Traffic Impact Assessment

Kiln 6 Upgrade Modification 9
Berrima Cement Works

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Contents

1. Introduction

TRAFFIX has been commissioned by the Boral Cement Limited to undertake a Traffic Impact Assessment (TIA) in support of a Section 75W (S74W) application seeking modification to the current consent for the Kiln 6 Upgrade at Berrima Cement Works, New Berrima.

Coal is currently used to fire the cement kilns at the cement works. The S75W modification seeks approval for the use of additional waste derived fuels and the associated construction of a fuel storage and feeding system to service Kiln 6. Due to the lower bulk density of the waste derived fuels, compared with coal fuel, the modification will result in a minor increase in truck movements. The primary objective of this TIA is to assess the implications of this additional traffic.

This report documents the finding of our investigations relating the traffic impacts of the modification works. The remainder of the report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the traffic implications
- Section 6: Presents the overall study conclusions

2. Location and Site

The Berrima Cement Works site is located in New Berrima and lies within the Wingecarribee local government area, approximately 2.5 kilometres east of the Hume Highway (M31 Motorway), 8 kilometres southwest of Bowral and 50 kilometres west of Port Kembla. A Location Plan is presented in **Figure 1** that shows the location of the site within the wider regional context.

At a local level, the main operational area of the cements works is located south of Taylor Avenue. However, the overall cement works site also includes largely vacant rural land to the west and northwest and northeast of Taylor Avenue as well. A Site Plan is presented in **Figure 2** which shows the sites location with the context of New Berrima.

The overall site has a total site area of approximately 330 hectares and is completely contained in the sector bounded by Australia Avenue to the north, Berrima Road to the east, Old Hume Highway to the west and the New Berrima suburb boundary to the south. Taylor Avenue traverses the whole length of the site running 1.8 kilometres west from the intersection with Berrima Road.

The operational area of the cement works, including the internal site area of the proposed development modifications, is more accurately contained by Taylor Avenue to the north, Berrima Road to the east and by the alignment of Argyle Street to the west.

Reference should be made to the Photographic Record presented in **Appendix A**, which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

