1 Introduction

Cross Yarra Partnership (CYP) has been contracted by Melbourne Metro Rail Authority (MMRA) to design and construct the Metro Tunnel Project. The project includes two nine-kilometre train tunnels and five new underground train stations, linking the north-west Sunbury rail corridor and the south-east Cranbourne/Pakenham rail corridor, unlocking additional capacity in the existing City Loop. The five new underground stations are located at Arden, Parkville, CBD North, CBD South and Domain.

To manufacture the concrete segments to line the tunnels and station boxes for the Metro Tunnel Project, it is proposed to build and operate a factory to produce and store the segments off site. The segments will then be transport to the Metro Tunnel Project. As a bespoke construction product, there are currently no suppliers in Victoria with either the capacity and/or experience to deliver these components, particularly on the scale required and thus a project-specific concrete segment manufacturing facility is required.

The Ravenhall concrete segment manufacturing facility (hereby referred to as the 'facility'), is located at 1198 Christies Road, Ravenhall. The land area that the facility is proposed to be built on will hereafter be referred to as the 'subject site'. The subject site has been selected to manufacture these concrete segments, largely due to the onsite supply of raw material, existing concrete batching equipment, internal and external buffers and access to state significant highways and roads.

The objective of this air quality impact assessment was to assess the potential air quality impacts associated with the operation of the facility.

1.1 Scope of works

1.1.1 Baseline assessment

- Review of applicable National and Local ambient air quality legislation;
- Review of potential pollutants and associated human health effects;
- Review of local meteorological conditions influencing the pollution dispersion and dilution in the area;
- Identification of nearby sensitive receivers; and
- Evaluation of the baseline air quality situation in the area.

1.1.2 Impact assessment

- Compilation of an emissions inventory for identified sources of emission due to the proposed facility operations and other related activities;
- Undertake dispersion modelling to predict the ambient air quality (PM_{10} and $PM_{2.5}$ concentrations) at each sensitive receptor. One operational scenario was modelled; and
- Comparison of the predicted concentrations to applicable ambient air quality standards to determine compliance.

2 Background

2.1 The Subject Site

The subject site for the facility is at 1198 Christies Road, Ravenhall (subject site outlined in black in Figure 2.1). This land is located in the City of Melton, approximately 25 km west of the Melbourne CBD, to the west of the Deer Park Bypass and 3.3 km from the Deer Park residential area.

The subject site is generally level with current ground levels at AHD 70. The west of the subject site will be excised from Deer Park Boral site's quarry operation boundary, and will be duly excised from the Work Authority. This area is currently used to store aggregate in mounds. These aggregate mounds will be removed in future to allow for works. The eastern portion of the subject site was previously used by the police special operations group.

The subject site has raised earthen bunds and fencing that are all used to visually screen the quarry and landfill uses from surrounding roads whilst also serving as a wind buffer/break. Along Christies Road is vegetated, this further serves to screen the site from external view. The existing internal earthen bunds on the subject site will be removed, and the bunds on both the eastern and southern boundaries will be retained and extended to the south west to act as visual and acoustic barrier.

