Tarcoola Turf and Quarries

Extension of Tarcoola Quarry

Additional Supplementary Information

June 2014

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1. Introduction

Tarcoola Turf and Quarries (TTQ) submitted a development application (DA13/0307) to Wagga Wagga City Council (Council) for the extension of the existing Tarcoola Quarry operations located at Lot 4 DP 740222, East Wagga Wagga. An Environmental Impact Statement accompanying the DA was placed upon public exhibition and a supplementary report was prepared to revise the proposal and respond to government agency and community submissions in regards to the proposal.

Council has requested clarification on a number of additional items following discussions in a meeting of the Southern Joint Regional Planning Panel on the 11th of April, 2014.

This report is to provide clarification to the items raised in Council's letter for consideration as part of the determination. The report also provides comment on the draft conditions of approval recommended for the project

The response should be read in conjunction with the EIS Volume 1 and 2 for Extension of Tarcoola Quarry dated June 2013 and the Supplementary Report for the Extension of Tarcoola Quarry dated November 2013.

2. Submissions Response

2.1 The Proposal

2.1.1 Is consent being sought for aggregate crushing?

The proposal represents an extension to the existing Tarcoola Quarry operations through progressively expanding the quarry footprint and increasing production to 150,000 tonnes per annum. The EIS described the extraction, screening, stockpiling and transport operations as remaining largely in accordance with existing practices using existing equipment and operational practices.

The identified resource includes loam, sand and gravel from within the Murrumbidgee River floodplain. It is estimated that approximately 70% of the resource consists of sand and gravels of less than 20 mm, with the remainder consisting of oversized material which is generally less than 100 mm with very occasional larger gravels of up to 150 mm diameter.

The existing quarry includes a processing area including an integrated screening, washing and stockpiling operation which is proposed to be retained in its current configuration using the existing equipment or equivalent subject to ongoing performance and reliability.

Limited detail was provided of the processing operations as part of the proposal description presented in Chapter 2 of EIS as there are no changes to the existing processing configuration or equipment proposed to be used as part of the development application (DA).

The integrated screening plant incorporates three Finlay Supertrack 683 screens including a washery, a small cone crusher and a cyclone as shown on Figure 2-1 and Figure 2-2. Sand and gravel from the raw material stockpile is fed into the main feed hopper where it is washed to separate sand and gravel products. Sand is directed to the cyclone for dewatering and gravels pass through a series of screens to conveyors for further screening and processing.

Oversized materials which consist predominantly of gravels of between 20 and 100mm are directed to an oversized conveyor and transferred to a 28 inch Jaques Cone Crusher. The cone crusher breaks rock by squeezing the rock between an eccentrically gyrating spindle, which is

covered by a wear resistant mantle and the enclosing concave hopper. Oversized gravels are reduced in size and returned to the screening process via a conveyor for sorting into the required product sizes or returned to the cone crusher to achieve the desired product size. The processing plant also incorporates a small cyclone to separate water from the sand, which is directed to the sediment basin for subsequent recycling through the washery. The sand is typically stockpiled for four to five days allowing for additional seepage which is also directed to the sediment basin.

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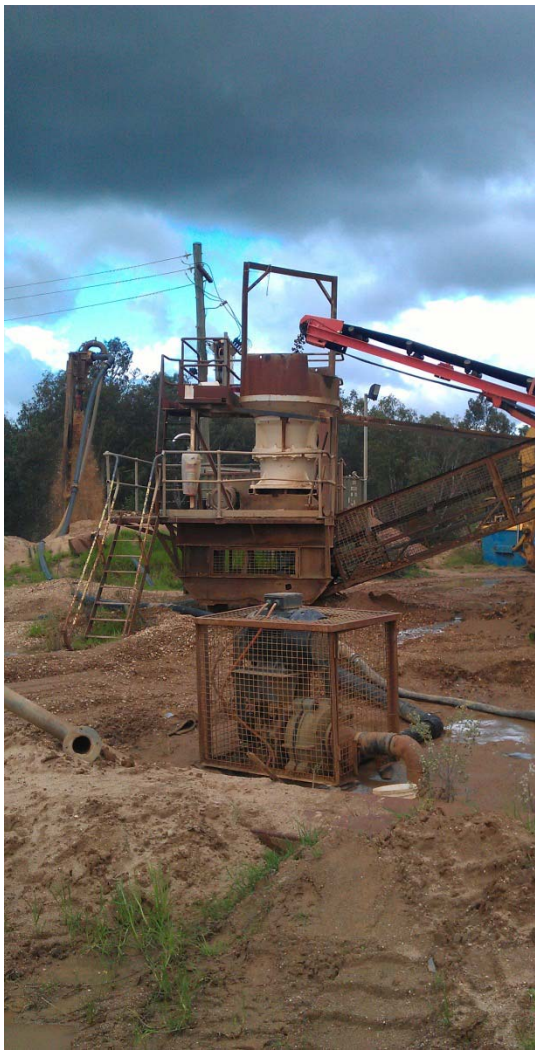

