Land and Environment Court
New South Wales

Case Title:	Hunter Environment Lobby Inc v Minister for Planning and Infrastructure (No 2)
Medium Neutral Citation:	[2014] NSWLEC 129
Hearing Date(s):	2-4, 6, 9-13, 16-19 September 2013, directions 10 March 2014, further submissions and directions 20 March 2014, directions 10 April 2014, directions 16 May 2014, written submissions 30 May, 17 June, 26 June and 2 July 2014
Decision Date:	27 August 2014
Jurisdiction:	Class 1
Before:	Pain J
Decision:	See paragraph 530
Catchwords:	APPEAL – objector appeal against Planning Assessment Commission's decision to approve an open-cut coal mine under Part 3A of the Environmental Planning and Assessment Act 1979 – impact on Aboriginal cultural heritage – impact on the long term functionality of agricultural land – impact on groundwater – protection of downstream water users – air quality health impacts and social and economic effects of mitigation measures – economic modelling of costs and benefits – conditional approval possible
Legislation Cited:	Commons Management Act 1989 s 4, s 14, Crown Lands Act 1989 Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002 Environmental Planning and Assessment Act 1979 s 4, Pt 3A, s 75J, s 75L, s 75R, cl 2 Sch 6A, cl 3 Sch 6A Environmental Planning and Assessment

Amendment (Part 3A Repeal) Act 2011
Environmental Planning and Assessment Regulation 2000 cl 8F, Sch 3
Land and Environment Court Act 1979 s 17, s 39
Mining Act 1992
National Environment Protection Council Act 1994 (Cth) s 15
National Parks and Wildlife Act 1974 s 84, s 90A
Protection of the Environment Administration Act 1991 s 6
Protection of the Environment Operations Act 1997
Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002
Singleton Local Environmental Plan 1996 Pt 3
State Environmental Planning Policy (Major Projects) 2005 cl 6, Sch 1 cl 5
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 cl 12, cl 14
Uniform Civil Procedure Rules 2005 Sch 7 cl 5
Water Management Act 2000 s 60A
Water Management (General) Regulation 2004 (repealed)
Water Management (General) Regulation 2011 cl 18, Sch 1, Sch 5 Pt 1 cl 12

Cases Cited:

Anderson v Director-General of the Department of Environment and Conservation [2006] NSWLEC 12; (2006) 144 LGERA 43
Ashton Coal Operations Pty Limited v Director-General, Department of Environment, Climate Change and Water (No 3) [2011] NSWLEC 1249
Associated Minerals Consolidated Ltd v Wyong Shire Council [1975] AC 538
Grace Bros Pty Ltd v Willoughby Municipal Council (1981) 44 LGRA 422
Gray v Minister for Planning [2006] NSWLEC 270; (2006) 152 LGERA 258
Hunter Environment Lobby Inc v Minister for Planning [2011] NSWLEC 221
Hunter Environment Lobby Inc v Minister for Planning and Infrastructure (No 3) [2014]

	NSWLEC 130 Ironstone Community Action Group Inc v NSW Minister for Planning [2011] NSWLEC 195 Olofsson v Minister for Primary Industries (No 2) [2011] NSWLEC 181 Telstra Corporation Limited v Hornsby Shire Council [2006] NSWLEC 133; (2006) 67 NSWLR 256 Terrace Tower Holdings Pty Ltd v Sutherland Shire Council [2003] NSWCA 289; (2003) 129 LGERA 195 White Mining (NSW) Pty Ltd, Austral-Asia Coal Holdings Pty Ltd & ICRA Ashton Pty Ltd/Scott Franks & Anor (Plains Clans of the Wonnarua People)/New South Wales [2011] NNTTA 110
Category:	Principal judgment
Parties:	Hunter Environment Lobby Inc (Applicant) Minister for Planning and Infrastructure (First Respondent) Ashton Coal Operations Pty Ltd (Second Respondent)
Representation	
- Counsel:	Mr R D White with Ms C Novak (Applicant) Mr S Free with Mr N Kelly (First Respondent) Mr A Galasso SC with Mr C Ireland (Second Respondent)
- Solicitors:	Environmental Defender's Office (Applicant) Legal Services Branch, Department of Planning and Infrastructure (First Respondent) McCullough Robertson Lawyers (Second Respondent)
File number(s):	11154 of 2012

JUDGMENT

Merits appeal in relation to open cut coal mine

1 The Minister for Planning and Infrastructure (the Minister) through his delegate the Planning Assessment Commission (PAC) approved the South-East Open-Cut coal mine project (the SEOC project) subject to conditions on 4 October 2012 (project approval). The project application was made by the Second Respondent, Ashton Coal Operations Pty Ltd (Ashton). This is an objector appeal under s 75L (now repealed) of the *Environmental Planning and Assessment Act* 1979 (the EPA Act) against the approval. The Applicant the Hunter Environment Lobby Inc sought an order that major project application, number MP 08_0182, be refused on several merit grounds.

2 I thank Commissioner O'Neill for her assistance in this matter. This matter has been considered in the context of the statutory framework addressed by the parties at the substantive hearing.

3 The Court went on a view of the proposed mine site and the surrounding area. It heard evidence from numerous residents in Camberwell on 3 and 4 September 2013 and from a number of objectors at Singleton Court House on 4 September 2013.

The SEOC project site

4 The SEOC project site is located in the Singleton local government area (LGA), approximately 12km north-west of Singleton, in the Hunter Valley, New South Wales. The SEOC project site is bounded to the west and north-west by Glennies Creek, which flows into the Hunter River about 2km south of the SEOC project site. The SEOC project site is located in the lower reaches of the Glennies Creek catchment, which has a total area of approximately 515 sq km and is part of the Hunter River catchment.

5 The SEOC project site is located immediately to the south of Camberwell village and the New England Highway and covers approximately 315ha.

Camberwell village is north of the New England Highway. The SEOC project site is approximately 2.5km south-east of Ashton's existing coal handling processing plant (CHPP). It includes an area of privately owned land the property of Mrs Wendy Bowman.

6 Camberwell village has 56 residences. Four are privately owned and the remaining residential properties are owned by Ashton. All permanently occupied residential properties within Camberwell are located north of the New England Highway. Camberwell does not contain any retail shops, commercial offices, schools or recreation facilities. Ashton also owns some properties south of the New England Highway, which are currently used for temporary housing of contractors and employees. Ashton submitted that this use will cease as soon as construction of the project commences.

The SEOC project proposal

7 The project is for an open cut coal mine. The total size of the resource to be extracted is 16.5 million tonnes (Mt) of run-of-mine (ROM) coal. The setback between the proposed mine pit and the high bank of Glennies Creek was increased from 150m to 200m and the setback from the northern site boundary was increased by the PAC. The conditions of approval restrict construction works and mining operations, apart from ROM coal handling, conveyor transport from the CHPP and maintenance to day and evening periods during the first two years of mining and allow mining operations to take place until 31 December 2025.

8 Further details of the SEOC project were set out in the Minister's and Ashton's submissions. Glennies Creek lies to the west of the SEOC project. Mining of the SEOC project will proceed from north to south, with initial overburden placed along the northern boundary of the open cut to form an environmental bund adjacent to the New England Highway. In-pit emplacement of overburden will commence as soon as is feasible. The bund is expected to reach its maximum height in one to two years, and will be rehabilitated progressively following its construction, resulting in the bund and the northern face of the emplacement vegetated within 12

months of emplacement. The mine is expected to yield 3.6 Mtpa ROM coal using a truck and excavator extraction method. At the time of the Director-General's report the total size of the resource to be extracted was 16.5 Mt ROM coal. The precise impact of the increased setback on the amount of the resource to be extracted has not been quantified.

9 The SEOC project will comprise seven years of active mining, seven years of reject emplacement and four years of site rehabilitation. Rehabilitation will be undertaken during and after mining, and will be ongoing as mining progresses from north to south. It is aimed at achieving in a naturally moulded landscape an integrated array of habitat connectivity corridors and effectively rehabilitated farm land.

10 The shape and character of the final rehabilitated landform is shown in the plan and cross-section views at exhibit A volume 4 pages 3016-3021. The final void constitutes an evaporative sink of around 700m in width, and is intended to allow natural evaporation from the surface and transpiration from specially selected salt tolerant vegetation to maintain a groundwater flow into the pit and away from Glennies Creek. Saline water from the mining operation will flow to this pit.

11 The project comprises the following documents and plans:

(a) Environmental Assessment Report dated November 2009;

(b) Response to Submissions dated June 2010;

(c) Additional Information and Project Changes dated January 2011;

(d) Amended plans submitted to the PAC and annexed to its determination report of 4 October 2012, comprising the correspondence (and attachments to the correspondence) of 21 May 2012, 8 June 2012, 27 June 2012, 31 July 2012, and 5 September 2012; and

(e) Statement of commitments (as set out in appendix 3 to the project approval).

12 Ashton currently operates the Ashton Coal Project (ACP) which is located approximately 14km north-west of Singleton in the Camberwell district of the Hunter Valley, NSW and comprises:

(a) the North East Open Cut coal mine (NEOC mine), which is located directly to the north of Camberwell village. The extraction of coal from the NEOC mine ceased on 24 September 2011 and the NEOC mine final void is currently being used for reject disposal. Rehabilitation of the final void will be completed after the end of underground mining at the ACP. Rehabilitation of the out of pit emplacement areas was completed in April 2012;

(b) the Ashton Underground mine (Underground mine), which uses longwall extraction methods and is located to the south-west of Camberwell village; and

(c) the Ashton CHPP, which processes the ROM coal and loads product coal onto trains for transport to the port at Newcastle and is located to the north-west of Camberwell village.

Part 3A Project Application and the appeal

13 The Project Application was submitted to the Director-General of Planning by Ashton, on 11 March 2009, with a preliminary Environmental Assessment (EA) dated February 2009. The project was considered under Pt 3A of the EPA Act, as it came within cl 5(1)(a) of Sch 1 of the State Environmental Planning Policy (Major Projects) 2005 at the time the application was made (confirmed by the Director-General as delegate of the Minister in a Record of the Minister's opinion for the purposes of cl 6(1) of the State Environmental Planning Policy (Major Projects) 2005 dated 4 September 2009). Part 3A was repealed by the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act* 2011, the relevant parts of which commenced on 1 October 2011. As an approved project, it is within the definition of transitional Part 3A projects in cl 2(1)(a) of Sch 6A

of the EPA Act titled Transitional arrangements - repeal of Part 3A. Part 3A continues to apply to this project under cl 3(1) of Sch 6A of the EPA Act.

14 The Minister's power and of the delegate the PAC to grant approval was grounded in s 75J which provided:

> **75J Giving of approval by Minister to carry out project**
> (1) If:
> (a) the proponent makes an application for the approval of the Minister under this Part to carry out a project, and
> (b) the Director-General has given his or her report on the project to the Minister,
> the Minister may approve or disapprove of the carrying out of the project.
>
> (2) The Minister, when deciding whether or not to approve the carrying out of a project, is to consider:
> (a) the Director-General's report on the project and the reports, advice and recommendations (and the statement relating to compliance with environmental assessment requirements) contained in the report, and
> (b) ...
>
> (3) In deciding whether or not to approve the carrying out of a project, the Minister may (but is not required to) take into account the provisions of any environmental planning instrument that would not (because of section 75R) apply to the project if approved. However, the regulations may preclude approval for the carrying out of a class of project (other than a critical infrastructure project) that such an instrument would otherwise prohibit.
>
> (4) A project may be approved under this Part with such modifications of the project or on such conditions as the Minister may determine.
>
> (5) The conditions of approval for the carrying out of a project may require the proponent to comply with any obligations in a statement of commitments made by the proponent (including by entering into a planning agreement referred to in section 93F).

15 Under the Environmental Planning and Assessment Regulation 2000 (EPA Regulation) cl 8F(1)(c) owner's consent is not required for an activity of this kind. The SEOC project site extends over land not owned by Ashton.

16 The appeal is under Pt 3A Div 2 s 75L (since repealed). The entitlement to appeal under s 75L arises where a project would have been designated development if not coming within Pt 3A, is not a critical infrastructure project, there has not been approval of a concept plan for the project under

Div 3, and the project has not been the subject of PAC review. Schedule 3 of the EPA Regulation provides that open cut coal mines processing more than 500 tonnes of coal per day or that disturb more than 4ha of land are designated development. The project satisfies these criteria, has not been declared critical infrastructure and does not involve a concept plan or PAC review. There is no challenge to the Applicant's right to bring these proceedings.

17 The Court has power to determine the appeal under s 75L pursuant to s 17(d) of the *Land and Environment Court Act* 1979 (the Court Act). Under s 39 of the Court Act the Court has all the functions and discretions which the Minister had in relation to the matter. Accordingly, the Court has the power to modify, refuse or approve the project unaltered pursuant to s 75J. Section 39(4) of the Court Act states the Court is required to have regard to any relevant Act and instruments made under any such Act, the circumstances of the case and the public interest. This is a de novo hearing, as provided for in s 39(3) of the Court Act.

Non-binding instruments which can be considered

18 Section 75R relevantly provided:

> (1) Part 4 and Part 5 do not, except as provided by this Part, apply to or in respect of an approved project (including the declaration of the project as a project to which this Part applies and any approval or other requirement under this Part for the project).
> (2) Part 3 and State environmental planning policies apply to:
> (a) the declaration of a project as a project to which this Part applies or as a critical infrastructure project, and
> (b) the carrying out of a project, but (in the case of a critical infrastructure project) only to the extent that the provisions of such a policy expressly provide that they apply to and in respect of the particular project.
> (3) Environmental planning instruments (other than State environmental planning policies) do not apply to or in respect of an approved project.
> ...

