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21 June 2018

Ms M Patterson
Major Projects
Department of Planning & Environment

Our ref: MBP
Matter no: 9623073

**By email: may.patterson@planning.nsw.gov.au**

Dear Ms Patterson

**Proposed Sutton Forest Sand Quarry**
**Development Application No: SSD_6334**
**Our client: VSSV Pty Limited the owner of the Green Valley Sand Quarry**

We act for VSSV Pty Limited and are instructed to lodge an objection to consent being granted to the Sutton Forest Sand Quarry for the reasons set out in this letter.

**1. Lack of transparency**

The Green Valley Sand Quarry is 15 km by road from Marulan whereas the proposed Sutton Forest Quarry is 22 km by road from Marulan (and 14 km as the crow flies for Green Valley and 21 km as the crow flies for Sutton Forest). R W Corkery & Co Pty Ltd acted for Rocla Pty Limited in obtaining approval for MP 08_0230 and during 2016 and 2017 R W Corkery acted as Project Manager to enact physical commencement of the Green Valley Sand Quarry. That project has physically commenced although sand extraction has not yet commenced.

However, although the Green Valley Sand Quarry is noted on a map by R W Corkery & Co Pty Limited in its Documentation Supporting an Application for Director General's Requirements for the Sutton Forest Quarry dated December 2013, page 24 figure 4.3, in the EIS prepared by R W Corkery & Co Pty Limited a similar figure 4.6 is included on page 4-13 but the Green Valley Sand Quarry has been deleted. Penrose Quarry is shown on both plans.

The Traffic Impact Assessment has been prepared by Transport & Urban Planning Pty Limited, Special Consultant Studies Compendium Volume 1 Part 1 dated February 2018. Transport & Urban Planning Pty Limited also acted for VSSV Pty Limited in obtaining approval for MP 08_0230 and yet no account has been taken of the Green Valley Sand Quarry in relation to the generation of traffic along the Hume Highway or the "cumulative effect" of traffic.

Neither R W Corkery & Co Pty Limited nor Transport & Urban Planning Pty Limited could claim ignorance of the Green Valley Sand Quarry in MP 08_0230.

VSSV is concerned that the Sutton Forest Sand Quarry application has not been made with the degree of transparency, candour or rigour that should attend such an application.

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## 2. Green Valley Sand Quarry

MP 08_0230 has been physically commenced and permits:

(a) an estimated 41 million tonnes of friable sandstone to be extracted yielding approximately 30 million tonnes of high quality sand products;

(b) the extraction of up to 1.3 million tonnes of extractive material from the site in any calendar year;

(c) the transport of not more than 1 million tonnes of product from the site in any calendar year;

(d) the despatch of not more than 170 laden trucks from the site on any day;

(e) the despatch of not more than 25 laden trucks per hour between 5.00 am and 10.00 pm on any day; and

(f) the despatch of not more than 8 laden trucks per hour between 10.00 pm and 5.00 am on any day.

MP 08_0230 is permitted to operate until 2043.

## 3. Director General's Requirements

We make comments below in relation to various non-compliances, or incomplete information, in relation to the Director General Requirements. However, our client only became aware of the proposed quarry eight (8) days before the time expires for objections to be lodged. There may well be further detailed objections made by our client but for now we set out the Director's General's Requirements which are shown on the left-hand column of the Table below with the objections as raised by VSSV Pty Limited in the column on the right.

| **DG Requirements** | **VSSV Pty Limited's comments** |
|---|---|
| **General requirements** | |
| General requirements of cl. 6 and 7 of Schedule 2 of EP&A Regulation 2000 | |
| Detailed description of development including: | |
| - Need for the proposed development | Section 1.4 of EIS Section 1<br><br>Penrith Lakes has ceased and Kurnell is slowing.<br><br>No specific mention of Green Valley Sand Quarry<br><br>Figure 4.3 and section 4.2.2 (page 25) – specific reference to Green Valley Sand Quarry (Figure 4.3 only appeared in the 2013 documentation prepared prior to the DGR's. A similar Figure 4.6 is included on page 4-13 of |

