Traffix Group

Our Reference: G33135L-01A

9 June 2023

Aurora Construction Materials Pty Ltd
PO Box 656
NIDDIRE VIC 3042
Attention: Mr Kelvin Sargent

Dear Sir,

5575 South Gippsland Highway, Lang Lang – Proposed Sand Quarry Development
Traffic Impact Assessment

Introduction

Traffix Group has been engaged to undertake a Traffic Impact Assessment for a proposed sand quarry development at 5575 South Gippsland Highway, Lang Lang, including the development of a concept design for the proposed site access.

The following report provides a traffic engineering assessment of traffic issues associated with the development and provides the rationale for the proposed design of the site access.

Existing Conditions

Subject Site

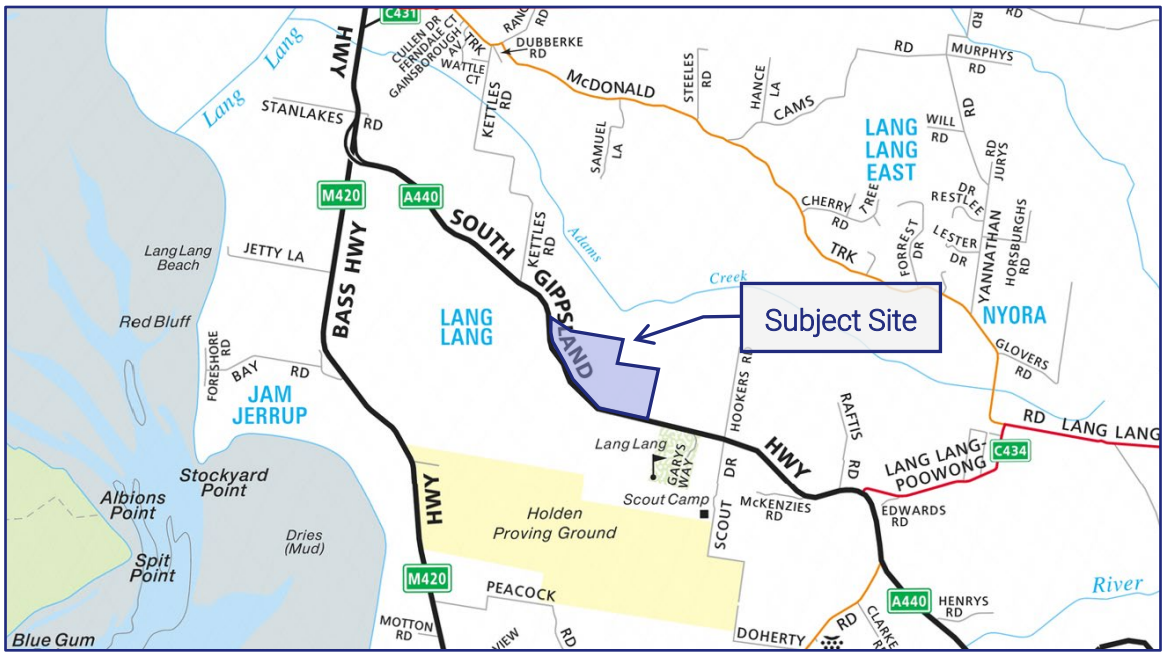
The subject site is located on the northeast side of South Gippsland Highway approximately 5km south-east of Bass Highway in Lang Lang. The location of the site is presented on a locality map at Figure 1 and an aerial photograph at Figure 2.

The subject site is irregular in shape with an area of approximately 117.3ha and has direct frontage to South Gippsland Highway of approximately 2.3km.

The site is currently undeveloped and occupied by farming land.

The site is located within a Green Wedge Zone – Schedule 1 (GWZ1) under the Planning Scheme. Land use in the vicinity of the site is generally farmland, bushland and other quarries to the east of the site.

Level 28, 459 Collins St
Melbourne Victoria 3000
T: 03 9822 2888
admin@traffixgroup.com.au
Traffix Group Pty Ltd
ABN: 32 100 481 570
traffixgroup.com.au



Source: Melway Publishing Pty Ltd

Figure 1: Locality Map

Source: https://web.metromap.com.au (Image Date: 14 September 2022)

Figure 2: Aerial Photograph

South Gippsland Highway is a VicRoads declared Arterial Road and Road Zone Category 1 under the Planning Scheme. South Gippsland Highway generally extends in a northwest-southeast direction.

In the vicinity of the site, South Gippsland Highway is a sealed road accommodating a single through traffic lane in each direction with sealed shoulders of varying width (approx. 2m on each side). Safety barriers (Flexible W-beam guard fence and wire-rope barriers) are generally provided along both sides of this section of South Gippsland Highway.