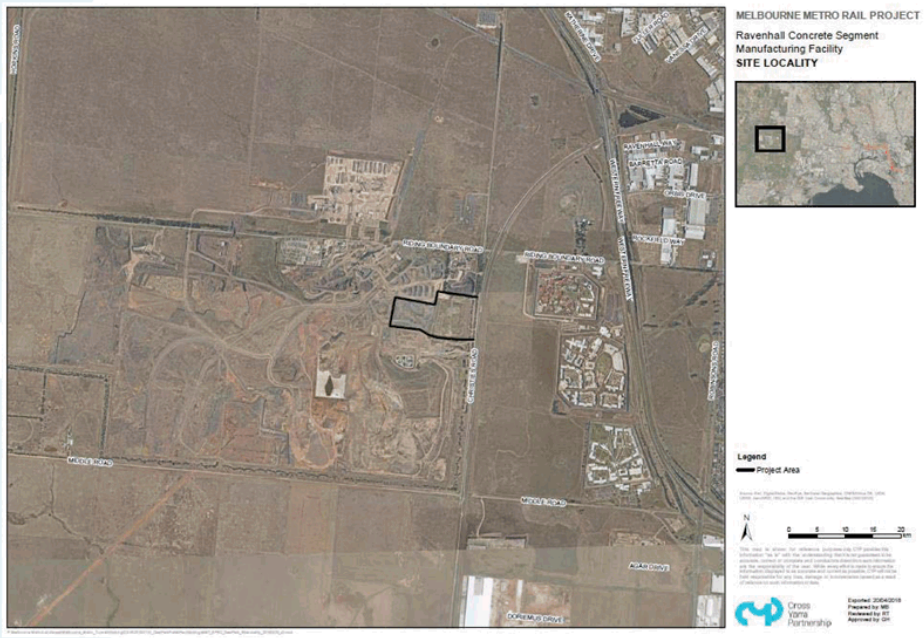


FIGURE.2-1: Subject site (black)

2.2 Subject site

The connecting Boral site has three major current uses for the site are stone extraction (i.e. quarrying), aggregate production and landfill. The quarry has operated since the 1960s. The quarry extracts basalt for the construction industry across metropolitan Melbourne. The existing stockyard, quarry and asphalt plant is located directly to the north and west, followed by Riding Boundary Road, a local traffic road, and the quarry site. There is an electrical terminal station to the north of the subject site and powerlines to the west.

The overall size of the connect quarry and landfill provides buffers between the subject site and existing land uses. Generous external buffers are also provided around the prisons. A 200 m Quarry Blast Buffer and a 500 m Quarry Sensitive Use Buffer apply from the approved quarry works authority border.

To the east of the subject site, is Christies Road, a local traffic road, followed by the Regional Rail Link Corridor, the Ravenhall Nature Conservation Reserve, and the Dame Phyllis Frost Centre (a women's prison), the Ravenhall Prison (a men's medium security prison), and the Metropolitan Remand Centre (a men's prison). There is a rural dwelling to the north east of prisons.

To the south of the subject site, is the Melbourne Regional Landfill, followed by Middle Road, a designated local road. A number of dwellings are located in the surrounding area, however all have a substantial buffer to the subject site.

3 Project description

3.1 Land use and operations

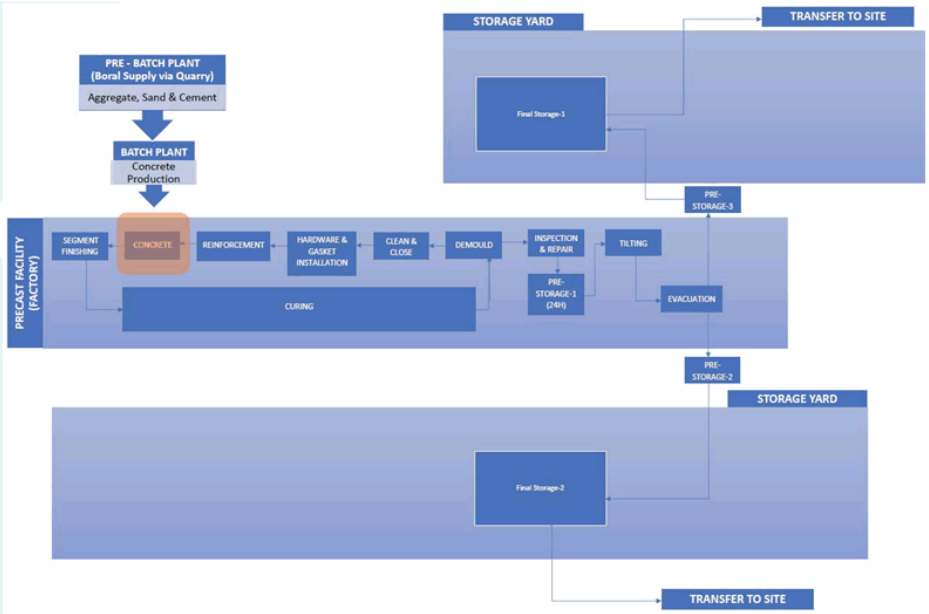
The subject site is proposed to be used for 'industry' to manufacture concrete segments for installation in the Metro Tunnel Project. The operational process is outlined in Figure 3-1 below. Concrete is produced in the batch plant by receiving, storing, transferring, weighing, blending and discharging the constitute raw materials. The concrete segments are produced through casting concrete in a reuseable mould or form which is then cured in a controlled environment. The product is then then stored in a storage yard for delivery to the Metro Tunnel Project.