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| DG Requirements | VSSV Pty Limited's comments |
|---|---|
| | the EIS but Green Valley Sand Quarry has been deleted (Penrose Quarry is shown).<br><br>No specific justification of the **need** for the development, nor any detailed analysis. This does not comply with the requirements.<br><br>No reference to need for additional sand supplies. Rather the Executive Summary states that "Sydney consumes an average of approximately 6 million tonnes of construction sand annually, approximately two-thirds of which is fine to medium-grained sand." The EIS ignores the fact that there is 1.5 million tonnes per annum of sand available in close proximity to the site. The application is written as if neither Penrose Quarry or Green Valley Sand Quarry were approved. |
| - Alternatives considered | This should include a 'Not proceedings' option.<br><br>Analysis is very cursory:<br><br>• Approved sites "have approved upper limits of extraction often less than 0.5 million tonnes per year". This is misleading. Penrose Quarry is above 500K tonnes, and Green Valley Sand Quarry is 1 million tonnes.<br><br>• EIS 7.3.5: Need to source other "greenfield quarry locations". Misleading as it does not refer to Penrose Quarry or Green Valley Sand Quarry.<br><br>• Damage to customer base of Hi-Quality is considered, but not any impact on commercial impacts to Penrose Quarry or Green Valley Sand Quarry.<br><br>EIS should consider a 'no build' option. In the "Alternatives considered" in section 2.15 |
| Consideration of relevant EPIs | Insufficient time to consider whether an objection should be raised. |
| Risk Assessment of potential environmental impacts of the development, identifying the key issues for further assessment | Insufficient time to consider whether an objection should be raised. |

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| DG Requirements | VSSV Pty Limited's comments |
|---|---|
| Detailed assessment of the key issues specific below, and any other significant issues identified in the risk assessment: | |
| - An assessment of the potential impacts of all stages of the development, including **any cumulative impacts**, taking into consideration relevant guidelines, policies, plans and statutes | Cumulative impacts should be considered in greater detail, and analysis performed as part the specialist consultant studies. Particularly in relation to the Traffic Impact Assessment. See section 5.1.7.3 at page 5-20 of the EIS. |
| - A description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment and | Could adaptive management and/or contingency plans be implemented for traffic volumes? That is, a condition of consent requiring the proponent in 10 years' time do a study that may limit the number of trucks? |
| A statement of commitments, outlining all the proposed environmental management and monitoring measures included in the EIS | |
| EIS must be accompanied by a report from a qualified QS providing: | |
| - Detailed calculation of CIV, including all the assumptions and components from with the CIV calculation is derived | No calculation provided. Only lump sum of $15 million provided in Project Summary. This does not comply with the requirements. |
| - Close estimate of the jobs that will be created during construction and operation phases | While there is an assessment of jobs created through the development, there is no consideration of endangering other jobs by impacts upon the profitable operations of Penrose Quarry and Green Valley Sand Quarry. |
| - Certification | |
| **Land Resources** | |
| Detailed assessment of the potential impacts on: | |
| - Soils and land capability (including land contamination) | Insufficient time to consider whether an objection should be raised. |
| - Landforms and topography | Insufficient time to consider whether an objection should be raised. |
| - Land use, including conservation and | Insufficient time to consider whether an |

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| DG Requirements | VSSV Pty Limited's comments |
|---|---|
| recreational use | objection should be raised. |
| - Agricultural resources and/or enterprises in the local area, including<br>o Any change in land-use arising from requirements for biodiversity offsets<br>o Detailed description of measures that would be implemented to avoid and/or minimise the potential impacts of the project on agricultural resources and/or enterprises | Insufficient time to consider whether an objection should be raised. |
| **Water Resources** | |
| Detailed assessment of potential impacts on the quality and quantity of existing surface water and ground water resources including impacts on: | See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June 2018. |
| - Existing user entitlements, affected licensed water users and basic landholder rights | See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June 2018. |
| - Groundwater-dependent and riparian ecology | See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June 2018. |
| - Regional water supply infrastructure | Property 25 marked on the Figure 4.5 page 4-11 of the EIS is a fresh water spring used by Coca Cola for water production by Coca Cola and Schweppes<br><br>See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June 2018. |
| Detailed site water balance, including description of site water demands, water disposal methods (incl of volume and frequency of any water discharges), water supply infrastructure and water storage structures | See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June 2018. |
| detailed consideration of maintenance of an adequate buffer between all excavations and highest predicted groundwater table | See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June 2018. |
| identification of any licencing requirements or other approvals under *Water Act 1912* or WMA | See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June |