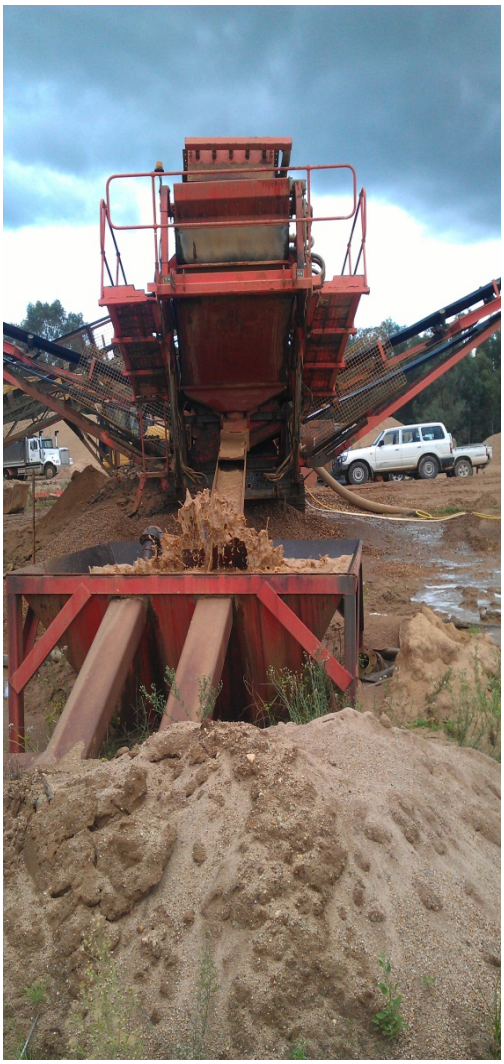

Figure 2-1 Cone crusher, wash and cyclone within screening plant

Figure 2-2 Integrated screening operations

While the cone crusher was not specifically described within the project description chapter of the EIS, it does form part of the existing integrated screening plant which was described in the EIS as being retained and included in the assessment process particularly in regards to noise and dust emissions.

Sound pressure levels were measured at multiple locations surrounding the integrated screening operations (incorporating crushing) and were used in modelling of noise emissions generated by the quarry processing equipment as shown in Table 5 and Table 13 in the noise assessment included as Annex G in Volume 2 of the EIS.

The cone crusher is enclosed within a concaved hopper and does not generate noise in excess of the overall screening process. Reducing the size of the gravels would in fact reduce the noise associated with conveying and screening oversized gravel.

TSP and PM_{10} emissions for the integrated screening operation were conservatively estimated as part of the dust emissions inventory. All oversized material enters the cone crusher directly from the washery within the primary screen and so the oversized material is washed and damp resulting in limited potential for dust emissions associated with the operation of the crusher.

The 28 inch cone crusher is the smallest available on the market and is effectively integrated as part of the overall screening process as shown in Figure 2-1 and Figure 2-2. While it does operate to effectively reduce oversized gravels to marketable fractions, it is estimated that 95% of the oversized gravels are less than 100 mm and it is not analogous or have the equivalent potential for emissions associated with crushers typically used within a hard rock quarry.

The crusher forms part of the existing processing equipment which is proposed to be retained as part of the DA. The potential impacts associated with the crusher have been assessed in the EIS as part of the integrated screening operation and inclusion of the crusher within the screening plant has no material effect on the results of the environmental assessment.

It is noted that pursuant Clause 55 of the Environmental Planning and Assessment Regulation, 2000, a development application may be amended or varied by the applicant (with the agreement of the consent authority) at any time before the application is determined.

TTQ proposed to vary the DA to explicitly include crushing of oversized gravels and operation of the cyclone for dewatering washed sand as part of the processing equipment in the development application.

2.1.2 Equipment to be used

Council have requested clarification on the equipment proposed to be used as part of the proposal following interpretation of the equipment outlined as sources of noise and dust emission sources in the EIS.

The noise and air quality assessments were undertaken to provide a conservative representation of anticipated worst case emission sources from the quarry. This is based upon the current operational practices which are proposed to be continued under the development application.

The noise assessment included quarry layout and equipment list presented in Figure 8.2 and Table 8.4 of the EIS with additional detail provided in the specialist assessment in Annex G. The assessment provides an indicative layout of the significant noise sources utilised in modelling for two alternative scenarios for receivers located north and south of the proposed operations. Not all in pit extraction equipment was used in each modelling scenario which included:

- Scenario 1 - equipment placed on the north western side of the site (near Receiver 2).
- Scenario 2 – equipment placed to the south west of the site (near Receivers 1 and 3).

Each scenario assessed in the noise model therefore included one haul truck being loaded by an excavator and Front End Loader (FEL) at the surface of the extraction area in either the northern or southern section of the extraction area, concurrently with a haul truck unloading at the processing area together with the screening operations and two delivery trucks on the access road.

In practice the equipment used on a day to day basis would fall within the worst case operational parameters adopted as part of the assessment.

The quarry operations include four full-time staff, which limits the potential for concurrent operation of the equipment. In-pit excavation and haulage is typically undertaken by a single operator who transfers from the excavator to haul truck when loading is complete so the equipment is not being operating concurrently. Two operators operate front end loaders either within the pit or at the stockpiles and a fourth operator maintains the screening operations.

