J.J. & C.B. Dunn
c/o Locked Bag 7
WAUCHOPE NSW 2446

11 December 2019

Attention: Ms. Melissa Anderson
Major Projects
NSW Department of Planning, Industry and Environment
GPO Box 39
SYDNEY NSW 2001

By email: melissa.anderson@planning.nsw.gov.au

Dear Ms. Anderson,

RE: Hanson Sancrox Quarry SSD Application No. 7293

We have no objection to the continued use of the quarry and an expansion of the quarry in appropriate circumstances, in an appropriate scale, design, with a reasonable contribution to the broader community and without impacts on neighbouring properties or the environment.

Whilst we have lived adjacent to the existing quarry for over 30 years, we have development approval for an industrial subdivision on our property and the DA process involved a long and detailed engagement with Hanson Quarry over a number of years.

This process resulted in a tripartite voluntary planning agreement (VPA) between the neighbours and Port Macquarie Hastings Council. This VPA is attached at "**A**".

Additionally, in the justification of our industrial development, we were required to complete a process where assessment of the existing quarry air quality, noise and fly rock was calculated in detail and the SKM/Terrock report in that regard is attached at "**B**".

As discussed further in this submission the SKM/Terrock report calculated an appropriate buffer for flyrock at 90m and the industrial development along the boundary of the existing pit is deferred until 1 July 2020 as agreed by the parties to the VPA.

That said we are very disappointed with the proposal on exhibition and we are compelled to provide this submission given what we believe is a fundamentally flawed design that adversely affects our property and our development approval already in place.

Additionally, we are quite disappointed with the lack of detailed engagement by Hanson and their consultants and the first time we saw the proposal's detail was when it was put on exhibition.

Given the history as neighbours we would have preferred a more open and engaging process with us, however, Hanson has chosen not to proceed in that manner with regard to this application.

We have no issue with Hanson's local staff, and we try to engage with them as good neighbours should do, however, we feel that at a corporate level Hanson do not act in a positive way for our local community and the local staff are somewhat 'stuck in the middle' in this situation.

Accordingly, we wish to make the following submission on the proposed Hanson Sancrox Quarry expansion SSD No. 7293 documentation:

Volume

The temporary 5-year increase to 455,000 tonnes, essentially for the Pacific Highway upgrade, ended on 14 March 2019.

As such the current approval is for an extraction of 185,000 tonnes per annum and the inference in the documentation that the current approved rate is 455,000 tonnes is disingenuous and inaccurate.

The justification to increase the demand and the output of Sancrox Quarry by 4 times to go to 750,000 tonnes per annum is not clear. If the demand and output is not there, then the scale of the proposal and the need to go to a 24hr operation is not there.

We submit that the scale of the proposal is not justified by the exhibited documentation and there is scant to no analysis of local supply and demand.

Noise

The exhibited noise modelling provided does not provide noise level contour diagrams and it is not clear how noise will be received by neighbouring properties.

We hear the existing crushing plant at our house, but having lived with that for 30 years, we accept that level of noise during the current hours of operation which are during daylight hours.

We could not accept nor be expected to accept the same sort of noise 24 hours a day. This would be an impost on our home and the application does not adequately substantiate how our house might be affected by night-time noise with the proposed development.

With the scale of the excavation proposed and timeframe (30 years) of the development we would have expected a noise/screen bund along the entire boundary with our property and in fact with all neighbouring properties, in order to appropriately to deal with this issue.

Blasting

We are very disappointed that there is no detailed flyrock assessment within the exhibited documentation. There is a comment that the blasting will comply with AS2187-2006 however there is no detail as to how that will occur.

The detailed assessment undertaken by SKM/Terrock for our industrial development application is more pertinent than any of the information contained within the exhibited documentation and that should be an embarrassment to Hanson and their consultants, especially given the proposed scale of the quarry expansion.

We submit that a detailed flyrock assessment for the proposed Sancrox quarry expansion be carried out by Hanson which reflects the detail of the expansion project.

More importantly, the proposal does not provide any flyrock buffers and these must be contained within quarry property. The SKM/Terrock report calculated a 90m buffer for flyrock and accordingly any proposed blasting should be at least 90 metres from the Southern boundary of our property and the proposal should be modified accordingly.

Our property has experienced flyrock in the past (see recent photos attached at "**C**") and that is part of the reason why development along our Southern boundary is deferred in accordance with the VPA. That said, exporting flyrock onto the neighbour's property is in effect a cost shifting onto someone else's property and that is not appropriate nor acceptable to us.

We submit that all buffers for flyrock be contained within the Hanson property. In accordance with the SKM/Terrock report, we submit that any blasting be at least 90m from our property boundary.

Air Quality & Dust

There appears to be no modelling of air quality for the current and proposed quarry and its equipment and the SKM/Terrock report again would be more detailed in this regard.

We experience dust at our home and similar to the noise we experience, we've come to deal with it over the last 30 years.

That said, the existing crushing plant and any new crushing plan could be contained in order to mitigate dust export to neighbouring properties.

We submit that any crushing plant be made to be fully contained in order to mitigate dust.

Hydrology

This is one issue that has caused us a lot of grief over the years. The existing 'sales floor' or area that stores the crushed rock at the quarry has been artificially filled over a number of years.

It is now some 5 metres above existing ground levels and depending on the prevailing weather/rain, we get large volumes of stormwater runoff that goes for days and weeks after large rain events.

The VPA in place has a mechanism to provide for a solution to the issue, however, there has been no detailed engagement by Hanson with respect to this issue and no attempt by their consultants to finalise an agreed outcome as part of this development application. We expected Hanson to engage with us on this issue as part of this application and we submit that this issue be dealt with now.

Attached at "**D**" is a section completed by our consultants King & Campbell showing how the run-off issue has been created over time.

Attached at "**E**" are photos of the stormwater runoff issues on our property. These photos show the water issues despite the recent and prolonged drought conditions we have experienced.

There is vague reference to a 'spring' in the hydrology material exhibited but this is an embarrassing assessment of what is a manmade issue created over a number of years. A site inspection and an explanation as to how this has developed over the years would easily clarify the issue.

We submit that there be engagement with us to resolve an agreed outcome regarding this stormwater issue on our property as part of this DA assessment.

Groundwater

The groundwater modelling figure 8.4 is a real concern.

This indicates significant drawdown on our property (up to 40m from the contours provided) and especially in areas that are to be dedicated to Council as E2 habitat.

What is also a concern is how the groundwater drawdown will affect our residence, dam and orchard.

It might seem like a minor issue in the context of a proposal like this, but we are concerned about how the change in groundwater may affect our property in the longer term.

How is this order of groundwater drawdown justified on neighbouring properties? We do not understand how this extent of groundwater drawdown can be either justified or simply forced onto neighbouring properties? How is this to be offset?

Visual Amenity

The visual assessment is poorly done and the photographs and visibility model provided in the EIS documentation are not a true reflection of the existing quarry operation.

Some of the photos are of vegetation not actually on the quarry property and are put forward as the quarry's screen which is disingenuous.

There is no coordinated assessment of how the quarry and the quarry's new plant will look when already approved development proceeds to the North, East and South of the quarry.

Attached at "**F**" are recent photos taken of the existing quarry operations from our property and from Winery Drive.

There appears to be an expectation with the way the proposal is formulated that a visual screen ought to be provided on neighbouring properties and this is unacceptable to us and ought to be unacceptable to the assessor of the application.

We submit that a decent and permanent visual screen be provided along the whole of the Northern boundary of the quarry so that as our development (as already approved) proceeds and the quarry expansion occurs that the quarry operations are appropriately screened within its own property boundaries.

Social & Economic

There are no developer contributions proposed in the application.

For the industrial development approved under Port Macquarie Hastings DA #2012/305 substantial contributions towards the Sancrox overpass arrangement and local roads were made and the total land and cash contribution was in the order of $4.5M.

For a development of this scale it would be expected to see a substantial contribution to local roads and local road maintenance and this should be assessed by Port Macquarie Hastings Council. For example 750,000 tonnes is approximately 18,750 dog and trailer truck movements per annum if you assume 40 tonnes per truck and trailer movement.

There is limited to no discussion or consideration of the Council's Urban Growth Management Strategy or the future urban investigation area of Fernbank Creek and Sancrox. Quarried rock is important to our local area, however, with a range of quarries in the LGA, protecting the future growth areas is a significant consideration in the assessment of the application and there appears to have been little coordination with Port Macquarie Hastings Council in this regard.

The Ethos Urban 2019 report says: *"The quarry site is remote and rural with no social infrastructure within walking distance of the site that would be affected by the expansion of quarry operations".* The quarry is effectively in the centre of our LGA and our future growth areas and there needs to a balance as to the scale of the proposal and its potential impacts on surrounding properties and their future. Additionally the Ethos report ignores the potential impacts of dust, noise, flyrock, runoff and vibration on the surrounding properties.

We submit that a significant contribution be made to Port Macquarie Hastings Council and that this be negotiated by the Council directly.

Quarry Closure & Rehabilitation

There is a lack of detail about how the quarry will be rehabilitated or for what use the massive hole in the ground will be utilised. As proposed the hole is approximately 500 metres wide, around 1 kilometre long and to a depth of RL-40, it is difficult to see how no rehabilitation plan can be acceptable.

We submit that a final use/rehabilitation plan be provided now.

Property Title Issues

We own Lot 1 DP 1144490. The proposal, in various diagrams/drawings, indicates that the proposed development of the quarry carries over the boundary and onto our land.

This is another indication of the lack of care and detail by the consultants acting for Hanson.

How can a proposal actually suggest that the development occurs on a neighbour's property?

For example see attached at "**G**" is a marked-up Proposed Study Area – Figure 5.1 and a marked up Quarry Staging – Figure 2.3. Both these figures clearly indicate excavation on our property.

This is obviously unacceptable and requires amendment.

Further to the comments made above regarding flyrock, we would expect any excavation is well away from our boundary and approximately 90 metres away unless no blasting is required.

Corridor Plans – SLR Assessment

The connectivity plans or corridor plans (marked-up copies attached at "**H**") created by SLR show a distinct lack of understanding of what is already approved and what is reality on neighbouring properties.

There is no long-term ability for a corridor through the middle of our industrial subdivision. This needs revision.

There is no ability for a corridor on Expressway Spares property and that would be obvious by the approvals in place and what is 'on the ground' at the moment.

There appears to be no coordination with the Greater Sancrox ecological work previously undertaken by Council and the Greater Sancrox work better deals with issues of corridors.

Consultation

As noted at the start of this application, we have been disappointed by the lack of direct and detailed engagement by Hanson with us regarding all of the neighbourly issues raised above.

The documentation and proposal exhibited is so poor in terms of detail, in our view any revised proposal should be made to be put back on exhibition for public consultation and comment.

Current Operations

The quarry has not met existing consent conditions with respect to establishing and maintaining a vegetated screen along its Northern and Eastern boundaries.

None of the existing quarry boundaries have any safety fencing.

The stormwater issue that has been raised by us over a long period of time has been ignored in this application.

The 'exporting' of flyrock risk onto neighbouring properties in the past appears to have been continued with this application. This is patently unacceptable and no approval can allow this.

We will continue to work with the local staff, however, given the history and the nature of this application we have limited confidence in Hanson as an organisation meeting an acceptable standard of development with respect to this proposal.

The scale of the proposal is such that we would have expected that a number of these issues were dealt with up front and we are frankly disappointed to have to lodge a submission of this nature.

Conclusion

We submit that the application is deficient in terms of detail and the scale of the proposal exceeds any local demand and the expansion design and scale has a significant impact on neighbouring properties which must be refused or must be addressed in a revised proposal.

Attached at "I" is a series of plan and sections indicating the issues of flyrock buffer and screen and how we suggest they be addressed.

We recommend a site visit by Department of Planning staff to clearly understand the issues we have raised. We can be contacted at casunn@bigpond.net.au if need be.

Yours Sincerely,

11/12/19

Jim Dunn for and on behalf of
J.J. & C.B. Dunn

"A"

lindsaytaylorlawyers

planning • environment • local government

Sancrox Employment Land & Quarry

Planning Agreement

Under s93F of the *Environmental Planning and Assessment Act 1979*

Port Macquarie-Hastings Council

James John Dunn and Catherine Brigette Dunn (as trustees for the JJ & CB Dunn Superannuation Fund)

Expressway Spares Pty Ltd

Hanson Construction Materials Pty Limited

15 April 2014

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Sancrox Employment Land & Quarry Planning Agreement

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Sancrox Employment Land & Quarry

Planning Agreement

Summary Sheet

Council:

Name: Port Macquarie-Hastings Council

Address: Cnr Lord & Burrawan Streets PORT MACQUARIE NSW 2444

Telephone: (02) 6581 8111

Facsimile: (02) 6581 8123

Email: council@pmhc.nsw.gov.au

Representative: Peter Cameron

Landowner:

Name: Expressway Spares Pty Ltd

Address: Private Bag 7, WAUCHOPE NSW 2446

Telephone: (02) 6586 2506

Facsimile: (02) 6585 1969

Email: patrick.cassegrain@expressway.com.au

Representative: Patrick Cassegrain

Name: James John Dunn and Catherine Brigette Dunn (as trustees for the JJ & CB Dunn Superannuation Fund)

Address: 181 Sancrox Road, WAUCHOPE NSW 2446

Telephone: (02) 6586 9369

Facsimile: (02) 6586 9368

Email: jamesdunn@minedor.com.au

Representative: James Dunn

Hanson

Name: Hanson Construction Materials Pty Limited

Address: Level 5, 75 George Street, Parramatta, NSW, 2150

Telephone: (02) 9354 2600

Facsimile: (02) 9354 2619

Email: ian.petrovski@hanson.com.au

Representative: Ian Petrovski

Land:

See definition of *Land* in clause 1.1.

Development:

See definition of *Development* and *Industrial Subdivision* in clause 1.1.

Development Contributions:

See Part 2.

Security:

See clause 19.

Registration:

See clause 23.

Dispute Resolution:

See clauses 21 and 22.

Sancrox Employment Land & Quarry

Planning Agreement

Under s93F of the *Environmental Planning and Assessment Act 1979*

Parties

Port Macquarie-Hastings Council ABN 11 236 901 601 of Cnr Lord and Burrawan Streets, Port Macquarie NSW 2444 **(Council)**

and

James John Dunn and Catherine Brigette Dunn as trustees for the JJ & CB Dunn Superannuation Fund of 181 Sancrox Road, Wauchope New South Wales 2446 **(Dunn Family)**

and

Expressway Spares Pty Ltd ABN 55 000 483 107 of Private Bag 7, Wauchope New South Wales 2446 **(Expressway Spares)**

and

Hanson Construction Materials Pty Limited ABN 90 009 679 734 of Level 5, 75 George Street, Parramatta, New South Wales 2150 **(Hanson)**

Background

A Expressway Spares owns the Expressway Spares Land and the Dunn Family owns the Dunn Land.

B The Expressway Spares Land and the Dunn Land adjoin the Quarry Land.

C Hanson owns the Quarry Land and uses it for the purposes of the Quarry.

D Expressway Spares and the Dunn Family sought the making of the LEP, and the LEP has been made and has taken effect.

E In order to facilitate the ongoing operations of the Quarry, and the development of the Expressway Spares Land and the Dunn Land for industrial purposes, the parties have agreed to enter into this Agreement, and to make Development Contributions in accordance with this Agreement.

Operative provisions

Part 1 - Preliminary

1 Definitions & Interpretation

1.1 In this Agreement the following definitions apply:

Access Road Land means the part of the Quarry Land identified as '*Area to be acquired*' on the plan contained in Schedule 1.

Act means the *Environmental Planning and Assessment Act 1979* (NSW).

Agreement means this Agreement and includes any schedules, annexures and appendices to this Agreement.

Approval includes approval, consent (including Development Consent), licence, permission or the like.

Burdened Lots means the proposed lots 6-11 inclusive, 40-44 inclusive and 72 shown on the Industrial Subdivision Plan.

Claim includes a claim, demand, remedy, suit, injury, damage, loss, Cost, liability, action, proceeding or right of action.

Compatible Development means the following types of Development, or any other types of Development agreed to by Council:

(a) subdivision,

(b) earthworks,

(c) stockpiling of materials,

(d) Subdivision Work.

Dedicate means dedicate free of any cost to the Council unless this Agreement expressly provides to the contrary.

Development has the same meaning as in the Act.

Development Application has the same meaning as in the Act.

Development Consent has the same meaning as in the Act.

Development Contribution means a monetary contribution, the dedication of land free of cost, the carrying out of work, or the provision of any other material public benefit, or any combination of them, to be used for, or applied towards, the provision of Public Infrastructure or another public purpose.

Dunn Land means Lot 1 in Deposited Plan 124543.

Expressway Spares Land means Lot 2 in Deposited Plan 222740.

GST has the same meaning as in the GST Law.

GST Law has the same meaning as in *A New Tax System (Goods and Services Tax) Act 1999* (Cth) and any other Act or regulation relating to the imposition or administration of the GST.

Hanson Driveway Land means the land shaded in green on the plan contained in Schedule 5.

Industrial Subdivision means subdivision of the Dunn Land and the Expressway Spares Land in accordance with the Development Consent granted to the Industrial Subdivision DA on 10 April 2013 as modified from time to time.

Industrial Subdivision DA means being DA 2012/305 lodged with the Council by the Landowner on 6 July 2012 as amended.

Industrial Subdivision Plan means the plan contained in Schedule 2 to this Agreement.

Just Terms Act means the *Land Acquisition (Just Terms Compensation) Act 1991*.

Land means the Expressway Spares Land, the Dunn Land and the Quarry Land.

Landowner means Expressway Spares and the Dunn Family except as otherwise specifically provided by this Agreement.

Party means a party to this agreement, including their successors and assigns.

Quarry means the extractive industry operated on the Quarry Land by Hanson pursuant to the Quarry Consent.

Quarry Consent means the Development Consents granted to DA1995/0193 and DA 2004/0609 as modified from time to time and any other Development Consent granted from time to time that replaces that consent or enables the expansion of the Quarry.

Quarry Land Road and Infrastructure Work means road and infrastructure work on the Quarry Land and Expressway Spares Land, including the construction of an intersection providing direct access to the Quarry Land as shown on the RMS Plan.

Quarry Land means Lot 1 in Deposited Plan 704890, Lot 1 in Deposited Plan 720807 and Lot 353 in Deposited Plan 754434.

Regulation means the *Environmental Planning and Assessment Regulation 2000*.

RMS means Roads and Maritime Services constituted under the *Transport Administration Act 1988*.

RMS Plan means the plan contained in Schedule 3.

Sancrox Employment Land Road Construction Planning Agreement means the planning agreement with the same name entered into between the Council and the Landowner under s93F of the Act dated 15 July 2011, as amended and includes any planning agreement that replaces that agreement.

Sancrox LEP means the *Port Macquarie-Hastings Local Environmental Plan 2011 (Amendment No. 3).*

Standard means *Australian Standard AS2187.2-2006 – Explosives –Storage and Use – Part 2 – Use of Explosives.*

Subdivision Work has the same meaning as in the Act.

1.2 In the interpretation of this Agreement, the following provisions apply unless the context otherwise requires:

1.2.1 Headings are inserted for convenience only and do not affect the interpretation of this Agreement.

1.2.2 A reference in this Agreement to a business day means a day other than a Saturday or Sunday on which banks are open for business generally in Sydney.

1.2.3 If the day on which any act, matter or thing is to be done under this Agreement is not a business day, the act, matter or thing must be done on the next business day.

1.2.4 A reference in this Agreement to dollars or $ means Australian dollars and all amounts payable under this Agreement are payable in Australian dollars.

1.2.5 A reference in this Agreement to a $ value relating to a Development Contribution is a reference to the value exclusive of GST.

1.2.6 A reference in this Agreement to any law, legislation or legislative provision includes any statutory modification, amendment or re-enactment, and any subordinate legislation or regulations issued under that legislation or legislative provision.

1.2.7 A reference in this Agreement to any agreement, deed or document is to that agreement, deed or document as amended, novated, supplemented or replaced.

1.2.8 A reference to a clause, part, schedule or attachment is a reference to a clause, part, schedule or attachment of or to this Agreement.

1.2.9 An expression importing a natural person includes any company, trust, partnership, joint venture, association, body corporate or governmental agency.

1.2.10 Where a word or phrase is given a defined meaning, another part of speech or other grammatical form in respect of that word or phrase has a corresponding meaning.

1.2.11 A word which denotes the singular denotes the plural, a word which denotes the plural denotes the singular, and a reference to any gender denotes the other genders.

1.2.12 References to the word 'include' or 'including' are to be construed without limitation.

1.2.13 A reference to this Agreement includes the agreement recorded in this Agreement.

1.2.14 A reference to a party to this Agreement includes a reference to the servants, agents and contractors of the party, and the party's successors and assigns and executors, and in the case of a trustee, includes the trustee or trustees from time to time.

1.2.15 Any schedules, appendices and attachments form part of this Agreement.

1.2.16 Notes appearing in this Agreement are operative provisions of this Agreement.

2 Application & Commencement of this Agreement

2.1 This Agreement applies to the Land and the Industrial Subdivision.

3 Further Agreements Relating to this Agreement

3.1 The Parties may, at any time and from time to time enter into agreements relating to the subject-matter of this Agreement that are not inconsistent with this Agreement for the purpose of implementing this Agreement.

4 Application of s94, s94A and s94EF of the Act

4.1 This Agreement does not exclude the application of s94 or s94EFof the Act to the Industrial Subdivision or to any other Development.

4.2 This Agreement excludes the application of s94A of the Act to the Industrial Subdivision or to any other Development to the extent provided for in the Sancrox Employment Land Road Construction Planning Agreement.

4.3 Benefits under this Agreement are not be taken into consideration when determining a Development Contribution under s94 of the Act in relation to any Development, unless otherwise provided in this Agreement

5 Dunn Family Warranty

5.1 The Dunn Family discloses to the Parties that it is the trustee for *JJ & CB Dunn Superannuation Fund* and, in that capacity, warrants to the Parties that:

5.1.1 it has full capacity to enter into this Agreement, and

5.1.2 is able to fully comply with its obligations under this Agreement and is under no restriction or limitation in relation to the performance of its obligations by reason of its appointment as trustee for that trust.

Part 2 – Development Contributions, Restrictions and Other Works

6 Dedication of Access Road Land

6.1 Hanson, if required by the RMS, is to Dedicate the Access Road Land to the RMS or as directed by the RMS, in accordance with any relevant arrangements agreed between Hanson and the RMS.

6.2 If at any time after completion of the Quarry Land Road and Infrastructure Work the RMS notifies the Council in writing that it will not require Hanson to dedicate the Access Road Land, the Council may notify Hanson in writing that the Access Road Land is to be dedicated to the Council by such reasonable time as is specified in the notice and Hanson is to strictly comply with the notice.

6.3 To the extent permitted by law, the Council is to have regard to the dedication of the Access Road Land by Hanson in accordance with this clause 6 for the purpose of determining Development Contributions that Hanson may be required to make under s94 of the Act or a planning agreement under s93F of the Act in relation to future development on the Quarry Land or any land acquired by Hanson for the purposes of expanding the Quarry.

7 Transfer of Hanson Driveway Land

7.1 Expressway Spares is to transfer to Hanson, for nominal consideration ($1) to Hanson, the Hanson Driveway Land not later than 60 days after the commencement of the Quarry Land Road and Infrastructure Work or at such later time as is agreed to by Hanson acting reasonably.

7.2 The Hanson Driveway Land is transferred for the purposes of this Agreement when a deposited plan, transfer or other instrument in registrable form is lodged for registration at Land and Property Information that is effective to transfer the title to that land to Hanson when registered.

8 Temporary Access Arrangements to Quarry

8.1 Expressway Spares is to make land available to the RMS for the purpose of the construction by the RMS of the temporary access road shown hatched in grey and marked 'B' in the plan contained in Schedule 4.

9 Location of Services to the Quarry

9.1 If the carrying out of the Quarry Land Road and Infrastructure Work results in a need to modify or relocate any existing services to the Quarry, the

Landowner will bear the costs of relocating those services to an equivalent standard.

9.2 For the purposes of clause 9.1 *existing services* includes, without limitation, potable water supply, telecommunications and electricity supply.

10 Quarry Land Road and Infrastructure Work

10.1 For the purpose of enabling the RMS to carry out the Quarry Land Road and Infrastructure Work, Hanson is to give the RMS access to the Access Road Land in accordance with the lease between Hanson and the RMS relating to the Access Road Land entered into on or around 13 June 2013.

10.2 The Landowner is not to make, or cause, suffer or permit the making of, any request to RMS or the Council to change the design or specification of the part of the Quarry Land Road and Infrastructure Work:

10.2.1 without the written consent of Hanson, which is not to be unreasonably withheld, and

10.2.2 unless the changes are in accordance with the requirements of any such consent.

10.3 Nothing in this Agreement requires Hanson to bear any costs of the Quarry Land Road and Infrastructure Work except as specifically provided by this Agreement.

10.4 Hanson is to bear the costs of any Work required to be carried out by Hanson in connection with the Quarry Land Road and Infrastructure Work and agreed to by RMS and the Council that would not otherwise have been required to be carried out by RMS or the Council.

10.5 The Landowner is to bear the costs of any Work required to be carried out by them in connection with the Quarry Land Road and Infrastructure Work and agreed to by RMS and the Council that would not otherwise have been required to be carried out by RMS or the Council.

11 Procedures relating to the dedication of land

11.1 Land is dedicated for the purposes of this Agreement when:

11.1.1 a deposited plan is registered in the register of plans held at the Land and Property Information that dedicates land as a public road (including a temporary public road) under the *Roads Act 1993* or creates a public reserve or drainage reserve under the *Local Government Act 1993*, or

11.1.2 the RMS or Council, as the case requires, is given an instrument in registrable form under the *Real Property Act 1900* that is effective to transfer the title to the land to the RMS or Council when registered.

11.2 For the purposes of clause 11.1.2:

11.2.1 Hanson is to give the RMS or Council, as the case requires, for execution by the RMS or Council as transferee, an instrument of transfer under the *Real Property Act 1900* relating to the land to be dedicated, and

11.2.2 the RMS or Council, as the case requires is to execute the instrument of transfer and return it to Hanson within 14 days of receiving it from the Landowner,

11.2.3 Hanson is to lodge the instrument of transfer for registration at the Land and Property Information within 14 days of receiving it from the RMS or Council duly executed,

11.2.4 Hanson and the Council are to do all things reasonably necessary to enable registration of the instrument of transfer to occur.

12 Restriction on subdivision of the Land

12.1 The Landowner is not to make, or cause, suffer or permit the making of, a Development Application or any other application for Approval to create the Burdened Lots if the application creates a road that is contiguous with any part of the boundary of the Quarry Land.

12.2 Nothing in clause 12.1 affects the creation of the temporary access road referred to in clause 8.

13 Restrictions on development of the Burdened Lots

13.1 The Landowner is not to make, or cause, suffer or permit the making of, a Development Application or any other application for Approval to carry out, or carry out, Development comprising the erection of buildings on the Burdened Lots unless those buildings:

13.1.1 will be located 10 metres or more from the common boundary with the Quarry Land, or

13.1.2 in the case of:

(a) the Burdened Lots comprising proposed lots 6-11, the buildings will incorporate noise attenuation measures which comply with the NSW Industrial Noise Policy requirements for industrial receivers,

(b) the Burdened Lots comprising proposed lots 40-44, the Landowner has obtained Hanson's consent for the erection of the buildings.

13.2 Nothing in this clause 13 affects the continued operation of the existing mobile phone tower on proposed lot 72 shown on the Industrial Subdivision Plan.

14 Restriction on development of Dunn Land

14.1 The Dunn Family is not to make or cause, suffer or permit the making of a Development Application or any other application for Approval to carry out, or carry out, Development other than Compatible Development on proposed lots 40, 41, 42, 43, and 44 shown on the Industrial Subdivision Plan (**Exclusion Lots**) until 1 July 2020.

14.2 The Parties acknowledge that clause 14.1 is an agreement between the Dunn Family and Hanson and does not bind Council or affect Council's exercise of its regulatory functions.

15 Creation of Vegetated Buffer Areas

15.1 Expressway Spares and Hanson will each, on their own land, create and maintain a vegetated buffer area having a minimum width of 1 metre along the common boundary of the Quarry Land and the Expressway Spares Land, and will jointly erect a secure fence along that boundary.

15.2 The secure fence required to be erected under clause 15.1 is to be designed and constructed to prevent people from passing between the Expressway Spares Land and the Quarry Land across the common boundary where the fence is located.

15.3 The vegetated buffer area is to be vegetated in a manner agreed between Hanson and Expressway Spares, provided that the area of the buffer and the plantings within the buffer are to be the same on both the Expressway Spares Land and the Quarry Land.

15.4 Expressway Spares and Hanson will bear the costs of establishing and maintaining the vegetated buffer area referred to in clause 15.1 on their land, and will jointly bear the costs of the erection and maintenance of the fence referred to in that clause.

15.5 Subject to clause 15.6, the obligations imposed by clause 15.1 may be staged in accordance with any staging of the Industrial Subdivision on the Expressway Spares Land.

15.6 The obligations imposed by clause 15.1, are not required to be performed until after:

15.6.1 the temporary access road referred to in clause 8.1 is removed, or

15.6.2 Hanson notifies Expressway Spares that that road is no longer required.

15.7 Hanson and the Dunn Family agree to the creation of a vegetated buffer area and erection of a secure fence along the common boundary of the Dunn Land and the Quarry Land on the same terms as are contained in clauses 15.1-15.6, with references to Expressway Spares replaced with references to the Dunn Family, and references to the Expressway Spares Land being replaced with references to the Dunn Land.