19 The State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) is not a mandatory consideration but may be taken into account in determining this

application; *Ironstone Community Action Group Inc v NSW Minister for Planning* [2011] NSWLEC 195 at [25]. Clause 12 specifies matters a consent authority should take into account when considering a development application for mining and provides:

> Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:
> (a) consider:
> (i) the existing uses and approved uses of land in the vicinity of the development, and
> (ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and
> (iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and
> (b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and
> (c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).

20 Clause 14 of the Mining SEPP provides:

> (1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:
> (a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,
> (b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,
> (c) that greenhouse gas emissions are minimised to the greatest extent practicable.
> (2) Without limiting subclause (1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions.

21 Environmental planning instruments (EPIs) may be taken into account under s 75J(3), but are not binding under s 75R(3). Consequently, the Singleton Local Environmental Plan 1996 (Singleton LEP) may be considered. The project site is zoned 1(a) (Rural Zone) under the

Singleton LEP. Mining is permissible in this zone with development consent. The objectives of the 1(a) (Rural Zone) are set out in the Rural Zoning Table, Pt 3 of the Singleton LEP which states:

> (a) to protect and conserve agricultural land and to encourage continuing viable and sustainable agricultural land use,
> (b) to promote the protection and preservation of natural ecological systems and processes,
> (c) to allow mining where environmental impacts do not exceed acceptable limits and the land is satisfactorily rehabilitated after mining,
> (d) to maintain the scenic amenity and landscape quality of the area,
> (e) to provide for the proper and co-ordinated use of rivers and water catchment areas,
> (f) to promote provision of roads that are compatible with the nature and intensity of development and the character of the area.

Issues

22 The issues in the matter can be summarised as:

(1) Whether the SEOC project will have a significant impact on Aboriginal cultural heritage on the SEOC project site and in the vicinity, and whether this is contrary to the public interest and the principle of intergenerational equity (Aboriginal cultural heritage);

(2) Whether the SEOC project will have an adverse impact on the potential for sustained agricultural production on the SEOC project site, and whether this is contrary to the principle of intergenerational equity (land rehabilitation);

(3) Whether the SEOC project fails to address medium to long term risks to landscape functionality (including water quantity, water quality and land quality) and whether this is contrary to the precautionary principle and the principle of intergenerational equity (groundwater). Whether the SEOC project fails to adequately protect the health of the Hunter River and associated tributaries downstream of the SEOC project site, and the communities and environments that depend on that system and whether this is contrary to the precautionary principle, intergenerational equity and the principle of conservation of biological diversity and ecological

integrity (water licensing and the Hunter River Salinity Trading Scheme (HRSTS));

(4) Whether the SEOC project will have a significant impact on the health and wellbeing of the residents of Camberwell and other residents in the vicinity of the SEOC project site, and whether this is contrary to the public interest, the precautionary principle and the principle of intergenerational equity (health and air quality);

(5) Whether noise and dust conditions and mitigation strategies under the project approval will result in unacceptable social impacts, and whether this is contrary to the public interest and to the principle of intergenerational equity (social);

(6) Whether the SEOC project will result in significant social, environmental and economic costs that have not been adequately addressed for the project, contrary to ecologically sustainable development (ESD) and the public interest (economic);

(7) Whether the Court would be slow to grant approval due to the need to acquire some of the land on which the SEOC project is to be carried out by reason of the uncertainty this will cause landowners (landholder uncertainty);

(8) Whether the SEOC project will have a significant impact on the historic and social values of the common at property 167L, contrary to the principle of intergenerational equity (the Commons issue); and

(9) Whether the actual or potential environmental harm of the SEOC project, and the consequential economic and social harm, outweighs the social and economic benefits of the SEOC project and whether this is contrary to ESD and the public interest (proportionality).

23 The Minister and Ashton submitted that conditional approval should be granted as none of the issues identified by the Applicant warrant refusal. To the extent there are likely impacts on the environment these can be

satisfactorily mitigated as identified in the proposed conditions, a number of which have been amended in accordance with expert evidence given during the hearing.

24 The Applicant relied on principles such as the precautionary principle, intergenerational equity and the conservation of biological diversity which are recognised collectively as principles aimed at the achievement of ESD. ESD is referred to in the definitions section (s 4) of the EPA Act as having the same meaning as in s 6(2) of the *Protection of the Environment Administration Act* 1991. It is there described as requiring the "effective integration of economic and environmental considerations in decision-making processes" which can be achieved through the implementation of the principles relied on by the Applicant. The precautionary principle is defined as:

> ... if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
> In the application of the precautionary principle, public and private decisions should be guided by:
>
> (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
> (ii) an assessment of the risk-weighted consequences of various options, ...

25 The principle of inter-generational equity is defined as "the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations". The conservation of biological diversity and ecological integrity should be a fundamental consideration. These principles have been discussed in a number of cases of this Court such as *Telstra Corporation Limited v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256 at [107]-[183], *Gray v Minister for Planning* [2006] NSWLEC 270; (2006) 152 LGERA 258 at [118]-[144] and *Anderson v Director-General of the Department of Environment and Conservation* [2006] NSWLEC 12; (2006) 144 LGERA 43 at [199].

Impact on Aboriginal cultural heritage

26 The Applicant contended that the SEOC project will have a significant impact on Aboriginal cultural heritage on the SEOC project site and in the vicinity of the project site, contrary to the public interest and the principle of intergenerational equity (Amended Statement of Facts and Contentions (ASOFC) par 59):

> a) The project site is at the heart of a complex, multi-layered cultural landscape of value to contemporary Aboriginal culture, including:
>
> i) biophysical attributes (drainage systems, fauna, geology and soils);
> ii) material traces of traditional Wonnarua people;
> iii) historical associations and experiential reference points of the members of the Plains Clans of the Wonnarua Peoples (PCWP);
>
> b) The project site includes three sites assessed to be highly significant, 18 sites of moderate to high significance, and 60-65 sites of low significance;
> c) These cultural sites, and the value of the project site as part of the cultural landscape, will be lost as a result of the mining of the project site;
> d) The mitigation strategies and conditions under the project approval fail to adequately protect the cultural values of the project site, in particular to the descendants of the PCWP.

27 The Minister and Ashton dispute the contentions made by the Applicant in par 59 of its ASOFC in their ASOFCs in reply. I note that the evidence refers to Wonnarua, Wanaruah and Wonaruah as different spellings of the relevant clan name.

28 Project approval conditions proposed by the Minister require preparation and implementation of an Aboriginal Heritage Conservation Strategy (AHCS) for the Ashton complex and its associated biodiversity offset areas to the satisfaction of the Director-General (condition 47, Sch 3); the preparation and implementation of a heritage management plan for the Ashton mine complex to the satisfaction of the Director-General including an archaeological salvage program for the project disturbance area and a description of the measures that would be implemented for the protection, monitoring and management of Aboriginal sites outside the project disturbance area (condition 51, Sch 3); and an archaeological survey of

the revised corridor for the transmission line prior to carrying out development in the transmission line realignment corridor (condition 49, Sch 3). Condition 48 of Sch 3 does not allow Ashton to harm any Aboriginal objects contained in the Southern Conservation Area.

29 The Plains Clan of the Wonnarua Peoples (PCWP) which was formed in 2010 is registered as a native title claimant. The Future Act Determination *White Mining (NSW) Pty Ltd, Austral-Asia Coal Holdings Pty Ltd & ICRA Ashton Pty Ltd/Scott Franks & Anor (Plains Clans of the Wonnarua People)/New South Wales* [2011] NNTTA 110 was provided to the Court. The National Native Title Tribunal considered the SEOC project area in that statutory context. The National Native Title Tribunal held at [97] that there was scant evidence of the exercise of any registered native title rights and interests on the area of the proposed tenement. There was no substantial evidence of the life, culture and traditions of the claimant group either generally or in the area of the proposed tenement. There was no evidence that the subject land had been accessed by members of the native title party or that there are any areas or sites of particular significance on or near the proposed tenement. The proposed future act could be done without the imposition of conditions (at [101]).

30 The parties referred to the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance 1999 (the Burra Charter) (exhibit A, vol 5, tab 96).

31 While the Burra Charter and its accompanying guidelines are not statutory documents, they are recognised as setting a standard for cultural heritage management in Australia and a key reference for those who make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians (p 4170).

National Parks and Wildlife Act 1974

32 Section 84 of the *National Parks and Wildlife Act* 1974 (NPW Act) provides:

84 Aboriginal places
The Minister may, by order published in the Gazette, declare any place specified or described in the order, being a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture, to be an Aboriginal place for the purposes of this Act.

Insite Report (Exhibit 1A, vol 3, tab 26)

33 The consultation process undertaken during the preparation of the Aboriginal Archaeological Assessment, prepared by Insite Heritage Pty Ltd dated 5 November 2009, which was Appendix 13 of the EA (exhibit 1A, vol 3, tab 26) (Insite Report) was conducted by Wells Environmental Services, as consultants, and Ashton. Letters of notification of the SEOC project and a request for the contact details of Aboriginal stakeholder groups who may have an interest in the project were sent to a number of relevant government departments and to all stakeholders known to Ashton, and advertisements inviting registration of interests from community stakeholder groups and individuals were placed in the public notices section of local and Sydney newspapers. A total of 21 registrations of interest were received for the SEOC project and these stakeholder groups were invited to participate in the field work on a roster basis of three days per group (exhibit 4A). The stakeholder groups were provided with a draft copy of the Insite Report and their responses to the draft copy are included in Appendix D of the Insite Report.

34 The Insite Report records 85 sites on the SEOC project site, of which three sites have been identified as being of high significance (exhibit 1A, vol 3, tab 26, p 60). All sites have been assessed for scientific significance, public significance, cultural significance and representative significance. The three sites identified as being of high significance have been graded against the three criteria as follows:

Site	Site type	Scientific significance	Public significance	Representative significance
SA2/3	artefact scatter	high	moderate	moderate
SA9/2	artefact scatter	high	moderate-high	moderate
SA11/6	artefact scatter	high	high	high

35 The Insite Report includes, in Appendix D (exhibit 4A), a number of responses from the Aboriginal stakeholders to the findings of the Insite Report. The Insite Report refers to Appendix D for the significance assessment regarding the cultural significance of the sites.

36 The Insite Report includes, in Appendix H, the Aboriginal Site Recording Forms completed by Ms Suzie Worth on behalf of the Wanaruah Local Aboriginal Land Council dated December 2008 for a number of the archaeological resource sites and submitted to the NSW Department of Environment and Conservation (now the Office of Environment and Heritage (OEH)) for inclusion in the Aboriginal Heritage Information Management System (AHIMS) Register. There is no evidence before the Court concerning the result of the submission of the Aboriginal Site Recording Forms completed by Ms Worth.

Site visit

37 The Court, in the company of the parties and their experts visited a number of sites within and in the vicinity of the SEOC project site, including archaeological resource sites identified in the Insite Report. Mrs Maria Stocks (Aboriginal stakeholder) gave evidence on site. The sites visited by the Court included the following, identified on map 6 location and site inspection (MFI 2):

(a) Inspection site 15: St Clement's Anglican Church, Camberwell;

(b) Inspection site 16: identified as SA2/3 by the Insite Report (Fig 10, p 62);

(c) Inspection site 17: identified as SA11/6 by the Insite Report (Fig 10, p 62);

(d) Inspection site 18;

(e) Inspection site 19;

(f) Inspection site 20: identified as SA9/2 by the Insite Report (Fig 10, p 62); and

(g) Inspection site 21.

38 Of the above sites visited by the Court, all the sites, except inspection site 15, are within the SEOC project area. Inspection sites 17 and 20 are located within the area identified as the location of the pit and inspection sites 16 and 18 are located within the area identified as the location of the environmental bund (MFI 2, Map 6).

39 The area of Glennies Creek adjoining Mrs Wendy Bowman's property was also viewed.

Expert Evidence

40 Dr Maria Cotter (on behalf of the Applicant) and Dr Johan Kamminga (on behalf of Ashton) provided expert Aboriginal cultural heritage evidence.

41 Dr Maria Cotter affirmed an affidavit dated 3 June 2013. Dr Cotter is a qualified geoarchaeologist and Aboriginal cultural heritage management specialist with 20 years experience in the survey, assessment and management of Aboriginal cultural heritage within NSW. She has had specific experience in documentation and assessment of the Aboriginal cultural heritage values of the traditional lands of the PCWP and is currently employed as the Cultural Landscape Programs Manager of Tocomwall Pty Ltd. The Director of Tocomwall Pty Ltd is Mr Scott Franks (Dr Cotter affidavit 3 June 2013 par 3). Mr Franks swore affidavits read in these proceedings and is an Aboriginal stakeholder member of the PCWP.

42 In her affidavit, Dr Cotter lists a number of places that are of importance to the PCWP (Dr Cotter affidavit par 51-64). These places are not located on the SEOC project site, except for locale K (Camberwell Common) which is said to have contemporary significance to the PCWP, and are within a 20km radius of the SEOC project site (TS 433/19). Dr Cotter described these places in oral evidence as "physical manifestation or points of reference in the landscape" (TS 432/26-27). Dr Cotter said that few of these places were identified by the Insite Report, despite being of cultural heritage value to the PCWP (TS 432/28-29). According to Dr Cotter, the archaeological resource sites on the SEOC project site, identified in the

Insite Report, form part of the wider cultural landscape of importance to the PCWP, including Glennies Creek, "which clearly runs through the SEOC [project site, and] is a dreaming track" (TS 432/50-433/4).