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| DG Requirements | VSSV Pty Limited's comments |
|---|---|
| 2000 | 2018. |
| demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant WSP or water source embargo | |
| detailed description of the proposed water management system, water monitoring program, and other measures to mitigate surface and groundwater impacts | See attached letter from Drew Bewsher of Bewsher Consulting Pty Limited dated 21 June 2018. |
| **Biodiversity** | |
| measures taken to avoid, reduce or mitigate impacts on biodiversity | Insufficient time to consider whether an objection should be raised. |
| accurate estimates of proposed vegetation clearing | Insufficient time to consider whether an objection should be raised. |
| detailed assessment of potential impacts of the development on any | Insufficient time to consider whether an objection should be raised. |
| - Terrestrial or aquatic threatened species or populations and their habitats, EEC, and groundwater dependent ecosystems, paying particular attention to the indirect impacts on the threatened ecological communities and threatened flora associated with Long Swamp | Insufficient time to consider whether an objection should be raised. |
| - Regionally significant remnant vegetation, or vegetation corridors, with particular consideration to the *Illawarra Regional Environmental Plan No 1* | Insufficient time to consider whether an objection should be raised. |
| comprehensive offset strategy to ensure the development maintains or improves biodiversity values in the medium to long term | Insufficient time to consider whether an objection should be raised. |
| **Heritage** | |
| an Aboriginal cultural heritage assessment which must: | |
| - Demonstrate effective consultation with Aboriginal communities | |

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| DG Requirements | VSSV Pty Limited's comments |
|---|---|
| - Outline any proposed impact mitigation and management measures | |
| A Historic heritage assessment (including archaeology) which must: | |
| - Include a statement of heritage impact (including significance assessment) for any State significant or locally significant historic heritage item | |
| - Outline any proposed mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures) | |
| **Traffic & Transport** | |
| accurate predictions of project-related traffic and a detailed assessment of the potential impacts of project-related traffic on the capacity, safety and efficiency of road networks, including modelling to predict queue lengths and intersection performance | No modelling to predict queue lengths and intersection performance<br><br>No reference to analysing traffic on a cumulative basis. While it is said that it considers cumulative effects of Penrose Quarry (which was closed at the time of the application – see section 4.2.2) and Green Valley Sand Quarry, there is in fact no such cumulative consideration undertaken on a sufficiently detailed or realistic basis. |
| detailed description of the measures that would be implemented to upgrade and/or maintain the capacity, efficiency and safety of effected roads and intersections over the life of the project, including concept plans for any proposed works | Only states that no works are required, as the Hume Highway has the capacity<br><br>Cumulative Impacts – section 5.1.7.3 page 5-20:<br><br>*When consideration is given to additional heavy vehicles (sic) traffic travelling to and from the operating Penrose Quarry and approved Green Valley Sand Quarry located adjacent to the Hume Highway south of the Site, there could be up to an additional 50vph using the northbound lanes of the Hume Highway. Cumulatively, this respectively represents a 45% and 41% increase in the calculated average hourly heavy vehicle movements in each direction. However, when compared to average weekday heavy vehicle movements travelling north (2 881 vpd) and south (2 912 vpd) on the Hume Highway, the cumulative increase would be 12% for each* |

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| DG Requirements | VSSV Pty Limited's comments |
|---|---|
| | *direction of travel.*<br><br>It is noted that this is not addressed in the Traffic Impact Assessment Report (Volume 1 Part 1), but only included in the EIS body.<br><br>The Traffic Impact Assessment prepared for the Green Valley Sand Quarry stated: "At full production of 1,000,000 tonnes per annum, the project would generation 240 truck movements on an average day and up to 284 truck movements on a busy (85th percentile) day." (page 6-5) However MP 08_0230 restricted the truck movements to 170 from the site per day, ie. 340 possible movements. |
| **Greenhouse gases** | |
| quantitative assessment of potential Scope 1, 2, and 3 greenhouse gas emissions | Does not appear to take into account the cumulative impact of Penrose Quarry or Green Valley Sand Quarry. |
| qualitative assessment of the potential impacts of these emissions on the environment | |
| as assessment of reasonable and feasible measures to minimum and ensure energy efficiency | |
| **Hazards** | |
| paying particular attention to public safety | |
| bushfires | |
| **Social & economic** | |
| potential impacts on local and regional communities, including impacts on social amenity | |
| a detailed description of the measures that would be implemented to minimise the adverse social and economic impacts of the project, including any infrastructure improvements or contributions and/or VPAs | |
| detailed assessment of costs and benefits of the development as a whole, and whether it would result in a net benefit for the NSW community | See Section 5.14<br><br>No consideration of economic impacts on already approved sand quarries in the area. |