16 Easements for Drainage

16.1 In the event that Hanson needs to drain stormwater from the Quarry Land across either the Expressway Spares Land, the Dunn Land or both (**Affected Land**), then Expressway Spares or the Dunn Family or both, as the case may be, agree to allow Hanson to do so on the following terms and conditions:

16.1.1 subject to the terms of any Development Consent or other Approval, any works required to drain stormwater will comply with the provisions of *AUS-SPEC # 1 Development Design Specification Series and Development Construction Specification Series* in relation to attenuation of the stormwater discharge and removal of sediments and nutrients from the discharge;

16.1.2 Hanson must register an '*Easement to Drain Water*', on terms generally in accordance with those contained in Part 3 of Schedule 8 of the *Conveyancing Act 1919* burdening the Affected Land and benefitting the Quarry Land ("**Easement**"), provided that the part of the Affected Land subject to the easement is to be agreed by the Landowner of the Affected Land, acting reasonably having regard to the Industrial Subdivision on the Affected Land;

16.1.3 Expressway Spares or the Dunn Family or both, as the case may be, must execute the required instrument in registrable form under the *Real Property Act 1900* that is effective to register the Easement, and Expressway Spares or the Dunn Family or both, as the case may be, must return the required executed instrument to Hanson within 14 days of receiving it from Hanson, together with the applicable Certificate of Title;

16.1.4 Expressway Spares or the Dunn Family or both, as the case may be, must do all things reasonably necessary to enable registration of the Easement;

16.1.5 Hanson must meet all costs associated with any works required to be carried out to facilitate the drainage of the stormwater across the Affected Land, including any pipes and any connections to any existing or proposed infrastructure within the Affected Land; and

16.1.6 Hanson must attenuate the flow of stormwater discharge from the Quarry Land such that the amount discharged onto the Affected Land does not exceed the amount of stormwater that would have naturally discharged onto the Affected Land prior to the development of the Quarry.

16.2 The Landowner of the Affected Land must ensure that any stormwater infrastructure constructed on the Affected Land as part of the Industrial Subdivision is designed in such a way as to enable Hanson to connect to that infrastructure pursuant to this clause 16.

16.3 Hanson and the Landowner agree to use their reasonable endeavours to co-ordinate the construction of infrastructure for stormwater drainage on the Land, including in respect of the timing of the construction of such works and the contractor engaged to carry out any such works.

17 Restrictions on Objections

17.1 Hanson will not object to the Industrial Subdivision DA.

17.2 The Landowner may only object to an application by Hanson for an Approval to increase the rate of production of the Quarry if:

17.2.1 the application seeks to change the requirements of the Quarry Consent regarding noise, ground vibration and overpressure in relation to industrial receivers; and

17.2.2 the application is inconsistent with this Agreement.

17.3 If Hanson acquires Lot 2 in DP 574308, the Landowner will not object to any application for Approval to extend the Quarry onto that property, provided that the grant and implementation of such an Approval would not cause Hanson to breach this Agreement or the Standard.

18 Termination of Restrictions

18.1 Clauses 12 to 15 and 17 do not apply upon the sooner of the following occurring:

18.1.1 subject to clause 18.2, the Quarry not operating for a continuous period of more than 2 years,

18.1.2 development for a purpose other than the Quarry being commenced on the Quarry Land,

18.1.3 the Quarry Consent being surrendered in accordance with the Regulation.

18.2 For the purposes of clause 18.1.1:

18.2.1 clauses 12 to 15 and 17 continue to apply unless and until the Landowner obtains Council's written consent that those clauses do not apply, such consent being able to be given or withheld in the Council's absolute discretion, and

18.2.2 the Council is to consult Hanson in relation to any application by the Landowner for the Council's written consent before giving or withholding its consent.

Part 3 – Enforcement and Dispute Resolution

19 Acquisition of land required to be dedicated

19.1 If a Party does not dedicate land required to be dedicated under this Agreement at the time at which it is required to be dedicated, the Party consents to the Council compulsorily acquiring the land for compensation in

the amount of $1 without having to follow the pre-acquisition procedure under the Just Terms Act.

19.2 The Council is to only acquire land pursuant to clause 19.1 if it considers it reasonable to do so having regard to the circumstances surrounding the inability or failure by the Party to dedicate the land required to be dedicated under this Agreement.

19.3 Clause 19.1 constitutes an agreement for the purposes of s30 of the Just Terms Act.

19.4 If, as a result of the acquisition referred to in clause 19.1, the Council is required to pay compensation to any person other than the Party from whom the land is acquired, that Party is to reimburse the Council that amount, upon a written request being made by the Council.

19.5 The Party from whom the land is acquired indemnifies and keeps indemnified the Council against all Claims made against the Council as a result of any acquisition by the Council of the whole or any part of the land concerned except if, and to the extent that, the Claim arises because of the Council's negligence or default.

19.6 The Party from whom the land is acquired is to promptly do all things necessary, and consents to the Council doing all things necessary, to give effect to this clause 19, including without limitation:

19.6.1 signing any documents or forms,

19.6.2 giving land owner's consent for lodgement of any Development Application,

19.6.3 producing certificates of title to the Registrar-General under the *Real Property Act 1900*, and

19.6.4 paying the Council's costs arising under this clause 19.

20 Enforcement in a court of competent jurisdiction

20.1 Without limiting any other provision of this Agreement, each of the Parties may, either jointly or individually, enforce this Agreement in any court of competent jurisdiction.

20.2 For the avoidance of doubt, nothing in this Agreement prevents:

20.2.1 a Party from bringing proceedings in the Land and Environment Court to enforce any aspect of this Agreement or any matter to which this Agreement relates,

20.2.2 the Council from exercising any function under the Act or any other Act or law relating to the enforcement of any aspect of this Agreement or any matter to which this Agreement relates.

21 Dispute resolution – expert determination

21.1 This clause applies to a Dispute between any of the Parties to this Deed concerning a matter arising in connection with this Deed that can be determined by an appropriately qualified expert if:

21.1.1 the Parties to the Dispute agree that it can be so determined, or

21.1.2 the Chief Executive Officer of the professional body that represents persons who appear to have the relevant expertise to determine the Dispute gives a written opinion that the Dispute can be determined by a member of that body.

21.2 A Dispute to which this clause applies is taken to arise if one Party gives another Party a notice in writing specifying particulars of the Dispute.

21.3 If a notice is given under clause 21.2, the Parties are to meet within 14 days of the notice in an attempt to resolve the Dispute.

21.4 If the Dispute is not resolved within a further 28 days, the Dispute is to be referred to the President of the NSW Law Society to appoint an expert for expert determination.

21.5 The expert determination is binding on the Parties except in the case of fraud or misfeasance by the expert.

21.6 Each Party is to bear its own costs arising from or in connection with the appointment of the expert and the expert determination.

21.7 The Parties are to share equally the costs of the President, the expert, and the expert determination.

22 Dispute Resolution - mediation

22.1 This clause applies to any Dispute arising in connection with this Deed other than a Dispute to which clause 21 applies.

22.2 Such a dispute is taken to arise under this Agreement if one Party gives another Party a notice in writing specifying particulars of the dispute.

22.3 If a notice is given under clause 22.2, all of the Parties are to meet within 14 days of the notice in an attempt to resolve the dispute.

22.4 If the dispute is not resolved within a further 28 days, all of the Parties must mediate the dispute in accordance with the Mediation Rules of the Law Society of New South Wales published from time to time and must jointly request the President of the Law Society, or the President's nominee, to select a mediator.

22.5 If the dispute is not resolved by mediation within a further 28 days, or such longer period as may be necessary to allow any mediation process which has been commenced to be completed, then each of the Parties may, either jointly or individually, exercise their legal rights in relation to the dispute, including by the commencement of legal proceedings in a court of competent jurisdiction in New South Wales.

Part 4 – Other Provisions

23 Registration of this Agreement

23.1 The Parties agree to register this Agreement on the Land subject to obtaining the agreement of the persons specified in s93H(1) of the Act to registration.

23.2 The Landowner and Hanson are to use their reasonable endeavours to obtain the consent of the persons specified in s93H(1) of the Act to registration of this Agreement.

23.3 If the agreement of the persons specified in s93H(1) of the Act to registration of this Agreement is obtained, the Parties are to do such things as are reasonably necessary to enable registration to occur.

23.4 The Council is to provide the Landowner and Hanson with an instrument in registrable form (except for necessary executions) requesting registration of this Agreement on the title to the Land.

23.5 Within 40 business days of the date of Council providing the instrument referred to in clause 23.4, the Landowner and Hanson are to provide the Council with the following documents to enable registration of this Agreement:

23.5.1 the instrument duly executed by the Landowner or Hanson as the case may be, and any other person whose execution is required, and

23.5.2 the written irrevocable consent of each person referred to in s93H(1) of the Act to that registration.

23.6 The Parties are to do such things as are reasonably necessary to remove any notation relating to this Agreement from the title to the Land:

23.6.1 in so far as the part of the Land concerned is a lot created in the Industrial Subdivision that the Council reasonably considers is intended for separate occupation and disposition,

23.6.2 in relation to any other part of the Land, once the Landowner or Hanson, as the case may be, has completed its obligations under this Agreement to the reasonable satisfaction of the Council or this Agreement is terminated or otherwise comes to an end for any reason whatsoever.

23.7 The Landowner and Hanson are to pay to the Council the Council's costs incurred pursuant to this clause within 7 days of a written demand by the Council for such payment.

24 Restriction on dealings

24.1 A Party is not to:

24.1.1 sell or transfer the Land or any part, or

24.1.2 assign its rights or obligations under this Deed, or novate this Deed,

to any person unless:

24.1.3 the Party has, at no cost to the Council, first procured the execution by the person to whom the Land or part is to be sold or transferred or the Party's rights or obligations under this Deed are to be assigned or novated, of a deed in favour of the Council on terms reasonably satisfactory to the Council, and

24.1.4 where relevant, the deed referred to in clause 24.1.3 is to incorporate the terms of this Agreement, and

24.1.5 the Council has given written notice to the Developer stating that it reasonably considers that the purchaser, transferee, assignee or novatee, is reasonably capable of performing its obligations under this Deed, and

24.1.6 the Party is not in breach of this Deed, and

24.1.7 the Council otherwise consents to the transfer, assignment or novation, such consent not to be unreasonably withheld.

24.2 Clause 24.1 does not apply in relation to any sale or transfer of the Land, or any part, if this Deed is registered on the title to that Land at the time of the sale or transfer.

25 Notices

25.1 Any notice, consent, information, application or request that must or may be given or made to a Party under this Agreement is only given or made if it is in writing and sent in one of the following ways:

25.1.1 delivered or posted to that Party at its address set out in the Summary Sheet,

25.1.2 faxed to that Party at its fax number set out in the Summary Sheet, or

25.1.3 emailed to that Party at its email address set out in the Summary Sheet.

25.2 If a Party gives another Party 3 business days notice of a change of its address or fax number or email address, any notice, consent, information, application or request is only given or made by that other Party if it is delivered, posted, faxed or emailed to the latest address or fax number.

25.3 Any notice, consent, information, application or request is to be treated as given or made if it is:

25.3.1 delivered, when it is left at the relevant address,

25.3.2 sent by post, 2 business days after it is posted,

25.3.3 sent by fax, as soon as the sender receives from the sender's fax machine a report of an error free transmission to the correct fax number, or

25.3.4 sent by email and the sender does not receive a delivery failure message from the sender's internet service provider within a period of 24 hours of the email being sent.

25.4 If any notice, consent, information, application or request is delivered, or an error free transmission report in relation to it is received, on a day that is not a business day, or if on a business day, after 5pm on that day in the place of the Party to whom it is sent, it is to be treated as having been given or made at the beginning of the next business day.

26 Costs

26.1 Expressway Spares and Dunn Family are each to pay $5,000.00 and Hanson is to pay $10,000.00 to the Council for the Council's costs of preparing, negotiating, executing and stamping this Agreement, and any document related to this Agreement within 7 days of a written demand by the Council for such payment.

26.2 If the Council incurs any costs in enforcing this Agreement against a Party, that Party is to pay to the Council its costs of enforcing this Agreement within 21 days of a written demand by the Council for such payment.

27 Entire Agreement

27.1 This Agreement contains everything to which the Parties have agreed in relation to the matters it deals with.

27.2 No Party can rely on an earlier document, or anything said or done by another Party, or by a director, officer, agent or employee of that Party, before this Agreement was executed, except as permitted by law.

28 Further Acts

28.1 Each Party must promptly execute all documents and do all things that another Party from time to time reasonably requests to effect, perfect or complete this Agreement and all transactions incidental to it.

29 Governing Law and Jurisdiction

29.1 This Agreement is governed by the law of New South Wales.

29.2 Each of the Parties submit to the non-exclusive jurisdiction of its courts and courts of appeal from them.

29.3 Each of the Parties are not to object to the exercise of jurisdiction by those courts on any basis.

30 No Fetter

30.1 Nothing in this Agreement shall be construed as requiring Council to do anything that would cause it to be in breach of any of its obligations at law, and without limitation, nothing shall be construed as limiting or fettering in any way the exercise of any statutory discretion or duty.

31 Representations and Warranties

31.1 Each of the Parties represent and warrant that they, jointly and individually, have power to enter into this Agreement and comply with their obligations under the Agreement and that their entry into this Agreement will not result in the breach of any law.

32 Joint and Individual Liability and Benefits

32.1 Except as otherwise set out in this Agreement:

32.1.1 any agreement, covenant, representation or warranty under this Agreement by 2 or more persons binds them jointly and each of them individually, and

32.1.2 any benefit in favour of 2 or more persons is for the benefit of them jointly and each of them individually.

33 Severability

33.1 If a clause or part of a clause of this Agreement can be read in a way that makes it illegal, unenforceable or invalid, but can also be read in a way that makes it legal, enforceable and valid, it must be read in the latter way.

33.2 If any clause or part of a clause is illegal, unenforceable or invalid, that clause or part is to be treated as removed from this Agreement, but the rest of this Agreement is not affected.

34 Modification

34.1 No modification of this Agreement will be of any force or effect unless it is in writing and signed by all the Parties to this Agreement.

35 Waiver

35.1 The fact that a Party fails to do, or delays in doing, something it is entitled to do under this Agreement, does not amount to a waiver of any obligation of, or breach of obligation by, another Party.

35.2 A waiver by a Party is only effective if it is in writing.

35.3 A written waiver by a Party is only effective in relation to the particular obligation or breach in respect of which it is given. It is not to be taken as an implied waiver of any other obligation or breach or as an implied waiver of that obligation or breach in relation to any other occasion.

36 GST

36.1 In this clause:

Adjustment Note, **Consideration**, **GST**, **GST Group, Margin Scheme**, **Money, Supply** and **Tax Invoice** have the meaning given by the GST Law.

GST Amount means in relation to a Taxable Supply the amount of GST payable in respect of the Taxable Supply.

GST Law has the meaning given by the *A New Tax System (Goods and Services Tax) Act 1999* (Cth).

Input Tax Credit has the meaning given by the GST Law and a reference to an Input Tax Credit entitlement of a party includes an Input Tax Credit for an acquisition made by that party but to which another member of the same GST Group is entitled under the GST Law.

Taxable Supply has the meaning given by the GST Law excluding (except where expressly agreed otherwise) a supply in respect of which the supplier chooses to apply the Margin Scheme in working out the amount of GST on that supply.

36.2 Subject to clause 36.4, if GST is payable on a Taxable Supply made under, by reference to or in connection with this Agreement, the Party providing the Consideration for that Taxable Supply must also pay the GST Amount as additional Consideration.

36.3 Clause 36.2 does not apply to the extent that the Consideration for the Taxable Supply is expressly stated in this Agreement to be GST inclusive.

36.4 No additional amount shall be payable by the Council under clause 36.2 unless, and only to the extent that, the Council (acting reasonably and in accordance with the GST Law) determines that it is entitled to an Input Tax Credit for its acquisition of the Taxable Supply giving rise to the liability to pay GST.

36.5 If there are Supplies for Consideration which is not Consideration expressed as an amount of Money under this Agreement by one Party to the other Party that are not subject to Division 82 of the *A New Tax System (Goods and Services Tax) Act 1999*, the Parties agree:

36.5.1 to negotiate in good faith to agree the GST inclusive market value of those Supplies prior to issuing Tax Invoices in respect of those Supplies;

36.5.2 that any amounts payable by the Parties in accordance with clause 36.2 (as limited by clause 36.4) to each other in respect of those

Supplies will be set off against each other to the extent that they are equivalent in amount.

36.6 No payment of any amount pursuant to this clause 36, and no payment of the GST Amount where the Consideration for the Taxable Supply is expressly agreed to be GST inclusive, is required until the supplier has provided a Tax Invoice or Adjustment Note as the case may be to the recipient.

36.7 Any reference in the calculation of Consideration or of any indemnity, reimbursement or similar amount to a cost, expense or other liability incurred by a party, must exclude the amount of any Input Tax Credit entitlement of that party in relation to the relevant cost, expense or other liability.

36.8 This clause continues to apply after expiration or termination of this Agreement.

37 Explanatory Note Relating to this Agreement

37.1 The Appendix contains the Explanatory Note relating to this Agreement required by clause 25E of the Regulation.

37.2 Pursuant to clause 25E(7) of the Regulation, each of the Parties agree that the Explanatory Note in the Appendix is not to be used to assist in construing this Planning Agreement.

Schedule 1

(Clause 1.1)

Access Road Land

Plan on the next page.

Breakdown by property

Property Description	Total area ha	Total area of acquisition m²	Total residual area ha
Lot 1 DP704890	1.304	3175	0.9865
Lot 353 DP754434	23.77	0.00	23.77
Lot 1 DP720807	0.9875	0.00	0.9875
TOTAL	26.06	3175	25.744

Schedule of coordinates and distance around acquisition area

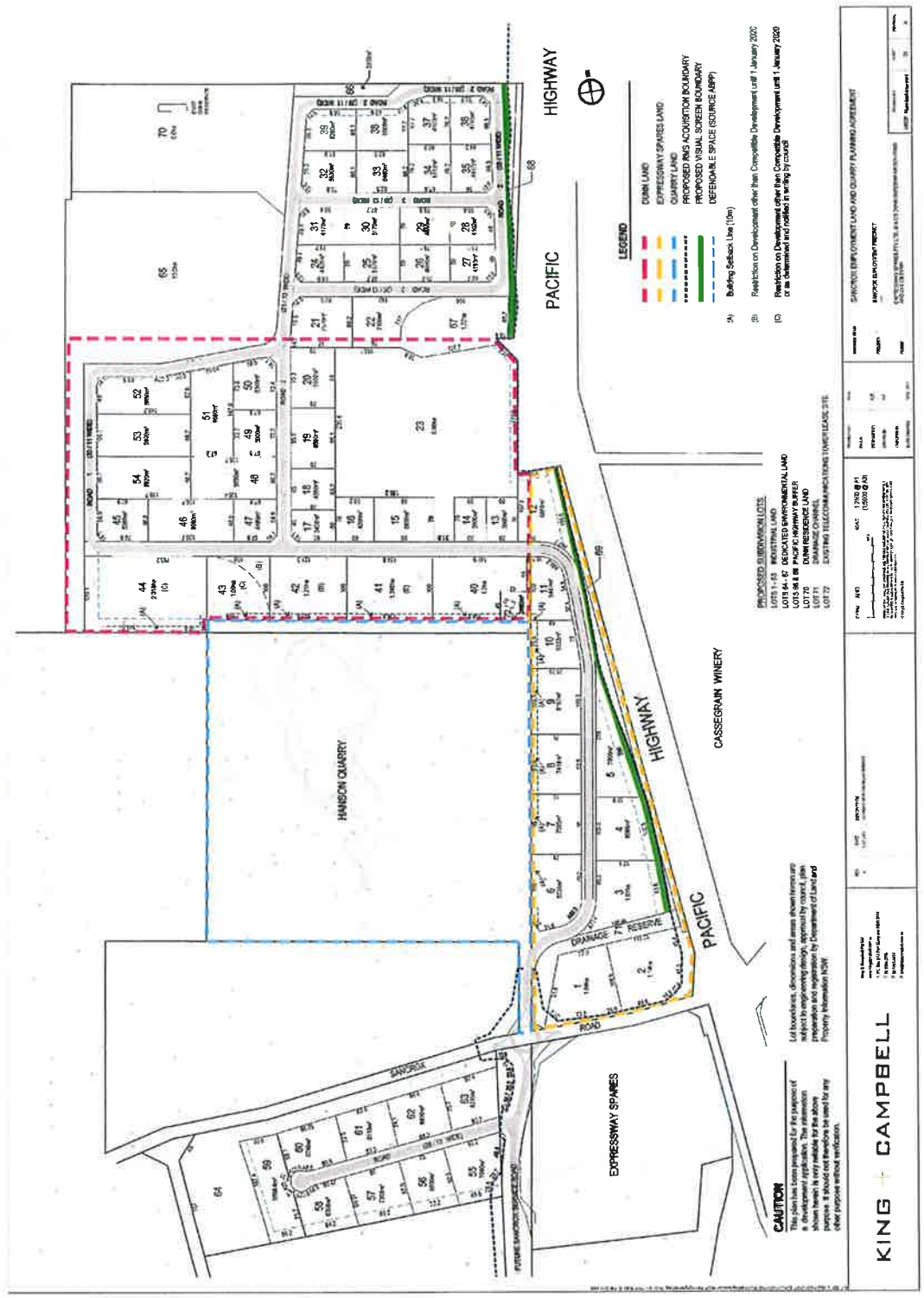
Point No.	Easting	Northing	Line No.	Distance (m)
P1	482938.7	6521699.8	L1	159.7
P2	482911.4	6521542.4	L2	20.8
P3	482890.6	6521542.3	L3	150.9
P4	482916.5	6521690.9	L4	23.9

Schedule 2

(Clause 1.1)

Industrial Subdivision Plan

Industrial Subdivision Plan on next page.

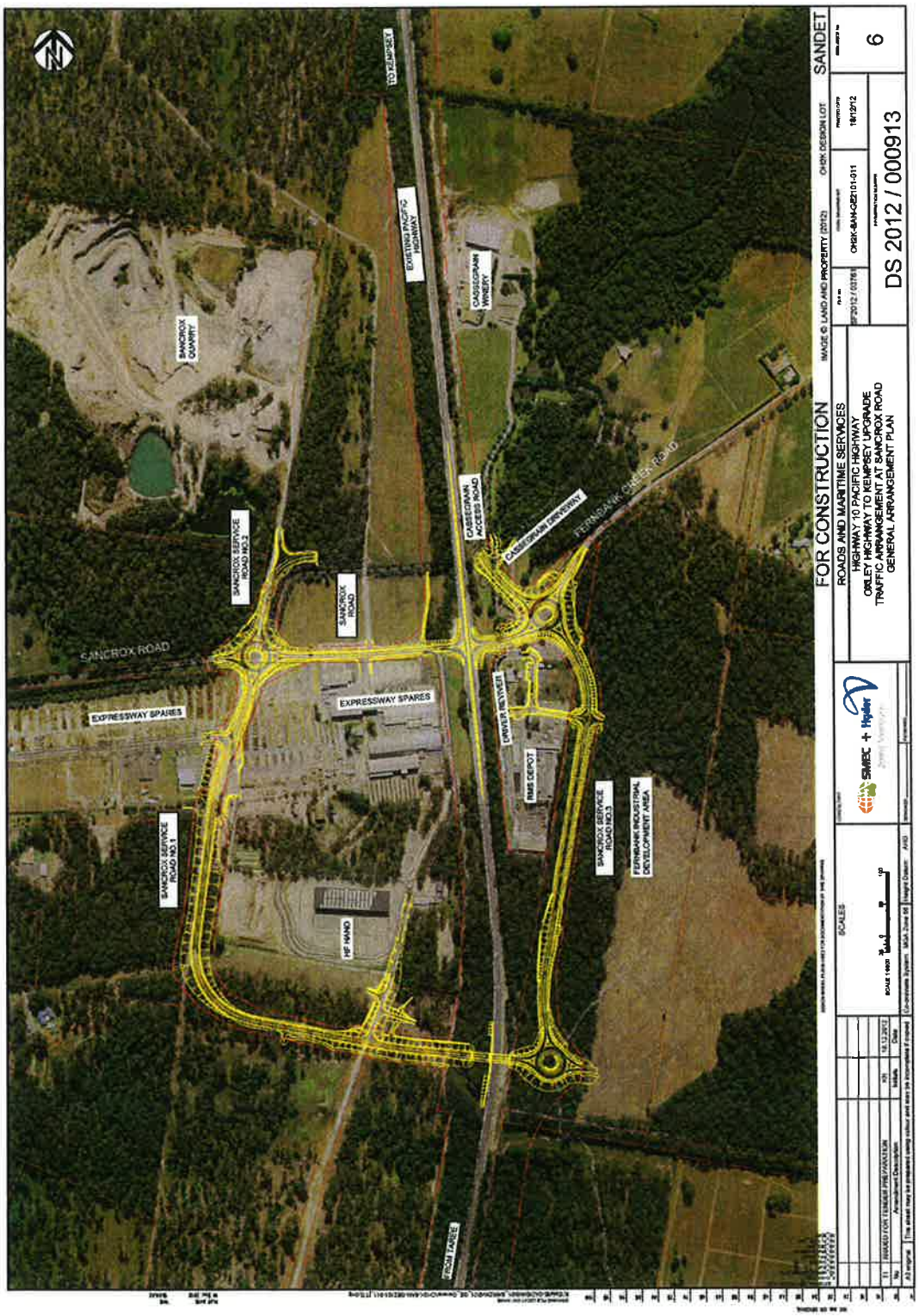

HIGHWAY
PACIFIC
LEGEND
DUNN LAND
EXPRESSWAY SPARES LAND
QUARRY LAND
PROPOSED RNS ACQUISITION BOUNDARY
PROPOSED VISUAL SCREEN BOUNDARY
DEFENDABLE SPACE (SOURCE ABPP)
(A) Building Setback Line (10m)
(B) Restriction on Development other than Compatible Development until 1 January 2020
(C) Restriction on Development other than Compatible Development until 1 January 2020 or as determined and notified in writing by council
HANSON QUARRY
CASSEGRAIN WINERY
HIGHWAY
PACIFIC
DRAINAGE RESERVE
ROAD
EXPRESSWAY SPARES
SANCROX EMPLOYMENT LAND AND QUARRY PLANNING AGREEMENT
KING CAMPBELL
CAUTION

Schedule 3

(Clause 1.1)

RMS Plan

RMS Plan on next page.

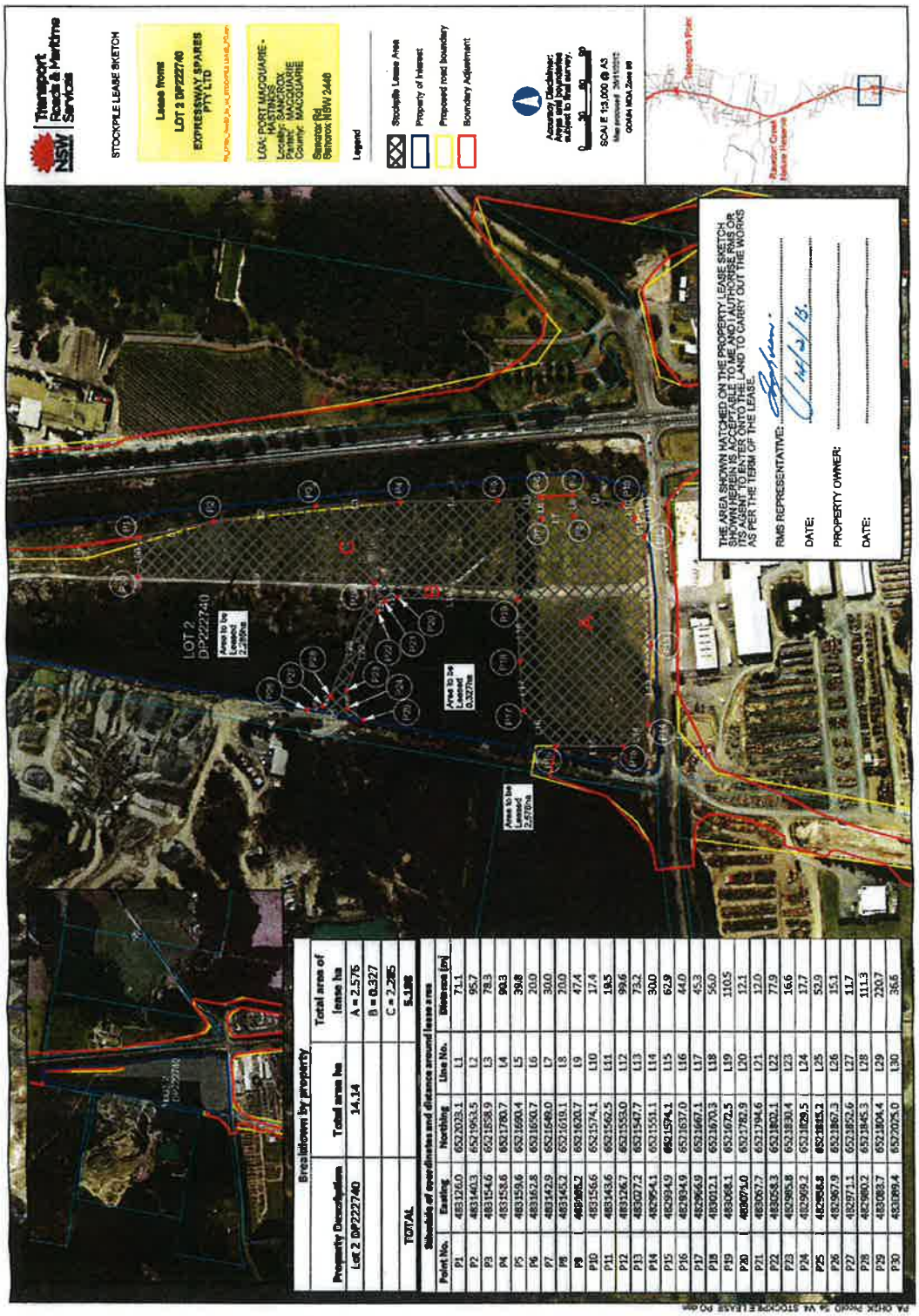

SANCROX ROAD
EXPRESSWAY SPARES
SANCROX QUARRY
CASSEGRAIN WINERY
FERNBANK CREEK ROAD
FERNBANK INDUSTRIAL DEVELOPMENT AREA
FOR CONSTRUCTION
ROADS AND MARITIME SERVICES
HIGHWAY 10 PACIFIC HIGHWAY
ORLEY HIGHWAY TO KEMPSEY UPGRADE
TRAFFIC ARRANGEMENT AT SANCROX ROAD
GENERAL ARRANGEMENT PLAN
DS 2012 / 000913
6

Schedule 4

(Clause 8)

Temporary Access Road

Plan on next page.



