanting earth bunds (DEBs) are not proposed for this site. • Progression of construction through site may create isolated areas of earthworks that require a DEB to be constructed. Should any DEB be required they will be designed in accordance with ECan Guidelines.
Silt fences / super silt fences	• Silt fences will be used where necessary to provide sediment treatment where runoff is not directed to sediment retention areas. • Design will be in accordance with ECan Guidelines.
Dewatering treatment	• Dewatering treatment will be required to allow the discharge or stormwater and groundwater from the basement excavations. This dewatering system will treat sediment laden water to allow active pumping and discharge of all water from site to the stormwater system.
Chemical flocculation	• Chemical flocculation may be required within the dewatering containers should clarity of discharge be discoloured. Due to the use of dewatering containers, any flocculation will require close management, likely provided in a Flocculation Management Plan following establishment onsite. • Any SRP constructed throughout the duration of the project will likely require flocculation.

4.2 Minor amendments

Minor amendments are those that will not materially change the manner in which works are undertaken or the way in which outcomes are achieved and do not require agreement with ECan. These include:

- Repositioning or implementing silt fences and super silt fences;
- Installation of diversion bunds, check dams and inlet protection; and,
- Mulching, top soiling, and stabilisation.

Changes to sediment retention devices and earthwork staging will be discussed with ECan on a regular basis through the project.

4.3 Decommissioning

No erosion and sediment control measures will be removed until the contributing catchment is stabilised or an alternative measure is installed. Stabilisation is defined as inherently resistant to erosion or rendered resistant, such as by the application of clean basecourse, colluvium, grassing, mulch, or other methods as agreed with ECan. The surface is considered stabilised once an 80% vegetative cover has been established where stabilisation is obtained from seeding.

5 Specific Erosion and Sediment Control Measures

This section should be read in conjunction with the ESC Plan provided in Appendix A.

The strategy of ESC within these two project sites incorporates the use of their largely impervious surroundings, flat gradient and basement excavations.

Both sites have large basement excavations (**Appendix B**) taking up the majority of their respective footprints. These excavations, relative to each site's catchment size, far exceed the volume requirement of any sediment retention pond that could be built. Constructing an SRP within each site is also impractical given the site's flat gradient, location in an urban environment, largely impervious surfaces and basement excavation extent offering no available area for construction. Each basement acting as a stormwater retention area will require a dewatering process, as detailed below.

The current state of each site consists of buildings currently being demolished or a largely stabilised surface of metalled hardfill. This hardfill will minimise the erosion potential of each site, therefore mitigating potential sediment runoff and the requirement for sediment treatment. In conjunction with this stabilised surface, the gradient of each site is flat, further minimising the erosion potential and sediment runoff likelihood. It is acknowledged that the basement excavations will minimise this impervious surface, however the working platforms surrounding the excavations will remain largely stabilised.

The ESC measures detailed in this section will be located where they serve the largest practicable catchments and can remain as long as possible (to avoid having to relocate controls). These positions, however, are dependent on the contractor's methodology and the staging of works within the site, which may be subject to change through the project's duration.

5.1 Silt fences

A silt fence will be required surrounding both sites, where practical, which will act as a treatment device for any sheet flow off the flat surfaces. Little stormwater flow is anticipated towards the silt fences, with the basement areas likely drawing stormwater towards them. Any discharge through the silt fences will discharge to neighbouring properties or the road network's stormwater network (which will have additional protection measures in place).

Silt fences may be required when areas become isolated through development and the ability to direct flows to the retention area is impractical. These areas will be addressed on a case by case basis.

5.2 Stabilised entranceway/s

Stabilised entranceways will be constructed at all access points to the sites, namely Dorset Street and Park Terrace for Site 1, and Peterborough Street for Site 2.

These stabilised accessways will be, at a minimum, 10m long, 4m wide and constructed using 50mm aggregate to a depth of 150mm over a filter cloth base. The aggregate should be topped up or replaced as necessary. Alternative hardfill use will be discussed with ECan as required.

A wheel wash or other means to clean soil residue off trucks exiting the site (e.g. water blasting) may be required. Should a wheel wash or other means of cleaning wheels be implemented, it will be positioned in a location where the wash can be retained and settled onsite.

Any additional entrances, if developed, will also be stabilised in accordance with the guideline specifications above.

5.3 Dirty water and clean water bunds / channels

The perimeter of each site will contain a silt fence where one can be practically constructed. It some areas the ground surface may be impervious and impede the ability to construct a silt fence. In this case, a bund or cut off drain will be formed to prevent potential dirty water flow offsite and direct flow back to the retention excavations or a silt fence.

Due to the flat nature of the site, it is expected that dirty water channels will be required to direct standing water to the retention (basement) excavations or to another isolated retention area to allow the controlled dewatering from the site. These internal channels will be constructed and located as required depending on the staging of works or any temporary standing water observed following rainfall.

In some cases, localised bunds on impervious surfaces may be in the form of asphalt to direct dirty water or clean water accordingly. It is likely these asphalt perimeter bunds will be constructed in the early stages of the project given the flat nature of the site and inability in some areas to predict where stormwater flow may be directed until observations can be made in the first rainfall events.

5.4 Retention and Dewatering

The retention of stormwater within both sites is provided by the basement excavations. These excavations far exceed the design criteria for stormwater retention capacity of a SRP relative to their respective catchment sizes and are therefore seen as an appropriate means of retaining stormwater. It is acknowledged that while the excavations provide the retention capacity, they are lacking the ability to treat sediment laden water. Each retention area will therefore rely on a dewatering treatment process to enable the near-constant pumping of water from the excavation to the stormwater network.

Groundwater intrusion is also expected within the basement excavations past a certain depth (~1.3m below ground level provided in Tonkin and Taylor Geotechnical Report).

Discussion with Christchurch City Council (CCC) has been had regarding the discharge of water to the nearby stormwater network. CCC agreed to the discharge to the network provided the pipe capacities are sufficient, the quality of the discharge is managed and that no nuisance flooding of the nearby public roads occurs. It was also highlighted that the Ōtākaro River during flood may cause higher levels within the stormwater network which may restrict the capacity of dewatering. Tonkin and Taylor Ltd's hydrogeological analysis has calculated that a constant dewatering rate of between 12 – 50 L/s may be required in the first two weeks of excavation, minimising to 3 – 17 L/s after three months. The nearby stormwater infrastructure was being assessed at the time of preparing this report to confirm the maximum discharge capability from each site to their respective network discharge points.