Photographs showing South Gippsland Highway in the vicinity of the site are presented in Figure 3 and Figure 4.

Figure 3: South Gippsland Highway - View North

Figure 4: South Gippsland Highway - View South

Existing Traffic Conditions

Traffic volume data sourced from the Department of Transport and Planning suggests that this section of South Gippsland Highway has a two-way Average Annual Daily Traffic (AADT) volume of 7,600 vehicles per day, evenly split to be 3,800 vehicles in each direction[1].

The Austroads Guide to Traffic Management suggests that the design hour volume should be 11-16% of AADT for rural locations. Conservatively assuming 16%, this represents a two-way volume of 1,216 vehicles per hour or a one-way volume of 608 vehicles per hour in each direction during the peak hour.

Proposal

The proposal is to develop the site for the purposes of a Sand Quarry with access to the site proposed to be taken via an upgrade to the existing access located near the site's northern boundary to South Gippsland Highway (farm gate and unmade crossover).

A layout plan of the proposed development is attached at Appendix A.

The proposed Sand Quarry is expected to have 10 to 15 employees on-site at a time and is anticipated that the site will generate approximately 30 quarry trucks in and out per day associated with distribution of the quarried sand products.

[1] Source: https://vicroadsopendata-vicroadsmaps.opendata.arcgis.com/datasets/traffic-volume/explore?location=-38.323656%2C145.603037%2C13.61

Proposed Vehicle Access Location

Vehicle access to the site is proposed to be at a similar location to the existing access. An aerial photograph depicting the location of the existing and proposed vehicle access is shown in Figure 5 and a photograph of the existing site is presented at Figure 6.

Source: https://web.metromap.com.au (Image Date: 14 September 2022)

Figure 5: Aerial Photograph of Site Access

Figure 6: Photograph of Existing Site Access

Sight Distance Assessment of Access Location

Recommended sight distance criteria are set out in *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, May 2023*. Clause 3.2 of the Austroads guidelines sets out that:

> *The types of sight distance that must be provided in the design of all intersections include:*
>
> - *approach sight distance (ASD)*
> - *safe intersection sight distance (SISD)*
> - *minimum gap sight distance (MGSD).*

AS2890.2 also sets out requirements for commercial vehicle traffic entering a public roadway from an access driveway, which are equivalent to the MGSD requirements.

The guidelines define the terms "Approach Sight Distance" (ASD), "Safe Intersection Sight Distance" (SISD) and "Minimum Gap Sight Distance" (MGSD) as follows:

> *ASD*
>
> *ASD is defined as the minimum level of sight distance which must be available on the minor road approaches to all intersections to ensure that drivers are aware of the presence of an intersection.*
>
> *ASD is measured from a driver's eye height (1.1 m) to 0.0 m, which ensures that a driver is able to see any line marking and kerbing at the intersection.*
>
> *ASD is also desirable on the major road approaches so that drivers can see the pavement and markings within the intersection and should be achieved where practicable.*
>
> *SISD*
>
> *SISD is the minimum sight distance which should be provided on the major road at any intersection. SISD provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation and to decelerate to a stop before reaching the collision point.*
>
> *SISD allows for a 3 second observation time for a driver on the priority legs of the intersection to detect the problem ahead (e.g. car from minor road stalling in through lane), plus the distance required to stop (also known as Stopping Sight Distance (SSD).*
>
> *SISD is measured along the carriageway from the approaching vehicle to the conflict point; the line of sight having to be clear to a point 7.0 m (5.0 m minimum) back along the side road from the conflict point*
>
> *MGSD*
>
> *MGSD is based on distances corresponding to the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning manoeuvre at intersections.*
>
> *MGSD is measured from a point 1.1 m (driver's eye height) to a point 0.65 m (object height – typically a vehicle indicator light) above the travelled way.*

The posted speed limit along South Gippsland Highway in the vicinity of the site access is 100km/h. Accordingly, the sight distance requirements for a 110km/h design speed have been adopted in accordance with requirements from VicRoads Supplement to Austroads guide to road design.

The various minimum sight distance requirements for a 110km/h design speed under the Austroads Guidelines for a flat grade are presented in Table 1.

Table 1: Sight Distance Requirements

Design Speed	Austroads Guide to Road Design Part 4A		
	ASD	SISD	MGSD
110km/h	209m(1) (Rt 2.5 sec (2))	300m(1) (Rt 2.5 sec (2))	244m (8 sec gap (3))

Notes:

1. South Gippsland Highway in vicinity of the site is generally flat, therefore no grade corrections have been applied.
2. General minimum value for high speed rural intersections.
3. Conservatively assumes, the provision of left and right turn lanes at the intersection, the critical acceptance gap would be for the right turn movement out of the minor road onto a four lane/two way major road.