Breakdown by property			
Property Description	Total area ha	Total area of lease ha	
Lot 2 DP2227740	14.14	A = 2.576	
		B = 0.327	
		C = 2.295	
TOTAL		5.198	

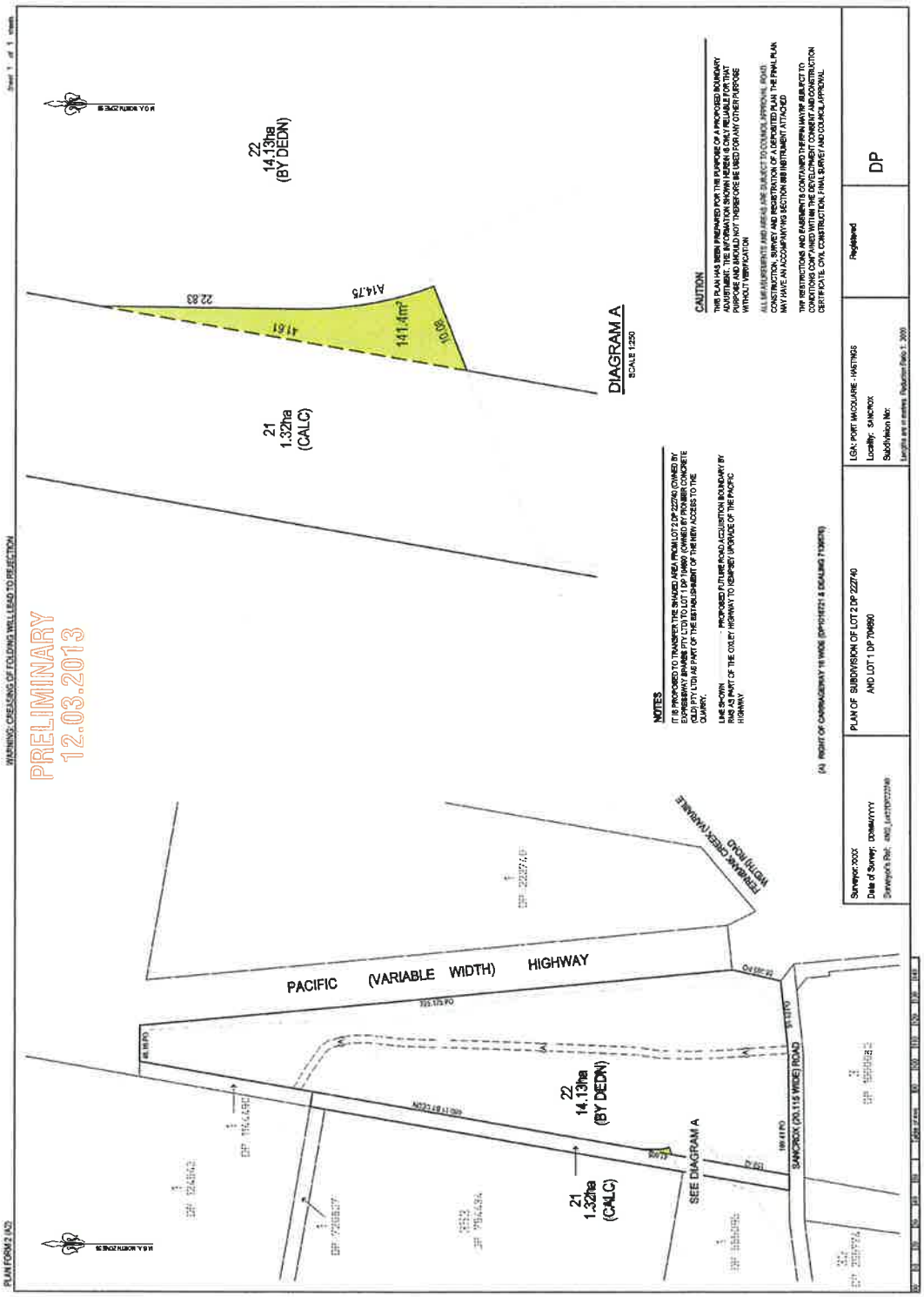
Schedule of coordinates and distance around lease area				
Point No.	Easting	Northing	Line No.	Distance (m)
P1	483126.0	6521203.1	L1	71.1
P2	483140.3	6521196.5	L2	95.7
P3	483154.6	6521858.9	L3	78.3
P4	483155.6	6521780.7	L4	90.3
P5	483159.6	6521690.4	L5	39.8
P6	483162.8	6521650.7	L6	20.0
P7	483142.9	6521648.0	L7	30.0
P8	483143.2	6521618.1	L8	20.0
P9	483156.2	6521620.7	L9	47.4
P10	483156.6	6521574.1	L10	17.4
P11	483143.6	6521562.5	L11	18.5
P12	483126.7	6521553.0	L12	99.6
P13	483007.2	6521547.7	L13	73.2
P14	482954.1	6521551.1	L14	30.0
P15	482934.9	6521574.1	L15	62.9
P16	482934.9	6521637.0	L16	44.0
P17	482966.9	6521667.1	L17	45.3
P18	483012.1	6521670.3	L18	56.0
P19	483068.1	6521672.5	L19	110.5
P20	483071.0	6521782.9	L20	12.1
P21	483067.7	6521794.6	L21	12.0
P22	483058.3	6521802.1	L22	77.9
P23	482985.8	6521830.4	L23	16.6
P24	482969.2	6521828.5	L24	12.7
P25	482956.8	6521815.2	L25	52.9
P26	482967.9	6521767.3	L26	15.1
P27	482971.1	6521752.6	L27	11.7
P28	482980.2	6521745.3	L28	111.3
P29	483083.7	6521804.4	L29	22.07
P30	483089.4	6521795.0	L30	36.6

Schedule 5

(Clause 7)

Hanson Driveway Land

Plan on the next page


PRELIMINARY
12.03.2013
DIAGRAM A
SCALE 1:250
22
14.13ha
(BY DEDN)
21
1.32ha
(CALC)
141.4m²
PACIFIC (VARIABLE WIDTH) HIGHWAY
SANCROX (20.115 WIDE) ROAD
SEE DIAGRAM A
TERRANGE CREEK (VARIABLE WIDTH) ROAD
CAUTION
NOTES
PLAN OF SUBDIVISION OF LOT 2 DP 222740
AND LOT 1 DP 794860
LGA: PORT MACQUARIE - HASTINGS
Locality: SANCROX
Subdivision No:
Registered
DP

Execution

Executed as an Agreement

Dated: 15 April 2014

Executed on behalf of the Council

General Manager

SARAH ENDY EA TO GENERAL MANAGER

Witness/Name/Position

Executed by James John Dunn and Catherine Brigette Dunn as trustees for the JJ & CB Dunn Superannuation Fund

James John Dunn

Witness

Catherine Brigette Dunn

Witness

Executed on behalf of Expressway Spares in accordance with s127(1) of the *Corporations Act 2001(Cth)*

Name/Position
PATRICK CASSEGRAIN, MANAGING DIRECTOR

Name/Position
DENIS CASSEGRAIN, DIRECTOR

Executed on behalf of Hanson in accordance with s127(1) of the *Corporations Act 2001(Cth)*

Name/Position JAN VENCALEK
DIRECTOR

Name/Position VICTORIA VINCENT
DIRECTOR

Appendix

(Clause 37)

Environmental Planning and Assessment Regulation 2000

(Clause 25E)

Explanatory Note

Draft Planning Agreement

Under s93F of the *Environmental Planning and Assessment Act 1979*

Parties

Port Macquarie Hastings Council ABN 11 236 901 601 of Cnr Lord and Burrawan Streets, Port Macquarie NSW 2444 (**Council**)

and

James John Dunn and Catherine Brigette Dunn as trustees for the JJ & CB Dunn Superannuation Fund of 181 Sancrox Road, Wauchope New South Wales 2446 (**Dunn Family**)

and

Expressway Spares Pty Ltd ABN 55 000 483 107 of 7 Sancrox Road Wauchope New South Wales 2446 (**Expressway Spares**)

and

Hanson Construction Materials Pty Limited ABN 90 009 679 734 of Level 5, 75 George Street, Parramatta, New South Wales 2150 (**Hanson**)

Description of the Land to which the Draft Planning Agreement Applies

Dunn Land, being Lot 1 in Deposited Plan 124543.

Expressway Spares Land, being Lot 2 in Deposited Plan 222740.

Quarry Land, being Lot 1 in Deposited Plan 704890, Lot 1 in Deposited Plan 720807 and Lot 353 in Deposited Plan 754434.

Description of Proposed Development

The proposed development is the subdivision of the Land in accordance with the Industrial Subdivision Plan as shown in Schedule 2.

Summary of Objectives, Nature and Effect of the Draft Planning Agreement

Objectives of Draft Planning Agreement

The objective of the Draft Planning Agreement is to facilitate the ongoing operations of the Quarry, and the development of the Expressway Spares Land and the Dunn Land for industrial purposes, and to make contributions for dedication of land.

Nature of Draft Planning Agreement

The Draft Planning Agreement is a planning agreement under s93F of the Act. The Draft Planning Agreement is a voluntary agreement under which Development Contributions (as defined in clause 1.1 of the Draft Planning Agreement) are made by Hanson and the Landowner for various public purposes (as defined in s93F(2) of the Act).

Effect of the Draft Planning Agreement

The Draft Planning Agreement:

- relates to the Land and the development of the Expressway Spares Land and Dunn Land for industrial purposes,
- requires the dedication of land for the construction of an access road for a proposed industrial subdivision, and land for an intersection,
- imposes restrictions on the development of the Dunn Land and Expressway Land,
- is to be registered on the title to the Land,
- provides a dispute resolution methods for a dispute under the agreement, being mediation,
- provides that the agreement is governed by the law of New South Wales, and
- provides that the *A New Tax System (Goods and Services Tax) Act 1999* (Cth) applies to the agreement.

Assessment of the Merits of the Draft Planning Agreement

The Planning Purposes Served by the Draft Planning Agreement

The Draft Planning Agreement:

- promotes and co-ordinates of the orderly and economic use and development of the Land to which the agreement applies,
- provides land for public purposes in connection with the Development,
- provides increased opportunity for public involvement and participation in environmental planning and assessment of the Development.

How the Draft Planning Agreement Promotes the Public Interest

The Draft Planning Agreement promotes the public interest by promoting the objects of the Act as set out in s5(a)(ii),(iv) to (vi) and 5(c) of the Act.

For Planning Authorities:

Development Corporations - How the Draft Planning Agreement Promotes its Statutory Responsibilities

N/A

Other Public Authorities – How the Draft Planning Agreement Promotes the Objects (if any) of the Act under which it is Constituted

N/A

Councils – How the Draft Planning Agreement Promotes the Elements of the Council's Charter

The Draft Planning Agreement promotes the elements of the Council's charter by providing a means that allows the wider community to make submissions to the Council in relation to the agreement.

All Planning Authorities – Whether the Draft Planning Agreement Conforms with the Authority's Capital Works Program

The Draft Planning Agreement requires the dedication of land for the construction of roadworks to serve a proposed industrial subdivision. The roadworks are not included in the Council's relevant current capital works program. However, the Council's Management Plan identifies these types of works in the relevant capital works program. Accordingly, the dedication of land under the agreement to allow for future road construction is consistent and conforms with the capital works envisioned by the Council's Management Plan.

All Planning Authorities – Whether the Draft Planning Agreement specifies that certain requirements must be complied with before a construction certificate, occupation certificate or subdivision certificate is issued

No.

"B"

Sancrox Employment Precinct Buffer Zone Assessment - Air Quality, Noise and Flyrock

BUFFER ZONE REPORT

- Draft D
- 2 April 2009

Sancrox Employment Precinct Buffer Zone Assessment - Air Quality, Noise and Flyrock

BUFFER ZONE REPORT

- Draft D
- 2 April 2009

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LIMITATION: The sole purpose of this report and the associated services performed by Sinclair Knight Merz Pty Ltd (SKM) is to assess the proposed Sancrox Employment Precinct buffer zone requirements in accordance with the scope of services set out in the contract between SKM and Port Macquarie Hastings council.. That scope of services, as described in this report, was developed with Council.

In preparing this report, SKM has relied upon, and presumed accurate, certain information (or absence thereof) provided by the Client and other sources. Except as otherwise stated in the report, SKM has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

SKM derived the data in this report from a variety of sources. The sources are identified at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. SKM has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose of the project and by reference to applicable standards, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by SKM for use of any part of this report in any other context.
This report has been prepared on behalf of, and for the exclusive use of, Council, and is subject to, and issued in connection with, the provisions of the agreement between SKM and Council.

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1. Introduction

In November 2005, Port Macquarie Hastings Council (PMHC) resolved to prepare a draft Local Environmental Plan (LEP) to rezone land to the west of Port Macquarie, to create an industrial precinct immediately adjacent to the Pacific Highway. The land has become known as the Stage 1 Sancrox Employment Precinct and is herein referred to as 'the Precinct' (refer to **Figure 1-1**).

- **Figure 1-1 Sancrox Employment Precinct Locality Plan**

A Local Environmental Study and Structure Plan will be required to support a draft plan to rezone the land. Consequently, on 6 September 2006, the Department of Planning issued guidelines for the preparation of a Local Environmental Study, which amongst other matters, included the need to consider potential for conflict with surrounding land uses.

In July 2007, Council adopted the Industrial Land Strategy 2007 (ILS). The ILS identified the Sancrox Employment Precinct as an area with potential for a sizeable and coordinated industrial development on the Pacific Highway with advanced planning and access considerations.

Through its Focus Group, Council established a process of having a number of specialist environmental studies co-ordinated by King & Campbell Consultants, on behalf of the landowners, to provide input to the LES and Structure Plan processes. A review of one of these reports, Draft Noise and Air Quality Impact Assessment prepared by Heggies Consultants for King & Campbell dated 2 October 2007, is the subject of this Interim Report.

SKM in association with Terrock Consultants were appointed by Council on 17 June 2008 to undertake a review of the draft Heggies Report with particular reference to the likely impacts of the existing/ future quarry operations to the proposed Employment Precinct, including fly-rock risk; and to determine buffer requirements (if any), together with recommended means to eliminate or reduce any limitations to a future rezoning of the Employment Precinct.

At this time, there are no agreed buffers beyond the property boundaries of the adjoining quarry and there is no assumption that there is any capacity for buffers on surrounding land. The quarry however, operates under an existing development consent and plans for a westward expansion have recently been flagged, subject to lodgement and approval of a formal Development Application (along with the relevant owner's consent to DA lodgement).

In September 2008, SKM issued an interim response to the study brief. Preparation of the report was facilitated by dialogue with Council's planning staff, in addition to a site inspection and stakeholder workshop held with Council staff, relevant consultants, the DPI and landowner representatives on 4 July 2008.

The workshop agreed on a number of key issues that warranted further investigation, including review of existing studies; buffer zone policy applicable in NSW and elsewhere; and impacts of general quarry operations and blasting that may impact on the proposed Sancrox Employment Precinct. This report will address these issues, and will broadly discuss potential mitigation options which may allow the reduction or elimination of a buffer zone situated on properties adjacent to the quarry.

2. Review of Documentation

This section of the report provides a review of the documentation by Heggies Consultants in relation to the likely impacts of the quarry to the proposed Employment Precinct; together with review comments. In undertaking the review SKM has drawn on the results of other surveys, databases and information from other studies as required.

2.1. Heggies, Draft Sancrox Employment Precinct: Noise and Air Quality Impact Assessment, 2 October 2007

The report provided an assessment of potential noise and air quality impacts of the proposed Sancrox Employment Precinct on surrounding properties. It also provided an assessment of blasting impacts (airblast overpressure and ground vibration) from the Hansons Quarry to the proposed Sancrox Employment Precinct.

2.1.1. Noise

Monitoring of the background noise environment in the area of the Sancrox Quarry was carried out at the residence at 234 Bushlands Drive. During this noise monitoring, quarry noise was noted as being not audible.

Comment: There is significant topography and dense vegetation separating the quarry site and the residence at 234 Bushlands Drive and hence it is expected that quarry noise would be inaudible. The quarry is more exposed to the east, e.g. The Dunn property and quarry noise propagation in this direction would be greater than towards residences to the west.

With reference to the DECC Industrial Noise Policy (INP), operational noise criteria for the Sancrox Employment Precinct were determined for sensitive locations surrounding the precinct, based on the amenity noise criteria being the controlling criteria for the site. With the exception of the Cassegrain Winery (a commercial premises), the sensitive receivers were classified as rural residential. The report did not consider intrusive and sleep disturbance and noted that potential impacts of individual industries would need to be addressed at the time of the development.

Comment: As relevant to the establishing of industries on properties adjacent to the quarry, there is no noise criteria set for these receiving industries.

The Environmental Noise Model (ENM) was used to predict noise emissions from the proposed development, based on the type of industry proposed for each sector and a number of assumptions in relation to the precinct site and noise levels from existing adjacent developments. No noise mitigation measures were assumed for any of the noise sources.

Noise levels for all sensitive receivers during the daytime were predicted to comply with relevant noise goals. Evening noise levels were predicted to exceed relevant goals for four locations. Night time noise levels were predicted to exceed relevant goals for most receivers.

The report recommends a combination of acoustically designed enclosures, noise barriers and specifically targeted management techniques for mitigation of noise impacts from developments within the Precinct.

Comment: Again the focus is on the impact of the quarry and industry that may develop within the Sancrox Employment Precinct on existing sensitive residential receivers, rather than the impact of the quarry on proposed industries within the Precinct which is relevant to establishing a buffer zone.

2.1.2. Blasting

With reference to the DECC guidelines for blasting based on human comfort levels, emission criteria for airblast and ground vibration were determined for residential receivers. In the absence of specific guidelines for commercial receivers, modified criteria were proposed for airblast on the basis of a reduced expectation for human comfort in comparison to residential receivers. With regard to ground vibration, reference was made to Australian Standard AS 2187-2-2006, which provides guidelines for storage and use of explosives and British Standard BS 7385: Part 2-1993, which provides criteria for building damage from vibration.

Comment: SKM considers that the adopted criteria for air blast were appropriate. However, AS 2187-2-2006 states that ground vibration limits for occupied "non sensitive sites", such as factories and commercial premises, may be increased further if agreement can be reached with the occupier of the premises.

Monitoring of a blast with a Maximum Instantaneous Charge (MIC) of 86 kg was undertaken in a property adjacent to the quarry in order to predict the levels of blasting at surrounding commercial receivers with the proposed Precinct. Blast calculations were made using established standard blasting site laws modified from the US Bureau of Mines and assumptions relating to MIC.

The results predicted that airblast overpressure and ground vibration would meet nominated criteria for commercial receivers within the proposed Precinct. There were no recommendations made in relation to mitigating potential blasting impacts.

Comment: As part of the detailed blasting analysis included within the Buffer Zone Assessment Report SKM provide a detailed consideration of the Heggies predictions.

2.1.3. Air Quality

Monitoring of ambient air quality in the area of the proposed Precinct was not undertaken for the assessment. The report assumed that no odour sources were present in the vicinity of the proposed development. Background (nuisance) dust levels were assumed to be conservatively high. Recorded data from the DECC air quality monitoring station at Beresfield (located approximately 180 kms south of the site) was used for background particulate matter (i.e. TSP and PM_{10}). The report stated that data for 2006 was used as this was consistent with the on site meteorological file used for the assessment.

Comment: The Beresfield data is considered irrelevant for the assessment of air quality (dust impacts) at Sancrox. This aside, it is expected that Beresfield data is conservative for the purpose of quarry dust impacts.

The report provides some discussion on the DECC criteria for odour, dust and particulate matter.

Comment: SKM considers that the adopted criteria where applied to sensitive residential receivers is appropriate and would be conservative when applied to industrial/commercial receivers. Typically the biggest issue for extractive industries co-located with other industrial/commercial premises is dust deposition (fallout) particularly on parked cars and other structures.

The AUSMPLUME model was used to predict air pollution emissions from the proposed development, based on the type of industry proposed for each sector and a number of assumptions in relation to the precinct site and background air pollutant levels from existing adjacent developments. TAPM was used to generate a meteorological file for use in the model incorporating data from the Port Macquarie Airport located approximately 6 kms from the site.

The result of the air dispersion modelling indicated that predicted concentrations of odour, dust and particulate matter would not exceed nominated criteria. The report considers that buffering distances between each industry and adjacent sensitive receptors were adequate. There were no recommendations made in relation to mitigating potential air quality impacts.

Comment: SKM considers that the air dispersion modelling set up and results are reasonable for assumptions made, however, are irrelevant to the current buffer zone assessment, as the results are referenced to surrounding sensitive receivers, and not to potential adjacent industrial / commercial receivers.

2.2. Heggies, Flyrock from Quarry Blasting, letter dated 5 February 2008

The correspondence provided a brief overview of flyrock from quarry blasting and indicated that flyrock results from the lack of confinement of the high pressure gaseous energy liberated during an explosion and therefore, steps must be taken by appropriate blasting practice to ensure that the explosion is properly contained to limit flyrock potential.

Comment: Whether the lack of confinement is caused by overloading, under-stemming or under-burdening, the effects are the same. Flyrock as referred to is 'wild' flyrock as distinct from the normal movement of rock following a blast.

2.3. Summary

The draft Heggies report and supplementary correspondence consider noise, blasting, flyrock and air quality. As relevant to informing the LES process, the focus of the draft report is on the impact of the quarry and potential future industry to surrounding sensitive receivers, ie residences. In this regard the report is considered to be robust, subject to the commentary provided in the preceding section and the acknowledgements made that further assessment of specific industries will be required prior to any development occurring.

The draft report and correspondence however, do not consider in any detail the impact of the quarry on proposed industrial land use within the Sancrox Employment Precinct, and the subject Buffer Zone Assessment serves this purpose.

3. Statutory Context

3.1. Development Approvals for Hanson's Quarry

The Hanson's Sancrox Quarry operates under two development consents granted by PMHC under the *Environmental Planning and Assessment Act 1979* (EP&A Act): DA1995/193 and DA 2004/609. Both development consents have been modified since first granted and the sequence of modifications is summarised in **Table 3-1** below.

Table 3-1 Sancrox Quarry Development Approvals

Development Approval	Date	Comment
DA 1995/193	19/11/1996	Conditional approval for continuation of the quarry under the now repealed State Environmental Planning Policy 37 – Continued Mines and Extractive Industries. Property descriptions – Portion 353 Lot 1 DP 7048890 and Lot 1 DP 720807.
	14/06/2007	Amendment to extend operating hours for the period between 18-29 June 2007. Property descriptions – Lot 353 DP 754434 and Lot 1 DP 720807.
	7/01/2008	Amendment to extend operating hours for selected activities. Property descriptions – Lot 353 DP 754434 and Lot 1 DP 720807.
DA 2004/609	10/01/2005	Conditional approval for extension to existing quarry. Property descriptions – Lot 353 DP 754434, Lot 1 DP 704890 & Lot 1 DP 720807.
	14/07/2007	Amendment Property descriptions –Lot 353 DP 754434, Lot 1 DP 704890 and Lot 1 DP 720807. Requires that approval be read in conjunction with consent for DA 1995/193, with any inconsistencies referred to Council.

3.1.1. Noise Limits

Various criteria have been set out throughout the approval history of the Sancrox quarry, as outlined below:

- DA 1995/193, Condition 19

  Noise generated from the quarrying operations is not to exceed the acceptable noise limits specified in the Noise Impact Assessment (Report No. 95.933.A1). Measures to ensure such are to be detailed in the Environmental Management and Rehabilitation Plan.

- DA 2004/609, Condition E-4.

  Noise from the development (measured as the LA_{eq} level) shall not exceed the background noise (measured as the LA_{90} noise level in the absence of the source) by more than 5 dB(A) in any Octave Band Centre Frequency, at the boundary of any residence.

In January 2000, the Environment Protection Authority released the *NSW Industrial Noise Policy* (INP). This document provided the framework and process for deriving the noise limit for assessments and (separately) consents and licences that will enable the EPA to regulate premises that are scheduled under the *Protection of the Environment Act, 1997*.

The assessment of noise is complex and subjective. The EPA now DECC advocates that the assessment procedure should not be considered in isolation from other social and economic aspects of a development.

The procedure specifies that there are two criteria for environmental noise that require assessment. The first relates to the intrusiveness of a noise source, and controls intrusive noise impacts in the short term for residential premises. This is the procedure that has been used to calculate the noise limits outlined in the DA conditions above, and should continue to apply to quarry noise when measured at residential properties.

The second criteria contained in the INP relates to the acceptability of the resulting noise, in relation to the amenity of the surrounding landscape. The Application Notes intended for use with the INP state that *'The INP does not require that intrusive noise be assessed at industrial or commercial premises. For industrial/commercial receivers, only the amenity criteria apply.'* As this development relates to industrial and commercial land use, these amenity noise criteria should be applied when measuring noise from quarry activities within the Sancrox Employment Precinct.

The criteria applicable to commercial receivers are defined by the Acceptable Noise Levels (ANLs) listed below (Table 2.1 of the *EPA Industrial Noise Policy*):

- **Table 3-2 Amenity Noise Criteria – Acceptable Noise Levels**

Time of Day	Recommended LA_{eq} Noise Level dB(A)			
	Commercial Land Use		Industrial Land Use	
	Acceptable	Recommended Maximum	Acceptable	Recommended Maximum
When in Use	65	70	70	75

3.1.2. Blasting Limits

No site specific criteria have been established for the quarry with respect to airblast overpressure and ground vibration. However, in an effort to control impacts, the following condition applies under DA 1995/193 (Condition 25):

- Blasting is restricted to between the hours of 9:00am and 3:000pm Monday to Saturday with a maximum instantaneous charge (MIC) of 37 kg. Blasting carried out within 375m of the southern residence is to be restricted to a MIC of 15 kg.

It should be noted that on 14 February 2008, Hanson's Sancrox Quarry notified PMHC of its intention to apply to change this MIC limit to an Outcomes Based Compliance System. Under this type of system, the criteria normally recommended for overpressure and ground vibration from blasting in Australia are contained in the Australian and New Zealand Environment Council (ANZEC) guidelines, and are based on data contained in the *Australian Standard: Explosives – Storage and Use (AS2187.3-2006)*.

The ANZEC criteria for the recommended maximum level for air blast at residential locations is 115 dB(L). The level of 115 dB(L) may be exceeded on up to 5% of the total number of blasts over a period of 12 months however, the level should not exceed 120 dB(L) at any time.

The recommended maximum level for ground vibration at a residential location is a Peak Particle Velocity (PPV) of 5 mm/s. The PPV level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

Limits chosen by other regulatory authorities have also been set out in AS 2187-2-2006. For occupied non sensitive sites, such as factories and commercial premises a Peak Particle Velocity (PPV) of 25mm/sec and peak overpressure level of 125 dB(L) have been recommended. However the Standard further states that vibration and overpressure limits may be increased to higher, frequency dependent criteria where agreement is reached with the occupants.

Further discussion of the statutory context of AS 2187-2006 is included in Section 3.6 of this report.

3.1.3. Air Quality Limits

Although no quantitative criteria exist for dust emissions from the quarry site, PMHC has endeavoured to prescribe certain measures that must be undertaken, as part of normal operations, to limit the potential for dust emissions from quarrying activities. These include:

- DA 1995/193

  Condition 7.A.(c) Bitumen sealing of the access road from Sancrox Road for a distance of 50m.

  Condition 17. The Environmental Management and Rehabilitation Plan should include measures as outlined in the Statement of Environmental Effects to maintain air quality and minimise the effects of air pollution.

- DA 2004/609

  Condition 5. Internal unsealed roadways, quarry floor and stockpiles are to be watered as required to minimise dust generation impacting on the natural or built environment. A water truck is to be available at all times to ensure compliance.

  Condition 6. No truck carrying extracted or crusher / washed products from the site shall use any public road unless its load is fully covered by a suitable material to prevent spillage or dust falling from the truck. Should any accidental spillage occur from the trucks owned and / or operated by the extraction operator it shall be cleaned up by the operator as soon as practicable.

  Condition 7. All vehicles and machinery used must comply with the Environmental Protection Authority (EPA) requirements and be fitted with properly maintained emission controls relevant to their date of manufacture.

  Condition 16. An erosion and sediment control plan be prepared. This plan shall include …dust control measures.

Although not referred to in the Sancrox Quarry DAs, ambient air quality objectives are set by the DECC to measure and protect against adverse air quality impacts from industrial activities. Typically dust concentration criteria is health based criteria and set to protect entire communities including the most sensitive receivers. Deposition criteria is set for managing nuisance impacts. The concentration based air quality criteria for PM_{10} and TSP in NSW are provided in **Table 3-3**.

Table 3-3 NSW DECC Criteria for PM_{10} and TSP

Parameter	Averaging Period	Concentration (µg/m^3)
PM_{10}	24-hour	50
PM_{10}	Annual	30
TSP	Annual	90

Source: Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DECC, 2005)

Dust deposition rates are assessed against the criteria of 4g/m^2/month at the nearest off-site sensitive receiver.

3.1.4. Operating Hours

The current development approvals specify the operating hours for Hanson's quarry as follows:

DA 1995/193

- 7.00 am to 5.00 pm – Monday to Friday
- 7.00 am to 1.00 pm – Saturday
- No work is to be carried out on Sundays

In addition to the above, activities such as the movement of trucks into the site, operation of loading equipment, loading of trucks and movement of trucks out of the site (as outlined in the modification to DA 1995/193 issued 7 January 2008) is also permitted to occur during the following hours:

- 7.00 am to 11.00 pm – Monday to Friday
- 7.00 am to 5.00 pm – Saturday, Sunday and Public Holidays
- 11.00 pm to 7.00 am on up to twenty (20) occasions within a twelve (12) month period (with no overlapping of the twelve (12) month periods). Records are to be kept and provided to Council upon request. It should be noted the hours of operation in this consent will also apply to DA 2004/609.

