Great Northern Concrete Works Approval Application
Supporting Document

Date: 8 November 2018
Reference: M21142018-001_A
DOCUMENT CONTROL RECORD

Prepared and Authorised By: Murali Mahendran
Position: General Manager
Signed: 
Date: 8 November 2018

REVISION STATUS

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Description of Revision</th>
<th>Date</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Great Northern Works Concrete Approval Document</td>
<td>8 November 2018</td>
<td>Murali Mahendran</td>
</tr>
</tbody>
</table>

Recipients are responsible for eliminating all superseded documents in their possession.

Disclaimer

This document is published in accordance with and subject to an agreement between GaiaRevolution and the Great Northern Concrete Pty Ltd (Client). It is confined to the issues that have been raised by the Client in the Client’s engagement of GaiaRevolution and is prepared using the standard of skill and due care ordinarily exercised by environmental consultants in preparing such documents.

Any person or organisation that relies on or uses the document for reasons or purposes other than those agreed by GaiaRevolution and the Client without first obtaining the prior written approval of GaiaRevolution does so entirely at their own risk. To the extent permitted by law, GaiaRevolution excludes any liability, including any liability for negligence, for any loss, including indirect or consequential damages arising from or in relation to any reliance on this document for any purpose other than that agreed with the Client.
# TABLE OF CONTENTS

1. **TABLE OF CONTENTS** ........................................................................................................... 3

1. **Applicant Details** .................................................................................................................. 5

1.1 **Overview** .............................................................................................................................. 5

1.2 **Purpose** ................................................................................................................................ 6

1.3 **Prescribed Premises Category** ............................................................................................ 6

2. **Prescribed Premise** .................................................................................................................. 7

2.1 **Location** ................................................................................................................................. 7

3. **Other Approvals** ..................................................................................................................... 9

4. **Stakeholder Consultation** ....................................................................................................... 9

5. **Design Principles** .................................................................................................................. 9

6. **Throughput** ............................................................................................................................ 10

7. **Operations** ............................................................................................................................ 11

7.1 **Aggregate Material Storage Areas** ....................................................................................... 11

7.2 **Cement Silos** ......................................................................................................................... 11

7.3 **Slump Stand Area** .................................................................................................................. 11

7.4 **Staff** ..................................................................................................................................... 11

7.5 **Hours of Operation** ............................................................................................................... 11

7.6 **Amenities Facilities** ............................................................................................................... 12

7.7 **Services** .................................................................................................................................. 12

7.8 **Security** .................................................................................................................................. 12

8. **Fit and Competent Operator** .................................................................................................. 14

9. **Existing Environment** ............................................................................................................. 15

9.1 **Flora and Vegetation** ............................................................................................................ 15

9.2 **Fauna** .................................................................................................................................. 15

9.3 **Surface Water** ....................................................................................................................... 15

9.4 **Ground Water and Soil** ........................................................................................................ 15

10. **Indigenous Heritage** ............................................................................................................. 16

11. **Public Health and Environmental Risks** ........................................................................... 17

11.1 **Emission to Land** ................................................................................................................ 17

11.2 **Emission to Air** .................................................................................................................... 20

11.3 **Noise Emission** ................................................................................................................... 21

12. **Sighting and Location** .......................................................................................................... 24

12.1 **Public and Residential Places** ............................................................................................. 24

13. **Environmental Management** ............................................................................................... 26

13.1 **Environmental Management Framework** ........................................................................ 26

13.1.1 **Management of Dust** ..................................................................................................... 26

13.1.2 **Management of Noise** .................................................................................................... 29
13.2 Monitoring.................................................................................................................. 30
13.2.1 Monitoring Actions ............................................................................................... 30
13.2.2 Audits and Inspections ......................................................................................... 30
13.3 Complaints Handling............................................................................................... 30
14 Conclusion..................................................................................................................... 31
15 Appendix....................................................................................................................... 32

TABLES

Table 1: Proposal Profile ........................................................................................................ 6
Table 2: Prescribed premises categories .................................................................................. 6
Table 3: Source Sound Power Levels ...................................................................................... 21
Table 4: Predicated Noise Levels ........................................................................................... 22
Table 5: Predicted mitigated noise levels ............................................................................... 23

FIGURES

Figure 1 Location of the Proposed Prescribed Premises ......................................................... 5
Figure 2 Location of the Proposed Concrete Batching Plant .................................................... 7
Figure 3 Excerpt of MENSPP ............................................................................................... 8
Figure 4 Proposed Concrete Batch Plant Layout ................................................................. 13
Figure 5 Flow of water through the production process ......................................................... 19

APPENDICES

Appendix 1 Works Approval Application form DWER IR-F09 .................................................. 32
Appendix 2 Environmental Management Plan ........................................................................ 33
Appendix 3 Dust Management Plan ....................................................................................... 34
Appendix 4 Noise Impact Assessment .................................................................................... 35
Appendix 5 Air Quality Assessment ......................................................................................... 36
Appendix 6 EPA determination of Scheme Amendment for the Construction and Operation of the Mobile Concrete Batch Plant ..................................................................................... 37
Appendix 7 Letter of no objection .......................................................................................... 38
Appendix 8 Proposed Scheme Amendment – Submission Response ....................................... 39
Appendix 9 Scheme Amendment Approval ............................................................................... 40
1 Applicant Details

1.1 Overview

Great Northern Concrete Pty Ltd (Great Northern Concrete) is in the process of establishing a new mobile concrete batching plant (MCBP) at Lot 22 (No. 3728 Great Northern Highway, Muchea) which will distribute premixed concrete for the construction industry.

The site is located within the Shire of Chittering, north of Perth approximately 70km northeast of the Perth Central Business District (CBD) 50km north of the Midland City Centre and 40 km north of Ellenbrook (Figure 1). The 2.0013ha site is currently zoned ‘General Industry’ under the Local Planning Scheme No. 6.

Figure 1 Location of the Proposed Prescribed Premises
Table 1: Proposal Profile

<table>
<thead>
<tr>
<th>Proposal Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Great Northern Concrete Pty Ltd</td>
</tr>
<tr>
<td>CAN/ABN</td>
<td>38 618 099 693</td>
</tr>
<tr>
<td>Registered Business Address</td>
<td>3728 Great Northern Highway Muchea, Western Australia, 6501</td>
</tr>
<tr>
<td>Geographical Region</td>
<td>Wheatbelt</td>
</tr>
<tr>
<td>Local Government District</td>
<td>Shire of Chittering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Murali Mahendran</td>
</tr>
<tr>
<td>Position</td>
<td>General Manager</td>
</tr>
<tr>
<td>Company</td>
<td>Gaiarevolution</td>
</tr>
<tr>
<td>Mobile</td>
<td>0414 770 395</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:murali@gaiarevolution.com">murali@gaiarevolution.com</a></td>
</tr>
<tr>
<td>Postal Address</td>
<td>PO Box 260, Parkwood, WA, 6147</td>
</tr>
</tbody>
</table>

1.2 Purpose
The purpose of this document is to support an application for a Works Approval for construction commissioning, and operation of mobile concrete batching plant in line with the Environmental Protection Act 1986 – Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998.

1.3 Prescribed Premises Category
The concrete batching plant is a prescribed premises as defined in Part 1 of Schedule 1 of the Environmental Protection Regulations 1987 (Table 2).

Table 2: Prescribed premises categories

<table>
<thead>
<tr>
<th>CATEGORY NO.</th>
<th>DESCRIPTION</th>
<th>PRODUCTION OR DESIGN CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Concrete batching or cement products manufacturing: premises on which cement products or concrete are manufactured for use at places or premises other than those premises.</td>
<td>100 tonnes or more per year</td>
</tr>
</tbody>
</table>
2 Prescribed Premise

2.1 Location

The site is located within the Shire of Chittering, north of Perth approximately 70km northeast of the Perth Central Business District (CBD) 50km north of the Midland City Centre and 40 km north of Ellenbrook (Figure 2).

![Figure 2 Location of the Proposed Concrete Batching Plant](image)

The site is located within a planned industrial precinct within the Shire of Chittering known as the Muchea Employment Node (MEN). The MEN has been identified for the provision of service-based uses such as transport, livestock, fabrication, warehousing, wholesaling and general commercial use and will provide a concentration of employment opportunities both locally and in surrounding areas. The MEN has a total area of 1,113ha comprising four precincts including Precinct 1 north A, Precinct north B, Precinct 2 south, Precinct 3 west and Precinct 4 east. The 2.0013ha site is located within Precinct 1 north A.

The MEN is currently serviced by Great Northern Highway which separates Precincts 1 and 2 (east) from Precinct 3 (west). The entire MEN area will ultimately be serviced by the Perth to Darwin Highway which is aligned to the west of the structure plan area.

An excerpt of the Muchea Employment Node Structure Plan (MENSP) is included at Figure 2 and identifies the site.

The site has been a farm pasture paddock previously. The site has no native vegetation the pasture has been well maintained.

For the purpose of the Works Approval Application the cadastral boundary of Lot 22 is the premises boundary.
Figure 3 Excerpt of MENSP
3 Other Approvals

Rights in Water and Irrigation Act 1914
5C Licence to take water : Licence Number GWL200284(1)

Part IV of the Environmental Protection Act 1986
The scheme amendment to rezone the proposed prescribed premises location from Agricultural Resources to General Industry to build and operate the MCBP was referred to the EPA under Section 48A of the Environmental Protection Act 1986 by the Shire of Chittering. The EPA determined that no further assessment is required on 24 January 2018 (Appendix).

Planning and Development Act 2005
In order to establish the plant Great Northern Concrete obtained an approval on 19 September 2018 from the Shire of Chittering Section 75 of the Planning and Development Act 2005 for an amendment to Local Planning Scheme No. 6. The amendment changed the zoning of the site from ‘Agriculture Resource’ to ‘General Industry’ (Appendix 8).

Great Northern Concrete is also seeking planning consent from the Shire of Chittering for the construction and operation of the MCBP.

4 Stakeholder Consultation
The scheme amendment documents to rezone the proposed prescribed premises location from Agricultural Resources to General Industry were referred to the community as part of the consultation process. No objections were received from neighbours. A number of submissions were received from authorities (Appendix 6). Following the closure of the submissions period, neighbouring land owner from Lot 3620 Great Northern Highway provided a letter of no objection to the Shire of Chittering (Appendix 7).

5 Design Principles
The plant will incorporate the best practice features, exceeding industry standards for emissions and fail safe systems for material handling. It will utilize the wet mix also known as central mix concrete manufacturing process as opposed to the traditional dry mix also known as truck mix process.

A wet mix plant combines all the dry ingredients and water into a central mixer, which mixes the concrete before loading the prepared concrete into an agitator truck. The wet mix process is a more water efficient process with substantially lower dust emissions than for a dry mix plant. Additionally wet mix plants are able to produce superior quality concrete in terms of increased consistency, homogeneity, workability, strength and permeability.
6 Throughput

The proposed plant will consist of a single twin shaft mixer. The maximum throughput is limited to the rate at which the mixer can be supplied with sand and aggregates, the rate at which the concrete agitator trucks can maneuver into the loading position, be loaded, and exit the loading area. The name plate production capacity of the plant is 60m³ per hour this equates to 524,160m³ per annum if the plant operated 24 hours a day 7 days a week.

To estimate the expected production rate further constraints must be taken into consideration such as the hours of operation, plant maintenance requirements, and the ability to supply the plant with concrete constituent materials. A dominant constraint is market demand and customer requirements. With these considerations taken into place the estimated production rate is approximately 52,000 tonnes per annum.
7 Operations
The function of the facility is to batch concrete and load onto trucks for distribution from the site (figure 4). Once raw materials are delivered to the plant, the pre-mix loading facilities weigh and batch cement, sand, aggregates and water and load these into the agitator trucks in a controlled sequence for distribution from the site. The proposed batching plant will comprise the following components:

- ground storage bins;
- storage silos;
- cement weigh hoppers;
- vehicle wash down areas;
- slurry and settlement pits; and
- truck washout pits.

7.1 Aggregate Material Storage Areas
Aggregate materials, including coarse and fine aggregates are delivered to the plant by trucks in B-double configuration or semi trailers trucks and stored in designated storage silos. These delivery vehicles enter the site via one access point on the western boundary. The aggregates are then moved to the conditioning areas (Storage Bins) next to the front end loader. Dust suppression is provided by sprinklers utilising secondary plant water in the stockpile areas and storage bins as well as the operating loader areas.

Front loader trucks load aggregate materials from material storage bins and transfer them to surge hoppers, which discharge the required amounts to be batched.

7.2 Cement Silos
Bulk cement is stored onsite in steel silos which are fitted with an independent overfill alarm system. Cement Silos are orientated horizontally. Cement is transferred from storage to batching through sealed steel augers. The dry raw materials are then transferred into the bowl of an agitator truck via an enclosed conveyor belt.

7.3 Slump Stand Area
Water is added to the dry raw material mix in agitator trucks within the slump stand area via an overhead pipe. Wheel wash occurs within this sealed area prior to agitator trucks exiting the site.

7.4 Staff
The facility will employ up to 7 staff:
- One to two employees operating the batching plant process; and
- Four to five truck drivers.

7.5 Hours of Operation
The facility will generally operate from 7am to 7pm Monday to Saturday, however due to the broad range of uses for batched concrete, there may be instances when operation outside of these hours is required. Afterhours noise management procedures will be implemented in the event that operations are required outside of these hours. In addition the complaint process will be implemented if any noise complaints are received and the incident will be investigated. If it is found through the investigation process that there are immediate concerns from the incident then the MCBP will cease operation until the issue causing the concerns is rectified.
7.6 Amenities Facilities
The existing shed on site will be converted into a staff amenities room. Toilets will be installed within the shed and will be serviced by a Biomax unit. The ablution facilities will be constructed and operated in accordance with relevant regulations.

7.7 Services
The Site is serviced with reticulated power. An existing shed on the site includes a 5 litre water tank which captures rain water for use.

A 5C Licence to take water licence has been obtained by the proponent to supply the Site. The bore has been installed in the south-western corner of the Site adjacent to Great Northern Highway. It is intended that the water sourced from the bore will be pumped to the water storage tanks located south of mobile concrete batching plant.

7.8 Security
The site will be secured with 2.4 metre high cyclone fencing around the perimeter.
Figure 4 Proposed Concrete Batch Plant Layout
8 Fit and Competent Operator

Great Northern Concrete have twenty five years experience in the concrete industry and currently supply and lay certified pre mixed concrete for commercial and residential use including house slabs, footings, kerbings, shed pads, driveways and paths.

Great Northern Concrete currently supplies the Muchea, Bindoon, Chittering, Bullsbrook, Swan Valley and surrounding areas.

As the Perth Metropolitan Region expands, there is a greater demand for premixed concrete in the outer north eastern sector and surrounding regional areas. Additionally, the adjoining Industrial Development area within the Muchea Employment Node Special Control Area will provide additional demand for pre-mixed concrete, as will the road works associated with North Link and the Perth to Dampier National Highway.

The supply of concrete from batching plants within a reasonable delivery envelope is often critical to the integrity of this specialised construction material. For this reason the new Great Northern Concrete batching plant will be optimally located to supply the local market without loss of quality to this essential raw material.

Great Northern Concrete is committed to develop the site area with practical and efficient operations that respect governmental standards, other neighbouring businesses expectations and the environment.

In addition Great Northern Concrete has carried out Environmental Noise Impact Assessment and an Air Quality Assessment of the proposed operations. Great Northern Concrete will also implement the Environmental Management Plan and Dust Management Plan.
9 Existing Environment

9.1 Flora and Vegetation
The prescribed premises site has been historically cleared with no native vegetation remaining. The proposed premises will not result in any clearing of native vegetation.

9.2 Fauna
There is no native vegetation or habitats that can support fauna. The proposed premises will not result in any impacts to fauna or fauna habitats.

9.3 Surface Water
Surface water will be managed within the study area to insure the water leaving the study area after the proposed development will meet pre-development conditions for both water quality and quantity. The site is not within a Public Drinking Water Source Area.

Ellen Brook runs 700m west of the study area. The western side of the study area abuts the Great Northern Highway. There will be a swale constructed between the west of the study area and the Great Northern Highway to promote infiltration, reduce stormwater peak flow rates, and remove sediments.

Storm water will be diverted to the swale. Any water with sediment will be stored, settled, and the water will be released through the swale. Potentially contaminated or contaminated water will be diverted through a concrete lined collection pits which then flow to concrete lined settlement pits where water is reclaimed, stored in storage tanks and reused for operation.

A review of the WA Atlas Wetland Management Category Mapping was undertaken which identified the study site is within a ‘Multiple Use’ wetland. Multiple Use wetlands are generally described as ‘wetlands with few remaining important attributes and functions’, their respective management objectives involving:

Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare.

The proposed development will not have additional adverse impacts to the existing wetland or Ellen Brook.

9.4 Ground Water and Soil
There is no contaminated soil at the proposed premises. Any potential for contamination of soil and groundwater will be managed by Great Northern Concrete through implementing the Great Northern Concrete Environmental Management Plan and Operational Procedures.

The potential for localised contamination of soil and groundwater will be managed by hard-standing the site working area including water collection pits with all contaminated stormwater separated and directed to concrete lined collection pits which then flow to settlement pits and reused in the process.
There will be a wash bay for collection of hydrocarbon-contaminated water. This water will be directed to a lined sump with an oil water separator for treatment prior to discharge.

Waste water from the concrete truck agitator are directed through a wash-out pit in an associated below ground wedge pit. The wash-out pits are built from pre-fabricated concrete panels placed in a rectangle with a gate mechanism. Excess water in the trucks will go into the wash out pit, which will subsequently drain into the wedge pit. This water can then be used for washing of the trucks.

Great Northern Concrete will operate under the terms of the Environmental Management Plan (EMP) which includes wastewater management. The implementation of the EMP will further contribute to minimising potential impacts to groundwater as a result of site operations.

The proposed operation and construction methodology mentioned above will mitigate any potential localised impacts to groundwater or soil form the proposed development.

10 Indigenous Heritage

A search was undertaken on the Department of Indigenous Affairs Aboriginal Heritage Enquiry System which returned no results of Registered Aboriginal Sites on or around the subject site.
11 Public Health and Environmental Risks

11.1 Emission to Land

The potential for localised contamination of soil and groundwater will be managed by hard-standing the site working area including water collection pits with all contaminated stormwater separated and directed to concrete lined collection pits which then flow to settlement pits and reused in the process.

There will be a wash bay for collection of hydrocarbon-contaminated water. This water will be directed to a lined sump with an oil water separator for treatment prior to discharge.

Waste water from the concrete truck agitator are directed through a wash-out pit in an associated below ground wedge pit. The washout pits are built from pre-fabricated concrete panels placed in a rectangle with a gate mechanism. Excess water in the trucks will go into the wash out pit, which will subsequently drain into the wedge pit. This water can then be used for washing of the trucks.

In addition the following actions will be undertaken to ensure waste water is managed to prevent adverse impacts to the environment.

- Cleaning up material spilt during concrete batching or transport immediately.
- All water used to clean up spilt materials will be directed into washout pit.
- All water draining from any area where agitators and mixers will be loaded or where concrete is batched, will be directed into the washout pit.
- All other water that drains off sealed or paved areas and which are likely to contain waste materials, will be directed into the washout pit.
- Any water removed from, or which might overflow from washout pit, will be directed into associated below ground wedge pit.
- Water that is likely to contain hydrocarbons will be directed through the oily water separator prior to being reused for dust suppression (e.g. from truck washdown pad).
- The grey water used in concrete batching will be reused for washing trucks.
- Settled material will be kept in the washout pit wet to minimise dust emissions, until the pit is required to be dried out to allow the settled material to be removed.
- Settled material in washout pit will not be higher than 300 mm below the top of the wedge pit walls.
- Wedge pit will be constructed so that is large enough to contain all of the water which might drain into it.
- Maintenance will be carried out washout pit, wedge pit, swale, and oily water separator as often as necessary, to ensure their efficient operation.
- All excess concrete waste created during concrete batching or cement product manufacturing (including material removed from washout pit, wedge pit, swale, and oily water separator where possible will be recycled, or disposed of at an appropriate licensed landfill site or waste treatment facility.
The Water Management System
The Water Management System for the concrete batching plant will include bore water stored in water tanks and associated plumbing equipment erected to provide buffer water storage for operations including batching of concrete, wash-down of plant and trucks and watering of stockpile. These water tanks will be plumbed into a water chiller unit to supply water to the loading bay at a precise temperature.

Waste water from the concrete truck agitator will be handled in an environmentally responsible manner through the construction and use of a wash-out pit and an associated below ground wedge pit. The wash-out pits are built from pre-fabricated concrete panels placed in a rectangle with associated apron slabs. This system confines all concrete waste wash-out from the trucks. This allows for the settlement of solid waste, which is left to dry out. The anticipated quantity of solid waste generated will be the equivalent to less than 2% of the batched concrete produced. After the solid waste has dried out, it is stockpiled temporarily on site until a full tipper load of material (between 40 and 50 tonnes) has accumulated. The contractor will collect the waste in a tipper truck loaded by the front end loader at the site then carted away. As the solid pit waste produced by the plant is a highly alkaline material, the waste cannot be taken directly to landfill and instead must be removed by a waste contractor to be treated off-site to reduce the alkalinity prior to recycling or disposal.

Grey water generated at the loading bay will collect in the below ground wedge settlement pit and transferred underground to the washout area recycling facility. The washout area will be located next to the slump stand and adjacent to (to the west) the main concrete plant. It will contain a dedicated single-truck mixed use washing bay where trucks will be washed using a high pressure water cleaner as well as a water recycling facility. Any solid waste from the washout recycling facility can be removed by a loader and transferred to the settlement pits. The grey water collected in the washout area recycling facility will be collected in a wedge pit for re-use in washing down trucks.