The proposed facility is to undertaken manufacturing 24 hours a day. The project is likely to produce an average output of approximately 130 segments per a day. It has a theoretical output of one segment every 8 minutes.

Access to the subject site will be via an existing unused access point on Christies Road situated between the Melbourne Regional Landfill entry and Riding Boundary Road. It has been estimated that there will be 9,000 deliveries over two years with an average of 20 per day and 40 per day at peak periods of production. As most of the raw material products will be sourced from the quarry, there will be approximately eight daily deliveries from off-site suppliers and approximately 20 deliveries from the facility. Deliveries will be planned between 19:00 hrs and 05:00 hrs (i.e. 7:00 pm and 5:00 am) to avoid peak traffic periods.

During the morning peak period between 06:00 hrs and 08:00 hrs (i.e. 6:00 am and 8:00 am), approximately 45 staff will be entering the facilities. During the afternoon peak period between 16:00 hrs and 18:00 hrs (i.e. 4:00 pm and 6:00 pm), 45 staff will be exiting the subject site and 40 will be entering.

FIGURE 3-1: OPERATIONAL FLOWCHART



3.2 Constituent product

Constituent products of the facility include:

Fine and coarse aggregates – These will be delivered from remote or local quarries by road trucks and tipped into bunkers designed to receive and store up to two days of production capacity. The bunkers will have structures to shade the materials and mitigate against fugitive dust emissions. From the bunkers, fine and course aggregates will be

transferred by front end loader to a boot hopper/ receival hopper for transfer by covered conveyor to an overhead bin structure. It is expected up to five different fine and course aggregates will be used in the production of the concrete. Each material will have a separate bin to avoid contamination. This overhead bin structure will also be covered. When batching commences, fine and course aggregates are individually weighed into weigh hopper, controlled by the batching computer. Once weighing of the constituent materials is complete, the batch is discharged onto a belt for transfer to the mixer.

Cementitious productions (cement/ slag/ flyash/ silica fume) – These will be delivered by pneumatic tank / road vehicle from local and interstate sources. The pneumatic tankers use compressed air to transfer the Cementitious Products to vertical silos. Interlocks prevent inadvertent discharge of Cementitious Products into the wrong silos. The air is filtered and returned to atmosphere through a series of filters. Two Cementitious Products are proposed, however more may be required. A silo is required. A silo is required for each of the products. When batching commences, cement is transferred via an auger or screw to a weigh vessel for accurate weighing and then discharge into the mixer. The batch computer controls the transfer and weighing of the material.

Water – Primarily sourced from water mains and stored in onsite tanks. Water may be heated or chilled depending on weather conditions. And the concrete specification. The use of recycled water may be considered. When batching commences, water will be pumped into a water weigh vessel before being discharged into the mixed. The batch controls the transfer and weighing of the material.

Admixtures – These are liquid products that enhance or modify concrete performance. They are delivered to site in the suppliers' truck and pumped into on site plastic tanks of around 5000 litres. Admixtures are transferred by pump and metres into the mixed. Up to three types of admixture are likely to be used at this facility. The batch computer controls the transfer and weighing of the material.