DA 2004 / 609

- 7.00 am to 6.00 pm – Mondays to Saturdays
- No work is to be carried out on Sundays and Public Holidays

It should be noted that condition 5 of DA 1995/193 effectively nullifies this condition.

3.1.5. Environmental Management Plan (EMP)

As per the quarry DA requirements Sancrox Quarry has an EMP, with the most recent update being October 2008.

The EMP provides a range an environmental management measures that when effectively implemented, will ensure a satisfactory level of impact to off-site receivers. It is noted that to date, off-site receivers have generally been residential and relatively distant to the quarry boundary.

In the event of industrial/commercial development within the Sancrox Employment Precinct, additional management measures may be required to protect future workers occupying the precinct from quarry impacts.

3.2. Environment Protection Licence

The Sancrox Quarry operates under Environment Protection Licence (EPL) 5289 issued by the Department of Environment and Climate Change (DECC). The approved activities under the EPL include "extractive activities" and "crushing, grinding or separating" works.

The EPL conditions relate to general environmental management and do not specify limits in relation to air, noise and vibration emissions from the operation.

3.3. Ministerial Direction Regarding Extractive Industry

The Hansons Quarry and proposed Sancrox Employment Precinct are subject to a Ministerial Direction under Section 117(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The objective of Local Planning Direction 1.3 Mining, Petroleum Production and Extractive Industries is:

> *"to ensure that the future extraction of State or regionally significant reserves of coal, other mineral, petroleum and extractive material are not compromised by inappropriate development."*

Under the Direction, Council is required to consult with the Director-General of the Department of Primary Industries (DPI) in relation to potential land use conflicts that may arise in the preparation of a draft Local Environmental Plan (LEP).

3.4. State Environmental Planning Policy (Mining, Petroleum Production and Extractive industries) 2007

State Environmental Planning Policy (Mining, Petroleum Production and Extractive industries) 2007 (herein referred to as the 'Mining SEPP') aims to facilitate the orderly and economic use and development of land containing extractive material resources.

Section 12 of the Mining SEPP requires Council to consider the compatibility of proposed extractive industries with other land uses. Section 13 of the SEPP requires Council to consider the existing and approved uses of land in the vicinity of proposed development and whether the proposed development may:

- have a significant impact on current of future extraction or recovery of extractive materials; and
- be incompatible with any existing or approved uses or current of future extraction recovery.

3.5. Port Macquarie-Hastings Industrial Land Strategy 2007

The Port Macquarie-Hastings Industrial Land Strategy 2007, prepared by AECgroup Consultants on behalf of the PMH Council, aims at ensuring an adequate supply of industrial lands, in strategic locations, to accommodate demand and provide a strong employment base in the region over the next 20 years. The Stage 1 Sancrox Employment Precinct is identified as a priority investigation area for rezoning and development, primarily for transport and logistics uses and other industrial uses compatible to the operation of Hanson's quarry.

3.6. AS 2187- 2006: Explosives

Blasting at Hanson's Sancrox quarry should be carried out in a manner that complies with AS 2187-2-2006, Explosives – Storage and Use, Part 2: Use of Explosives. The requirements for an exclusion zone during blasting are addressed in this document, under Appendix L - Exclusion Zones, which makes the following comments:

- Where the exclusion zone extends onto neighbouring property, unique designs shall be established and implemented for each blast, rather than the applying standard site blast procedures.
- The establishment of an exclusion that extends beyond the site boundary shall be investigated; this may require liaison with all affected parties, including staff, landowners, emergency services and transport authorities where required.
- If a zone of the required size cannot be established, another method of carrying out the task shall be considered.
- The size of the exclusion zone shall be determined by a competent person.

4. Stakeholder Consultation

This section provides an overview of the consultation with stakeholders that has occurred to date.

4.1. Site Visit and Stakeholder Workshop

A visit to the Sancrox Quarry was attended by the majority of project stakeholders on 4 July 2008. Hansons provided an overview of quarry operations, including pit locations, production rates, blast procedures and an indication of future development and expansion of the operation. Following the site visit, a meeting between project stakeholders was facilitated by SKM at the PMHC Administration Building, to discuss issues relevant to the Buffer Zone Assessment.

During the workshop, King & Campbell Consultants, on behalf of the landowners, raised the issue that AS 2187.2 required the quarry to obtain adjoining owners' consent to establish an exclusion zone on land outside the boundary of the quarry. King & Campbell expressed a view that the obligation was with the quarry to alter blasting/extraction practices where extracting material immediately adjacent to a property boundary; and that an assumed buffer or exclusion zone on the adjoining land does not exist.

It was further argued that without an adjustment to quarrying methods to take into account the non-existence of an exclusion zone, the additional cost of quarrying the material adjacent to the quarry property boundary was in effect, being transferred to the adjoining landowners without compensation. Minutes of the site meeting and workshop were circulated to all stakeholders and following consideration of comments, the Minutes were updated and reissued to stakeholders on 29 July 2008. A copy of the Minutes is included in **Appendix A**.

King and Campbell have since advised SKM that landowners have initiated negotiations with the quarry owners with the aim of establishing agreed exclusion zones during blast events. It is understood that these negotiations commenced following the receipt of legal advice obtained by King and Campbell on behalf of their clients in relation to the exclusion zone issue. The advice indicates as follows:-

- When using explosives for blasting, the quarry is required to comply with the Explosives Act 2003, the Explosives Regulation 2005, and AS 2187.2-2006 Explosives, Storage, Transport and Use.
- There is nothing in the Act, the Regulation or the Australian Standard that requires the adjoining landowners to agree to the use of their land as part of the prescribed exclusion zone in relation to the quarry operations.

- AS2187.2 states:

  "For blasting operations where the [exclusion] zone is on or extends into neighbouring property, each blast will be unique and the feasibility of establishing an exclusion zone that extends beyond the site boundary shall be investigated. This may require liaison with … local landowners. …

  If a zone of the required size cannot be established and controlled or the expected timeframe, then another method of carrying out the task shall be considered."

Having considered the advice, King and Campbell have formed the view that their clients' objection to the establishment of the prescribed exclusion zone on their land is sufficient to trigger the operation of the above provision, so as to require the quarry operators to modify their blasting practices.

SKM do not provide any opinion on the legal advice received by King and Cambell as outlined above. The information is provided in this report as information only.

4.2. State Government Authorities

The Department of Primary Industries (DPI), Department of Planning (DoP) and the Department of Environment and Climate Change (DECC) currently have no formal policies on buffer zones for extractive industries.

The DPI has advised that SECTION 117 Direction Minerals mapping provides indicative buffer areas (i.e. to trigger consultation under section 62 of the EP&A Act 1079), but tended to coincide with the Department's recommended safety margin of notionally 1km around quarries involving blasting. It is considered that safety margins for blasting could be less with appropriate investigations, however, the general recommendation from DPI is for a minimum of 500m for how development proposed near the Quarry.

The DPI has also flagged that notices under Section 117 for resource protection are currently under review and are likely to include a northwest extension of the 'Sancrox' resource and a westward buffer zone extension to Haydons Creek.

In the absence of any firm plans for quarry expansion this assessment is limited to the existing operation of Sancrox Quarry.

5. Buffer Zone Assessment

5.1. Overview

Based on the information presented in Section 1to 5 of this report it is clear that key environmental issues associated with the Sancrox Employment Precinct and the co-existence of proposed industrial/commercial receivers with the adjacent Sancrox Quarry are:

- blasting impacts;
  - flyrock
  - airblast overpressure
  - ground vibration
- quarry machinery noise; and
- quarry dust impacts.

This section of the report provides an assessment of the above impacts as relevant to the need for a buffer zone to separate quarry activities from potential future industrial/commercial receivers within the proposed Sancrox Employment Precinct. While no detailed modelling studies have been undertaken impacts are assessed using empirical techniques.

5.2. Sancrox Quarry Blast Monitoring

As relevant to the assessment of airblast overpressure and ground vibration a quarry blast was measured on Tuesday 8 July 2008.

5.2.1. Blast Details

Preliminary monitoring locations were chosen in advance in conjunction with Alan Richards of Terrock, and were confirmed on the day of the blast after further consideration of local conditions. The blast was carried out at approximately midday on an area of the Third Bench Platform in Pit 2 (refer to **Figure 5-1** and **Figure 5-2**). The nearest site boundary was located in a northerly direction at a distance of approximately 100m. The details of the blast are specified below:

- Number of Holes: 54
- Hole Depth: 13m
- Stemming Height: 2m
- MIC: 87kg
- Burden: 3m

- **Figure 5-1 Sancrox Quarry - Blast Drilling in Progress**

5.2.2. Methodology

Monitoring was conducted at six locations (refer to **Figure 5-2**), which were chosen in order to encompass the proposed Sancrox Industrial Development area, and to provide data which would assist with the prediction of vibration and overpressure levels. Location 6 was chosen to duplicate the monitoring location chosen during the previous blast assessment, as part of the *Sancrox Employment Precinct Air and Noise Assessment (Heggies, 2007).*

Monitoring of the blast was carried out using two Instantel 'Minimate' vibration meters, two Instantel 'Blastmate' vibration meters, and two Blastronics 'umx' vibration meters. All meters were capable of monitoring vibration, and five of the six were equipped with microphones to enable the measurement of air blast overpressure levels. Location 2 was chosen as the site to forego overpressure monitoring, as this location was expected to experience the lowest overpressure levels.

The meters were mounted on solid concrete blocks, approximately 300mm x 200mm x 200mm in size, which were securely embedded in the soil to ground level. Geophones were secured to these concrete blocks using epoxy glue, and microphones were embedded in the ground at a height of 800mm. Vibration meters were set to trigger at vibration levels of 0.3mm/sec, whereupon they would record continuous noise and vibration levels for a period of 8 seconds.

- **Figure 5-2 Blast Monitoring Locations**

5.2.3. Results of Blast Monitoring

The blast was set off at 11:37am, and 15 holes were successfully fired. At this stage a cut off occurred, and the blast halted.

After the blast setup was repaired, the blast was re triggered at 12:07pm, and the remaining holes were blasted.

Preliminary results of the monitoring are set out in **Table 5-1**.

- **Table 5-1 Blast Monitoring Results, 14 July 2008**

Monitoring Location	Vibration Peak Particle Vector Sum (PPVS) mm/sec		Blast Overpressure – dB(L)	
	Blast 1 (11:37)	Blast 2 (12:05)	Blast 1 (11:37)	Blast 2 (12:05)
Location 1	2.82	1.13	118.2	118.0
Location 2	1.76	1.13	NO MIC	NO MIC
Location 3	1.76	1.15	116.7	114.8
Location 4	2.33	2.0	114.4	112
Location 5	25.7	19.0	120.8	123.8
Location 6	4.86	4.36	116.9	117.6

The results of these measurements as relevant to buffer zone requirements for managing airblast overpressure and ground vibration are discussed in **Sections 5.5** and **5.6** of this report.

5.3. Airblast Overpressure

Airblast, or overpressure, is an air pressure wave that is generated by explosive movement of rock and gases at the triggering of a blast, and is transmitted through the air. Although higher frequency components of an overpressure event are commonly audible, these are quickly attenuated through interaction with the atmosphere and local geography, and it is generally the low frequency components that are perceived, either directly through the body or through secondary effects such as the rattling of windows or doors. Overpressure is typically described and measured in a linear decibel scale (dB(L)).

Criteria, legislation and standards applicable to blast overpressure at this site have been discussed in **Section 3.1.2**.

5.3.1. Impact Assessment

Assessment of the likely overpressure levels on areas in the Sancrox Employment Precinct is based on calculated overpressure levels, with reference to the results of blast monitoring carried out during July 2008 (refer to Section 5.2). During discussion with Hanson's staff, it was

determined that the parameters of the monitored blast were typical for blasting operations at this site. The results of this monitoring compare well with the results of Heggies monitoring conducted in July 2007, where similar charges were used and effectively identical results were obtained.

The results of monitoring were compared to calculated overpressure levels, using methods outlined by the US Bureau of Mines. These have been set out below in **Table 5-2** for reference.

- **Table 5-2 Monitored and Calculated Blast Overpressure Levels**

Location	Distance from Blast (m)	Measured Overpressure dB(L)	Calculated Overpressure (MIC 87kg)
1	447	118.1	108.3
2	658	-	104.3
3	500	115.75	107.2
4	342	113.2	111.1
5	105	122.3	123.4
6	237	117.25	114.9

The results above indicate that whilst calculated values are generally indicative of actual airblast overpressure levels generated by blasting at the quarry, calculations become less reliable at increased distances. However it can be seen that calculated values appear reliable for distances where measured values approach the ANZECC airblast overpressure criteria, and therefore the calculated results have been used in this assessment.

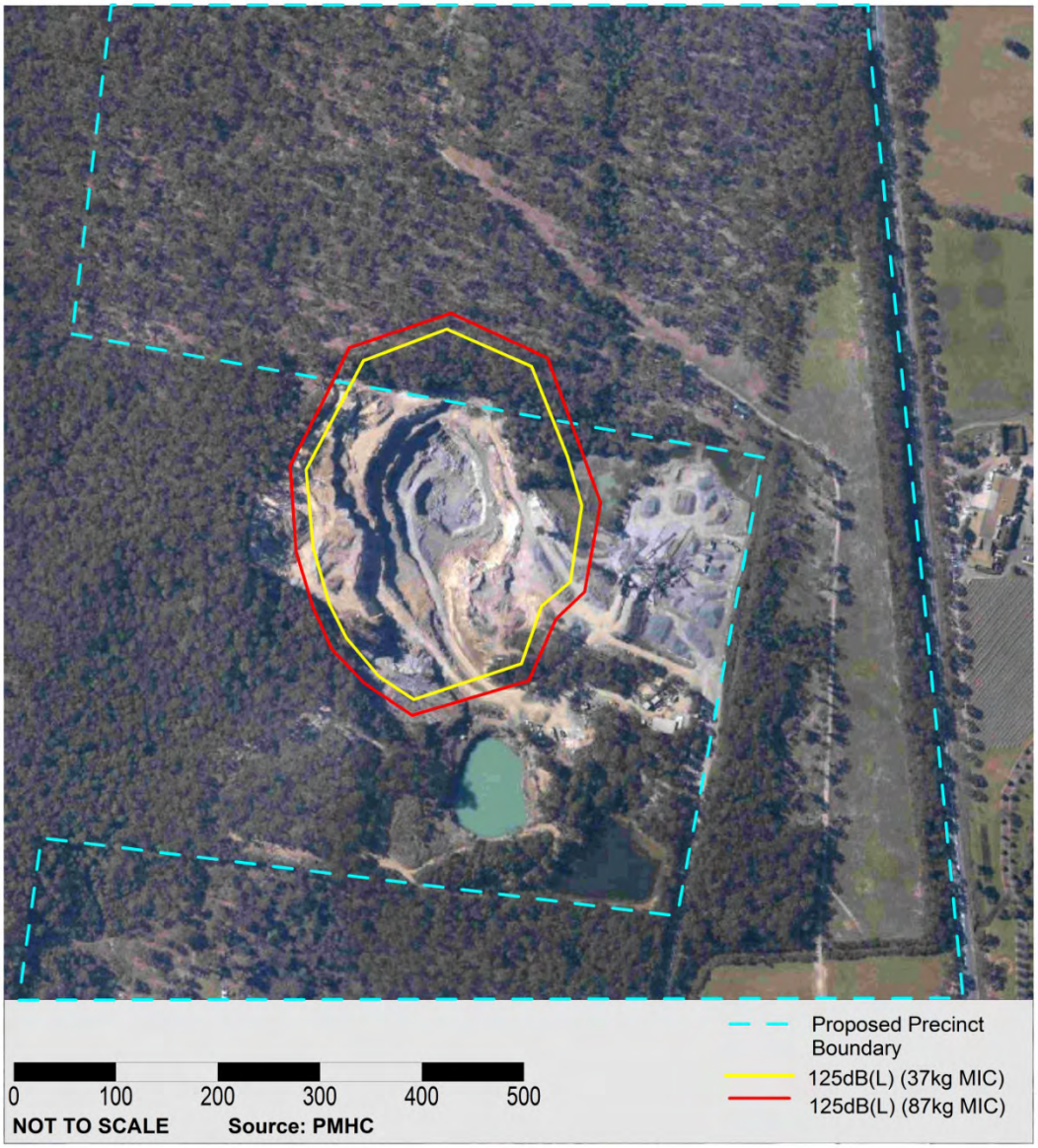
Table 5-3 sets out calculated airblast overpressures at increasing distances away from the blast.

Table 5-3 Predicted Overpressure Levels

Distance (m)	Calculated Overpressure Level – dB(L) MIC 87kg	Calculated Overpressure Level – dB(L) MIC 37kg
10	148	146
17	143	**140**
21	**140**	138
34	135	**133**
42	**133**	131
50	131	129
73	127	**125**
90	**125**	123
100	124	122
118	122	**120**
146	**120**	118
200	117	115
500	107	105
1000	100	98

Assuming an overpressure limit of 125dB(L) is adopted (refer to Section 3.1.2), then compliance can be seen to occur at a distance of approximately 73m where an MIC of 37kg is used, and at 90m where an MIC of 87kg is used. This would prohibit development to the south western area of the adjacent northern lot, for a distance of approximately 100m, with the precise distance varying depending upon the variables of each blast event, including the MIC used. An approximate representation of these results has been shown below in **Figure 5-3**. It should be noted that these distances are indicative only, and actual airblast levels may vary considerably according to precise blast and geological conditions.

- **Figure 5-3 Calculated Overpressure Contours**



It should be noted that these contours have been calculated using a worst case, non directional approach, and have assumed that a blast may occur anywhere within the pit area. This approach would tend to overstate predicted overpressure levels, particularly behind the face of the blast. It therefore follows that these calculations are an approximate representation of potential air blast levels only, and monitored results will vary with each individual blast.

5.3.2. Possible Mitigation Measures

During a blasting event, the major influences on air blast levels include:

- Delay interval;
- Charge mass;
- Burden;
- Spacing;
- The amount and type of stemming used;
- Direction of initiation of the blast;
- The charge depth;
- Covering of the detonation cord;
- Charge confinement;
- Blast hole deviation;
- Geological conditions; and
- Meteorological conditions.

The primary method for attenuating blast overpressure should be the consideration of these factors during the design of a blast event. One option during the blast design may be increasing the front row burden and stemming height to reduce the air blast distances. For example increasing the minimum front row burden to 3.5m will decrease air blast levels by 5 dB(L) for all blasts if accompanied by a stemming height increase to 3.0m. The burden of following rows can remain at 3.0m. It should be noted, however, the results of this assessment are based on current blasting practices, as measured in July 2008, which are considered acceptable for maintaining acceptable impacts within 73 m for 37 kg MIC blasts and 90 m for 87 kg MIC blasts.

Off site options for mitigating the effects of air blast are similar to those that would be used to reduce the impact of equipment noise at receiver locations, however it should be noted that noise walls do not generally provide significant attenuation against overpressure, and that the benefits of these structures in relation to overpressure amelioration is generally outweighed by the associated construction costs.

The most effective option for reducing the impact of blast overpressure would be its consideration during the design of the industrial precinct site layout. At the design stage consideration should be given to potential future land uses, distances from potential blast zones, building layout and internal building design.

In designing the layout of the industrial zone, possible screening benefits that can be obtained from the placement of large buildings or warehouses along the development area boundaries should be considered. Thought should also be given to the location of offices, staff rooms other sensitive activities within the buildings.

During the construction of buildings in the Sancrox Employment Precinct, consideration may also be given to the incorporation of architectural noise treatments to individual buildings. These may consist of one or more of the options outlined below:

- Minimisation of window size and number, particularly those facing the quarry;
- Additional roof insulation;
- Thicker glass used in windows; and
- Incorporation of sound insulating material in walls, especially those walls facing the quarry.

5.3.3. Buffer Zone Recommendations

Applying the results of the unmitigated overpressure calculations to standard blast overpressure criteria, development would not be recommended on land contained within the 125 dB(L) contours shown on **Figure 5-3,** assuming there is no limitations to quarrying activities within the quarry boundary.

5.4. Ground Vibration

Vibration is generated at the moment of the blast and is transmitted through the ground. The effects of vibration can be divided into three main categories:

- Where occupants or users of the building are disturbed or inconvenienced;
- Those in which the building contents may be affected; and
- Circumstances in which the integrity of the building or the structure itself may be prejudiced.

Vibration is measured by monitoring the movement of the ground through the three orthogonal axis, and producing a figure to represent the vector sum of this movement. The vibration levels at which human discomfort is perceived are well below the levels at which building damage may be caused.

Criteria, legislation and standards applicable to blast induced vibration at the quarry have been discussed in **Section 3.1.2**.

5.4.1. Impact Assessment

Assessment of the likely ground vibration levels on areas in the Sancrox Employment Precinct has been based on calculated vibration levels, with reference to the results of blast monitoring carried out during July 2008 (refer Section 5.2 and **Table 5-1**). During discussion with Hanson's staff, it was determined that the parameters of the monitored blast were typical for blasting operations at this site. The results of this monitoring compare well with the results of Heggies monitoring conducted in July 2007, where similar charges were used and effectively identical results were obtained.

The results contained in **Table 5-1** showed that likely vibration levels at the nearest quarry boundary are expected to be marginally below 25mm/sec. The results of vibration monitoring were compared with calculated vibrations levels, using methods developed by the US Bureau of Mines are outlined below.

- **Table 5-4 Calculated Vibration Levels**

Location	Distance from Blast (m)	Measured PPV mm/sec	Calculated PPV (MIC 87kg)
1	447	1.98	2.33
2	658	1.45	1.26
3	500	1.46	1.95
4	342	2.17	3.58
5	105	22.35	23.69
6	237	4.61	6.44

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As for airblast overpressure the calculated ground vibration levels are generally indicative of actual measured vibration levels generated by blasting at the quarry, with calculations becoming less reliable at increased distances. However it can be seen that calculated values appear reliable for distances where measured values approach the ANZECC ground vibration criteria of 25 mm/s, and therefore the calculated results have been used in this assessment.

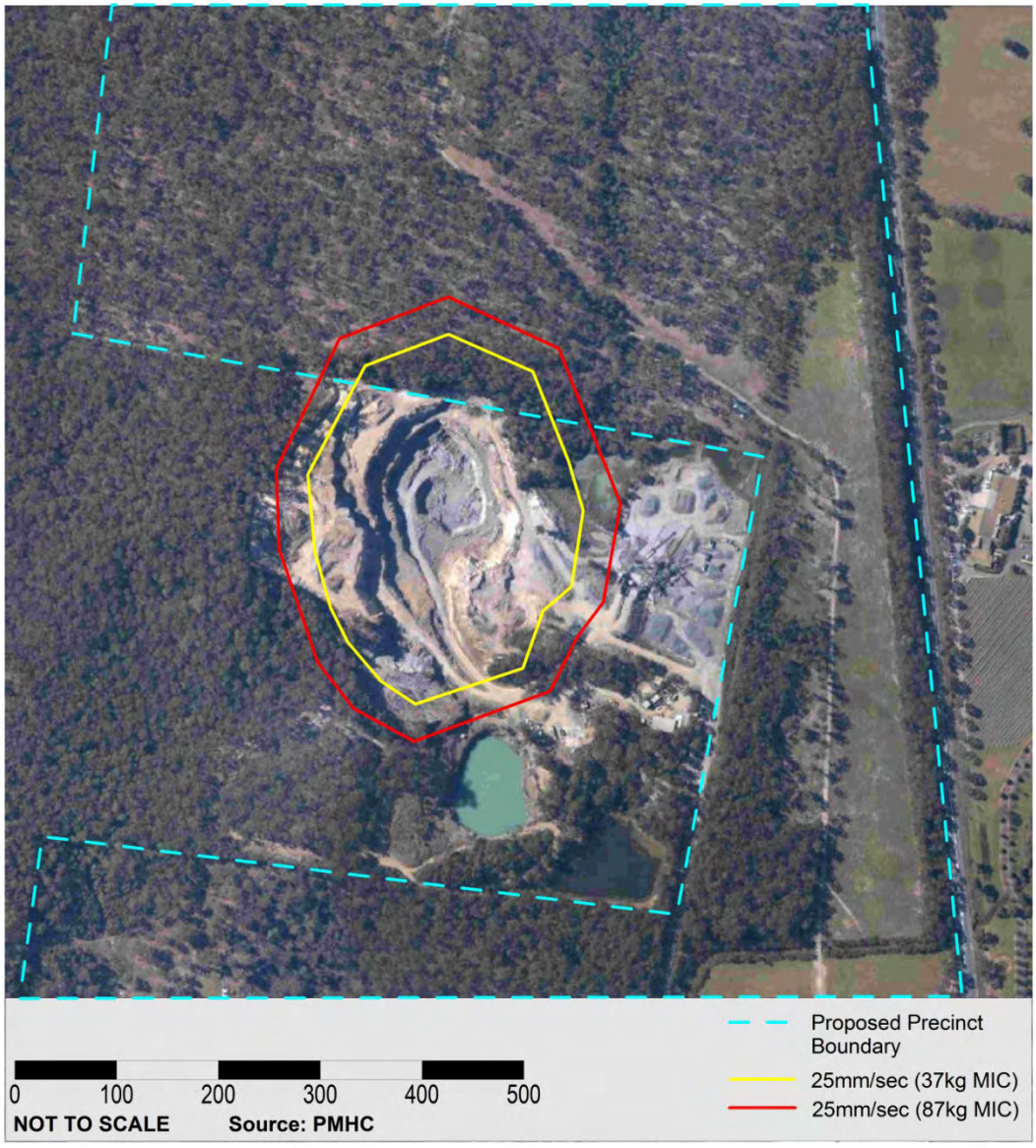
Table 5-5 sets out calculated ground vibration at increasing distances away from the blast.

- **Table 5-5 Predicted Vibration Levels**

Distance (m)	Calculated PPV - mm/sec (MIC 87kg)	Calculated PPV - mm/sec (MIC 37kg)
10	1019.8	514.6
50	77.7	39.2
66	49.8	**25.1**
100	25.6	12.9
101	**25.2**	12.7
180	10.0	**5.0**
200	8.5	4.3
277	**5.0**	2.5
500	2.0	1.0
1000	0.6	0.3

Assuming a vibration limit of 25mm/sec is adopted, compliance can be seen to occur at a distance of approximately 66m where an MIC of 37kg is used, and at 101m where an MIC of 87kg is used. This would prohibit development in the southern area of the adjacent northern lot, for a distance of approximately 100 m, depending upon the MIC used during a blast event. It should be noted that actual vibration levels may be within plus or minus 65% of these calculated values, due to the observed margin of error included in the calculations. These results are illustrated in **Figure 5-4** overpage.

- **Figure 5-4 Calculated Vibration Contours**



It should be noted that these contours have been calculated assuming a blast may occur anywhere within the pit area. In addition it makes no allowances for local geology, water content or the direction of blast initiation. For this reason these calculations should be interpreted as an approximate indication of potential vibration levels only.

5.4.2. Possible Mitigation Measures

The primary method for attenuating ground vibration during blasting should be through consideration of off-site vibration impacts when designing the blast event. The main parameters affecting ground vibration levels during a blast are:

- Maximum Instantaneous Charge (MIC);
- Delay interval;
- Direction of initiation;
- Charge confinement;
- Blast hole deviation;
- Geological conditions; and
- Water saturation of ground.

Employment Precinct Mitigation Measures

Off-site options for reducing the impact of blast overpressure may include the consideration of separation distances and local geography during the design of the site, including giving thought to possible future land uses and the internal layout of buildings (ie offices, staff rooms other sensitive activities should be positioned in areas furthest from the likely location of future blasts.).

5.4.3. Buffer Zone Recommendations

Applying the results of the unmitigated overpressure calculations to standard blast overpressure criteria, development would not be recommended on land contained within the 25mm/s contours shown on **Figure 5-4,** assuming there is no limitations to quarrying activities within the quarry boundary.

The limits may be increased further if agreement can be reached with the occupier of the premises. In setting these limits, consideration would be given to the building design and inherent frequency dependant weaknesses in its structure.

5.5. General Quarry Noise

Noise impacts from the Sancrox Quarry may be generated through many different activities; however the main sources of audible, off-site noise would typically be activities such as blasting, crushing, reversing beepers and the loading of material into buckets or trucks.

The transmission of noise over the type of distances involved with the existing quarry, are typically influenced primarily by the local geography and the separation distance between the source and the receiver.

Criteria, legislation and standards applicable to site noise emissions from the Sancrox Quarry have been discussed in Section 3.1.1.

5.5.1. Impact Assessment

Each impact assessment must ensure that the potential for any adverse impacts is thoroughly examined and that adequate mitigation is employed. In some instances due to the nature and proximity of the works, it is expected that noise impacts may not be adequately controlled at all receiver locations: as previously noted, the DECC advocates that the assessment procedure should not be considered in isolation from other social and economic aspects of a development.

A typical case equipment list and expected sound pressure levels are presented in **Table 5-6** below. It should be noted that no noise measurements were made at the Sancrox Quarry so the following values are approximates only.

Table 5-6 Likely Equipment List and Typical Sound Power Levels

Plant	Sound Power Level dB(A)	Operating Area
Crushing Plant	115	Crushing Plant
Front End Loader	114	Crushing Plant
Front End Loader	114	Crushing Plant
On-Site Dump Truck	110	Crushing Plant
Dog & trailer product truck	110	Crushing Plant
On-Site Dump Truck	110	Pit Operations
Excavator + Hammer	119	Pit Operations
Hydraulic Drill	120	Pit Operations

Likely quarry noise levels have been calculated for both the pit operations and crushing activities. During each calculation, all equipment has been assumed to be operating simultaneously in the nominated work area. Calculations have been based on simple noise attenuation techniques, and as such the results shown below in **Table 5-7** have not taken into account further reductions in noise levels that may occur due to ground or atmospheric absorption or as a result of local geographical influences, such as the pit face. As such these noise calculations should be viewed as conservative, and in general estimated ‘worst case’ noise levels.