Dewatering treatment will process both groundwater and surface water entering the excavation. Dewatering treatment will involve pumping water through a lamella clarifier or dewatering sea containers. Ryman Contractors have experience with a similar dewatering process on their previous sites, utilising two 20ft sea containers with decants which allowed the dewatering and discharge from their site. A schematic is provided in **Appendix C** providing an example of a container dewatering system. Any dewatering system involving the use of containers will contain decant uprisers, can contain multiple geotextile baffles and can have as many containers connected in unison as required to provide effective treatment. Similarly, the use of a lamella clarifier will provide effective treatment of any water requiring pumping from the excavation.

Each basement excavation will contain a low point and have a pumping eye installed to act as the point of dewatering. A pumping eye will be a perforated cylindrical casing (e.g. ~300mm boss pipe) surrounded in aggregate to allow a dewatering hose to be suspended inside. This pumping eye will allow the complete dewatering of each basement to prevent ponding of water and restrictions on working space in the basement.

Water clarity management from any dewatering system installed will be crucial to allowing the maximum volume of water possible to be discharged as required. It is advised that Ryman Contractors engage a dewatering specialist to provide recommendations on the dewatering device to be installed, and any flocculation requirements that this device may have. It is anticipated that any device will require a trial period to assess the clarity of discharge during its initial set up. This assessment of discharge clarity will then be required on a daily basis to ensure acceptable levels of clarity are maintained.

An automated or manual flocculant dosing process may be required to provide a flocculant dose specific to the volume of water requiring treatment. Given the current variabilities in this system, including: changing geology with depth, unknown groundwater discharge rate, changing stormwater volume (per rainfall event) and unknown dewatering system; this detail will need to be provided in the form of a Flocculation Management Plan (or Dewatering Plan) following the establishment and assessment of the dewatering device onsite as mentioned above. It may be shown that the dewatering device chosen is effective in treating sediment laden discharge and no flocculation is required at all.

5.5 Sediment Retention Ponds (SRP) and Decanting Earth Bunds (DEB)

No SRPs or DEBs are proposed for this project.

There may be the requirement to construct smaller retention treatment devices during the project if any isolated catchments are created through the development of the site which cannot be contained in the basement excavation or treated with another device (e.g. silt fence). If required, any SRP or DEB constructed will be designed to ECan Guidelines, have a 2% retention capacity and can incorporate chemical flocculation.

Design relating to any SRP or DEB that may be required throughout the project can be provided through a revision of the ESCP. If an SRP or DEB is constructed, a Flocculation Management Plan (FMP) may be required to be produced during the development to inform chemical dosing requirements and management.

5.6 Stormwater inlet protection

Stormwater inlet protection will be required on all streets or neighbouring properties given the surrounding urban environment and impervious surfaces. Inlet protection is seen as the last method of treatment for any potential dirty water discharge leaving the site. Any protection installed will be in accordance with ECan Guidelines and incorporate the use of silt socks, sandbags or cesspit catch-bags to offer silt entrapment.

Any stormwater inlet protection installed will be monitored on a weekly basis, with any silt build up removed and general wear and tear of material repaired or replaced as required.

6 Monitoring and maintenance

6.1 Routine monitoring and maintenance

All maintenance of erosion and sediment controls will be undertaken in accordance with ECan Guidelines including, at a minimum, the activities outlined in **Table 4.**

Any flocculation requirement of the dewatering device will be monitored as outlined in the Flocculation Management Plan.

Table 4: Erosion and sediment control monitoring and maintenance requirements.

Control type	Inspection and maintenance requirements	Frequency
Weather forecast	• Check Metservice New Zealand or a private forecast provider for rainfall forecasts. • Action site stabilisation and rainfall preparation should weather forecast be severe.	Daily
Silt fences and super silt fences	• Check that silt fences are toed in correctly. • Check for tears and other damage and repair/replace any areas of collapse, decomposition or ineffectiveness immediately. • Remove sediment accumulation when bulges develop, or deposition reaches 20% of the silt fence height.	Weekly and before and after rainfall events
Stabilised entranceways	• Check sufficient clean aggregate cover exists and if any sediment is being tracked to public roads. • Replace or top-up aggregate as necessary. • Clean roads when necessary with a sweeper truck. • Utilise a wheel wash or other means of cleaning tyres if site conditions don't allow adequate runoff of soil accumulated in truck tyres.	Weekly
Stabilised areas	• Check sufficient stabilisation (grassed areas should be 80% cover). • Re-seed, mulch, top up aggregate or geotextile cover as necessary.	Weekly and after rainfall events
Dewatering system	• Check any pumping eye is not silted up and the hose inlet remains suspended and not sucking sediment from the base. • Clear sediment around pumping eye if required. • Check dewatering clarifier or containers on a weekly basis and remove sediment when effectiveness is shown to decrease. • A maintenance check of any device installed should be undertaken on a daily to weekly basis.	
Sediment discharge points	• Check the stormwater network discharge inlet for signs of degradation or sediment accumulation from dewatering. • Check the stormwater outlet to the Ōtākaro River for any signs of erosion or sediment accumulation. • Both discharge locations may require additional erosion control methods to be implemented given the additional volumes of water the project will be discharging to these locations, including; temporary geotextile or coir matting as agreed upon with ECan.	Weekly and before and after rainfall events

Control type	Inspection and maintenance requirements	Frequency
Flocculation	• As outlined in any Dewatering Management Plan or Flocculation Management Plan.	Ongoing management of dewatering