Sight distance from the location of the proposed site access (existing site access) was measured to be approximately 320m to the northwest and approximately 380m to the southeast. As the South Gippsland Highway in this location is generally flat and the constraints to site distance relate to the horizontal curves, this value is relevant for each of the ASD, SISD and MGSD requirements.

Accordingly, the available sight distance along the South Gippsland Highway from the site access in each direction meets the recommended sight distance requirements specified in the Austroads Guide to Road Design Part 4A.

Photographs showing the existing sight distance which is available at the existing access point are provided at Figure 7 and Figure 8.

Figure 7: Sight Distance - View Southeast

Figure 8: Sight Distance - View Northwest

The land within the subject site, where the access way is to be located is relatively flat and free from obstructions, with the proposed access road generally following a straight alignment.

The base of the existing silos within the subject site are visible from South Gippsland Highway, representing a distance of approximately 115m and coincides with a proposed internal intersection.

Accordingly, it is considered that there will be an ASD of at least 115m along the site access road. This ASD would correspond to a design speed of 80km/h which is significantly higher than the speed at which vehicles would travel along the site access road.

A photograph showing the existing sight distance to the east at the location of the proposed access road is provided at Figure 9.

Figure 9: Sight Distance - View East at Proposed Access Road

Traffic Impact Assessment

Traffic Distribution

We understand that movements to and from the quarry will predominantly originate from Melbourne. This is particularly applicable for the larger vehicles which are to provide sand products for various industry purposes within the Melbourne Metropolitan Region (i.e. concrete batching, sand and soil supplies).

Accordingly, inbound movements are expected to travel on South Gippsland Highway, turning left into the site. Outbound movements are expected to travel north-westbound along South Gippsland Highway from the site. For the purpose of conservativity, we have assumed that 33% of all movements may originate and depart to the south-east (i.e. towards the nearby towns of Korumburra, Leongatha and Wonthaggi).

Traffic Generation

An assessment of the expected traffic generation based on the staffing and delivery estimates provided by the applicant is provided as follows. This includes:

- Maximum of 15 staff on-site at any one time
- Approximately 30 deliveries/outgoing per day by trucks.

Staff

We understand that the site is to be staffed by up to 15 people at any one time. Traffic generation associated with staff would be associated with entry movements at the start of shifts and exit movements at the end of shifts.

Conservatively assuming all staff arrive/depart in any one hour and assuming all staff drive via separate vehicles, we can anticipate in the order of 15 entering staff trips during the AM peak and 15 departing movements during the PM peak.

Trucks

We understand that there will be a daily traffic generation of approximately 30 loads for incoming and outgoing movements. Assuming that trucks are accommodated on-site, this equates to approximately 60 vehicle movements per day (i.e. outgoing movement with sand supplies and incoming movement returning to site).

Assuming truck movements are evenly distributed over a 10 hour day, this equates to a peak hour traffic generation rate of approximately 6 vehicles per hour.

Additionally, it is assumed that a split of 50/50 for truck entry and exit movements to the site within an hour.

Summary

Based on the above, it is projected that the proposed quarry may generate traffic impacts of approximately 21 vehicles per peak hour. This equates to approximately 1 vehicle movement every 3 minutes.

Accordingly, we are satisfied that the traffic volumes generated by the site are minimal and can be accommodated on the surrounding road network. A figure which identifies the indicative turning movements based on previous assumptions is provided at Figure 10.