Fibres – Both steel fibres and polypropylene fibres are to be used in the production of the concrete segments. Both types of fibres will be delivered to site by supplier trucks in 1000 litre "bulka bags" and off loaded into covered storage. The fibres are transported to the concrete plant by forklift as required and lifted by gantry into the fibre feeders at the top of the plant. A separate fibre feeder is required for each type of fibre. When batching commences, the feeders weigh the required mass of fibres into the mixer.

Mixer – Once all constituent materials are weighed and transferred to the mixer, the mixer will operate for a predetermined period to ensure the correct consistency of the mix. A door at the bottom of the mixer opens to allow the material to fall into a transfer bucket.

Transfer bucket – Transport the concrete batch from the concrete plant, through the wall of the segment manufacturing facility to be placed into the segment moulds.

The layout of the proposed facility is given in Figure 3-2.

3.3 Development

Figure 3.2 outlines the facilities and works on site, including:

- Concrete batching (within the batching plant area)
- Concrete segment production (within the factory building)
- Concrete segment storage areas
- Workshop facilities
- Offices, with associated amenities and kitchen facilities
- Perimeter security fencing
- Removal of internal bunds, retaining bunds to south and east and extending bund to the south

The facility will have dedicated parking within the site for all staff and workforce. Vehicle access and parking will be completely independent and segregated from the connect quarry operations. A total of 51 car spaces will be provided onsite. Temporary truck parking is to be provided on the internal access and ring roads. There will be no permanent parking for trucks on site.

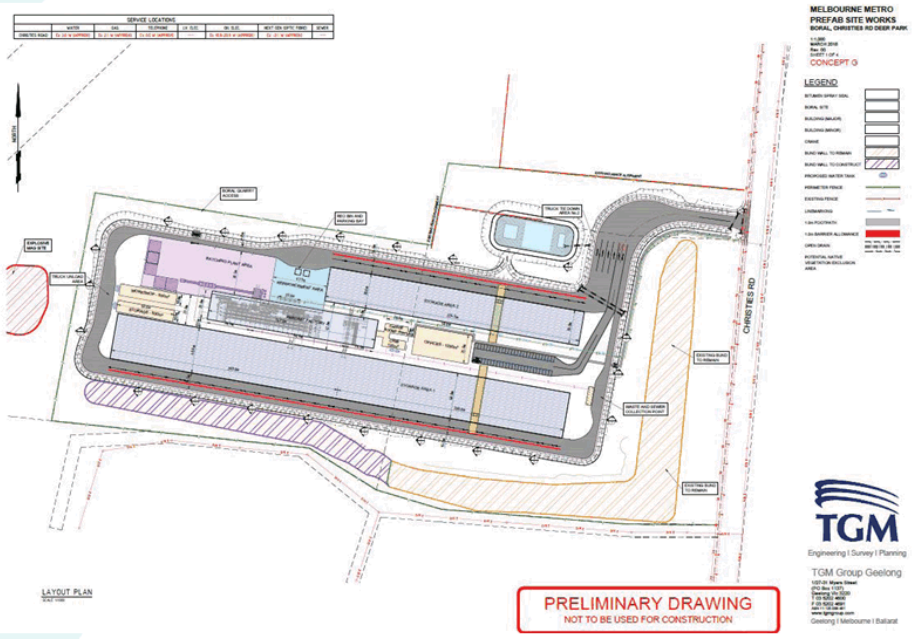


FIGURE 3.3: RAVENHALL CONCRETE SEGMENT MANUFACTURING FACILITY CONCEPT DESIGN

3.4 Environment management system

The proposed facility will be constructed and operated under an Environmental Management System (EMS) developed in accordance with ISO AS/NZS 14001 Environmental Management Systems. The EMS will be comprised of policies, manuals, plans, standards, procedures and other key documents as shown in Figure 3-3 and described in Table 3-1.