A scraper and grader are also infrequently operated at the site for removal of overburden, bund construction and remedial works. The scraper and grader are not used concurrently with in-pit extraction equipment and would fall within the worst case operational parameters included within the noise model. The site also maintains three staff on the turf operations and two administrative staff in the office.

Similarly for the air quality assessment the emissions inventory was developed to present a conservative operational scenario based upon the equipment currently in use at the quarry and a summary of the dust emission inventory was provided in Table 9.4. Further details of the assumptions and equipment used in the modelling is provided in Section 4.3 of Appendix I in Volume 2 of the EIS, which includes the adopted emission factors developed in accordance with the National Pollution Inventory (NPI).

The major emission source was determined to be large trucks travelling on the unpaved access road and haulage routes within the site as shown on Figure 9 in Appendix I. The draft approval conditions also require sealing of the access road to the quarry entrance which will significantly

reduce the haulage distance on unsealed roads and the anticipated emissions from the operations.

2.1.3 Stockpiles

Stockpiles are maintained within the screening process area and vary based upon external market demand. The stockpiles typically occupy an overall area of between 1 and 1.5 hectares within the plant area as shown on Figure 2-3 and include the following typical stockpile sizes:

- 100 tonnes of raw material
- 20,000 tonnes of 20 mm
- 6000 tonnes of 10-14 mm
- 6000 tonnes of 5 mm
- 3000 to 4000 tonnes of sand.

The gravel aggregates have been washed and are typically of sufficient size to minimise the potential for significant dust emissions. The sand stockpiles are also damp from the washing process and typically stockpiled for four to five days to allow for additional seepage which is recycled through the sediment basin.

Site observations during the preparation of the EIS did not identify the stockpiles as significant emission source and the air quality assessment has allowed for conservative estimates of wind erosion from exposed surfaces to be included in the modelling as discussed in Section 1.4.

Figure 2-3 Stockpiles maintained adjoining screening plant

2.2 Noise

2.2.1 Background Noise Levels

Background noise level readings were undertaken at sensitive receivers in proximity to the proposal to assess the existing ambient noise environment for the purposes of establishing operational noise criteria in accordance with the EPA's Industrial Noise Policy (INP). The locations were dependant on access constraints and representativeness of the local noise environment and chosen to represent different exposure to road traffic noise for potentially impacted receivers.

The noise logger at Receiver R2 was located approximately 30m from the house in the potentially most affected point, in the direction nearest to the quarry. The quarry was operating during noise measurements however was not audible during site attendance. The location is considered appropriate for use as a background noise level.

Noise monitoring was initially proposed to be undertaken at Receiver 1, however upon attendance it was noticed that construction activities being undertaken immediately to the south of the receiver and were influencing the noise levels and would likely result in artificially elevated background noise levels.

The noise logger was subsequently positioned at Receiver R3, approximately 15 m from the residence in the direction of the quarry. This site was secure and was more elevated than a position 30 m away from the receiver and is considered representative.

Receivers 1, 3, 4 and 5 are all subject to road traffic noise from the Sturt Highway. Receiver 3 where the monitoring was undertaken is a similar set-back from the Highway and a similar distance to the quarry as Receiver 5 making this location representative of the noise levels in the area. The only quarry noise observed during attendance at Receiver 3 was occasional reverse beepers which would not contribute to the background noise levels in the assessment as background noise is based on the LA_{90}.

Given that these sites are influenced by road traffic noise, using the data from Sunday when the quarry was not operating would not be reasonable as the road traffic noise from the Sturt Highway traffic is also generally lower on Sundays. In addition using just Sunday is not considered a large enough data set to calculate the Rating Background Level.

A review of the noise assessment predictions show that even if the conservative background noise levels from Receiver 2 were used at all of the receivers, the proposal would comply with the criteria.

2.2.2 Impulsive noises

The INP states that where a noise source contains certain characteristics, such as impulsiveness, there is evidence to suggest that it can cause greater annoyance than other noise at the same level.

GHD has reviewed the noise assessment and to ensure a conservative assessment backing alarms have been added into the noise model. In order to mitigate potential noise impacts on the surrounding community GHD recommends that broadband backing alarms be replaced on all equipment. GHD has assessed a heavy duty 102 dB BBS-TEK Alarm. A 5 dB(A) additional penalty has been added to the broadband backing alarms for impulsiveness, however as the alarms are broadband no tonal adjustments are needed. The assessment shows that the criteria will be achieved at all receivers, with broadband reversing alarms on equipment. For operating scenario A the predicted noise level at Receiver 2 increases by 0.6 dB(A) however remains at the criteria of 42 dB(A) and all other receivers continue to comply. Likewise with

scenario B the predicted noise levels at Receiver 2 increases by 0.4 dB(A) however still complies with the criteria of 42 dB(A).