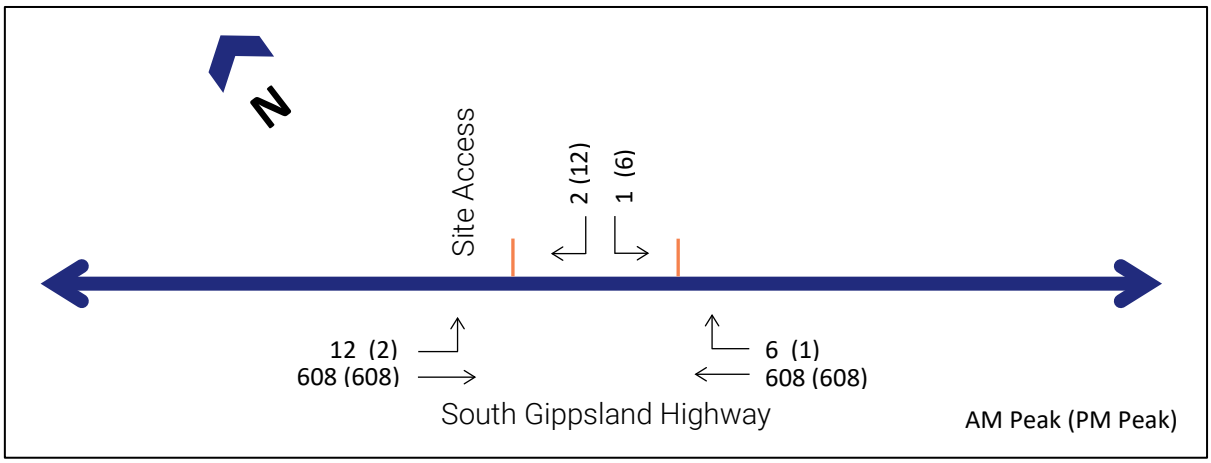


Figure 10: Post-Development Traffic Volumes

Indicative Road Works

Given the configuration of the nearby road network (arterial road with limited passing opportunities), it is our opinion that turn lanes should be provided as part of the access arrangements to the site. Observations along South Gippsland Highway in the vicinity of the site identified that a turn lane is provided to the following:

- Quarries and industrial uses.
- Single properties such as farm land.
- Lang Lang Golf Club.
- Local streets.

Accordingly, any works to be undertaken at the site's proposed access is to be designed in accordance with VicRoads supplements to the Austroads Guides.

Guidance regarding the types of treatment for the development has been taken from the AustRoads' "*Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings*". The referenced chart that has been adopted is relevant for speeds more than or equal to 100km/h based on the existing speed limit along South Gippsland Highway of 100km/h.

Figure 11 provides an assessment of critical AM peak period entry turn movements against the warrants for intersection treatments outlined in the Austroads Guide to Traffic Management. The volumes are based on those presented in Figure 10.

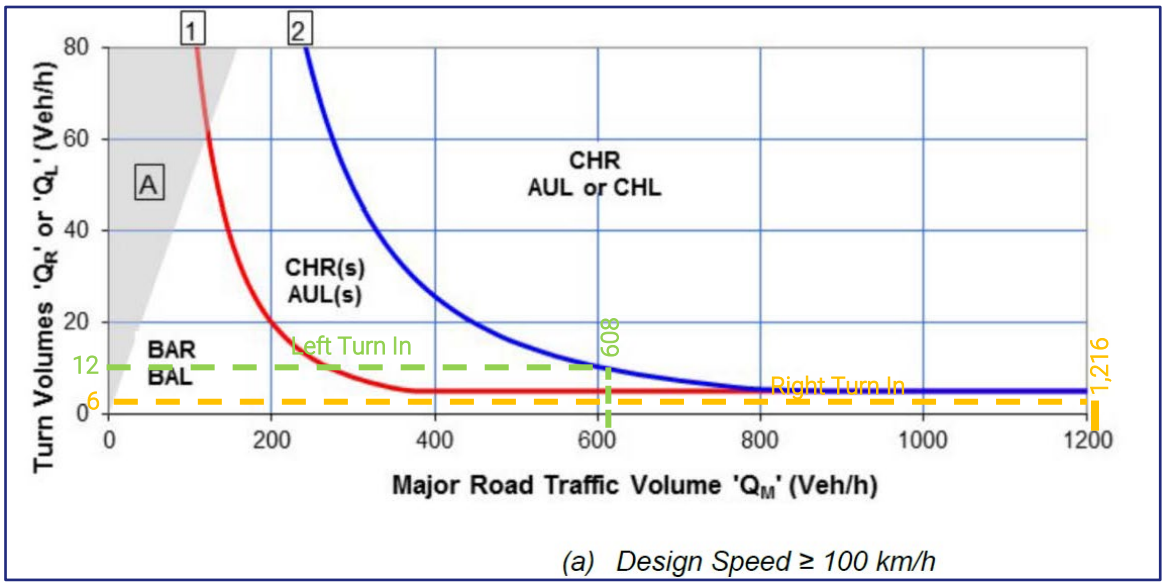


Figure 11: AM Peak - Site Access Entry Movements

The assessment identifies that under the Austroads Warrants the vehicle entry to the proposed development would be expected to meet the warrants for an auxiliary left turn (AUL) and Channelised Right turn (CHR) intersection treatment.

For the 110km/h design speed, the CHR treatment will require a total lane length of 205m including the taper to allow for a truck to store and vehicles to slow to a stop if required, and the AUL treatment will require a total lane length of 180m including the taper to allow vehicles to slow to a turning speed of 20km/h.

It is undesirable to provide auxiliary turn lanes on the minor road approach to an unsignalised intersection due to the vehicle in one lane obstructing the view of the vehicle in the other lane. Accordingly, a single lane approach is recommended for the access road.

Widening is proposed to occur predominantly on the eastern side of South Gippsland Highway to minimise the impacts on existing barriers, swale drains and vegetation.