The loading bay and wash-out pit will be located within a greywater containment perimeter with a concrete floor and a semi-mountable curb profile. Similarly the slump stand, washout area and recycling facility will also be situated within a greywater containment perimeter. This will completely preclude the drainage of waste materials into the groundwater.

Occasionally, excess concrete produced as part of the batching process will require disposal or recycling. However, given that batched concrete is a costed resource, it is unusual for substantial amounts to be produced over and above what has been ordered for a particular project. On rare occasions, greater amounts of batched concrete may need to be disposed of due to emergencies or supply disruptions. In these situations, contingency measures will be established for the removal and disposal of wet concrete. This would typically involve the delivery of the wet concrete directly to the recycling plant by the contractor for processing, where it is dried, broken up, then disposed of.
Figure 5 Flow of water through the production process

Landscaping will be carried out including planting within the channel drain along the front (west) boundary to improve site drainage. This will also be beneficial to the presentation of the front property boundary to the street and will create a natural vegetated buffer between the road and the activities within the site. The landscaping within the drain adjacent to the front property boundaries will be planted with native reeds and/or shrubs to promote drainage, as well as the planting of grass in this location to improve the site.
amenity. Due to the potential for leaves and other natural debris to spoil batched concrete, extensive landscaping within proximity to the plant is not proposed. The plant species and planting density of any landscaping treatment will be carefully planned to avoid disruption to the plant activities.

11.2 Emission to Air

Dust will be generated during the operation of the MCBP. However Great Northern Concrete will manage the operation of the MCBP in a manner that will minimise dust emission from the study area.

Concrete batching if properly managed is not an inherently dusty operation. Plant design and emissions controls have improved substantially to meet current environmental and health regulations. Great Northern has used best practice design and emissions controls to virtually eliminate dust emissions by the proposed plant.

Furthermore Great Northern has undertaken qualitative air quality assessment (Appendix 5). WSP Australia Pty Ltd (WSP) was engaged by Great Northern Concrete Pty Ltd to conduct a qualitative air quality assessment in support of the works approval application.

The objective of the qualitative air quality assessment was to estimate particulate matter (PM10 and PM2.5) emissions during operation of the concrete batching plant and to compare its contribution to the overall emission loading to the local airshed (Chittering Local Government Area).

The main emission sources for the proposed CBP were identified using project and process information provided by the client and publicly available information e.g. National Pollutant Inventory (NPI) Emission Estimation Technique Manual (EETM) for Concrete Batching and Concrete Product Manufacturing and United State Environment Protection Authority (USEPA) AP-42: Compilation of Emission Factors.

Particulate matter (PM10 and PM2.5) emissions were estimated using emission factors detailed in the NPI EETM for Concrete Batching and Concrete Product Manufacturing and USEPA AP-42: Compilation of Emission Factors and compared these estimates to reported NPI data in the Chittering LGA airshed for the 2016/2017 reporting period.

The estimated PM10 emissions from the CBP were less than 2% of total emissions reported to the NPI for the Chittering LGA 2016/2017 reporting period. For PM2.5, the contribution of 22% is higher primarily due to the non-reporting to the NPI of diffuse sources for the 2016/17 period.

The draft separation distance guidelines between sensitive and industrial land uses were reviewed and indicated that the proposed location of the CBP does not achieve the recommended 300 – 500 m at five of the nearest residential receptors (SR1 to SR5).

The proposed CBP plant will be designed and operated in line with best practice. The implementation of the Dust Management Plan (DMP) with stringent controls and continuous on-site monitoring along the site boundary will ensure that emissions from the proposed CBP do not adversely impact the receiving environment.

Great Northern Concrete has committed to the following air quality management practices:

- Implement the Dust Management Plan for the operation of the mobile concrete batch plant;
- Dust suppression techniques (e.g. water) will be implemented during construction activities;
- Water for dust suppression will be provided from a bore; and
- Vehicle speeds on site shall be reduced where necessary to minimise dust emissions.
Pre-installed reticulated water sprays in the bin structures will minimise dust generated in stockpiling and batching operations. Cement silos and weigh hoppers will be fitted with dust filters. The concrete loading bay will be directed to collection pits. Dust generated at the loading point is suppressed through a preinstalled high pressure water spray bar system that is controlled by the batching computer. Additional mobile water sprays will provide dust suppression to external stockpiles and yard areas as required. Weekly inspection of filtration systems will be carried out.

Detailed dust management measures for the MCBP is in the Great Northern Concrete Dust Management Plan (Appendix 3).

Due to the size of the operation, the design and construction of the MCBP, the proposed management control measures the impact of dust generated on the study area is likely to be negligible.

11.3 Noise Emission

Noise emissions will be generated during the construction and operation of the mobile concrete batching plant. Greater Northern Concrete commissioned WSP to carry out a noise impact assessment on the proposed MCBP (Appendix 4). The assessment was carried out on the six identified surrounding sensitive receptors (Table 4).

Table 3: Source Sound Power Levels

<table>
<thead>
<tr>
<th>SOURCE ITEM</th>
<th>OCTAVE BAND FREQUENCY HZ</th>
<th>SOUND POWER LEVEL</th>
<th>TOTAL dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>Concrete Truck</td>
<td>111</td>
<td>112</td>
<td>107</td>
</tr>
<tr>
<td>Delivery Truck</td>
<td>110</td>
<td>106</td>
<td>105</td>
</tr>
<tr>
<td>Front End Loader</td>
<td>109</td>
<td>103</td>
<td>102</td>
</tr>
<tr>
<td>CBP</td>
<td>105</td>
<td>96</td>
<td>97</td>
</tr>
<tr>
<td>Aggregate weigh sand first</td>
<td>89</td>
<td>82</td>
<td>79</td>
</tr>
<tr>
<td>Concrete truck loading</td>
<td>114</td>
<td>109</td>
<td>102</td>
</tr>
<tr>
<td>Concrete truck at slump</td>
<td>108</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>Cement delivery</td>
<td>110</td>
<td>116</td>
<td>103</td>
</tr>
</tbody>
</table>

The potential for machinery to emit noise is quantified as the Sound Power Level expressed in decibels (dB re 1x10^-12 W). At the receiver, the noise is quantified as the Sound Pressure Level expressed in decibels (dB re 20 µPa). Details of the Sound Power Levels used in the model are shown in Table 3.
Table 4: Predicted Noise Levels

<table>
<thead>
<tr>
<th>NOISE SENSITIVE RECEIVER</th>
<th>PREDICTED LA10 dB*</th>
<th>ASSIGNED LEVEL LA10 dB</th>
<th>COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3620 Great Northern Highway</td>
<td>79</td>
<td>65</td>
<td>+14</td>
</tr>
<tr>
<td>6 Muchea East Road</td>
<td>55</td>
<td>49</td>
<td>+6</td>
</tr>
<tr>
<td>35 Muchea East Road</td>
<td>54</td>
<td>49</td>
<td>+5</td>
</tr>
<tr>
<td>3599 Great Northern Highway</td>
<td>61</td>
<td>65</td>
<td>-4</td>
</tr>
<tr>
<td>30 Muchea East Road</td>
<td>54</td>
<td>47</td>
<td>+7</td>
</tr>
<tr>
<td>43 Brand Highway</td>
<td>53</td>
<td>45</td>
<td>+8</td>
</tr>
</tbody>
</table>

*5 dB adjustment for tonality applied

The assessment predicted noise levels from fixed plant and vehicles associated with the MCBP are predicted to comply with day time assigned level at all identified receivers except for 3620 Great Northern Highway and 30 Muchea East Road which exceed the criteria by 7 dB and 2 dB respectively. Therefore, noise mitigation is required to achieve compliance with the Noise Regulations at these receivers. The noise levels were remodelled with the additional barriers in place and the modelling predicted that the noise levels comply with day time assigned level at all identified receivers (Table 5).

The following mitigation measures were recommended by WSP and included in mitigated predicted mitigated noise modelling. These mitigation measures will be implemented during the construction of the MCBP.

- A 4 m high acoustic L shaped or three sided barrier to the south of the slumping stand will be constructed
- 3 m high acoustic barrier with 1 m overhang to the west of the cement delivery area will be constructed
- 2.4 m high solid site boundary fence will be constructed
Table 5: Predicted mitigated noise levels

<table>
<thead>
<tr>
<th>NOISE SENSITIVE RECEIVER</th>
<th>PREDICTED LA10 dB*</th>
<th>ASSIGNED LEVEL LA10 dB</th>
<th>COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3620 Great Northern Highway</td>
<td>65*</td>
<td>65</td>
<td>0</td>
</tr>
<tr>
<td>6 Muchea East Road</td>
<td>47</td>
<td>49</td>
<td>-2</td>
</tr>
<tr>
<td>35 Muchea East Road</td>
<td>48</td>
<td>49</td>
<td>-1</td>
</tr>
<tr>
<td>3599 Great Northern Highway</td>
<td>51</td>
<td>65</td>
<td>-14</td>
</tr>
<tr>
<td>30 Muchea East Road</td>
<td>47</td>
<td>47</td>
<td>0</td>
</tr>
<tr>
<td>43 Brand Highway</td>
<td>40</td>
<td>45</td>
<td>-5</td>
</tr>
</tbody>
</table>

*5 dB adjustment for tonality applied
12 Sighting and Location

12.1 Public and Residential Places

The EPA’s Guidance for the Assessment of Environmental Factors – Separation Distances between Industrial and Sensitive Land Uses No. 3 (Guidance Statement No. 3) provides for separation distances between industry (such as extractive industries) and sensitive land uses, which are listed as follows:

- Residential developments, hospitals, motels, hostels, caravan parks, school, nursing homes, child care facilities, shopping centres, playgrounds, and some public buildings. Some commercial, institutional and industrial land uses which required high levels of amenity or are sensitive to particular emissions may also be considered ‘sensitive land uses’. Examples include some retail outlets, offices and training centres, and some types of storage and manufacturing facilities.

Under Appendix 1 of the Guidance Statement No. 3, the recommended separation distance for batching plants to sensitive land uses is 300m to 500m depending on size. The proposed batching plant operations are anticipated to have a lower capacity. This is also reflected within the anticipated vehicle movements outlined under the proposal section below.

The site is situated within the Muchea Employment Node (MEN) Structure Plan Area. The MEN Structure Plan 2011 is a Western Australian Planning Commission document which identifies the Structure Plan area for future industrial uses and contains a 1000m separation buffer from the town site and a 500 separation buffer from rural residences. The Site is therefore well located within the planned buffer areas for the future industrial area (figure 4).

The following sensitive premises are in the vicinity of the proposed development:

- Lot 3620 Great Northern Highway: on the southern boundary of the proposed site containing an industrial premises (transport depot) and a caretaker facility which has not been used for some years forming part of the industrial premises.
- 35 Muchea East Road sensitive residential property located approximately 220 m east of the proposed site.
- 30 Muchea East Road residential property located approximately 260 m east of the proposed site.
- 6 Muchea East Road residential property located approximately 165 m south of the proposed site.
- Lot 3599 Great Northern Highway: industrial premises (transport depot) and a caretaker facility forming part of the industrial premises located approximately 170 m southwest of the proposed site.
- 43 Brand Highway residential property located approximately 550 m southwest of the proposed site.

Rural residential properties exist within the recommended separation distances from the proposed batching plant, however all sensitive premises in proximity to the study area and its indicative buffer areas are also located within the MEN Structure Plan Area. These properties are also located within the newly gazetted MEN Special Control Area which now forms part of the Shire of Chittering Local Planning Scheme No. 6. Therefore, the location of the study area, inclusive of the surrounding sensitive land uses, within the planned future MEN industrial area are considered to be well located for industrial use and should be protected from future encroachment by sensitive land uses by the planned buffer areas within the MEN Structure Plan area.
Additionally Guidance Statement No. 3 notes that:

A sound site-specific technical analysis will provide the most appropriate guide to the separation distance that should be maintained between a particular industry and sensitive land uses, or between industrial precincts and sensitive land uses, to avoid or minimise land use conflicts.

Figure 4: (Extract) MEN Structure Plan area

In addition an EMP has been developed to ensure that the plant design and operating procedures will comply with:

- Australian Standards for the construction of all structures and components.

This EMP identifies and provides management measures to implement to minimise any impacts from the establishment of the proposed Plant. Due to the size and technology used in the operation the impact to surrounding sensitive receptors should be minimal.
13 Environmental Management

13.1 Environmental Management Framework

13.1.1 Management of Dust

Great Northern Concrete has committed to the following air quality management practices:

13.1.1.1 General

The following general dust management practices will be undertaken:

- Concrete batching will be carried out in a manner that no visible dust escapes onto any place to which the public has access.
- Dust suppression techniques (e.g. water or surfactants) will be applied to trafficable areas as often as necessary to minimise dust emissions.
- Aggregate stock piles have water sprays for conditioning of materials and dust reduction during transfer of materials.
- All wind shields, water sprays, dust extraction systems and other devices used will be maintained in good working order.

13.1.1.2 Material Management

Material management practices that will manage potential air quality impacts include:

- All aggregate will be stored and sand kept on-site in bins or bays which are designed to minimise airborne dust, or where the use of such bins or bays is not practicable, store in stockpiles on the ground.
- Aggregate storage bins will be fitted with water sprays.
- Reticulated ground bins will be used to facilitate dust free loading;
- Dust covers to overhead bins will be used to eliminate windblown dust at higher level;
- Height limit signs will be placed on the ground bins to ensure all raw materials remain below the height of the walls;
- The height of aggregate or sand will be minimised in a storage bin or bay so that it does not exceed the height of the bin or bay (including any windshields fitted to it).
- The aggregate or sand stockpiles will be covered or kept damp so as to minimise airborne dust.
- Coarse aggregate from stock piles will be moistened;
- Stock levels will be monitored by batch plant operators;
- The aggregate storage areas also will fit within the overall traffic management plan to ensure that the dust caused by vehicle moment is maintained at a minimum;
- Shade cloth and an automatic sprinkler system will be installed to ensure that the aggregates are kept moist and control airborne dust during stockpiling operations;
- Sprinklers will be used regularly on site boundary and at the washout pits to suppress dust on site;
- The site will be swept regularly;

13.1.1.3 Material Delivery and Loading

All aggregate trucks will be equipped with the following measures to prevent dust:

- All raw material and aggregate trucks will be covered when they enter and exit the site.
- The trafficable areas of the site will be heard stanced to eliminate dust during on-site vehicle movements.
- A wash down area will be used to wash down trucks prior to exiting the site;
• All trucks are to be free from dust on exiting the site.
• Unloading will stop and will not resume until appropriate measures to prevent excessive visible dust generation are taken if, during the unloading of aggregate or sand, excessive visible dust is generated.

13.1.1.4 Silo Management
Great Northern will implement the following silo management measures:
• All cement on-site will be stored in either bags or in a cement silo.
• The cement silos are oriented horizontally.
• The cement silos will be fitted with reverse pulse dust extraction filters, overfill alarms and automatic cut off valves on cement fill lines.
• Silos will be fitted with compliant reverse pulse filters, overflow prevention (high level alarms – visual and audible, auto shut-off), and emergency overflow discharge pipe to within 1m of ground.
• High level fill alarms and fill line shut off valves will prevent silo over fill.
• All inspection points and hatches will be fully sealed.
• Filling of cement storage silo will cease if any visible cement dust escapes from the silo, until appropriate measures have been taken to prevent the escape of cement dust from the silo.

13.1.1.5 Plant/ Equipment
The plant/equipment will be fitted with the following design features to minimise dust:
• The cement silos will be fitted with reverse pulse dust extraction filters, Overfill alarms and automatic cut off valves on cement fill lines.
• Cement weigh hoppers will have dust filters installed. The concrete loading bay will be enclosed with water sprays installed, and any run off will be directed to collection pits.
• The batching operations are computerised with manual backup. The batching equipment is operated by license / trained personnel.
• Audible alarms indicating levels will be installed to eliminate equipment from over filling;
• Relief valves to be attached to the filters to ensure safe operation of MCBP;
• Cement filters will be serviced/replaced as necessary at six (6) month intervals;
• A spare set of filter bags to be held on-site at all times for emergency replacement; and
• Sealed penetrations to the cement silos and weigh hoppers, including inspection and service hatches.

13.1.1.6 General Site
The site will be managed to minimise the potential for dust generation from the MCBP, slumping areas and vehicle operation.

General site management measures include:
• Regular use of sprinklers on site boundary and at the washout pits to suppress dust on site.
• Vehicles carrying concrete, or any of the ingredients of concrete will be washed, free of cement slurry and dust before they leave the site.
• All inside areas on-site which may be affected by cement product manufacturing regularly will be regularly cleaned to prevent the accumulation of dust on any surface.
• Regular sweeping of site.
13.1.1.7 Waste Management

The following actions will be undertaken to ensure waste water is managed to prevent adverse impacts to air quality.

- Cleaning up material spilt during concrete batching or transport immediately.
- All water used to clean up spilt materials will be directed into washout pit.
- All water draining from any area where agitators and mixers will be loaded or where concrete is batched, will be directed into the washout pit.
- All other water that drains off sealed or paved areas and which are likely to contain waste materials, will be directed into the washout pit.
- Any water removed from, or which might overflow from washout pit, will be directed into associated below ground wedge pit.
- Water that is likely to contain hydrocarbons will be directed through the oily water separator prior to being reused for dust suppression (e.g. from truck washdown pad).
- The gray water used in concrete batching will be reused for washing trucks.
- Settled material will be kept in the washout pit wet to minimise dust emissions, until the pit is required to be dried out to allow the settled material to be removed.
- Settled material in washout pit will not be higher than 300 mm below the top of the wedge pit walls.
- Wedge pit will be constructed so that is large enough to contain all of the water which might drain into it.
- Maintenance will be carried out on washout pit, wedge pit, swale, and oily water separator as often as necessary, to ensure their efficient operation.
- All excess concrete waste created during concrete batching or cement product manufacturing (including material removed from washout pit, wedge pit, swale, and oily water separator where possible will be recycled, or disposed of at an appropriate licensed landfill site or waste treatment facility.

13.1.1.8 Spill Response

Rapid spill response will occur with any material spills internal and external to site will be immediately reported to the site supervisor. The site supervisor will co-ordinate the spill clean-up within 24 hours of notification.
13.1.2 Management of Noise

Noise emissions will be generated during the construction and operation of the mobile concrete batching plant. The noise level modelling predicted that with the additional barriers in place the noise levels will comply with day time assigned level at all identified receivers.

In addition the following noise management practices will be implemented during construction and operation of the mobile concrete batch plant:

- A 4 m high acoustic L shaped or three sided barrier to the south of the slumping stand will be constructed.
- 3 m high acoustic barrier with 1 m overhang to the west of the cement delivery area will be constructed.
- 2.4 m high solid site boundary fence will be constructed.
- Compliance with the Environmental Protection (Noise) Regulations 1997 and Australian Standard 2436-1981: Guide to noise control on construction, maintenance and demolition sites and relevant occupational health and safety standards;
- Equipment will be generally operated during daylight hours; and
- Regularly inspect, maintain and replace mobile equipment so that noise levels are minimised during the equipment life.

The noise emission as a result of the operation of the MCBP will be in line with surrounding businesses and operations.
13.2 Monitoring

13.2.1 Monitoring Actions
The following monitoring actions will be undertaken:

- The cement storage silo air cleaning systems will be tested at least weekly to check efficiency.
- Oily interceptor discharge water quarterly will be monitored to confirm that it contains <5 ppm TPH if water is to be reused.
- Visual monitoring of cement and raw materials dust as well as concrete waste around the site will be conducted daily by the delegated employee.
- Weekly visual inspections of the immediate surrounds of the site will be conducted by the delegated employee.

13.2.2 Audits and Inspections
The following audits and inspections actions will be undertaken:

- Continual visual dust monitoring will be undertaken of dust emissions from the MCBP.
- Air cleaning system filters will be inspected, or if the air cleaning system is fitted with pressure gauges for the detection of blockages or leaks, check gauges, at least weekly.
- The cement storage silo air cleaning systems will be tested at least weekly.
- The integrity of the impervious lining of the washout pit and wedge pit will be inspected weekly.
- Weekly compliance checks will be completed using the Concrete Batching Inspection Form and document the above tests and inspections.
- Monthly compliance inspections will be undertaken using the Concrete Batching Inspection Form.

13.3 Complaints Handling

Complaints Handling form will be established for the site to record the date, nature, and resolution action of any complaints. Complaints will be directed to the site supervisor or delegated employee for resolution. If the complaint is verified as being due to a site source, remedial action will be undertaken within two working days. If it is found through the investigation process that there are immediate concerns from the incident then the MCBP will cease operation until the issue causing the concerns is rectified.
14 Conclusion
Through the design and construction of the plant and the management control measures proposed, Great Northern Concrete will minimise the emissions discussed through the operation of the Mobile Concrete Batching Plant. In addition, Great Northern is committed to minimising water and electricity consumption and dust emissions to beyond compliance to regulatory standards.

The proposed development of the Mobile Concrete Batch Plant is unlikely to cause any significant adverse impact on the environment and will be a suitable operation in the planned industrial Muchea Employment Node precinct within the Shire of Chittering.
15 Appendix
Appendix 1 Works Approval Application form DWER IR-F09
Great Northern Concrete Environmental Management Plan

Date: 8 November 2018
Reference: M21122018-001_D
DOCUMENT CONTROL RECORD

<table>
<thead>
<tr>
<th>Prepared and Authorised By:</th>
<th>Murali Mahendran</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position:</td>
<td>General Manager</td>
</tr>
<tr>
<td>Signed:</td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td>8 November 2018</td>
</tr>
</tbody>
</table>

REVISION STATUS

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Description of Revision</th>
<th>Date</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Final</td>
<td>25 October 2018</td>
<td>Murali Mahendran</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GaiaRevolution</td>
</tr>
</tbody>
</table>

Recipients are responsible for eliminating all superseded documents in their possession.