2.2.3 Vibration

Vibration measurements were not conducted during the assessment. Quarrying equipment may generate moderate levels of vibration however the rate at which the vibration decays is generally quite high. Considering the distance between the quarry and receivers is large (over 200 metres to the proponents house and higher to other receivers) then vibration is not considered to be an issue. Typical vibration levels from activities such as excavation are generally negligible at distances greater than 50 metres and it should be noted that blasting is not proposed as part of the operations. Measuring vibration at these receivers would therefore not be relevant as vibration levels from the quarry would be negligible and any measured levels at these sites would more likely be from other sources.

2.3 Air Quality

2.3.1 Background air quality

No background air quality is recorded onsite meaning that data from the OEH site in North Wagga Wagga was used. The site records only PM_{10} on a daily basis (typical of OEH sites outside major metropolitan areas as other gaseous pollutants can be considered negligible). It is noted that here has been no existing regulatory or other requirement for Tarcoola quarry to sample for ambient dust levels although dust monitoring is proposed to be undertaken as part of the ongoing operations which are the subject of the DA.

It is noted that the PM_{10} sub-set is typically approximately 50% of total suspended particulates (TSP) in the ambient air in regions where road traffic is not the dominant particulate source, such as rural areas (USEPA, 2001[1]). In the absence of monitoring data for TSP, the annual average TSP concentration for the region may therefore be derived by multiplying the annual average PM_{10} concentration by a factor of two.

2.3.2 Adopted background air quality levels

The submission recommends that the peak or 99th percentile background 24 hour PM10 values should be added to the maximum modelled incremental value from the project for the assessment. The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales state that there are to be no additional exceedances of the 24-hour average impact assessment criterion even if the measured background levels are bordering on the criteria.

These approaches suggest that the maximum emissions from the proposal are added to the background concentrations during anomalous regional events such as dust storms or bushfires and there is little chance that any development in the region would demonstrate full compliance with the criteria.

Additional analysis of raw air quality monitoring data from the North Wagga Wagga site indicates:

- average to be 17.2 ug/m^3,
- 70th percentile to be 19.1 µg/m^3
- 99th percentile to be 43.4 µg/m^3.

1 USEPA (2001) "Federal Register: Control of Air Pollution from New Motor Vehicles: Heavy Duty Engine and Vehicle Standards; Highway Diesel Fuel Sulfur Control Requirements; Proposed Rules".

- Highest daily to be 67.2 µg/m^3
- Highest daily not exceeding the criteria to be 49.2 µg/m^3.

Since the station became operational in July 2011 there has been 28 exceedances of the criteria (50 ug/m^3) with the highest daily PM10 average of 67.2 µg/m^3, well above the criteria. This was also 44 events between 40 and 50 ug/m^3 with the highest daily PM10 average not already exceeding the criteria was 49.2 ug/m^3. This would result in any incremental emissions from the quarry resulting in an exceedance of the 24 hour criteria when the regional background levels are elevated and bordering the criteria as a result of events unrelated to the operation of the quarry.

In lieu of the fact that Wagga Wagga has a high occurrence of elevated background PM10 level, the assessment presented in the EIS proposed the use of an average level be incorporated as the 'background' in the Air Quality assessment.

A further review of other States show that the Victorian Environment Protection Authority recommends the use of the 70th percentile measurement of dust levels as an estimate for the background level which is understood to have been considered appropriate for the assessment of similar projects in regional NSW.

The approach is considered conservative as it uses the average background 24 hour PM10 which occurs for 70% of the year, whilst eliminating the anomalous events such as regional dust storms or bushfires.

The 70th percentile for the year of PM10 daily average air quality monitoring at North Wagga Wagga is 19.1 µg/m^3. Even when using this background level the conservative dust predictions show compliance at all times with the 50 µg/m^3 24-hour average. The average of the daily PM10 can be used for the annually averaged criteria (PM10 and TSP).

2.3.3 General quarry activities

Material throughputs in the original EIS were calculated based upon a worst case daily production which is limited by the capacity of the equipment and the operating hours in a day.

The EIS highlighted that in reality the annual extraction was anticipated to be considerably less than the original limit specified in the EIS and the supplementary report has refined the extraction rate in the DA to more realistic expectations based upon anticipated market demand.

The assessment is considered conservative on a short term basis as the assessment represents the realistic limit of the extraction and processing equipment on a daily basis and the reduction in the annual extraction rate now allows for periods of lower extraction rates to fall within environmental parameters used in the developing the modelling assumptions.

The major emission source was determined to be large trucks travelling on the unpaved access road and haulage routes within the site as shown on Figure 9 in Appendix I. The modelling assumed haulage on unsealed roads up to the site weighbridge and adopted the emission factors for heavy vehicles of 48 tonnes capacity resulting in a PM10 emission factor of 1.25 kg/km. This was conservatively applied in the assessment where in reality a number of the vehicle movements on the unsealed roads would be occurring using 10 tonne trucks with a PM10 emission factor of 0.6 kg/km resulting in an overestimation of emissions in the model. The draft approval conditions also require sealing of the access road to the quarry entrance which will significantly reduce the haulage distance on unsealed roads and further reduce the anticipated emissions from the operations.