A functional layout of the indicative/recommended works to be provided to access the site from South Gippsland Highway has been prepared and is attached at Appendix B.

The intersection has been designed to accommodate access for a 19m semi-trailer design vehicle and a B-25m B-double check vehicle.

Conclusion

Having undertaken a traffic engineering assessment for the proposed sand quarry development at 5575 South Gippsland Highway, Lang Lang, we are of the opinion that:-

a) The available sight distance along the South Gippsland Highway from the proposed site access in each direction meets the recommended sight distance requirements specified in the Austroads Guide to Road Design Part 4A,

b) It is projected that the proposed quarry may generate traffic impacts of approximately 21 vehicles per peak hour, equating to approximately 1 vehicle movement every 3 minutes. Accordingly, we are satisfied that the traffic volumes generated by the site are minimal and can be accommodated on the surrounding road network,

c) The proposed access is expected to meet the warrants for an auxiliary left turn (AUL) and Channelised Right turn (CHR) intersection treatment. A functional layout of the proposed site access from South Gippsland Highway including these treatments has been prepared and is attached at Appendix B, and

d) There is no traffic engineering reason not to issue a planning permit for the proposed sand quarry development at 5575 South Gippsland Highway, Lang Lang.

We trust this information meets with your requirements. Please contact Joshua Dunstone at Traffix Group if you require any further information.