Table 5-7 Estimated Construction Noise Levels

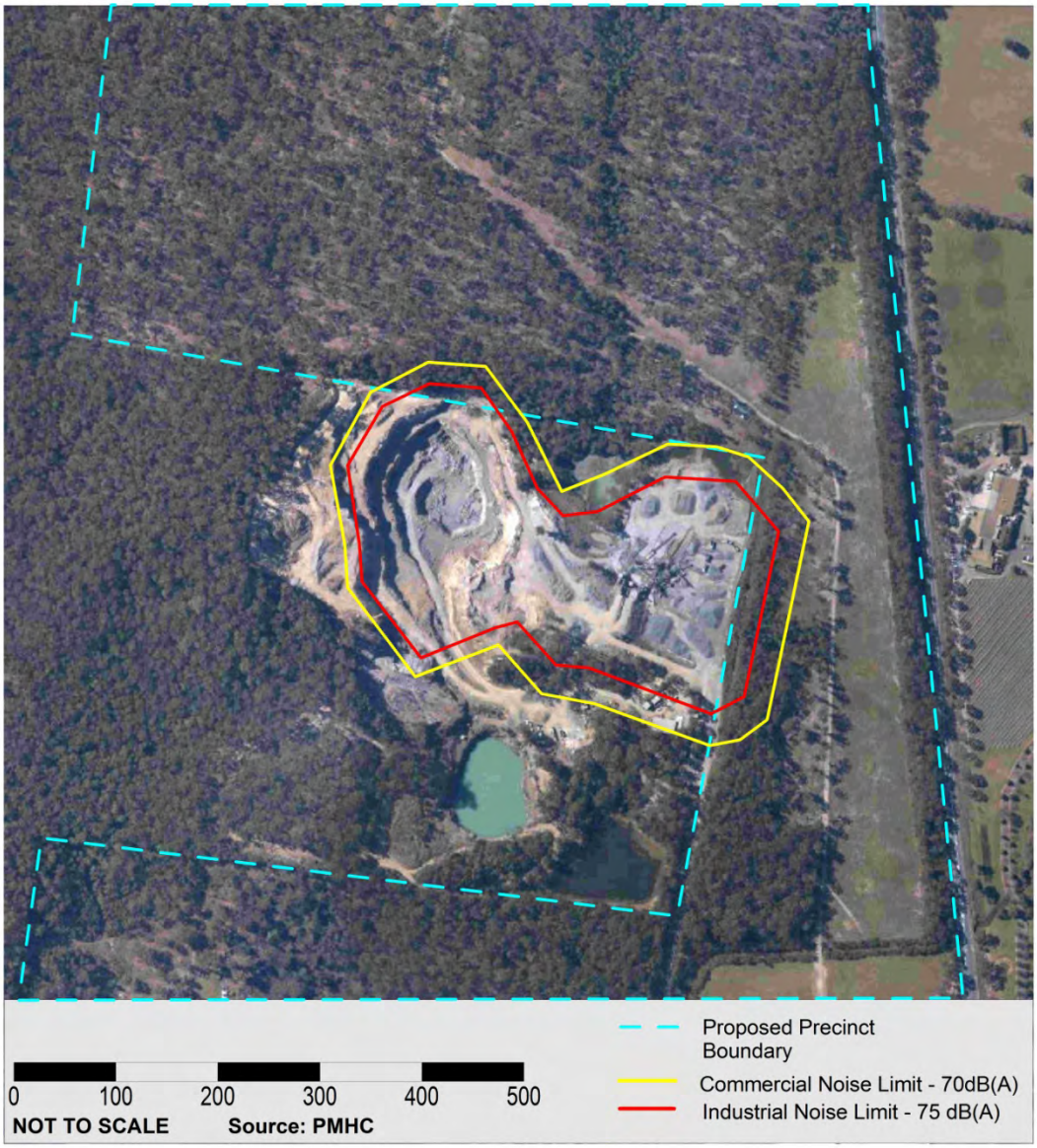
Distance from Work Area (m)	Estimated Noise Level – Pit Operations – dB(A)	Estimated Noise Level – Crushing Plant – dB(A)
40	80	**75**
50	78	73
70	**75**	**70**
100	72	67
125	**70**	65
200	66	61
300	62	57
400	60	55

As a result of normal crushing activities, compliance with the commercial amenity criteria of 70 dB(A), as contained in the INP, would typically occur at a distance of approximately 70m from the crushing plant, whilst during pit operations compliance may be expected at a distance of 125m from the pit. Although in actuality noise from low areas of the pit would be subject to a nominal 10 dB(A) attenuation as a result of screening from the pit face. This would reduce the separation distance required to approximately 40m, and has been included in the calculation of the approximate radius of these distances which is shown in **Figure 5-5**.

It is acknowledged that at times mobile plant, eg. drill rigs will be operating on the top of the pit and when this occurs close to the boundary will be operating, a distance of up to 125 m may be needed to meet commercial noise criteria. Given the infrequency of such activities, these would be most appropriately management on a case by case basis rather than specific consideration as part of the buffer zone assessment.

In terms of compliance with the industrial amenity noise criteria of 75 dB(A), compliance would be expected within 70m of pit operations and within 40m of crushing plant activities. Again 10 dB(A) reduction in pit noise levels would be expected, and an approximate radius of these distances, including the pit face attenuation, has also been included in **Figure 5-5**.

- **Figure 5-5 Calculated Noise Limit Contours**



5.5.2. Possible Mitigation Measures

Measures to mitigate the effects of noise pollution have been outlined in the Hanson Sancrox Quarry Environmental Management Plan, and include:

- No other machinery is to operate in exposed locations (ie on existing ground levels above the pit) while drilling is being carried out in those locations.
- No drilling will be carried out in exposed locations while stripping work is being carried out in those locations.
- Additional equipment brought to site will be inspected to ensure that it is in good condition with regard to engine, transmission and exhaust system before use.
- Stripping work will be carried out in exposed locations at the northern end of the quarry during north easterly to north westerly breezes and at the southern end of the quarry during south westerly to south easterly breezes; or alternatively
- Stripping work will be carried out in exposed locations in the quarry only while the other plant and machinery is shut down.
- Blast size is to be kept to a maximum instantaneous charge of 37kg apart from blasts within 375m of residence B (to the south of the subject property) when the maximum instantaneous charge will be a maximum of 15kg, additional overburden should be placed on the surface over the charges to contain the blast pressure, or blasting should be carried out behind a berm with a minimum height of 2m.
- There is to be continuing education of workers to ensure awareness regarding noise control.
- Monitoring measures as detailed in Section 4 are to be implemented during future operations of the quarry.

The EMP also sets out that monitoring of noise levels will be carried out by an acoustical consultant:

- Following complaints from adjoining landowners (no complaints recorded to date);
- After replacement of major plant or equipment with potential to increase cumulative noise levels; and
- During stripping operations of the exposed areas of Stage 3 extraction.

The purpose of the monitoring is to ensure that the specified acceptable noise limits outlined in the Noise Impact Assessment prepared by Caleb Smith Consulting are not exceeded.

More generic mitigation options that could be employed by the quarry to reduce noise levels may include:

- Giving consideration to site layout and plant locations;
- The use of dampened tips on rock breakers;
- The screening of work areas, particularly for exposed operations such as the crushing plant and truck loading areas; and
- Where OH&S issues can be safely managed, the use of alternatives to reversing alarms such as spotters, closed circuit television monitors and 'smart' reversing alarms.

In addition to on-site quarry noise mitigation off-site options may be considered. These should begin with the consideration of the site layout, including possible screening benefits that may be obtained through the placement of large warehouses or similar buildings along the boundary of the development area. Consideration should be given to possible impacts on any noise sensitive premises.

Further reductions can be achieved through the consideration of the internal design of buildings; plans should consider the placement of sensitive rooms, such as staff rooms and offices at the opposite end to the quarry. Where noise reductions are still required, and costs are not considered excessive, consideration may be given to building architectural treatments such as:

- Boundary fences with noise attenuation in their design;
- Minimisation of window size and number, especially those facing the quarry;
- Doors be constructed in a manner that considers noise mitigation in their design (eg Solid core doors, with seals);
- Sealing of eaves;
- Additional roof insulation;
- Thicker glass used in windows;
- Double layer of plasterboard in the ceilings;
- Double brick construction or incorporation of sound insulating material in walls; and
- Double glazing of windows, especially those facing the Quarry.

5.5.3. Buffer Zone Recommendations

Figure 5-5 shows the estimated noise levels from quarry operations in the Sancrox Employment Precinct. As can be seen, estimated noise levels in the north (DP 754434 and DP 226821) and south (DP 555085 and DP 25577) of the proposed development area should remain within the criteria outlined in the NSW INP for both commercial and industrial properties.

Estimated noise levels directly to the north of the quarry (DP 124543) are expected to effectively remain within both the industrial and commercial noise criteria throughout the area. A small region adjacent to the north eastern corner of the quarry site has been predicted to marginally exceed the commercial criteria, however this area is screened by an existing soil berm of approximately 2m in height which obstructs a direct line of sight to the quarry crushing operations, and a nominal 5 dB(A) reduction in the calculated noise level would be expected.

Where more sensitive land uses are desired within this lot, a noise screen along the top of the existing earth berm would be expected to provide further noise attenuation, up to levels in the order of 5dB(A) - 10dB(A), however detailed noise modelling would be required to confirm actual noise reductions.

When considering noise levels in the area between the Sancrox Quarry and Pacific Highway (DP 22740), calculations have shown that the area adjacent to the crushing plant, located between the quarry boundary and the Dunn property's on-site access road, may not be suitable for commercial development without further mitigation. Noise levels may be reduced in this area by the construction of a noise screen between the northern quarry boundary and the quarry weighbridge. It is expected that approximately 10dB(A) noise attenuation could be gained through a structure such as this, thereby bringing the entire area within the NSW INP industrial amenity criteria, and the land to the east of the access road to within the commercial amenity criteria. However the area is effectively outside the industrial noise contour, and as such it would be expected that industrial landuses in this area may proceed with little or no mitigation.

Where large warehouses are planned for construction, an additional noise reduction of approximately 5dB(A) may be gained through the positioning of these structures in a manner that considers their potential screening benefits for subsequent rows of buildings. It should be noted that where these buildings are themselves located with zones of excessive noise, they should not have doors or windows located on their western side, and construction should be of a suitable soundproofing material, such as colourbond or similar. In addition, areas to the west of the buildings should not be designed for day-to-day use.

5.6. Air Quality

Potential air quality impacts from quarry activities in the vicinity of the Sancrox Employment Precinct include vehicle exhaust emissions and particulate matter (dust).

Dust may be generated on the quarry site through many different processes, including vehicle movements on unsealed roads, stripping of overburden, drilling and crushing activities, blasting, loading and unloading of materials, and wind scouring from exposed surfaces such as stockpiles, truck trays, pit areas and roads.

Common size related terms are the classes Total Suspended Particulate Matter (TSP), PM_{10} and $PM_{2.5}$. TSP refers to the mass concentration of all suspended particles in the atmosphere. PM_{10} refers to all particles with aerodynamic sizes less than 10 μm, and $PM_{2.5}$ is all particles with aerodynamic sizes less than 2.5 μm. Dust deposition rates are used to assess the effects of coarse particulate matter on amenity.

Particulate matter presents a health hazard to the lungs, enhances chemical reactions in the atmosphere, reduces visibility, increases the possibility of precipitation, fog and clouds and reduces solar radiation.

The health effects of particles are largely related to the extent to which they can penetrate the respiratory tract. Larger particles (those greater than 10 μm) generally adhere to the mucus in the nose, mouth, pharynx and larger bronchi and are generally removed by swallowing or expectorating. Respirable particles are particles with an aerodynamic size less than about 3 μm. Particles below 2.5 μm can reach the deepest parts of the respiratory system, where they can only be removed by the body's cellular defence system. Respirable particles have been associated with a wide range of respiratory symptoms.

5.6.1. Impact Assessment

Although no air quality data is available for the quarry site, it is expected that dust deposition (fallout) will be an important consideration at the Sancrox Employment Precinct, but one which is expected to be manageable, without the need for significant buffer distances.

The main sources of dust generation within the Sancrox Quarry site are expected to be wind generated dust from exposed areas, wheel generated dust from truck movements and the dust generated during the crushing of rock material. Smaller emissions may be generated as a result of truck loading and dumping and blasting activities on the site.

Specific influences on dust emissions at the Sancrox Quarry are outlined below:

- Exposed areas at the quarry site are principally located within the pit area, and as such are generally protected to some extent from wind erosion.
- The quarry crushing plant has continuous water spraying over conveyor belts which significantly reduces dust emissions from this source; this technique has the added benefit that material stockpiles are generally washed gravel, and would therefore not be expected to generate significant volumes of airborne dust.
- The Sancrox Quarry EMP requires that onsite haul roads are watered, particularly during periods of increased wind speeds.

Assuming standard dust mitigation methods, including those outlined in the Sancrox Quarry EMP continue to be followed, dust levels at the quarry boundary would be expected to generally comply with the NSW air quality criteria discussed in **Section 0**.

It is acknowledged that by increasing the population around the quarry will in general increase the chance of complaints from impacts such as dust.

To minimise this potential proposed land uses adjacent to the quarry at this stage include a cement works and asphalt plant, in addition to other quarry related industry. These land types are not typically dust sensitive and potential dust emissions from the quarry are not expected to affect the day to day operation of these potential future industries.

5.6.2. Possible Mitigation Measures

Quarry dust mitigation measures include:

- Implementation of dust emission control measures including the activities outlined in the EMP in addition to seeding long-term stockpiles, and removing mud and dirt tracked on to road surfaces;
- Monitoring and recording the effectiveness of measures implemented to control dust emissions;
- Progressively rehabilitating disturbed areas as soon as earthworks are complete or where earthworks on disturbed areas are dormant for greater than 8 weeks;
- Limiting vehicle and machinery access to designated work areas;
- Installing water micro-sprays using recycled water from sediment dams to wet the various stages of materials production at the processing plant and equipment;

In addition to quarry dust mitigation, consideration should also be given to locating dust sensitive land uses, such as spray painting workshops, photographic studios and fabric manufacturing eg. sail makers, at increased distances from the quarry. Dust modelling, using software applications such as Ausplume can assist with determining suitable separation distances.

5.6.3. Buffer Zone Recommendations

Assuming the standard dust minimisation techniques discussed above are used on the quarry site, and dust sensitive industries are located away from quarry site boundaries, there should be no reason that dust impacts will negatively affect normal day-to-day running of industries within the proposed industrial precinct.

5.7. Flyrock

For the assessment of flyrock impacts associated with the Sancrox Quarry, a special consultant Terrock was engaged to perform this work.

A full copy of the Terrock report is included in **Appendix B**.

The Terrock report concludes:

> *"Large quarries have operated with blasting operations close to houses and factories with appropriate control measures to limit the throw of flyrock. The control measures required should form part of the Blast Management Plan.* (Refer to Section 6 of Terrock report for discussion of Blast Management Plan recommendations.)
>
> *Ideally, flyrock must be contained within the quarry boundary or on land owned or controlled by the quarry. However, it is acceptable to the Mines Inspectorate that, with adjoining landowners permission, adjoining land may become part of the safety exclusion zone for quarry blasting operations where flyrock may be expected to land. Without this agreement, the quarry boundary is the limit of flyrock throw.*
>
> *The quarry is required to maintain the boundary fence and it is usual for the extraction limit to enable the construction and maintenance of a perimeter road within the boundary fence. The extraction limit is usually at least 20m from the boundary although it may be reduced to 10m in some cases.*
>
> *With the adjoining landowners permission, and with suitable evacuation procedures for persons located on the adjoining land, blasting can be conducted to within 20m of the quarry boundary with the adoption of suitable blasting specifications and practices. However, if flyrock is not to leave the quarry boundary under any circumstances, the control over the drilling and loading operations requires a major change to current blasting specifications and loading practice."*

Noting that a minimum 90 m buffer zone between quarry activity and any future industrial / commercial receivers has been determined from theoretical assessment of quarry noise, air quality as well as blast vibration and overpressure for blasts with MIC of no greater than 37 kg, Terrock conclude:

> *"If an agreement is reached with the adjoining landowner that the adjoining land can be included as part of a 90 metre blast safety exclusion zone, and that infrequent flyrock into this area is acceptable to the owner and the responsible authorities, this can be achieved with only minor increases to burden and stemming height from current practice.*

6. Conclusion

SKM in association with Terrock Consultants were appointed by Port Macquarie Hastings Council (PMHC) on 17 June 2008 to complete a Buffer Zone Assessment which investigates the likely impacts of the existing/future quarry operations at Hansons Quarry on future industrial / commercial receivers within the proposed adjacent Sancrox Employment Precinct.

Specific quarry impacts assessed included fly-rock risk, ground vibration and airblast overpressure from quarry blasting as well as general quarry noise and dust impacts.

At this time, there are no agreed buffers beyond the property boundaries of the adjoining quarry and there is no assumption that there is any capacity for buffers on surrounding land. The quarry however, operates under an existing development consent and plans for a westward expansion have recently been flagged, subject to lodgement and approval of a formal Development Application (along with the relevant owner's consent to DA lodgement).

In September 2008, SKM issued an interim response to the study brief. Preparation of the report was facilitated by dialogue with Council's planning staff, in addition to a site inspection and stakeholder workshop held with Council staff, relevant consultants, the DPI and landowner representatives on 4 July 2008.

The workshop agreed on a number of key issues that warranted further investigation, including review of existing studies; buffer zone policy applicable in NSW and elsewhere; and impacts of general quarry operations and blasting that may impact on the proposed Sancrox Employment Precinct. This report addresses these issues, broadly discusses potential mitigation options which may allow the reduction or elimination of a buffer zone situated on properties adjacent to the quarry.

The outcome of the buffer zone investigations is that following the implementation of remedial measures to reduce quarry impacts as implemented by both the quarry and design features of the proposed Sancrox Employment Precinct, some buffer beyond the existing quarry boundary would be required to mitigate quarry impacts, assuming quarry activities including blasting may occur within 10 – 20 m of quarry boundaries. Based on the assessments undertaken and associated assumptions a buffer distance beyond the quarry boundary of approximately 90 m is considered sufficient to mitigate adverse impacts from quarry blast ground vibration, airblast overpressure as well as general quarry noise and dust impacts. Stakeholders representing the quarry and adjoining landowners will need to consider the feasibility of the remedial measures proposed that are considered necessary to achieve this minimum buffer distance.

With respect to flyrock Terrock's conclusion is that:

"If an agreement is reached with the adjoining landowner that the adjoining land can be included as part of a 90 metre blast safety exclusion zone, and that infrequent flyrock into this area is acceptable to the owner and the responsible authorities, this can be achieved with only minor increases to burden and stemming height from current practice."

Appendix A Meeting Minutes

A.1 Meeting - 29/07/08

Minutes – Reissued

Purpose of Meeting	**Stakeholder Consultation**		
Project	Sancrox Employment Precinct Buffer Zone Assessment	**Project No**	EN02471
Prepared By	Katie Bagnall	**Phone No**	02 4979 2600
Place of Meeting	Sancrox Quarry & Port Macquarie Hastings Council	**Date**	4 July 2008
Present	Quarry site visit and Council meeting SKM Project Manager – Matt Davies (MD) SKM Environmental Scientist – Katie Bagnall (KB) SKM Acoustics / Air Quality Scientist – Ben Ison (BI) Terrock Blast Specialist – Alan Richards (AR) Council Senior Strategic Planner – Sandra Bush (SB) Council Strategic Planning Manager – Peter Cameron (PC) NSW DPI – Jeff Brownlow (JB) Hanson Quarry Area Manager Northern NSW – Chris Dolden (CD) Hanson Quarry Manager – Brad Allman (BA) King & Campbell Landowner Representative – Tony Thorne (TT) King & Campbell Landowner Representative – Meg Teasdell (MT) Council meeting only Landowner – James Dunn (JD) Landowner – Dan McMullen (DM)		
Apologies	Hanson Quarry Country NSW Manager – Graeme Stark Landowner –Peter Beaumont	Landowner – Patrick Cassegrain Landowner –Catherine Dunn	
Distribution	All attendees		

Item	Action By/Date
1) **Sancrox Quarry Site Visit** Brad Allman provided an overview of quarry operations, including pit locations, production rates, blast procedures and an indication of future development and expansion of the operation. Detail included: ▪ Extraction rate 70,000m^3 per annum. ▪ Benches were generally <12m in height to maintain safe operations. ▪ Of the 5 benches, the commercial value of levels 3–5 was greatest (e.g. for road construction), with some value in levels 1–2 for select material. ▪ Development approvals have been sought and obtained to expand the extraction area, but maintain the extraction rate.	Note

Item	Action By/Date

- Can work on 3-4 faces at any one time to service the current market.
- Base of pit 3 is currently at the lowest level (AHD) permitted by development approval.
- Plan to extract material from northern to south-western area, depending on commercial factors.
- Future expansion to northwest to extract commercially valuable material.
- Nearest sensitive receivers are McMullen residence to south and Dunn residence to north respectively.
- Observed drill rig and crusher operating and a road truck and front end loader moving around site.
- Safety procedures shot-firer follows prior to blasting includes clearing site and adjacent areas, posting sentries at boundaries and blocking site access, sounding sirens and countdown to blast, checking discharge of explosives and giving all clear to site. No formal requirement to notify neighbours of intended blast.

2) **Meeting at Council Chambers** Note

Refer to attached slides

1. PC provided an overview of the buffer zone assessment project.
2. MD introduced the SKM (and Terrock) project team, and stakeholders (Council, Hansons. Landholders, DPI, King and Campbell (representing landholders). Recap of Agenda.
3. MD
    a. provided an overview of the buffer zone assessment scope of works, deliverables and timeframe for completion (refer to attached presentation).
    b. explained the differences between the Heggies report and the SKM assessment.
4. JB
    a. DPI broadly supports the approach by Council and its consultants.
    b. DPI would need to assess any proposal on merit to avoid significant constraints on future extractive industry in the existing quarry and a NW resource extension.
    c. DPI was likely to be sympathetic to an operational accord between the quarry operator and industrial precinct proponent that is also acceptable to Council.
    d. S.117 notifications for resource protection were being revised, and likely to be modified to include a NW extension of the resource and a westward buffer zone extension to Haydons Creek.
    e. The Mining SEPP permits extractive industry on land where either agriculture or industry is permitted.

Item	Action By/Date

f. DPI buffer zones were for planning purposes (to trigger consultation), but tended to coincide with DPI's recommended safety margin of notionally 1 km around quarries involving blasting.

g. Safety margins for blasting could be less with appropriate investigations, but the general recommendation from DPI was for a minimum of 500 m.

h. DPI is not a consent authority for extractive resources (construction material are not Minerals under the Mining Act) and therefore its environmental responsibilities for mines did not extend to quarries.

i. Quarries are covered by the Occupational Health and Safety Act and Mine Health and Safety Act (formerly Mines Inspection Act) which regulates OHS. Mines Inspectors are not involved in conditioning consents but tend to take public risk seriously. Further advice will be sought, particularly as the focus on blasting safety and management has clear implications for quarry operations and hence for OHS.

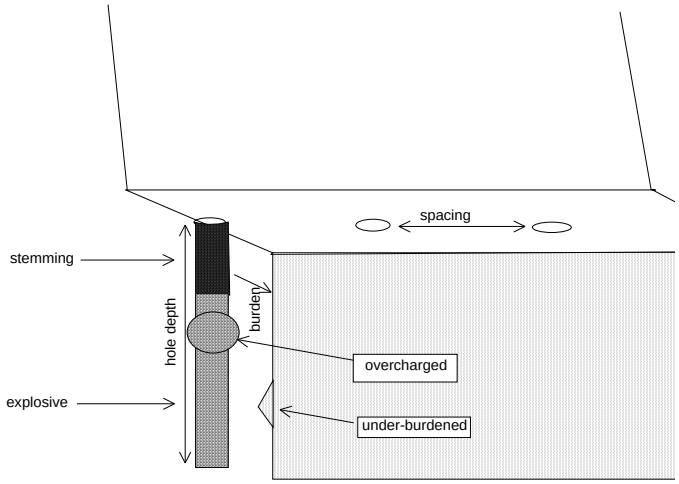
j. DPI had concerns about additional development being permitted in the vicinity without traffic access to and across the Pacific Highway being resolved, so progress was effectively conditional on the RTA implementing its proposal.

k. Site geology is complex, but an important factor in optimal quarry (and blasting) design. In particular, the rocks trend obliquely to the orientation of the proposed industrial precinct, so any blasting risk outside the quarry site could vary laterally and temporally.

5. AR

a. provided an introduction to blasting practices and explained terms such as hole spacing, burden, hole depth, stemming height.

Item	Action By/Date



b. discussed potential environmental and safety issues relating to flyrock and explained that flyrock is often a result of under-burden or over-charging.

c. explained the general trajectory theory for flyrock, which is what will be used for this assessment, using a combination of site-specific data and existing data for hard rock quarries.

d. explained clearance distance design (maximum throw of flyrock) and introducing safety factors for plant and personnel. General guidance is, for example, for a maximum throw of 100m, a plant safety factor would be 200m and a personnel safety factor would be 400m. Additional measures could also be considered to reduce clearance distances required and these would need further evaluation.

3) **General discussion of stakeholder issues** — Note

1. Some discussion between PC and JB on the process for determining and approval of a 'buffer zone' within DPI. JB indicated that while there are no firm DPI guidelines, the opportunity for up-front participation is welcomed.
2. All agreed that it should be assumed that the proposed upgrade to the access from Pacific Highway to Sancrox Road will be suitable for existing and future developments and was not a consideration for the current investigation. — SB to provide SKM with details of the proposed upgrade
3. TT questioned whether alternative blast control procedures would be put in place with regard to blasting 'towards' property

Item		Action By/Date
	boundaries. TT raised exclusion zones on adjoining properties as a major concern for landholders. TT expressed the view that the obligation was with the quarry to alter blasting/extraction practices when extracting material immediately adjacent to a property boundary and that an assumed buffer or exclusion zone on the adjoining property does not exist. Further, TT expressed the view that without an adjustment to quarrying methodologies to take into account the nonexistence of an exclusion zone, the additional cost of quarrying the material adjacent to quarry property boundary was in effect being transferred onto the adjoining landowner by affecting his land without any compensation.	Note
4.	BA advised that for every blast, specific planning is completed, considering the material being blasted, burden, hole spacing, etc. AR mentioned that there are blasting methodologies that can be applied to minimum flyrock such as increase the burden distance, greater spacing, smaller blasts and that there will be a limit to how far a quarry operator can go before such methodologies become too expensive or impractical.	Note
5.	TT raised the issue that the quarry must, pursuant to Clause 70 of the *Explosives Regulation 2005*, comply with AS 2187.2 *Explosives—Storage, transport and use* with respect to the establishment of Exclusion Zones. Appendix L of AS 2187.2 requires that for all blasts an exclusion zone or evacuation zone be established prior to firing the shot and that these are a component of the Blast Management Plan. If the exclusion zone is on or extends onto neighbouring property, then the feasibility of this is to be investigated for each blast, in consultation with local landholders and other affected bodies. TT expressed the view that an appropriate level of consultation has not occurred in the past (i.e. “an occasional phone call”) and therefore blasting could not be deemed compliant with AS2187.2. TT mentioned that the original development consent (which established the northern extraction limits) or the Environmental Management Plan for the site do not contemplate an exclusion zone on neighbouring properties. Further, the original DA assessed impacts of the quarry on existing residences and limited the MIC for blasting accordingly and was approved on the basis that such means were sufficient to mitigate the potential impacts of quarrying (including blasting) on the adjoining properties.	Note

Item		Action By/Date
	6. JD questioned if blast mats/covers could be used as an additional control measure. AR advised that blast mats are not suitable for use in quarries and raise additional safety issues	Note
	7. TT requested that the Heggies advice regarding Flyrock from Quarry Blasting be considered in SKM's work. The advice refers to a recent NSW Land and Environment Court Case (Figtree Hill Pty Ltd V Cleary Bros (Bombo)) which considered blasting and flyrock at a hard rock quarry. However, CD expressed some concern that the Heggies advice did not provide a coherent review of blasting practices and flyrock issues and questioned the relevance to SKM's scope of work.	This will be considered in the literature review to be undertaken by Terrock
	8. JB asked if the Terrock flyrock management (e.g. clearance distance design, etc.) had been reviewed by DPI – NSW Mines Inspectorate. AR indicated that he did not believe that a formal review has been undertaken in NSW, although other states had accepted the methodology.	
	9. General discussion about ground vibration and air blast overpressure. AR advised that Maximum Instantaneous Charge (MIC) is important for ground vibration, but less so for air blast overpressure. For the latter, the charge mass and distance, burden, stemming height were more important. BA indicated that blast vibration limits to be sought by the quarry rather than limits on MIC.	MD to provide AR with Heggies report
	10. In summary, MD acknowledged that flyrock, dust, air blast overpressure and ground vibration were issues that need to be quantified in order to understand the implications for the quarry operations and adjacent landholders	Note
4)	**Actions**	
	1. SKM to attend next quarry blast, weather and time permitting, to undertake some field monitoring of vibration and air blast overpressure. *Completed – see attached.*	SKM/ Hanson 8 July
	2. SKM to prepare an interim report and submit to Council. Report to comprise as literature review, summary of issues, and overview of existing controls. That is, a summary of the facts, no recommendations would be made.	18 July
	3. Council to invite comments from stakeholders on interim report	Fast turn-around time required from all
	4. SKM to submit draft report to Council for review	1 August (Fast turn-around

Item	Action By/Date
	time required)
5. SKM to address comments and re-submit report. Council to provide to stakeholders prior to workshop	est. 8 August
6. Presentation/Workshop	15 August

Attachment A – SKM Presentation

Sancrox Employment Precinct – Quarry Buffer Zone Assessment

Site Consultation Meeting

4 July 2008

Sinclair Knight Merz

Terrock

Stakeholders / Consultant Team

Stakeholders:

- Port Macquarie Hastings Council – Sandra Bush / Peter Cameron
- NSW DPI – Jeff Brownlow
- Hansons Quarry – Chris Dolden / Graeme Stark / Brad Allman
- King and Campbell – Tony Thorne / Meg Teasdell
- Landowners – Patrick Cassegrain / James and Catherine Dunn / Dan McMullen (Peter Beaumont)

Consultant Team:

- SKM – Matt Davies / Katie Bagnall / Ben Ison
- Terrock – Alan Richards

Agenda for Meeting

- Summary of Quarry Site Visit
- Scope of Buffer Zone Assessment
- Timeframe
- Deliverables
- Review of DPI Buffer Zone Considerations
- Workshop of Issues
- Actions

Summary of Quarry Site Visit

Scope of Assessment

- Prepare Methodology and Timeframe
- Review Draft Noise and Air Quality Assessment (Heggies, 2007)
- Prepare Interim Report – “highlight key issues and means to a resolution”
- Consult DPI
- Fly Rock Assessment
- Buffer Zone Assessment
- Reporting

Timeframe / Deliverables

Site Consultation	-	4 July 2008
Interim Report	-	18 July 2008
Draft Buffer Report	-	1 August 2008
Council Comments	-	15 August 2008
Final Report	-	29 August 2008

DPI Buffer Zone Considerations

> Input from Jeff Brownlow

7

Workshop of Issues

> General Discussion of Stakeholder Issues for Consideration

8

Actions Arising

9

Attachment B – Summary of Blast Monitoring, 8 July 2008

The blast was set off at 11:37 am as planned on Tuesday, 8 July. However, a 'cut off' occurred, where an interruption in the blast lead resulted in only 31 of the 54 blast holes being triggered. The wires were retied and the remaining holes were blasted at 12:05 pm. All blast monitors were triggered and vibration data was obtained at 6 locations, and overpressure results at 5 locations (see below). Due availability of monitoring equipment, overpressure was unable to be captured at one location (Location 2).