Disclaimer

This document is published in accordance with and subject to an agreement between GaiaRevolution and the Great Northern Concrete Pty Ltd (Client). It is confined to the issues that have been raised by the Client in the Client’s engagement of GaiaRevolution and is prepared using the standard of skill and due care ordinarily exercised by environmental consultants in preparing such documents.

Any person or organisation that relies on or uses the document for reasons or purposes other than those agreed by GaiaRevolution and the Client without first obtaining the prior written approval of GaiaRevolution does so entirely at their own risk. To the extent permitted by law, GaiaRevolution excludes any liability, including any liability for negligence, for any loss, including indirect or consequential damages arising from or in relation to any reliance on this document for any purpose other than that agreed with the Client.
# 1 TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TABLE OF CONTENTS</td>
<td>3</td>
</tr>
<tr>
<td>1. Introduction</td>
<td>5</td>
</tr>
<tr>
<td>1.1. Overview</td>
<td>5</td>
</tr>
<tr>
<td>1.2. Purpose</td>
<td>5</td>
</tr>
<tr>
<td>1.3. Background</td>
<td>6</td>
</tr>
<tr>
<td>1.4. Site Description</td>
<td>6</td>
</tr>
<tr>
<td>2. Operations</td>
<td>8</td>
</tr>
<tr>
<td>2.1. Aggregate Material Storage Areas</td>
<td>8</td>
</tr>
<tr>
<td>2.2. Cement Silos</td>
<td>8</td>
</tr>
<tr>
<td>2.3. Slump Stand Area</td>
<td>8</td>
</tr>
<tr>
<td>2.4. Staff</td>
<td>8</td>
</tr>
<tr>
<td>2.5. Hours of Operation</td>
<td>8</td>
</tr>
<tr>
<td>2.6. Security</td>
<td>9</td>
</tr>
<tr>
<td>2.7. Amenities Facilities</td>
<td>9</td>
</tr>
<tr>
<td>3. Environmental Management</td>
<td>10</td>
</tr>
<tr>
<td>3.1. Flora and Vegetation</td>
<td>10</td>
</tr>
<tr>
<td>3.2. Fauna</td>
<td>10</td>
</tr>
<tr>
<td>3.3. Storm Water Management</td>
<td>10</td>
</tr>
<tr>
<td>3.4. Ground Water and Soil</td>
<td>10</td>
</tr>
<tr>
<td>3.5. Dust Management</td>
<td>14</td>
</tr>
<tr>
<td>3.6. Noise Emission</td>
<td>14</td>
</tr>
<tr>
<td>3.7. Solid Waste management</td>
<td>15</td>
</tr>
<tr>
<td>3.7.1. Aggregate Recycling</td>
<td>15</td>
</tr>
<tr>
<td>3.7.2. Concrete Washout Waste</td>
<td>15</td>
</tr>
<tr>
<td>3.7.3. Other Wastes</td>
<td>15</td>
</tr>
<tr>
<td>3.7.4. Waste Collection</td>
<td>15</td>
</tr>
<tr>
<td>3.7.5. Waste Contractors</td>
<td>15</td>
</tr>
<tr>
<td>3.7.6. Frequency</td>
<td>15</td>
</tr>
<tr>
<td>3.7.7. Site Hygiene</td>
<td>15</td>
</tr>
<tr>
<td>3.7.8. Spills</td>
<td>16</td>
</tr>
<tr>
<td>4. Environmental Risk Assessment</td>
<td>17</td>
</tr>
<tr>
<td>5. Training and Awareness</td>
<td>21</td>
</tr>
<tr>
<td>5.1. Monitoring Actions</td>
<td>21</td>
</tr>
<tr>
<td>5.2. Audits and Inspections</td>
<td>21</td>
</tr>
<tr>
<td>5.3. Complaints Handling</td>
<td>22</td>
</tr>
<tr>
<td>6. Appendix</td>
<td>23</td>
</tr>
</tbody>
</table>
TABLES

Table 1: Great Northern Concrete Environmental Risk Assessment Table ..................................................18

FIGURES

Figure 1 Location of the Proposed Concrete Batching Plant ...........................................................................5
Figure 2 Location of the Proposed Concrete Batching Plant ...........................................................................6
Figure 3 Excerpt of MENS (the site shown in yellow border) .........................................................................7
Figure 4 Flow of water through the production process ..................................................................................13

APPENDICES

Appendix 1 Great Northern Concrete Environmental Risk Tables ....................................................................23
1 Introduction

1.1 Overview

Great Northern Concrete Pty Ltd (Great Northern Concrete) is in the process of establishing a new mobile concrete batching plant (MCBP) at Lot 22 (No. 3728 Great Northern Highway, Muchea (the site) which will distribute premixed concrete for the construction industry. In order to establish the plant Great Northern Concrete are seeking consent of the Shire of Chittering for an amendment to Local Planning Scheme No. 6. The amendment will involve a change to the zoning of the site from ‘Agriculture Resource’ to ‘General Industry’. Great Northern Concrete is also seeking planning consent from the Shire of Chittering for the construction and operation of the MCBP.

The site is located within the Shire of Chittering, north of Perth approximately 70km northeast of the Perth Central Business District (CBD) 50km north of the Midland City Centre and 40 km north of Ellenbrook (Figure 1). The 2.0013ha site is currently zoned ‘Agriculture Resource’ under the Local Planning Scheme No. 6.

1.2 Purpose

The purpose of this document is to detail the environmental and mitigation measures, which will be implemented during the construction and operation phase of the MCBP to reduce any associated adverse environmental impacts and comply with the Environmental Protection Act 1986 – Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998.

This Environmental Management Plan (EMP) provides a framework for actions, responsibilities, and procedures associated with environmental management with which Great Northern will follow.

Figure 1 Location of the Proposed Concrete Batching Plant
1.3 Background
Great Northern Concrete have twenty five years experience in the concrete industry and currently supply and lay certified pre mixed concrete for commercial and residential use including house slabs, footings, kerbings, shed pads, driveways and paths.

Great Northern Concrete currently supplies the Muchea, Bindoon, Chittering, Bullsbrook, Swan Valley and surrounding areas.

As the Perth Metropolitan Region expands, there is a greater demand for premixed concrete in the outer north eastern sector and surrounding regional areas. Additionally, the adjoining Industrial Development area within the Muchea Employment Node Special Control Area will provide additional demand for premixed concrete, as will the road works associated with North Link and the Perth to Dampier National Highway.

The supply of concrete from batching plants within a reasonable delivery envelope is often critical to the integrity of this specialised construction material. For this reason the new Great Northern Concrete batching plant will be optimally located to supply the local market without loss of quality to this essential raw material.

Great Northern Concrete is committed to develop the site area with practical and efficient operations that respect governmental standards, other neighbouring businesses expectations and the environment.

This EMP is intended to be a live document that will be initially submitted to the Shire of Chittering for approval and then reviewed annually by the Great Northern.

1.4 Site Description
The site is located within the Shire of Chittering, north of Perth approximately 70km northeast of the Perth Central Business District (CBD) 50km north of the Midland City Centre and 40 km north of Ellenbrook (Figure 1).

The site is located within a planned industrial precinct within the Shire of Chittering known as the Muchea Employment Node (MEN). The MEN has been identified for the provision of service-based uses such as
transport, livestock, fabrication, warehousing, wholesaling and general commercial use and will provide a concentration of employment opportunities both locally and in surrounding areas. The MEN has a total area of 1,113ha comprising four precincts including Precinct 1 north A, Precinct north B, Precinct 2 south, Precinct 3 west and Precinct 4 east. The 2.0013ha site is located within Precinct 1 north A.

The MEN is currently serviced by Great Northern Highway which separates Precincts 1 and 2 (east) from Precinct 3 (west). The entire MEN area will ultimately be serviced by the Perth to Darwin Highway which is aligned to the west of the structure plan area.

An excerpt of the Muchea Employment Node Structure Plan (MENSP) is included at Figure 2 and identifies the site.

The site has been a farm pasture paddock previously. The site has no native vegetation the pasture has been well maintained.

![Figure 3 Excerpt of MENSP (the site shown in yellow border)](image-url)
2 Operations
The function of the facility is to batch concrete and load onto trucks for distribution from the site. Once raw materials are delivered to the plant, the pre-mix loading facilities weigh and batch cement, sand, aggregates and water and load these into the agitator trucks in a controlled sequence for distribution from the site. The proposed batching plant will comprise the following components:

- ground storage bins;
- storage silos;
- cement weigh hoppers;
- vehicle wash down areas;
- slurry and settlement pits; and
- truck washout pits.

2.1 Aggregate Material Storage Areas
Aggregate materials, including coarse and fine aggregates are delivered to the plant by trucks in B-double configuration or semi trailer trucks and stored in designated storage silos. These delivery vehicles enter the site via one access point on the western boundary. The aggregates are then moved to the conditioning areas (Storage Bins) next to the front end loader. Dust suppression is provided by sprinklers utilising secondary plant water in the stockpile areas and storage bins as well as the operating loader areas.

Front loader trucks load aggregate materials from material storage bins and transfer them to surge hoppers, which discharge the required amounts to be batched.

2.2 Cement Silos
Bulk cement is stored onsite in steel silos which are fitted with an independent overfill alarm system. Cement Silos are orientated horizontally. Cement is transferred from storage to batching through sealed steel augers. The dry raw materials are then transferred into the bowl of an agitator truck via an enclosed conveyor belt.

2.3 Slump Stand Area
Water is added to the dry raw material mix in agitator trucks within the slump stand area via an overhead pipe. Wheel wash occurs within this sealed area prior to agitator trucks exiting the site.

2.4 Staff
The facility will employ up to 7 staff:
- One to two employees operating the batching plant process; and
- Four to five truck drivers.

2.5 Hours of Operation
The facility will generally operate from 7am to 7pm Monday to Saturday, however due to the broad range of uses for batched concrete, there may be instances when operation outside of these hours is required. A noise complaint process will be implemented in the event that operations are required outside of these hours.
2.6 Security
The site will be secured with 2.4 metre high cyclone fencing around the perimeter.

2.7 Amenities Facilities
The existing shed on site will be converted into a staff amenities room. Toilets will be installed within the shed and will be serviced by a Biomax unit. The ablution facilities will be constructed and operated in accordance with relevant regulations.
3 Environmental Management

3.1 Flora and Vegetation
The site does not have any native vegetation. The construction and operation of the MCBP will not result in any clearing of native vegetation.

3.2 Fauna
There is no native vegetation or habitats that can support fauna. The construction and operation of the MCBP will not result in any impacts to fauna or fauna habitats.

3.3 Storm Water Management
Storm water will be managed within the site to insure the water leaving the site will be similar in quality and quantity of the water that entered the site.

Ellen Brook runs 700m west of the site. The western side of the site abuts the Great Northern Highway. There will be a swale constructed between the west of the site and the Great Northern Highway to promote infiltration, reduce stormwater peak flow rates, and remove sediments.

A vegetated swale will be used to convey stormwater from the site. The swale will promote infiltration and reducing stormwater runoff peak flow, velocity and volume, and remove coarse and medium sediments, including suspended solids and trace metals. Any water with sediment will be stored, settled, and the water will be released through the swale. Potentially contaminated or contaminated water will be diverted through a concrete lined collection pits which then flow to concrete lined settlement pits where water is reclaimed, stored in storage tanks and reused for operation. The swale will be maintained regularly.

Other actions that will be undertaken to prevent contamination of soil, stormwater include:

- Preventing stormwater from entering or leaving work areas where it may become contaminated with grease, oils, chemicals, particulates or solvents.
- Covering and bunding such areas where necessary to avoid the incursion of stormwater and prevent hazardous and trade wastes from contaminating the surrounding soil and stormwater system.
- Preventing wastewater containing contaminants (e.g. degreasers, oils and detergents) from contaminating stormwater or the ground.
- Wash down from workshop floor, vehicles or machinery parts will be directed to the oily water separator and not to the surrounding soil or into stormwater drains.
- Store wastes will be undercover so that contaminants cannot be washed to stormwater by rain.

3.4 Ground Water and Soil
The potential for localised contamination of soil and groundwater will be managed by hard-standing the site working area including water collection pits with all contaminated stormwater separated and directed to concrete lined collection pits which then flow to settlement pits and reused in the process.

There will be a wash bay for collection of hydrocarbon-contaminated water. This water will be directed to a lined sump with an oil water separator for treatment prior to discharge.
Waste water from the concrete truck agitator are directed through a wash-out pit in an associated below ground wedge pit. The washout pits are built from pre-fabricated concrete panels placed in a rectangle with a gate mechanism. Excess water in the trucks will go into the wash out pit, which will subsequently drain into the wedge pit. This water can then be used for washing of the trucks.

In addition the following actions will be undertaken to ensure waste water is managed to prevent adverse impacts to the environment.

- Cleaning up material spilt during concrete batching or transport immediately.
- All water used to clean up spilt materials will be directed into washout pit.
- All water draining from any area where agitators and mixers will be loaded or where concrete is batched, will be directed into the washout pit.
- All other water that drains off sealed or paved areas and which are likely to contain waste materials, will be directed into the washout pit.
- Any water removed from, or which might overflow from washout pit, will be directed into associated below ground wedge pit.
- Water that is likely to contain hydrocarbons will be directed through the oily water separator prior to being reused for dust suppression (e.g. from truck washdown pad).
- The grey water used in concrete batching will be reused for washing trucks.
- Settled material will be kept in the washout pit wet to minimise dust emissions, until the pit is required to be dried out to allow the settled material to be removed.
- Settled material in washout pit will not be higher than 300 mm below the top of the wedge pit walls.
- Wedge pit will be constructed so that is large enough to contain all of the water which might drain into it.
- Maintenance will be carried out washout pit, wedge pit, swale, and oily water separator as often as necessary, to ensure their efficient operation.
- All excess concrete waste created during concrete batching or cement product manufacturing (including material removed from washout pit, wedge pit, swale, and oily water separator where possible will be recycled, or disposed of at an appropriate licensed landfill site or waste treatment facility.

The Water Management System

The Water Management System for the concrete batching plant will include bore water stored in water tanks and associated plumbing equipment erected to provide buffer water storage for operations including batching of concrete, wash-down of plant and trucks and watering of stockpile. These water tanks will be plumbed into a water chiller unit to supply water to the loading bay at a precise temperature.

Waste water from the concrete truck agitator will be handled in an environmentally responsible manner through the construction and use of a wash-out pit and an associated below ground wedge pit. The wash-out pits are built from pre-fabricated concrete panels placed in a rectangle with associated apron slabs. This system confines all concrete waste wash-out from the trucks. This allows for the settlement of solid waste, which is left to dry out. The anticipated quantity of solid waste generated will be the equivalent to less than 2% of the batched concrete produced. After the solid waste has dried out, it is
stockpiled temporarily on site until a full tipper load of material (between 40 and 50 tonnes) has accumulated. The contractor will collect the waste in a tipper truck loaded by the front end loader at the site then carted away. As the solid pit waste produced by the plant is a highly alkaline material, the waste cannot be taken directly to landfill and instead must be removed by a waste contractor to be treated off-site to reduce the alkalinity prior to recycling or disposal.

Grey water generated at the loading bay will collect in the below ground wedge settlement pit and transferred underground to the washout area recycling facility. The washout area will be located next to the slump stand and adjacent to (to the west) the main concrete plant. It will contain a dedicated single-truck mixed use washing bay where trucks will be washed using a high pressure water cleaner as well as a water recycling facility. Any solid waste from the washout recycling facility can be removed by a loader and transferred to the settlement pits. The grey water collected in the washout area recycling facility will be collected in a wedge pit for re-use in washing down trucks.

The loading bay and wash-out pit will be located within a greywater containment perimeter with a concrete floor and a semi-mountable curb profile. Similarly the slump stand, washout area and recycling facility will also be situated within a greywater containment perimeter. This will completely preclude the drainage of waste materials into the groundwater.

Occasionally, excess concrete produced as part of the batching process will require disposal or recycling. However, given that batched concrete is a costed resource, it is unusual for substantial amounts to be produced over and above what has been ordered for a particular project. On rare occasions, greater amounts of batched concrete may need to be disposed of due to emergencies or supply disruptions. In these situations, contingency measures will be established for the removal and disposal of wet concrete. This would typically involve the delivery of the wet concrete directly to the recycling plant by the contractor for processing, where it is dried, broken up, then disposed of.
Figure 4 Flow of water through the production process
3.5 Dust Management
Dust will be generated during the operation of the MCBP. However Great Northern Concrete will manage the operation of the MCBP in accordance with the Great Northern Concrete Dust Management Plan.

Great Northern Concrete has committed to the following air quality management practices:
- Dust suppression techniques (e.g. dust suppression sprays) will be implemented during construction and operations activities;
- Water for dust suppression will be provided from a bore; and
- Vehicle speeds on site shall be reduced where necessary to minimise dust emissions.

Pre-installed reticulated water sprays in the bin structures will minimise dust generated in stockpiling and batching operations. Cement silos and weigh hoppers will be fitted with dust filters. The concrete loading bay will be directed to collection pits. Dust generated at the loading point will be suppressed through a preinstalled high pressure water spray bar system that is controlled by the batching computer. Additional mobile water sprays will provide dust suppression to external stockpiles and yard areas as required. Weekly inspection of filtration systems will be carried out.

Further dust management measurement and process is located in the Great Northern Concrete Dust Management Plan.

3.6 Noise Emission
Noise emissions will be generated during the construction and operation of the mobile concrete batching plant. The noise level modelling predicted that with the additional barriers in place the noise levels will comply with day time assigned level at all identified receivers.

In addition the following noise management practices will be implemented during construction and operation of the mobile concrete batch plant:
- Compliance with the Environmental Protection (Noise) Regulations 1997 and Australian Standard 2436-1981: Guide to noise control on construction, maintenance and demolition sites and relevant occupational health and safety standards;
- Equipment will be generally operated during daylight hours; and
- Regular inspection, maintenance and replacement of mobile equipment will occur so that noise levels are minimised during the equipment life.
- A 4 m high acoustic L shaped or three sided barrier to the south of the slumping stand will be constructed
- 3 m high acoustic barrier with 1 m overhang to the west of the cement delivery area will be constructed
- 2.4 m high solid site boundary fence will be constructed
- Compliance with the Environmental Protection (Noise) Regulations 1997 and Australian Standard 2436-1981: Guide to noise control on construction, maintenance and demolition sites and relevant occupational health and safety standards;
- Equipment will be generally operated during daylight hours; and
- Regularly inspect, maintain and replace mobile equipment so that noise levels are minimised during the equipment life.

The noise emission as a result of the operation of the MCBP will be in line with surrounding businesses and operations.
3.7 Solid Waste management

It is acknowledged that waste generation will occur from the use of the site.

The principle of waste management employed at the site is based on a hierarchy of controls as follows:

- Prevent
- Reduce
- Re-use
- Recycle
- Treatment
- Disposal

3.7.1 Aggregate Recycling
Aggregate will be recovered and reused where possible.

3.7.2 Concrete Washout Waste
Concrete washout waste is created when the agitator trucks return from deliveries and wash out the barrels. Barrels will be filled with recycled water, then the water and remaining concrete materials will be discharged to the washout pits for dewatering. The washout pits have sealed gates fitted to the front. These gates and the rear of the pits are fitted with multi-level clarifying bungs to allow the water to be decanted from the pit after the settlement of fines. Water flow from the washout pits drains to the main slurry pit.

3.7.3 Other Wastes
Other wastes will be managed in the following manner:

- Scrap metal will be removed from site by the maintenance contractors and recycled at a scrap metal recycling facility.
- Waste oil from machinery services will be returned to a licensed waste oil recycler for recycling by the service or maintenance contractors, truck servicing will be performed off-site.
- A bin will be provided for all other wastes. The size of the bin, frequency of collection and the contents will be regularly reviewed.

3.7.4 Waste Collection
Waste will be collected by the waste contractor from the waste bin locations. The waste contractor will have direct access to these areas. The waste contractor will collect the bins from the bin enclosures. The waste contractor will be made aware of any specific management requirements.

3.7.5 Waste Contractors
Waste will be collected through a private waste contractor.

3.7.6 Frequency
The waste will be collected as frequently as required to ensure that waste does not overflow.

3.7.7 Site Hygiene
The following site hygiene actions will be undertaken.

- Vehicles carrying concrete, or any of the ingredients of concrete will be washed, free of cement slurry and dust before they leave the site.
• All inside areas on-site which may be affected by cement product manufacturing will be cleaned regularly to prevent the accumulation of dust on any surface.

• All fittings and electrical installations in areas will be cleaned by water are waterproof or otherwise designed to withstand water.

3.7.8 Spills

Material spilt during concrete batching or transport will be cleaned up immediately. Spill kits will be available in workshop area, fuel and chemical storage area and around the site. Spill response work instructions will be available on site.
4 Environmental Risk Assessment

There is the potential for a number of environmental impacts to be generated by the MCBP operation. However, these environmental risks can be considerably reduced by the design of the plant and management control measures.

Great Northern will minimise all foreseeable impacts by implementing environmental management measures for the design, construction and operation of the batch plant.