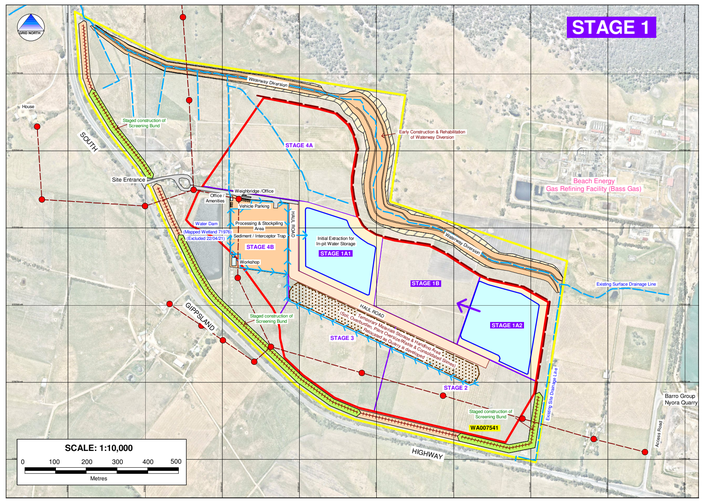
Yours faithfully,

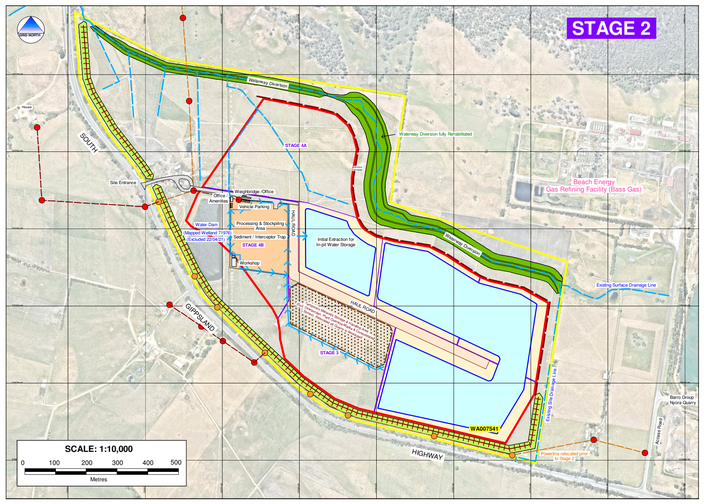
TRAFFIX GROUP PTY LTD

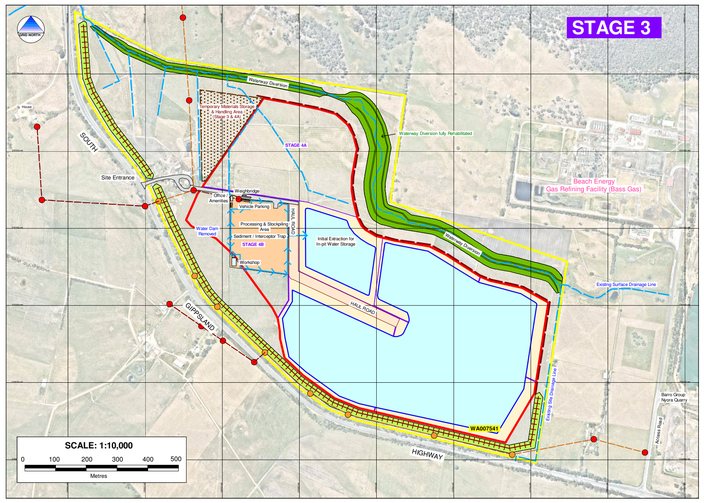
ROSS THOMSON
Senior Associate

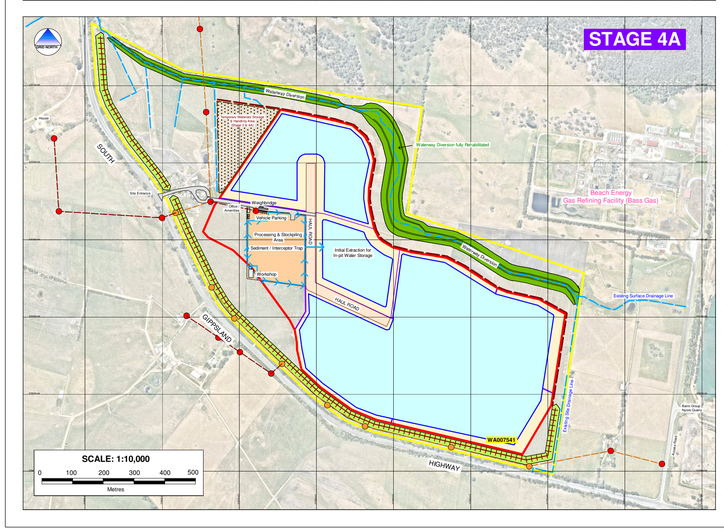
Appendix A

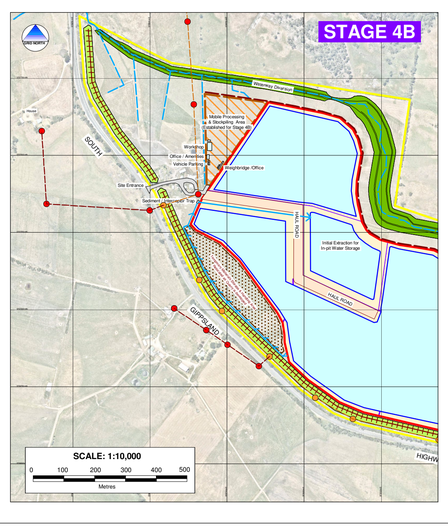
Proposed Development Layout Plan

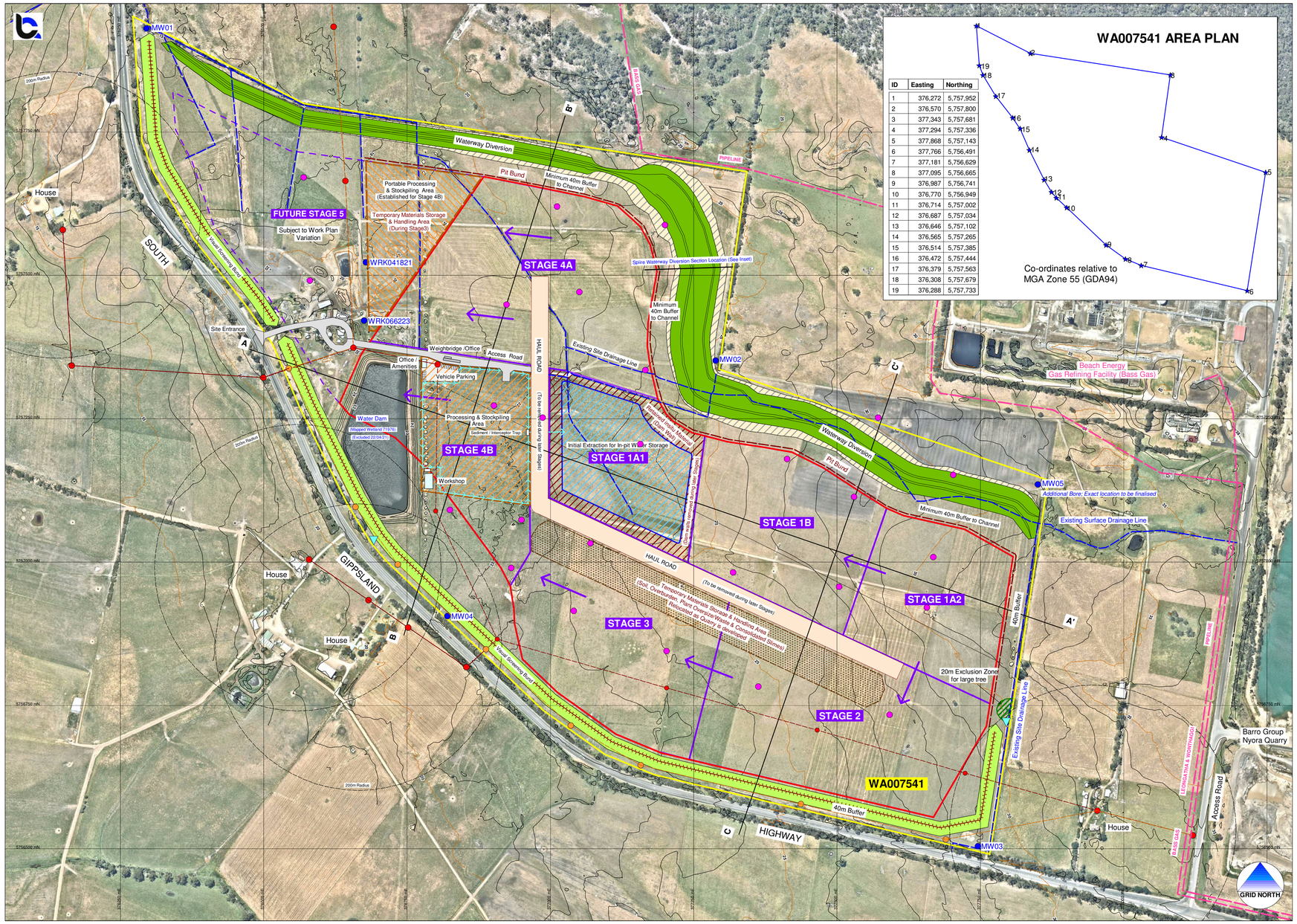












WA007541 AREA PLAN

ID	Easting	Northing
1	376,272	5,757,952
2	376,570	5,757,800
3	377,343	5,757,681
4	377,294	5,757,336
5	377,868	5,757,143
6	377,766	5,756,491
7	377,181	5,756,629
8	377,095	5,756,665
9	376,987	5,756,741
10	376,770	5,756,949
11	376,714	5,757,002
12	376,687	5,757,034
13	376,646	5,757,102
14	376,565	5,757,265
15	376,514	5,757,385
16	376,472	5,757,444
17	376,379	5,757,563
18	376,308	5,757,679
19	376,288	5,757,733

Co-ordinates relative to MGA Zone 55 (GDA94)