43 Dr Johan Kamminga affirmed an affidavit dated 5 July 2013. Dr Kamminga is a consultant archaeologist with over 40 years of archaeological experience in archaeological research and Aboriginal heritage consulting, with expertise in prehistory and stone artefacts (Dr Kamminga affidavit resume p 1). Dr Kamminga's report can be summarised as follows:

(a) The Aboriginal stakeholder consultation process undertaken during the preparation of the Insite Report was adequate (par 26);

(b) The assessment of scientific (archaeological) value in the Insite Report was rated too highly (par 34);

(c) The potential for high scientific value of the stone artefacts identified on the SEOC project site is not demonstrated (par 34);

(d) The survey markers on the SEOC project site for the identification of archaeological sites were adequately positioned (par 39);

(e) The identified "grinding grooves" in exposed sandstone, by the Insite Report, are likely to be scour marks created by a plough tine (par 47); and

(f) Dr Cotter does not demonstrate in her report that the SEOC project area achieves a level of cultural significance that warrants consideration for listing as a potential area of significance (par 56(a)) and the evidentiary standards applied by Dr Cotter have not met the usual standards of proof required by the OEH to register a place as an Aboriginal place on the AHIMS register (par 56(b)).

44 Dr Cotter and Dr Kamminga provided a joint report, dated 15 August 2013 (exhibit K) in which the fundamental disagreement between the experts is

whether or not the SEOC project will have an unacceptable impact on indigenous cultural heritage values and places within the SEOC project site and the vicinity of the project site. The experts, who agreed on very little, disagreed on the following relevant topics:

(a) the adherence of the Insite Report to the principles and preamble of the Burra Charter;

(b) the adequacy of the consultation process during the preparation of the Insite Report with the Aboriginal community stakeholders;

(c) the locations of the sites identified by the Insite Report and the consequent reliability of the Insite Report;

(d) the adequacy of the Insite Report in considering the cumulative impacts of mining on the Aboriginal archaeological resource;

(e) the adequacy of the assessment of archaeological significance in the Insite Report; and

(g) impact of the SEOC project on the Aboriginal cultural heritage values of the SEOC project site and its surrounds

45 In oral evidence, Dr Kamminga described the difference between his and Dr Cotter's backgrounds as follows (TS 430/1-11):

> [Dr Cotter] has written a PhD on cultural landscape and it's clearly her passion and she's very skilled in the analysis and description of cultural landscape and she has a great commitment to that area of Aboriginal heritage. My own background is a generalist background. I write and do research in a large range of areas... I have fundamental research experience and my PhD is on Aboriginal stone artefacts, which is largely what we are dealing with in terms of physical remains within the SEOC area. I have probably examined about a million stone artefacts in my career and microscopically would be well over 100,000 to 200,000.

46 Dr Cotter described the difference between her approach and that of Dr Kamminga (and the Insite Report) as follows (TS 436/30-43):

> I believe that the fundamental difference is the fact that [Dr Kamminga] has focused on the archaeological resources and indeed on the evaluation of the value, for example, of the sites in regard to archaeological models of research and prediction. I, on

> the other hand, recognise and do recognise those stone artefacts, but I also believe that there are a wider range of Aboriginal cultural values, values that are recognised and emphasised by OEH that have not been considered and I do think that that is the fundamental difference... So I believe that it is a fundamental placement of emphasis on the archaeology versus the wider Aboriginal cultural landscape...

The Plains Clans of the Wonnarua People (and Dr Cotter's objectivity)

47 Dr Cotter said in oral evidence that the PCWP represents "four heads of family", which she described as "one cultural group" (TS 440/23-25). They are the descendents of Mary Shoe or Henry "Harry" Taggart (Dr Cotter affidavit par 28) and are represented by Mrs Maria Stocks (Mrs Barbara Foot's daughter), Mr Rob Lester, Mrs Rhonda Ward, Mr Charlie Franks and Mr Scott Franks (Dr Cotter affidavit par 29). Dr Cotter confirmed in oral evidence that the PCWP did not exist as a group at the time of the preparation of the Insite Report dated November 2009 (TS 487/26).

48 Dr Cotter confirmed in oral evidence that she is employed by Mr Scott Franks, Director of Tocomwall Pty Ltd and one of the four heads of family of the PCWP (TS 489/29). In cross-examination, counsel for Ashton asked Dr Cotter how she grappled with the concept of objectivity in giving evidence before this Court in circumstances where she is employed by one of the Aboriginal stakeholders and as Tocomwall Pty Ltd performs contract Aboriginal archaeological work for mines in the locality. Dr Cotter replied as follows (TS 489/44-490/1):

> Because I am a professional providing professional viewpoints in regard to a cultural heritage that are independent of my boss insofar as if he says something that I don't agree with in a professional sense I tell him so. I find it a strange statement in some ways to be actually asked about that because I believe what I have provided is effective independent information as so far as it can be done and that's the point I do make in my affidavit. Unless people have attempted to make and achieve a relationship with individuals, it's very hard to find out the information that's required.

Adherence of the Insite Report to the principles of the Burra Charter

49 According to Dr Cotter, the Insite Report is not consistent with a number of the principles of the Burra Charter, as the Burra Charter defines cultural significance as "aesthetic, historic, scientific, social or spiritual value for

past, present or future generations" (exhibit A, vol 5, tab 96, p 4171) and the Insite Report focuses exclusively on the determination of the archaeological (scientific) value of Aboriginal objects and only provides a limited appraisal of other values identified in the Burra Charter such as aesthetic, social or historic values (exhibit K, p 2).

50 Dr Cotter considers that the Insite Report assumes "a predetermined trajectory of full mine impact" and does not assess whether the three archaeological sites identified as being of high significance should be conserved in situ (Dr Cotter affidavit par 101). The Insite Report assumption that the only options are mitigation measures, including salvaging the archaeological resource, is, according to Dr Cotter, contrary to Articles 4.1 and 6.1 of the Burra Charter, which state that cultural significance is best understood by collecting and analysing information before making decisions (Dr Cotter affidavit par 102). In Dr Cotter's opinion, salvaging the archaeological resource does not preserve the multiple layers of meaning embodied in the site itself, which is the key to the cultural heritage values held by the PCWP in relation to the SEOC project site (Dr Cotter affidavit par 104).

51 Dr Cotter considers that the Insite Report does not address the full range of Aboriginal cultural values for Aboriginal people and this is contrary to Article 24 of the Burra Charter, which states that significant associations and meanings between people and a place should be respected (Dr Cotter affidavit par 108).

52 Dr Kamminga considers that the Insite Report meets the requirements of the Burra Charter and the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation, July 2005 published by the OEH (TS 420/23-29 and Dr Kamminga affidavit par 26).

The adequacy of the consultation process

53 Dr Cotter considers that the consultation process undertaken during the preparation of the Insite Report was inadequate, for example, the cultural

heritage values enunciated by Aunty Barb Foot (Mrs Barbara Foot) were not adequately considered by the Insite Report (exhibit K, p 3).

54 Dr Cotter said in oral evidence that the notification of an Aboriginal Stakeholder Register which commenced the consultation process (an example of the letter sent to parties that had responded to newspaper advertisements is included in the Insite Report at p 84-85) referred to "archaeological survey" and "archaeological investigations" and the emphasis on the word "archaeology" drew out a particular group of Aboriginal people with a particular purpose (TS 486/1-2). According to Dr Cotter, the majority of responses were from those working as Aboriginal cultural heritage consultants (TS 485/44). Dr Cotter confirmed in oral evidence that a number of the registered groups consulted during the preparation of the Insite Report in 2008 did contain individuals who later became members of the PCWP when it was formed in 2010, including Mr Scott Franks, Mrs Barbara Foot and Mrs Rhonda Ward (TS 487/33-34, 40-43, 488/4-8,18-22).

55 Dr Kamminga is satisfied that the Aboriginal stakeholder consultation carried out for the Insite Report was satisfactory and in his view this is evidenced by the number of local Aboriginal organisations that registered an interest and participated in the review and input process during the preparation of the Insite Report (Dr Kamminga affidavit par 25). He understands that 17 of the 21 registered stakeholders participated in the fieldwork and most also provided sociocultural information, or expressed views about further consultation and other expectations (Dr Kamminga affidavit par 23).

The identification of the Aboriginal archaeology sites by the Insite Report

56 In Dr Cotter's opinion, the survey pegs on the SEOC project site are not located in a position to adequately designate the archaeological site they refer to in the Insite Report. She considers that as a possible consequence, the original recording and assessment of the archaeological evidence was in error, hence the data cannot be relied upon and the

inaccurate position of the pegs makes future identification and management of the archaeological resource difficult (Dr Cotter affidavit par 96-98).

57 Dr Kamminga considers that the pegs are sufficiently close to the archaeological site and that, together with the description of the site, it is not difficult to locate each one. In oral evidence, Dr Kamminga said that it is common and accepted practice for a consultant archaeologist to take a single GPS reading when recording a stone artefact scatter (TS 421/17-19). As the Insite Report field survey was carried out in 2008, it is also possible that small stone objects have moved due to erosion, rain splash, wind blown dust, stock trampling or seasonal and annual vegetation growth (TS 421/6).

Impact of the project on Aboriginal cultural heritage values and places within the SEOC project site and the vicinity of the project site including the adequacy of the assessment of archaeological significance by the Insite Report

58 Dr Cotter considers that the Insite Report focuses exclusively on the determination of the archaeological (scientific) value of Aboriginal objects and only provides a limited appraisal of other Aboriginal cultural heritage values (exhibit K, p 2).

59 Dr Kamminga considers that the assessment of significance in the Insite Report is satisfactory and that the cultural significance of the SEOC project site is expressed in the stakeholder responses in Appendix D of the Insite Report (TS 471/44-45).

60 In Dr Cotter's opinion, the surface and sub-surface archaeology that exists within the SEOC project site is of high research potential (exhibit K, p 15). However, Dr Cotter considers that the significance of the SEOC project site is that it is a component of a larger cultural landscape of value to the PCWP. She explains this as follows (exhibit K, p 22):

> The SEOC is an integral part of a cultural landscape of substantial (and well sub-stantiated [sic]) cultural value to the PCWP. It is at the epicentre of all realms of their cultural existence; it [is] from within this landscape that they have and continue to derive

> intimate social and spiritual knowledge from which they are able to comprehend their beginnings and belongings. The landscape of the SEOC and surrounds is part of a rare heritage landscape with cultural attributes and signs that are uniquely known and understood by the PCWP who demonstrate a cultural connectivity with this place that extends from at least a time before first sovereignty to the present.

61 Dr Cotter said in oral evidence that Aboriginal people are the primary determinants of the value of their heritage (TS 433/36-37) and that if the PCWP hold values in the landscape that are not held by other Aboriginal parties, this does not make these values invalid or unreliable (TS 433/44-45). Dr Cotter said that the impact of open cut mining on the PCWP cultural values will be catastrophic and absolute because a key component of the cultural importance of the area is its physical location and complementary setting (TS 434/17). Dr Cotter considers that the SEOC project site is sufficiently important that it should be retained and considered for listing as a unique Aboriginal cultural landscape of State heritage significance (TS 436/5-8). Dr Cotter confirmed in oral evidence that when she has referred to cultural significance on the SEOC project site, she was referring to the values held by the PCWP (TS 487/4).

62 Dr Kamminga said in oral evidence that there is nothing remarkable about the stone artefact scatters in the SEOC project area and he questions the high significance that has been attributed to a number of the Aboriginal sites on the SEOC project site. In his opinion, Aboriginal stone artefacts are ubiquitous in the Hunter Valley, as they are found everywhere and are virtually indestructible (TS 420/13-19). Dr Kamminga considers that the proposed disturbance by mining of the physical evidence (essentially stone artefacts and stone manuports) of past Aboriginal presence and activity within the SEOC project area is very unlikely to constitute a significant cumulative impact on Aboriginal cultural heritage in national, state, or local contexts (exhibit K, p 10).

63 According to Dr Kamminga, a recorded relatively high density of stone artefacts by itself should not be interpreted as meaning that an area or

deposit of stone artefacts must have a high scientific value, because the assessment of scientific value turns on a number of considerations, such as rarity of items, the integrity of the sedimentary context from which the stone artefacts have been recovered, whether the artefacts or sites can be reliably and/or precisely dated and whether the sites are common or rare, to list only a few. In Dr Kamminga's opinion, the Insite Report has rated the scientific value (assessed research potential) of the archaeological resource too highly, as archaeologists in the field are often not able to distinguish between the different types of fractured stone and consequently overrate its scientific value (Dr Kamminga affidavit par 27-28, 34). Dr Kamminga's reasons that the assessed scientific value of the archaeological resource on the SEOC project site is not adequately demonstrated are as follows (Dr Kamminga affidavit par 34(a)-(f)):

(a) The impacts of farming since the 1880s has resulted in a general reduction of the archaeological value of the cultural horizon on the SEOC project site;

(b) The range of stone types found on the SEOC project site reflect common stone artefact types that are standard for the region;

(c) There is low to negligible potential of encountering Aboriginal sites or stone objects belonging to the Pleistocene era (before circa 10,000 years ago);

(d) There is no likelihood of encountering Aboriginal artefacts made of organic materials;

(e) The Insite Report has given undue weight to the "artefact density" in the assessment of scientific value, when in fact scientific value turns on a number of considerations; and

(f) The Insite Report relies heavily and uncritically on the 2002 Witter Report (exhibit A, vol 5, tab 101).