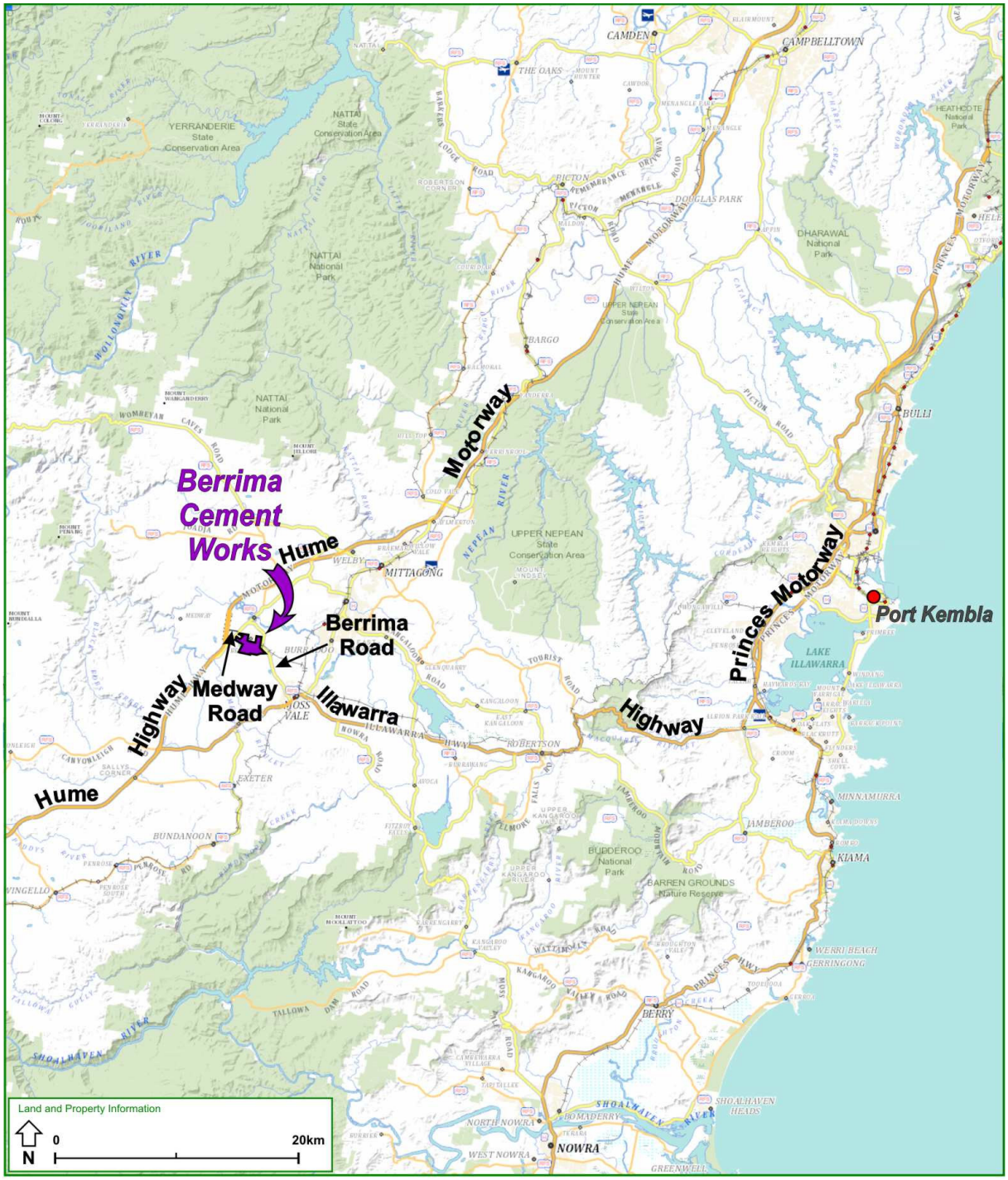


Figure 1: Location Plan

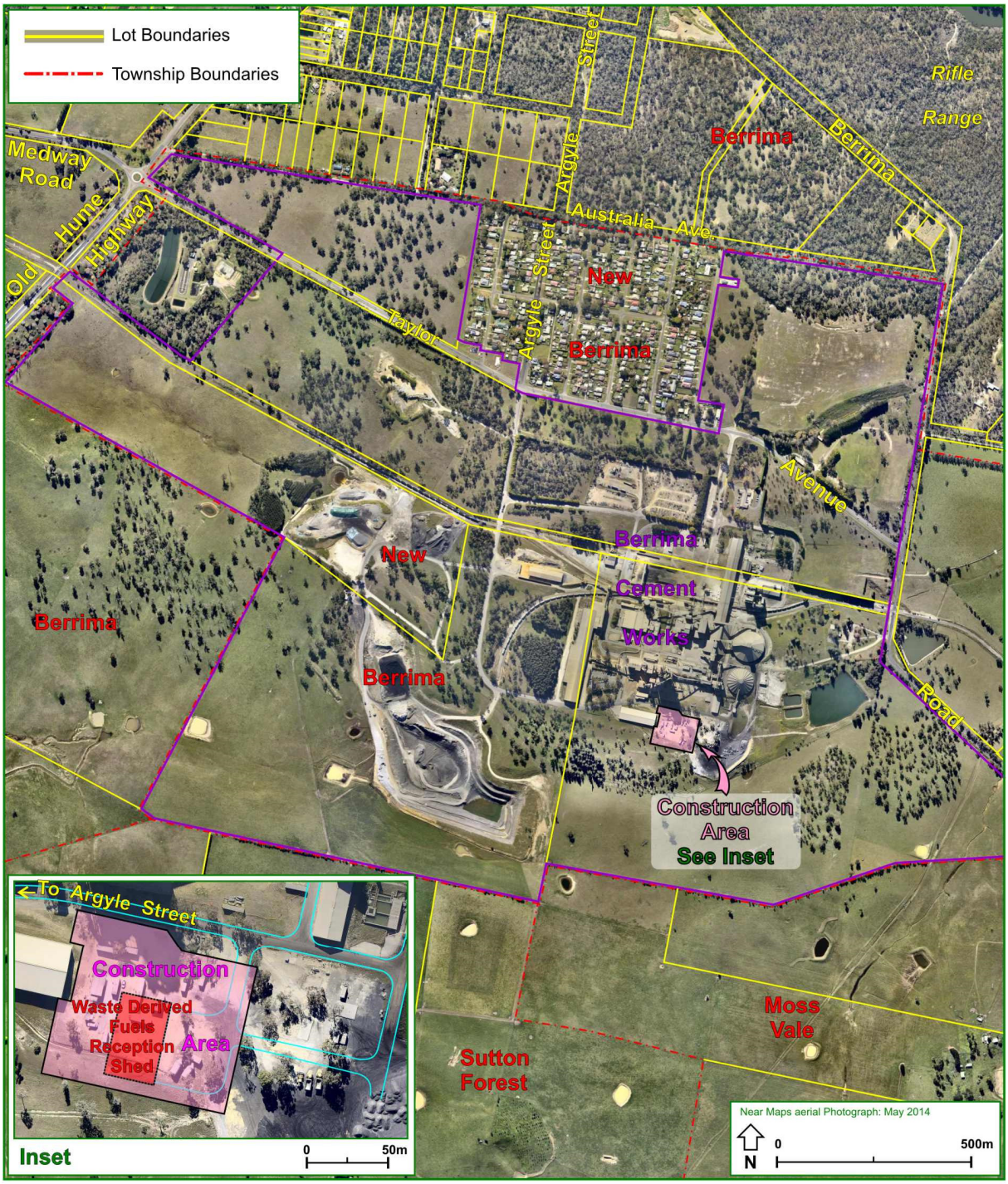


Figure 2: Site Plan

3. Existing Traffic Conditions

3.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** and key roads in the vicinity of the site are discussed in the following sections.