The results of the monitoring have been provided to Terrock for review and consideration in the buffer zone assessment.

A.2 Meeting – 3/12/2008

Minutes

Purpose of Meeting	**Stakeholder Consultation**		
Project	Sancrox Employment Precinct Buffer Zone Assessment	**Project No**	EN02471
Prepared By	Matt Davies	**Phone No**	02 4979 2600
Place of Meeting	Sancrox Quarry & Port Macquarie Hastings Council	**Date**	3 December 2008
Present	SKM Project Manager – Matt Davies (MD) Council Senior Strategic Planner – Sandra Bush (SB) Council Strategic Planning Manager – Peter Cameron (PC) NSW DPI – Jeff Brownlow (JB) Hanson Quarry Area Manager Northern NSW – Chris Dolden (CD) Hanson Quarry Country NSW Manager – Graeme Stark King & Campbell Landowner Representative – Tony Thorne (TT) King & Campbell Landowner Representative – Meg Teasdell (MT) Council meeting only Landowner – James Dunn (JD) Landowner – Dan McMullen (DM)		
Apologies			
Distribution	All attendees		

Item	Action By/Date
1) MD: Presentation of Buffer Zone Assessment Results by Matt Davies. Refer to Attachment A for presentation.	
2) MD: Table 5-11, stemming heights to be confirmed	MD
3) TT: Clarification throughout needed for "mitigated" vs "unmitigated"	MD
4) CD: The assumption that the pit wall will mitigate all quarry noise, (eg. drill rig on top of wall) may be inaccurate. This is to be re-assessed in the final report	MD
5) CD: Clarification of throw vs fly-rock required throughout the fly-rock assessment section of the report	MD
6) JB: DPI generally happy with report from an initial review, further comments to be provided. DPI's general approach is to advocate a negotiated agreement being reached by landowners	

7) JB: The Buffer Zone Report should be supported by a management plan (or process) as to how quarry impact mitigation and surrounding land-use development interact to minimise the potential for future land-use conflict

8) Additional comments on meeting or minutes to be received by COB 10/12/08 All

9) Final report delivered to Council by 19/12/08 MD

Attachment A – Buffer Zone Assessment Presentation

Sancrox Employment Precinct – Quarry Buffer Zone Assessment

Findings of Buffer Zone Study

3 December 2008

Sinclair Knight Merz

Terrock

Stakeholders / Consultant Team

Stakeholders:

- Port Macquarie Hastings Council – Sandra Bush / Peter Cameron
- NSW DPI – Jeff Brownlow
- Hansons Quarry – Chris Dolden / Graeme Stark / Brad Allman
- King and Campbell – Tony Thorne / Meg Teasdell
- Landowners – Peter Cassegrain / James and Catherine Dunn / Dan McMullen (Peter Beaumont)

Consultant Team:

- SKM – Matt Davies / Katie Bagnall / Ben Ison
- Terrock – Alan Richards

Agenda for Meeting

- General Introduction
  - Including a summary of work undertaken since last meeting
- Summary of Buffer Zone Study Findings
- Discussion of Issues
- Break
- Summary of Outcomes
  - To be included in final report

Work Undertaken Since Last Meeting (4/7/08)

> Blast Monitoring	> 8/7/08
> Draft Interim Report	> 3/9/08
> Comments received on Draft Interim Report	> 18/9/08
> Meeting with Council / King and Campbell	> 19/9/08
> Draft Buffer Zone Report	> 21/10/08
> Comments received on Draft Buffer Zone Report	> 27/11 – 2/12/08

Summary Buffer Zone Findings

- **Overpressure**
  - Assessment based on results of blast monitoring
  - Using Standard overpressure limits 125dB(L):
    - Estimated Buffer Zone
      - MIC 87kg 90m from blast
      - MIC 37kg 73m from blast
  - Suggested Mitigation Options:
    - Increase front row burden
    - Increase stemming height
    - Consideration of overpressure during Sancrox development site layout and building design

Summary of Buffer Zone Findings

- **Ground Vibration**
  - Assessment based on results of blast monitoring
  - Using Standard ground vibration limits 25mm/sec:
    - Estimated Buffer Zone
      - MIC 87kg 101m from blast
      - MIC 37kg 66m from blast
  - Error margin in calculations (up to 65%)
  - Suggested Mitigation Options:
    - Consideration of separation distances and land use during site design

Summary of Buffer Zone Findings

- **Operational Noise**
  - Industrial Noise Policy DECC Guidelines
    - Industrial Land use 75dB(A)
    - Commercial Land use 70dB(A)
  - Estimated Buffer Zone:
    - Industrial Land use
      - 70m from Pit Activities
      - 40m from Crushing Plant
    - Commercial Land use
      - 125m from Pit Activities
      - 70m from Crushing Plant
  - Suggested Mitigation Options:
    - Consideration of noise levels during quarry activities
    - Consideration of noise levels during site layout and building design

Summary of Buffer Zone Findings

- **Air Quality (Dust)**
  - Qualitative assessment based on NSW Air Quality Criteria
  - Using EMP dust mitigation methods, dust levels should comply with these guidelines at site boundary
  - Suggested Mitigation Options:
    - Implementation of dust mitigation methods as outlined in Sancrox Quarry's EMP
    - Consideration of potential dust levels during land use and site layout design

Summary of Buffer Zone Findings

- **Flyrock**
  - Assessment carried out by Terrock
    - Likely maximum throw distances calculated and safety margins added
  - Estimated Buffer Zone (SF 4.0):

Stemming height	5 deg hole angle	10 deg hole angle
2.5 m	164	212
3.0 m	104	132
3.5 m	68	**88**
4.0 m	48	64

  - Suggested Mitigation Options:
    - Consideration of stemming height and hole angle during blast design

Recommendations

- A buffer distance of approximately 88 m between quarry activity and the proposed Sancrox developments is considered sufficient, provided impact mitigation measures are implemented

- Stakeholders will need to consider the feasibility of the mitigation measures proposed to achieve minimum buffer distance

- Sensible land use design should consider locating non-sensitive landuses within nearest development areas to the quarry irrespective of the results of this assessment

Appendix B Terrock Flyrock Report

TERROCK
Consulting Engineers

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SANCROX QUARRY

BUFFER ZONE ASSESSMENT

Adrian J. Moore
11th February 2009

SANCROX QUARRY

BUFFER ZONE ASSESSMENT

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SANCROX QUARRY

BUFFER ZONE ASSESSMENT

1 INTRODUCTION

Terrock Consulting Engineers were requested by Port Macquarie Hastings Council (PMHC) to complete a Buffer Zone Assessment in association with SKM. The Assessment was to include a review of the draft Heggies Report with particular reference to the likely impacts of flyrock risk on current and future quarry blasting operations on the Proposed Employment Precinct.

Indicated in the assessment was to be a determination of buffer requirements (if any) with recommended means to eliminate or reduce any limitations to future zoning of the Employment Precinct.

2 REVIEW OF HEGGIES REPORT

The Heggies report can be summarised as “flyrock results from the lack of confinement of the high pressure gaseous energy liberated during an explosion and steps must be taken by appropriate blasting practice to ensure that the explosion is properly contained to limit the flyrock potential”.

Whether the lack of confinement is caused by overloading, under-stemming or under-burdening, the effects are the same. Control of flyrock is achieved by ensuring sufficient confinement of the explosion by proper blast design and conscientious application of the design during hole mark out, drilling and explosives loading operations. It is entirely performance related. As quoted in their report, large quarries can operate close to houses and commercial premises without flyrock incidents, providing an appropriate blast design is adopted and it is effectively implemented by the shotfiring crew.

Flyrock as referred to is ‘wild’ flyrock and is distinct from the normal movement of rock following a blast.

3 ISSUES RELEVANT TO FLYROCK ASSESSMENT

3.1 Flyrock Modelling

Flyrock models were developed by Terrock from basic trajectory theory coupled with a launch velocity determined from confinement parameters.

The basic models are:

Horizontal throw:

$$L = \frac{Vo^2 Sin2\theta}{g} \quad [1]$$

Maximum throw:

$$Lmax = \frac{Vo^2}{g} \quad [2]$$

Maximum height reached:

$$H = \frac{Vo^2 Sin^2\theta}{2g} \quad [3]$$

Horizontal throw to a point at a different altitude:

$$L = \frac{Vo^2 Cos2\theta}{g} \left(Vo\ Sin\theta + \sqrt{(VoSin\theta)^2 \pm 2gH}\right) \quad [4]$$

The Terrock launch velocity model is:

$$Vo = k\left(\frac{\sqrt{m}}{BorS.H}\right)^{1.3} \quad [5]$$

Where:

L = Horizontal throw (m)
Vo = Launch velocity (m/s)
θ = Launch angle (hole angle + collar dispersal allowance of 10º)
B= Burden (m)
S.H. = Stemming height (m)
H = Difference in altitude between blast and receiver (m)
g = Gravitational constant (9.8m/s/s)
k = an empirical constant; 27 has proven conservative at other quarries
m = Charge mass/m or total charge if less than 1m long

The flyrock models assume that a continuous length of appropriate stemming material (crushed rock 1/8th – 1/10th the hole diameter) is loaded and that the burden consists of competent rock and does not consist of loose blocks or slabs nor is weakened by faults, joints or weathering.

The models are useful to assist shotfirers to determine the size of the exclusion zone around a blast. All blasts require the establishment of an exclusion zone as an essential component of a Blast Management Plan. Advice on the requirements and purpose of exclusion zones is contained in **Appendix L** of AS 2187.2–2006. This has been included in this report as **Appendix 2.** Particular mention is made of the Sancrox Quarry situation where the exclusion zone may extend into a neighbouring property.

3.2 Flyrock Assessment of Current Blasting

The Flyrock Assessment of current Sancrox blasting specifications provided to us are shown in **Table 1**:

Table 1 - Current Sancrox Quarry Specifications

	Level 1	Levels 4 and 5
Hole Diameter:	89mm	89mm
Burden:	3.0m	2.5m
Face Height:	18m	12m
Stemming Ht:	2.5 - 3m	2.0 - 2.7m
Subdrill:	0.5 - 0.75m	0.5 - 0.75m
Hole Angle:	Front row 5º, then 10º and 14º	Front row 5º, then 10º and 14º

The relationship between throw and burden can be demonstrated graphically assuming a 1.1(g/cc) emulsion explosive (6.8kg/m). The following graph (**Figure 1**) has been produced for flyrock prediction in front of the face. In the absence of specific flyrock observations at this quarry, calibration experience at other quarries has been used.

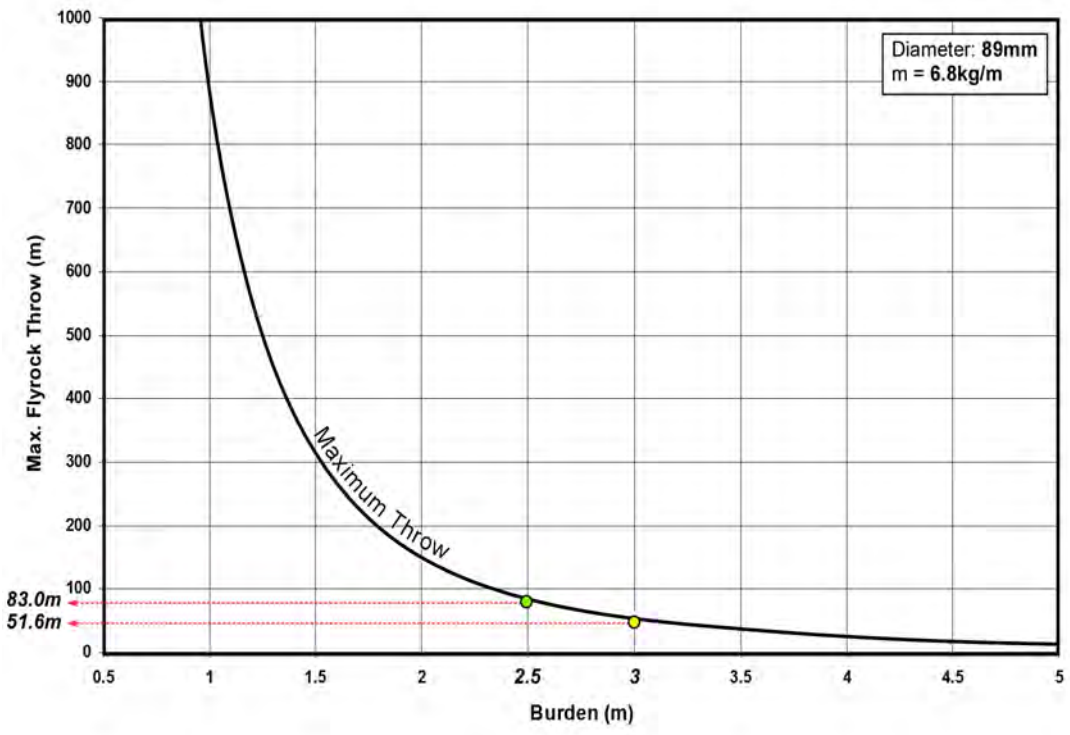


Figure 1 – Relationship between burden and maximum throw in front of face.

The predicted maximum flyrock distances in front of the face are 51.6m for a 3.0m burden and 83.0m for a 2.5m burden. To determine a clearance zone from a blast the following safety factors are recommended:

- For plant, equipment etc: **Safety Factor = 2.0**
  i.e : flyrock should be limited to a maximum of half the distance to buildings etc.

- For personnel, and quarry boundaries accessible by people: **Safety Factor = 4.0**
  i.e: flyrock should be limited to a maximum of a quarter the distance to areas accessible to people.

The recommended minimum clearance distance in front of a face for current blasting practice is shown in **Table 2.**

Table 2 - Flyrock Throw and Clearance Distances for Current Practice

	Level 1: B = 3.0m, S.H. = 2.5m			**Levels 4 and 5**: B = 2.5m, S.H. = 2.0m		
	Max. Throw (m)	**F.O.S. = 2** Plant/Equip (m)	**F.O.S. = 4** Personnel (m)	**Max. Throw** (m)	**F.O.S. = 2** Plant/Equip (m)	**F.O.S. = 4** Personnel (m)
Front of face	51.6	103	206	83	166	332
Behind face (Angle = 5º)	41.5	83	166	74.1	148	296
Behind face (Angle = 10º)	53.3	107	214	95.3	190	380
Behind face (Angle = 14º)	61.6	23	246	110	220	440

* *F.O.S = Factor of Safety*

The clearance distance calculations behind the face depend on the hole inclination. The hole angles listed are 5º, 10º and a rear row angle of 14º with a 10º collar dispersion allowance. The maximum throws for 2.5m and 2.0m stemming heights are listed in **Table 2.**

The recommended clearance zone is determined by a construction with a 90º arc of maximum throw criteria in front of the face connected by tangents to a behind face semicircle.

The clearance zone for a blast with a 10º hole angle, burden of 3.0m and stemming height of 3.5m is demonstrated in **Figure 2.** (Note: This is **not** current practice.)

On the basis of the Level 1 specifications the current blasting practice would require a buffer distance of 246m behind the face to achieve a Safety Factor of 4.0.

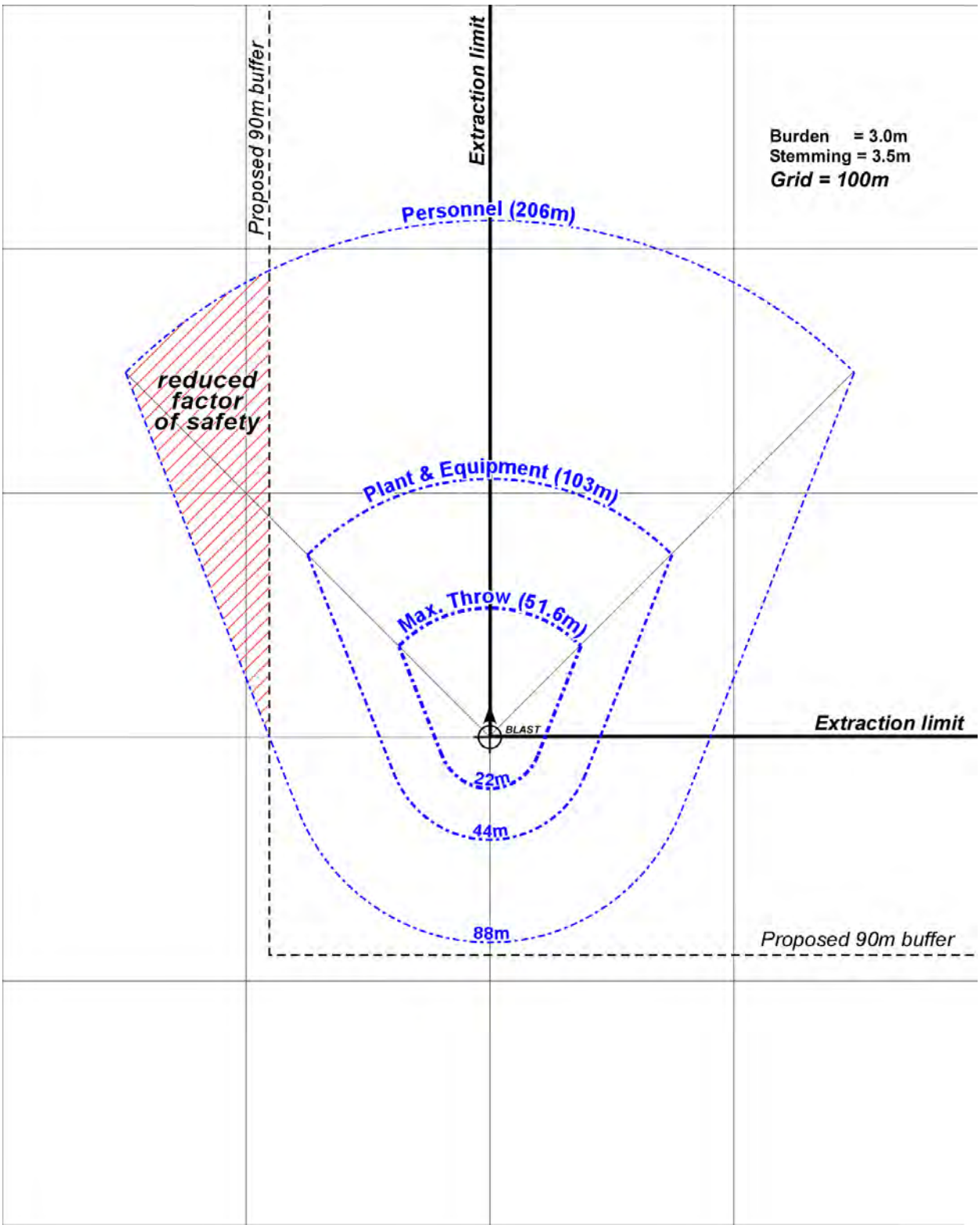


Figure 2 - Minimum Clearance Zones for 3.0m Burden & 3.5m Stemming Height

4 DEVELOPMENT OF A FLYROCK CLEARANCE STRATEGY

Current blasting practice may result in the flyrock throws previously outlined. If there is to be a reduction of throw, there has to be a change of specification. The parameters that can be changed are burden, stemming height and hole angle. If the quarry can be developed such that all blasts face away from the boundary, then stemming height and hole angle influence the maximum throw behind the face. The variation in maximum throw and recommended clearance distance ***behind*** a blast for variations in stemming height are listed in **Table 3**.

Table 3 - Maximum Throw and Minimum recommended clearance distances behind a blast

	Hole Angle = 5°		Hole Angle = 10°	
Stemming Height (m)	**Max. Throw (m)**	**Min. Clearance (m) F.O.S. = 4.0**	**Max. Throw (m)**	**Min. Clearance (m) F.O.S. = 4.0**
2.0	74	294	95	380
2.5	41	164	53	212
3.0	26	104	33	132
3.5	17	68	22	88
4.0	12	48	16	64
4.5	9	36	12	48

The purpose of the flyrock buffer zone is to protect people and property from the possible impact of flyrock. Ideally flyrock should be contained within the quarry boundary and not be projected onto land owned by others. **SAFETY IS OF PRIME IMPORTANCE**. However, I am informed that it is acceptable to the Mines Inspectorate for an agreement to be reached with the adjoining landowner for the adjacent land to be included in the blasting safety zone. In this case flyrock may be expected on this adjoining land.

The size of the buffer zone and blasting practice required depends on whether the object is to:

- ensure that flyrock is generally contained within the quarry boundary (Safety Factor = 1.0), but may sometimes project beyond the boundary.

- permit flyrock to be projected onto adjacent land, but not so far as to present a risk to people (Safety Factor = 4.0) ; this circumstance requires the permission of adjoining landowners.

- ensure that flyrock does not to leave the quarry property under any circumstances; this situation applies if agreement cannot be reached with the adjoining landowner.

An approach that has been applied at another site regarding the development of a flyrock buffer zone is to generally limit the maximum throw to the boundary distance (from a 20m extraction limit) with a safety factor of 1.0.

This assumes that it is acceptable for flyrock to be inadvertently projected over the boundary due to unforseen circumstances but not to reach buildings where people work. In the case referred to the neighbouring land was grazing land and people and buildings were not at issue.

The minimum blast specifications to comply with this situation for a blast at the extraction limit is:

- Burden = 3.5m
- S.H. = 3.5m
- Hole Angle = 10º

The recommended clearance zone is shown in **Figure 3.** Provided that these specifications are rigorously implemented **with zero reduction tolerance**, the maximum throw is predicted to be 22m with a Factor of Safety of 4.0, which would give a clearance distance of 88m.

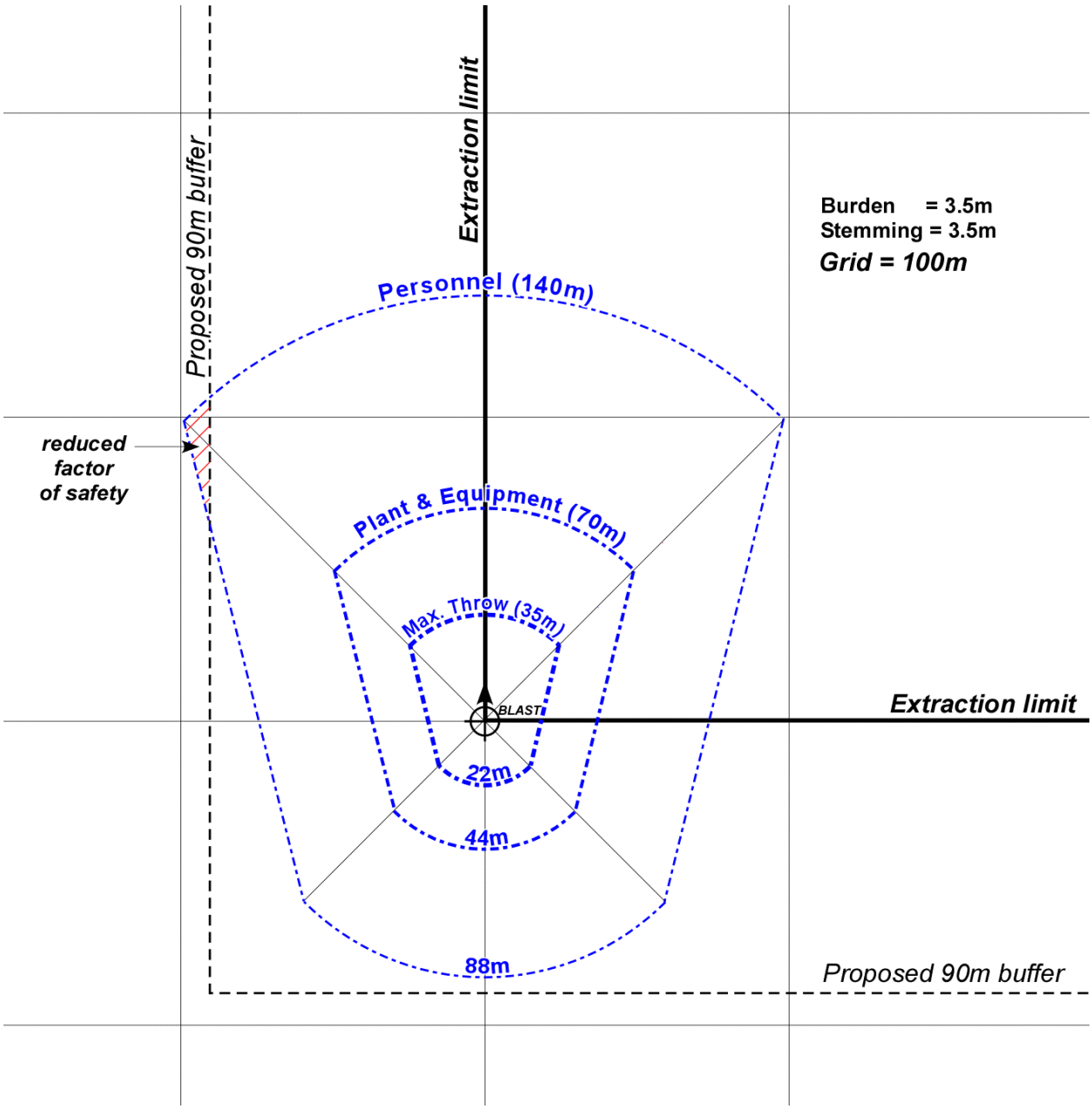


Figure 3 - Clearance Zones for 3.5m Burden & 3.5m Stemming Height

This approach generally in accordance with the 90m buffer zone shown by SKM to comply with air blast and ground vibration limits.

However, if it is totally unacceptable for flyrock to leave the quarry under any circumstances, the following stemming heights are required to maintain a 4.0 Safety Factor at the boundary.

Table 4 – Stemming height requirements to contain flyrock within the quarry boundary at 4.0 Safety Factor at the 20m extraction limit.

Distance from boundary (m) 4 times Maximum Throw	Stemming Height (m)
20	6.2
30	5.3
40	4.8
50	4.4
60	4.1
70	3.8
80	3.6
90	3.5

To accommodate the increased stemming height required would require radical changes to the blast geometry to maintain the current powder factor. There are also implications for face control with a long length of uncharged hole near the collar. Decking or pre splitting may be required to provide a stable face for machine to operate under.

For blasts facing towards the east, the quarry faces must be turned by about 45º so that side projection in front of face is also contained within the boundary.

5 SENSITIVITY OF THE FLYROCK MODEL

The sensitivity of flyrock to burden reduction can also be assessed from **Figure 1** (e.g. if a front row burden of 1.5m was inadvertently loaded, the flyrock prediction is 300m). However if a burden of 1.0m was loaded, the maximum throw is 900m.

The sensitivity of the maximum flyrock throw to burden variation to the recommended clearance zones is demonstrated in **Figure 3**. If the design burden (3.0m) and stemming height (3.5m) are each inadvertently reduced by 0.5m, (i.e. Burden = 2.5m; Stemming Height = 3.0m) the resulting maximum throws and clearance zones are shown in **Figure 4.**

This demonstrates that the tolerance on the design loading specification used in the predictive modelling is **zero** reduction.

i.e. design burden (3.0m), tolerance = zero.
design stemming height (3.5m), tolerance = zero.

Sufficient checks must be included in the Management Plan to ensure that in the critical area approaching the quarry boundary, every blast hole loaded has at least the designed burden and spacing.