64 Dr Kamminga does not agree with the significance attributed to the Aboriginal objects and cultural landscape by the Applicant (Applicant's ASOFC par 59). According to Dr Kamminga, the object of sound cultural

heritage management is not to identify whether a cultural landscape will be impacted, but rather to determine whether a proposal will impact on places or values of particular significance and if so, how these impacts should be managed. It is therefore necessary to first determine the level of cultural significance of the SEOC project site (Dr Kamminga affidavit par 52). In Dr Kamminga's opinion, Dr Cotter has failed to provide an adequate assessment of the impacts of the SEOC project on what she describes as the cultural landscape (Dr Kamminga affidavit par 57).

65 Dr Kamminga said in oral evidence, in response to Dr Cotter's assertions regarding the PCWP's cultural values in the landscape which include the SEOC project site, that it was hard for him to come to grips with Dr Cotter's evidence regarding the significance of the cultural landscape, as he cannot identify reliable and credible evidence for the significance of cultural landscape in the SEOC project area (TS 430/34-35) and he does not see a general consensus or widespread belief amongst the Aboriginal stakeholders in the existence of, for instance, a dreaming trail (TS 431/30-33). Dr Kamminga said the following in oral evidence in regard to Dr Cotter's evidence (TS 432/2-8):

> the whole of Australia is a cultural landscape, not only for Aboriginal people, but for British settlers, for Italian people, for Chinese and so forth. The cultural landscape doesn't have a particular end. Maria [Dr Cotter] has drawn a very long bow on this issue and so I simply disagree fundamentally in terms of the reconstruction of a cultural landscape and this being intrinsic and absolutely and utterly essential, or even necessarily that the cultural landscape is credible.

The Aboriginal Heritage Information Management System

66 The OEH maintains the AHIMS register, which is a register of notified Aboriginal objects and Declared Aboriginal Places in NSW. Notified Aboriginal objects are Aboriginal objects that have been found and notified to the OEH by members of the public or professionals. Aboriginal objects may exist on a parcel of land even though they have not been notified to the OEH and included in the AHIMS register. Declared Aboriginal Places are places of special cultural significance to the Aboriginal people in NSW because of their spiritual, ceremonial, historical, social, or educational

values. The NSW Atlas of Aboriginal Places (OEH) includes all Declared Aboriginal Places.

67 There are no Declared Aboriginal Places within the SEOC project site included on the AHIMS register (Insite Report Figure 3 p 17) or in the NSW Atlas of Aboriginal Places. Mr Scott Franks has nominated an area (in the vicinity of the SEOC project site) as a Declared Aboriginal Place. The nomination form, "Aboriginal Place Program Nomination Form", dated 24 July 2013, was attached to his affidavit dated 1 August 2013. The supporting plan tendered (exhibit T) separately identifies the sites of significance referred to in Dr Cotter's report. None are on the SEOC project site. The closest is Glennies Creek which adjoins the SEOC project site.

68 None of the archaeological resource sites identified in the Insite Report and submitted to the OEH by Ms Suzie Worth of the Wanaruah Local Aboriginal Land Council have been included on the AHIMS register as a Declared Aboriginal Place. St Clement's Anglican Church, Camberwell, has recently been included as a Declared Aboriginal Place (TS 422/13).

69 According to Dr Kamminga, the Declared Aboriginal Places on the AHIMS register and NSW Atlas of Aboriginal Places cannot be considered an exhaustive list of places that might reach the threshold for declaration as Declared Aboriginal Places in NSW, however a review of the AHIMS register is relevant in providing an objective measure of the thresholds required for a place to be considered a Declared Aboriginal Place under the NPW Act. The OEH applies strict evidentiary criteria for the entry of a place on to the AHIMS register as a Declared Aboriginal Place and it contains just nine places within 100km of the SEOC project area and each of these places required a high level of cultural significance and evidentiary proof in order to be registered. In Dr Kamminga's opinion, the level of cultural significance described by Dr Cotter does not meet, nor come close to, the threshold for considering the SEOC project area to be a potential area of significance and the evidentiary standards applied by Dr

Cotter have not met the usual standards of proof required by the OEH to register a place as a Declared Aboriginal Place (Dr Kamminga affidavit par 55-56). Dr Cotter considers the SEOC project site is sufficiently important for listing as a Declared Aboriginal Place.

Evidence of Aboriginal stakeholders

70 Mr Lawrence Perry affirmed an affidavit dated 20 June 2013. Mr Perry is a member of the Gringai Clan (one of the clans that collectively make up the Wonnarua People) and the Gringai clan country is the northern part of the Hunter Valley, including Glennies Creek (Mr Perry affidavit par 1). Mr Perry is the Acting Chief Executive Officer of the Wonnarua National Aboriginal Corporation and he has carried out the duties of this position since 2008 (Mr Perry affidavit par 3). Mr Perry is a co-director of Yunaga Mine Services, a company that provides land care management, employment and training for Aboriginal people in the Singleton area, with a focus on engaging contracts in the mining sector (Mr Perry affidavit par 4). Mr Perry has participated in similar consultation and field work for other mining companies in the Hunter Valley (Mr Perry affidavit par 11).

71 According to Mr Perry, the SEOC project site is not considered to be an Aboriginal place of high significance, however the Wonnarua National Aboriginal Corporation does place high cultural significance on Glennies Creek itself and he understands that Glennies Creek will not be impacted by the SEOC project (Mr Perry affidavit par 13). In Mr Perry's opinion, the Insite Report's methodology and consultation with Aboriginal stakeholders was done in a manner that respected their cultural heritage (Mr Perry affidavit par 15). Mr Perry is satisfied the SEOC project is acceptable on the basis that Aboriginal stakeholders are involved in the development of a heritage management plan and they are able to participate in the salvaging of artefacts (Mr Perry affidavit par 16).

72 Mr Scott Franks affirmed two affidavits dated 17 May 2013 and 1 August 2013. Mr Franks is a Traditional Owner and registered Native Title Clamant for the land on which the SEOC project site is situated (Mr Franks

affidavit 17.5.13 par 1). He is one of four heads of family of the PCWP and is authorised to speak on behalf of his family line (Mr Franks affidavit 17.5.13 par 3). Mr Franks disagrees with Mr Perry's description of the clans that make up the Wonnarua people (Mr Franks affidavit 1.8.13 par 6). In Mr Franks' opinion, the Gringai group does not have rights to speak for Country in or around the Singleton area, including the SEOC project site (Mr Franks affidavit 1.8.13 par 10).

73 According to Mr Franks, the ancestors of the PCWP travelled through Wonnarua Country performing important cultural ceremonies, including initiations along ceremonial tracks, or songlines. Part of the songline of his ancestors runs along Glennies Creek on the western side. The SEOC project site makes up half of one whole place along the songlines of his ancestors and the place is of high cultural significance to him and the PCWP. The other half of the place is the area over the Underground mine (Mr Franks affidavit 17.5.13 par 11(a), (d) and (e)). If the SEOC project proceeds, Mr Franks believes this will sever his songline (Mr Franks affidavit 17.5.13 par 17). Mr Franks has nominated an area that includes the SEOC project site as a Declared Aboriginal Place.

Submissions

74 The Applicant submitted the following:

(a) Aboriginal cultural heritage consists of places, objects and features which are of significance to Aboriginal people because of their traditions, observances, lore, customs, beliefs and history.

(b) Aboriginal cultural heritage is dynamic and may comprise physical (tangible) or non-physical (intangible) elements.

(c) Aboriginal cultural heritage also relates to the connection and sense of belonging that people have with the landscape and with each other.

(d) Aboriginal cultural heritage is not confined to sites. It includes people's memories, storylines, ceremonies,

language and ways of doing things that continue to enrich local knowledge about the cultural landscape.

(e) Aboriginal cultural heritage provides essential links between the past and present: it is an intrinsic part of Aboriginal people's cultural identity, connection and sense of belonging to Country.

75 Mrs Maria Stocks and Mr Franks have given evidence of the significance of the SEOC project site to the cultural heritage values of the PCWP. Dr Cotter's evidence confirms the significance of the site. The AHCS should not be implemented, as approving the SEOC project will cause harm to important Aboriginal sites and objects. Further, there has been no assessment of the proposed route for transmission lines on the other side of Glennies Creek.

76 The Minister submitted that having regard to the evidence now put before the Court, nothing flows from the Applicant's complaint about the previous process of consultation undertaken in the preparation of the EA. The Court is concerned with the substantive question of whether the SEOC project will have adverse impacts on Aboriginal cultural heritage of a kind that would warrant refusal of approval for the SEOC project or imposition of further conditions. The Applicant has addressed that question directly by leading evidence which is intended to prove such adverse impacts. In the circumstances the Court will not be assisted by a debate about the adequacy of past procedures.

77 The Applicant's evidence points to places/locales of cultural significance in the area near the SEOC project site, but not within the SEOC project site or in areas that will be directly affected by the SEOC project. This is apparent from Dr Cotter's report. The list of "PCWP Specific Connections to the SEOC and its Surrounds" in par 51-64 consists, with one exception, entirely of sites that are outside the SEOC project site. In most cases the sites in question are a long distance away (TS 477/10-480/28). The point of contemporary significance referred to in par 63 would not be a sound

basis to conclude that that particular place, let alone the entire SEOC project site, has high cultural significance (particularly given the outcome of the application in question). The cultural significance of Glennies Creek does not serve to establish that the adjacent SEOC project site is itself a place of high cultural significance. Contrary to the Applicant's submission Dr Cotter does not opine that the SEOC project site was a focal point of habitation, ceremony and resource exploitation. Rather, Dr Cotter was describing Glennies Creek, Bowman's Creek and other nearby creeks (Dr Cotter affidavit at par 47).

78 As was made clear in the cross-examination of Dr Cotter, the effect of her evidence is that the region surrounding the places of significance is a landscape of cultural significance to the PCWP (TS 494/23-495/41). In assessing such a claim the observation of Dr Kamminga in his report is significant. Because of the very breadth of the concept of cultural landscape, sound cultural heritage management requires an assessment of how a proposal will impact on places of particular significance.

79 Nothing in the Applicant's evidence demonstrates that the SEOC project will have direct adverse impacts on areas of high cultural significance of a kind that would justify refusal of approval. The Director-General's Report recognised that the SEOC project would result in unavoidable impacts adjacent to areas of high significance and adjacent to the existing Southern Conservation Area (exhibit A, vol 1, tab 7 p 525). In order to "compensate for these additional impacts" the Department of Planning and Infrastructure ((the Department) now an Agency known as Planning and Infrastructure) proposed conditions requiring Ashton to review and expand the existing conservation arrangements for the mine complex in consultation with the Aboriginal community, the Department and the OEH. This condition (which became condition 47 in Sch 3) is an appropriate response to the overall heritage impacts affected by the SEOC project and the broader Ashton Coal Complex. The Court should not accept the much broader proposition advanced by the Applicant that all of the areas adjacent to Glennies Creek (including in this case the SEOC project area

which is more than 200m from Glennies Creek) are part of a general place or setting of high cultural significance. As to the suggested impact of the transmission line in relation to Glennies Creek, given the low impact of such a facility the Court should be satisfied that proposed condition 49 is adequate to minimise any adverse impact on Aboriginal cultural heritage.

80 Ashton submitted that it was required by the Department to revise the proposed corridor for the transmission line which required relocation out of the Southern Voluntary Conservation Area. In relation to the revised corridor for the transmission line to the west of Glennies Creek, condition 49 in Sch 3 requires an archaeological survey of the transmission line corridor in consultation with the Aboriginal community. The final design must include all reasonable and feasible measures to minimise impacts to Aboriginal objects and submit detailed plans to the Director-General for approval. It should also be noted that the land subject to the revised route of the corridor west of Glennies Creek has been surveyed and studied by Witter (2002), as regards the Northern area (cf pages 21-22 Insite Report) (TS 466/30-42), and in the Insite Report as regards the area east of Glennies Creek (p 30-32 referring to Site SA12).

81 Dr Kamminga specifically confirmed that he had considered Aboriginal cultural landscape issues and could not identify credible evidence for the significance of cultural landscape in the SEOC project area (TS 430/35-432/15).

82 Dr Cotter's expressions of opinion about Aboriginal cultural landscape issues are based on discussions with a small group of four families which has labelled itself the PCWP. That is not the only group representing the Wonnarua People. As observed by Dr Kamminga, the concept of cultural landscape is very broad and the whole or large parts of Australia can legitimately be considered as cultural landscape for Aboriginal people, and others who have settled here. In essence, Dr Cotter's evidence restates this indisputable proposition, and provides anecdotal examples of the connection of several families with various parts of the landscape over the

last 100 years or so. Many of the events recorded by Dr Cotter based on what she has been told relate to matters, which while historically fascinating, are entirely unrelated to anything in the nature of traditional Aboriginal ceremony or life (for example, local Aboriginal men volunteering for service in the First World War and being killed on the Western Front) (TS 481/35-50, 482/1-21). Many of her recorded events and allegedly significant places are not relevant to these proceedings as they lay entirely outside the SEOC project site (TS 477-478). Dr Cotter has not limited her analysis to the SEOC project site but has, unhelpfully, included locations up to 20km from the SEOC project site. Indeed, Dr Cotter confirmed that she has specifically resisted the demands of relevance, instead believing the SEOC project site boundaries to be an imposition on the amorphous and untrammelled conception of Aboriginal culture to which she adheres.

