

Bellgrove, Rangiora

Erosion Sediment Control Plan

Bellgrove Rangiora Limited

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Document control record

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1 Background

Bellgrove Rangiora Limited (BRL) is proposing to develop an area of land on the eastern outskirts of Rangiora township into a new residential subdivision (Bellgrove Development). The wider development is located between Northbrook Road to the south and Coldstream Road to the north and is approximately 100 hectares in area. The portions of the development north (~64ha) and south (~36ha) of Kippenberger Avenue will generally be referred to as Bellgrove North and South respectively.

Under new government legislation, a portion of the Bellgrove North Development is currently seeking fast-track Resource consent approval for Stage 1 is being sought under the COVID-19 Recovery (Fast-track Consenting) Act 2020. The land proposed for fast tracked development in stage 1 is located immediately north of Kippenberger Ave and is approximately 20 hectares in area. The fast-tracked area is herein referred to as 'the site'.

2 Plan references

This report details the Erosion and Sediment Control Plan (ESCP) to manage potential sediment laden runoff, with the aim of minimising the effects of construction on the surrounding environment.

The preparation of this ESC plan has been undertaken in accordance with the Environment Canterbury Erosion and Sediment Control Toolbox 2017. This ESC plan will be a live document and will be updated as required to run in line with the construction staging and the varying weather or site conditions as required at the time of construction.

Refer to the following documents for visual details of the ESC plan:

- 509177-0001-DRG-CC-0013-A – ESC Plan
- 509177-0001-DRG-CC-0014-A – ESC Plan Details 1
- 509177-0001-DRG-CC-0015-A – ESC Plan Details 2

3 Basis for design

3.1 Site description

The site is predominantly flat grading at approximately 1 in 200 from the north west to south east. The topsoil consists of fine sand and traces of rootlets with dark brown soil. From 0.25 m-2.2 m the soil consists of silty sand, sandy silt, and silt. Beyond 2 m and up to 15 m, the soil transitions to a sandier gravel with minor cobbles in a greyish brown colour. Here the soil is very dense and moist with the presence of minor silt layers.

The currently rural site slopes gently to the southeast and is largely grassed and divided into paddocks. Stage 1 of the site is naturally divided into two sections with Kippenberger Ave along the southern boundary then the Cam / Ruataniwha River separates sub-stages 1A-1B from sub-stages 1C-1D. The Northern Flow Channel that leads east to Golf Links Road is the northern boundary of stage 1. These waterbodies are generally speaking dry channels but are designed to be retained and will be enhanced with planting and naturalised to become main features of this stage. The Cam / Ruataniwha river is the most sensitive receiving environment and it is important that people using this ESCP are aware of this and protect this channel appropriately.

3.2 Proposed development

Bellgrove North is currently proposed to be developed in five stages of work. Stage 1 consists of four sub-stages, 1A, 1B, 1C and 1D. Kippenberger Ave upgrade will also be carried out as a separate stage which is going through a consultation period with WDC and the associated community groups.

3.3 Key principles for ESC management during construction

The key principles for ESC management during construction are as follows:

- Minimise Disturbance – the design of ESC plan shall consider existing site features and minimise earthworks extents
- Stage Construction - staging of construction activities to limit exposed surfaces that may produce sediment. With the maximum staging area of Stage1A is 75582m2 (including the Cam works to Road 1)
- A small wetland has been identified in the channel of the Cam River directly north of the Homestead which is to be protected and maintained in its original location
- Protect Slopes – avoid disturbance of existing slopes and provide diversions around or stabilisation of vulnerable slopes such as channel banks. Although unlikely, to be a concern on site, there may be minor slopes at the banks of the Cam and Northern Flow Channel.
- Protect Receiving Environments – consideration of receiving environments including the existing Cam / Ruataniwha River and Northern Flow Channel which flow through the site. Bunds and separate staging will be used to protect the Cam River and Northern Flow Channels.
- Rapidly Stabilise Exposed Areas – soils disturbed are to be progressively stabilised
- Install Perimeter Controls and Diversions - prevent mixing of clean water runoff with dirty water runoff in the site. Divert upstream catchments around exposed areas through clean water diversion channels. Dirty water diversion channels which are located on steeper slopes, such as riverbanks, may require velocity controls including rock lining and/or check dams. Within the steeper sections of the site, drop out pits located within the dirty water diversion channels could potentially be used to reduce the load on the downstream treatment devices
- Employ Sediment Retention Devices - capture and treat runoff with structural devices. By preference sediment laden water will be retained within the site and discharged into land. Where flows are to be directed to surface waterbodies (i.e. the Cam / Ruataniwha River) and more natural controls cannot reach the required standard (50 mg/L) promotion of sediment removal through coagulation and flocculation processes to improve the settlement of suspended sediments and efficiency of the retention devices
- Adjust the ESC plan as needed - ESC measures and the ESC plan should be reviewed and updated to reflect changes to construction sequencing, weather changes with input from the Contractor completing works on site
- Storage of excavated materials or other materials may be required during the earthworks and civil works stage of the project. The exact location of stockpiles will be confirmed by the Contractor prior to construction. After the pre-construction meeting the ESC plan will be updated if required to include additional control measures or new stockpile locations. It is proposed that silt fences or other sediment control measures in accordance with Environment Canterbury (ECan) requirements shall be applied around stockpiles especially if stored for long durations
- Vegetation work at the site will consist of some tree removal and planting of a variety of bush, shrubs, and trees. This will include planting along the side of the roads, the Cam / Ruataniwha River and the Northern Flow Channel. This work will be tied in with the Landscaping plan being developed by Rough and Milne.
- Care shall be taken during each phase of the project to ensure sufficient and progressive stabilisation and minimisation of exposed soil. Measure such as the following should be used;
 - Grass seed, if conditions are appropriate