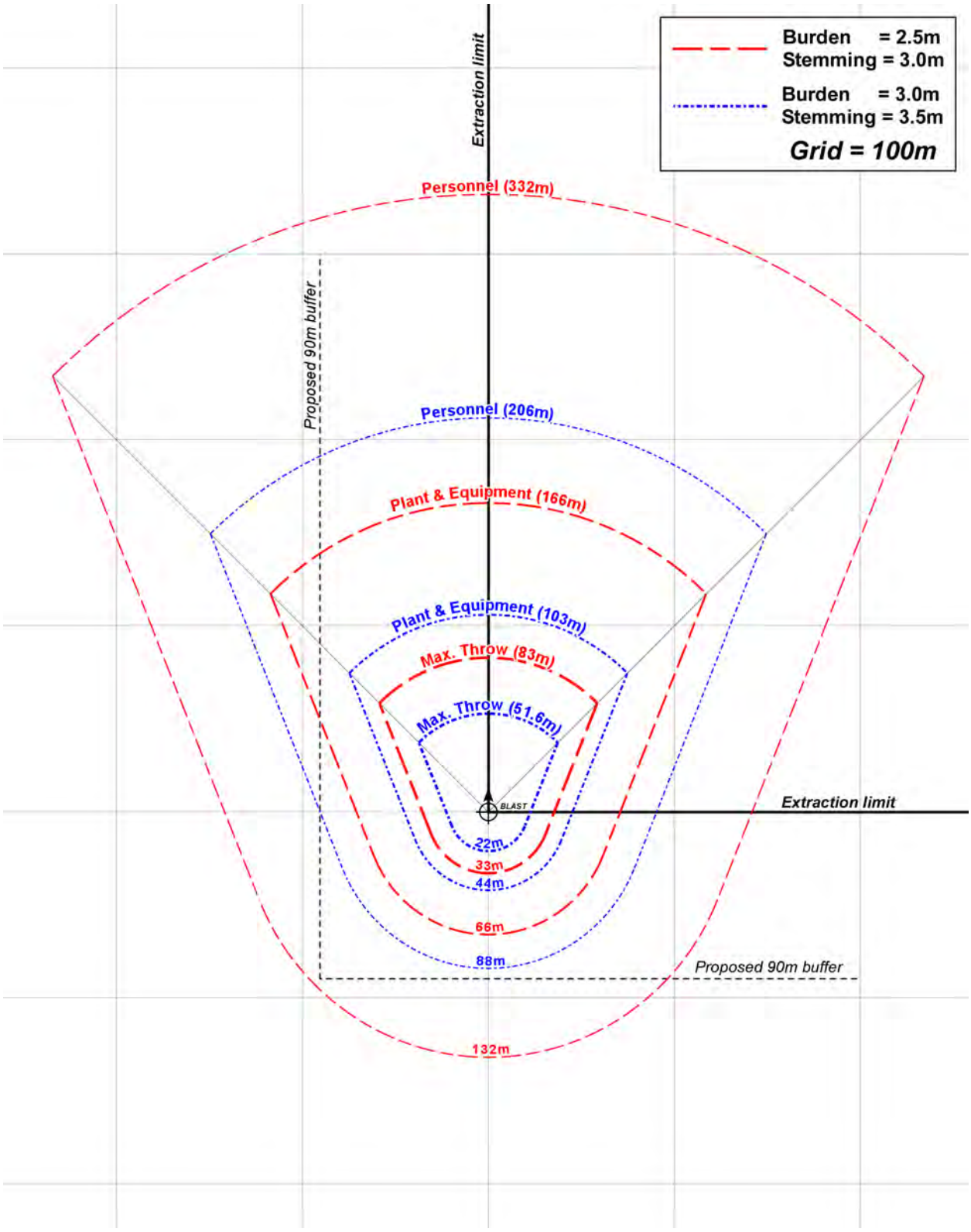


Figure 4 – Comparison of Clearance Zones with 0.5m reductions of burden and stemming height.

6 BLAST MANAGEMENT PLAN

The requirements for a Blast Management Plan are contained in **Appendix A** of AS 2187.2 – 2006 (attached as **Appendix 1**).

Some of the requirements need input at corporate level, some are quarry site specific and some are blast specific. Most of the issues raised should be addressed in a Management Plan and additional site specific requirements may need to be included.

The Blast Management Plan should be developed in consultation with Hanson's state and quarry management, and the shotfirers responsible for the conduct of the blasting.

To ensure the safety of the public and buildings beyond any planned buffer zone, procedures and checks must be put into place to ensure that every blast hole loaded complies with the minimum confinement criteria to limit flyrock throw to the buffer zone.

To give confidence to all parties involved, an essential part of the Blast Management Plan is the observation and recording of flyrock throw from blasts to build up a history to be able to demonstrate to the authorities that it can be controlled by loading performance.

The procedures and checks must ensure that the following tolerances are met:

Designed Front row burden	e.g. 3.0m – zero mm
Designed Stemming height	e.g. 3.5m – zero mm

To achieve these burden tolerances, the faces must be profiled using laser theodolite survey and bore tracking systems, the surveyor and shotfirer being mindful that:

- The minimum front row burden required is 3.0 m of solid rock - whoever does the survey must carefully examine the face to ensure that loose slabs or blocks, hanging lumps, weak ground etc. are not interpreted as solid rock.

- The face profiling system is only accurate to ±0.5m

- The face profiling system set to auto mode may not pick up the extremes of the humps and hollows of the face and some extreme face points may require manual sighting, especially on an irregular face.

- Minimum side burden is a particular issue on irregular faces and the surveyor and shotfirer to pay particular attention to loss of burden towards the boundary.

The person designing the loading should be mindful that:

- The minimum burden shown on the face profile to guarantee the minimum cover over a fully loaded explosive column is in the order of an additional 0.5m or more. Anything less must be decked through or the holes redrilled and the original holes backfilled with stemming.

The flyrock distances predicted from the minimum stemming heights used in the models presumes an uninterrupted column of suitably sized stemming material. To ensure that the correct amount of stemming is added to each blast hole it must be measured and recorded. It is possible that the stemming material may bridge across the hole and form an air gap in the column. Such a bridging may influence the effectiveness of the stemming and could result in a greatly increased flyrock throw.

7 CONCLUDING REMARKS

Large quarries have operated with blasting operations close to houses and factories with appropriate control measures to limit the throw of flyrock. The control measures required should form part of the Blast Management Plan.

Ideally, flyrock must be contained within the quarry boundary or on land owned or controlled by the quarry. However, it is acceptable to the Mines Inspectorate that, with adjoining landowners permission, adjoining land may become part of the safety exclusion zone for quarry blasting operations where flyrock may be expected to land. Without this agreement, the quarry boundary is the limit of flyrock throw.

The quarry is required to maintain the boundary fence and it is usual for the extraction limit to enable the construction and maintenance of a perimeter road within the boundary fence. The extraction limit is usually at least 20m from the boundary although it may be reduced to 10m in some cases.

With the adjoining landowners permission, and with suitable evacuation procedures for persons located on the adjoining land, blasting can be conducted to within 20m of the quarry boundary with the adoption of suitable blasting specifications and practices. However, if flyrock is not to leave the quarry boundary under any circumstances, the control over the drilling and loading operations requires a major change to current blasting specifications and loading practice.

A 90 m buffer zone has been nominated by SKM as the distance required to limit air blast and ground vibration at Commercial buildings.

If an agreement is reached with the adjoining landowner that the adjoining land can be included as part of a 90 metre blast safety exclusion zone, and that infrequent flyrock into this area is acceptable to the owner and the responsible authorities, this can be achieved with only minor increases to burden and stemming height from current practice.

Adrian J. Moore
11th February 2009

APPENDICES

APPENDIX A

BLAST MANAGEMENT PLAN AND RECORDS

(Normative)

A1 INTRODUCTION

All blasts shall be planned and designed to achieve the required outcome with minimum impact on the surrounding environment, below, on or above the soil or water surface. Records that detail the results of each blasting operation should be taken and maintained. This information assists in the planning and implementation of further blasts and provides documentation in case of incident or complaint.

A2 BLAST MANAGEMENT PLAN

A2.1 Purpose

The purpose of the blast management plan is as follows:

(a) Detail the objectives for the project or task.

(b) Identify risks and hazards associated with the objectives, including control and/or mitigation.

(c) Identify site-specific requirements including selection of personnel, training programs and communication systems.

(d) Introduce blast as part of the overall task in a planned manner.

(e) Control the blast process from design to initiation, evaluation and misfire treatment.

(f) Implement a review process to ensure that the objectives are met.

(g) Assure compliance with the approval/contract specifications.

(h) Assure the safety of the public, site personnel and surrounding properties.

Where required, the plan shall be submitted to a regulatory authority for authorization; otherwise the components of the plan shall be submitted to one or more competent persons, within the organization conducting the blast, responsible for such authorization.

A2.2 Contents

A blast plan, should include, but not be limited to, the following:

(a) Location of the proposed blasting.

(b) Description of the proposed blasting.

(c) Permits/licences required for the project.

(d) Identification and position of the person responsible for the project including project safety and security.

(e) Identification and position of person who has given approval to use explosives on the project.

(f) Key appointments and responsibilities.

(g) Shotfirer's details.

(h) Details of the risk management assessment.

(i) Details of adjacent structures or services that influence the blast design.

(j) Details of reports, drawings and records consulted.

(k) Layout plan of the blast including drilling pattern and hole depths.

(l) Detonation sequence/effective charge mass per delay (MIC)/powder factor.

(m) Type of explosive to be used and quantity required.

(n) Method of initiation.

(o) Type of firing equipment and procedures.

(p) Drilling procedures.

(q) Explosive loading and charging procedures.

(r) Explosive storage and handling procedures.

(s) Security procedures for the site and the blast, including explosives.

(t) Environmental considerations for airblast overpressure, ground vibration.

NOTES:

1 Information on air blast overpressure and ground vibration is given in Appendix J.

2 Information on flyrock and fly is given in Appendix E.

(u) Details of communication systems.

(v) Warning procedures.

(w) Traffic management plan.

(x) Proposed dates and times of blasting.

(y) Details of the exclusion zone.

NOTE: See Appendix L.

(z) Method of notification to owners and occupiers of structures, and providers of services adjacent to the blast.

(aa) Influence of weather.

(bb) Loading in poor light conditions or reduced visibility.

(cc) Cessation of explosive-related activities during electrical storms.

(dd) Misfire management system.

(ee) Post blast assessment and inspection procedures.

(ff) Provision for post-blast comments.

(gg) Signature spaces for the plan author, shotfirer and person who approves the plan.

A3 BLAST RECORDS

Details of the blast should be taken and maintained, including but not limited to the following:

(a) Environmental conditions at the time of the blast.

(b) Monitoring equipment including type, serial number and location.

(c) Details of measurements recorded during the blast.

(d) Details of flyrock or fly.

(e) Details of incidents and complaints.

(f) Comment on the results of the blast.

(g) Proposed modification to the blast plan for future shots.

Provision for this information may be made on the blast plan.

A4 TUNNEL AND MINE DEVELOPMENT BLAST RECORD

Elements of safety associated with tunnel blasting, such as the possible presence of hazardous atmospheres and inrush should be recorded.

A5 DEMOLITION OF STRUCTURES

NOTE: Guidance on completing a blast plan for demolition of structures is given in Appendix K.

APPENDIX L

EXCLUSION ZONES

(Normative)

L1 GENERAL

All blasts require the establishment of an exclusion or evacuation zone prior to firing the shot. Depending on the industry, the zone can be the area, below, at and above ground level, from which all unauthorized persons are excluded to protect them from injury or harm.

The size of the exclusion zone shall be such that all fly and associated debris is contained within the zone, as well as consideration on impacts of blast environmental limits on humans and where required, animals.

The effects of dust should be minimized.

An exclusion zone can comprise an inner zone, which is established prior to the commencement of loading the shot, and an outer zone that adjoins the boundary of the inner zone, and is established prior to the final connections being made or programming of electronic detonators. The purpose of the inner zone is to allow work to continue in surrounding areas during loading, but must be controlled to prevent unauthorized access of personnel, plant and equipment.

The inner zone shall be identified by being cordoned off with flagging tape, flags, hazard blast cones, berms, signage or other suitable means visible at all times to restrict unauthorized entry.

The shotfirer and authorized persons may remain in the exclusion zone, at a predetermined protected location during firing. Final approval for persons to observe or monitor the shot from within an exclusion zone remains with the shotfirer, who should not be subject to any external pressure.

L2 PLANNING

The requirements for an exclusion zone shall be a component of the blast management plan. The degree of planning will be dependent on the industry, for instance the ventilation system of an underground mine will influence an exclusion zone in three dimensions.

For blasting operations where the zone is contained within property boundaries (subject to airspace clearances) or underground, standard procedures may be developed and implemented for each blast.

For blasting operations where the zone is on or extends onto neighbouring property, each blast will be unique and the feasibility of establishing an exclusion zone that extends beyond the site boundary shall be investigated. This may require liaison with project management staff, regulatory authorities, emergency service providers, local landowners, transport authorities (land, maritime and air), energy service providers, and any other affected body. The effect on animals shall be considered, as noise from a blast can cause distress resulting in injury or death. Existing facilities and energy systems within the exclusion zone may need to be protected as fly can cause significant damage. Approvals from regulatory bodies and other authorities may be required.

If a zone of the required size cannot be established and controlled for the expected timeframe, then another method of carrying out the task shall be considered.

L3 SIZE OF THE EXCLUSION ZONE

The size of the exclusion zone is directly related to the blasting activity and the surrounding environment. For example, an exclusion zone for structural demolition would differ considerably to a remote agricultural blast and similarly for underground or maritime work.

The distance required to limit airblast overpressure to tolerable levels can be estimated, but the distance for fly can be difficult to predict and can vary from site to site. Therefore a competent person shall determine the size of the zone, in many cases through extensive consultation with other stakeholders. The zone may be larger than the calculated size to make use of control points such as transport junctions, or elevated areas that provide clear lines of observation.

On public roads when deciding the location of traffic control points, areas that are difficult for impatient drivers to bypass once stopped shall be identified. Examples of such bypasses include the potential to move to another lane or drive across the median strip to another carriageway and then drive through the exclusion zone. Temporary barriers may be insufficient to stop such drivers and physical blockages such as plant may be necessary. The control point shall be sited so that there is adequate stopping sight distance for drivers, enhanced by the use of warning signs. A minimum of two people should be assigned to each traffic control point with one person moving along the stationary line of traffic to inform drivers how long the delay is likely to be. Where alternative routes allow safe bypass of the exclusion zone, signs shall be erected prior to the junction.

For contract work, the contract documentation should include the requirements for an exclusion zone, but distances should not be stipulated unless they have been determined by a competent person and are known to be achievable within the surrounding area.

L4 ESTABLISHING AND DISESTABLISHING THE ZONE

Written procedures shall be developed for the establishment and disestablishment of the exclusion zone. Content, where applicable, should include, but not be limited to the following:

(a) A description of the zone and method of implementation.

(b) Details of organizations involved.

(c) A list of key personnel outlining tasks and responsibilities.

(d) A list of other personnel, outlining tasks and responsibilities.

(e) A description of the means of communication.

(f) A procedure to control radio transmissions that may influence the communication or security of the shot.

(g) Timings and procedures for notification of agencies on-site and off-site such as emergency service providers.

(h) A procedure to activate in the event of inclement weather or lightning.

(i) Identification of the location of, and the method of manning of, control points.

(j) Procedures to clear areas such as public roadside rest areas, toilets and underside of bridges that are located within the zones.

(k) A method to establish and notify the shotfirer that the inner and outer zones have been cleared.

(l) A method to control livestock or wildlife.

(m) Identification of, and contact details for, liaison with bodies who control the approval to fire, such as air traffic control.

(n) Procedures for passage of emergency vehicles such as police, fire and ambulance.

(o) Procedures for immediate notification of and dealing with trespassers.

(p) Warning procedures prior to firing.

(q) Procedures to remove fly or debris that may fall on roads or other areas.

(r) Procedures for misfires.

(s) Safety and security procedures for the shot remaining loaded overnight.

(t) A procedure to identify that fumes have cleared to safe levels in underground work areas.

(u) A method of notification to return the whole of the exclusion zone to normal.

(v) A method of notification to disestablish the outer zone, only.

Site briefings shall be conducted for personnel involved with the establishment and disestablishment of an exclusion zone. If different organizations provide personnel, the same pool of people should be used when the operation involves blasting over a period of time. Rehearsals should also be considered.

When a shot cannot be initiated and is to remain loaded overnight, the firing circuit shall be made safe. Under these circumstances the exclusion zone can be based on the inner zone provided the area is secured prior to returning the outer zone to normal. When a site requires guarding, personnel other than the shotfirer and crew, shall be engaged to ensure that the shotfirer has sufficient rest prior to firing the next day. Such personnel shall be briefed on hazards and a procedure for contacting a responsible person in the case of trespass.

The exclusion zone should not be returned to normal until the 'all clear' for the blasting operation is given by the shotfirer.

L5 SPECTATORS

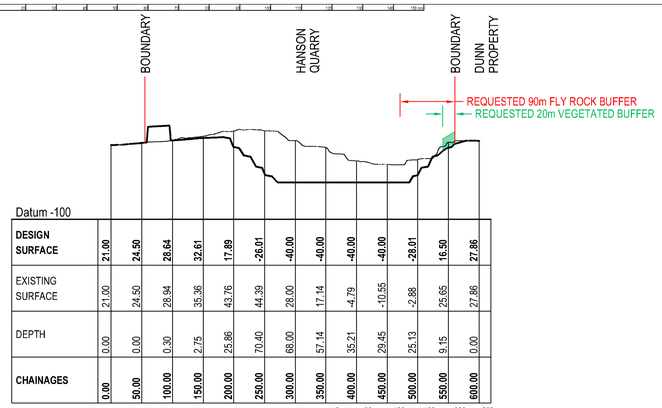
The use of explosives in some industries can attract spectators and possibly demonstrators along with strong media involvement. Such possibilities shall be considered for the control and size of the exclusion zone. It is important that control is established and maintained at all levels of the project and the blasting operation should not be promoted as a public display.

For surface work it may be preferable to fire on weekdays rather than a weekend or near a public holiday, as this may reduce the potential for spectators. Where the operation is adjacent to a school bus route, the shot should be fired by early afternoon to avoid delays. In addition, support can be more readily obtained if a difficulty arises, e.g., a misfire.

Where notification has to be given in advance to the public, such as road closures, it is preferable for reasons of security not to mention the use of explosives. Similarly, if the method of firing does not involve electric detonators, signage on explosives relating to transmitters may not be required.

"C"

"D"



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EXISTING SURFACE	21.00	24.50	28.94	35.36	43.76	44.39	28.00	17.14	-4.79	-10.55	-2.88	25.65	27.86
DEPTH	0.00	0.00	0.30	2.75	25.86	70.40	68.00	57.14	35.21	29.45	25.13	9.15	0.00
CHAINAGES	**0.00**	**50.00**	**100.00**	**150.00**	**200.00**	**250.00**	**300.00**	**350.00**	**400.00**	**450.00**	**500.00**	**550.00**	**600.00**

SECTION BB

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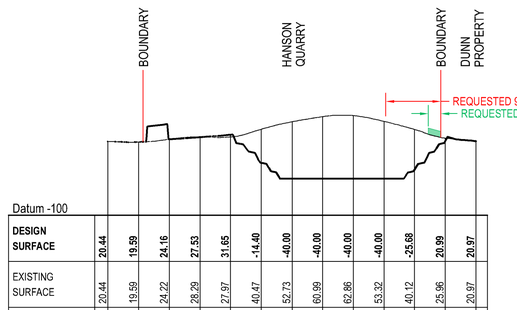
VERTICAL SCALE 1:5000 @ A1



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EXISTING SURFACE	20.44	19.59	24.22	28.29	27.97	40.47	52.73	60.99	62.86	53.32	40.12	25.96	20.97
DEPTH	0.00	0.00	0.06	0.76	-3.67	54.87	92.73	100.99	102.86	93.32	65.80	4.96	0.00
CHAINAGES	**0.00**	**50.00**	**100.00**	**150.00**	**200.00**	**250.00**	**300.00**	**350.00**	**400.00**	**450.00**	**500.00**	**550.00**	**600.00**

SECTION CC

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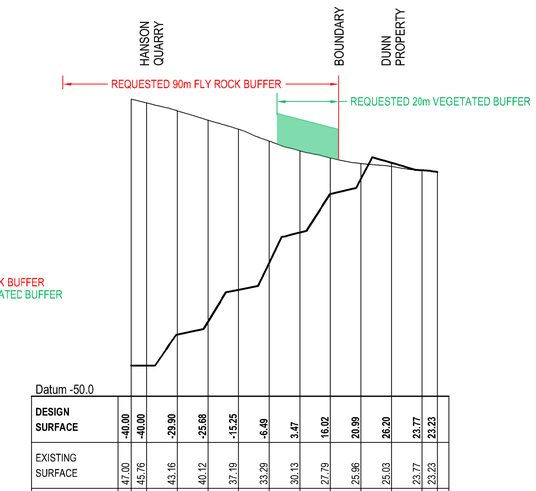
VERTICAL SCALE 1:5000 @ A1



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EXISTING SURFACE	47.00	45.76	43.16	40.12	37.19	33.29	30.13	27.79	25.96	25.03	23.77	23.23	
DEPTH	87.00	85.76	73.06	65.80	52.44	39.78	26.66	11.77	4.96	-1.17	0.00	0.00	
CHAINAGES	**475.00**	**480.00**	**490.00**	**500.00**	**510.00**	**520.00**	**530.00**	**540.00**	**550.00**	**560.00**	**570.00**	**575.00**	

SECTION CC CH 475 - CH 575

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HORIZONTAL SCALE 1:1000 @ A1

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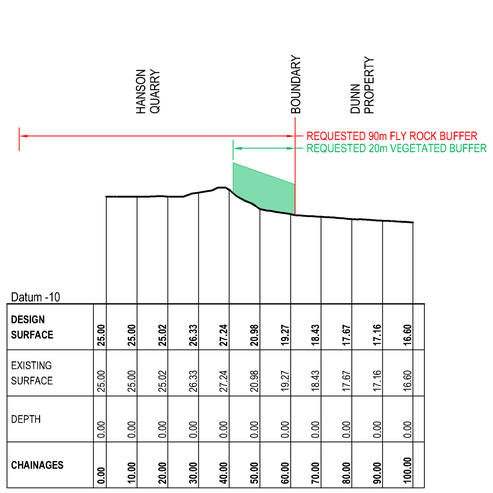
VERT.CAL SCALE 1:1000 @ A1



Datum -10

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EXISTING SURFACE	25.00	25.00	25.02	26.33	27.24	20.98	19.27	18.43	17.67	17.16	16.60
DEPTH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHAINAGES	**0.00**	**10.00**	**20.00**	**30.00**	**40.00**	**50.00**	**60.00**	**70.00**	**80.00**	**90.00**	**100.00**

SECTION EE

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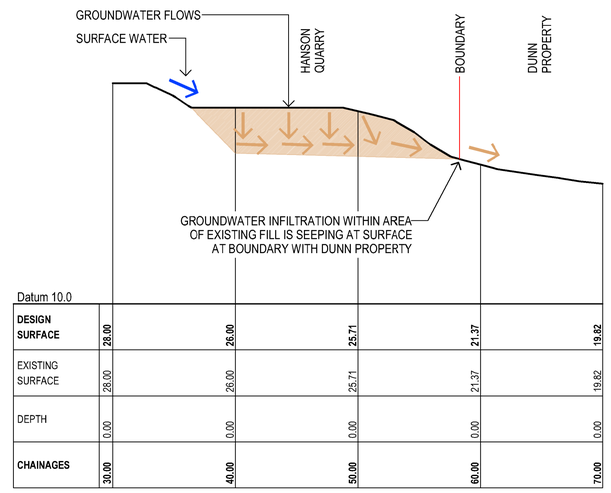
VERTICAL SCALE 1:1000 @ A1



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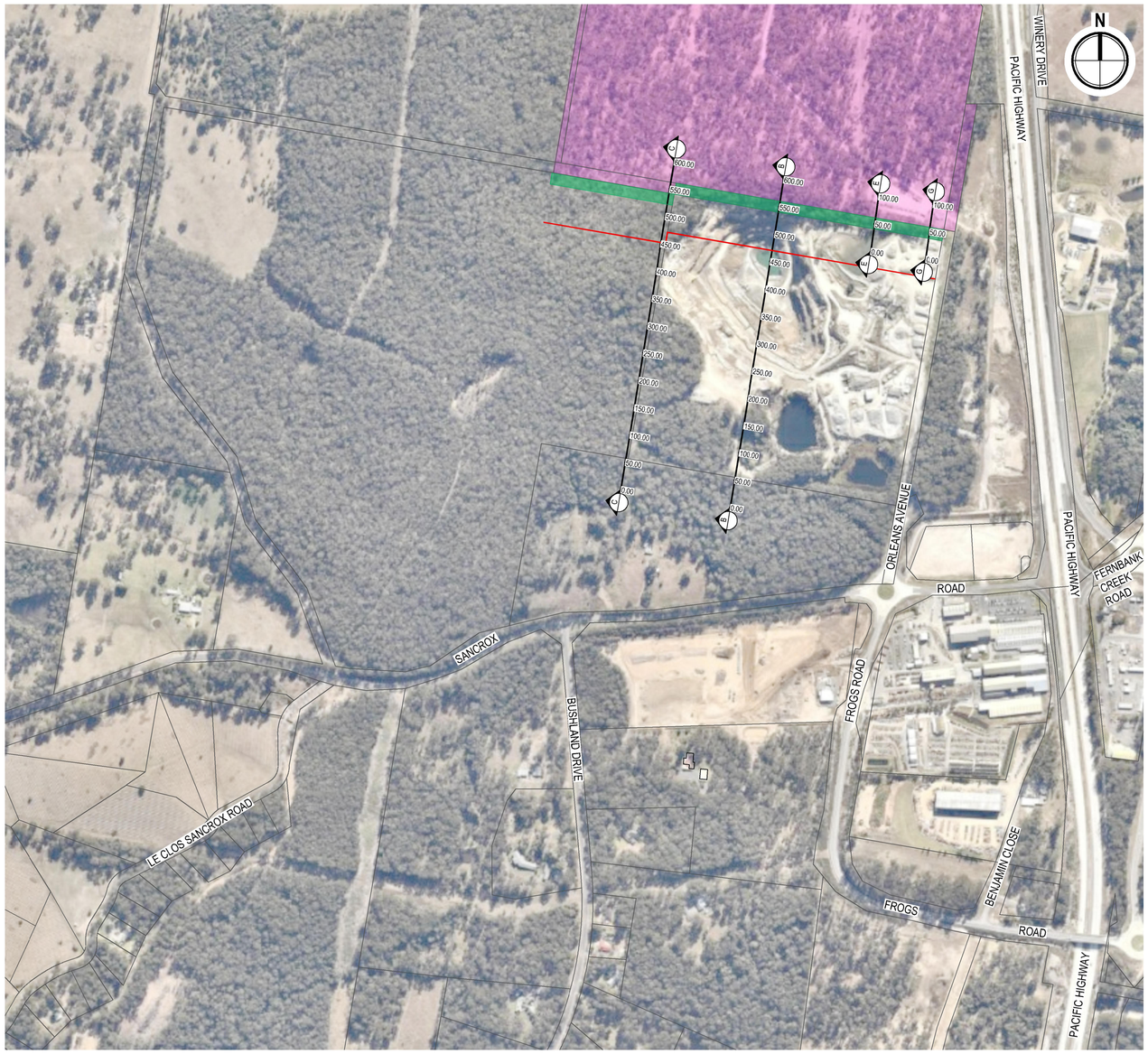
DEPTH	0.00	0.00	0.00	0.00	0.00
CHAINAGES	**30.00**	**40.00**	**50.00**	**60.00**	**70.00**

SECTION GG CH 30 - CH 70

0 2.5 5.0 7.5 10.0 12.5m
HORIZONTAL SCALE 1:250 @ A1

0 2.5 5.0 7.5 10.0 12.5m
VERTICAL SCALE 1:250 @ A1



LEGEND

- 10 — SURFACE CONTOURS (10m MAJOR CONTOUR INTERVALS)
- SURFACE CONTOURS (1.0m MINOR CONTOUR INTERVALS)
- DUNN PROPERTY
- FILLED LAND

NOTES

1. THIS PLAN HAS BEEN PREPARED FROM PUBLIC STATE GOVERNMENT & PMH COUNCIL SUPPLIED GIS MAPPING INFORMATION. IT IS SUITABLE ONLY FOR THE PURPOSE OF BROAD AREA SITE ANALYSIS AND STRUCTURE PLANNING. ALL SITE ANALYSIS AND PROPOSALS ARE SUBJECT TO DETAILED SITE SURVEY AND PLANNING ASSESSMENT AND DEVELOPMENT APPROVAL PROCESSES.