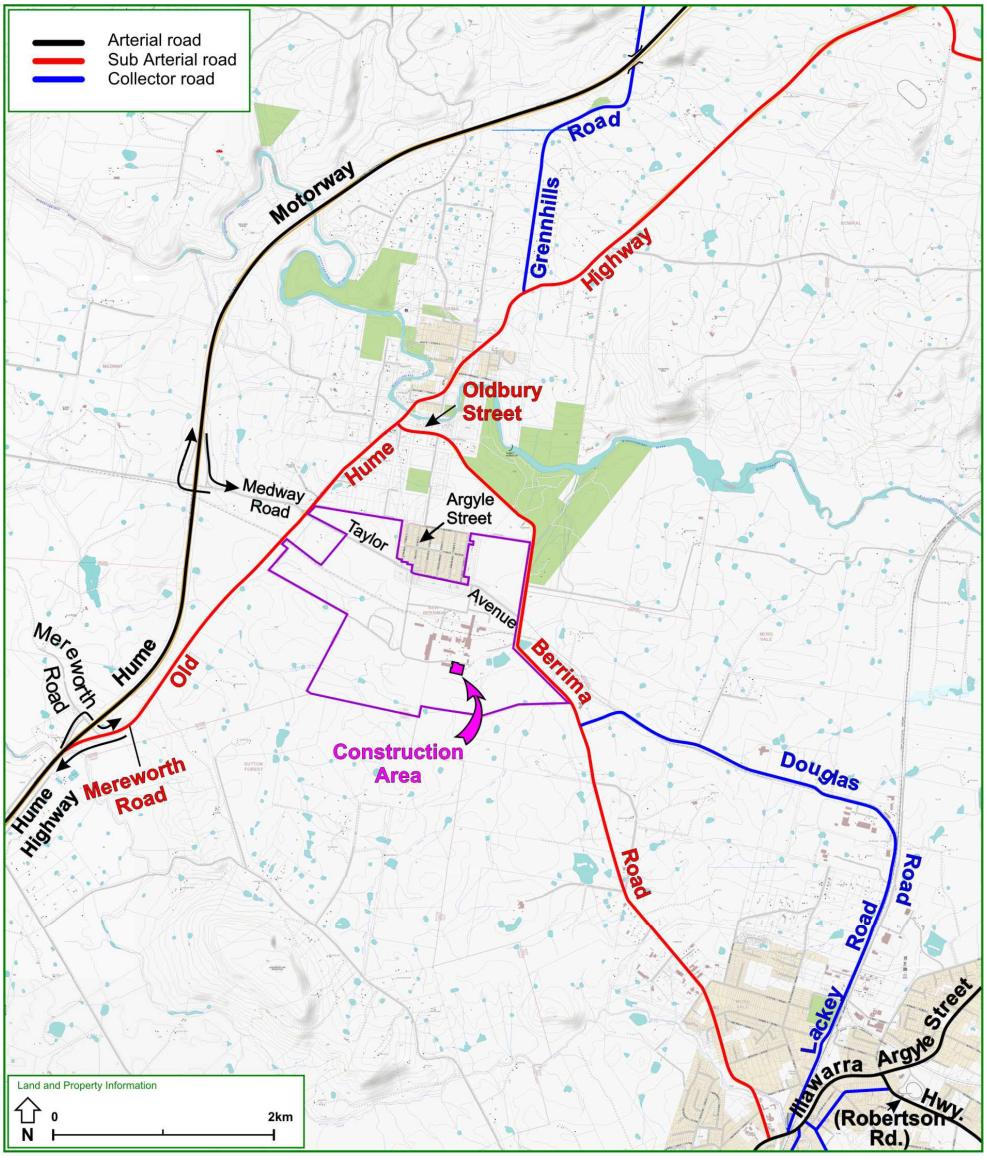


Figure 3: Road Hierarchy

3.1.1 Taylor Avenue

Taylor Avenue is a local road that runs in an east-west direction which connects Berrima Road in the east with Old Hume Highway in the west. It provides a key link for the cement works with the majority of heavy vehicles using it to access the Hume Highway (M31 Motorway) to the west. Within the vicinity of the site, Taylor Avenue is subject to a 50 km/h speed zoning.

It is understood that a 'typical transport day' for the cement works occurs mainly during the following hours:

- Weekdays: 12-hours, from 4.00am in the morning until 4.00pm in the afternoon; and
- Saturdays: 6-hours, from 7.00am in the morning until 1.00pm in the afternoon.

Limited operations (generating low volumes of heavy vehicle traffic) also occur outside these periods.

In order to assess the impacts of the proposal upon Taylor Avenue, a tube counter was placed across it, between the intersections with Sydney Street and Melbourne Street, to record traffic volume and speed data. The following summarises relevant data that the tube counter recorded during the seven (7) day survey period from 12.00am Thursday 11 September to 12.00am Thursday 18 September:

- 5-Day (Weekday) Average Daily Traffic volume data demonstrating that on average:
  - 2,795 vehicles use Taylor Avenue over a 24-hour period, including 767 trucks (27.4%).
  - 2,025 vehicles use Taylor Avenue over the 12-hour peak operating period (4.00am - 4.00pm), including 632 trucks (31.2%).
- Saturday Daily Traffic volume data demonstrating that:
  - 1,866 vehicles used Taylor Avenue over a 24-hour period, including 168 trucks (9.0%).
  - 698 vehicles used Taylor Avenue over the 6-hour peak operating period (7.00am - 1.00pm), including 96 trucks (13.8%).

- Sunday Daily Traffic volume data demonstrating that:
  - 1,637 vehicles used Taylor Avenue over the 24 hour period, including 98 trucks (6.0%)

3.1.2 Berrima Road

Berrima Road is an RMS Main Road (MR372) that runs in a north-south direction which connects Berrima in the north with Moss Vale in the south. It carries approximately 3,700 vehicles per day (2003 Annual ADT) and accommodates one traffic lane in either direction. Within the vicinity of the site, Berrima Road is subject to an 80 km/h speed zoning.

3.1.3 Old Hume Highway

The Old Hume Highway is an RMS Main Road (MR258) that runs in a north-south direction connecting Mittagong in the north with New Berrima in the south. It carries approximately 6,700 vehicles per day (2003 AADT) and accommodates one traffic lane in either direction. Within the vicinity of the site, the Old Hume Highway is subject to an 80 km/h speed zoning.

3.1.4 Hume Highway (M31 Motorway)

The Hume Highway is a national highway that runs in a generally northeast-southwest direction which connects the Sydney and Melbourne metropolitan areas. It carries approximately 9,850 vehicles per day (2012 AADT) and – in the vicinity of the site – has a divided carriageway with two traffic lanes in either traffic direction and is subject to a 110 km/h speed zoning.

It can be seen from **Figure 3** that the site is conveniently located with respect to the arterial road network serving the region.

3.2 Existing Site Characteristics

3.2.1 Summary of Existing Operation

The Berrima Cement Works manufactures clinker and cement products using the only remaining cement kiln (Kiln 6) in New South Wales. Raw materials are sourced and delivered to the plant via road and rail to produce up to 1.56 million tonnes of clinker per year for customers in NSW, ACT and overseas. In addition, coal is transported to site by road to be used as heat energy within Kiln 6.

The cement works is operational 24 hours a day, 7 days a week but, as mentioned, the typical peak transport hours are for a 12-hour period during weekdays between 4.00am and 4.00pm and on Saturdays for a 6-hour period between 7.00am and 1.00pm.

The Berrima Cement Works employs approximately 150 people.

3.2.2 Existing Access

With reference to **Figure 4**, there are two gates to the site providing access to the Berrima Cement Works site which are managed according to the vehicle type and purpose. A private railway line also operates through the site which enters the site at Berrima Road.