Environmental risk assessment has been undertaken for the site and is presented in Table 1. Great Northern Concrete Environmental Risk Rating Matrix and Risk Criteria Table are presented in Appendix 1.
<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Environmental Impact</th>
<th>Inherent Risk</th>
<th>Mitigation Measure</th>
<th>Residual Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Management and Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental incident occurs</td>
<td>Air, water, or noise pollution</td>
<td>Likely</td>
<td>Minor Medium</td>
<td>Standard work instructions available for operation tasks. Daily, weekly, monthly environmental inspections completed. Regular training in incident response. Environmental spill kit available on site. Standard work instructions available for management and containment of spills.</td>
</tr>
<tr>
<td>Batch plant operation and agitator loading</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust generated from material weighing and batching</td>
<td>Air Pollution</td>
<td>Possible</td>
<td>Minor Medium</td>
<td>The concrete loading bay will be enclosed with water sprays installed, and any run off will be directed to collection pits.</td>
</tr>
<tr>
<td>Noise generated from material weighing and batching</td>
<td>Noise Pollution</td>
<td>Possible</td>
<td>Slight Low</td>
<td>The concrete loading bay will be enclosed.</td>
</tr>
<tr>
<td>Noise generate from agitator loading or slumping</td>
<td>Noise Pollution</td>
<td>Possible</td>
<td>Slight Low</td>
<td>A 4 m high acoustic L shaped or three sided barrier to the south of the slumping stand will be constructed.</td>
</tr>
<tr>
<td>Site Traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust generated from traffic movements within site</td>
<td>Air Pollution</td>
<td>Possible</td>
<td>Minor Medium</td>
<td>All internal access routes will be hard stanced. Access routes kept clean by hosing or sweeping.</td>
</tr>
<tr>
<td>Water Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water contamination before discharge</td>
<td>Water Pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------</td>
<td>----------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>Aggregate Receival, Storage and Handling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery of dry material cause dust</td>
<td>Air pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Windborne dust created during transfer of material from delivery bins to storage bins</td>
<td>Air pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Cement Receipt, Storage and Handling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cement discharge occurs during delivery</td>
<td>Air pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Cement discharge within MCBP</td>
<td>Water pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Cement discharges from silo during delivery</td>
<td>Air pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Cement discharges from silo</td>
<td>Air pollution</td>
<td>Possible</td>
<td>Slight</td>
<td>Low</td>
</tr>
<tr>
<td>Event Description</td>
<td>Pollutant</td>
<td>Likelihood</td>
<td>Impact</td>
<td>Control Measures</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cement discharges during batching</td>
<td>Air pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Cement discharges during agitator loading</td>
<td>Air pollution</td>
<td>Possible</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Admixture Receipt, Storage and Handling</td>
<td>Water pollution</td>
<td>Unlikely</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Admixture spills occurs from tanks</td>
<td>Water pollution</td>
<td>Unlikely</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Admixture spills occurs during transfer to MCBP or during loading</td>
<td>Water pollution</td>
<td>Unlikely</td>
<td>Minor</td>
<td>Medium</td>
</tr>
</tbody>
</table>
5 Training and Awareness

Familiarise all personnel associated with concrete batching activities with the requirements of this EMP.

All employees will undertake environmental and safety training, as well as refresher training and will be informed of operational requirements. Truck drivers and employees will also be informed via regular ‘toolbox’ meetings of the importance of reporting any environmental issues or incidents on trucks or on site to the site supervisor.

All site personnel will receive training on environmental management as required by the Regulations. Training of personnel on environmental management issues will form part of the site induction process. Reinforcement of such will occur on a daily basis by supervisory personnel and management during routine visits.

5.1 Monitoring Actions

The following monitoring actions will be undertaken:

- The cement storage silo air cleaning systems will be tested at least weekly to check efficiency.
- Oily interceptor discharge water quarterly will be monitored to confirm that it contains <5 ppm TPH if water is to be reused.
- Visual monitoring of cement and raw materials dust as well as concrete waste around the site will be conducted daily by the delegated employee.
- Weekly visual inspections of the immediate surrounds of the site will be conducted by the delegated employee.

5.2 Audits and Inspections

The following audits and inspections actions will be undertaken:

- Continual visual dust monitoring will be undertaken of dust emissions from the MCBP.
- Air cleaning system filters will be inspected, or if the air cleaning system is fitted with pressure gauges for the detection of blockages or leaks, check gauges, at least weekly.
- The cement storage silo air cleaning systems will be tested at least weekly.
- The integrity of the impervious lining of the washout pit and wedge pit will be inspected weekly.
- Weekly compliance checks will be completed using the Concrete Batching Inspection Form and document the above tests and inspections.
- Monthly compliance inspections will be undertaken using the Concrete Batching Inspection Form.
5.3 Complaints Handling

Complaints Handling form will be established for the site to record the date, nature, and resolution action of any complaints. Complaints will be directed to the site supervisor or delegated employee for resolution. If the complaint is verified as being due to a site source, remedial action will be undertaken within two working days. If it is found through the investigation process that there are immediate concerns from the incident then the MCBP will cease operation until the issue causing the concerns is rectified.
### 6 Appendix

**Appendix 1 Great Northern Concrete Environmental Risk Tables**

#### Great Northern Concrete Environmental Risk Rating Matrix

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Consequence</th>
<th>Slight</th>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Certain</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Extreme</td>
<td>Extreme</td>
</tr>
<tr>
<td>Likely</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Extreme</td>
<td>Extreme</td>
</tr>
<tr>
<td>Possible</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Rare</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

#### Great Northern Concrete Environmental Risk Criteria Table

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Environment</th>
<th>Public Health* and Amenity (such as air and water quality, noise, and odour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>• on-site impacts: catastrophic</td>
<td>• Loss of life</td>
</tr>
<tr>
<td></td>
<td>• off-site impacts local scale: high level or above</td>
<td>• Adverse health effects: high level or ongoing medical treatment</td>
</tr>
<tr>
<td></td>
<td>• off-site impacts wider scale: mid level or above</td>
<td>• Specific Consequence Criteria (for public health) are significantly exceeded</td>
</tr>
<tr>
<td></td>
<td>• Mid to long term or permanent impact to an area of high conservation value</td>
<td>• Local scale impacts: permanent loss of amenity</td>
</tr>
<tr>
<td></td>
<td>or special significance^</td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>• on-site impacts: high level</td>
<td>• Adverse health effects: mid level or frequent medical treatment</td>
</tr>
<tr>
<td></td>
<td>• off-site impacts local scale: mid level</td>
<td>• Specific Consequence Criteria (for public health) are exceeded</td>
</tr>
<tr>
<td></td>
<td>• off-site impacts wider scale: low level</td>
<td>• Local scale impacts: high level impact to amenity</td>
</tr>
<tr>
<td></td>
<td>• Short term impact to an area of high conservation value or special</td>
<td></td>
</tr>
<tr>
<td></td>
<td>significance^</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Specific Consequence Criteria (for environment) are exceeded</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>• on-site impacts: mid level</td>
<td>• Adverse health effects: low level or occasional medical treatment</td>
</tr>
<tr>
<td></td>
<td>• off-site impacts local scale: low level</td>
<td>• Specific Consequence Criteria (for public health) are at risk of not being</td>
</tr>
<tr>
<td></td>
<td>• Specific Consequence Criteria (for environment) are at risk of not being</td>
<td>met</td>
</tr>
<tr>
<td></td>
<td>met</td>
<td>• Local scale impacts: mid level impact to amenity</td>
</tr>
<tr>
<td>Minor</td>
<td>• on-site impacts: low level</td>
<td>• Specific Consequence Criteria (for public health) are likely to be met</td>
</tr>
<tr>
<td></td>
<td>• off-site impacts local scale: minimal</td>
<td>• Local scale impacts: low level impact to amenity</td>
</tr>
<tr>
<td></td>
<td>• Specific Consequence Criteria (for environment) are not detectable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Specific Consequence Criteria (for environment) likely to be met</td>
<td></td>
</tr>
<tr>
<td>Slight</td>
<td>• on-site impact: minimal</td>
<td>• Local scale: minimal impacts to amenity</td>
</tr>
<tr>
<td></td>
<td>• Specific Consequence Criteria (for environment) met</td>
<td>• Specific Consequence Criteria (for public health) criteria met</td>
</tr>
</tbody>
</table>
### Great Northern Concrete Environmental Risk Likelihood Table

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Certain</td>
<td>The risk event is expected to occur in most</td>
</tr>
<tr>
<td>Likely</td>
<td>The risk event will probably occur in most circumstances.</td>
</tr>
<tr>
<td>Possible</td>
<td>The risk event could occur at some time.</td>
</tr>
<tr>
<td>Unlikely</td>
<td>The risk event will probably not occur in most circumstances.</td>
</tr>
<tr>
<td>Rare</td>
<td>The risk event may only occur in exceptional circumstances.</td>
</tr>
</tbody>
</table>
Appendix 3 Dust Management Plan
GREAT NORTHERN CONCRETE PTY LTD

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

PROPOSED CONCRETE BATCHING PLANT
3728 GREAT NORTHERN HIGHWAY, MUCHEA

SEPTEMBER 2018
Environmental Noise Impact Assessment
Proposed Concrete Batching Plant
3728 Great Northern Highway, Muchea

Great Northern Concrete Pty Ltd

WSP
Level 5, 503 Murray Street
Perth WA 6000
PO Box 7181
Cloisters Square WA 6850

Tel: +61 8 9489 9700
Fax: +61 8 9489 9777
wsp.com

REV | DATE | DETAILS
---|------|-----------------
C | 26/09/2018 | Updated Sound Power Levels and site operations

<table>
<thead>
<tr>
<th>NAME</th>
<th>DATE</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared by:</td>
<td>Andrew Boladz</td>
<td>26/09/2018</td>
</tr>
<tr>
<td>Reviewed by:</td>
<td>Simon Moore</td>
<td>26/09/2018</td>
</tr>
<tr>
<td>Approved by:</td>
<td>Jamie Hladky</td>
<td>26/09/2018</td>
</tr>
</tbody>
</table>

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.

PS110127-ACS-REP-001 RevC  180928  September 2018
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th></th>
<th>CONTENT</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>SITE LOCATION</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>NOISE CRITERIA</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>METHODOLOGY</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>PREDICTION OF NOISE LEVELS</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>IMPACT ASSESSMENT</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>NOISE MITIGATION OPTIONS</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>CONCLUSION</td>
<td>10</td>
</tr>
</tbody>
</table>
1 INTRODUCTION

WSP was engaged by Great Northern Concrete to undertake an environmental noise impact assessment of noise emissions from a proposed new Concrete Batching Plant (CBP).

The aims of the study were:

— Provide a description of the new location and CBP layout.
— Identify the nearest potentially-affected receivers.
— Provide a description of the environmental noise criteria relevant to the CBP operation.
— Assess the potential noise impacts of the CBP on the nearest receivers.
— In the event of exceedances being predicted recommend potential mitigation options.

The facility is proposed to be located at 3728 Great Northern Highway, Muchea, Western Australia. The site is currently zoned as agricultural and will shortly be rezoned to general industry (gazettel expected in September 2018). The site is surrounded by industrial and agricultural zoning within the broader Muchea Employment Node Special Control Area (Muchea Industrial Precinct). A map of the Muchea Industrial Precinct within which the site and surrounding properties are located is included within Appendix A1. The site is also positioned immediately east of the planned road train assembly area to be constructed on the land between Great Northern Highway and the Perth Darwin National Highway. The area has been chosen due to its proximity to the new Brand Highway deviation to service freight trucks utilising the Perth Darwin National Highway.

The main noise generating activities from the proposed facility are expected to be:

— Noise from fixed plant.
— Noise from mobile plant.
— Noise associated with vehicles visiting the CBP.

The facility will typically operate under the following conditions:

— 7.00 am to 7.00 pm Monday to Saturday.
2 SITE LOCATION

The location of the CBP facility and the nearest premises are shown in Figure 2-1. The nearest premises are identified as:

- Lot 3620 Great Northern Highway: on the southern boundary of the proposed site containing an industrial premises (transport depot) and a residence forming part of the industrial premises.
- 35 Muchea East Road: noise sensitive residential receiver located approximately 220 m east of the proposed site.
- 30 Muchea East Road: noise sensitive residential receiver located approximately 260 m east of the proposed site.
- 6 Muchea East Road: noise sensitive residential receiver located approximately 165 m south of the proposed site.
- Lot 3599 Great Northern Highway: industrial premises (transport business) and residence forming part of the industrial premises located approximately 170 m southwest of the proposed site.
- 43 Brand Highway: noise sensitive residential receiver located approximately 550 m southwest of the proposed site.

Reproduced with permission Google Earth

Figure 2-1 Site and sensitive receiver locations

The proposed layout of the CBP and traffic routes are shown in Appendix A2.
3 NOISE CRITERIA

The applicable statutory requirements for noise emissions are contained within the *Environmental Protection Act 1986* (the Act) and the *Environmental Protection (Noise) Regulations 1997* (the Noise Regulations).

The Noise Regulations require that noise emitted from any premises must comply with assigned noise levels when received at any other premises and be free of the intrusive characteristics of tonality, modulation and impulsiveness. In addition, the noise emissions must not “significantly contribute” to an exceedance of the assigned levels. A noise emission is generally understood to “significantly contribute” if it is higher than a level which is 5 dBA below the assigned level at the point of reception.

**Assigned noise levels**

Assigned noise levels are the levels of noise allowed to be received at a premises at a particular time of the day.

The assigned levels are specified according to the type of premises receiving the noise. There are different assigned levels for noise sensitive, commercial and industrial premises. The assigned levels for noise sensitive premises vary depending on the time of the day. The assigned noise levels always apply at the premises receiving the noise.

For noise sensitive premises, the assigned levels are adjusted by the addition of an influencing factor to account for the existing acoustic environment. The influencing factor increases with the amount of commercial and industrial premises in the vicinity of the receiver as well as the presence of any major or secondary roads. This is calculated by considering areas within 100 m and 450 m radius of the receiver location.

The table of assigned levels, shown in Table 3-1 identifies three types of assigned levels: \( L_{A_{\text{max}}} \), \( L_{A1} \) and \( L_{A10} \).

**Table 3-1 Table of assigned noise levels**

<table>
<thead>
<tr>
<th>TYPE OF PREMISES RECEIVING NOISE</th>
<th>TIME OF DAY</th>
<th>ASSIGNED LEVEL dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>( L_{A10} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( L_{A1} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( L_{A_{\text{max}}} )</td>
</tr>
<tr>
<td>Noise sensitive premises at locations within 15 m of a building directly associated with a noise sensitive use</td>
<td>0700 to 1900 hours Monday to Saturday</td>
<td>45 + Influencing factor</td>
</tr>
<tr>
<td></td>
<td>0900 to 1900 hours Sunday and public holidays</td>
<td>40 + Influencing factor</td>
</tr>
<tr>
<td></td>
<td>1900 to 2200 hours All days</td>
<td>40 + Influencing factor</td>
</tr>
<tr>
<td></td>
<td>2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays</td>
<td>35 + Influencing factor</td>
</tr>
<tr>
<td>Noise sensitive premises at locations further than 15 m from a building directly associated with a noise sensitive use</td>
<td>All hours</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>Commercial premises</td>
<td>All hours</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>Industrial and utility premises</td>
<td>All hours</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>

The calculation of the influencing factor for each identified noise sensitive receiver is shown in Table 3-2.
Table 3-2 Influencing factor assumptions

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DESCRIPTION</th>
<th>CONTRIBUTION TO IF dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>35 Muchea East Road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 Muchea East Road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 Muchea East Road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>43 Brand Highway</td>
</tr>
<tr>
<td>Industrial Land</td>
<td>within 100 m</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>within 450 m</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17%</td>
</tr>
<tr>
<td>Commercial Land</td>
<td>within 100 m</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>within 450 m</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Major Roads</td>
<td>within 100 m</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>within 450 m</td>
<td>N/A</td>
</tr>
<tr>
<td>Secondary Roads</td>
<td>within 100 m</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Great Northern Highway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6,645 VPD)</td>
</tr>
<tr>
<td></td>
<td>within 450 m</td>
<td>N/A</td>
</tr>
<tr>
<td>Influencing Factor</td>
<td>(rounded to nearest dB), IF</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3-3 Specific criteria noise sensitive premises

<table>
<thead>
<tr>
<th>TIME OF DAY</th>
<th>RECEIVER</th>
<th>ASSIGNED LEVEL dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L_10</td>
</tr>
<tr>
<td>0700 to 1900 Monday to Saturday (Noise sensitive</td>
<td>6 &amp; 35 Muchea East Road</td>
<td>49</td>
</tr>
<tr>
<td>premises)</td>
<td>30 Muchea East Road</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>43 Brand Highway</td>
<td>45</td>
</tr>
<tr>
<td>All hours (Industrial premises)</td>
<td>3620 Great Northern Highway</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>3599 Brand Highway</td>
<td>65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Receiver</th>
<th>Assigned Level dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>*0700 to 1900 Monday to Saturday (Noise sensitive</td>
<td>6 &amp; 35 Muchea East Road</td>
<td>49</td>
</tr>
<tr>
<td>premises)*</td>
<td>30 Muchea East Road</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>43 Brand Highway</td>
<td>45</td>
</tr>
<tr>
<td>All hours (Industrial premises)</td>
<td>3620 Great Northern Highway</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>3599 Brand Highway</td>
<td>65</td>
</tr>
</tbody>
</table>

**Intrusive characteristics**

If noise emitted from any premises when received at any other premises cannot reasonably be free of intrusive characteristics of tonality (e.g. drone or pitch), modulation (e.g. siren) or impulsiveness (e.g. bang), then a series of adjustments must be added to the emitted levels (measured or calculated) and the adjusted level must comply with the assigned level. The adjustments are detailed in Table 3-4.

Table 3-4 Table of adjustments

<table>
<thead>
<tr>
<th>ADJUSTMENT WHERE NOISE EMISSION IS NOT MUSIC THESE ADJUSTMENTS ARE CUMULATIVE TO A MAXIMUM OF 15 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where tonality is present</td>
</tr>
<tr>
<td>+5 dB</td>
</tr>
</tbody>
</table>

**Representative Assessment Period**

The assigned levels are statistical noise levels over a Representative Assessment Period (RAP). For this assessment, a RAP of 15 minutes has been selected as an appropriate period for assessing the noise from the site.

As most of the noise sources from the site are expected to be generally constant the L_{10} criteria has been used for the assessment of the noise levels at the receivers.
4 METHODOLOGY

4.1 MODELLING

A noise model was prepared using the SoundPLAN 7.4 Industrial Module, a commercial software system developed by Braunstein and Bernt GmbH in Germany.

The software allows the use of various internationally recognised noise prediction algorithms. The CONCAWE method, developed in the Netherlands for assessment of large industrial plants, has been selected for this assessment (for all receivers apart from 3620 Great Northern Highway) as it enables meteorological influences to be assessed. Due to the close proximity of the receiver at 3620 Great Northern Highway CONCAWE is not suitable therefore the ISO 9613:1996 Acoustics – Attenuation of sound during propagation outdoors algorithm was used for the single point predictions at this location.

The CONCAWE model included the climatic parameters outlined in the Western Australian Department of Environmental Regulation Draft Guidelines on Environmental Noise for Prescribed Premises 2016; these parameters are highlighted in Table 4-1. The modelling assumed a worst case scenario wind direction from the source to the receiver.

Table 4-1 Meteorological conditions used in the noise predictions

<table>
<thead>
<tr>
<th>TIME OF DAY</th>
<th>TEMPERATURE</th>
<th>RELATIVE HUMIDITY</th>
<th>WIND SPEED*</th>
<th>PASQUIL STABILITY CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day (07:00 to 19:00)</td>
<td>20°C</td>
<td>50%</td>
<td>4 m/s</td>
<td>E</td>
</tr>
<tr>
<td>Night (22:00 to 07:00)</td>
<td>15°C</td>
<td>50%</td>
<td>3 m/s</td>
<td>F</td>
</tr>
</tbody>
</table>

* The wind is orientated so that it blows from the source to the receiver

The assumptions used in the modelling were:

- Day time worst case meteorological conditions.
- Area topography flat ground.
- Batching plant located on a raised 500 mm mound.
- Soft ground absorption.
- One concrete truck movement per hour traveling at 20 km/h.
- One raw material delivery truck movement per hour traveling at 20 km/h.
- One front end loader movement per fifteen minutes traveling at 10 km/h.
- All noise sources are operating simultaneously.
- Noise sources assumed omnidirectional.
- The sound levels referred to in this report represent the $L_{A10}$ emission level.
- 2 m high storage bins on eastern boundary of site.
- Height of receivers 1.5 m.
4.2 SOURCE SOUND POWER LEVELS

The potential for machinery to emit noise is quantified as the Sound Power Level expressed in decibels (dB re 1x10^{-12} W). At the receiver, the noise is quantified as the Sound Pressure Level expressed in decibels (dB re 20 µPa).

Specific noise data in relation to the CBP was not available therefore the Sound Power Levels for the CBP used in the modelling were obtained from CMQ Engineering of a similar plant and from reference levels contained within the WSP database from previous surveys. Details of the Sound Power Levels used in the model are shown in Table 4-2.

Table 4-2 Source Sound Power Levels

<table>
<thead>
<tr>
<th>SOURCE ITEM</th>
<th>OCTAVE BAND FREQUENCY HZ SOUND POWER LEVEL</th>
<th>TOTAL dBa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63</td>
<td>125</td>
</tr>
<tr>
<td>Concrete Truck</td>
<td>111</td>
<td>112</td>
</tr>
<tr>
<td>Delivery Truck</td>
<td>110</td>
<td>106</td>
</tr>
<tr>
<td>Front End Loader Komatsu WA4800</td>
<td>109</td>
<td>103</td>
</tr>
<tr>
<td>CBP</td>
<td>105</td>
<td>96</td>
</tr>
<tr>
<td>Aggregate weigh sand first</td>
<td>89</td>
<td>82</td>
</tr>
<tr>
<td>Concrete truck loading</td>
<td>114</td>
<td>109</td>
</tr>
<tr>
<td>Concrete truck at slump</td>
<td>108</td>
<td>104</td>
</tr>
<tr>
<td>Cement delivery</td>
<td>110</td>
<td>116</td>
</tr>
</tbody>
</table>
5  PREDICTION OF NOISE LEVELS

The predicted noise levels at the nearest noise sensitive receivers from the CBP facility are shown in Table 5-1.