- Hydroseed with a stabilising agent
- Straw mulch with a stabilising agent
- Ready lawn
- Covering with filter fabric if a quick fix temporary measure is required.

3.4 Programme of works

Stage 1 consists of approximately 20ha and has been shown as four sub-stages 1A, 1B, 1C and 1D. It is proposed that the site will be very close to a balanced cut and fill leaving very little excess. Currently the cut and fill volumes for the four sub-stages total 40,000m³ of cut and 38,000m³ of fill. Some material may be required to leave site. The intention is that any removal will be undertaken as back filling loads to reduce traffic movements and double handling.

Stages 1A and 1B are between the Cam / Ruataniwha River and Kippenberger Ave. This will lend itself to be earth worked together and will utilise a single stabilised entranceway and stockpile location.

The methodology for the initial stages of construction is given below:

- It is recommended to construct the sediment retention ponds first
- Build earth bunds around the banks of the Cam / Ruataniwha River and the Northern Flow Channel to ensure dirty sediment laden water/run off does not enter the waterbodies. The small wetland opposite the Homestead is also to be protected in a similar manner to ensure this is not disturbed.
- Divert any runoff water in the direction of the basins to ensure the dirty water has an area to drain to
- All staff will be required to understand the theory behind the ESC plan so they can ensure it works efficiently and do not unintentionally short cut the system
- All staff need to know in advance the emergency procedures that will be implemented for any accident, including spills and accidental untreated sediment discharge reaching surface water

As per standard earthworks practise the topsoil strip will occur over areas where cut to fill can be done together so material can be placed immediately after being cut allowing it to be handled once. As soon as practical after placing topsoil will be re-spread and seeded to re-establish a stabilised surface.

The roadways will be treated separately from the bulk earthworks as the services being installed in the roadways will mean a delay in getting them completely re-covered. As the roadways will be sitting lower than the surrounding ground any water entering these areas will be able to be controlled by damming. Service installation will be very close to the underlying gravels and the natural drainage will be sufficient to ensure any runoff can be handled on site.

The final stormwater treatment basins are to be dry basins therefore by installing the basins early there will be storage available to hold any runoff. The underlying gravels enable any gathered stormwater runoff to be captured and discharged back to ground with little, if any, overland run off having to be discharged to the nearby waterbodies. If discharge to the waterbodies is required, it will be after several treatment types and only be required if the sediment retention basins become inundated. The final stormwater soak pit locations will be in different locations to that utilised by the sediment basins however when the sediment basins are no longer in use it will be a requirement to remove all gathered sediment from site before completing the dry basins.

Upon the works being completed in stage 1A and 1B the focus will move to stage 1C and 1D which is the land between the Northern Flow Channel and the Cam / Ruataniwha River. Two stockpile locations and sediment ponds are shown in this area as the shape of the site has a low point that may not be able to grade to the eastern-most boundary. Again, it is hoped to work both these stages together so as to ensure a balanced approach on the earthworks can occur.

3.5 Inspection and monitoring programme

Key principles for ESC inspection and monitoring during and after construction are:

- Adjust the ESC plan as needed - ESC measures and the ESC plan should be reviewed and updated to reflect changes to construction sequencing, weather changes with input from the contractor completing works on site
- It is essential that the ESC plan has an inspection and monitoring system is good enough to pick up any potential issues, and to communicate these to the relevant people who can act on them quickly

The contractor's ESC plan will state the frequency and methodology of checking ESC measures, including who is responsible for doing this, and how the findings are recorded, reported and assessed. This includes checks that will be needed during rainfall events, and to accommodate any times that the site will be unattended, including weekends.