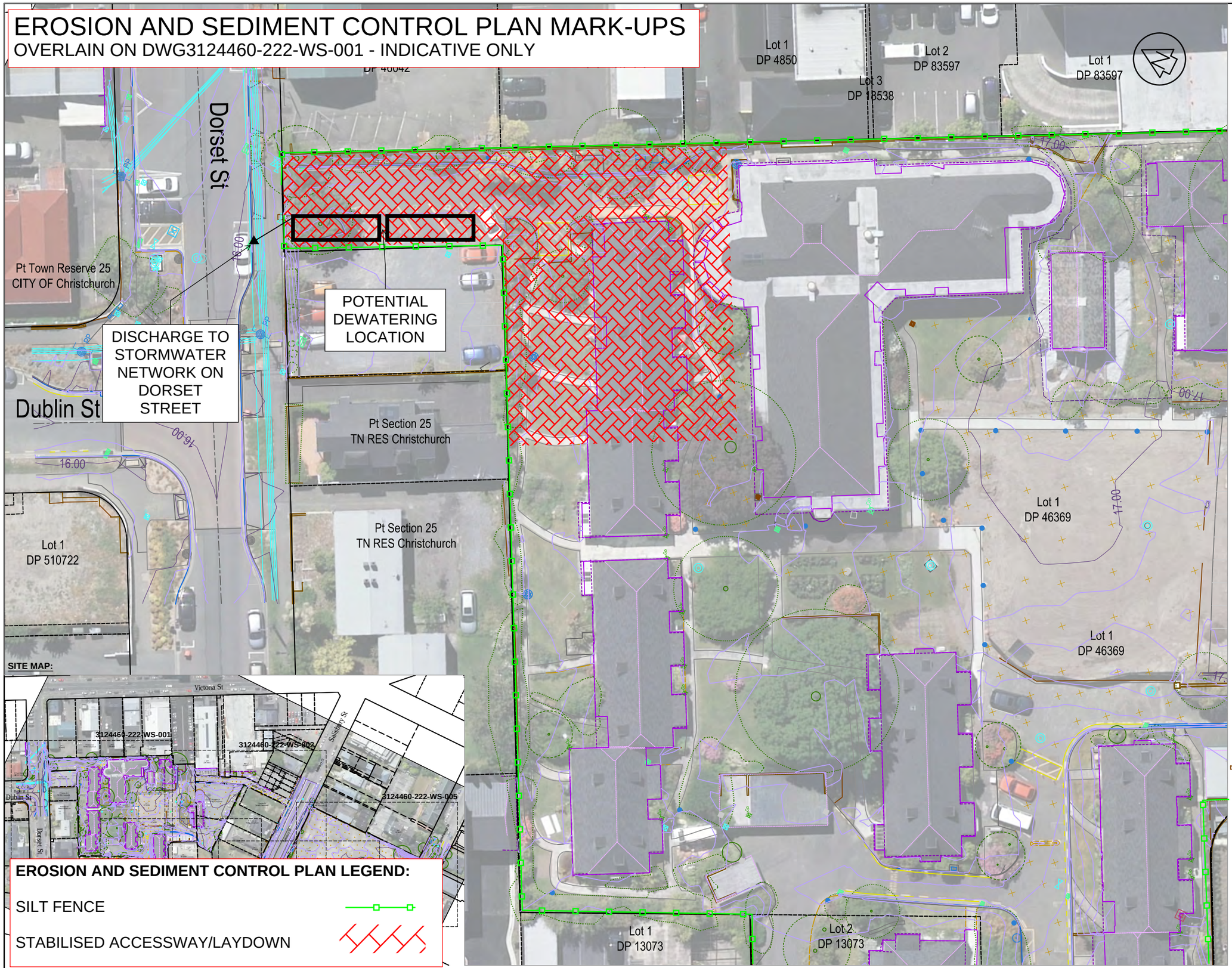
A

Appendix A – Erosion and Sediment Control Plan Mark-up

Drawing Plotted: 12 Sep 2019 12:46 PM

EROSION AND SEDIMENT CONTROL PLAN MARK-UPS

OVERLAIN ON DWG3124460-222-WS-001 - INDICATIVE ONLY



SITE MAP:

EROSION AND SEDIMENT CONTROL PLAN LEGEND:

SILT FENCE

STABILISED ACCESSWAY/LAYDOWN

NOTE:

1. COORDINATES ARE IN TERMS OF NZGD2000 MOUNT PLEASANT CIRCUIT. ORIGIN OF COORDINATES:

   EM41 (LINZ Geodetic Database 30/11/2018)
   806 980.736mN
   392 209.160mE

2. LEVELS ARE IN TERMS OF CDD. ORIGIN OF LEVELS:

   EM41 (LINZ geodetic database 14/01/2018 - converted to CDD)
   RL 15.700m

3. THE ABSOLUTE ACCURACY OF TOPOGRAPHOCAL DATA FOR THIS SURVEY IS ESTIMATED AT +/- 25 mm RELATIVE TO THE ORIGIN OF COORDINATES AND TO THE ORIGIN OF LEVELS.
4. THE ACCURACY OF ROOF LINES IS ESTIMATED AT +/- 100 mm.
5. CADASTRAL BOUNDARIES SHOWN ARE SOURCED FROM LINZ AND ARE APPROXIMATE ONLY. ESTIMATED ACCURACY IS +/- 100 mm. IF BOUNDARY LOCATION IS CRITICAL THEN FURTHER SURVEY WORK MAY BE REQUIRED.
6. THIS PLAN DOES NOT DEPICT INFORMATION RELATING TO ANY ENCUMBRANCES ASSOCIATED WITH THE PROPERTY. PLEASE REFER TO THE TITLE PLAN AND CERTIFICATE OF TITLE. AN INVESTIGATION OF THE MOST CURRENT RECORDS SHOULD BE UNDERTAKEN PRIOR TO DESIGN AND CONSTRUCTION COMMENCING.
7. INFORMATION DEPICTED ON THIS PLAN IS INSUFFICIENT FOR PRODUCING A BUILDING LOCATION CERTIFICATE OR HEIGHT TO BOUNDARY CALCULATIONS.
8. SPOT HEIGHTS AND CONTOURS SHOWN ARE FOR INFORMATION PURPOSE ONLY. REFER TO THE SUPPLIED DWG FOR THE CORRECT SURFACE MODEL.