Table 5-1 Predicted noise levels

<table>
<thead>
<tr>
<th>NOISE SENSITIVE RECEIVER</th>
<th>PREDICTED L_A10 dB DAYTIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>3620 Great Northern Highway</td>
<td>74</td>
</tr>
<tr>
<td>6 Muchea East Road</td>
<td>50</td>
</tr>
<tr>
<td>35 Muchea East Road</td>
<td>49</td>
</tr>
<tr>
<td>3599 Great Northern Highway</td>
<td>55</td>
</tr>
<tr>
<td>30 Muchea East Road</td>
<td>49</td>
</tr>
<tr>
<td>43 Brand Highway</td>
<td>48</td>
</tr>
</tbody>
</table>

The noise contour map showing the predicted noise levels extending to the worst affected receivers is shown in Appendix A3.
6 IMPACT ASSESSMENT

The results of the noise modeling and compliance with the established criteria are presented in Table 6-1. Based on analysis of third octave data that WSP has from other CBP operations, a tonal characteristic may be associated with the cement delivery, therefore as per the noise regulations a +5 dB penalty has been applied for a tonal impact.

Predicted compliances are highlighted in green and exceedances are highlighted in orange.

Table 6-1 Predicted noise levels

<table>
<thead>
<tr>
<th>NOISE SENSITIVE RECEIVER</th>
<th>PREDICTED $L_{A10}$ dB*</th>
<th>ASSIGNED LEVEL $L_{A10}$ dB</th>
<th>COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3620 Great Northern Highway</td>
<td>79</td>
<td>65</td>
<td>+14</td>
</tr>
<tr>
<td>6 Muchea East Road</td>
<td>55</td>
<td>49</td>
<td>+6</td>
</tr>
<tr>
<td>35 Muchea East Road</td>
<td>54</td>
<td>49</td>
<td>+5</td>
</tr>
<tr>
<td>3599 Great Northern Highway</td>
<td>61</td>
<td>65</td>
<td>-4</td>
</tr>
<tr>
<td>30 Muchea East Road</td>
<td>54</td>
<td>47</td>
<td>+7</td>
</tr>
<tr>
<td>43 Brand Highway</td>
<td>53</td>
<td>45</td>
<td>+8</td>
</tr>
</tbody>
</table>

*5 dB adjustment for tonality applied

The predicted noise levels from fixed plant and vehicles associated with the CBP are predicted to exceed the criteria at all identified receivers except for 3599 Great Northern Highway.

Therefore, noise mitigation is required to achieve compliance with the Noise Regulations at these receivers.
7 NOISE MITIGATION OPTIONS

The significant contributors to the exceedances noted in Section 6 are the cement delivery, slumping and concrete truck loading. In order to achieve compliance with the assigned levels at the nearest noise sensitive receivers’ mitigation works are recommended; it should be noted that these are conceptual noise mitigation recommendations and further detailed design will be required:

- 4 m high acoustic L shaped or three sided barrier to the south of the slumping stand as highlighted in Appendix A4.
- 3 m high acoustic barrier with 1 m overhang to the west of the cement delivery area as highlighted in Appendix A4.
- 2.4 m high solid site boundary fence as highlighted in Appendix A4.

Potential materials for acoustic barriers are outlined in Appendix A5.

The noise levels have been remodelled with the additional barriers in place and the predicted noise levels are assessed in Table 7-1. As the impact of the cement delivery truck is no longer a significant source at all the receivers except for 3620 Great Northern Highway, the tonal penalty has only been applied at this one location.

Day time operation is predicted to comply at all identified receivers with the acoustic barriers in place.

Table 7-1 Predicted mitigated noise levels

<table>
<thead>
<tr>
<th>NOISE SENSITIVE RECEIVER</th>
<th>PREDICTED $L_{A10}$ dB*</th>
<th>ASSIGNED LEVEL $L_{A10}$ dB</th>
<th>COMPLIANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3620 Great Northern Highway</td>
<td>65*</td>
<td>65</td>
<td>0</td>
</tr>
<tr>
<td>6 Muchea East Road</td>
<td>47</td>
<td>49</td>
<td>-2</td>
</tr>
<tr>
<td>35 Muchea East Road</td>
<td>48</td>
<td>49</td>
<td>-1</td>
</tr>
<tr>
<td>3599 Great Northern Highway</td>
<td>51</td>
<td>65</td>
<td>-14</td>
</tr>
<tr>
<td>30 Muchea East Road</td>
<td>47</td>
<td>47</td>
<td>0</td>
</tr>
<tr>
<td>43 Brand Highway</td>
<td>40</td>
<td>45</td>
<td>-5</td>
</tr>
</tbody>
</table>

*5 dB adjustment for tonality applied

The noise contour map showing the predicted mitigated noise levels extending to the worst affected receivers is shown in Appendix A3.
8 CONCLUSION

WSP was commissioned by Great Northern Concrete to conduct an acoustic assessment relating to the proposed CBP at Muchea. The acoustic assessment has been conducted in accordance with the requirements of Western Australia Environmental Protection (Noise) Regulations 1997.

Noise levels associated with the fixed and mobile plant were assessed against the assigned levels within the Noise Regulations at the nearest receivers and were predicted to be non-compliant without noise mitigation.

Recommended conceptual noise mitigation has been outlined and the plant has been remodeled with the mitigation in place. The mitigated predicted noise levels were compliant with the assigned noise levels for the daytime period at all the nominated receivers.
Development shall be generally in accordance with the structure plan guidelines and precinct policy statements outlined in section 6 of the report.

Proposed site
Lot 22
A2. CBP LAYOUT

[Diagram of proposed CBP layout showing locations of proposed concrete batching plant at 3728 Great Northern Highway, Muchea, Great Northern Concrete Pty Ltd.]
A3. NOISE CONTOUR MAPS
A4. BARRIER PLACEMENT
### A5. ACOUSTIC BARRIER MATERIALS

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete panel</td>
<td></td>
</tr>
<tr>
<td>Masonry</td>
<td></td>
</tr>
<tr>
<td>Fibre cement sandwiched with compressed foam</td>
<td></td>
</tr>
</tbody>
</table>
Adamsson Sound Seal Panel

Hebel Sound barrier
Flexshield Sonic Wall

Example of sheet steel with insulation and perforated metal construction

Stratocell Whisper
Appendix 4 Noise Impact Assessment
GREAT NORTHERN CONCRETE PTY LTD

QUALITATIVE AIR QUALITY ASSESSMENT
PROPOSED MOBILE CONCRETE BATCHING PLANT,
3728 GREAT NORTHERN HIGHWAY, MUCHEA

NOVEMBER 2018
Qualitative Air Quality Assessment
Proposed Mobile Concrete Batching Plant, 3728 Great Northern Highway, Muchea

Great Northern Concrete Pty Ltd

WSP
Level 5, 503 Murray Street
Perth WA 6000
PO Box 7181
Cloisters Square WA 6850

Tel: +61 8 9489 9700
Fax: +61 8 9489 9777
wsp.com

<table>
<thead>
<tr>
<th>REV</th>
<th>DATE</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final</td>
<td>12/11/18</td>
<td>Report update</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>DATE</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared by:</td>
<td>John Conway</td>
<td>12/11/18</td>
</tr>
<tr>
<td>Reviewed by:</td>
<td>John Conway</td>
<td>12/11/18</td>
</tr>
<tr>
<td>Approved by:</td>
<td>Jason Watson</td>
<td>12/11/18</td>
</tr>
</tbody>
</table>

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.
## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air NEPM</td>
<td>National Environmental Protection Measure (Ambient Air Quality)</td>
</tr>
<tr>
<td>AMS</td>
<td>Aussie Modular Solutions</td>
</tr>
<tr>
<td>AWS</td>
<td>Automatic weather station</td>
</tr>
<tr>
<td>BoM</td>
<td>Bureau of Meteorology</td>
</tr>
<tr>
<td>CBP</td>
<td>Concrete batching plant</td>
</tr>
<tr>
<td>DMP</td>
<td>Dust management plan</td>
</tr>
<tr>
<td>DWER</td>
<td>Department of Water and Environmental Regulation</td>
</tr>
<tr>
<td>EETM</td>
<td>Emission Estimation Technique Manual</td>
</tr>
<tr>
<td>EP Act</td>
<td><em>Environment Protection Act 1986</em></td>
</tr>
<tr>
<td>FEL</td>
<td>Front end loader</td>
</tr>
<tr>
<td>LGA</td>
<td>Local Government Area</td>
</tr>
<tr>
<td>NPI</td>
<td>National Pollutant Inventory</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>Particulate matter less than 10 microns in diameter</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>Particulate matter less than 2.5 microns in diameter</td>
</tr>
<tr>
<td>RF</td>
<td>Reduction factor</td>
</tr>
<tr>
<td>SR</td>
<td>Sensitive receptor</td>
</tr>
<tr>
<td>TEOM</td>
<td>Tapered element oscillating microbalance</td>
</tr>
<tr>
<td>TSP</td>
<td>Total suspended particulates</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>USEPA</td>
<td>United States Environmental Protection Agency</td>
</tr>
<tr>
<td>WA</td>
<td>Western Australia</td>
</tr>
<tr>
<td>kg</td>
<td>Kilogram</td>
</tr>
<tr>
<td>t</td>
<td>Tonne</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

WSP Australia Pty Ltd (WSP) was engaged by Great Northern Concrete Pty Ltd to conduct a qualitative air quality assessment in support of a Works Approval Application for a proposed mobile concrete batching plant (CBP) in Muchea, Western Australia (WA).

The objective of the qualitative air quality assessment was to estimate particulate matter (PM\textsubscript{10} and PM\textsubscript{2.5}) emissions during operation of the concrete batching plant and to compare its contribution to the overall emission loading to the local airshed (Chittering Local Government Area).

The main emission sources for the proposed CBP were identified using project and process information provided by the client and publicly available information e.g. National Pollutant Inventory (NPI) Emission Estimation Technique Manual (EETM) for Concrete Batching and Concrete Product Manufacturing and United State Environment Protection Authority (USEPA) AP-42: Compilation of Emission Factors.

Particulate matter (PM\textsubscript{10} and PM\textsubscript{2.5}) emissions were estimated using emission factors detailed in the NPI EETM for Concrete Batching and Concrete Product Manufacturing and USEPA AP-42: Compilation of Emission Factors and compared these estimates to reported NPI data in the Chittering LGA airshed for the 2016/2017 reporting period.

The estimated PM\textsubscript{10} emissions from the CBP were less than 2% of total emissions reported to the NPI for the Chittering LGA 2016/2017 reporting period. For PM\textsubscript{2.5}, the contribution of 22% is higher primarily due to the non-reporting to the NPI of diffuse sources for the 2016/17 period.

The draft separation distance guidelines between sensitive and industrial land uses were reviewed and indicated that the proposed location of the CBP does not achieve the recommended 300–500 metres (m) at five of the nearest residential receptors (SR1 to SR5).

Notwithstanding, the proposed CBP plant will be designed and operated in line with best practice. Furthermore, the implementation of a Dust Management Plan (DMP) with best practice controls and regular on-site monitoring along the site boundary will ensure that emissions from the proposed CBP do not adversely impact the receiving environment.
1 INTRODUCTION

WSP Australia Pty Ltd (WSP) was engaged by Great Northern Concrete Pty Ltd to conduct a qualitative air quality assessment to estimate particulate matter emissions from a proposed concrete batching plant (CBP) in Muchea, Western Australia (WA) in support of a Works Approval Application.

1.1 OBJECTIVE

The objective of the qualitative air quality assessment was to estimate particulate matter ($\text{PM}_{10}$ and $\text{PM}_{2.5}$) emissions during operation of the concrete batching plant and to compare its contribution to the overall emission loading to the local airshed (Chittering Local Government Area).

1.2 SCOPE OF WORKS

The scope of works for the assessment were to:

- provide a description of the proposed CBP project
- provide a description of the project location
- identify the nearest potentially-affected sensitive receptors
- establish the main pollutants of interest for the project
- review legislative requirements for concrete batching plants
- establish existing air quality and meteorological conditions for the project site estimate emissions from the CBP using publicly available information e.g. National Pollutant Inventory (NPI) data, AP-42 emission factors and information provided by the client
- propose best practice management measures
- prepare a report presenting the outcomes of the qualitative assessment.
2 PROJECT DESCRIPTION

2.1 SITE OPERATIONS

The proposed CBP will operate 7 am to 7 pm Monday to Saturday. Plant operations are proposed as follows:

— delivery of bulk raw materials delivered by trucks or semi-trailers from the western entrance
— unloading of raw materials into bulk stockpile areas or silos
— movement of raw materials into conditioning areas (storage bins) by front end loader. Computerised batching operations with continuous stock level monitoring
— batched concrete discharged into agitator trucks, final slumping water added and concrete delivered to customer
— daily truck movements (20) will involve deliveries of concrete, cement and raw materials
— one front end loader operating on site.

The proposed CBP will have an estimated production rate of 52,000 tonnes per annum.

The proposed layout of the CBP and traffic routes are presented in Appendix A.
3 POLLUTANTS OF INTEREST

The main pollutants of interest for the proposed CBP include the following particulate matter fractions:

- PM$_{10}$
- PM$_{2.5}$.
4 REGULATORY REQUIREMENTS

4.1 LEGISLATION AND POLICY

Western Australia’s primary environmental protection legislation is the Environmental Protection Act 1986 (EP Act). The EP Act establishes the framework for regulating the discharge of air emissions governed by the Department of Water and Environmental Regulation (DWER). Pursuant to the EP Act are state regulations, environmental policies and guidance statements.

Legislation relevant to air emissions from CBP’s in WA are presented in the following sections.

4.2 NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE

As an interim measure, the DWER has recommended the adoption of the standards prescribed in the National Environment Protection (Ambient Air Quality) Measure (Air NEPM) where relevant.

For PM$_{10}$ and PM$_{2.5}$, these 24 hour and annual standards are summarised in Table 4.1.

Table 4.1 Air NEPM PM$_{2.5}$ and PM$_{10}$ standards

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>AVERAGING PERIOD</th>
<th>STANDARD ($\mu$g/m$^3$)</th>
<th>SOURCE</th>
<th>ENVIRONMENTAL VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>24 hour</td>
<td>50</td>
<td>Air NEPM</td>
<td>Human health</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>24 hour</td>
<td>25</td>
<td>Air NEPM</td>
<td>Human health</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3 SEPARATION DISTANCES

Separation (buffer) distances are distances recommended between industrial premises and sensitive land uses to protect the beneficial uses of the air environment (EPA 2015). The EPA has developed a draft document ‘Guidance for the Assessment of Environmental Factors – Separation Distances between Industrial and Sensitive Land Uses No. ’3 to provide guidance to its regulatory functions around works approvals and licences.

The applicable category for this project is ‘concrete batching or cement products manufacturing’ and Table 4.2 presents a summary of the applicable separation distance between industrial and sensitive land uses.
Table 4.2 Summary of recommended separation distances for concrete batching or cement products manufacturing plants

<table>
<thead>
<tr>
<th>INDUSTRY</th>
<th>DESCRIPTION OF INDUSTRY</th>
<th>KEY GOVERNMENT AGENCIES FOR ADVICE OR APPROVALS</th>
<th>ENVIRONMENTAL REQUIREMENTS</th>
<th>EMISSION TYPE</th>
<th>SEPARATION DISTANCE (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete batching plant</td>
<td>Concrete is made (batched) and loaded for transport or cement products are made</td>
<td>Local Government</td>
<td>Environmental Protection (Concrete Batching and Cement Product Manufacturing) regulations 1998</td>
<td>X X</td>
<td>300–500, depending on size</td>
</tr>
</tbody>
</table>

The distance between the boundary of the proposed CBP and the nearest sensitive receptors (SR1 – SR5) indicates that the separation distance is not achieved.

4.4 MUCHEA EMPLOYMENT NODE

The proposed mobile CBP is located within a planned industrial precinct with the Shire of Chittering known as the Muchea Employment Node (MEN). The endorsed MEN has been identified for the future provision of service based uses such as transport, livestock, fabrication, warehousing and general commercial use comprising four precincts and covering a total area of 1,113 hectares (ha).

An excerpt of the Muchea Employment Node Structure Plan 2011 (MENSP) is illustrated in Figure 4.1. The study area of 2 ha is located within Precinct 1 north A of the MEN Structure Plan Area. The MENSP 2011 is a Western Australian Planning Commission document identifying the Structure Plan area for future industrial uses and prescribes a 500 metre (m) sensitive land use buffer for rural residences.

As discussed in Section 4.3, rural sensitive receptors (SR1 to SR5) are located within the recommended separation distance guideline of 300 – 500 m for the proposed CBP. These receptors are also located within the MEN Structure Plan Area 500 m residence buffer and within the gazetted MEN Special Control Area which forms part of the Shire of Chittering Local Planning Scheme No. 6. The mobile CBP situated within the planned future MEN industrial area, and inclusive of the sensitive land uses, is considered to be an appropriate location.
4.5 CONCRETE BATCHING PLANT REGULATIONS

Pursuant to the EP Act 1986, operators of CBP’s in WA are required to comply with environmental requirements prescribed in the Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998. The Regulations lists a range of dust controls and management measures designed to minimise dust from CBP’s.
5 RECEIVING ENVIRONMENT

5.1 SITE SETTING

The CBP facility is proposed to be located at 3728 Great Northern Highway, Muchea, Western Australia, within the Chittering local government area (LGA). The site is currently zoned as agricultural and is surrounded by industrial and agricultural zoned land. The site will shortly be rezoned to general industry.

The site is positioned immediately east of the planned road train assembly area to be constructed on the land between Great Northern Highway and the Perth Darwin National Highway. The area has been chosen due to its proximity to the new Brand Highway deviation to service freight trucks utilising the Perth Darwin National Highway.

Figure 5.1 shows the location of the proposed CBP and its immediate surrounding area.

An existing property (SR1) is located immediately to the south, sharing a boundary with the proposed CBP. This is an industrial premise (transport depot) with a caretaker facility which has not been used for some years, and forms part of this industrial premise. On the south-western side of the intersection of Brand Highway and Great Northern Highway also lies an industrial premise (transport depot) with a caretaker facility forming part of the industrial premise (SR2). Further south-east, below Muchea East Road and Brand Highway, lies another residential household dwelling (SR3), approximately 165 m from the Project site.

Approximately 400 m to the south-west, Aussie Modular Solutions (AMS) operates a business which contains open air storage of mining equipment and skip bins. Additionally, poultry farms operated by INGHAMS Enterprises Pty. Limited (INGHAMS) are approximately 600m further south-west.

To the east of the Project site, two residential household dwellings (SR4 and SR5) exist on either side of Muchea East Road, approximately 220 m and 260 m away from the Project site respectively. Lanes Poultry farm operates further north-east along Gulliente Road off Muchea East Road.
Directly north of the site is predominantly characterised by grasslands with few trees and no development. North west of the Project site indicates that there is a commercial business with stockpiles and heavy vehicles.

Towards the south-west, along Brand Highway, lies a single residential household dwelling (SR6) and a commercial business. In addition, southwest of the Project site lies another poultry farm belonging to INGHAMS.

## 5.2 TOPOGRAPHY

Topography at the Project site is flat and predominantly characterised by grasslands and agricultural land.

## 5.3 SENSITIVE RECEPTORS

The draft separation distance guidance document (Environment Protection Authority, 2015), provides a descriptive definition of a sensitive land use as follows:

‘where people live or regularly spend time and which there are therefore sensitive to emissions from industry. Sensitive land uses include, but are not limited to residences, hospitals and nursing homes, short stay accommodation, schools, childcare and other educational facilities and some public buildings, the sensitivity of a land use may also be proportionate to the size of the population affected by the activity.’

The Department of the Environment ‘Air Quality Modelling Guidance Notes’ (DoE, 2006), also refers to ‘other locations (receptors) of interest (e.g. places of human residence)’.

Table 5.1 presents the nearest sensitive receptors to the proposed location of the proposed concrete batching plant.

<table>
<thead>
<tr>
<th>SENSITIVE RECEPTOR ID</th>
<th>ADDRESS</th>
<th>DIRECTION FROM CBP</th>
<th>DISTANCE FROM CBP BOUNDARY</th>
<th>EASTING</th>
<th>NORTHING</th>
<th>BASE ELEVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR1</td>
<td>Lot 3620 Great Northern Highway</td>
<td>South</td>
<td>Shared boundary</td>
<td>404755</td>
<td>6506113</td>
<td>54 m</td>
</tr>
<tr>
<td>SR2</td>
<td>Lot 3599 Great Northern Highway</td>
<td>Southwest</td>
<td>170 m</td>
<td>404642</td>
<td>6505971</td>
<td>52 m</td>
</tr>
<tr>
<td>SR3</td>
<td>6 Muchea East Road</td>
<td>South</td>
<td>165 m</td>
<td>404816</td>
<td>6505953</td>
<td>55 m</td>
</tr>
<tr>
<td>SR4</td>
<td>35 Muchea East Road</td>
<td>East</td>
<td>220 m</td>
<td>405092</td>
<td>6506035</td>
<td>60 m</td>
</tr>
<tr>
<td>SR5</td>
<td>30 Muchea East Road</td>
<td>East</td>
<td>260 m</td>
<td>405058</td>
<td>6505946</td>
<td>58 m</td>
</tr>
<tr>
<td>SR6</td>
<td>43 Brand Highway</td>
<td>Southwest</td>
<td>550 m</td>
<td>404271</td>
<td>6505792</td>
<td>48 m</td>
</tr>
</tbody>
</table>

The location of the CBP facility and the nearest sensitive receptors are shown below in Figure 5.2.
5.4 HISTORICAL METEOROLOGY

The nearest Bureau of Meteorology (BoM) automatic weather station (AWS) located at Pearce RAAF Base (ID: 009053) is approximately 10 kilometres (km) south of the Project site. Given the relatively flat terrain of the project area, the meteorological data collected at the BoM station is considered to be broadly representative of the project site.