| DG Requirements | VSSV Pty Limited's comments |
|---|---|
| | No cost-benefit analysis conducted, other than rudimentary overview of potential issues.<br><br>Benefits appear to be overstated generally and focus upon the private commercial interests of the landowner and/or the proposed operator of the Sutton Forest Sand Quarry. |

**4. Water catchment issues – preliminary assessment**

(a) The site drains to Long Swamp Creek which is reliant on water from both ground water and surface water. The associated aquatic environment is strongly dependant on preserving the water quantities and qualities originating from these 2 sources. The existing aquatic environment and the associated hydrogeology and hydrology have received only limited attention in the EIS.

(b) Long Swamp Creek is also an upper tributary of the Wollondilly River and lies within the catchment of Sydney Water supply. Any developments such as the proposal, which could potentially alter the quantity or quality of water in the catchment, consequently require special consideration.

(c) There are a number of water courses which traverse the site and drain to Long Swamp Creek. The surface flows in these water courses will be either eliminated or highly altered as part of the proposed operations, and then will be partially restored after the quarry closes operation and the site is rehabilitated. The documentation provided appears to be an inadequate assessment of the impact of the proposal on these water courses and Long Swamp Creek.

(d) The proposal involves works within 40 m of many of these water courses and therefore requires controlled activity approvals under the *Water Management Act*.

(e) The monitoring and assessment of the existing flows, water levels and water quality in Long Swamp Creek and its water courses are very limited and provide only a coarse appreciation of the existing hydrological characteristics. Little confidence can be placed in the existing hydrological flow regime that has been presented in the EIS.

(f) The ground water modelling is based on assumptions of the existing hydrogeology and climate but there does not appear to have been any sensitivity assessments undertaken to explore the variation in the models predictions given the uncertainties in the model inputs.

(g) Surface water assessments have been based on rainfall between 1945 and 1999. They should have been based on the whole of the 20th Century rainfall events – see paragraph 7 of the letter from Drew Bewsher dated 21 June 2018.

(h) The surface runoff calculations are lacking in integrity. See paragraph 8 of Drew Bewsher's letter 21 June 2018.

(i) There does not appear to be sufficient impact assessment of the proposed sediment and water supply dams. Some of these are many metres high. All of these structures will overtop in extreme storms (causing scouring and pollution) and it is unclear how these risks are to be mitigated. There are also insufficient details of these dams such as size, storage capacity, construction type, spillway details, etc.

(j) The water balance details had been presented for a dry year (1982) and for mean annual flow. There are wide variations caused by our hydrological cycle and we would have expected more rigorous analysis to be presented including behaviour in a range of wet, dry and median conditions, including sensitivity analysis indicating how these predictions may vary once better information becomes available.

(k) In relation to the water catchment, there is insufficient baseline information to assess the effectiveness of the controls for the water catchment. The modelling and predictions of the future groundwater and surface water behaviour on Long Swamp Creek are approximate and may vary considerably when further data becomes available.

## 5. Conclusion

VSSV objects to the proposed development on grounds including:

(a) No demonstrated need for additional sand resources beyond those available from Penrose Quarry and Green Valley Sand Quarry. The proponent is required to demonstrate a market need and it appears to have purposefully ignored the 1.5 million tonnes of sand available from Penrose Quarry and Green Valley Sand Quarry.

(b) No consideration or inadequate consideration of the cumulative impacts of traffic on the Hume Motorway

(c) The proposed quarry is within the Sydney Water Catchment – there is another almost 1million people planned to be living within the Sydney basin within the next 15 years. The water catchment for the greater Sydney area should be strictly protected.