LEGEND:

- BUILDING COLUMN
- BUILDING DECK
- BUILDING EAVE
- BUILDING FOOTPRINT
- BUILDING ROOF
- CONTOUR MINOR (0.1m)
- CONTOUR MAJOR (1.0m)
- FEATURE CONCRETE
- FEATURE FENCE
- FEATURE FURNITURE
- FEATURE HANDRAIL
- FEATURE PAVING STONES
- FEATURE PED CROSS PAD
- FEATURE SEAT
- FEATURE SIGN LINE
- FEATURE STEP
- FEATURE WALL BOTTOM
- FEATURE WALL TOP
- ROAD ARROW
- ROAD BACK OF KERB
- ROAD CENTRELINE
- ROAD EDGE OF METAL
- ROAD EDGE OF SEAL
- ROAD FOOTPATH
- ROAD GUTTER FLOW
- ROAD LIP OF CHANNEL
- ROAD LIP OF KERB
- ROAD PARKING LINES
- ROAD SYMBOL
- ROAD TEXT
- ROAD TOP OF KERB
- ROAD WHITE LINE
- ROAD WHITE LINE DASHED
- ROAD YELLOW LINE
- ROAD YELLOW LINE DASHED
- TOPO BREAKLINE
- UNKNOWN CABLE OVERHEAD
- VEG BUSH
- VEG DRIP LINE
- CADASTRAL BOUNDARY
- BUILDING EXCLUSION ZONE

- COMMS PLINTH
- ELECTRICAL LIGHT BOLLARD
- ELECTRICAL LIGHT POLE
- ELECTRICAL MARKER
- ELECTRICAL POWER BOX
- ELECTRICAL POWER POLE
- FEATURE GATE
- FEATURE BOLLARD
- FEATURE MARKER POST
- FEATURE POST
- FEATURE SIGN
- ROAD TRAFFIC LIGHT
- STORMWATER GRATE
- STORMWATER LID
- STORMWATER CESSPIT DOUBLE
- STORMWATER CESSPIT SINGLE
- TOPO SPOT HEIGHT
- UNKNOWN MANHOLE
- UNKNOWN PLINTH
- UNKNOWN VALVE
- UNKNOWN VENT
- UNKNOWN LID
- VEG TREE

ORIGINAL DRAWING IN COLOUR

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	BUILDING EXCLUSION ZONE ADDED	MW	AS	CH	12.09.19
A	INITIAL RELEAS	MW	AS	CH	03.05.19

Drawing Originator: Beca

Original Scale (A1) 1:200
Reduced Scale (A3) 1:100

Surveyed	MW	11.04.19	Approved For Issue*
Drawn	MW	03.05.19	
Survey Check	AS	03.05.19	
Dwg Approved	CH	03.05.19	Date

* Refer to Revision 1 for Original Signature

Client: RYMAN HEALTHCARE LTD

Project: PARK TERRACE

Title: TOPOGRAPHIC SURVEY

Discipline: SURVEY

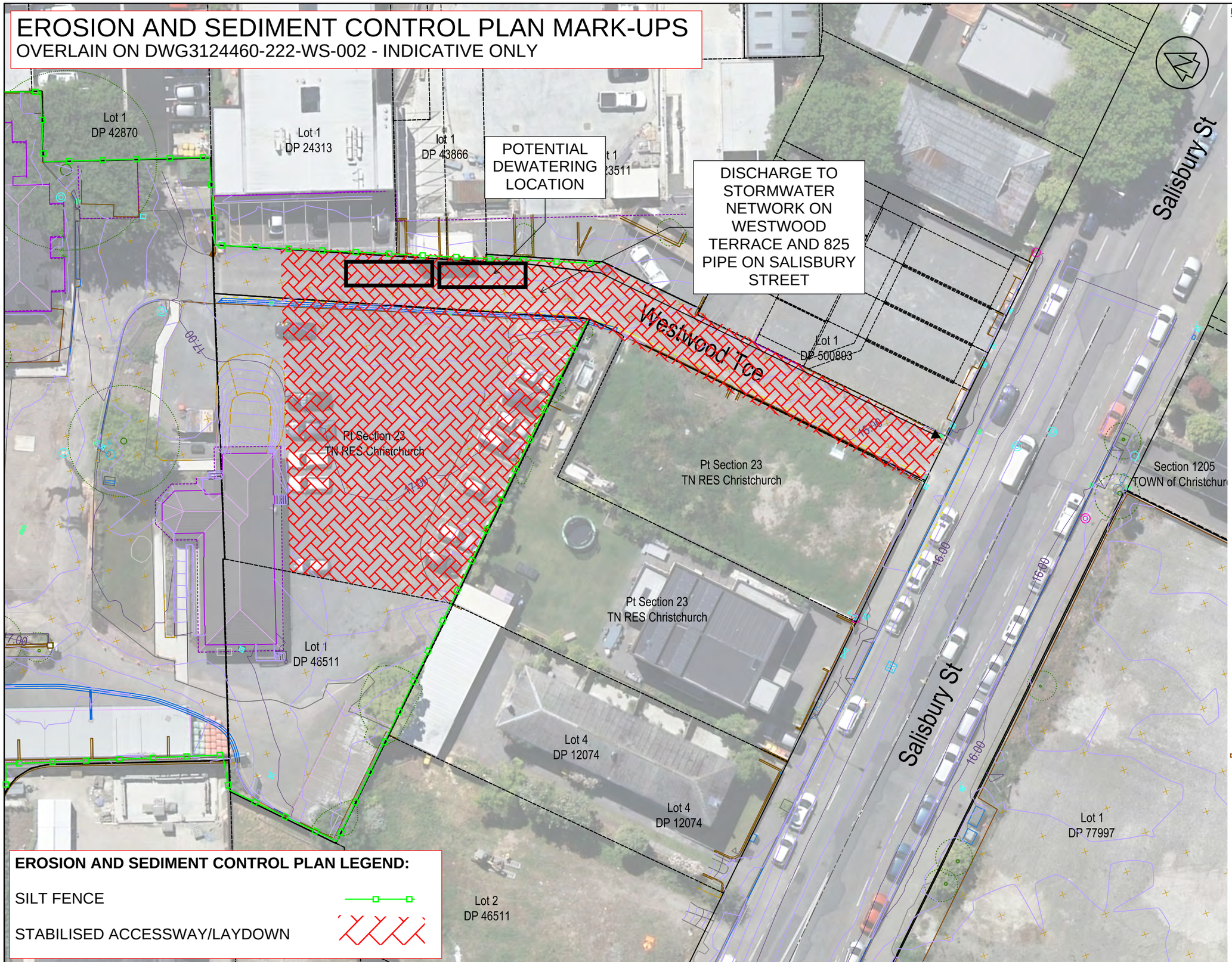
Drawing No.: 3124460-222-WS-001

Rev.: B

Drawing Plotted: 12 Sep 2019 12:46 PM

EROSION AND SEDIMENT CONTROL PLAN MARK-UPS

OVERLAIN ON DWG3124460-222-WS-002 - INDICATIVE ONLY



EROSION AND SEDIMENT CONTROL PLAN LEGEND:

SILT FENCE

STABILISED ACCESSWAY/LAYDOWN

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LEGEND:

- BUILDING COLUMN
- BUILDING DECK
- BUILDING EAVE
- BUILDING FOOTPRINT
- BUILDING ROOF
- CONTOUR MINOR (0.1m)
- CONTOUR MAJOR (1.0m)
- FEATURE CONCRETE
- FEATURE FENCE
- FEATURE FURNITURE
- FEATURE HANDRAIL
- FEATURE PAVING STONES
- FEATURE PED CROSS PAD
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- ROAD PARKING LINES
- ROAD SYMBOL
- ROAD TEXT
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- ROAD WHITE LINE
- ROAD WHITE LINE DASHED
- ROAD YELLOW LINE
- ROAD YELLOW LINE DASHED
- TOPO BREAKLINE
- UNKNOWN CABLE OVERHEAD
- VEG BUSH
- VEG DRIP LINE
- BUILDING EXCLUSION ZONE

- COMMS PLINTH
- ELECTRICAL LIGHT BOLLARD
- ELECTRICAL LIGHT POLE
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- TOPO SPOT HEIGHT
- UNKNOWN MANHOLE
- UNKNOWN PLINTH
- UNKNOWN VALVE
- UNKNOWN VENT
- UNKNOWN LID
- VEG TREE

ORIGINAL DRAWING IN COLOUR

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	BUILDING EXCLUSION ZONE ADDED	MW	AS	CH	12.09.19
A	INITIAL RELEAS	MW	AS	CH	03.05.19

Drawing Originator: Beca

Original Scale (A1) 1:200
Reduced Scale (A3) 1:100

Surveyed	MW	11.04.19	Approved For Issue*
Drawn	MW	03.05.19	
Survey Check	AS	03.05.19	
Dwg Approved	CH	03.05.19	Date

* Refer to Revision 1 for Original Signature

Client: RYMAN HEALTHCARE LTD

Project: PARK TERRACE

Title: TOPOGRAPHIC SURVEY

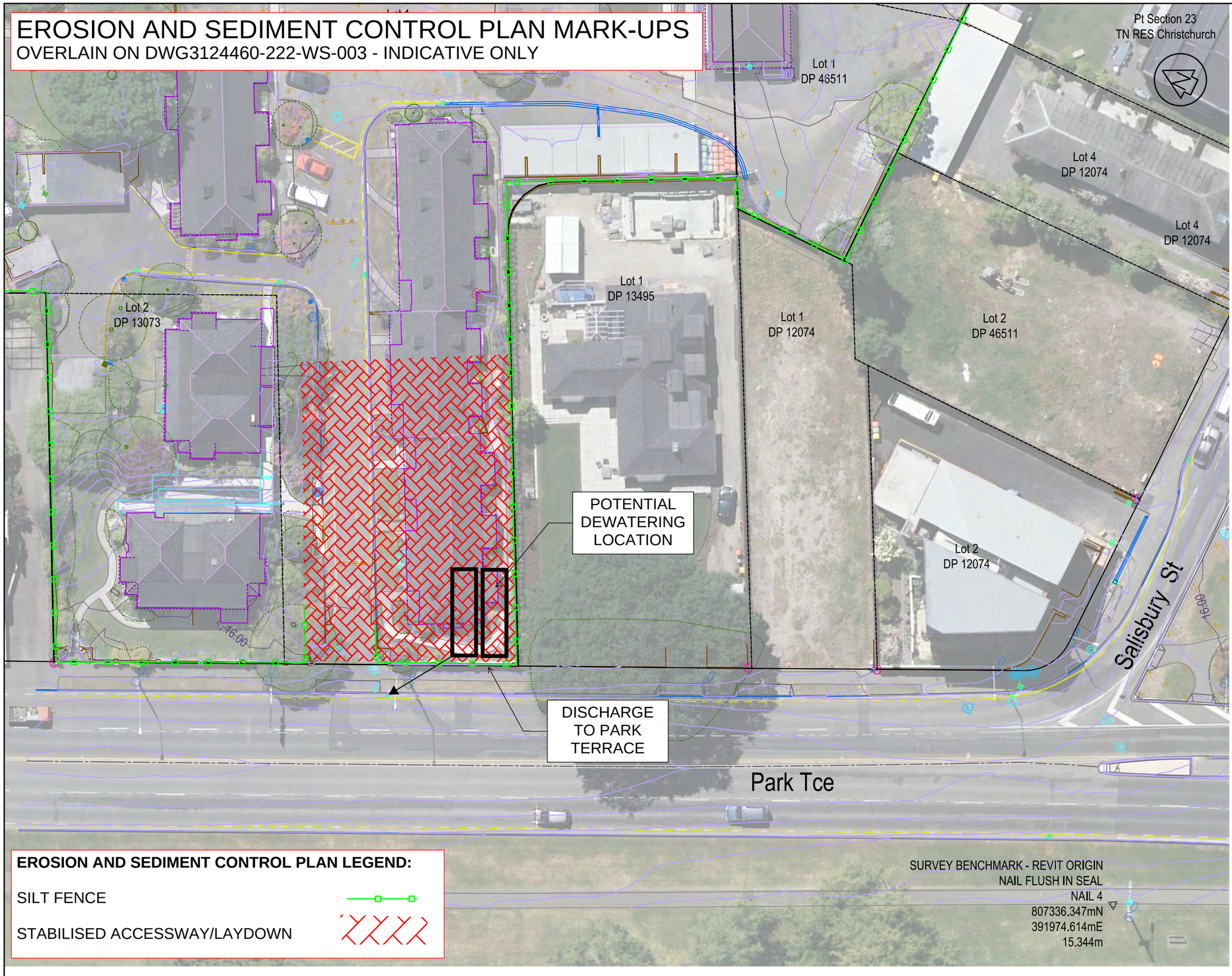
Discipline: SURVEY

Drawing No.: 3124460-222-WS-002

Rev.: B

Drawing Plotted: 12 Sep 2019 12:47 PM

EROSION AND SEDIMENT CONTROL PLAN MARK-UPS
OVERLAIN ON DWG3124460-222-WS-003 - INDICATIVE ONLY



EROSION AND SEDIMENT CONTROL PLAN LEGEND:

SILT FENCE

STABILISED ACCESSWAY/LAYDOWN

SURVEY BENCHMARK - REVIT ORIGIN
NAIL FLUSH IN SEAL
NAIL 4
807336.347mN
391974.614mE
15.344m

NOTE:

1. COORDINATES ARE IN TERMS OF NZGD2000 MOUNT PLEASANT CIRCUIT. ORIGIN OF COORDINATES:

   EM41 (LINZ Geodetic Database 30/11/2018)
   806 980.736mN
   392 209.160mE
2. LEVELS ARE IN TERMS OF CDD. ORIGIN OF LEVELS:

   EM41 (LINZ geodetic database 14/01/2018 - converted to CDD)
   RL 15.700m
3. THE ABSOLUTE ACCURACY OF TOPOGRAPHOCAL DATA FOR THIS SURVEY IS ESTIMATED AT +/- 25 mm RELATIVE TO THE ORIGIN OF COORDINATES AND TO THE ORIGIN OF LEVELS.
4. THE ACCURACY OF ROOF LINES IS ESTIMATED AT +/- 100 mm.
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ORIGINAL DRAWING IN COLOUR

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No.	Revision	By	Chk	Appd	Date
B	BUILDING EXCLUSION ZONE ADDED	MW	AS	CH	12.09.19
A	INITIAL RELEAS	MW	AS	CH	03.05.19

Drawing Originator: Beca

Original Scale (A1) 1:200
Reduced Scale (A3) 1:100

Surveyed	MW	11.04.19	Approved For Issue*
Drawn	MW	03.05.19	
Survey Check	AS	03.05.19	
Dwg Approved	CH	03.05.19	Date

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Client: RYMAN HEALTHCARE LTD

Project: PARK TERRACE

Title: TOPOGRAPHIC SURVEY

Discipline: SURVEY

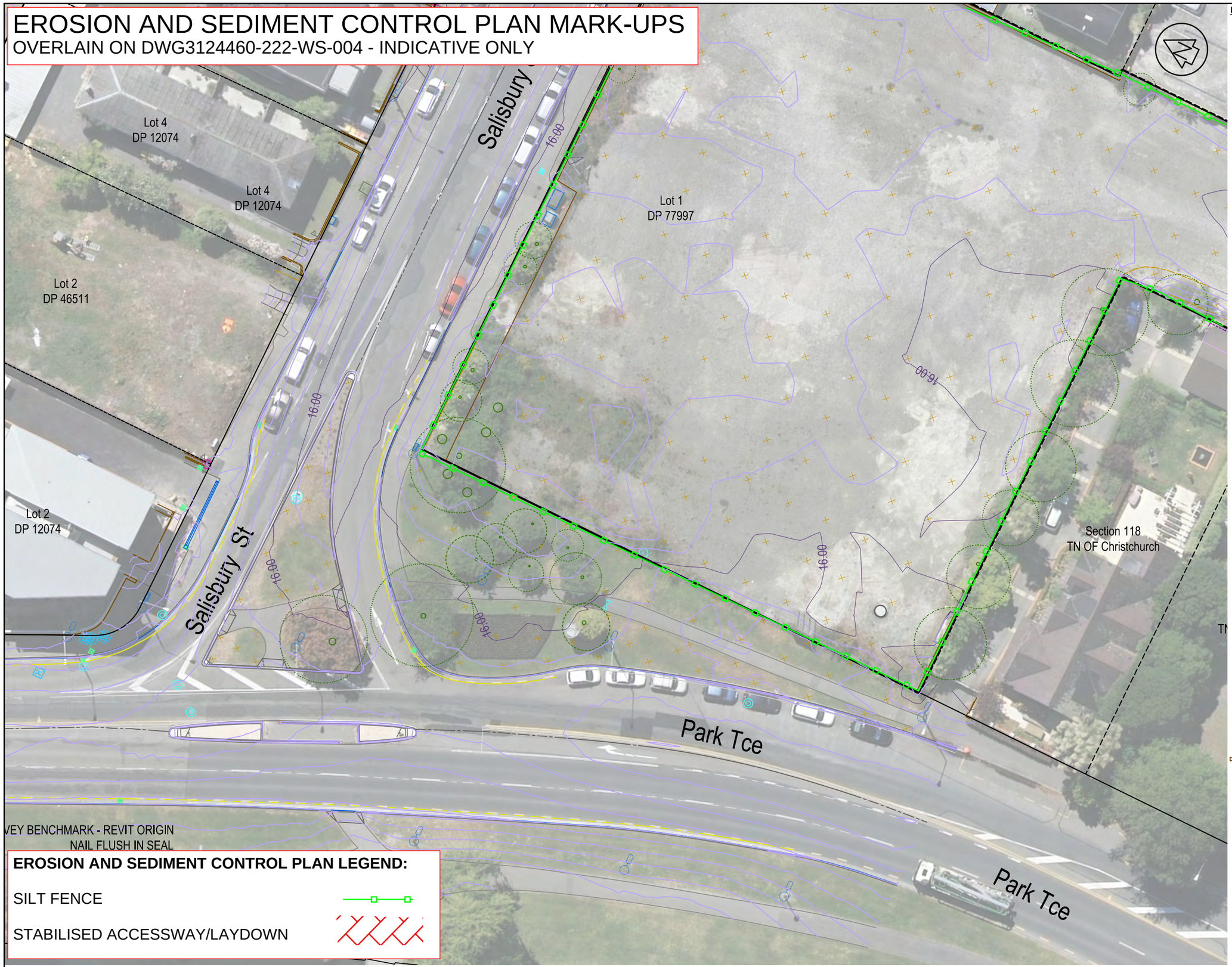
Drawing No.: 3124460-222-WS-003

Rev.: B

Drawing Plotted: 12 Sep 2019 12:47 PM

EROSION AND SEDIMENT CONTROL PLAN MARK-UPS

OVERLAIN ON DWG3124460-222-WS-004 - INDICATIVE ONLY



EROSION AND SEDIMENT CONTROL PLAN LEGEND:

SILT FENCE

STABILISED ACCESSWAY/LAYDOWN

NOTE:

1. COORDINATES ARE IN TERMS OF NZGD2000 MOUNT PLEASANT CIRCUIT. ORIGIN OF COORDINATES:

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   806 980.736mN
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PRELIMINARY
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No.	Revision	By	Chk	Appd	Date
B	BUILDING EXCLUSION ZONE ADDED	MW	AS	CH	12.09.19
A	INITIAL RELEAS	MW	AS	CH	03.05.19

Drawing Originator: Beca

Original Scale (A1) 1:200
Reduced Scale (A3) 1:100

Surveyed	MW	11.04.19	Approved For Issue*
Drawn	MW	03.05.19	
Survey Check	AS	03.05.19	
Dwg Approved	CH	03.05.19	Date