5.4.1 WIND SPEED AND DIRECTION

Wind profiles based on the meteorology recorded at Pearce RAAF Base AWS over the period 1 January 2012 – 1 January 2017 are displayed in Figure 5.3. A summary of the meteorological data for this period is as follows:

- spring and summer winds are strongest reaching speeds of up to 13.8 km/hr
- easterly and northerly winds are most frequent followed by southerlies
- calm winds occur with a frequency of 5.5% with the highest proportion in winter.

Northerly winds have the potential for greatest particulate matter impact on the receptors located to the south of the proposed CBP (SR1 and SR3).
Figure 5.3 Wind rose plots for Pearce RAAF Base AWS station (1 January 2012 – 1 January 2017)
5.4.2 RAINFALL AND TEMPERATURE

Pearce RAAF Base AWS has a hot and dry climate, with January recording the highest maximum temperatures and July recording the lowest minimum temperatures throughout the year. The region is driest in summer, and receives most of its annual rainfall in late-autumn, winter and early spring. Total yearly average rainfall at Pearce RAAF Base AWS is 654.6 millimetres (mm), with the minimum average monthly rainfall recorded as 10.7 mm in January and maximum average monthly rainfall recorded at 134 mm in July.

The average temperature and rainfall data for Pearce RAAF Base AWS for the period 1940 to 2018 is shown in Figure 5.4

![Figure 5.4 Monthly rainfall (columns) and temperature (lines) data at Pearce RAAF Base AWS from 1940 to 2018](image)

Periods of high temperatures and low rainfall e.g. late spring and summer have the greatest potential for particulate matter generation.

5.5 EXISTING AIR QUALITY

The main industrial and non-industrial air emission sources contributing to the local airshed include:

- traffic using the local road network
- poultry farms (odour) to the south-west and north-east
- clay and sand quarries to the east and north
- mining
- landfill
- livestock centre
- light industries (e.g. open air mining equipment and skip bins facility)
- railway operations
- domestic fuel burning (gas, liquid, solid)
— residential activities (e.g. lawnmowers, barbecues)
— aeroplanes
— burning (fuel reduction, regeneration, agricultural, wildfires).

These sources may give rise to pollutants relevant to potential emissions from the proposed CBP including particulate matter fractions.

### 5.5.1 NATIONAL POLLUTANT INVENTORY

The National Pollutant Inventory (NPI) is a government platform which provides public access to information about estimated emissions of 93 substances in Australia. Within the LGA of Chittering, 8 industrial facilities reported on 53 substances for the 2016/2017 reporting year.

The reporting facilities included the following industries:

— gas supply and delivery services
— poultry farms
— landfill and recycling centre
— separation of titanium minerals.

Estimated emissions of particulate matter fractions (PM$_{10}$ and PM$_{2.5}$) for the above facilities are presented in Table 5.2.

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>EMITTED TO AIR (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INDUSTRIAL</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>160,050</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>1,650</td>
</tr>
</tbody>
</table>

Note 1: PM$_{2.5}$ emissions from diffuse sources were not reported to the NPI.

Table 5.2 shows that PM$_{10}$ emissions from industrial facilities were significantly higher than PM$_{2.5}$ for the 2016/2017 reporting period comprising more than 92% of the total emissions. Total PM$_{2.5}$ emissions are much lower than PM$_{10}$ with diffuse sources such as motor vehicles not reported to the NPI during this period.

### 5.5.2 BACKGROUND AIR MONITORING

As signatory to the Air NEPM, Western Australia is required to annually report results of ambient air quality monitoring.

The Department of Water and Environmental Regulation (DWER) currently operates 13 ambient air quality monitoring stations (AAQMS) across WA. The nearest AAQMS to the proposed CBP location are located in the northern Perth suburbs of Caversham and Duncraig.

The Caversham AAQMS is located approximately 33 km south of the Project site, in the City of Swan LGA. Duncraig is a northern suburb of Perth, in the City of Joondalup LGA, and is located approximately 35 km south west of the Project site. Both AAQMS measure PM$_{10}$ and PM$_{2.5}$ continuously using tapered element oscillating microbalance (TEOM).

These AAQMS were chosen to provide background PM$_{10}$ and PM$_{2.5}$ concentrations over the period 1 January 2012 – 1 January 2017 to represent the Project site. Data for the year 2017 has not been published yet and therefore will not be included.

A summary of 24-hour and annual PM$_{10}$ and PM$_{2.5}$ concentrations recorded at both AAQMS is presented in Table 5.3 and Table 5.4.
### Table 5.3 24-hour and annual PM$_{10}$ and PM$_{2.5}$ concentrations for 1 January 2012 – 1 January 2017 for Caversham AAQMS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MAXIMUM CONCENTRATION (24 HOUR)</th>
<th>75TH PERCENTILE (24 HOUR)</th>
<th>ANNUAL AVERAGE (24-HOUR)</th>
<th>NUMBER OF EXCEEDANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>PM$_{10}$ 68.7</td>
<td>19.4</td>
<td>16.8</td>
<td>4$^{(1)}(2)$</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 45.9</td>
<td>8.8</td>
<td>7.8</td>
<td>3$^{(1)}$</td>
</tr>
<tr>
<td>2013</td>
<td>PM$_{10}$ 62.4</td>
<td>18.8</td>
<td>15.4</td>
<td>1$^{(1)}$</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 22.6</td>
<td>8.8</td>
<td>7.9</td>
<td>0</td>
</tr>
<tr>
<td>2014</td>
<td>PM$_{10}$ 52.6</td>
<td>21.1</td>
<td>17.4,$^{(3)}$</td>
<td>1$^{(3)}$</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 39.3</td>
<td>9.2</td>
<td>8.1</td>
<td>1$^{(3)}$</td>
</tr>
<tr>
<td>2015</td>
<td>PM$_{10}$ 46.8</td>
<td>20.2</td>
<td>16.7</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 30.0</td>
<td>10.3</td>
<td>16.7,$^{(3)}(4)$</td>
<td>5$^{(3)}(4)$</td>
</tr>
<tr>
<td>2016</td>
<td>PM$_{10}$ 38.1</td>
<td>18.5</td>
<td>15.0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 24.1</td>
<td>8.8</td>
<td>15.0</td>
<td>0</td>
</tr>
</tbody>
</table>

(1) Smoke haze  
(2) Crustal event  
(3) Bushfire events  
(4) Prescribed burns.

### Table 5.4 24-hour and annual PM$_{10}$ and PM$_{2.5}$ concentrations for 1 January 2012 – 1 January 2017 for Duncraig AAQMS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MAXIMUM CONCENTRATION (24 HOUR)</th>
<th>75TH PERCENTILE (24 HOUR)</th>
<th>ANNUAL AVERAGE</th>
<th>NUMBER OF EXCEEDANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>PM$_{10}$ 89.5</td>
<td>18.8</td>
<td>16.2</td>
<td>2$^{(1)}$</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 77.3</td>
<td>8.8</td>
<td>8.2</td>
<td>3$^{(1)}$</td>
</tr>
<tr>
<td>2013</td>
<td>PM$_{10}$ 37.6</td>
<td>18.3</td>
<td>15.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 18.7</td>
<td>9.1</td>
<td>7.6</td>
<td>0</td>
</tr>
<tr>
<td>2014</td>
<td>PM$_{10}$ 53.0</td>
<td>18.9</td>
<td>15.5</td>
<td>1$^{(2)}$</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 47.6</td>
<td>8.9</td>
<td>7.6</td>
<td>1$^{(2)}$</td>
</tr>
<tr>
<td>2015</td>
<td>PM$_{10}$ 82.7</td>
<td>20.2</td>
<td>16.5</td>
<td>1$^{(3)}$</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 35.8</td>
<td>9.9</td>
<td>16.5</td>
<td>3$^{(2)}(4)$</td>
</tr>
<tr>
<td>2016</td>
<td>PM$_{10}$ 40.0</td>
<td>17.4</td>
<td>14.4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$ 27.0</td>
<td>8.8</td>
<td>14.4</td>
<td>1$^{(2)}$</td>
</tr>
</tbody>
</table>

(1) Smoke haze  
(2) Bushfire event  
(3) Assessable event  
(4) Prescribed burns.

PM$_{10}$ and PM$_{2.5}$ concentrations are expected to be lower at Muchea than those concentrations recorded at the Caversham and Duncraig AAQMS due to much lower levels of vehicular traffic in the local area.
6 QUALITATIVE ASSESSMENT

6.1 AIR EMISSION SOURCES

The potential air emission sources from the CBP include:

- sand and aggregate transfer to elevated bins
- cement unloading to storage silos
- weigh hopper loading
- mixer loading (central mix)
- truck loading (truck mix)
- vehicle traffic (paved roads)
- wind erosion from sand and aggregate storage piles
- 62.5KVA diesel power generator.

Most of these identified sources will be minimised through enclosure or sealing of equipment, details of which are presented in Section 7.

Main power from the grid will provide power for the operations of the porta-batch plant. A diesel generator will be used as a back-up power supply. Combustion emissions from the diesel generator will be localised and not considered to be significant.

The main particulate matter emission sources are likely to include process emissions, aggregate/raw material transfer and wind erosion from bunkers/stockpiles.

6.2 QUALITATIVE ASSESSMENT OF AIR EMISSIONS

6.2.1 EMISSION FACTORS

PM$_{10}$ and PM$_{2.5}$ emission rates at the proposed CBP were calculated using emission factors detailed in the NPI EETM for Concrete Batching and Concrete Product Manufacturing and the USEPA AP-42 Compilation of Emission Factors.

These are summarised in Table 6.1.

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>UNCONTROLLED PM$_{10}$ EMISSION FACTOR (kg/tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand and aggregate transfer to storage piles via front end loader (FEL)</td>
<td>0.014</td>
</tr>
<tr>
<td>Wind erosion from sand and aggregate storage piles</td>
<td>0.3</td>
</tr>
<tr>
<td>Total process emissions</td>
<td>0.05</td>
</tr>
</tbody>
</table>

PM$_{2.5}$ estimated emission rates were determined using PM$_{2.5}$:PM$_{10}$ particle size ratios detailed in the USEPA AP-42 document. The PM$_{2.5}$:PM$_{10}$ ratio for sand and aggregate transfer, and storage piles is 0.15 and was used to determine PM$_{2.5}$ emissions from the CBP.
6.2.2 REDUCTION FACTORS

The NPI EETM for Concrete Batching and Concrete Product Manufacturing also provides reduction factors (RF) for various dust management measures used. This is summarised in Table 6.2.

Table 6.2 Reduction factors for concrete batching plants

<table>
<thead>
<tr>
<th>MANAGEMENT MEASURE</th>
<th>EMISSION REDUCTION (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind breaks</td>
<td>30%</td>
</tr>
<tr>
<td>Water sprays</td>
<td>50%</td>
</tr>
<tr>
<td>Enclosure (2 or 3 walls)</td>
<td>90%</td>
</tr>
<tr>
<td>Covered stockpiles</td>
<td>100%</td>
</tr>
</tbody>
</table>

The NPI EETM for Concrete Batching and Concrete Product Manufacturing does not specify a reduction factor for process emissions. As a conservative estimate, controlled emissions from concrete batching are assumed to be 50% of the emission factor presented in Table 6.1.

6.2.3 ESTIMATED EMISSIONS

The production rate at the proposed CBP is 52,000 t/year and emission rates for PM$_{10}$ and PM$_{2.5}$ are based on available uncontrolled emission factors and particle size ratios detailed in Section 6.2.1.

The estimated emission rates for the main air emission sources for the CBP are presented in Table 6.3.

Table 6.3 Estimated emission rates for CBP air emission sources

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>PM$_{10}$ EMISSION RATE (kg/yr)</th>
<th>PM$_{2.5}$ EMISSION RATE (kg/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total process emissions</td>
<td>1,300</td>
<td>195</td>
</tr>
<tr>
<td>Offloading of aggregates from road trucks into bunkers/stockpiles</td>
<td>364</td>
<td>54.6</td>
</tr>
<tr>
<td>Loading of aggregates via front end loader</td>
<td>364</td>
<td>54.6</td>
</tr>
<tr>
<td>Transfer of aggregates from front end loader to hopper</td>
<td>364</td>
<td>54.6</td>
</tr>
<tr>
<td>Wind erosion from sand and aggregate storage piles</td>
<td>2.1</td>
<td>0.32</td>
</tr>
<tr>
<td>Wind erosion from sand and aggregate storage bunkers (3 wall enclosures)</td>
<td>0.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Total Estimated PM</td>
<td>2,395</td>
<td>359</td>
</tr>
<tr>
<td>PM emissions to Chittering LGA (2016/17)</td>
<td>173,950</td>
<td>1,650</td>
</tr>
<tr>
<td>% Contribution from CBP to Chittering LGA aired</td>
<td>1.4</td>
<td>22</td>
</tr>
</tbody>
</table>

Estimated PM$_{10}$ emissions from the proposed CBP are calculated to be approximately only 1.4% of the total reported emissions to the Chittering LGA airshed.

Estimated PM$_{2.5}$ emissions from the proposed CBP are determined to be approximately 22% of the total reported PM$_{2.5}$ emissions to the Chittering LGA airshed. The percentage contribution of PM$_{2.5}$ to the local airshed is expected to be lower than estimated due to the non-reporting of diffuse sources (e.g. vehicular emissions) to the NPI for the Chittering LGA.
7 MANAGEMENT MEASURES

The proposed CBP will be designed and operated in line with best practice to ensure particulate matter emissions from the plant are minimised.

A Dust Management Plan (DMP) has been prepared for the proposed CBP to include the following best practice management measures:

- a 4 m high acoustic L shaped or three sided barrier to the south of the slumping stand will be constructed (refer to WSP Environmental Noise Impact Assessment Report, September 2018)
- a 3 m high acoustic barrier with 1 m overhang to the west of the cement delivery area will be constructed (refer to WSP Environmental Noise Impact Assessment Report, September 2018)
- 2.4 m high solid site boundary fence will be constructed (refer to WSP Environmental Noise Impact Assessment Report, September 2018)
- all internal access routes will be hard standed
- access routes and the yard to be watered to be kept clean by hosing or sweeping, in particular during dry and windy conditions and periods of low rainfall
- any spilt material during concrete batching or transport to be cleaned up immediately
- all aggregate and sand will be stored on-site in storage bins or bays, designed to minimise dust generation
- the height of aggregate and sand piles stored in bays will not exceed the height of the bay
- high perimeter walls on three sides of sand and aggregate stockpiles to be constructed
- sand and aggregate storages to be dampened with an automatic sprinkler system as necessary
- dust suppression sprays will be fitted to receival bins
- all conveyors and conveyor head chutes will be enclosed
- the weighted scraper at the head end and vee plough at the tail end will clean the conveyor belting
- cement hoppers will be fitted with dust filters
- cement is transferred from storage to batching through sealed steel augers
- silo will be fitted with high level fill alarms and fill line shut off valves to prevent over fill
- the cement silo to be fitted with a reverse pulse dust extraction filter, overfill alarms and automatic over fill cut off valves on cement fill lines
- all inspection points and hatches will be fully sealed
- cement to be transferred from storage to batching through sealed steel augers
- all dry raw materials to be transferred into the bowl of an agitator via an enclosed conveyor
- batch water to be added to the raw materials during discharge to the agitator
- cement silos and weigh hoppers will be fitted with dust filters
- reticulated water sprays to be pre-installed in the bin structures to minimise dust generated during stockpiling and batching
- a high-pressure water spray system to be pre-installed as the loading point to minimise dust generation
- sprinklers will be used regularly along the site boundary
- all trucks will be washed in a dedicated single truck mixed use washing bay prior to leaving site
- continual visual dust monitoring will be undertaken of dust emissions from the Muchea CBP.

The proposed CBP will also comply with the requirements of the Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998.
8 DISCUSSION

WSP conducted a qualitative air quality assessment to estimate the particulate matter loading from the proposed CBP in Muchea. PM$_{10}$ and PM$_{2.5}$ levels associated with operation of the CBP were estimated using NPI emission factors and particle size ratios provided in AP-42, and compared to NPI reported emissions for the Chittering LGA airshed during the 2016/2017 period.

PM$_{10}$ emissions from the CBP were estimated to comprise approximately only 1.4% of total emissions reported to the NPI for the Chittering LGA. The relatively high 22% PM$_{2.5}$ contribution of total emissions is due to the non-reporting to the NPI of diffuse sources for the 2016/2017 period. The actual contribution from the proposed CBP is expected to be much lower than this estimated contribution.

A review of the draft separation distance guidelines indicated that the proposed location of the CBP does not achieve with the recommended 300 – 500 m distance between industrial and sensitive land uses at five of the nearest residential receptors (SR1 to SR5).

Notwithstanding, the implementation of a DMP during operation of the proposed CBP with stringent controls and regular on-site monitoring will ensure that emissions from the proposed CBP do not adversely impact the receiving environment.
9 LIMITATIONS

SCOPE OF SERVICES
This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA
In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

ENVIRONMENTAL CONCLUSIONS
In accordance with the scope of services, WSP has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

REPORT FOR BENEFIT OF CLIENT
The report has been prepared for the benefit of the client and no other party. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS
WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.
BIBLIOGRAPHY

Department of the Environment, Air Quality Modelling Guidance Notes. 2006


National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Concrete Batching and Concrete Product Manufacturing, Version 2.1, April 2008

United States Environmental Protection Agency AP-42: Compilation of Emission Factors

United States Environmental Protection Agency 2006. Background Document for Revisions to Fine Fraction Ratios used for AP-42 Fugitive Dust Emission Factors


Western Australian Government 1987. Environmental Protection Regulations 1987

ABOUT US

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With 36,000 talented people in more than 500 offices across 40 countries, we engineer projects that will help societies grow for lifetimes to come.
Appendix 5 Air Quality Assessment
GREAT NORTERN CONCRETE PTY LTD

QUALITATIVE AIR QUALITY ASSESSMENT
PROPOSED MOBILE CONCRETE BATCHING PLANT,
3728 GREAT NORTHERN HIGHWAY, MUCHEA

NOVEMBER 2018
Qualitative Air Quality Assessment
Proposed Mobile Concrete Batching Plant, 3728 Great Northern Highway, Muchea

Great Northern Concrete Pty Ltd

WSP
Level 5, 503 Murray Street
Perth WA 6000
PO Box 7181
Cloisters Square WA 6850

Tel: +61 8 9489 9700
Fax: +61 8 9489 9777
wsp.com

REV     DATE    DETAILS
Final   12/11/18 Report update

<table>
<thead>
<tr>
<th>NAME</th>
<th>DATE</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared by: John Conway</td>
<td>12/11/18</td>
<td></td>
</tr>
<tr>
<td>Reviewed by: John Conway</td>
<td>12/11/18</td>
<td></td>
</tr>
<tr>
<td>Approved by: Jason Watson</td>
<td>12/11/18</td>
<td></td>
</tr>
</tbody>
</table>

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1</td>
<td>OBJECTIVE</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>SCOPE OF WORKS</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>PROJECT DESCRIPTION</td>
<td>2</td>
</tr>
<tr>
<td>2.1</td>
<td>SITE OPERATIONS</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>POLLUTANTS OF INTEREST</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>REGULATORY REQUIREMENTS</td>
<td>4</td>
</tr>
<tr>
<td>4.1</td>
<td>LEGISLATION AND POLICY</td>
<td>4</td>
</tr>
<tr>
<td>4.2</td>
<td>NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE</td>
<td>4</td>
</tr>
<tr>
<td>4.3</td>
<td>SEPARATION DISTANCES</td>
<td>4</td>
</tr>
<tr>
<td>4.4</td>
<td>MUCHEA EMPLOYMENT NODE</td>
<td>5</td>
</tr>
<tr>
<td>4.5</td>
<td>CONCRETE BATCHING PLANT REGULATIONS</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>RECEIVING ENVIRONMENT</td>
<td>7</td>
</tr>
<tr>
<td>5.1</td>
<td>SITE SETTING</td>
<td>7</td>
</tr>
<tr>
<td>5.2</td>
<td>TOPOGRAPHY</td>
<td>8</td>
</tr>
<tr>
<td>5.3</td>
<td>SENSITIVE RECEPTORS</td>
<td>8</td>
</tr>
<tr>
<td>5.4</td>
<td>HISTORICAL METEOROLOGY</td>
<td>9</td>
</tr>
<tr>
<td>5.5</td>
<td>EXISTING AIR QUALITY</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>QUALITATIVE ASSESSMENT</td>
<td>14</td>
</tr>
<tr>
<td>6.1</td>
<td>AIR EMISSION SOURCES</td>
<td>14</td>
</tr>
<tr>
<td>6.2</td>
<td>QUALITATIVE ASSESSMENT OF AIR EMISSIONS</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>MANAGEMENT MEASURES</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>DISCUSSION</td>
<td>17</td>
</tr>
</tbody>
</table>
ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air NEPM</td>
<td>National Environmental Protection Measure (Ambient Air Quality)</td>
</tr>
<tr>
<td>AMS</td>
<td>Aussie Modular Solutions</td>
</tr>
<tr>
<td>AWS</td>
<td>Automatic weather station</td>
</tr>
<tr>
<td>BoM</td>
<td>Bureau of Meteorology</td>
</tr>
<tr>
<td>CBP</td>
<td>Concrete batching plant</td>
</tr>
<tr>
<td>DMP</td>
<td>Dust management plan</td>
</tr>
<tr>
<td>DWER</td>
<td>Department of Water and Environmental Regulation</td>
</tr>
<tr>
<td>EETM</td>
<td>Emission Estimation Technique Manual</td>
</tr>
<tr>
<td>EP Act</td>
<td>Environment Protection Act 1986</td>
</tr>
<tr>
<td>FEL</td>
<td>Front end loader</td>
</tr>
<tr>
<td>LGA</td>
<td>Local Government Area</td>
</tr>
<tr>
<td>NPI</td>
<td>National Pollutant Inventory</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Particulate matter less than 10 microns in diameter</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>Particulate matter less than 2.5 microns in diameter</td>
</tr>
<tr>
<td>RF</td>
<td>Reduction factor</td>
</tr>
<tr>
<td>SR</td>
<td>Sensitive receptor</td>
</tr>
<tr>
<td>TEOM</td>
<td>Tapered element oscillating microbalance</td>
</tr>
<tr>
<td>TSP</td>
<td>Total suspended particulates</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>USEPA</td>
<td>United States Environmental Protection Agency</td>
</tr>
<tr>
<td>WA</td>
<td>Western Australia</td>
</tr>
<tr>
<td>kg</td>
<td>Kilogram</td>
</tr>
<tr>
<td>t</td>
<td>Tonne</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

WSP Australia Pty Ltd (WSP) was engaged by Great Northern Concrete Pty Ltd to conduct a qualitative air quality assessment in support of a Works Approval Application for a proposed mobile concrete batching plant (CBP) in Muchea, Western Australia (WA).