(d) The proposal should be refused on the basis of the information provided in the Ground Water Impact Assessment by Larry Cook Consulting Pty Limited and Coffey Geotechnics Pty Limited; and Surface Water Assessment by Strategic Environmental & Engineering Consulting (SEEC) Pty Limited on the basis of the inherent risks identified by Mr Bewsher in his letter 21 June 2018, being risks to:

- Long Swamp Creek;
- Sydney's water supply;
- the water courses which traversed the site and drained to Long Swamp Creek;
- the monitoring and assessment of existing flows, water levels and water quality in Long Swamp Creek and its water courses are very

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limited and provide only a coarse appreciation of the existing hydrological characteristics;

- there does not appear to have been any sensitivity assessments undertaken to explore the variation in the ground water models predictions;
- surface water assessments have been based on rainfall between 1945 and 1999 being the wettest part of the 20th Century, and excluding the drier first half of the century and the "Millennium Drought" at the beginning of the 21st Century;
- the surface runoff calculations appear to lack integrity;
- there does not appear to be sufficient impact assessment of the proposed sediment and water supply dams;
- the water balance details should have had a more rigorous analysis presented including behaviour in a range of wet, dry and median conditions, and including sensitivity analyses indicating how these predictions may vary once better information becomes available.

(e) The increase in employment is not established as no account has been taken of the impact on Penrose Quarry or Green Valley Sand Quarry.

(f) There does not appear to be any consideration of the impacts of climate change on rainfall, surface water runoff etc.

(g) The application has been presented with a skewed analysis of benefits (focussing too greatly upon private commercial interests associated with the proposed development) and without presenting an accurate or candid assessment of the real impact that the project will have, including adverse impacts upon Green Valley Sand Quarry (a State significant development which has attained prior approval).

This submission has been written in limited time and the comments contained herein are of a preliminary nature. However, VSSV Pty Limited would be prepared to expand on these comments given further time.

We respectfully request the Secretary to consider these submissions.

Yours faithfully
**Hunt & Hunt**

**Maureen Peatman**
Partner

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21 June 2018
Ref: J2281L_1.docx

Mrs Maureen Peatman
Hunt & Hunt
GPO Box 4132
Sydney NSW

By Email (only): MPeatman@huntnsw.com.au

Dear Mrs Peatman

**EIS FOR PROPOSED SAND QUARRY AT SUTTON FOREST**
**WATER CATCHMENT ISSUES – PRELIMINARY ASSESSMENT**

This letter sets out our response to your recent request for us to undertake an initial review of the water issues associated with the Sutton Forest quarry proposal as documented in the EIS.

Over the last two days we have perused the EIS and paid particular attention to the:

- *Groundwater Impact Assessment* by Larry Cook Consulting Pty Ltd and Coffey Geotechnics Pty Limited; and
- *Surface Water Assessment* by Strategic Environmental & Engineering Consulting (SEEC) Pty Ltd,

and now make the following comments:

1. The site drains to Long Swamp Creek which is reliant on water from both groundwater and surface water. The associated aquatic environment is strongly dependent on preserving the water quantities and qualities originating from these two sources. The existing aquatic environment and the associated hydrogeology and hydrology have received only limited attention in the EIS.
2. Long Swamp Creek is also an upper tributary of the Wollondilly River and lies within the catchment of Sydney's water supply. Any developments such as the proposal, which could potentially alter the quantity or quality of water in the catchment, consequently require special consideration.
3. There are a number of watercourses which traverse the site and drain to Long Swamp Creek. The surface flows in these watercourses will be either eliminated or highly altered as part of the proposed operations, and then will be partially restored after the quarry closes operation and the site is rehabilitated. In our opinion, the documentation provides an inadequate assessment of the impact of the proposal on these watercourses and Long Swamp Creek.

4. The proposal involves works within 40m of many of these watercourses and therefore requires controlled activity approvals under the Water Management Act. It appears that the Proponent has deferred these approvals to a later stage of the project.