The dust modelling has also been undertaken to be conservative, with the Ausplume model not taking into account Dry Depletion. Should dry depletion be considered then the predicted dust levels would be significantly lower than the modelled results presented in the EIS. The

Ausplume manual[2] states that “The 'no depletion' option may be acceptable if deposition is weak, and it will result in an overestimate of both concentrations and deposition”.

2.3.4 Wind erosion

The area for wind erosion in the air quality modelling was 10 ha of uncovered surfaces incorporating two pits of up to 5 ha as described in Table 5 within Annex I in Volume 2. The area specified in Table 9.4 is an error arising out of assessment of multiple pit configurations during the development of the EIS.

The 10 ha area is considered conservative considering that progressive expansion of the pits will generally occur when the deeper cells are subject to considerable ground-water ingress and will form lakes and the processing stockpile area is not considered a major emission source as gravel aggregates have been washed and are typically of sufficient size to minimise the potential for significant dust emissions. The processing and stockpiling area will undergo water and dust controls as required throughout the operation of the quarry.

2.3.5 Silicon and $PM_{2.5}$

Workplace health and safety was not considered in this assessment as it was not required in the DGRs. It is up to the operator to ensure workplace health and safety requirements for the employees. $PM_{2.5}$ is usually only a health quality issue for combustion processes with the exception of respirable crystalline silica (RCA) in quarry or extractive industries. Depending on the material involved and the processes capable of producing ‘freshly cleaved surfaces’ (mechanical operations such as crushing but less so for ‘simple’ material transfer of screens and loaders) just 20% of PM_{10} is in the $PM_{2.5}$ fraction. RCS is most often found to be less than 20% of the $PM_{2.5}$ (less than 4% of the PM_{10}). Moreover, most of the operations at this site will be in a ‘wet’ process mode (such as any crushing) with limited resultant PM_{10} or RCS (as $PM_{2.5}$) emissions.

2.4 Land Resources

2.4.1 Land Capability

The EIS did not undertake a detailed assessment of agricultural land capability as the focus of the environmental assessment and development application was for the extension of the existing extractive industry operating at the site.

The proposed footprint of the quarry operation represents approximately 25% of the 80 ha site which has previously been used for grazing, turf operations and extractive industries. The proposal represents a continuation of an existing land use over a small proportion of the site and is not considered unduly restrict the agricultural capability of the area.

The site is zoned RU1 Primary Production under the Wagga Wagga LEP 2010 and extractive industries are permitted with consent and are considered compatible with the zone objectives. Additionally, under the State Environmental Planning Policy (SEPP) Mining, Petroleum and Extractive Industries 2007 allows for extractive industries to be carried out with consent on any land for which agriculture or industry is permitted with or without consent.

NSW Agriculture has developed an agricultural land classification system for evaluating biophysical, social and economic factors that may constrain the use of land for agriculture NSW Agriculture (2002). Section 6.3 of the guideline provides general considerations used in the land classification mapping process, including lands that do not need to be evaluated which

2 EPA Publication Ausplume Gaussian Plume Dispersion Model Technical User Manual, 2000

includes quarries and mining areas. The guidelines also note that key factors may need to be considered in more detail than others based upon individual site characteristics.

The site is not considered suitable for intensive or regular crop production which is representative of a Class 1 or 2 agricultural land classification. The site is subject to regular inundation by flood waters resulting in a high potential for economic losses associated with flooding in the long term. This would result in either a Class 3 or 4 agricultural land classification, which is supported by the history of the site which has previously been used for either cattle grazing or turf operations. Pasture and turf is considered more resilient to frequent flood events than more intensive cultivation and is representative of the appropriate land classification for the site.

Despite the agricultural classification, the extractive industry is a permitted land use and represents only a small proportion of the available land for agriculture both on the site and in the locality.

2.5 Water Management

2.5.1 Impacts on Site Discharges

The surface water assessment presented within Annex D in Volume 2 of the EIS included the development of a water balance to quantify the likely transfers within the quarry operations for both existing and future operational scenarios. The water balance results were based upon rainfall records from 1942 to 2012 sourced from the local Bureau of Meteorology station identified as Wagga Wagga AMO (Station number 72150) and included mean annual transfers together with results for a typical wet year and a typical dry year. A typical wet year was represented by 1992 which was the fourth highest rainfall year and 1967 was the lowest rainfall year on record as shown on Figure 4.1 of the Surface Water Report in Annex D of the EIS.

Evaporation was also sourced from Wagga Wagga AMO. There is variation in pan factors that are suggested in different references to support the modelling and 0.9 was adopted as a more conservative (i.e. greater evaporation) option than lower numbers such as 0.7.

The water transfers within the original water balance schematics presented in the EIS assumed the existing sediment lagoon and future basin within the existing southern pit were traditional sediment basins with a sealed base in accordance with the Blue Book. This was undertaken to demonstrate a worse case discharge scenario in terms of volume to the Murrumbidgee River and indicated a mean annual discharge of 126.1 ML during stage 1 and 180.6 ML during Stage 2 of the proposal. The flows represent a tiny proportion of the total flows in the Murrumbidgee as presented in Figure 4.4 of Annex D and replicated in Table 2-1 for ease of comparison. The data provides an analysis of flows from gauging station 410001 on the Murrumbidgee River at Wagga Wagga for the period 1900-1912.