83 Ashton submitted that much of Dr Cotter's written and oral evidence lacks scientific rigour sufficient for this Court to make any proper conclusion as to its assertions and in the main borders on a kind of storytelling (although no doubt a genuine expression of Dr Cotter's expert opinion and beliefs).

84 Ashton submitted that the PCWP did not exist at the time of the preparation of the Insite Report, as the PCWP was formed in 2010. Mrs Barbara Foot of Wanaruah Custodians, later a member of the PCWP, did participate in the consultation process, as evidenced by a letter written on her behalf by an officer of the OEH (exhibit 4A, p 143-4) and the acknowledgement of the contents of that correspondence by the Insite Report (p 10).

85 Ashton submitted that the size of scatter sites are noted in the Insite Report (p 199-200, p 214, p 252) and that some archaeological resource sites are as large as 100 x 50sqm (SA5/11) and are denoted by a single GPS reading. A description of the archaeological resource and its location is included in addition to the GPS reading, provides sufficient detail for the archaeological resource to be located on site.

86 Ashton submitted that any impacts on Aboriginal cultural heritage will be acceptably managed in accordance with the AHCS (condition 47 of Sch 3), which will be developed by a qualified archaeologist on behalf of Ashton in consultation with the local Aboriginal community, the Department and the OEH.

Findings on Aboriginal cultural heritage

Adherence of Insite Report to Burra Charter/Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation

87 The Director-General's Requirements (DGRs) for the SEOC project (exhibit 1A, vol 1, tab 13) identified "Heritage - both Aboriginal and non-Aboriginal" as a key issue to be addressed by the EA (p 4). The Policies, Guidelines and Plans Ashton was to have regard to included the following:

(a) Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, 2005) (draft Guidelines for consultation, now Aboriginal cultural heritage consultation requirements for proponents 2010);

(b) The Burra Charter; and

(c) NSW Heritage Manual (NSW Heritage Office and the Department of Urban Affairs and Planning).

88 The Burra Charter (exhibit A, vol 5, tab 96, p 4165-4193) is an overarching document which sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians (exhibit A, vol 5, tab 96, p 4170). The Burra Charter starts from a premise of a place being of cultural significance and provides the principles for managing and interpreting places of cultural significance. It provides a broad overview of the heritage context for heritage significance although it is not directed to assessment particularly. The Burra Charter (exhibit A, vol 5, tab 96, p 4170) states that it should be read as a whole as many articles are interdependent and were referred to by the experts as summarised above in their evidence.

89 The NSW Heritage Manual includes assessing heritage significance, which identifies a process of investigating, assessing and managing heritage significance. Heritage significance assessment criteria include historic, aesthetic, social, scientific, rarity and representative criteria. Gradings of significance are also specified. Of greater relevance in this matter are the draft Guidelines for consultation which address Aboriginal heritage assessment directly, including a wide definition of Aboriginal cultural heritage in s 1.3 consisting of physical and non-physical elements (exhibit A, vol 5, tab 102, p 4462). An assessment process includes identifying Aboriginal cultural heritage through consulting Aboriginal people with cultural knowledge or responsibilities for country (p 4463). Assessment information requirements include social/cultural, landscape, archival documentation and archaeological elements (p 4464-4465). The final 2010 version (exhibit A, vol 5, tab 104) requires similar information about cultural heritage assessment of places, not just objects.

90 The Insite Report is called Aboriginal Archaeological Assessment and the contents of the substantive report reflect the terms of reference from Ashton to undertake an Aboriginal archaeological heritage assessment. The cultural significance of the identified archaeological sites is determined, according to the Report at p 59, by the community reports (largely those of Aboriginal stakeholders) in their responses in writing contained in Appendix D (exhibit 4A). The Insite Report does consider a range of assessment criteria beyond scientific significance in the context of the archaeological surveys undertaken. The Insite Report includes (table 6, p 59) a table listing the archaeological resource sites and grades their significance against the criteria of scientific, public and representative. However, Aboriginal cultural heritage assessment requires a broader assessment and analysis than reflected in the Insite Report, including intangible aspects of culture, not just objects, as recognised in *Ashton Coal Operations Pty Limited v Director-General, Department of Environment, Climate Change and Water (No 3)* [2011] NSWLEC 1249 at [82]-[83]. That case was considering a different statutory regime, namely

an application for an Aboriginal Heritage Impact Permit (AHIP) under s 90A of the NPW Act by Ashton in relation to an area in Camberwell above the Underground mine. The observations of the Commissioners about the broad considerations relevant to the assessment of Aboriginal cultural heritage are pertinent to this matter also and at [82] refer to the Aboriginal cultural heritage consultation requirements for proponents in the 2010 guidelines (par 87(a)) in doing so.

91 I accept Dr Cotter's opinion that the Insite Report does focus on the archaeological resource on the SEOC project site and is too narrow an assessment of Aboriginal cultural heritage given the requirements of the draft Guidelines for consultation in particular, and the broader guidance contained in the Burra Charter and the relevant part of the NSW Heritage Manual.

92 The terms of reference for the Insite Report were too narrow, focusing on objects not places, and do not reflect the requirements for Aboriginal cultural assessment required by any of the three heritage documents required to be addressed in the DGRs. Arguably there was a failure to assess the significance of all relevant aspects of Aboriginal cultural heritage on the SEOC project site by the Insite Report as required by the relevant guidelines.

The adequacy of the consultation process

93 Dr Cotter identified in oral evidence that individual members of the PCWP participated in the consultation process during the preparation of the Insite Report, notwithstanding that some of these individuals do not agree with all the findings of the Insite Report. I note that the PCWP as a group did not exist at the time of preparation of the Insite Report.

94 The emphasis on the word archaeology in the notification letters to Aboriginal stakeholders sent by Insite reflects their overly narrow terms of reference (Insite Report p 84-85). The letters from registered Aboriginal stakeholders in response to the draft report, contained in Appendix D of

the Insite Report (exhibit 4A), addressed both the future management of the archaeological resource on the SEOC project site and wider social and cultural values related to the SEOC project site and environs. That response during the consultation process with Aboriginal community members and businesses articulated wider cultural significance values associated with the Camberwell area, which includes the SEOC project site, was due to Aboriginal respondents not limiting themselves in responding to the archaeological sites alone. As identified during the hearing, the Insite Report does include references to the historical and cultural aspects of the area around the SEOC project site, generally focussed on the significance of the Glennies Creek area.

95 Community consultation with the registered Aboriginal stakeholders during the preparation of the Insite Report was not undertaken in accordance with the relevant guidelines at the time of the preparation of the Insite Report as required by the DGRs (exhibit 1A, vol 1, tab 13, p 7), being the draft Guidelines for consultation (exhibit A, vol 5, tab 102). On the basis of all of the evidence including the content of the whole Insite Report and the responses received in the public consultation process, wider aspects of Aboriginal cultural heritage were recorded. As I have evidence before me which addresses Aboriginal cultural heritage broadly in the sense referred to by the Burra Charter, the NSW Heritage Manual and the draft Guidelines for consultation this failure should not give rise to a refusal. However, Ashton must do better in future in this area of assessment to ensure its consultants are provided with sufficiently broad terms of reference.

The identification of Aboriginal archaeological sites by the Insite Report

96 In my view, the explanation provided by Dr Kamminga regarding the position of survey pegs in relation to individual archaeological resource sites is reasonable and informed by his extensive expertise in the area of Aboriginal archaeology. I note that some of the archaeological resource sites identified by the Insite Report cover a significantly large area and a single peg can only indicate an approximate position of the scatter as a

result. I do not accept Dr Cotter's view that the data in the Insite Report cannot be relied upon.

Impact of the project on Aboriginal cultural heritage values and places within the SEOC project site and the vicinity of the project site including the adequacy of the assessment of archaeological significance by the Insite Report

97 For the following reasons I do not consider Dr Cotter's evidence and opinion demonstrates that the SEOC project site is of substantial significance for Aboriginal cultural heritage. Dr Cotter confirmed in oral evidence that she is employed by Tocomwall Pty Ltd, a company of which Mr Scott Franks is a director. Mr Franks is one of the four heads of family of the PCWP (TS 489/29). In my view, this commercial relationship does potentially compromise the perception of Dr Cotter's independence in providing expert evidence in this matter. Dr Cotter's opinion regarding the significance of the cultural landscape on and in the vicinity of the SEOC project site solely reflects the views of the PCWP, as stated in her oral evidence (TS 487/4). Mr Perry's affidavit demonstrates that there are differing views amongst Aboriginal people in the Camberwell area of the significance of the SEOC project site for Aboriginal cultural heritage. There is universal agreement that Glennies Creek and its banks have significance for Aboriginal cultural heritage. That lies outside the SEOC project site.

98 The Expert Witness Code of Conduct (Sch 7 Uniform Civil Procedure Rules 2005) requires in cl 5 that an expert must include in a report the facts and assumptions of fact and the expert's reasons for each opinion expressed.

99 Dr Cotter has provided her opinion based on a thorough search of the Aboriginal use of the area surrounding the SEOC project site, which largely relies on interviews conducted with Aboriginal people who are members of the four families of the PCWP. There is no evidence, such as descriptions and explanations of cultural or other use of the SEOC project site by Aboriginal people, in particular by PCWP descendants, in her

report. During the view by the Court of the SEOC project site Dr Cotter speculated that areas of the site may have been used for food gathering and other domestic activities. I surmise that it is highly likely the activities she referred to occurred across much of the surrounding landscape. The SEOC project site and its surrounding landscape is highly modified by European agricultural practices which I surmise have been conducted in that area for many, many decades.

100 Dr Cotter's report mostly considers the surrounds of the SEOC project site. The report quotes extensively what PCWP members said to Dr Cotter about the area around the SEOC project site because according to Dr Cotter the best evidence of Aboriginal cultural heritage is obtained from Aboriginal people. While that can be accepted, Dr Cotter appeared to link any association with the general area near the site in a 20km radius as supporting a conclusion that the SEOC project site is of cultural significance. All except one of the 15 locations referred to in her report as having significance for Aboriginal cultural heritage are not on the SEOC project site. Some of these locations are at some distance from the SEOC project site, such as Shadlows Lane and locales Q, S, T, U, V and X which are described as places adjoining Glennies Creek near Mount Olive where PCWP members have lived or now live. One location near the SEOC project site is at or near Glennies Creek, which will be undisturbed as it is outside the project site. The same locations are the subject of the application by Mr Franks on behalf of the PCWP for an area to be declared an Aboriginal Place. The area in that application extends some 20km along Glennies Creek from the SEOC project site.

101 The only site identified in Dr Cotter's report within the SEOC project site is the Camberwell Common (locale K) (The complicated history of this land and the finding that it is not now a common is referred to elsewhere in this judgment). This is described as having contemporary significance to the PCWP as it was the place in 2010 over which they successfully registered their first Native Title application. Registration, I was informed, required information sufficient to meet a prima facie threshold to be provided. That

material is not provided in this case. As identified above in par 29, the Future Act Determination which followed that registration found there was scant evidence of the exercise of any native title rights and interests on the land the subject of the native title claim, which I infer included the common, such as evidence of the life, culture and traditions of the PCWP. I find myself in a similar position as the Native Title Tribunal given the lack of such material before me. In the absence of any evidence to substantiate the common as having greater cultural significance I am unable to attribute any weight to that matter.

102 If the role of an expert on Aboriginal cultural heritage is to collate experiences of Aboriginal people, it is also necessary to undertake an analysis of the experiences and link these to the relevant land in issue if an expressed opinion is to be useful to this Court. Any association of a PCWP member with the general area around the SEOC project site was referred to, regardless of timing, for example the World War I experiences of a member and his relative who lived in the Camberwell area are identified by Dr Cotter. The criticism of Ashton's set out in par 82 based on this material is valid. No cultural or other experiences of Aboriginal people on the SEOC project site were identified in Dr Cotter's report. The archaeological sites identified by the Insite Report on the SEOC project site were not identified as sites of cultural significance in Dr Cotter's report. I find her evidence undiscerning and therefore unconvincing. Ashton's criticisms of Dr Cotter's report set out at par 83 are justified.

103 I am not satisfied that there is any credible evidence for the SEOC project site being at the "epicentre of all realms of their [PCWP's] cultural existence" (Dr Cotter, exhibit K, p 22). The observations of Dr Kamminga quoted at par 65 that Australia is a cultural landscape for many groups is apposite to this matter. As the Minister submitted (above at par 77-78) Dr Cotter does not opine that the SEOC project site was a focal point of habitation, ceremony and resource exploitation. There is no evidence to support such a finding in the affidavit of Mr Franks summarised above. Dr Kamminga's opinion that sound cultural heritage management requires an

assessment of how a proposal will impact on places of particular significance should be accepted as supportive of the necessarily rigorous approach.

104 I accept Dr Kamminga's evidence that he does not see a general consensus or widespread belief amongst the Aboriginal stakeholders and that he cannot identify reliable and credible evidence for the significance of cultural landscape in the SEOC project site (TS 430/34-35, 431/30-33).