2. THE COORDINATES ADOPTED ARE MGA ZONE 56 COORDINATES AND GRID DISTANCES.

0 50 100 150 200 250
SCALE 1: 5000 @ A1

K:\C REF: C\5809_expresswayspares - sancrox north\21_Planning\5809 Quarry Investigation.dwg - A1(L) - QUARRY SECTION PLOT Dunn, 11- Dec -2019, angelac

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E: info@kingcampbell.com.au

REV.	DATE	DESCRIPTION	BY
A	11.12.2019	FOR SUBMISSION	AJC

DATUM: AHD SCALE: 1:5000 @ A1 (1:10000 @ A3)

0 250.0

PROJECT NO:	5809
DA NO.:	-
DESIGNED BY:	-
DRAWN BY:	LW
CHECKED BY:	-
DATE CREATED:	NOV 2019

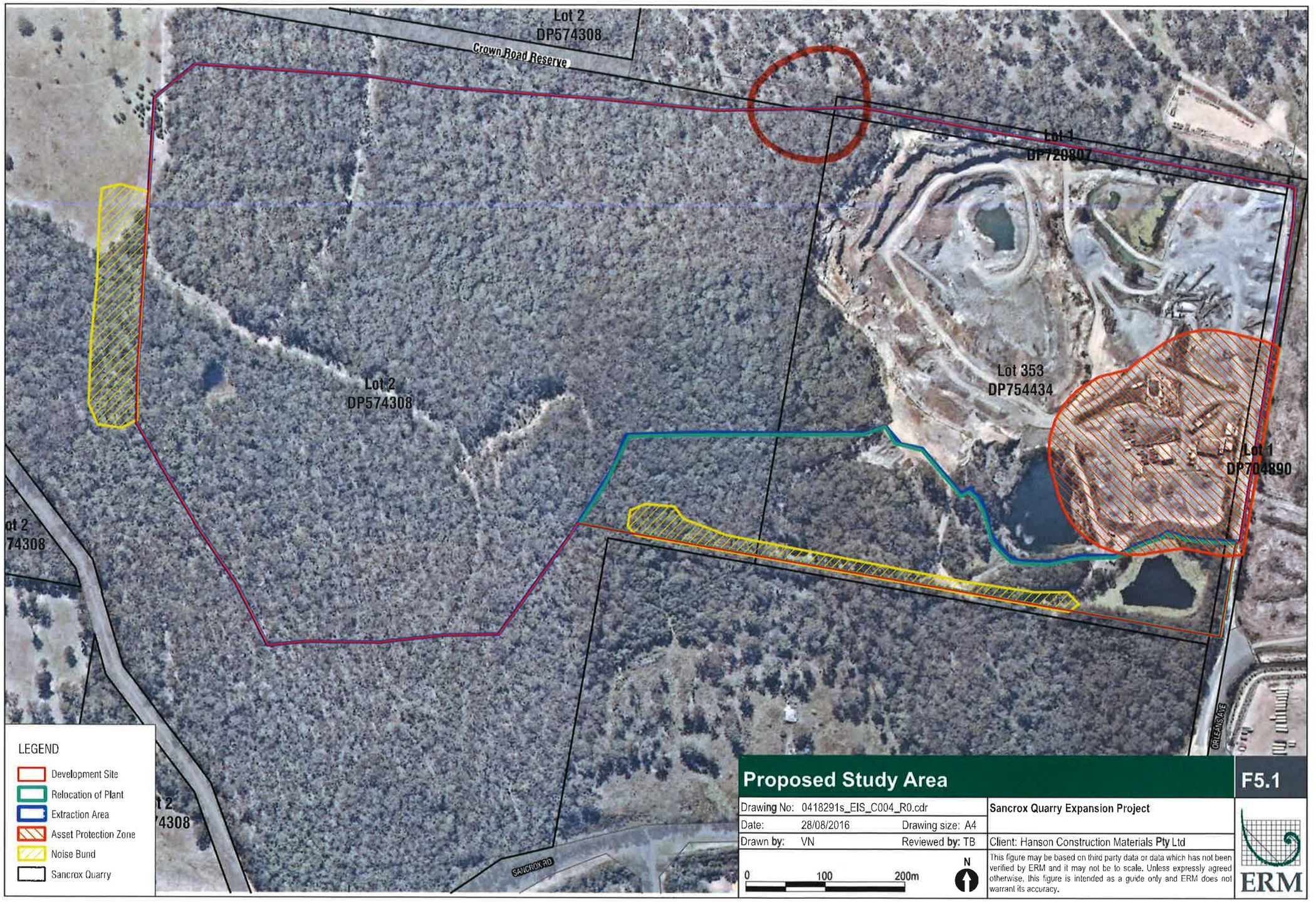
DRAWING TITLE:	QUARRY SECTION LOCATIONS - DUNN			**A1**
PROJECT:	SANCROX ENTERPRISE ZONE - QUARRY INVESTIGATION LOT 353 DP 754434, LOT 2 DP574308, LOT 1 DP 555095, ORLEANS AVENUE, S ANCROX			
CLIENT:	EXPRESSWAY SPARES PTY LTD	DRAWING NO:	SHEET:	REVISION:
		5809 Quarry Investigation	----	A

“E”


WARNING
OPTICAL FIBRE CABLE IN THIS VICINITY
Avoid costly cable damage
Please Dial 1100 'underground cable locations' before digging

"F"

"G"



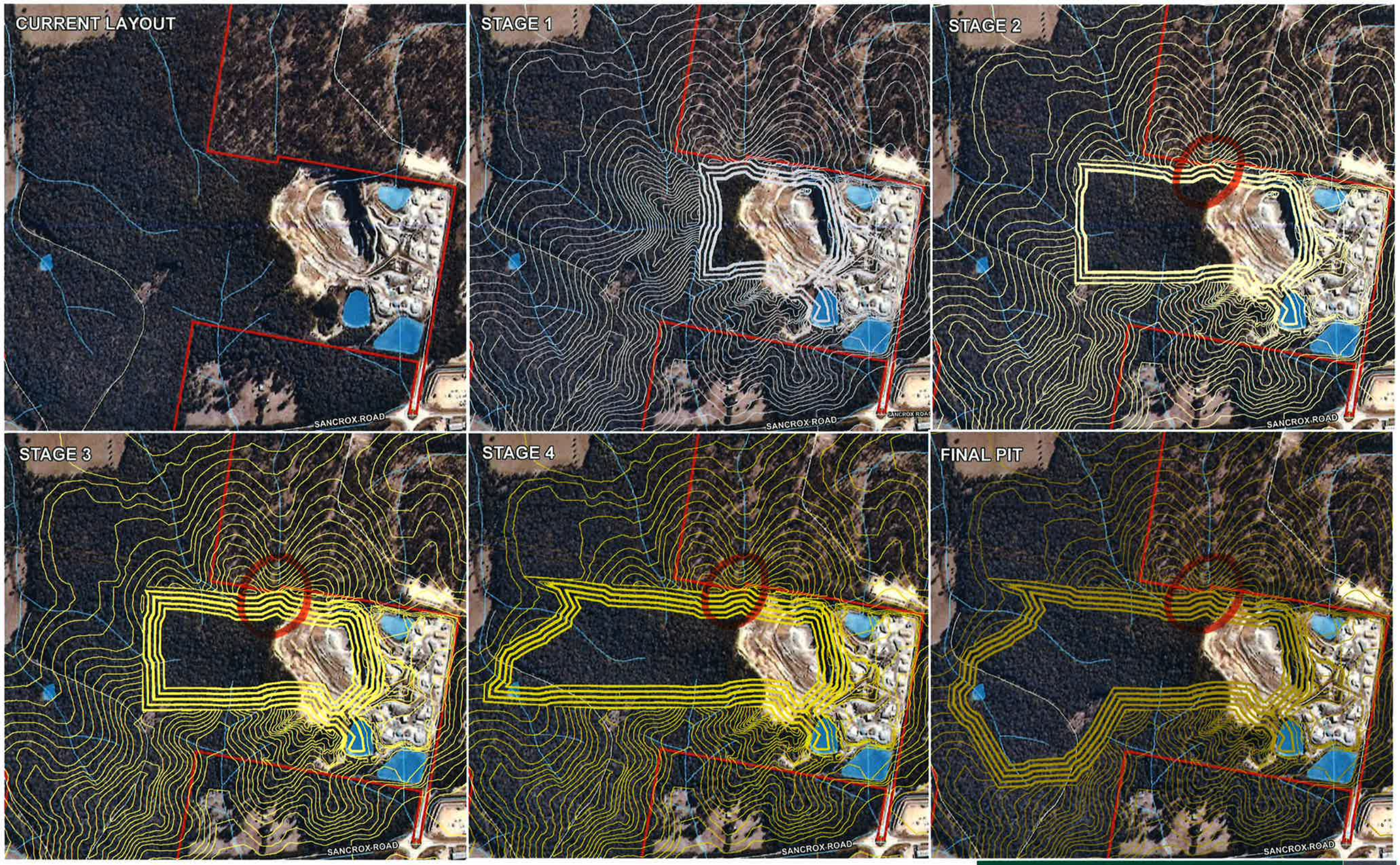
Proposed Study Area — F5.1

Drawing No:	0418291s_EIS_C004_R0.cdr		Sancrox Quarry Expansion Project
Date:	28/08/2016	Drawing size: A4	
Drawn by:	VN	Reviewed by: TB	Client: Hanson Construction Materials Pty Ltd

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM

"G"



Legend

- Existing Property Ownership
- Lot Boundary
- Road Network
- Watercourses

Quarry Staging:

- Stage 1 (RL-14m)
- Stage 2 (RL-14m)
- Stage 3 (RL-40m)
- Stage 4 (RL-40m)
- Final Pit (RL-40m)

Source:
Spatial Data: DFSI DCDB, DTDB 2017
Imagery Data: nearmap August 2017

Quarry Staging

F 2.3

Drawing No:	0418291s_EIS_G002_R2.mxd		**Sancrox Quarry Expansion Project**
Date:	27/07/2018	Drawing Size: A4	
Drawn By:	LT	Reviewed By: ME	Client: Hanson Construction Materials Pty Ltd

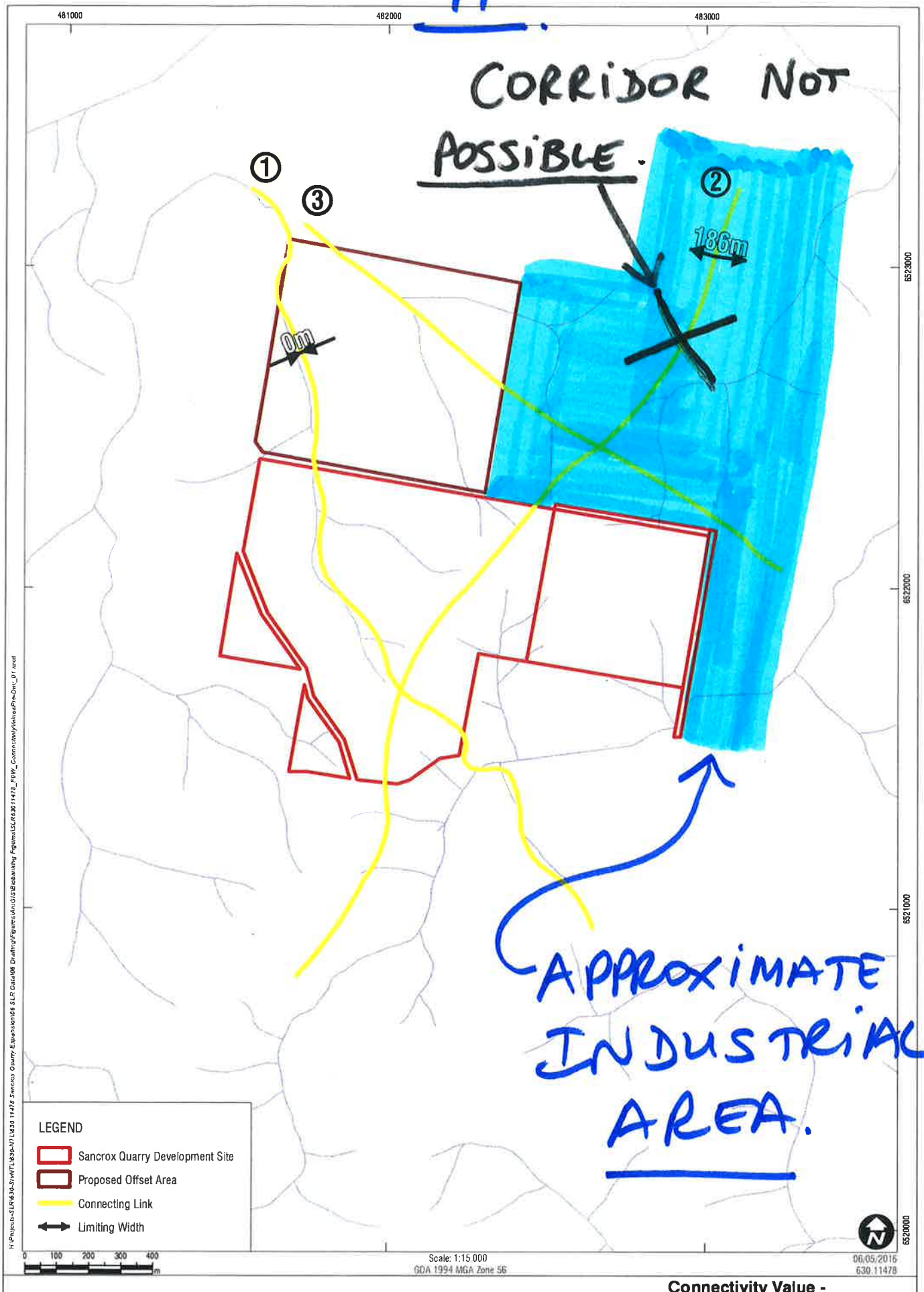
Coordinate System: GDA 1994 MGA Zone 56

0 100 200m

N

ERM

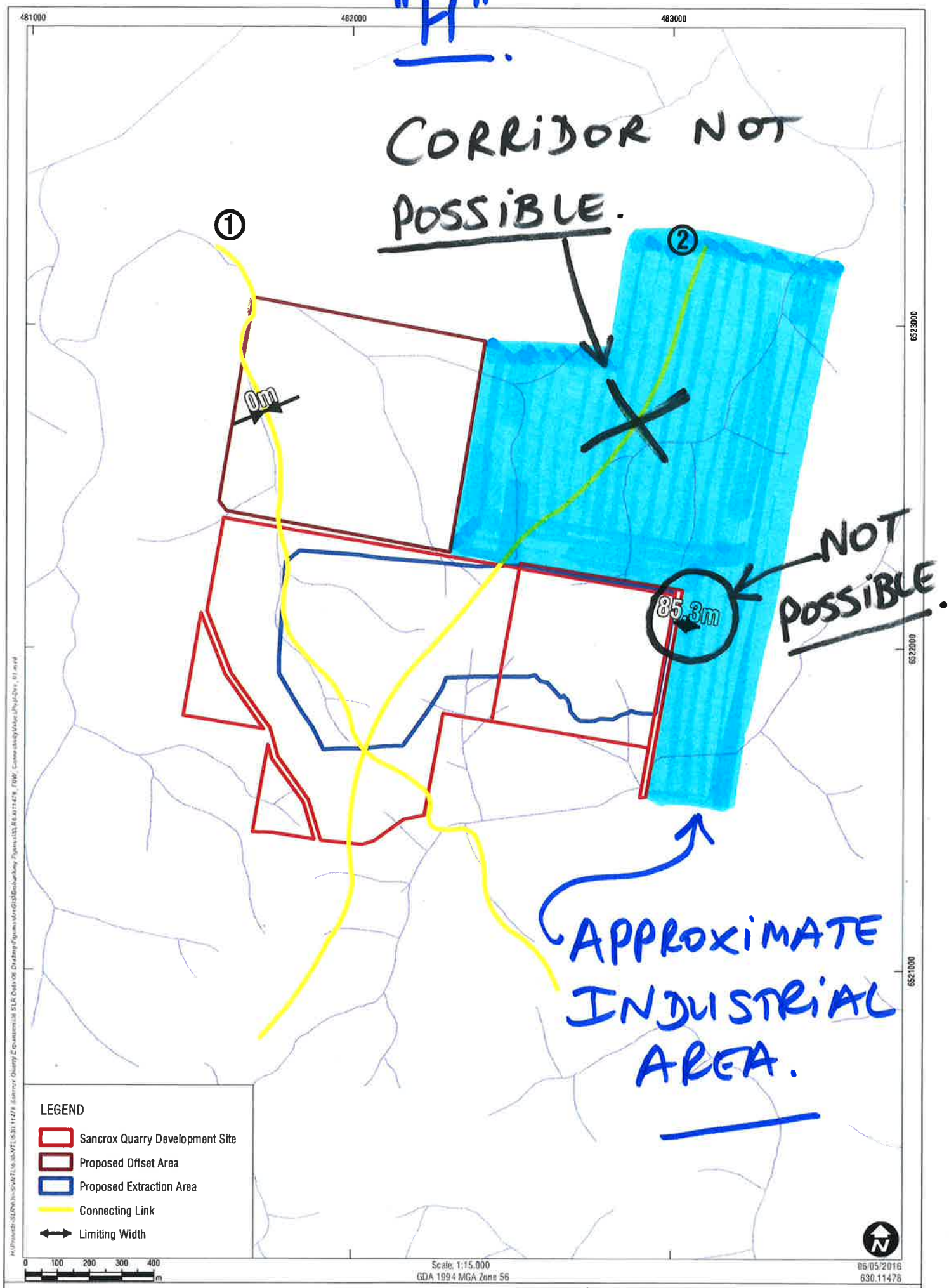
"H"



Connectivity Value - Pre-Development Site Connecting Links (Current linkage widths)

FIGURE X

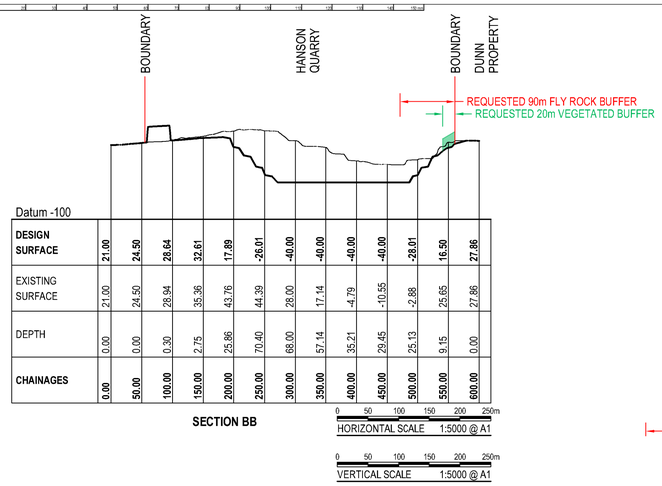
"H".



Connectivity Value - Post Development Site
Connecting Links
(Current linkage widths)

FIGURE X

Sheet Size A4



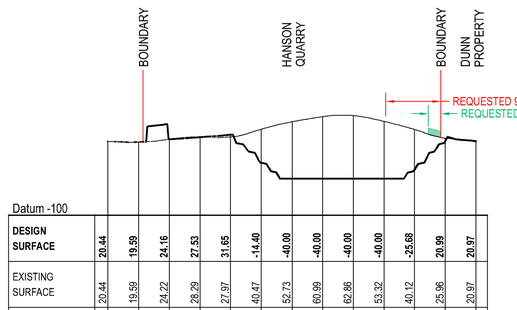
Datum -100

DESIGN SURFACE	**21.00**	**24.50**	**28.64**	**32.61**	**17.89**	**-26.01**	**-40.00**	**-40.00**	**-40.00**	**-40.00**	**-29.01**	**16.50**	**27.86**
EXISTING SURFACE	21.00	24.50	28.94	35.36	43.76	44.39	28.00	17.14	-4.79	-10.55	-2.88	25.65	27.86
DEPTH	0.00	0.00	0.30	2.75	25.86	70.40	68.00	57.14	35.21	29.45	25.13	9.15	0.00
CHAINAGES	**0.00**	**50.00**	**100.00**	**150.00**	**200.00**	**250.00**	**300.00**	**350.00**	**400.00**	**450.00**	**500.00**	**550.00**	**600.00**

SECTION BB

0 50 100 150 200 250m
HORIZONTAL SCALE 1:5000 @ A1

0 50 100 150 200 250m
VERTICAL SCALE 1:5000 @ A1



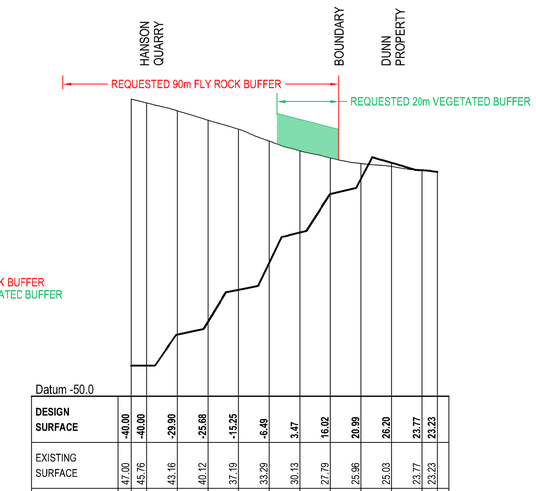
Datum -100

DESIGN SURFACE	**20.44**	**19.59**	**24.16**	**27.53**	**31.65**	**-14.40**	**-40.00**	**-40.00**	**-40.00**	**-40.00**	**-25.68**	**20.99**	**20.97**
EXISTING SURFACE	20.44	19.59	24.22	28.29	27.97	40.47	52.73	60.99	62.86	53.32	40.12	25.96	20.97
DEPTH	0.00	0.00	0.06	0.76	-3.67	54.87	92.73	100.99	102.86	93.32	65.80	4.96	0.00
CHAINAGES	**0.00**	**50.00**	**100.00**	**150.00**	**200.00**	**250.00**	**300.00**	**350.00**	**400.00**	**450.00**	**500.00**	**550.00**	**600.00**

SECTION CC

0 50 100 150 200 250m
HORIZONTAL SCALE 1:5000 @ A1

0 50 100 150 200 250m
VERTICAL SCALE 1:5000 @ A1



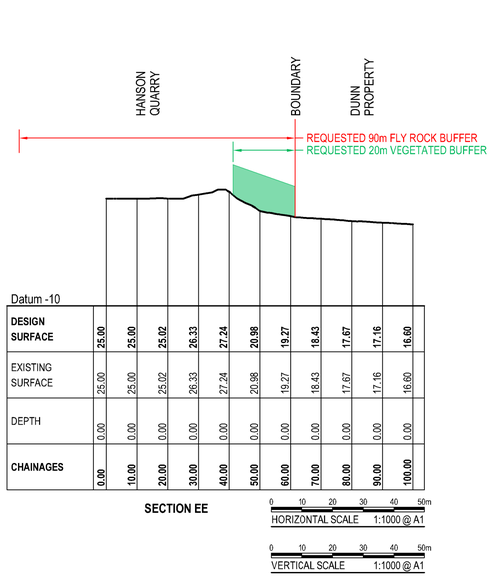
Datum -50.0

DESIGN SURFACE	**-40.00**	**-40.00**	**-29.90**	**-25.68**	**-15.25**	**-6.49**	**3.47**	**16.02**	**20.99**	**26.20**	**23.77**	**23.23**	
EXISTING SURFACE	47.00	45.76	43.16	40.12	37.19	33.29	30.13	27.79	25.96	25.03	23.77	23.23	
DEPTH	87.00	85.76	73.06	65.80	52.44	39.78	26.66	11.77	4.96	-1.17	0.00	0.00	
CHAINAGES	**475.00**	**480.00**	**490.00**	**500.00**	**510.00**	**520.00**	**530.00**	**540.00**	**550.00**	**560.00**	**570.00**	**575.00**	

SECTION CC CH 475 - CH 575

0 10 20 30 40 50m
HORIZONTAL SCALE 1:1000 @ A1

0 10 20 30 40 50m
VERT.CAL SCALE 1:1000 @ A1



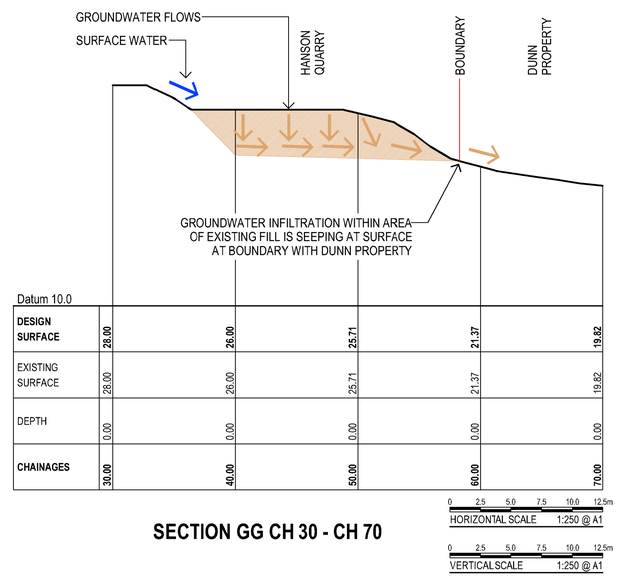
Datum -10

DESIGN SURFACE	**25.00**	**25.00**	**25.02**	**26.33**	**27.24**	**20.98**	**19.27**	**18.43**	**17.67**	**17.16**	**16.60**
EXISTING SURFACE	25.00	25.00	25.02	26.33	27.24	20.98	19.27	18.43	17.67	17.16	16.60
DEPTH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHAINAGES	**0.00**	**10.00**	**20.00**	**30.00**	**40.00**	**50.00**	**60.00**	**70.00**	**80.00**	**90.00**	**100.00**

SECTION EE

0 10 20 30 40 50m
HORIZONTAL SCALE 1:1000 @ A1

0 10 20 30 40 50m
VERTICAL SCALE 1:1000 @ A1



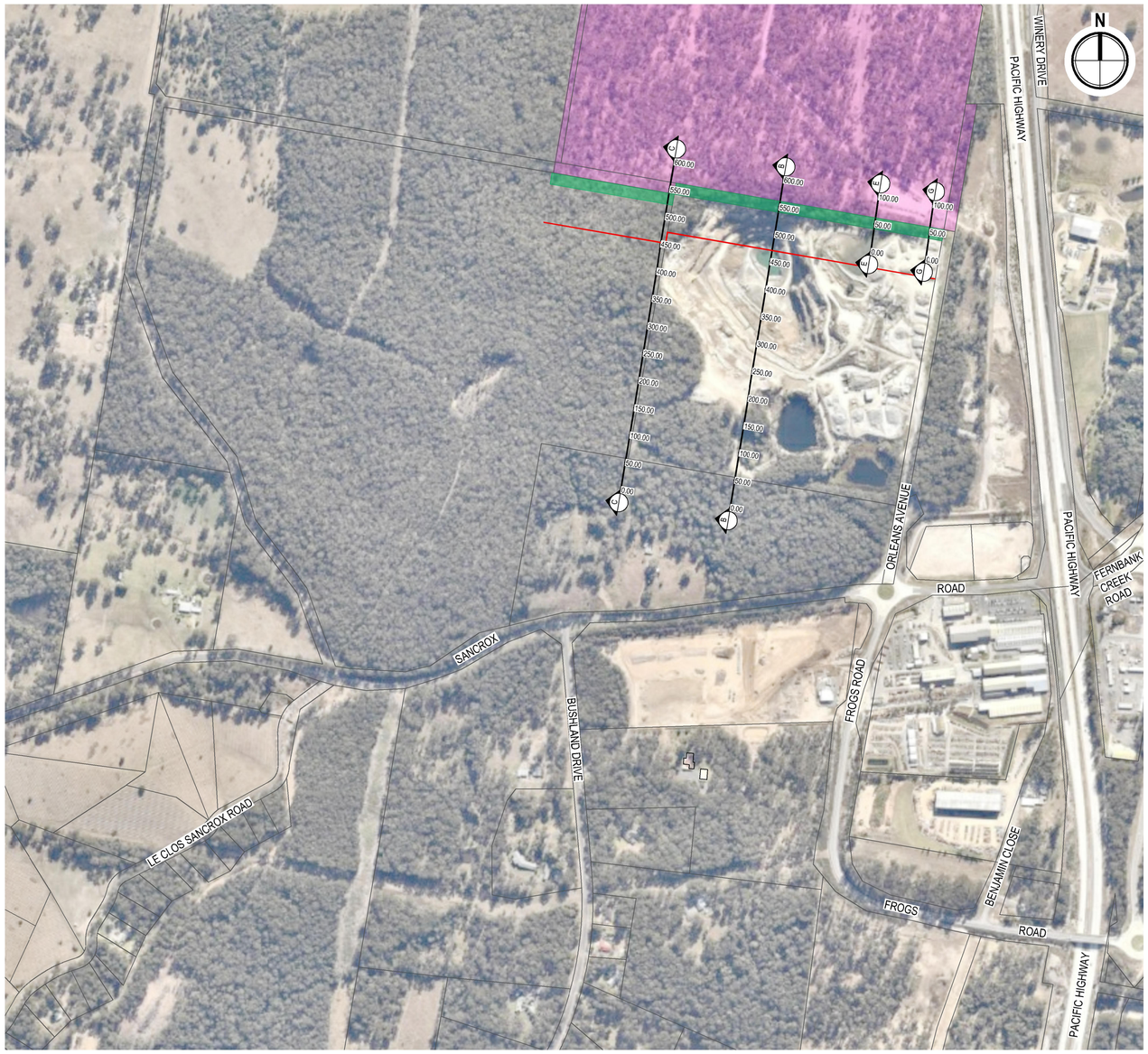
Datum 10.0

DESIGN SURFACE	**28.00**	**26.00**	**25.71**	**21.37**	**19.82**
EXISTING SURFACE	28.00	26.00	25.71	21.37	19.82
DEPTH	0.00	0.00	0.00	0.00	0.00
CHAINAGES	**30.00**	**40.00**	**50.00**	**60.00**	**70.00**

SECTION GG CH 30 - CH 70

0 2.5 5.0 7.5 10.0 12.5m
HORIZONTAL SCALE 1:250 @ A1

0 2.5 5.0 7.5 10.0 12.5m
VERTICAL SCALE 1:250 @ A1



LEGEND

- 10 — SURFACE CONTOURS (10m MAJOR CONTOUR INTERVALS)
- SURFACE CONTOURS (1.0m MINOR CONTOUR INTERVALS)
- DUNN PROPERTY
- FILLED LAND

0 50 100 150 200 250
SCALE 1: 5000 @ A1

NOTES

1. THIS PLAN HAS BEEN PREPARED FROM PUBLIC STATE GOVERNMENT & PMH COUNCIL SUPPLIED GIS MAPPING INFORMATION. IT IS SUITABLE ONLY FOR THE PURPOSE OF BROAD AREA SITE ANALYSIS AND STRUCTURE PLANNING. ALL SITE ANALYSIS AND PROPOSALS ARE SUBJECT TO DETAILED SITE SURVEY AND PLANNING ASSESSMENT AND DEVELOPMENT APPROVAL PROCESSES.

2. THE COORDINATES ADOPTED ARE MGA ZONE 56 COORDINATES AND GRID DISTANCES.

KING + CAMPBELL

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T: 02 6586 2555
F: 02 6583 4064
E: info@kingcampbell.com.au

REV.	DATE	DESCRIPTION	BY
A	11.12.2019	FOR SUBMISSION	AJC

DATUM: AHD SCALE: 1:5000 @ A1 (1:10000 @ A3)

0 250.0

PROJECT NO:	5809
DA NO.:	-
DESIGNED BY:	-
DRAWN BY:	LW
CHECKED BY:	-
DATE CREATED:	NOV 2019

DRAWING TITLE:	QUARRY SECTION LOCATIONS - DUNN			**A1**
PROJECT:	SANCROX ENTERPRISE ZONE - QUARRY INVESTIGATION LOT 353 DP 754434, LOT 2 DP574308, LOT 1 DP 555095, ORLEANS AVENUE, S ANCROX			
CLIENT:	EXPRESSWAY SPARES PTY LTD	DRAWING NO:	SHEET:	REVISION:
		5809 Quarry Investigation	----	A