Table 2-1 Murrumbidgee River Flows

Percentile	Percentage of Years Exceeding Flow	ML/year	
0	100%	464,251	Minimum on Record
0.05	95%	1,246,742	
0.1	90%	1,558,039	
0.25	75%	2,251,518	
0.5	50%	3,483,744	Median on Record
0.75	25%	4,708,146	
0.9	10%	6,106,408	
0.95	5%	7,386,690	
1	0%	15,023,090	Maximum on Record

The discharges represent a fraction of a percent of the total flows in the receiving water and the mean daily discharge of 0.49ML/day was not considered likely to have a noticeable impact upon receiving waters and monitoring was considered appropriate to demonstrate the ongoing performance of the quarry.

However, revised assumptions for the operation of the sediment basin were developed and presented in a revised water balance schematic in the supplementary report with no direct discharges to receiving waters.

In reality the sediment basin within the existing southern pit is hydraulically linked within the overall soil water system on the floodplain and water entering the sediment basin will infiltrate back to groundwater system or be recycled through the processing facility rather than pumped directly to the river as shown on the revised schematic. The revised water balance modelling was undertaken using rainfall records from 1942 to 2012 and indicated no discharges to the river from the sediment basin.

Water quality in the basin will be influenced by groundwater quality and the properties of the targeted sand and gravel resource within the extraction area. Flocculent will not be required as the basin is not discharging to receiving waters. The basin floor will have a similar hydraulic conductivity to the identified resource and therefore is not anticipated to be any issues associated with a potential sealing of the basin floor.

2.6 Environmental Safeguards

2.6.1 Commitments versus Recommendations

In accordance with Clause 7 of Schedule 2 of the Environmental Planning and Assessment Regulation, Chapter 15 of the EIS provides a compilation in a consolidated chapter of the measures proposed to mitigate any adverse effects of the development. The chapter specifies that all mitigation measures identified within the EIS will be incorporated into an environmental management plan which will be prepared to provide an overall framework for the management of environmental impacts at Tarcoola Quarry. All mitigation measures are commitments and form part of the proposal.

2.6.2 Equivocation of Environmental Safeguards

The submission has requested safeguards to be re-proposed in a way that is explicit and capable of being audited. The mitigation measures included in Chapter 15 of the EIS have been revised in accordance with the submission request and, where relevant to account for the proposed changes to the DA, included within the Supplementary Report.

General

The proposed extension of Tarcoola Quarry will be undertaken in accordance with the provisions and mitigation measures as described in the EIS and Supplementary Report and include:

- the extraction rate will be restricted to a maximum of 150,000 tpa
- hours of operation will be restricted to 7.00am to 6.00pm Monday to Friday and 8am to 6pm on Saturdays
- the extension of the quarry will be undertaken through the implementation of a series of pits throughout the Stage 1 and Stage 2 extension area within the pit boundaries provided in the supplementary report to the EIS
- pits 1 to 3 will incorporate two cells of up to 2.5 ha and Pit 4 will be limited to a single cell of 2.5 ha
- two pits will be available for active extraction at any time
- dewatering of groundwater from the active cell to a maximum depth of two metres will be undertaken when required to enable excavator access to the pit
- TTQ also propose to extract the “last bucket” from beneath the groundwater level in each cell to enable access to some of the more economic gravel deposits, whilst minimising the requirement for dewatering
- an 80 metre riparian buffer will be maintained to the Murrumbidgee. No operational activities will be undertaken within the riparian buffer following the rehabilitation of the existing sediment lagoon
- an earth bund will be constructed to provide flood protection around the two active pits and the processing plant area
- the bund will be constructed to provide a 1 in 10 year AEP level of protection with no additional allowance for freeboard
- extraction, screening, stockpiling and transport of the resource will remain largely in accordance with current operations using existing equipment and operational practices
- rrogressive rehabilitation of the quarry will be undertaken with rehabilitation of one existing pit undertaken concurrently with overburden removal and bund construction for the next pit to be incorporated into the operations
- rehabilitation will be undertaken in accordance with the plan presented in Appendix C of the EIS Supplementary Report.

Soil and water management

A soil and water management plan will be prepared to outline the measures to minimise the impacts of the proposed extension to the Tarcoola Quarry operations on the environment. The soil and water management plan will incorporate the following measures:

- quarry operations will maximise the volume of extracted groundwater to be returned on-site in order to minimise the potential for drawdown of the water table