105 I prefer Dr Kamminga's evidence regarding the comparative value of the archaeological resource on the SEOC project site, based on his extensive expertise in Aboriginal archaeology and prehistory. According to Dr Kamminga, Aboriginal stone artefacts are ubiquitous in the Hunter Valley and therefore a relatively high density of stone artefacts should not, by itself, be interpreted as meaning that an area or deposit of stone artefacts must have a high scientific value, as assessment of scientific value turns on many considerations (Dr Kamminga affidavit par 27). I accept Dr Kamminga's evidence regarding the thresholds required for objects and places to be included on the AHIMS register as a Declared Aboriginal Place (Dr Kamminga affidavit par 56) and his opinion that there is nothing special about the stone artefacts scatters on the SEOC project site (TS 420/15). I also accept Dr Kamminga's evidence that the proposed disturbance by mining of the physical evidence (principally stone artefacts and stone manuports) of past Aboriginal presence and activity within the SEOC project is very unlikely to constitute a significant cumulative impact on Aboriginal cultural heritage in national, state, or local contexts.

106 I give some weight to the fact that there are no places or objects on the SEOC project site included in the AHIMS register, managed by the OEH.

107 The route of the transmission line has been changed to avoid a designated conservation area and that has yet to be assessed for the impact if any on Aboriginal cultural heritage, a further point of criticism by the Applicant. I understand the work required is the erection of power poles at appropriate

intervals so that there will be some disturbance to soil in those locations. The transmission line is set back from Glennies Creek. The conditions propose that a study be undertaken prior to commencing work to ensure that work is informed by the study results. That is an appropriate response to that relatively low level intrusive work.

108 There is agreement between Mr Franks and Mr Perry that Glennies Creek and its banks have significance for Aboriginal cultural heritage in this area. Mrs Stocks also spoke of the significance of this area during the view. Glennies Creek, its banks and adjoining floodplain up to 200m lie outside the SEOC project site. There is dispute between Mr Franks and Mr Perry as to who can speak for the PCWP which dispute I am unable to resolve on the basis of what is before me. Each asserts in affidavits that he is a rightful representative. I do not consider I can dismiss Mr Perry's views. Leaving aside Glennies Creek, Mr Franks did not substantiate his general claims of significance for the PCWP of the SEOC project site in his affidavit. During the view, Dr Cotter did not draw my attention to anything on site by reference to Mr Franks' affidavit. I do not therefore consider that the claims of cultural significance are substantiated by the PCWP.

109 On review of the evidence as a whole and taking into consideration the project approval conditions, I am satisfied that the SEOC project will not have a significant impact on an area of significant Aboriginal cultural heritage and that the proposed conditions of approval are adequate to deal with the archaeological sites identified and which may be identified under condition 49 of Sch 3 in relation to the transmission line. Application of the principle of inter-generational equity as relied on by the Applicant does not suggest in light of the evidence before me that the project should be refused on this basis.

110 By this finding I am not intending in any way to be dismissive of the importance of Aboriginal cultural heritage. In order to establish that refusal of a project is warranted on this basis however more than general statements about Aboriginal cultural heritage significance in relation to the

SEOC project site are required. The proposed project conditions in relation to the management of Aboriginal cultural heritage are satisfactory.

Impact on long term functionality of agricultural land

111 The Applicant contended that the SEOC project will have an adverse impact on the potential for sustained agricultural production within the SEOC project site, contrary to the principle of intergenerational equity (ASOFC par 60):

> a) Since around the 1880s, the project site has been used for productive agricultural purposes, primarily cattle grazing and dairy farming;
> b) Present and potential future uses of the project site include cattle grazing and food production;
> c) A portion of the project site is identified as "biophysical strategic agricultural land" in the Upper Hunter Strategic Regional Land Use Plans;
> d) The project as proposed will lead to the loss of productive agricultural land and strategic agricultural land available to sustain future generations;
> e) The project proposes to rehabilitate the site for future intended uses of low level grazing and vegetated corridors of canopy cover (trees and shrubs);
> f) Low level grazing is of a lesser quality than the agricultural land which is currently on the project site;
> g) In any event there is uncertainty as to whether the rehabilitated land under the project will even allow low level grazing at the project site;

112 The Minister and Ashton dispute the contentions made by the Applicant in par 60 of its ASOFC in their ASOFCs in reply.

113 The EA considers soils, agricultural suitability and land capability in appendix 8 (exhibit 1A, vol 2, tab 21). It discusses the soil types recorded in the SEOC project by rural land capability classes (p 13) and agricultural land classification (p 15). It concludes that the major soil types identified on the SEOC project site are brown and grey sodosols. The site and soil assessment conducted indicated that the creek flats were rural land compatibility class II, terraces and footslopes rural land compatibility classification IV, the hillslopes were mapped as rural land compatibility class V, drainage lines and rocky hillcrests as rural compatibility class VI. The agricultural land classifications were class 2 on the creek flats, class 3

on the terrace and footslopes, class 4 on the hillslopes and class 5 on the timbered slopes and major drainage lines (p 22). A soil type boundaries map and land capability and agricultural suitability map were included (which were reproduced in MFI 3).

114 The proposed condition 58 in Sch 3 requires Ashton to rehabilitate the site to the satisfaction of the Executive Director Mineral Resources in the Division of Resources and Energy (DRE) within the Department of Trade and Investment, Regional Infrastructure and Services. The rehabilitation must be generally consistent with the proposed rehabilitation objectives described in the EA and the amended plans submitted to the PAC and comply with the objectives in Table 16 of the conditions. Table 16 includes establishing a minimum of 50ha (as agreed in course of hearing by the Respondents) of class 3 agricultural suitability land. Condition 59 requires Ashton to carry out rehabilitation as soon as reasonably practical following disturbance to the satisfaction of the Executive Director Mineral resources in DRE. Condition 60 requires Ashton to prepare and implement a rehabilitation management plan to the satisfaction of the Executive Director Mineral Resources in DRE to manage potential impacts of the SEOC project. Condition 61 requires Ashton to use its best endeavours to ensure that the agricultural productivity and production of non-operational project-related land is maintained or enhanced. This includes properties primarily used for agriculture that are acquired by Ashton due to noise and/or air quality impacts. It does not include land where disturbance is permitted under the conditions or land that forms part of the biodiversity offset area.

Expert evidence

115 Associate Professor Willem Vervoort (on behalf of the Applicant) and Dr David McKenzie (on behalf of Ashton) provided expert soil science evidence. Associate Professor Vervoort affirmed an affidavit on 17 May 2013, to which his expert report is annexed. Associate Professor Vervoort is the Associate Professor Hydrology and Catchment Management, The University of Sydney, Faculty of Agriculture, Food and Natural Resources.

Dr David McKenzie affirmed an affidavit on 21 June 2013, to which his expert report is annexed. He is a soil science consultant with 36 years experience. The experts prepared a joint report dated 7 August 2013 (exhibit G).

Current agricultural capability of the SEOC project site

116 The experts agreed in their joint report that the majority of the soil on the existing site has limited productivity and requires careful management by the farmer to provide improved conditions for plant growth (exhibit G, p 3) (TS 180/41 and 181/34-35).

117 Dr McKenzie states that the Applicant's contention (ASOFC par 60(a) and (c)) that the SEOC project site includes "productive and strategic agricultural land", only applies to a small strip of alluvium soil adjacent to Glennies Creek. According to Dr McKenzie, the dominant soil type on the SEOC project site is "Brown-Grey Sodosol", when superimposing the proposed pit on the soil type boundaries map (exhibit 1A, vol 2, tab 21, appendix C) (TS 167/45 and Dr McKenzie affidavit par 5).

Rehabilitation of the SEOC project site

118 The experts agreed that a good result following mining would be to achieve a level of agricultural capability consistent with the current capability of the SEOC project site. They agreed that this could be achieved within five years after the closure of the mine and that longer term monitoring is required to ensure that rehabilitation continues (exhibit G, p 4).

119 Associate Professor Vervoort said in oral evidence that post-mining the soil consists of a pile of mine spoil rock with a thin layer of topsoil and this would require careful management to maintain productivity (TS 183/44, 184/11-13). He agreed under cross-examination that just as the soils on the SEOC project site currently require careful management to provide improved conditions for plant growth, they will continue to require careful

management post-mining to achieve improved conditions for plant growth (TS 182/12-15).

120 The experts agreed that with careful landscape development a more natural shape of the landscape can be achieved and this will provide better landscape functioning (exhibit G, p 5). The experts agreed that condition 60, requiring Ashton to prepare and implement a rehabilitation management plan is adequate to ensure rehabilitation of the land post-mining (TS 193/24-25, 36).

121 A new topic raised in cross-examination of Dr McKenzie concerned whether the alluvial land on the eastern side of Glennies Creek identified in the soil type boundaries plan in the EA as LR (loamy rodosol being alluvial soil) would be available for farming during the SEOC project. This land falls outside the SEOC project site. The experts agreed that between the proposed high wall of the mine, on the western side and Glennies Creek to the west, there is a narrow strip of alluvium which is good quality agricultural land (TS 168/30-31). Dr McKenzie said in oral evidence that this strip of alluvial soil will be largely unscathed by the earthmoving associated with the mine and it will remain intact when the levee and ROM pad are removed after mining (TS 168/32-33, 169/5-9). Associate Professor Vervoort said that whether or not the alluvial land will be unscathed by the levee depends on how the levee influences the water balance of that alluvial soil and that would influence the future agricultural capability of the alluvial soil (TS 179/25-26). He agreed in cross-examination that alluvial soil next to Glennies Creek would generally be recharged by the creek (TS 179/36). Associate Professor Vervoort stated that in most cases there will be little effect [from the levee on the agricultural capabilities of the soil] (TS 180/26-31).

122 Dr McKenzie did not consider there would be difficulty in farming this area during the mining operation, that being a decision for Ashton assuming that it acquires Mrs Bowman's property. A further proviso identified by Dr McKenzie was that the land immediately adjacent to Glennies Creek was

identified as class 8 flood prone land so that stock would have to be moved on and off it. Associate Professor Vervoort's opinion was that whether this area could be used for farming during mining depended on whether it was large enough to do so economically and as a practical exercise in terms of access.

Submissions

123 The Applicant submitted that the proposal fails to address medium to long term risks to landscape functionality (Applicant's closing submissions par 79). Associate Professor Vervoort continued to have concerns with the long term water balance and emphasised the need for long term monitoring for 25 to 30 years. The Applicant accepted in closing submissions (par 105) that the agricultural potential for land within the SEOC project site was generally of poor quality.

124 In closing, the Applicant submitted that the strip of alluvial land adjacent to the eastern side of Glennies Creek was good quality alluvial land. While the ROM pad will be removed post-mining, the levee upon which part of the ROM pad sits will remain and as a result the landform height will be maintained and incorporated into the rehabilitation design (Applicant's closing submissions par 106). This will result in loss of an area of this land. Further the use of the land will be severely, if not totally, impeded by the mining activity nearby so that it will not be available for grazing. Associate Professor Vervoort questioned whether this area was large enough for useful farming. Dr McKenzie was said to be overly optimistic about the capacity of the land to be successfully rehabilitated.

125 The Minister submitted that the experts agreed that the majority of the soils at the SEOC project site have limited productivity and require careful management for improved plant growth. Careful management post-mining is able to achieve this. Associate Professor Vervoort's concerns about fixing appropriate rehabilitation standards are met by Sch 3 condition 60. The proposed condition 58 also requires a minimum of class 3 suitability land of 50ha. The issue raised by the Applicant in closing of loss of

agricultural land outside the SEOC pit area closer to Glennies Creek was not considered by the experts whose evidence focussed on the large area of the proposed mine pit. This was raised only in cross-examination by the Applicant's counsel (TS 171/43). This topic received limited expert consideration as a result. Any adverse impact is minimal. The agricultural capability study conducted as part of the EA has a map showing very little suitable agricultural land between the pit site and Glennies Creek. The strip of land immediately adjacent to Glennies Creek is assessed as being land capability class VIII, unsuitable for agricultural and pastoral production, with the agricultural land classification class 5, unsuitable for agriculture suitable for light grazing. Proposed new condition 61 requires Ashton if it acquires Mrs Bowman's property to use its best endeavours to ensure that the agricultural productivity and production of the land is maintained or enhanced. The Court should be satisfied given the additional information now available on this topic over and above that before the Director-General whose report concluded that the rehabilitation strategy for the SEOC project would provide ongoing agricultural use in the long term was correct.

126 Ashton submitted that the issue is addressed three ways, firstly, the expert evidence of Dr McKenzie and Associate Professor Vervoort, secondly by comparing the agricultural potential of the SEOC project site on a before and after basis given the evidence, and thirdly, by properly considering the application of the principle of intergenerational equity as it is apparent the productivity of the land will be maintained. As a result of the joint report (exhibit G), there is plainly no land rehabilitation issue that would constitute a ground for refusal of the SEOC project (Ashton's closing submissions par 93). The conditions suggested by Associate Professor Vervoort in relation to the up front design of the rehabilitation monitoring and assessment process will need to be included in the biodiversity management plan required by condition 45(c)(iii) and the rehabilitation management plan in condition 60. Associate Professor Vervoort conceded that the rehabilitation management plan would address his concerns with

long term management of land rehabilitation. The objectives of intergenerational equity are achieved.