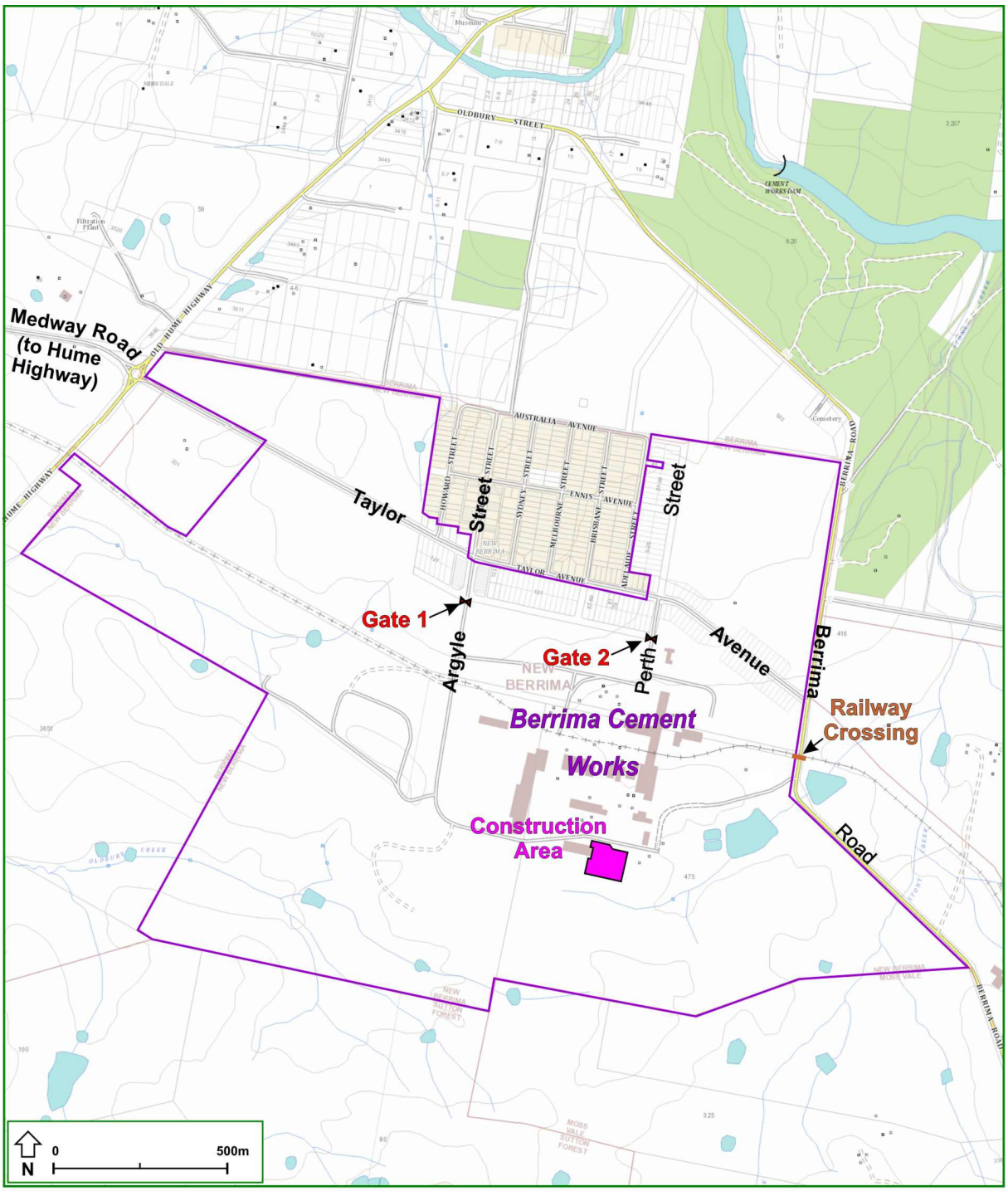


Figure 4: Site Access Points

The following summarises the functions of the two site accesses identified on **Figure 4**:

- Gate 1: On Argyle Street, used for access to administration, reception & stores;

- Gate 2: On Perth Street, used for all truck deliveries and dispatches;

3.2.3 Existing Traffic Generation

Boral Cement has provided detailed information regarding truck movements associated with the Berrima Cement Works. A daily volume of the truck loads has been established for each material, depending on payload capacity of the assigned truck. The information provided by the cement works indicates that the total number of truck loads per day that are transported for existing operations is approximately 207 loads. Due to the efficiency benefits of backloading trucks, whereby a truck arrives carrying a load of material (i.e. aggregate) and departs carrying a load of another material (i.e. clinker product), these 207 individual loads translates to only approximately 297 truck movements (arrival trips and departure trips) per weekday. It is also worth noting that raw materials, clinker and cement products are also delivered and dispatched via the privately operated railway line.

The deliveries and dispatch of materials to and from the cement works by road can be broken down as follows:

- Deliveries of raw materials used for production of clinker and cement are around 357,000 tonnes/year. Roughly half of this material is sourced from Port Kembla and the remaining shale and minerals mined from Marulan. Raw materials are generally delivered on weekdays from Monday to Friday using truck and dog trailer combinations with a payload capacity varying between 20-30 tonnes;

- Deliveries of fuels to create energy to operate the kiln are generally 220,000 tonnes/year on average. Currently this consists entirely of coal and coke breeze supplied from Port Kembla. B-Double trucks with a 35 tonne payload capacity are used to deliver this fuel on Saturday mornings in addition to weekdays; and

- Dispatch of manufactured clinker and cement are around 300,000 tonnes/year and 550,000 tonnes/year on average for each material respectively. Clinker is dispatched using a truck and dog combination with 30 tonne payload capacity generally between Wednesdays and Fridays while cement products are distributed 24 hours a day 7 days a week across NSW, ACT and overseas, serviced by a fleet of semi-trailers and B-Double powder tanker trucks.