* Refer to Revision 1 for Original Signature

Client: RYMAN HEALTHCARE LTD

Project: PARK TERRACE

Title: TOPOGRAPHIC SURVEY

Discipline: SURVEY

Drawing No.: 3124460-222-WS-004

Rev.: B

Drawing Plotted: 12 Sep 2019 12:47 PM

EROSION AND SEDIMENT CONTROL PLAN MARK-UPS

OVERLAIN ON DWG3124460-222-WS-005 - INDICATIVE ONLY

Section 12
TOWN of Chris

POTENTIAL DEWATERING LOCATION

Lot 1
DP 77997

Lot 1
DP 74079

Peterborough St

POTENTIAL DEWATERING LOCATION

DISCHARGE TO PETERBOROUGH STREET

Section 118
TN OF Christchurch

Section 119
TN OF Christchurch

16.00

EROSION AND SEDIMENT CONTROL PLAN LEGEND:

SILT FENCE

STABILISED ACCESSWAY/LAYDOWN

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- UNKNOWN VENT
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- VEG TREE

ORIGINAL DRAWING IN COLOUR

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	BUILDING EXCLUSION ZONE ADDED	MW	AS	CH	12.09.19
A	INITIAL RELEAS	MW	AS	CH	03.05.19

Drawing Originator: Beca

Original Scale (A1) 1:200
Reduced Scale (A3) 1:100

Surveyed	MW	11.04.19	Approved For Issue*
Drawn	MW	03.05.19	
Survey Check	AS	03.05.19	
Dwg Approved	CH	03.05.19	Date

* Refer to Revision 1 for Original Signature

Client: RYMAN HEALTHCARE LTD

Project: PARK TERRACE

Title: TOPOGRAPHIC SURVEY

Discipline: SURVEY

Drawing No.: 3124460-222-WS-005

Rev.: B

B

Appendix B – Preliminary Basement Design

Revisions

A	25.10.19	RESOURCE CONSENT DRAFT
B	13.12.19	RESOURCE CONSENT

SERVICES 75 m²
EWC
WATER BOILER 32 m²
HWC
HWT
LOBBY 16 m²
PABX 12 m²
LIFT 7 m²
LOBBY 13 m²
RUBBISH 39 m²
2000
SET DOWN IN SLAB FOR TREE PITS
SET DOWN IN SLAB FOR TREE PITS
SET DOWN IN SLAB FOR TREE PITS
SET DOWN
LOBBY 19 m²
LIFT 7 m²
SERVICES 6 m²
STAIR 19 m²
STAIR 2 17 m²
LIFT 7 m²
SERVICES RISER 9 m²
LIFTS 14 m²
CRAFT 54 m²
LOBBY 107 m²
CORRIDOR 54 m²
WC 19 m²
LAUNDRY 77 m²
KITCHEN 160 m²
UP
STAIR 45 m²
WORKSHOP 47 m²
GENERATOR 48 m²
8000
6000
PUMP 29 m²
MSB RM 33 m²
LOBBY 25 m²
STAIRS 15 m²
LIFT 7 m²
GARDENER 46 m²
MAINTENANCE 45 m²
CHAPEL ABOVE
BINS 46 m²
SCOOTERS 79 m²
PLAT LIFT 7 m²
LOBBY 18 m²
LIFT 7 m²
HALF BASEMENT

0 LEVEL 0
A2-010 A1 sheet scale = 1 : 250

N
TRUE NORTH

Client
RYMAN HEALTHCARE

Warren and Mahoney Architects New Zealand Ltd
254 Montreal Street
PO Box 25086
Christchurch 8011
New Zealand
Phone + 64 3 961 5926