- a detailed surface and groundwater monitoring program for the ongoing assessment of risks to the Murrumbidgee River or local groundwater aquifers
- quarrying activities will be limited to those areas within the proposed extraction areas. Access roads and disturbance activities should be managed with consideration to minimising off-site transport of sediment
- dewatering of pits will be undertaken in accordance with the licencing requirements under the Water Management Act
- clean water should be diverted away from areas of disturbance and open extraction pits using contour drains or modified channels. This will assist in the mitigation of sediment being mobilised and creating issues elsewhere in the water management system
- drainage and discharge lines are to be grassed or stabilised to prevent erosion. In addition, all earthworks including all batters, bunds, banks, dams or pits are not to exceed a 1 to 3 slope ratio and are to be stabilised with vegetation
- sediment trapped behind sediment fences must be regularly cleaned out and stockpiled in an appropriate area
- stabilisation of batters (pit walls) through partial backfilling will be undertaken to ensure safe operation during site rehabilitation. Post-closure backfilling could be done utilising material from bunds used for flood protection during the operational phase
- partial backfilling of pits with available overburden to minimise exposure of the water table
- refuelling of equipment and machinery will be undertaken in the bunded processing plant area. Fuel will continue to be delivered to site in a mobile tanker
- spill kits will be kept onsite to ensure any minor spills (fuels or oils) are contained and removed
- stockpiles of material are to be located well away (minimum of 5 m) from concentrated flow paths.

Flora and fauna

The following mitigation measures would be implemented to minimise the impacts of the proposal on the ecology of the study area:

- all staff will be inducted and informed of the limits of vegetation clearing and the areas of vegetation to be retained. Areas of vegetation not to be removed would be clearly specified in the site induction
- no inadvertent removal of trees would occur
- any “hot works” required for maintenance of equipment or machinery would be subject to a hot works permit and will not be undertaken on total fire ban days
- excavation of materials and establishment of a levee around the site would not encroach on the drip line of the trees in the vicinity of the site
- all vehicles and equipment used for operations will remain within the defined quarry operation footprint
- no woody debris would be removed from the subject site and would be relocated if it is within the construction footprint
- declared noxious weeds will be managed according to requirements under the NSW Noxious Weeds Act 1993.

Heritage

The following mitigation measures would be implemented to minimise the impacts of the proposal on the Aboriginal Heritage within the study area:

- an Aboriginal Heritage Impact Permit (AHIP) will be required for the quartz flake (IF1)
- OEH ACHCRs will need to be undertaken as part of the process for applying for the AHIP
- any unanticipated finds will be managed in accordance with the AHIP permit and protocols compliant with the NPW Act, 1974.

Noise

The following noise mitigation and management measures are recommended:

- no vehicle haulage will be undertaken outside the operating hours of the quarry
- all personnel on site inducted in regards to the potential for noise impacts and should aim to minimise impact or elevated noise levels, where possible
- all engine covers should be kept closed while equipment is operating
- as far as possible, material dropping heights into or out of trucks should be minimised
- vehicles should be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes should be eliminated, where practicable
- machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made
- attended noise measurements would be undertaken periodically during operations to validate predicted noise levels.

Air quality

The following mitigation measures would be implemented to minimise off-site dust impacts:

- Level 2 (greater than 2L/m^2/hr) water spraying would be undertaken on the unsealed access road. This should be undertaken during daytime weather conditions that assist dust dispersion (dry and windy) towards Receivers 1 and 4
- the size of storage piles should be minimised where possible
- on-site traffic should be controlled by designating specific routes for haulage and access and limiting vehicle speeds to below 25 km/hr
- all trucks hauling material should be covered before exiting the site
- material spillage on sealed public roads should be cleaned up as soon as practicable
- excavating operations producing excessive visible dust would be suspended during high wind speed events or water sprays should be used to minimise dust generation.

Traffic and transport

The following mitigation measures would be implemented to minimise the impacts of the proposal on the traffic and transport networks in the locality:

- Gillard Road will be sealed in accordance with the draft conditions of contract
- vehicles exiting the site to the west will be encouraged to utilise the Tarcoola Road extension and Kooringal Road if Council proceed with the potential extension of Tarcoola Road.

Visual

The following mitigation measures can be employed to reduce the impacts on landscape character zone 1 and all viewpoints.

- use bunding to shield the working face, plant and equipment from surrounding views. A grass cover will be established on the bunds to minimise visual contrast with the surrounding environment
- do not remove any existing mature trees from the riparian corridor
- undertake progressive rehabilitation of former pits within the quarry operational sequence in accordance with the rehabilitation plan presented in Appendix C of the Supplementary Report
- provide screening vegetation to minimise the visibility of new internal roads into the Stage 2 extension area
- minimise the size of stockpiles to that necessary to meet operational demand.

Waste

Mitigation measures to be implemented to minimise wastes generated during quarry operations are outlined below:

- wastes will be separated into recyclable and non-recyclable materials and stored in appropriate containers
- containers will be collected by a licensed waste contractor, as appropriate, or removed by quarry staff on a regular basis and transported off-site for disposal to a licensed landfill or recycling facility
- all waste disposal will be in accordance with the Protection of the Environment Operations Act 1997 (POEO Act) and Waste Classification Guidelines 2009 (DECCW, 2009)
- waste management procedures will be incorporated into the OEMP which will outline measures to avoid waste generation and promote reuse, recycling and reprocessing of waste where possible during construction and operation.

2.7 Hours of Operation

The operating hours sought as part of the DA are 7.00am to 6.00pm Monday to Friday and 8am to 6pm on Saturdays.