The objective of the qualitative air quality assessment was to estimate particulate matter (PM$_{10}$ and PM$_{2.5}$) emissions during operation of the concrete batching plant and to compare its contribution to the overall emission loading to the local airshed (Chittering Local Government Area).

The main emission sources for the proposed CBP were identified using project and process information provided by the client and publicly available information e.g. National Pollutant Inventory (NPI) Emission Estimation Technique Manual (EETM) for Concrete Batching and Concrete Product Manufacturing and United State Environment Protection Authority (USEPA) AP-42: Compilation of Emission Factors.

Particulate matter (PM$_{10}$ and PM$_{2.5}$) emissions were estimated using emission factors detailed in the NPI EETM for Concrete Batching and Concrete Product Manufacturing and USEPA AP-42: Compilation of Emission Factors and compared these estimates to reported NPI data in the Chittering LGA airshed for the 2016/2017 reporting period.

The estimated PM$_{10}$ emissions from the CBP were less than 2% of total emissions reported to the NPI for the Chittering LGA 2016/2017 reporting period. For PM$_{2.5}$, the contribution of 22% is higher primarily due to the non-reporting to the NPI of diffuse sources for the 2016/17 period.

The draft separation distance guidelines between sensitive and industrial land uses were reviewed and indicated that the proposed location of the CBP does not achieve the recommended 300–500 metres (m) at five of the nearest residential receptors (SR1 to SR5).

Notwithstanding, the proposed CBP plant will be designed and operated in line with best practice. Furthermore, the implementation of a Dust Management Plan (DMP) with best practice controls and regular on-site monitoring along the site boundary will ensure that emissions from the proposed CBP do not adversely impact the receiving environment.
1 INTRODUCTION

WSP Australia Pty Ltd (WSP) was engaged by Great Northern Concrete Pty Ltd to conduct a qualitative air quality assessment to estimate particulate matter emissions from a proposed concrete batching plant (CBP) in Muchea, Western Australia (WA) in support of a Works Approval Application.

1.1 OBJECTIVE

The objective of the qualitative air quality assessment was to estimate particulate matter (PM$_{10}$ and PM$_{2.5}$) emissions during operation of the concrete batching plant and to compare its contribution to the overall emission loading to the local airshed (Chittering Local Government Area).

1.2 SCOPE OF WORKS

The scope of works for the assessment were to:

- provide a description of the proposed CBP project
- provide a description of the project location
- identify the nearest potentially-affected sensitive receptors
- establish the main pollutants of interest for the project
- review legislative requirements for concrete batching plants
- establish existing air quality and meteorological conditions for the project site estimate emissions from the CBP using publicly available information e.g. National Pollutant Inventory (NPI) data, AP-42 emission factors and information provided by the client
- propose best practice management measures
- prepare a report presenting the outcomes of the qualitative assessment.
2 PROJECT DESCRIPTION

2.1 SITE OPERATIONS

The proposed CBP will operate 7 am to 7 pm Monday to Saturday. Plant operations are proposed as follows:

— delivery of bulk raw materials delivered by trucks or semi-trailers from the western entrance
— unloading of raw materials into bulk stockpile areas or silos
— movement of raw materials into conditioning areas (storage bins) by front end loader. Computerised batching operations with continuous stock level monitoring
— batched concrete discharged into agitator trucks, final slumping water added and concrete delivered to customer
— daily truck movements (20) will involve deliveries of concrete, cement and raw materials
— one front end loader operating on site.

The proposed CBP will have an estimated production rate of 52,000 tonnes per annum.

The proposed layout of the CBP and traffic routes are presented in Appendix A.
3 POLLUTANTS OF INTEREST

The main pollutants of interest for the proposed CBP include the following particulate matter fractions:

- PM$_{10}$
- PM$_{2.5}$.
4 REGULATORY REQUIREMENTS

4.1 LEGISLATION AND POLICY

Western Australia’s primary environmental protection legislation is the Environmental Protection Act 1986 (EP Act). The EP Act establishes the framework for regulating the discharge of air emissions governed by the Department of Water and Environmental Regulation (DWER). Pursuant to the EP Act are state regulations, environmental policies and guidance statements.

Legislation relevant to air emissions from CBP’s in WA are presented in the following sections.

4.2 NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE

As an interim measure, the DWER has recommended the adoption of the standards prescribed in the National Environment Protection (Ambient Air Quality) Measure (Air NEPM) where relevant.

For PM$_{10}$ and PM$_{2.5}$, these 24 hour and annual standards are summarised in Table 4.1.

Table 4.1 Air NEPM PM$_{2.5}$ and PM$_{10}$ standards

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>AVERAGING PERIOD</th>
<th>STANDARD (µg/m$^3$)</th>
<th>SOURCE</th>
<th>ENVIRONMENTAL VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>24 hour</td>
<td>50</td>
<td>Air NEPM</td>
<td>Human health</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>24 hour</td>
<td>25</td>
<td>Air NEPM</td>
<td>Human health</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3 SEPARATION DISTANCES

Separation (buffer) distances are distances recommended between industrial premises and sensitive land uses to protect the beneficial uses of the air environment (EPA 2015). The EPA has developed a draft document ‘Guidance for the Assessment of Environmental Factors – Separation Distances between Industrial and Sensitive Land Uses No. 3’ to provide guidance to its regulatory functions around works approvals and licences.

The applicable category for this project is ‘concrete batching or cement products manufacturing’ and Table 4.2 presents a summary of the applicable separation distance between industrial and sensitive land uses.
Table 4.2 Summary of recommended separation distances for concrete batching or cement products manufacturing plants

<table>
<thead>
<tr>
<th>INDUSTRY</th>
<th>DESCRIPTION OF INDUSTRY</th>
<th>KEY GOVERNMENT AGENCIES FOR ADVICE OR APPROVALS</th>
<th>ENVIRONMENTAL REQUIREMENTS</th>
<th>EMISSION TYPE</th>
<th>SEPARATION DISTANCE (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete batching plant</td>
<td>Concrete is made (batched) and loaded for transport or cement products are made</td>
<td>Local Government</td>
<td>Environmental Protection (Concrete Batching and Cement Product Manufacturing) regulations 1998</td>
<td>X X</td>
<td>300–500, depending on size</td>
</tr>
</tbody>
</table>

The distance between the boundary of the proposed CBP and the nearest sensitive receptors (SR1 – SR5) indicates that the separation distance is not achieved.

4.4 MUCHEA EMPLOYMENT NODE

The proposed mobile CBP is located within a planned industrial precinct with the Shire of Chittering known as the Muchea Employment Node (MEN). The endorsed MEN has been identified for the future provision of service based uses such as transport, livestock, fabrication, warehousing and general commercial use comprising four precincts and covering a total area of 1,113 hectares (ha).

An excerpt of the Muchea Employment Node Structure Plan 2011 (MENSP) is illustrated in Figure 4.1. The study area of 2 ha is located within Precinct 1 north A of the MEN Structure Plan Area. The MENSP 2011 is a Western Australian Planning Commission document identifying the Structure Plan area for future industrial uses and prescribes a 500 metre (m) sensitive land use buffer for rural residences.

As discussed in Section 4.3, rural sensitive receptors (SR1 to SR5) are located within the recommended separation distance guideline of 300 – 500 m for the proposed CBP. These receptors are also located within the MEN Structure Plan Area 500 m residence buffer and within the gazetted MEN Special Control Area which forms part of the Shire of Chittering Local Planning Scheme No. 6. The mobile CBP situated within the planned future MEN industrial area, and inclusive of the sensitive land uses, is considered to be an appropriate location.
4.5 CONCRETE BATCHING PLANT REGULATIONS

Pursuant to the EP Act 1986, operators of CBP’s in WA are required to comply with environmental requirements prescribed in the Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998. The Regulations lists a range of dust controls and management measures designed to minimise dust from CBP’s.
5 RECEIVING ENVIRONMENT

5.1 SITE SETTING

The CBP facility is proposed to be located at 3728 Great Northern Highway, Muchea, Western Australia, within the Chittering local government area (LGA). The site is currently zoned as agricultural and is surrounded by industrial and agricultural zoned land. The site will shortly be rezoned to general industry.

The site is positioned immediately east of the planned road train assembly area to be constructed on the land between Great Northern Highway and the Perth Darwin National Highway. The area has been chosen due to its proximity to the new Brand Highway deviation to service freight trucks utilising the Perth Darwin National Highway.

Figure 5.1 shows the location of the proposed CBP and its immediate surrounding area.

![Figure 5.1 Site location](image)

An existing property (SR1) is located immediately to the south, sharing a boundary with the proposed CBP. This is an industrial premise (transport depot) with a caretaker facility which has not been used for some years, and forms part of this industrial premise. On the south-western side of the intersection of Brand Highway and Great Northern Highway also lies an industrial premise (transport depot) with a caretaker facility forming part of the industrial premise (SR2). Further south-east, below Muchea East Road and Brand Highway, lies another residential household dwelling (SR3), approximately 165 m from the Project site.

Approximately 400 m to the south-west, Aussie Modular Solutions (AMS) operates a business which contains open air storage of mining equipment and skip bins. Additionally, poultry farms Operated by INGHAMS Enterprises Pty. Limited (INGHAMS) are approximately 600m further south-west.

To the east of the Project site, two residential household dwellings (SR4 and SR5) exist on either side of Muchea East Road, approximately 220 m and 260 m away from the Project site respectively. Lanes Poultry farm operates further north-east along Gulliente Road off Muchea East Road.
Directly north of the site is predominantly characterised by grasslands with few trees and no development. North west of the Project site indicates that there is a commercial business with stockpiles and heavy vehicles.

Towards the south-west, along Brand Highway, lies a single residential household dwelling (SR6) and a commercial business. In addition, southwest of the Project site lies another poultry farm belonging to INGHAMS.

### 5.2 TOPOGRAPHY

Topography at the Project site is flat and predominantly characterised by grasslands and agricultural land.

### 5.3 SENSITIVE RECEPTORS

The draft separation distance guidance document (Environment Protection Authority, 2015), provides a descriptive definition of a sensitive land use as follows:

‘where people live or regularly spend time and which there are therefore sensitive to emissions from industry. Sensitive land uses include, but are not limited to residences, hospitals and nursing homes, short stay accommodation, schools, childcare and other educational facilities and some public buildings, the sensitivity of a land use may also be proportionate to the size of the population affected by the activity.’

The Department of the Environment ‘Air Quality Modelling Guidance Notes’ (DoE, 2006), also refers to ‘other locations (receptors) of interest (e.g. places of human residence)’.

Table 5.1 presents the nearest sensitive receptors to the proposed location of the proposed concrete batching plant.

<table>
<thead>
<tr>
<th>SENSITIVE RECEPTOR ID</th>
<th>ADDRESS</th>
<th>DIRECTION FROM CBP</th>
<th>DISTANCE FROM CBP BOUNDARY</th>
<th>EASTING</th>
<th>NORTHING</th>
<th>BASE ELEVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR1</td>
<td>Lot 3620 Great Northern Highway</td>
<td>South</td>
<td>Shared boundary</td>
<td>404755</td>
<td>6506113</td>
<td>54 m</td>
</tr>
<tr>
<td>SR2</td>
<td>Lot 3599 Great Northern Highway</td>
<td>Southwest</td>
<td>170 m</td>
<td>404642</td>
<td>6505971</td>
<td>52 m</td>
</tr>
<tr>
<td>SR3</td>
<td>6 Muchea East Road</td>
<td>South</td>
<td>165 m</td>
<td>404816</td>
<td>6505953</td>
<td>55 m</td>
</tr>
<tr>
<td>SR4</td>
<td>35 Muchea East Road</td>
<td>East</td>
<td>220 m</td>
<td>405092</td>
<td>6506035</td>
<td>60 m</td>
</tr>
<tr>
<td>SR5</td>
<td>30 Muchea East Road</td>
<td>East</td>
<td>260 m</td>
<td>405058</td>
<td>6505946</td>
<td>58 m</td>
</tr>
<tr>
<td>SR6</td>
<td>43 Brand Highway</td>
<td>Southwest</td>
<td>550 m</td>
<td>404271</td>
<td>6505792</td>
<td>48 m</td>
</tr>
</tbody>
</table>

The location of the CBP facility and the nearest sensitive receptors are shown below in Figure 5.2.
5.4 HISTORICAL METEOROLOGY

The nearest Bureau of Meteorology (BoM) automatic weather station (AWS) located at Pearce RAAF Base (ID: 009053) AWS is approximately 10 kilometres (km) south of the Project site. Given the relatively flat terrain of the project area, the meteorological data collected at the BoM station is considered to be broadly representative of the project site.

5.4.1 WIND SPEED AND DIRECTION

Wind profiles based on the meteorology recorded at Pearce RAAF Base AWS over the period 1 January 2012 – 1 January 2017 are displayed in Figure 5.3. A summary of the meteorological data for this period is as follows:

— spring and summer winds are strongest reaching speeds of up to 13.8 km/hr
— easterly and northerly winds are most frequent followed by southerlies
— calm winds occur with a frequency of 5.5% with the highest proportion in winter.

Northerly winds have the potential for greatest particulate matter impact on the receptors located to the south of the proposed CBP (SR1 and SR3).
Figure 5.3 Wind rose plots for Pearce RAAF Base AWS station (1 January 2012 – 1 January 2017)
5.4.2 RAINFALL AND TEMPERATURE

Pearce RAAF Base AWS has a hot and dry climate, with January recording the highest maximum temperatures and July recording the lowest minimum temperatures throughout the year. The region is driest in summer, and receives most of its annual rainfall in late-autumn, winter and early spring. Total yearly average rainfall at Pearce RAAF Base AWS is 654.6 millimetres (mm), with the minimum average monthly rainfall recorded as 10.7 mm in January and maximum average monthly rainfall recorded at 134 mm in July.

The average temperature and rainfall data for Pearce RAAF Base AWS for the period 1940 to 2018 is shown in Figure 5.4:

![Figure 5.4 Monthly rainfall (columns) and temperature (lines) data at Pearce RAAF Base AWS from 1940 to 2018](image)

Periods of high temperatures and low rainfall e.g. late spring and summer have the greatest potential for particulate matter generation.

5.5 EXISTING AIR QUALITY

The main industrial and non-industrial air emission sources contributing to the local airshed include:

- traffic using the local road network
- poultry farms (odour) to the south-west and north-east
- clay and sand quarries to the east and north
- mining
- landfill
- livestock centre
- light industries (e.g. open air mining equipment and skip bins facility)
- railway operations
- domestic fuel burning (gas, liquid, solid)
— residential activities (e.g. lawnmowers, barbecues)
— aeroplanes
— burning (fuel reduction, regeneration, agricultural, wildfires).

These sources may give rise to pollutants relevant to potential emissions from the proposed CBP including particulate matter fractions.

### 5.5.1 NATIONAL POLLUTANT INVENTORY

The National Pollutant Inventory (NPI) is a government platform which provides public access to information about estimated emissions of 93 substances in Australia. Within the LGA of Chittering, 8 industrial facilities reported on 53 substances for the 2016/2017 reporting year.

The reporting facilities included the following industries:

— gas supply and delivery services
— poultry farms
— landfill and recycling centre
— separation of titanium minerals.

Estimated emissions of particulate matter fractions (PM$_{10}$ and PM$_{2.5}$) for the above facilities are presented in Table 5.2.

Table 5.2: Estimated pollutant emissions from all sources in the Chittering LGA for the 2016/2017 reporting period

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>EMITTED TO AIR (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INDUSTRIAL</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>160,050</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>1,650</td>
</tr>
</tbody>
</table>

Note 1: PM$_{2.5}$ emissions from diffuse sources were not reported to the NPI.

Table 5.2 shows that PM$_{10}$ emissions from industrial facilities were significantly higher than PM$_{2.5}$ for the 2016/2017 reporting period comprising more than 92% of the total emissions. Total PM$_{2.5}$ emissions are much lower than PM$_{10}$ with diffuse sources such as motor vehicles not reported to the NPI during this period.

### 5.5.2 BACKGROUND AIR MONITORING

As signatory to the Air NEPM, Western Australia is required to annually report results of ambient air quality monitoring. The Department of Water and Environmental Regulation (DWER) currently operates 13 ambient air quality monitoring stations (AAQMS) across WA. The nearest AAQMS to the proposed CBP location are located in the northern Perth suburbs of Caversham and Duncraig.

The Caversham AAQMS is located approximately 33 km south of the Project site, in the City of Swan LGA. Duncraig is a northern suburb of Perth, in the City of Joondalup LGA, and is located approximately 35 km south west of the Project site. Both AAQMS measure PM$_{10}$ and PM$_{2.5}$ continuously using tapered element oscillating microbalance (TEOM).

These AAQMS were chosen to provide background PM$_{10}$ and PM$_{2.5}$ concentrations over the period 1 January 2012 – 1 January 2017 to represent the Project site. Data for the year 2017 has not been published yet and therefore will not be included.

A summary of 24-hour and annual PM$_{10}$ and PM$_{2.5}$ concentrations recorded at both AAQMS is presented in Table 5.3 and Table 5.4.
### Table 5.3 24-hour and annual PM$_{10}$ and PM$_{2.5}$ concentrations for 1 January 2012 – 1 January 2017 for Caversham AAQMS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MAXIMUM CONCENTRATION (24 HOUR)</th>
<th>75$^{\text{th}}$ PERCENTILE (24 HOUR)</th>
<th>ANNUAL AVERAGE (24-HOUR)</th>
<th>NUMBER OF EXCEEDANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>PM$_{10}$</td>
<td>68.7</td>
<td>19.4</td>
<td>16.8</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>45.9</td>
<td>8.8</td>
<td>7.8</td>
</tr>
<tr>
<td>2013</td>
<td>PM$_{10}$</td>
<td>62.4</td>
<td>18.8</td>
<td>15.4</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>22.6</td>
<td>8.8</td>
<td>7.9</td>
</tr>
<tr>
<td>2014</td>
<td>PM$_{10}$</td>
<td>52.6</td>
<td>21.1</td>
<td>17.4,</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>39.3</td>
<td>9.2</td>
<td>8.1</td>
</tr>
<tr>
<td>2015</td>
<td>PM$_{10}$</td>
<td>46.8</td>
<td>20.2</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>30.0</td>
<td>10.3</td>
<td>16.7</td>
</tr>
<tr>
<td>2016</td>
<td>PM$_{10}$</td>
<td>38.1</td>
<td>18.5</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>24.1</td>
<td>8.8</td>
<td>15.0</td>
</tr>
</tbody>
</table>

(1) Smoke haze  
(2) Crustal event  
(3) Bushfire events  
(4) Prescribed burns.

### Table 5.4 24-hour and annual PM$_{10}$ and PM$_{2.5}$ concentrations for 1 January 2012 – 1 January 2017 for Duncraig AAQMS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MAXIMUM CONCENTRATION (24 HOUR)</th>
<th>75$^{\text{th}}$ PERCENTILE (24 HOUR)</th>
<th>ANNUAL AVERAGE</th>
<th>NUMBER OF EXCEEDANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>PM$_{10}$</td>
<td>89.5</td>
<td>18.8</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>77.3</td>
<td>8.8</td>
<td>8.2</td>
</tr>
<tr>
<td>2013</td>
<td>PM$_{10}$</td>
<td>37.6</td>
<td>18.3</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>18.7</td>
<td>9.1</td>
<td>7.6</td>
</tr>
<tr>
<td>2014</td>
<td>PM$_{10}$</td>
<td>53.0</td>
<td>18.9</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>47.6</td>
<td>8.9</td>
<td>7.6</td>
</tr>
<tr>
<td>2015</td>
<td>PM$_{10}$</td>
<td>82.7</td>
<td>20.2</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>35.8</td>
<td>9.9</td>
<td>16.5</td>
</tr>
<tr>
<td>2016</td>
<td>PM$_{10}$</td>
<td>40.0</td>
<td>17.4</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td>PM$_{2.5}$</td>
<td>27.0</td>
<td>8.8</td>
<td>14.4</td>
</tr>
</tbody>
</table>

(1) Smoke haze  
(2) Bushfire event  
(3) Assessable event  
(4) Prescribed burns.