Registered Architects and Designers
www.warrenandmahoney.com

Project Title
PARK TERRACE
SITE 01
BISHOPSPARK

Drawing Title
VILLAGE CENTRE B01
FLOOR PLAN LEVEL 0

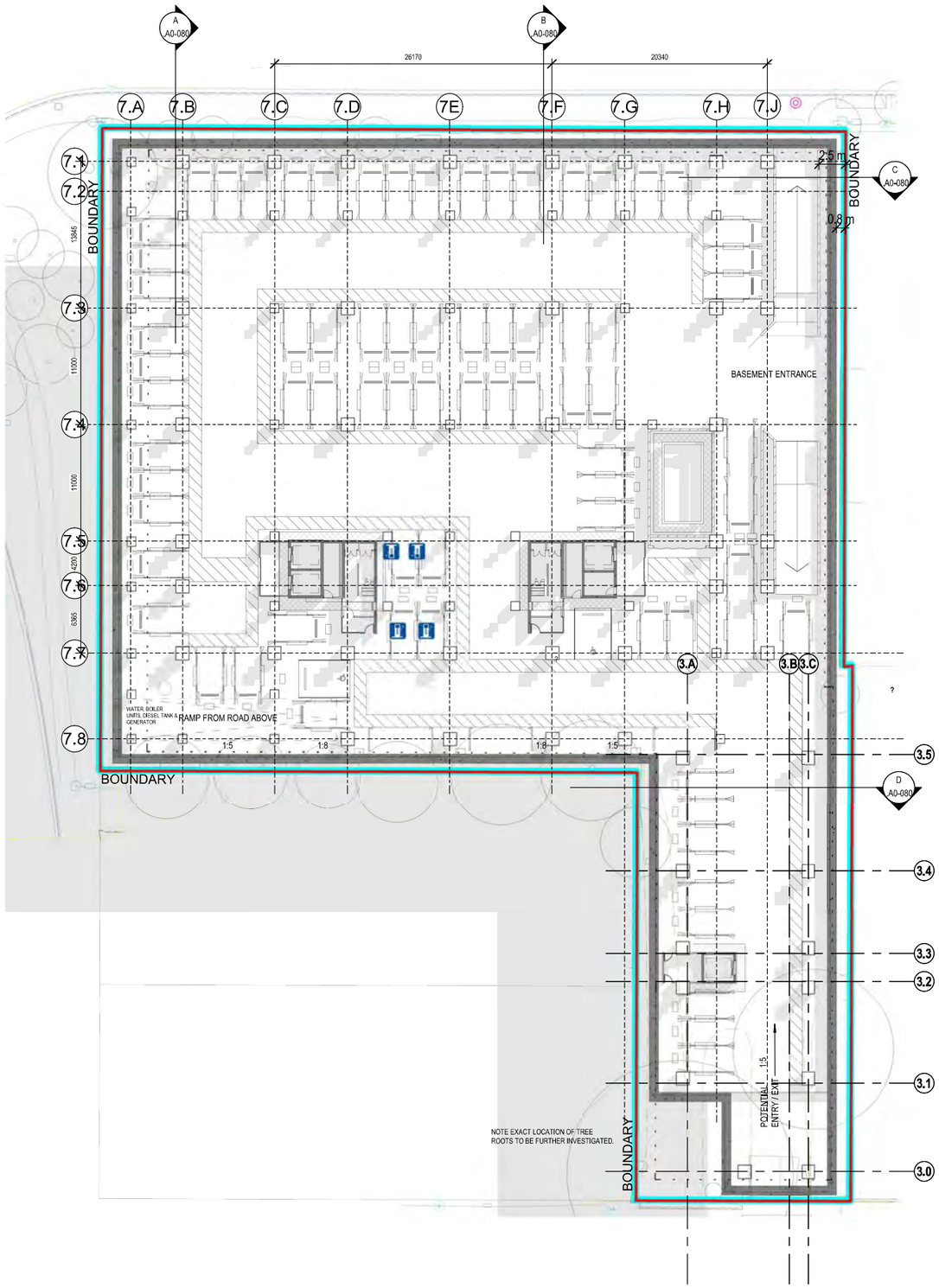
Drawing Issue
RESOURCE CONSENT

Drawing Details

Scale	1 : 250 @ A1
Date	13.12.19
Job No	8917
Drawn	WM Team
Checked	TDH

Drawing No B01 .A1-010
Revision B

WARREN AND MAHONEY



1 _A0-060 **PROPOSED SITE PLAN - BASEMENT**

A1 sheet scale = 1 : 250
A3 sheet scale is twice scale shown above

Revisions

A	22/11/19	COORDINATION SET
B	18/12/19	DRAFT RESOURCE CONSENT

Notes

N
TRUE NORTH

Client

RYMAN HEALTHCARE

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254 Montreal Street
PO Box 25086
Christchurch 8011
New Zealand
Phone + 64 3 961 5926

Registered Architects and Designers
www.warrenandmahoney.com

Project Title

PARK TERRACE
SITE TWO
PETERBOROUGH

Drawing Title

.S02
PROPOSED SITE PLAN
- BASEMENT

Drawing Issue

RESOURCE CONSENT

Drawing Details

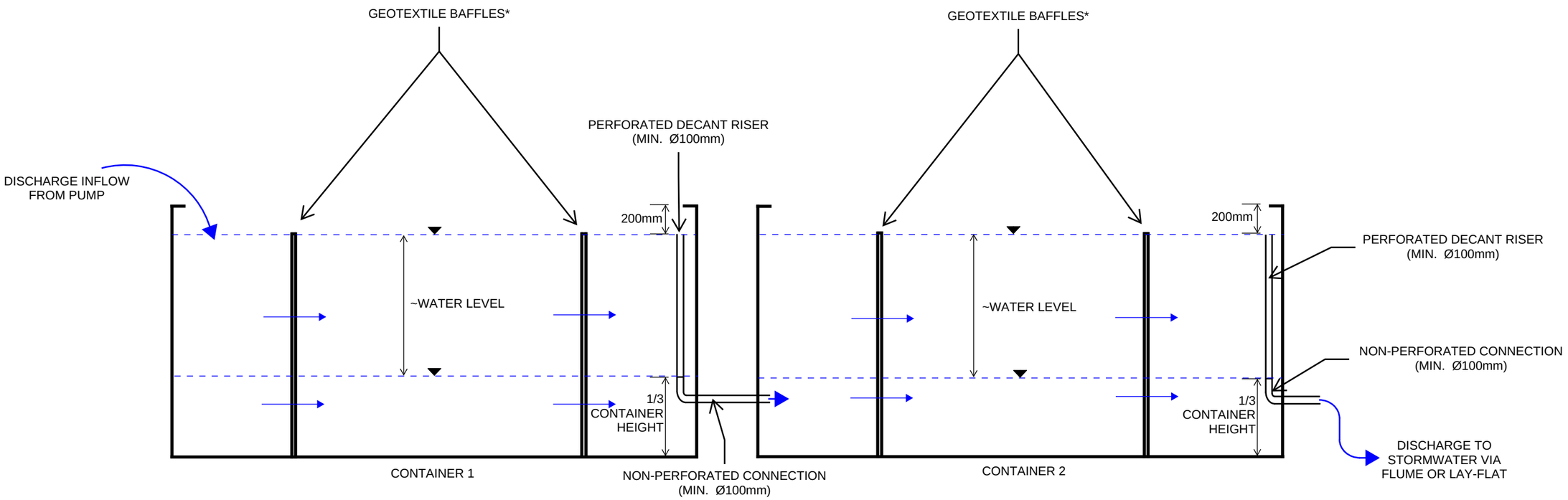
Scale	1 : 250 @ A1
Date	18/12/19
Job No	8899
Drawn	WM Team
Checked	TDH

Drawing No .S02 .A0-040 **Revision** B

WARREN AND MAHONEY®

C

Appendix C – Example Dewatering Container



SCHEMATIC CROSS SECTION - EXAMPLE SEA CONTAINER DEWATERING DEVICE*

*NOTES:

- NOT TO SCALE
- MULTIPLE BAFFLES CAN BE INSTALLED AS APPROPRIATE
- MULTIPLE CONTAINERS CAN BE CONNECTED IN UNISON FOR ADDITIONAL TREATMENT
- FLOCCULATION TO BE CONSIDERED INDEPENDENTLY
- SCHEMATIC ONLY TO BE CONSIDERED ONCE DEVICE AND APPROPRIATE CONTAINERS ARE SOUGHT

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	FINAL SCHEMATIC FOR RESOURCE CONSENT	CB	MR	MR	27.02.20

Drawing Originator: Beca

Original Scale (A1)
Reduced Scale (A3)

Design	CB	27.02.20
Drawn	CB	27.02.20
Dsg Verifier	MR	27.02.20
Dwg Check	MR	27.02.20

* Refer to Revision 1 for Original Signature

Client: RYMAN HEALTHCARE LIMITED

Project: PARK TERRACE RETIREMENT VILLAGE

Title: EROSION AND SEDIMENT CONTROL PLAN - DE-WATERING SCHEMATIC

Discipline: ENVIRONMENTAL

Drawing No.: -

Rev.: -