Minimal loss of functionality of agricultural land

127 The scope of loss of agricultural potential as understood from the Applicant's ASOFC and the expert evidence focussed on the area proposed to be mined. Broadly, the experts agreed that the majority of the soil on the existing site has limited productivity and requires careful management by the farmer to provide improved conditions for plant growth, that a requirement to prepare and implement a rehabilitation management plan is adequate to ensure the rehabilitation of the land post-mining, and that the land will continue to require careful management in order to achieve equivalent or better landscape functioning than presently exists. The majority of the SEOC project site consists of relatively poor soil which the experts agreed has limited productivity. The question is whether the land can be satisfactorily rehabilitated following mining (Singleton LEP, objectives for the 1(a) Rural Zone, Zoning Table Pt 3 (c)) and based on the agreement of the experts, I am satisfied that this objective is met by the SEOC project and the conditions. In closing the Applicant did not appear to raise any particular issue beyond this agreement in relation to the SEOC project site.

128 The Applicant in closing raised the potential loss of alluvial land next to Glennies Creek. In cross-examination of Dr McKenzie, the Applicant's counsel raised the issue of the location of LR (loamy rudisol) in the relatively narrow strip of alluvial land adjacent to the eastern bank of Glennies Creek. This was not an issue identified expressly in the Applicant's ASOFC and was not addressed in the written expert evidence. The ROM pad will be placed on part of this land during the SEOC project and is then to be removed. A small part is likely to be covered permanently post-mining by the levee. I am not satisfied that the Applicant's submission regarding the covering of a small area of alluvial soil by the levee post-mining constitutes a ground for refusal of the SEOC project.

129 There was questioning of the experts as to whether the alluvial land next to Glennies Creek could be farmed while mining was being conducted, with differing views expressed based on the logistics of Ashton being able to do so. Of greater relevance in terms of long-term loss of agricultural land is the use of the land after mining for agricultural purposes. That is intended to continue and is provided for in the proposed condition 61, Sch 3.

130 That the area is identified in the Upper Hunter Strategic Regional Land Use Plan as biophysical strategic agricultural land did not appear to play any role in resolving the issues in this part of the case. The particulars identified above in par 111 to the extent these raise an issue in (g) are not established in relation to the SEOC project site. I agree with Ashton's submission that there is no basis for considering the principle of intergenerational equity in these circumstances and this ground does not provide a basis for refusal of the SEOC project.

131 Associate Professor Vervoort's concerns about the need for more monitoring are considered in the next section.

Impact on groundwater

132 The Applicant's ASOFC states the SEOC project fails to address medium to long term risks to landscape functionality, including water quantity, water quality and land quality and is therefore contrary to the precautionary principle and intergenerational equity (ASOFC par 61(a), (b), (c), (d), (h), (i), (j), (l) and (m)):

> (a) There is uncertainty about the existing (pre-mining) hydrological and hydrogeological conditions within and also external to the project site;
> (b) The project will modify the hydrological and hydrogeological conditions within and also external to the project site;
> (c) The extent to which the hydrological and hydrogeological conditions will be modified are predicted by way of mathematical models;
> (d) There is uncertainty in the conceptualisation and parameterisation of mathematical models to predict natural systems;
> ...

(h) The project proposes some monitoring of impacts to alluvium and hard rock aquifers, groundwater, and Glennies Creek surface water and for a period of up to 16 years only after completion of mining;
(i) The potential impact of the mine on groundwater and Glennies Creek is estimated to be approximately 100 years;
(j) Notwithstanding that the impacts on water quality and quantity may last for 100 years, the project approval only requires water quality and quantity to be monitored for a period of up to 16 years after completion of mining;
...
(l) There is uncertainty about the hydrological and hydrogeological conditions (post-mining) within and also external to the project site during and after the proposed rehabilitation; and
(m) The project approval conditions fail to adequately address uncertainty in modelling over the life of the predicted impacts.

133 The Minister's ASOFC in reply state that:

In response to paragraph 61 of the SOFC, the Minister:
(a) repeats paragraphs 19-24;
(b) says that:
  (i) DGRs for the Project required Ashton to carry out a detailed assessment of the environmental, economic and social impacts of the Project;
  (ii) the PAC required further detailed assessment of particular aspects of the environmental impacts of the Project, including impacts on water quantity, water quality and land quality;
(c) contends that Ashton carried out such assessment, in compliance with the requirements of the DGRs and the PAC, and that this assessment includes an adequate assessment of the medium to long-term risks to water quantity, water quality and land quality;
(d) contends that while there are some uncertainties associated with this assessment, as is inherent in all groundwater modelling, these uncertainties have been addressed through the use of detailed sensitivity analysis and conservative assumptions (such as the use of no mitigation measures whatsoever) to produce worst case predictions that are unlikely to eventuate;
(e) says that the assessment concluded that:
  (i) the predicted maximum possible, worst-case water quantity impacts scenario (i.e. without mitigation) would result in a reduction in Glennies Creek baseflow of 65 ML/year, which is less than 0.1% of annual average flows, and the inflow of 50 ML/year of alluvial groundwater to the mine;
  (ii) these impacts would reduce significantly following the recovery of the groundwater system after mining operations cease, and the predicted worst-case long-term impact on Glennies Creek baseflow is less than 10 ML/year;

(iii) Ashton has access to sufficient water entitlements to cover the predicted maximum possible, worst-case water quantity impacts of the Project;

(iv) the construction of a low permeability barrier between Glennies Creek and the mine would minimise water quantity impacts on Glennies Creek and the connected alluvial groundwater;

(v) the final void in the rehabilitated Project land would create a groundwater sink to ensure that any long-term increase in salinity in the groundwater within the rehabilitated pit area will be contained and will not be able to flow towards Glennies Creek;

(vi) the construction of the low permeability barrier would minimise the potential for saline groundwater discharge toward Glennies Creek and its connected alluvial groundwater post-mining;

(vii) with these mitigation measures, the probable worst-case water quantity impacts of the Project are predicted to result in a reduction in Glennies Creek baseflow of 9.4 ML/year and the inflow of 1.6 ML/year of alluvial groundwater to the mine;

(viii) the Project would result in improvements to the water quality of the alluvial groundwater resource; and

(f) contends that the conditions of the Project contain a comprehensive suite of conditions related to water quantity, water quality and land quality to ensure that the actual impacts of the Project do not exceed the predicted impacts, provide safeguards for surrounding water users, offset any loss of baseflow to Glennies Creek, the alluvial aquifer and the hard-rock Permian aquifer, and ensure that the Project has no long-term impact on water quantity, water quality or land quality, including:

(i) Schedule 3, conditions 29-46, 58-60;

(ii) Schedule 5, conditions 1-4 and 8-9;

(iii) Commitments A1, A2, I1-I7, J1-J8, K1-K12, L1-L5, M1-M3, O1-O8, P1-P2, X1-X6

The Minister contends that the predicted impacts of the Project on water quantity, water quality and land quality:

(a) are not contrary to the precautionary principle as they do not threaten serious or irreversible environmental damage because:
(i) they are confined to the vicinity of the Project;
(ii) they are largely temporary;
(iii) the Minister repeats paragraph 61(d) and (e);

(b) are not contrary to the precautionary principle as there is no scientific uncertainty as to the predicted impacts of the Project on water quantity, water quality and land quality;

(c) are not contrary to the principle of intergenerational equity due to their minimal and temporary nature; and

(d) are not contrary to the public interest in that they have been suitably minimised through the design of the Project and can be appropriately managed and mitigated by conditions of approval.

134 Ashton's ASOFC in reply state that:

In response to the particulars raised in respect of paragraph 61, the Second Respondent says that:

(a) Extensive groundwater and surface water investigations have been undertaken by the Second Respondent to obtain a detailed understanding of the existing (pre-mining) hydrological and hydrogeological conditions within, and also externally, to the Project site;

(b) Based on extremely conservative hydraulic properties/assumptions, the Project is predicted to have a negligible impact on the hydrological and hydrogeological conditions within and also external to the Project site.

(c) While there will always be a degree of uncertainty in predicting natural systems, the Second Respondent has used a highly conservative approach (i.e. assuming extremely conservative hydraulic properties) when predicting potential groundwater and associated surface water impacts and the modelling indicates that there will be negligible impacts from the Project.

(d) In regards to water quantity, the Second Respondent holds adequate regulated river licences to account for and compensate any predicted impacts on Glennies Creek and this is a market mechanism that puts ESD principles into practice.

(e) Under condition 32 of Schedule 3 of the Project Approval the Second Respondent will provide a compensatory water supply to any landowner of privately-owned land whose water supply is adversely and directly impacted (other than an impact that is negligible) as a result of the Project.

(f) The twin mitigation measures of the low permeability barrier (LPB) and final void will be implemented and modelling indicates that either of these measures on their own would be adequate to lead to a net improvement in the salinity of Glennies Creek, and when implemented together, any adverse long-term salinity impact from the Project will be negligible, and certainly very much less than 1%.

(g) The Second Respondent says the comprehensive monitoring regime will be extended for a period of at least five years after completion of site rehabilitation. The monitoring and management plan for the LPB will describe the location and

frequency of monitoring to assess the integrity and performance of the LPB including periodic timeframes for further assessments to validate/re-model seepage predictions during and post mining.

(h) In addition, to the LPB and final void, the Second Respondent will undertake strategic planting of deep rooted salt tolerant trees and other vegetation to augment the final void in maintaining permanently depressed groundwater gradients within the rehabilitated landscape and will carry out monitoring biannually for at least five years following establishment of the restoration area. This monitoring will continue until such time that the trees are established within the restoration area and analyses of results following five years of growth are not significantly different from analogue sites.

(i) The strategic use of trees in the rehabilitated landscape and particularly in the area of the final void will assist in lowering water table levels in the post-mine landscape and will assist with maintaining groundwater gradients toward the final void, which will act as a long-term groundwater sink.

135 The EA considered the impact on groundwater in appendix 5 (exhibit 1A, vol 2, tab 18). The hydrogeological assessment was undertaken by Aquaterra Pty Ltd dated 2 July 2009. It proposed a buffer of 150m between Glennies Creek and the SEOC pit, restricting the pit to areas outside alluvium and the construction of a low permeability barrier (LPB). Additional modelling was undertaken to address concerns about the permeability between Glennies Creek and the proposed pit, preparing and implementing a groundwater monitoring program (exhibit A, vol 1, tab 7, p 514-515).

136 The PAC considered that the additional modelling undertaken by Ashton and Dr Frans Kalf, consulting hydrogeologist and principal of Kalf and Associates Pty Ltd engaged by the Department, provided an adequate basis for evaluating the extent of the likely risk (exhibit A, vol 3, tab 30, p 2725). It would be possible to establish an adequate monitoring regime. PAC considered that the monitoring regime proposed by Ashton must be endorsed by the NSW Office of Water (NOW) before its lodgement with the Director-General and that the plan be approved and implemented prior

to the commencement of mining (exhibit A, vol 3, tab 30, p 2725). The PAC highlighted the following changes, relevant to the question of water impacts: extension of the LPB, improvements to design and long-term maintenance, increased setback distance from Glennies Creek (to 200m); and location and shape of the final void. It would be possible to use the data from the improved monitoring system to produce updated modelling predictions throughout the mining period and shorter term adaptive management responses (exhibit A, vol 3, tab 30, p 2725). The PAC considered that the requirements to collect improved data, utilise that to produce revised modelling predictions and to assess whether these predictions require adjustment to mining operations should be independently reviewed, with the results provided to the NOW and the Department. Appropriate conditions had been drafted to reflect this (exhibit A, vol 3, tab 30, p 2726).

137 The PAC considered that there should be a condition imposed that there be negligible inflow of water to the pit from Glennies Creek and/or its associated alluvial aquifers. The PAC noted that there were backup provisions if water moves into the pit from Glennies Creek and its associated alluvial aquifer for which Ashton should be held to account via penalty provisions if it fails to deliver on its assurances (exhibit A, vol 3, tab 30, p 2728).

138 The PAC accepted on the basis of the proposed revised monitoring program that it should be possible to detect leakage into the pit through or around the LPB and that the period of monitoring proposed is adequate for this.

139 The PAC considered that the risk of saline water migrating from the SEOC project site to Glennies Creek post mine closure was adequately addressed (exhibit A, vol 3, tab 30, p 2732). The PAC also considered that the risks of flooding were adequately addressed and the commitment to incorporate the levee into the final landform should minimise any longer term risks (exhibit A, vol 3, tab 30, p 2732).

140 Conditions before the Court include Sch 3 condition 30 which requires Ashton to ensure that there is no more than negligible inflow of water into the pit from Glennies Creek and its associated alluvium and colluvium, and no more than negligible outflow of water from the pit to Glennies Creek or its associated alluvium and colluvium. Condition 31 requires Ashton to ensure that it has sufficient water for all stages of the SEOC project and if necessary adjust the scale of mining operations on site to match its available water supply to the satisfaction of the Director-General. Condition 32 requires Ashton to provide a compensatory water supply to any landowner of privately-owned land whose water supply is adversely and directly impacted as a result of the SEOC project in consultation with the NOW to the satisfaction of the Director-General. If Ashton and the landowner cannot agree on the measures to be implemented or there is a dispute about the implementation of these measures, either party may refer the matter to the Director-General for resolution. Condition 33 requires Ashton to ensure that all surface water discharges from the SEOC project site comply with the discharge limits set in any environment protection licence or relevant provisions of the *Protection of the Environment Operations Act* 1997 or Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002.