LEGEND

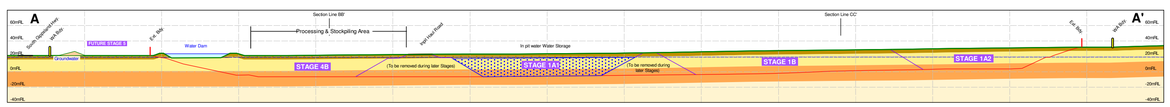
- WORK AUTHORITY 007541 BOUNDARY
- EXTRACTION BOUNDARY
- STAGE AREAS & DIRECTION
- WATERWAY DIVERSION CHANNEL & DISTURBED MARGINS (Spiire)
- EXISTING DRAINAGE LINE
- GAS PIPELINE (Underground)
- PIT BUND
- GROUNDWATER MONITORING BORES
- AIR QUALITY MONITORING STATION
- RUNOFF INTERCEPTION DRAIN
- CONTOUR (1m Interval)
- EXISTING POWER POLES & LINES
- RELOCATED POWER POLES & LINES "Exact location subject to Ausnet Approval"

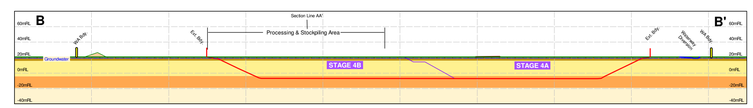
Aerial Photography Nearmap 22/12/19 & Topography Spiire 11/2018

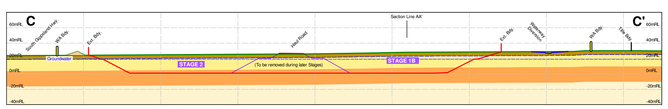
SECTION LEGEND

- Stage Boundary / Label
- Proposed Pit Profile
- Overburden
- Fine / Medium Sand
- Medium / Coarse Sand

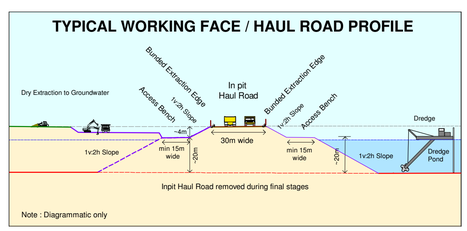
Both sand units contain layers of clay / interburden / organics & peat