5. The monitoring and assessment of the existing flows, water levels and water quality in Long Swamp Creek and its watercourses are very limited and provide only a coarse appreciation of the existing hydrological characteristics. Little confidence can be placed in the existing hydrological flow regime that has been presented in the EIS. We note that the Proponent will improve this as the project gets underway. Nevertheless we hold concerns that adequate work has been undertaken to establish the hydrological baseline conditions needed for this type of project, given its location in the upper reaches of Sydney's water supply catchment.

6. The Proponent has undertaken groundwater modelling based on assumptions of the existing hydrogeology and climate. This appears to be based on the best information which is available. However there has been no peer review of the groundwater modelling nor does there appear to have been any sensitivity assessments undertaken to explore the variation in the model's predictions given the uncertainties in the model inputs.

7. Surface water assessments have been based on rainfall between 1945 and 1999. This latter half of the 20th century is known to be much wetter than the first half of that century. The period also does not include the decade long 'Millennium Drought' which commenced at the start of the 21st century. Whilst the Proponent appears to have limited their analyses to a period for which local rainfall records are available, there are readily available rainfall data sets which cover a much longer period that could have been used. Most importantly these longer data sets comprise more representative climate periods including some significant droughts. The project's requirements for additional water supplies, (which don't appear to have been quantified), could be better determined.

8. The surface runoff calculations have been based on use of a volumetric coefficient of runoff ($C_v$) applied to rainfall. This is a very crude procedure and takes no account of antecedent moisture and other factors which influence the response of runoff to rainfall. Whilst the Proponent has no doubt been constrained by a lack of data, there appears to have been no attempt to undertake a sensitivity analysis based on different runoff assumptions (which could on occasions be an order of magnitude different to that inherently assumed in the adopted $C_v$ value).

9. There are a number of 'Water-Related Agency Requirements' listed in the Appendices of the EIS' *Surface Water Assessment* that have not been addressed, or if addressed, have not been documented.

10. There does not appear to be sufficient impact assessment of the proposed sediment and water supply dams. Some of these are many metres high. All of these structures will overtop in extreme storms (causing scouring and pollution) and it is unclear how these risks are to be mitigated. There are also insufficient details of these dams such as size, storage capacity, construction type, spillway details, etc.

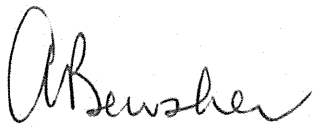
11. The water balance details have been presented for a dry year (1982) and for mean annual flows. There are wide variations caused by our hydrological cycle and we would have expected a more rigorous analysis to be presented including behaviour in a range of wet, dry and median conditions, including sensitivity analyses indicating how these predictions may vary once better information becomes available.

12. There does not appear to be any consideration of the impacts of climate change.

13. In relation to the potential impacts on water catchments arising from the proposal, there is a reliance on adapting site controls after commencement, when required, based on monitoring that is to be installed. However the effectiveness of these controls is limited given the lack of an adequate description of the current baseline conditions for groundwater and surface water. Further because of the limited data that is available, the modelling and predictions of the future groundwater and surface water behaviour on Long Swamp Creek are approximate and may vary considerably when further data becomes available.

Our comments above are preliminary. You will see that based on our review to date we have concerns that adequate water investigations have been undertaken by the Proponent. If requested we would be happy to carry out further investigations and provide you with more detailed advice in due course.

Yours sincerely



Drew Bewsher
Director

Bewsher

# Drew BEWSHER

## QUALIFICATIONS

Bachelor of Engineering (Hons), University of Tasmania, 1975.
Master of Science in Civil Engineering, California Institute of Technology USA, 1977

## AFFILIATIONS AND AWARDS:

Fellow, Institution of Engineers, Australia.
Member, College of Civil Engineers, Institution of Engineers, Australia.
Chartered Professional Engineer, NPER-3 Registration
Registered Professional Engineer of Queensland
Awards by Floodplain Management Australia:

- 2016 Australian Flood Risk Manager of the Year (Allan Ezzy Award)
- 2013 Harold Sternbeck Medal

## FIELDS OF SPECIAL COMPETENCE

Over thirty five years' experience in water related projects in Australia, America and South East Asia. This work has included floodplain management studies, river hydraulics and flood studies, computer modelling, hydrological studies, irrigation and salinity modelling, urban drainage investigation and design, water quality investigations, dam break studies, environmental planning and environmental impact assessment, construction supervision and the project management and economic evaluation of water resources projects. He has also provided expert testimony in legal proceedings related to flooding and drainage matters in the Supreme Court, District Court, and Land and Environment Court, and other tribunals in NSW, Victoria and Queensland.