3.6 Other considerations

The proposed ESC measures will consider dam and pump or dam and divert measures where the new stream alignment intersects the existing stream alignment, such as prioritising works to be undertaken in dry season and provide for pump/divert if needed. Silt fences and super silt fences will be used where the new alignment can be completed independently from the existing watercourses prior to the final stream diversion. Temporary waterbody crossings (such as farm tuff temporary culverts) could potentially be required for short-term use by construction vehicles.

It is proposed that the in-stream works will be completed once bulk earthworks in the upstream catchments have been completed and that disturbed areas adjacent to streams are stabilised immediately during and following construction. The proposed works within waterbodies will be completed during dry periods when there is no baseflow in the channel. A small wetland has been identified in the channel of the Cam River directly north of the Homestead which is to be protected and maintained in its original location.

Larger volumes of dewatering water will be pumped to adequately sized sediment retention ponds, or directly injected into the underlying gravels. Smaller volumes may exceed the limitations of the ponds and will be captured via silt fences, bunds or to flat, grassed land and will not be discharged into the neighbouring properties.

ESC measures for the dewatering of deep excavations will be managed in compliance with ECan requirements, such as TSS limits. It is anticipated that dewatering will be required for the installation of the wastewater pump station and potentially the downstream end of gravity networks. A "cut and cover" methodology is suggested which will ensure exposed areas are covered at the end of the day's works and before any potential rainfall event.

4 Material storage and construction support area

Storage of both imported and excavated materials may be required during the earthworks and civil works of the project. The locations of stockpiles have been indicated on the ESC plan however the exact locations are to be confirmed by the Contractor prior to construction starting. If required, the ESC plan is to be updated to reflect any changes and include additional control measures to reflect the Contractor's construction methodology and staging. It is proposed that silt fences or other sediment control measures in accordance with ECan's ESCT be applied around stockpiles if stored for long durations (exceeding two weeks).

The location of the Construction Support Area (CSA) is also to be confirmed by the Contractor prior to construction works starting.

5 ESC device selection

Stormwater management and sediment pollution mitigation strategies described in the following sections are based on ECan Sediment Control Toolbox.

The ESC plan described in the following sections and on drawings 509177-0001-DRG-CC-0013-A, 0014-A, and 0015-A are indicative only and are to be further developed at the detailed design stage for the project, in conjunction with the preferred earthworks contractor.

Table 1 Erosion and sediment control devices

Control	Application
Stabilised entrance/exit	Entrance/ exit to site must be stabilised prevent sediment being uplifted and transported by vehicle movement. This will consist of 50-150mm washed aggregate however temporary sealed access may also be used depending on expected traffic volumes. Shaker ramps could be integrated into the stabilised entrance/exit.
Diversion bunds/channels	To prevent upstream flows entering or exiting the disturbed areas, for discharge to stormwater network, treatment device or land. These can include a combination of clean water and dirty water diversion bunds/channels. Dirty water bunds/channels would be used to divert sediment-laden water to an appropriate sediment retention device. Clean water diversion bunds/channels would be used to divert clean water from upstream catchment around the site and to convey clean water from basins through to discharge points. Diversion gradients greater than 2% may need to be lined to minimise erosion.
Silt fence	Acts as a perimeter boundary to prevent sediment escaping the site area.. To be applied in accordance to ECan Sediment Control Toolbox.
Sediment retention ponds	Acts as a perimeter boundary to prevent sediment escaping the site area. To be applied in accordance to ECan Sediment Control Toolbox. Coagulation and flocculation maybe required within the basins to increase sediment removal efficiencies. If flocculants or coagulants are to be used to reduce sediment loading a site-specific water treatment plan will need to be prepared. Flocculants or coagulants must be used in accordance with the ESCT or other recognised guideline.
Silt sock	Can be used for two purposes, to treat sediment-laden water prior to discharge or as a perimeter control to prevent sediment escaping the site area. The use of these would be limited to smaller catchment areas. Silt socks require regular maintenance, and are easily damaged by vehicles.
Rapid stabilisation	Mulch/topsoiling and grass seeding, or other measures discussed in ECan Sediment Control Toolbox can be applied to cover exposed areas, preventing erosion and dust generation.
Cut and cover methodology	Stabilisation of earthworks using cut to fill methodologies and staged construction approaches where possible. This could be typically used for the installation of trenched services.

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