As previously discussed, the information provided by the cement works indicates that the total number of truck loads per day that are transported for existing operations is approximately 207 loads, translating to approximately 297 truck movements (arrival trips and departure trips) per weekday. These movements generally occur uniformly throughout an average 12-hour weekday; therefore, on average the works site generates approximately 25 vehicle movements per hour.

With regard to Saturdays, operations are generally limited to deliveries of coal fuel and the dispatch of cement products. The total number of truck loads per Saturday that are transported for existing operations results in about 90 truck movements (arrival trips and departure trips), about 23 trips for coal fuel, and 67 trips for deliveries of cement. These movements also occur uniformly throughout an average 6-hour Saturday; therefore, on average the cement works site generates approximately 15 movements (trips) per hour on Saturday mornings.

Cement deliveries also occur outside these hours, with the cement works operating 24 hours a day 7 days a week. Limited volumes of heavy vehicle traffic are generated during these periods.

3.2.4 Existing Truck Routes

It is understood that all cement works truck traffic accesses the New Berrima area via the Hume Highway (M31 Motorway) to the west of the site. To access the Hume Highway, the majority of trucks depart via Gate 2 and travel west through New Berrima along Taylor Avenue to the roundabout intersection at its western termination. From this roundabout, trucks travel either west along Medway Road or southwest along the Old Hume Highway, depending on whether their destination is north or south of New Berrima (refer to **Figures 3 and 4**).

4. Description of Proposed Development

The proposed changes to the consented development relate to the fuel system that supports Kiln 6 of the Berrima Cement Works. Modification of the development consent to approve the use of solid waste derived fuel is sought, along with the construction of the necessary fuel storage and feeding system. The development is shown indicatively on the plans attached at Appendix B. It is noteworthy that the modification will not result in any changes to staff levels, which are expected to remain at approximately 150 staff at the Berrima Cement Works.

4.1 Summary of Proposed Operation

The adoption of solid waste fuel is intended to supplement the existing use of coal to generate energy for the operation of Kiln 6, with no proposed change in the output of clinker and cement products. Provision of up to 100,000 tonnes of solid waste fuel is proposed to be used per year, which will reduce the reliance on coal from 220,000 tonnes consumed per year to around 170,000 tonnes.

It can be seen from the above figures that due to the lower bulk density of the solid waste fuel, compared with coal, an extra 50,000 tonnes of solid waste fuel is now required to service the existing energy needs of the kiln. As a result, there will be additional truck loads and movements to the site as a result of the modification to kiln 6.

4.2 Future Operational Traffic

Boral Cement has provided detailed information regarding the truck loads and movements that would need to be carried out to reflect the proposed development modifications and, specifically, the additional movements associated with the shift towards the use of solid waste fuel. The changes to the existing movements are isolated to delivery of fuel and would now accommodate:

- Coal and coke breeze: the reduction in coal required will result in five (5) fewer truck loads to 18 truckloads per day with 36 associated truck movements per day, a reduction from the 46 truck trips per typical weekday. A B-Double truck with 35 tonne payload would continue to deliver this coal on weekdays and Saturday mornings, when the 6-hour day would result in about 18 trips;

- Solid waste derived fuel: the waste fuel is to be delivered by either truck and dog trailer, walking floor trailers, flat bed trucks (for bales) or B-Double trucks with 24 tonne payload capacity. Based on this, 15 truckloads would need to be transported daily, resulting in 30 additional truck movements. Deliveries are to be made on the same weekday and Saturday morning timeframe; on Saturdays the 6-hour day would result in about 15 trips.

The traffic implications of the above changes are discussed in Section 5. It is noteworthy that due to the staffing levels remaining unchanged at about 150 staff, the proposed modification is not anticipated to have any parking implications. Therefore, the current level of on-site parking would remain satisfactory for the cement works once the modified Kiln 6 becomes operational.

5. Traffic Impact Analysis

5.1 Operational Traffic Generation

Table 1 summarises the details of the existing operational traffic for the Berrima Cement Works (refer to Section 3.2) and the details of the future operational traffic anticipated for the cement works following the proposed modification works (refer to Section 4.2). Table 1 also presents the 'net increase' in traffic volumes as a result of the proposal.

Table 1: Existing and Proposed Operational Truck Traffic

SCENARIO	12-HOUR WEEKDAY		6-HOUR SATURDAY MORNING	
	Daily	Hourly	Daily	Hourly
Existing (trucks)	297	24.8	90	15.0
Future (trucks)	317	26.4	100	16.7
Net Increase (trucks)	20	1.6	10	1.7
Net Increase (%)	6.7%	6.5%	11.1%	11.3%

Table 1 indicates that the net increase in traffic generation as a result of the proposal is:

- Weekday: 20 additional trips on an average 12-hour working weekday; equivalent to 1.6 additional truck trips per hour. These additional trips equate to an increase in truck trips of about 6.6%; and
- Saturday: 10 additional trips on an average 6-hour working Saturday, equivalent to 1.7 additional truck trips per hour. These additional trips equate to an increase in truck trips of about 11.2%.

The analysis above, in particular the fact that the proposal would generate about three (3) extra truck movements every two (2) hours on weekdays and Saturday mornings, demonstrates that the forecast increase in traffic generation as a result of the proposal is minor.

5.2 Taylor Avenue Impacts

Firstly, all additional waste fuel delivery truck traffic would use the same local truck routes as existing cement works trucks; that is, accessing the Hume Highway via Taylor Avenue and Medway Road or the Old Hume Highway. Accordingly, the proposal would not increase truck movements on roads that do not already support cement works trucks.

With regard to Taylor Avenue, **Table 2** summarises the details of the existing traffic flow volumes recorded by the tube count survey (refer to Section 3.1), the anticipated net increase in traffic (refer Table 1) and the percentage increase in traffic due to the modification works.