It should be noted that the quarry operations will fall within these hours, however the proposal aims to retain flexibility to meet peak demand.

2.8 Flooding

2.8.1 Modelling of Levees

Flood modelling undertaken for the EIS was undertaken for each potential pit configuration under three catchment configurations influenced by potential upgrades of the Wagga Wagga City levee and North Wagga levee respectively to ensure a conservative assessment.

The City levee is located to the south (left bank) of the river, extending from a short way downstream of the quarry around the main town would be upgraded to a maximum of a 1 in 100 year ARI. The North Wagga Wagga levee affords protection to the primary residential areas on the north bank of the Murrumbidgee and is proposed to be upgraded to a maximum of a 1 in 20 year ARI.

The Tarcoola Quarry assessment was based on the hydraulic model developed by WMA Water for the Wagga Wagga Murrumbidgee River Model Conversion Project which was built using TUFLOW, a 1D/2D (one dimensional/two dimensional) hydrodynamic flow model typically used in simulating flooding. Because of the limitations of the model, it was not practical to assess ARIs rarer than the 1 in 100 year event for the City Levee or the North Wagga Wagga levee upgrade scenarios which was the limit of the assessment for the conversion project.

No information is available for the City Levee upgrade for the Probable Maximum Flood (PMF) as described in page 7 of the supplementary report. The modelling in the EIS and the supplementary report takes into account 10, 20 and 100 year scenarios.

The initial flood modelling for the EIS included modelling for all potential catchment scenarios and pit configurations and found minimal differences in the level of Afflux between the alternate catchment configurations. The City Levee upgrade catchment scenario typically had the greatest increase in flood levels at surrounding properties associated with the proposal.

The size of the Stage 2 pits and level of flood protection afforded to the quarry was reduced as part of the refined project presented in the Supplementary Report. Additional modelling was therefore undertaken using the City Levee upgrade catchment conditions as the most conservative modelling scenario from the original assessment.

This was undertaken to demonstrate the revised configuration would provide an improvement to the results presented in the EIS so the most conservative scenario was adopted by the modelling.

Scenarios for existing catchment conditions and the upgrade of the North Wagga Levee were not undertaken for the final configuration. Based upon the results of the previous assessment there would be minimal difference (< 5mm) expected in the reported results for any catchment scenario.

2.8.2 Levee Heights

The figures have been inverted in the reporting within the supplementary report. Levee heights included in the model were set at 181.2 mAHD for Pits 1 and 2 and at 181.1 for Pits 3 and 4.

2.8.3 Freeboard

Due to the minimal difference in levels between a 1 in 10-year AEP standard of protection and a 1 in 20 year AEP event, incorporating 0.5 freeboard to the levees proposed in the supplementary report raised the level to also prevent flooding in the larger event and it proposed that freeboard is not incorporated into the design of the bunds. The AFFLUX maps in the supplementary report therefore overestimate the results in a 1 in 20 year AEP event as the bunds will have overtopped utilising the available storage within the extraction area.

3. Conditions of Approval

TTQ has reviewed the draft approval conditions presented in the Assessment Report to the Joint Regional Planning Panel and are happy to adhere to the conditions subject to the following clarifications.

Consent timeframe

Condition 36 states that the expansion and operation of the existing Tarcoola Quarry shall lapse at midnight on the 7th of March 2030. The proposal footprint and environmental assessment presented in the EIS and supplementary report is estimated to require 25 to 30 years to complete based upon maximum potential extraction rates. It is also noted that 25 to 30 year consents are typically granted for equivalent mining and extractive industry projects.

Consideration of extending the consent timeframe to 2040 is requested to reflect the development as described in the DA and to provide a greater level of economic certainty to the Proponent.

Hours of Operation

Condition L6.8 in the EPAs General Terms of Approval (GTA), specify construction activities at the premises must only be conducted between 10am and 3pm Monday to Friday.

It is unclear what forms the basis of the proposed hours which are considered overly restrictive with construction contractors only able to work for a limited proportion of each day.

TTQ propose to alternatively implement the recommended standard hours for construction specified in the EPA's Interim Construction Noise Guideline which includes:

- Monday to Friday – 7am to 6pm
- Saturday – 8am to 1pm;
- No work on Sundays or Public holidays.

Dust Monitoring

Condition M2.3 in the EPA 's GTA requires monitoring of TSP and PM10 at four surrounding receptors. TTQ proposed to implement a dust monitoring plan as part of the overall site EMP, however the practicality and objectives of implementing the condition in its current format is ambiguous.

TTQ recommend that the condition be reworded to require the preparation of a dust monitoring plan in consultation with the EPA in accordance with the approved methods for sampling and analysis of air pollutants in NSW.

This additional supplementary information report has been prepared by GHD for Tarcoola Turf and Quarries and may only be used and relied on by Tarcoola Turf and Quarries for the purpose agreed between GHD and the Tarcoola Turf and Quarries as set out in Section 1 of this report.

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The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	Karl Rosen	Kate Day	K. Day.	Karl Rosen	Karl Rosen	04/06/2014

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