## EXPERIENCE

**1986 to date | Bewsher Consulting Pty Ltd**

Principal responsible for a number of projects including:

*Floodplain Risk Management Studies and Plans* for approximately 30 NSW councils including those for the Hawkesbury, Double Bay, Eastwood, Nundle, Woolomin, Macquarie Park, Georges River, Mullet/Brooks Creek, Fairy/Cabbage Creek, Bowral, Coffs Creek, Camden Haven, Upper Parramatta River, Grafton, Lower Clarence River, Salt Pan Creek, Lower Georges River, Ballina and Tweed (BMT-WBM projects), Gwawley Bay, Prospect Creek, Billabong Creek, Berrima, Towradgi Creek, Haslams Creek, Mudgee, North Wentworthville, Carlingford, Brickfield Creek, Cabramatta Creek, Boundary Creek, Eastern Creek, Narrabri, Scone, Molong and the Paterson River.

*Independent technical audits and expert advice associated with flood risk management, hydrologic modelling and water resources issues in Australia.* This has included advice to the Queensland Floods Commission of Inquiry, expert hydrological review of major highway projects, expert technical support to the Snowy Water Inquiry and numerous Government projects relating to water efficiency savings throughout the Murray-Darling Basin including Menindee Lakes, technical auditor of the Murray-Darling Basin Commission 'Cap' models comprising 24 valley models developed by four states and the ACT, expert advice on various projects related to the Murray-Darling Basin Salinity

Management Strategy, expert review of IQQM models and environmental flow objectives for the NSW government, expert independent assessment of hydrological components of major infrastructure projects and EISs (e.g. Tillegra and Traveston Crossing Dam projects), together with numerous reviews carried out for the private sector.

*Flood risk assessment and computer modelling of flood behaviour* for over 500 projects in urban and rural areas of Australia. This has included assessment of risks to life and property from flooding, simulation of flow behaviour using one and two dimensional models, stormwater and urban drainage assessments, and consideration of a range of related environmental, riparian corridor and water quality issues.

*Expert testimony in excess of 60 court proceedings relating to development applications, valuation of flood prone land, personal injury claims and other issues relating to flooding, hydrology and stormwater drainage issues in NSW, Queensland and Victoria.*

*Policy formulation for floodplain development.* This has included the preparation of over 25 Development Control Plans for local councils in NSW to ensure new developments meet best practice standards for floodplain management. The scope of these policies has also addressed flood prone caravan parks, on-site stormwater detention and a range of broader stormwater management issues.

*Design and management of flooding and drainage infrastructure projects.* These projects comprise detention basins, major trunk stormwater systems, creek rehabilitation, and the civil works associated with numerous floodplain and stormwater projects.

**1980 to 1986 | Sinclair Knight & Partners Pty Ltd, Australia**

Specialist Water Engineer working on numerous development, government aid, mining and World Bank projects in NSW, Malaysia, and the islands of Sumatra and Java in Indonesia.

**1978 to1980 | River Murray Commission, Australia**

Investigation Engineer responsible for modelling of water resources of the Murray-Darling Basin, assisting the Executive Engineer with river operations and various investigations into the water resources of basin, and the preparation of water accounting procedures.

**1977 | Camp, Dresser & McKee, USA**

Engineering investigations of flood behaviour and river hydraulics in the Los Angeles Basin.

## PAPERS

Grech, P and Bewsher, D. (2014). Fitting Flood Risk Management into the New NSW Planning Act.

Grech, P and Bewsher, D. (2013). Time to Stop Blaming the Planners: How Floodplain Managers Can Improve the Planning Process.

Bewsher, D; Grech, P and Yeo, S. (2012). Hawkesbury's Flood Risk Management Plan: 15 Years in the Making

De Silva, N; Bewsher, D; Himsley, N & Seton, A. (2010). Is Inundation Resulting from Basin & Dam Failure, 'Flooding'?

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