Table 2: Traffic Implications for Taylor Avenue

SCENARIO	WEEKDAY		SATURDAY	
	Daily	12-hour day, 4.00am – 4.00pm	Daily	6-hour day, 7.00am – 1.00pm
Existing (vehicles)	2,795	2,025	1,866	698
Net Increase (vehicles)	20	20	10	10
Net Increase (%)	0.7%	1.0%	0.5%	1.4%

Table 1 indicates that the impacts to Taylor Avenue traffic as a result of the proposal would be:

- Weekday: An increase of just 1.0% in Taylor Avenue traffic volumes during the typical 12-hour working weekday and just 0.7% across all 24-hours of an average weekday; and
- Saturday: An increase of just 1.4% in Taylor Avenue traffic volumes during the typical 6-hour working Saturday and just 0.5% across all 24-hours of an average Saturday.

In summary, the traffic generation analysis above demonstrates that the additional traffic volumes required to deliver solid waste fuel would be minor at just 1.6-1.7 additional truck movements per hour during the average working weekday or Saturday. These additional traffic volumes equate to an increase in traffic volumes on Taylor Avenue of just 1.0-1.4% during the average working weekday or

Saturday. It is clear that traffic increases of such a low order would have no material impact on the performance or safety of the local road network and therefore no external infrastructure upgrades are required.

6. Conclusions

In conclusion:

- TRAFFIX has been commissioned by the Boral Cement to undertake a Traffic Impact Assessment in support of a Section 75W application seeking modification to the current consent for the Berrima Cement Works, New Berrima. The S75W modification seeks approval for the use of waste derived fuels and the associated construction of a solid waste fuel storage and feeding system to service Kiln 6;

- The traffic generation analysis presented in this TIA demonstrates that the additional traffic volumes required to deliver solid waste fuel would be minor at just 1.6-1.7 additional truck movements per hour during the average working weekday or Saturday. These additional traffic volumes equate to an increase in traffic volumes on Taylor Avenue of just 1.0-1.4% during the average working weekday or Saturday. It is clear that traffic increases of such a low order would have no material impact on the performance or safety of the local road network and therefore no external infrastructure upgrades are required;

- All additional waste fuel delivery truck traffic would use the same local truck routes as existing cement works trucks; that is, accessing the Hume Highway via Taylor Avenue and Medway Road or the Old Hume Highway. Accordingly, the proposal would not increase truck movements on roads that do not already carry cement works trucks;

- To offset the road impacts of the additional truck movements on Taylor Avenue as a result of the modification, Boral commits to:

    - paying a road maintenance levy to Council of 4 cents/tonne/km for the waste derived fuels the subject of this application; and

    - surrendering the coal stockpiling for sale modification (MOD 6) that was approved on 20 June 2012.

- Due to the staffing levels remaining unchanged at about 150 staff, the proposed modification is not anticipated to have any parking implications.

It is therefore concluded that the proposed development at the Berrrima Cement Works would have minimal impacts and is supportable on traffic planning grounds.

Appendix A

Photographic Record

View on Taylor Avenue looking east at the intersection of Argyle Street

View on Argyle Street looking south at the Gate 1 entrance to the subject site

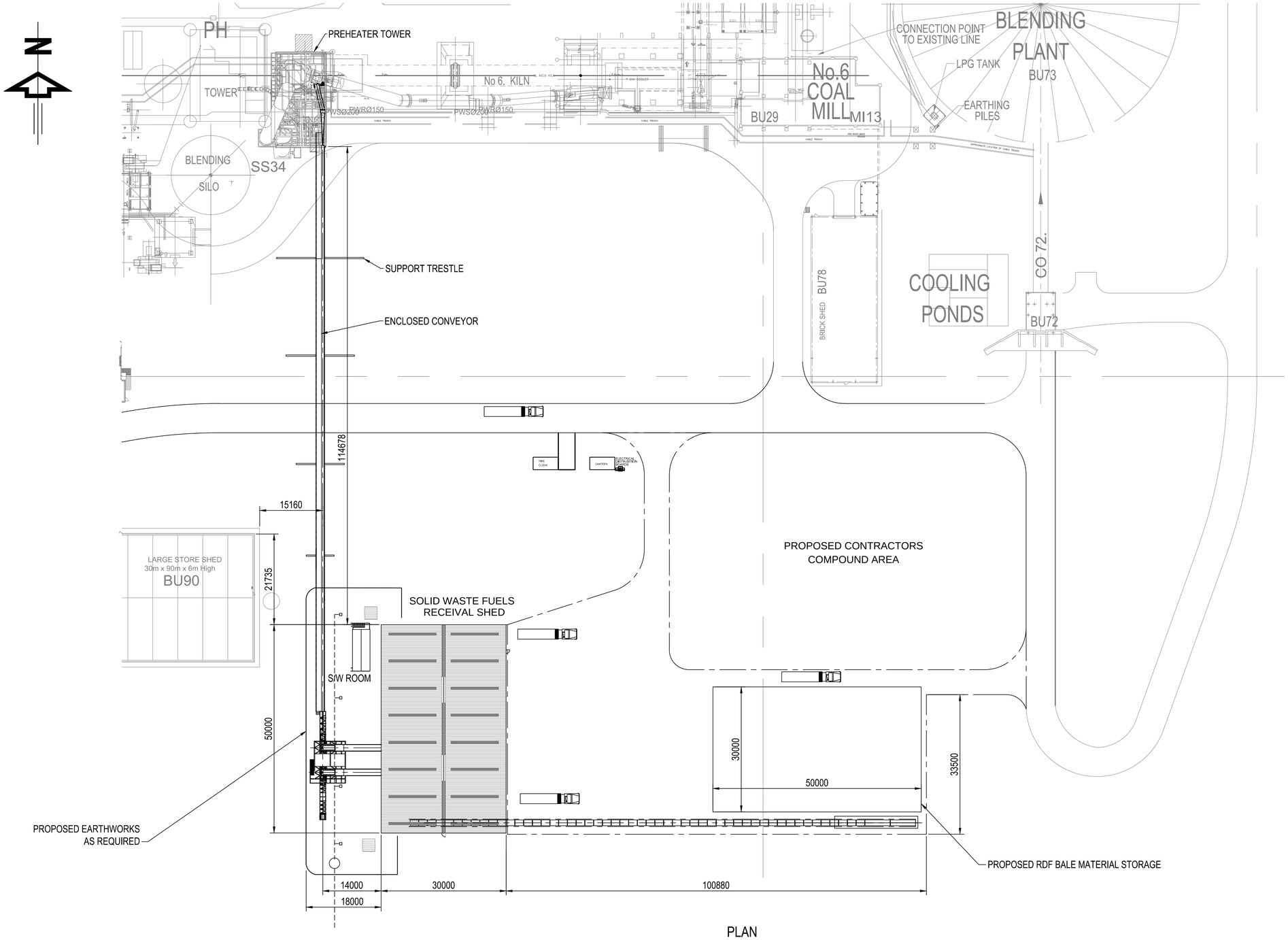
View on Taylor Avenue looking west at the intersection with Perth Street