PM$_{10}$ and PM$_{2.5}$ concentrations are expected to be lower at Muchea than those concentrations recorded at the Caversham and Duncraig AAQMS due to much lower levels of vehicular traffic in the local area.
6 QUALITATIVE ASSESSMENT

6.1 AIR EMISSION SOURCES

The potential air emission sources from the CBP include:

- sand and aggregate transfer to elevated bins
- cement unloading to storage silos
- weigh hopper loading
- mixer loading (central mix)
- truck loading (truck mix)
- vehicle traffic (paved roads)
- wind erosion from sand and aggregate storage piles
- 62.5KVA diesel power generator.

Most of these identified sources will be minimised through enclosure or sealing of equipment, details of which are presented in Section 7.

Main power from the grid will provide power for the operations of the porta-batch plant. A diesel generator will be used as a back-up power supply. Combustion emissions from the diesel generator will be localised and not considered to be significant.

The main particulate matter emission sources are likely to include process emissions, aggregate/raw material transfer and wind erosion from bunkers/stockpiles.

6.2 QUALITATIVE ASSESSMENT OF AIR EMISSIONS

6.2.1 EMISSION FACTORS

PM$_{10}$ and PM$_{2.5}$ emission rates at the proposed CBP were calculated using emission factors detailed in the NPI EETM for Concrete Batching and Concrete Product Manufacturing and the USEPA AP-42 Compilation of Emission Factors.

These are summarised in Table 6.1.

Table 6.1 Relevant PM$_{10}$ emission factors for concrete batching

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>UNCONTROLLED PM$_{10}$ EMISSION FACTOR (kg/tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand and aggregate transfer to storage piles via front end loader (FEL)</td>
<td>0.014</td>
</tr>
<tr>
<td>Wind erosion from sand and aggregate storage piles</td>
<td>0.3</td>
</tr>
<tr>
<td>Total process emissions</td>
<td>0.05</td>
</tr>
</tbody>
</table>

PM$_{2.5}$ estimated emission rates were determined using PM$_{2.5}$:PM$_{10}$ particle size ratios detailed in the USEPA AP-42 document. The PM$_{2.5}$:PM$_{10}$ ratio for sand and aggregate transfer, and storage piles is 0.15 and was used to determine PM$_{2.5}$ emissions from the CBP.
6.2.2 REDUCTION FACTORS

The NPI EETM for Concrete Batching and Concrete Product Manufacturing also provides reduction factors (RF) for various dust management measures used. This is summarised in Table 6.2.

Table 6.2 Reduction factors for concrete batching plants

<table>
<thead>
<tr>
<th>MANAGEMENT MEASURE</th>
<th>EMISSION REDUCTION (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind breaks</td>
<td>30%</td>
</tr>
<tr>
<td>Water sprays</td>
<td>50%</td>
</tr>
<tr>
<td>Enclosure (2 or 3 walls)</td>
<td>90%</td>
</tr>
<tr>
<td>Covered stockpiles</td>
<td>100%</td>
</tr>
</tbody>
</table>

The NPI EETM for Concrete Batching and Concrete Product Manufacturing does not specify a reduction factor for process emissions. As a conservative estimate, controlled emissions from concrete batching are assumed to be 50% of the emission factor presented in Table 6.1.

6.2.3 ESTIMATED EMISSIONS

The production rate at the proposed CBP is 52,000 t/year and emission rates for PM$_{10}$ and PM$_{2.5}$ are based on available uncontrolled emission factors and particle size ratios detailed in Section 6.2.1.

The estimated emission rates for the main air emission sources for the CBP are presented in Table 6.3.

Table 6.3 Estimated emission rates for CBP air emission sources

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>PM$_{10}$ EMISSION RATE (kg/yr)</th>
<th>PM$_{2.5}$ EMISSION RATE (kg/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total process emissions</td>
<td>1,300</td>
<td>195</td>
</tr>
<tr>
<td>Offloading of aggregates from road trucks into bunkers/stockpiles</td>
<td>364</td>
<td>54.6</td>
</tr>
<tr>
<td>Loading of aggregates via front end loader</td>
<td>364</td>
<td>54.6</td>
</tr>
<tr>
<td>Transfer of aggregates from front end loader to hopper</td>
<td>364</td>
<td>54.6</td>
</tr>
<tr>
<td>Wind erosion from sand and aggregate storage piles</td>
<td>2.1</td>
<td>0.32</td>
</tr>
<tr>
<td>Wind erosion from sand and aggregate storage bunkers (3 wall enclosures)</td>
<td>0.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Total Estimated PM</td>
<td>2,395</td>
<td>359</td>
</tr>
<tr>
<td>PM emissions to Chittering LGA (2016/17)</td>
<td>173,950</td>
<td>1,650</td>
</tr>
<tr>
<td>% Contribution from CBP to Chittering LGA aired</td>
<td>1.4</td>
<td>22</td>
</tr>
</tbody>
</table>

Estimated PM$_{10}$ emissions from the proposed CBP are calculated to be approximately only 1.4% of the total reported emissions to the Chittering LGA aired.

Estimated PM$_{2.5}$ emissions from the proposed CBP are determined to be approximately 22% of the total reported PM$_{2.5}$ emissions to the Chittering LGA aired. The percentage contribution of PM$_{2.5}$ to the local aired is expected to be lower than estimated due to the non-reporting of diffuse sources (e.g. vehicular emissions) to the NPI for the Chittering LGA.
7 MANAGEMENT MEASURES

The proposed CBP will be designed and operated in line with best practice to ensure particulate matter emissions from the plant are minimised.

A Dust Management Plan (DMP) has been prepared for the proposed CBP to include the following best practice management measures:

- a 4 m high acoustic L shaped or three sided barrier to the south of the slumping stand will be constructed (refer to WSP Environmental Noise Impact Assessment Report, September 2018)
- a 3 m high acoustic barrier with 1 m overhang to the west of the cement delivery area will be constructed (refer to WSP Environmental Noise Impact Assessment Report, September 2018)
- 2.4 m high solid site boundary fence will be constructed (refer to WSP Environmental Noise Impact Assessment Report, September 2018)
- all internal access routes will be hard stanced
- access routes and the yard to be watered to be kept clean by hosing or sweeping, in particular during dry and windy conditions and periods of low rainfall
- any spilt material during concrete batching or transport to be cleaned up immediately
- all aggregate and sand will be stored on-site in storage bins or bays, designed to minimise dust generation
- the height of aggregate and sand piles stored in bays will not exceed the height of the bay
- high perimeter walls on three sides of sand and aggregate stockpiles to be constructed
- sand and aggregate storages to be dampened with an automatic sprinkler system as necessary
- dust suppression sprays will be fitted to receive bins
- all conveyors and conveyor head chutes will be enclosed
- the weighted scraper at the head end and vee plough at the tail end will clean the conveyor belting
- cement hoppers will be fitted with dust filters
- cement is transferred from storage to batching through sealed steel augers
- silo will be fitted with high level fill alarms and fill line shut off valves to prevent overfill
- the cement silo to be fitted with a reverse pulse dust extraction filter, overfill alarms and automatic over fill cut off valves on cement fill lines
- all inspection points and hatches will be fully sealed
- cement to be transferred from storage to batching through sealed steel augers
- all dry raw materials to be transferred into the bowl of an agitator via an enclosed conveyor
- batch water to be added to the raw materials during discharge to the agitator
- cement silos and weigh hoppers will be fitted with dust filters
- reticulated water sprays to be pre-installed in the bin structures to minimise dust generated during stockpiling and batching
- a high-pressure water spray system to be pre-installed as the loading point to minimise dust generation
- sprinklers will be used regularly along the site boundary
- all trucks will be washed in a dedicated single truck mixed use washing bay prior to leaving site
- continual visual dust monitoring will be undertaken of dust emissions from the Muchea CBP.

The proposed CBP will also comply with the requirements of the Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998.
8 DISCUSSION

WSP conducted a qualitative air quality assessment to estimate the particulate matter loading from the proposed CBP in Muchea. PM$_{10}$ and PM$_{2.5}$ levels associated with operation of the CBP were estimated using NPI emission factors and particle size ratios provided in AP-42, and compared to NPI reported emissions for the Chittering LGA airshed during the 2016/2017 period.

PM$_{10}$ emissions from the CBP were estimated to comprise approximately only 1.4% of total emissions reported to the NPI for the Chittering LGA. The relatively high 22% PM$_{2.5}$ contribution of total emissions is due to the non-reporting to the NPI of diffuse sources for the 2016/2017 period. The actual contribution from the proposed CBP is expected to be much lower than this estimated contribution.

A review of the draft separation distance guidelines indicated that the proposed location of the CBP does not achieve with the recommended 300 – 500 m distance between industrial and sensitive land uses at five of the nearest residential receptors (SR1 to SR5).

Notwithstanding, the implementation of a DMP during operation of the proposed CBP with stringent controls and regular on-site monitoring will ensure that emissions from the proposed CBP do not adversely impact the receiving environment.
9 LIMITATIONS

SCOPE OF SERVICES
This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA
In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

ENVIRONMENTAL CONCLUSIONS
In accordance with the scope of services, WSP has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

REPORT FOR BENEFIT OF CLIENT
The report has been prepared for the benefit of the client and no other party. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS
WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.
BIBLIOGRAPHY

Department of the Environment, Air Quality Modelling Guidance Notes. 2006


National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Concrete Batching and Concrete Product Manufacturing, Version 2.1, April 2008

United States Environmental Protection Agency AP-42: Compilation of Emission Factors

United States Environmental Protection Agency 2006. Background Document for Revisions to Fine Fraction Ratios used for AP-42 Fugitive Dust Emission Factors


Western Australian Government 1987. Environmental Protection Regulations 1987

APPENDIX A
PROPOSED LAYOUT
ABOUT US

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With 36,000 talented people in more than 500 offices across 40 countries, we engineer projects that will help societies grow for lifetimes to come.
Appendix 6 EPA determination of Scheme Amendment for the Construction and Operation of the Mobile Concrete Batch Plant.
Title: Shire of Chittering - Local Planning Scheme 6 Amendment 66

Location: Lot 22 Great Northern Highway, Muchea

Ref ID: CMS17295

Date Received: 9-1-2018  
Date Sufficient Information Received: 9-1-2018

Responsible Authority: Shire of Chittering

Contact: Mr Nathalee Petersen

Preliminary Environmental Factors: None

Potential Significant Effects: None

Management: Not Required

Determination: Referral Examined, Preliminary Investigations and Inquiries Conducted. Scheme Amendment Not to be Assessed Under Part IV of EP Act. No Advice Given. (Not Appealable)

The EPA has carried out some investigations and inquiries before deciding not to assess this scheme. In deciding not to formally assess schemes, the EPA has determined that no further assessment is required by the EPA.

This Determination is not appealable.

Chairman's Initials: 

Date: 24 Jan 2018
Appendix 7 Letter of no objection
11 May 2018

Chief Executive Officer
Shire of Chittering
PO Box 70
BINDOON WA 6502

Attention: Peter Stuart

Dear Peter,

RE: PROPOSED SCHEME AMENDMENT NO. 56 TO SHIRE OF CHITTERING LOCAL PLANNING SCHEME NO. 6 – PROPOSED MOBILE CONCRETE BATCHING PLANT

I am the landowner of Lot 202 (No. 3620) Great Northern Highway, Muchea. My property is located directly south of Lot 22 (No. 3728) Great Northern Highway, Muchea which is currently subject of a request to amend the Shire of Chittering's Local Planning Scheme No. 6 to rezone the land from Agricultural Resource to General Industry and include an Additional Use for a concrete batching plant. I understand that the purpose of this amendment request is to facilitate the future development of a concrete batching plant on the land.

I have viewed the plans for the proposed future development and note the location of the plant being in close proximity to the common boundary with my property and the existing northernmost dwelling on my land. I have also reviewed the provisional noise and dust management measures that have been developed as part of the scheme amendment documentation. I confirm that I have no objection to the future development of the site for a concrete batching plant in the location as shown on the plans, subject to the implementation of noise and dust management measures as proposed.

In addition, I note that my northern neighbour has offered to erect a shade cloth fence along the portions of my northern boundary adjacent to where the main activities of the concrete batching plant are planned to occur. I fully support this offer and I am satisfied that it will function as a privacy measure between the two properties.

Thank you for your consideration of this submission.

Greg Ward
3620 Great Northern Highway, Muchea
<table>
<thead>
<tr>
<th>AGENCY SUBMISSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Submitter</strong></td>
</tr>
<tr>
<td>MRWA</td>
</tr>
<tr>
<td>Department of Primary Industries and Regional Development</td>
</tr>
<tr>
<td>The Department of Mines, Industry Regulation and Safety</td>
</tr>
<tr>
<td>Department of Health</td>
</tr>
</tbody>
</table>
Separate approval is required for any on-site waste water treatment process with such proposals being in accordance with DOH publications which may be referenced and downloaded from:
http://ww2.health.wa.gov.au/Articles/N_R/Recycled-water

The operation of the development is in accordance with approved management plans. A register of complaints and subsequent actions to address those complaints should be maintained by the operator.

The ongoing operation of this development is to be in accordance with the Office of the Environmental Protection Authority Guidance Statement No. 3 ‘Separation Distances between Industrial and Sensitive Land Uses 2005’.

Department of Water and Environmental Regulation

Please note that the advice in this correspondence relates only to Part V of the Environmental Protection Act 1986 (EP Act).

Under Schedule 1 Part 2 of the Environmental Protection Regulations 1987 (EP Regulations), concrete batching plants are described as Category 77 – Concrete batching or cement products manufacturing: premises on which cement products or concrete are manufactured for use at places or premises other than those premises with a production or design capacity of 100 tonnes or more per year.

The Environmental Protection Act 1986 requires a works approval to be obtained before constructing a prescribed premises and make it an offence to cause an emission or discharge, unless registration (for operation) is held for the premises. The purposes of a works approval is to allow DWER to assess the environmental acceptability of emissions and discharges of a proposal against standards and policies. Works approvals also contain conditions to ensure the premises can operate in an environmentally acceptable manner and that the works themselves do not cause unacceptable environmental impacts.

Subsequent to a works approval, occupiers of category 77 concrete batching plants can apply for registration for operation. Note that conditions are not attached to registrations granted under regulation 5B of the EP Regulations. With regard to ongoing management of operations, concrete batching is subject to the Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998. It is an offence to operate in contravention of the regulations.

DWER has no objection to the rezoning of the location to General Industry. However while the supporting documentation discusses separation distances from sensitive receptors, the potential for impacts of a concrete batching plant on existing residences within 500m has not been specifically addressed.

In assessing any works approval application received, DWER will consider potential impacts from emissions and discharges on sensitive receptors, including these residences. DWER may apply further regulatory controls.

Noted. The operator is aware of the requirement to obtain a works approval and license under Part V of the Environmental Protection Act 1986 prior to the construction of the proposed concrete batching plant. It is understood that works approvals can be progressed concurrently and independently to an application for planning approval with the Shire and should not function as a prerequisite for planning approval or vice versa.

This matter has been specifically addressed in Section 6.9 of the Draft Application for Planning Approval report included at Attachment 3 of the Scheme Amendment report. The matter has also been specifically addressed in Section 5.7 of the Environmental Assessment included at Attachment 2 of the Scheme Amendment report.

Notwithstanding, since the preparation of the Scheme Amendment Report, our client, Great Northern Concrete has now commissioned the...
accordingly or in instances where the assessment indicates an unacceptable risk of environmental or public health impact from emissions and discharges, may refuse the application.

following site-specific studies by independent expert consultants in response to the DWER submission which have been attached to this schedule. They are provisional advice that is intended to form part of the future development application to be lodged with the Shire. They include:

- An Environmental Noise Impact Assessment by WSP;
- An Environmental Management Plan by GaiaRevolution; and
- A Dust Management Plan by GaiaRevolution.

What the studies demonstrate is that dust and noise impacts arising from the operation of the mobile concrete batching plant will be adequately alleviated through the incorporation of specific management and mitigation measures which our client is happy to adopt and that will form part of a development application. The provision of this information should provide an assurance that the proposed additional use is capable for inclusion. Most importantly, the use is subject to a development application approval from the Council. Therefore the council has sufficient safeguards under the terms of the proposed amendment, in the same way as if another form of industry was applied for under the land. However, the retention of the Additional Use provision will provide reasonable certainty as to the use classification to be applied to the proposed land use when an application for development approval is submitted to the Shire.

Department of Fire and Emergency Services

I refer to your letter dated 21 February 2018 regarding the submission of a Bushfire Management Plan (BMP) (Version 1.0), prepared by Allerding and Associates dated 30 November 2017, for the above local planning scheme amendment. DFES provide the following comments with regard to State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7) and the Guidelines for Planning in Bushfire Prone Areas (Guidelines).

Assessment
1. Policy Measure 6.3 a) (ii) BAL Contour Map

<table>
<thead>
<tr>
<th>Issue</th>
<th>Assessment</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation Classification</td>
<td>Plot 7, Plot 8 and Plot 9 – not demonstrated</td>
<td>Revise the vegetation classification to apply the worst-case scenario as per AS 3959.</td>
</tr>
</tbody>
</table>

It is unclear what lawful mechanism exists to 'manage' the grassland areas in perpetuity to achieve a 'low' hazard level. Provide technical evidence and verification to qualify the vegetation management can be achieved and under what legislative instrument it is enforceable in perpetuity. An enforceable mechanism is required to

Refer updated BMP with revised Plots 7, 8 and 9.
provide certainty that the proposed management measures can be achieved in perpetuity and that they are enforceable.

**BAL Contour Map**  
**BAL ratings - not demonstrated**  
The BAL Contour Map includes areas of Lot 22 subject to BAL-40 and BAL-FZ, however Table 1 does not reflect this. The BAL rating of a lot is defined by the highest BAL rating applied through the BAL contouring. Table 1 should identify the higher rating of the subject lot to ensure this is brought to the attention of the proponent/landowner and the decision maker.

**Modification required.** Amend Table 1 of the BMP to reflect the methodology contained within the Guidelines at Appendix 3 and the BAL Contour map.

2. Policy Measure 6.3 c) Non-compliance with the Bushfire Protection Criteria

<table>
<thead>
<tr>
<th>Issue</th>
<th>Location</th>
<th>Assessment</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAL</td>
<td>A1.1</td>
<td>– not demonstrated</td>
<td>Modification required.</td>
</tr>
<tr>
<td>Water</td>
<td>A4.3</td>
<td>Not demonstrated</td>
<td>Modification/clarification required at subsequent planning stages.</td>
</tr>
</tbody>
</table>

DFES has assessed the BMP and identified a number of issues that need to be addressed prior to providing support for the proposal (refer to the tables above).
<table>
<thead>
<tr>
<th>Submitter</th>
<th>Comment</th>
<th>Proponent Response</th>
<th>Shire Officer Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPORT 1</td>
<td>I support the proposed rezoning of Lot 22 Great Northern Highway to allow the concrete batching plant to be established. I believe the local area will benefit from development such as this.</td>
<td>Noted.</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Comments are as per original submission received by the Shire. Submission comments have not been edited unless for the purposes of confidentiality where necessary.*
Appendix 9 Scheme Amendment Approval
Chief Executive Officer
Shire of Chittering
P O Box 70
Bindoon  WA  6502

Transmission via electronic mail to: chatter@chittering.wa.gov.au

Dear Sir

LOCAL PLANNING SCHEME NO. 6 - AMENDMENT NO. 66

The WAPC has considered the amendment and submitted its recommendation to the Minister in accordance with section 87(1) of the Planning and Development Act 2005 (the Act).

The Minister has approved the amendment in accordance with section 87(2)(a) of the Act.

In accordance with section 87(3) of the Act, the WAPC will cause the approved amendment to be published in the Government Gazette.

The WAPC has forwarded notice to the State Law Publisher (attached) and it is the local governments’ responsibility to make arrangements for the payment of any publication costs. The local government is required under section 87(4B) of the Act, and regulation 64 of the Planning and Development (Local Planning Schemes) Regulations 2015, to publish the approved amendment, ensure that it is available to the public, and notify each person who made a submission.

For all payment and purchase order queries, please contact the State Law Publisher on (08) 6552 6012 or fax (08) 9321 7536. One signed set of the amending documents is returned for your records.

Yours sincerely

Ms Sam Fagan
Secretary
Western Australian Planning Commission

19/09/2018
PLANNING AND DEVELOPMENT ACT 2005

APPROVED LOCAL PLANNING SCHEME AMENDMENT

SHIRE OF CHITTERING

LOCAL PLANNING SCHEME No. 6 - AMENDMENT No. 66

Ref: TPS/2237

It is hereby notified for public information, in accordance with section 87 of the Planning and Development Act 2005 that the Minister for Planning approved the Shire of Chittering Local Planning Scheme amendment on 14 September 2018 for the purpose of:

Description of amendment

(a) Rezoning Lot 22 Great Northern Highway, Muchea from “Agricultural Resource” to “General Industry”.

(b) Modifying the Scheme Maps accordingly to reflect the “General Industry” zone over Lot 22 Great Northern Highway, Muchea as provided for on the attached Scheme Amendment Map.

(c) Replace the words General Industrial Zone to General Industry in Clause 3.2.3 and delete the word ‘zone’ after the words General Industry in the Zoning Table.

(d) Modifying the Scheme Maps Legend to include the “General Industry” zone in the Local Schemes Zones as provided for on the attached Scheme Amendment Map.

G. HOUSTON
PRESIDENT

A. SHERIDAN
CHIEF EXECUTIVE OFFICER