The purpose of the EMS will be:

- To ensure that works are planned and performed so that the adverse effects on the environment are either avoided or minimised, and are carried out in accordance with approvals, obligations, and permits, including the approved Incorporated Document.
- To provide a structured approach for monitoring the implementation of the Construction Environmental Management Plan (CEMP), aspect-specific sub-plans and Operational Environmental Management Plan (OEMP).

Management documentation will be developed using the Plan-Do-Check-Act (PDCA) model which provides an iterative process to achieve continual improvement.

- **Plan**: establish environmental objectives and processes necessary to deliver results
- **Do**: support implementation of the processes as planned
- **Check**: monitor and measure processes and report the results
- **Act**: take actions to continually improve.

The CEMP will be the key document driving environmental management and compliance. Its purpose will be:

- To describe how the team will manage environmental aspects and impacts for the effective delivery of the works
- To provide the roadmap for the implementation of the EMS.

It will be prepared in accordance with the requirements of:

- ISO AS/NZS 14001 Environmental Management Systems
- EPA Publication No. 480, Environmental Guidelines for Major Construction

- Approved Incorporated Document.

The CEMP will detail the following:

- Describe the systems and processes for managing and minimising the environmental impacts of facility construction
- Key construction activities and associated risk (as identified in the risk register)
- Provide a roadmap for the implementation of the EMS
- Establish the processes to ensure and demonstrate that facility construction meets legislative and contractual obligations, including details of compliance tracking, monitoring, inspections, auditing and reporting
- Provide government authorities and stakeholders with evidence that the environmental management for construction is acceptable through demonstrating how environmental protection commitments will be achieved
- Provide means of continually improving environmental performance during construction

A number of aspect-specific sub-plans will also be developed to manage potential risks, including:

- Ecology Management Plan – aimed at minimising impacts to flora and fauna, including management of works within the vicinity of vegetation and trees, delineation of works areas and no-go-zones.
- Air Quality, Dust and Lighting Management Plan – aimed at minimising disruption during construction, including from dust and other emissions that could result in a deterioration of air quality, as well as lighting spillage which could affect amenity of surrounding areas.
- Noise and Vibration Management Plan – aimed at minimising noise and vibration impacts during construction.
- Traffic Management Plan – aimed at addressing safety of the public and the project team, minimising disruption to road users.

A voluntary Cultural Heritage Management Plan (CHMP) will be developed for the proposed facility in accordance with the Aboriginal Heritage Act 2006, the requirements of which will be incorporated into the EMS and CEMP for management during construction.

An OEMP will also be developed in accordance with ISO AS/NZS 14001 Environmental Management Systems and to address the EMS. Where necessary other EMS documentation will be updated specific to operations, including the Environmental Policy, risk register, aspect-specific sub-plans, and obligations register.

TABLE 3-1: KEY ENVIRONMENTAL MANAGEMENT SYSTEM DOCUMENTATION

Document type and description	IMS / EMS element
Policies: The guidelines and position for how the facility is construction and operated	Environmental Policy (Construction and Operation)
Standards: The minimum standards we expect from our workplaces	John Holland Global Mandatory Requirements (GMRs)
Manuals: The framework document that describes how our management system operates	EMS Manual
Plans: How we execute the requirements of the Project	The CEMP, OEMP, aspect-specific management sub-plan, and SEIP
Procedures: The step by step instructions to complete our tasks	e.g. Unexpected Discovery Procedure, Out of Hours Works Procedure, Disposal Procedure, Tree Management and Removal Procedure, Dewatering Procedure
Forms: The documents/places where you can enter data to record details, such as inspections	e.g. Clearing Permits, Out of Hours Work Permits, Dewatering Permits

Figure 3-3: Hierarchy of Environmental Management System Elements