View on Taylor Avenue looking at the Gate 2 entrance to subject site accessed off Perth Street

View on Medway Road looking west at the southbound exit of the Hume Highway interchange

Appendix B

Reduced Plans



PLAN

REV.	DATE	REV-BY APPROVED	REVISION
DP	15/01/15	M. Smith	DRAWING REVISED
D	3-12-14	L.P.McIntosh	DRAWING REVISED.
C	4-9-14	L.P.McIntosh	DRAWING REVISED.
B	25-7-14	L.P.McIntosh	DRAWING REVISED. RDF STORAGE RELOCATED.
A	29-5-14	D.KLUSENBERG	DRAWING ISSUED FOR COMMENT

REVISIONS

DRAWN: D.KLUSENBERG DATE: 29-5-14
CHECKED: DATE:
ENGINEER: DATE:
APPROVED: DATE:

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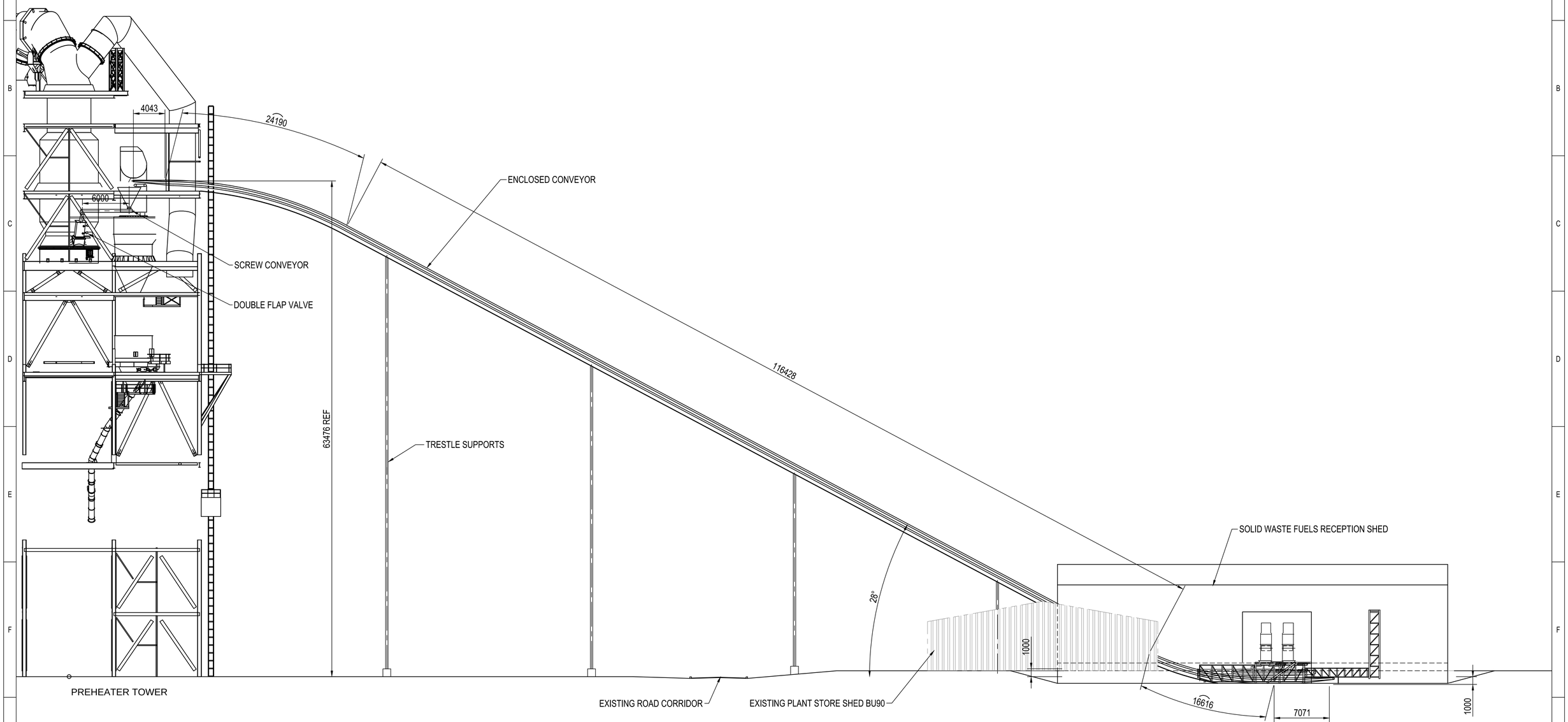
STATUS: PRELIMINARY

ALPHA NUMERIC:
BCSC-GES JOB No: GBM452
STOCK NUMBER
SHEET: A1
SCALE: NTS

PLANT: BERRIMA
PROJECT: SOLID WASTE FUELS
SECTION: KILN No6
SUB SECTION: PREHEATER
TITLE: MATERIAL SHED SITE - PLAN
CLASSIFICATION: GENERAL ARRANGEMENT