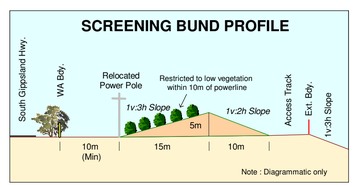




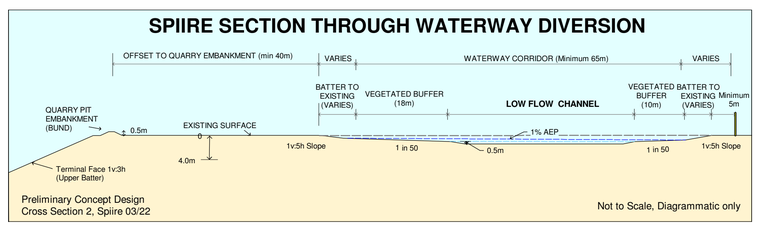
TYPICAL WORKING FACE / HAUL ROAD PROFILE



SCREENING BUND PROFILE



SPIIRE SECTION THROUGH WATERWAY DIVERSION



ADVERTISED PLAN

Plan & Cross Section Scale 1:4000

0 200 300 400 metres

ACM Sustaining Green

BCA CONSULTING EARTH RESOURCES

For **LANG LANG SAND RESOURCES P/L**

Extractive Industry Work Authority No: WA007541
Lang Lang Sand Pit, LANG LANG

SITE LAYOUT PLAN

Author:CLB, IGW, MS Date: 1/03/2023	Drawing: NS-2143 Revision: 2
Survey Source: Spiire	Contours: 1metre Vertical Datum: AHD
Orthophoto Date : Nearmap 22/12/2019	**Project No: A25_005**
Projection: MGA Zone 55 (GDA94)	**Figure: 3**
Fig3_SiteLayoutPlan_4000_0323.WOR	

Appendix B

Functional Layout Plan

ADVERTISED
PLAN

PRELIMINARY PLAN
FOR DISCUSSION
PURPOSES ONLY

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services
shown are approximate only and their exact
position should be proven on site.

ISSUE	ISSUE DESCRIPTION	DESIGNER	CHECKED/APPROVED	ISSUE DATE
A	INITIAL ISSUE	G R	J D (RPE0008682)	09 JUNE 2023

GENERAL NOTES
1. BASE INFORMATION FROM AERIAL PHOTOGRAPH (SOURCE: NEARMAP 2023).
2. ALL DIMENSIONS ARE TO FACE OF KERB & CHANNEL.
3. MAIN ROAD - SOUTH GIPPLSLAND HIGHWAY (SPEED ZONE 100km/h, DESIGN SPEED 110km/h).

DESIGNED
G. RAKITA

CHECKED/APPROVED
J. DUNSTONE

FILE NAME
G33135-00-00 dgn

Traffix Group
Level 28, 459 Collins Street
Melbourne, Victoria 3000
+61 3 9822 2888
www.traffixgroup.com.au

5575 SOUTH GIPPLSAND HIGHWAY
LANG LANG
CARDINIA SHIRE COUNCIL
FUNCTIONAL LAYOUT PLAN

SCALE 1:1000 (A3) 0 5 10 15 20
SHEET No.
DWG No. G33135-01-01

ADVERTISED PLAN

VEHICLE USED IN SIMULATION

(VEHICLE SPEED - 5km/h)

19m Semi

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

LEGEND

- FRONT WHEELS
- REAR WHEELS
- VEHICLE BODY
- BODY CLEARANCE

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services shown are approximate only and their exact position should be proven on site.

ISSUE	ISSUE DESCRIPTION	DESIGNER	CHECKED/APPROVED	ISSUE DATE
A	INITIAL ISSUE	G R	J D (RPE0008682)	09 JUNE 2023

GENERAL NOTES
1 BASE INFORMATION FROM AERIAL PHOTOGRAPH (SOURCE NEARMAP 2023)
2 ALL DIMENSIONS ARE TO FACE OF KERB & CHANNEL
3 MAIN ROAD - SOUTH GIPPLSLAND HIGHWAY (SPEED ZONE 100km/h, DESIGN SPEED 110km/h)

DESIGNED
G RAKITA

CHECKED/APPROVED
J DUNSTONE

FILE NAME
G33135-00-00 dgn

Traffix Group
Level 28, 459 Collins Street
Melbourne, Victoria 3000
+61 3 9822 2888
www.traffixgroup.com.au

5575 SOUTH GIPPLSAND HIGHWAY
LANG LANG
CARDINIA SHIRE COUNCIL
FUNCTIONAL LAYOUT PLAN

SCALE 1:1000 (A3) 0 5 10 15 20
SHEET No.
DWG No. G33135-01-01