GROUP ENGINEERING No: PLANT GE-B- DRAWING 2278 - SHEET 01
WORKS No:
REV. DP



ELEVATION LOOKING WEST

REV.	DATE	REV-BY APPROVED	REVISION
BP	28-7-14	L.P.McIntosh	DRAWING REVISED.
A	29-5-14	D.KLUSENBERG	DRAWING ISSUED FOR COMMENT

REVISIONS

DRAWN:	D.KLUSENBERG	DATE: 29-5-14
CHECKED:		DATE:
ENGINEER:		DATE:
APPROVED:		DATE:

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ALPHA NUMERIC:

BCSC-GES JOB No: GBM452

STOCK NUMBER

SHEET: A1

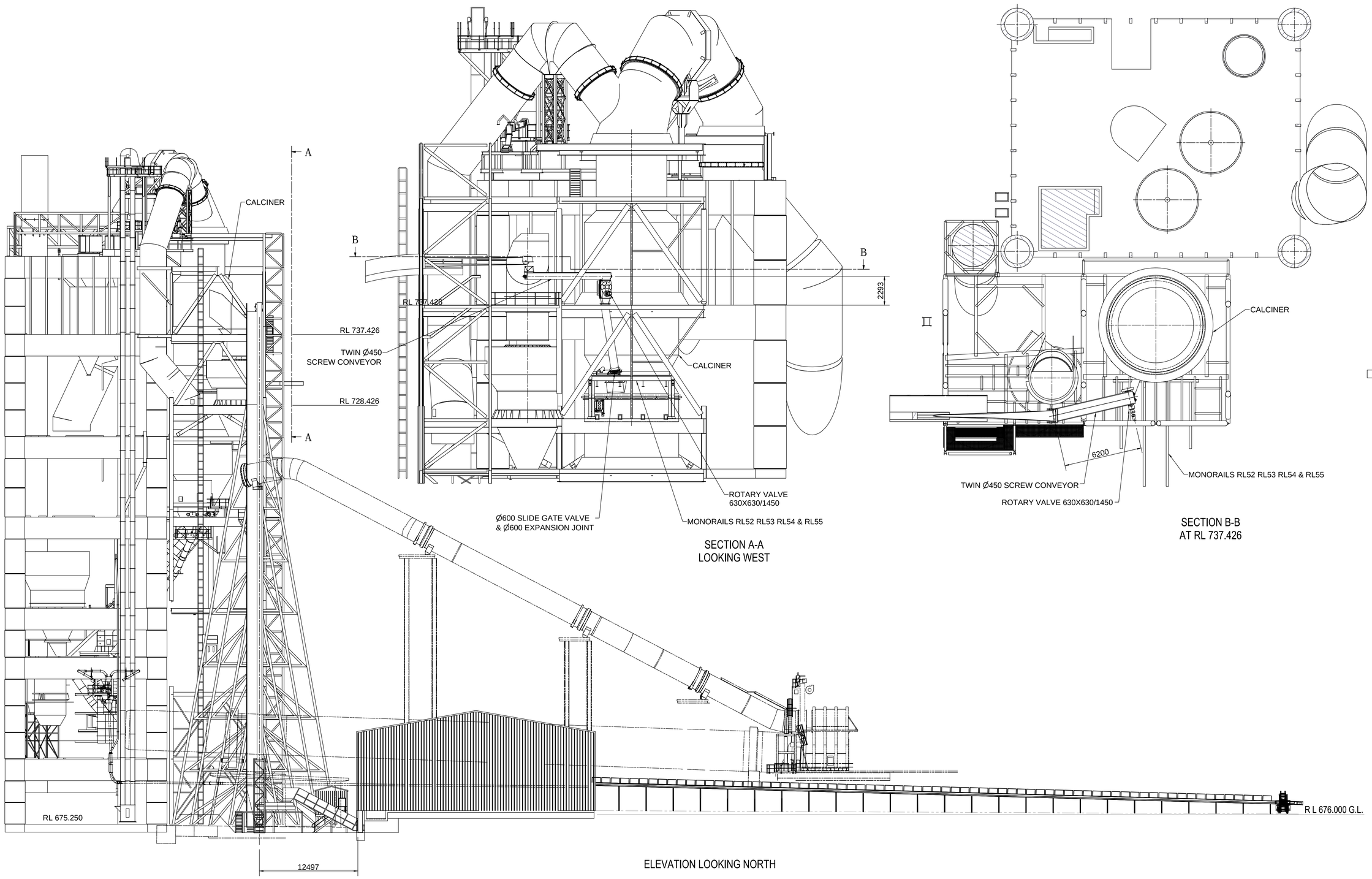
SCALE: NTS

PLANT: BERRIMA
PROJECT: SOLID WASTE FUELS
SECTION: KILN No6
SUB SECTION: PREHEATER
TITLE: MATERIAL SHED SITE - ELEVATION LOOKING EAST
CLASSIFICATION: GENERAL ARRANGEMENT

GROUP ENGINEERING No: PLANT GE-B- DRAWING 2281 - SHEET 01

WORKS No:

REV. BP



SECTION A-A
LOOKING WEST

SECTION B-B
AT RL 737.426

ELEVATION LOOKING NORTH

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
A	16/06/2014	L.P.McIntosh		DRAWING ISSUED

REVISION HISTORY

DRAWN: L.P.McIntosh	DATE: 16/06/2014	STATUS: PRELIMINARY	
CHECKED:	DATE:		
ENGINEER:	DATE:	ALPHA NUMERIC:	BCES JOB No: GBM452
APPROVED:	DATE:	STOCK NUMBER:	SHEET: B1 SCALE: NTS

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PLANT:	BERRIMA
PROJECT:	SOLID WASTE FUELS
SECTION:	KILN No6
SUB SECTION:	PREHEATER
TITLE:	PREHEATER TUBE CONVEYOR DISCHARGE GENERAL ARRANGEMENT
CLASSIFICATION:	

GROUP ENGINEERING No: PLANT DRAWING SHEET GE-B-2282-01

WORKS No: REV. AP