141 Condition 34 requires Ashton to prepare and implement a groundwater verification and monitoring program to the satisfaction of the NOW and the Director-General. Condition 35 requires Ashton to design the LPB to the satisfaction of the NOW and the Director-General and includes design specifications. Condition 36 requires Ashton to install the LPB prior to undertaking any mining operations within 40m of the Glennies Creek alluvium and colluvium, include quality assurance and testing and submit a report concerning LPB construction to the Director-General and the NOW. Condition 37 requires Ashton to prepare and implement a LPB monitoring and management plan to the satisfaction of the NOW and Director-General. Condition 38 requires Ashton to prepare and implement a water management plan for the Ashton mine complex to the satisfaction of the

Director-General to manage potential impacts of the SEOC project. This plan must be prepared in consultation with the OEH, the Environment Protection Authority (EPA), the DRE within the Department of Trade and Investment, Regional Infrastructure and Services and Singleton Shire Council, endorsed by the NOW and then submitted to the Director-General for approval prior to carrying out any development on the SEOC project site. The plan must include a site water balance, sediment control plan, a surface water management plan, a groundwater management plan and a surface and groundwater response plan. In condition 58 one of the rehabilitation objectives which Ashton must comply with is no more than negligible environmental consequences to Glennies Creek and its alluvial aquifer, including negligible leakage through the LPB, negligible adverse impact on surface water and groundwater quality, and negligible impact to other surface water and groundwater users.

Expert evidence

142 Associate Professor Vervoort (on behalf of the Applicant), Dr Frans Kalf (on behalf of the Minister) and Mr Dundon (on behalf of Ashton) provided expert evidence regarding the impact of the SEOC project on groundwater.

143 Associate Professor Vervoort identified in his affidavit concerns with uncertainty in groundwater modelling giving rise to a clear risk that the modelled predictions of groundwater and landscape recovery would not eventuate. He postulated a possible degree of connectivity between an underlying saline hard rock aquifer and an overlying smaller, less saline, alluvial aquifer related to Glennies Creek, being his understanding of the hydrogeological system (Associate Professor Vervoort affidavit par 11). He considered the boundary between the two could fluctuate over time (Associate Professor Vervoort affidavit par 36) and that due to model uncertainty there was a substantial risk that water flows towards the alluvial aquifer could be substantially greater than predicted. Modelling could assist with forward predictions to around 10 years post mine closure (par 104) but not beyond that.

144 Associate Professor Vervoort stated that what is required is continued monitoring for several more years (described below) beyond the proposed five years beyond mine closure. This would ensure that the projected outcomes could be compared to reality in the landscape.

(a) For the first 25 years, at least quarterly monitoring of groundwater and surface water for both quality and quantity.

(b) For the first 25 years, at least annual monitoring of vegetation and landscape functionality on the closed mine location.

(c) Every five years, update of Ashton's groundwater model and reporting on the landscape progression relative to the prior model predictions.

(d) Beyond 25 years (if no major problems are identified and the rehabilitation and recovery are as forecast) monitoring of groundwater and surface water in short bursts (maybe three years in ten) until the projected outcomes at 100 years post mine closure have been reached.

(e) Beyond 25 years (if no major problems are identified and the rehabilitation and recovery are as forecast) vegetation and landscape functionality monitoring every five years.

145 Mr Dundon, affirmed an affidavit dated 21 June 2013, to which his expert report is annexed. He is a consulting hydrogeologist and principal, Dundon Consulting Pty Ltd and has qualifications in geology, geophysics and geohydrology. Mr Dundon has been the primary author or the principal reviewer of the work on groundwater for the SEOC project site and he was previously employed by Aquaterra Pty Ltd (TS 221/4-5, 21, 24). Mr Dundon responded to the criticisms of Associate Professor Vervoort by providing his understanding of the hydrogeological system at the SEOC project site. There is a lack of connectivity between Glennies Creek alluvium and the colluvium in the pit. There is unlikely to be an

unacceptable level of alluvial groundwater flows from Glennies Creek into the void, or a long-term saline discharge toward Glennies Creek (Mr Dundon affidavit par 86). In relation to model uncertainty he said at par 122 the uncertainty in the model outcomes has been reduced by adhering to the best practice groundwater modelling guidelines, by upgrading and improving the Ashton groundwater model several times and by repeatedly calibrating and validating the model against observed impacts from the NEOC and Underground mines, all of which proposed forward practices.

146 Mr Dundon stated in his report that it has not been predicted that recovery would not occur until 100 years post-mining. Rather, 100 years is the duration of the modelling runs undertaken to predict post-mining recovery. Most of the post-mining recovery is predicted to occur within the first few years after completion of mining, or within the first 20 years after completion of mining for the most conservative scenario modelled.

147 It is acknowledged that there is uncertainty in the model predictions of long-term effects. However, the sensitivity and uncertainty modelling that has been undertaken as described above, together with the adoption of a very conservative mine plan with the LPB and final pit void, has substantially reduced the probability of an unacceptable adverse outcome from the impacts of the SEOC project.

148 Further, the progressive recalibration and validation of the model that has been achieved through matching the model predictions to observed responses from mining in the NEOC and Underground mines, including recovery observed to occur after completion of mining from the NEOC mine means that the reliability of the model for long-term prediction of post-mining recovery is much higher than is normally available for projects similar to the SEOC project.

149 The most recent uncertainty analysis modelling of post-mining recovery was undertaken in July 2012 (Aquaterra). It involved comparative modelling of impacts using (a), a model based on the most likely

groundwater conditions and determined from the results of investigations and with both the proposed LPB and final pit void in place and continuing to operate as designed, and (b), a model assuming an absolute worst case scenario in which very high floodplain alluvium hydraulic conductivities equal to the 98th percentile value from the test results were assumed for the entire floodplain, extending from Glennies Creek to inside the pit together with total failure of the LPB and absence of the final pit void.

150 The scenario (a) model predicted that recovery of groundwater levels inside the LPB would take up to 80 years to reach equilibrium, but that during the first 16 years after completion of mining, groundwater levels are predicted to recover to within 15m of eventual equilibrium level. Outside the LPB, groundwater levels are predicted to recover to within 1m or less of the eventual equilibrium value within the first five years after completion of mining.

151 The scenario (b) model predicted that recovery of groundwater levels both inside and outside the location of the proposed LPB would occur within 1m of the eventual equilibrium level within 10 years or less after completion of mining.

152 These two models cover the extreme range of possible outcomes, including a highly implausible absolute worst case outcome. Both showed that the recovery trends after completion of mining will be very clearly established within the first 16 years after completion of mining, or sooner. Any deviations from the predicted recovery trends will be very apparent within the first few years after completion of mining. Also, any adverse outcomes from the mining operation will become apparent during the first few years after completion of mining, when recovery is progressing at its fastest rate and hydraulic gradients between Glennies Creek and the pit will be at their greatest.

153 Accordingly, Mr Dundon considered that 16 years is an adequate period for post-mining monitoring of groundwater conditions by Ashton. Ashton is

proposing to partially backfill the void with tailings, then rehabilitate the void. This is expected to notionally take about 10 to 12 years after completion of mining, with monitoring continuing for a further five years. Long-term groundwater quality is very closely related to groundwater levels, particularly relative levels between the inside and outside of the LPB, and between the area inside the LPB and Glennies Creek and its connected alluvium. As the recovery trends of groundwater levels follow a logarithmic pattern, he considered there would be little benefit to be gained from extending monitoring to 50 years as suggested by Associate Professor Vervoort.

154 Dr Kalf affirmed an affidavit on 5 July 2013, to which his expert report is annexed. He has qualifications in science, engineering hydrology and hydrogeology. His affidavit largely agreed with the matters identified by Mr Dundon's investigation, sampling and monitoring, hydrogeological system connectivity, modelling, landscape rehabilitation and post-mining monitoring.

Geological sequence

155 In their joint expert report filed on 19 August 2013 (exhibit F), Associate Professor Vervoort, Dr Kalf and Mr Dundon agreed that the geological sequence has been established by drilling and sampling and consists of Permian hard rock, weathered Permian, colluvium and younger and older alluvium and that the Permian and weathered hard rock occurs both beneath the proposed mine pit site and extends beneath the Glennies Creek alluvium and beyond (exhibit F, topics 2 and 3).

156 The experts agreed that there is generally poor hydraulic conductivity (permeability) between the Permian hard rock (coal measures) and the overlying alluvium, due to the low vertical permeability of the Permian hard rock strata (exhibit F, topic 5). The experts agreed that there is some exchange of water between the colluvial and weathered Permian and the associated alluvium (TS 255/29-41), which they agreed can be described as "impaired or impeded" (exhibit F, topic 6) and Mr Dundon described as

"poorly to very poorly connected" (TS 255/44-45). In Associate Professor Vervoort's opinion, it is important to understand this relationship as the level of connectivity determines the potential for saline water to flow into Glennies Creek and the potential for fresh water to be lost to the saline aquifer (Associate Professor Vervoort affidavit par 11).

The salinity of the alluvial aquifer

157 The experts agreed that groundwater in the alluvial aquifer is less saline when compared to the colluvium, mainly because of infiltration of low salinity fresh water leaking from Glennies Creek (exhibit F, topic 4). Mr Dundon said in oral evidence that in order to have low salinity in the alluvium, there needs to be a dynamic movement of water, it needs to be both recharged adequately from rainfall and then flushed out, and this is a function of the higher permeability of the alluvium relative to the colluvium (TS 254/1-4).

158 Mr Dundon said in oral evidence that the normal nature of things at present is that there is a potential for flow of groundwater from the creek alluvium into Glennies Creek and typically, the salinity of groundwater in the alluvium is higher than the salinity of water flowing in the creek, which results in an additional contribution of salt into the stream flow of Glennies Creek (TS 281/50-282/4). The long term prediction is a very slight reduction in that rate of flow from the alluvium to the creek and a small component of flow from the hard rock aquifers will also reduce and these two factors will have a small, beneficial effect on the salinity of Glennies Creek and the downstream Hunter River as a result of the SEOC project (TS 282/6-8).

Groundwater investigation and sampling adequate to determine hydrogeological system

159 The experts agreed in the joint report that the amount of groundwater investigation and sampling has been sufficient to develop an understanding of the groundwater system to make a reasonable assessment of the potential impacts on groundwater during the operation

of the SEOC project (exhibit F topic 1). However, the experts disagreed in their individual reports whether or not the amount of sampling has been sufficient to make accurate predictions about how the groundwater system will recover following the completion of the SEOC project.

160 Associate Professor Vervoort considered in his report that the limited sampling of the complex geomorphologic environment carried out by Ashton results in uncertainty in the groundwater and surface water models and that Ashton is unable to accurately understand the complexity of the hydrogeological system (Associate Professor Vervoort affidavit par 43, 36). Because of the complexity of the environmental system in question, only a very detailed and extensive sampling would give a highly certain and detailed description of the underground hydrogeological system (Associate Professor Vervoort affidavit par 23). Associate Professor Vervoort considered that the limited sampling means that Ashton cannot accurately identify the extent of connectivity between the two aquifers, as sampling does not capture the spatial variability (Associate Professor Vervoort affidavit par 34, 35). In his view, continued monitoring of groundwater quantity and quality, vegetation and soil quality and landscape functionality related to the progress of the rehabilitation will be required for at least 50 years post mine closure, given the uncertainties associated with the model projection (Associate Professor Vervoort affidavit par 8).

161 Dr Kalf agreed with Mr Dundon that the investigations conducted at the SEOC project site and the Underground mine have been extensive and considered that the sampling bores have sufficiently demonstrated the range of hydrogeological conditions in cross-section and permeability in the alluvial flats (Dr Kalf affidavit par 4.6).

162 Associate Professor Vervoort said in oral evidence that following joint conferencing with the other experts, he had a better understanding of the hydrogeological system (TS 255/14-17) and he said the following (TS 254/43-50):

> Yes, basically my original description in my expert report were [sic] based on my reading of the reports that were in the EA and all that, and after discussions with Dr Kalf and Mr Dundon during the joint expert process we discussed a bit more in detail of how this system looked like and since they have done all the hydrogeological drilling, I agree with what their interpretation of the system is as based on the actual observations. So they presented to me what their observations - what they felt their observations implied in terms of what the hydrogeological system looked like in reality.

Low permeability barrier

163 The experts agreed that assuming a conservative uniform permeability over the entire younger alluvial creek flood plain and between the creek and the high wall of the mine on the western side reduces the uncertainty regarding the actual heterogeneous nature of the alluvial sediment permeability distribution to an acceptable level. The experts agreed that this approach is part of a thorough sensitivity analysis, common in hydrogeological analysis and model simulation to determine a conservative outcome and reduces uncertainties. Associate Professor Vervoort considered that this does not include uncertainties about the conceptual model and in observations (exhibit F, topic 7).

164 The experts agreed that the LPB is a contingency measure because of the potential for connectivity between the younger alluvium in the west and higher salinity sediments to the east, although Associate Professor Vervoort maintained that a requirement for a contingency measure such as the LPB indicates a degree of uncertainty about the likely groundwater flows. Dr Kalf indicated that irrespective of the effective permeability of the younger alluvium the LPB will act as a mitigation measure that will further reduce any potential inflow to the pit from the younger alluvium (exhibit F, topic 8).

Modelling

165 Mr Dundon and Dr Kalf agreed that the modelling conducted for the SEOC project has predicted with an acceptable degree of uncertainty the alluvial inflows to the pit during and post-mining and the long term saline discharge from the former pit area to Glennies Creek post-mining (exhibit

F, topics, 10 and 11). The purpose of the model, according to Mr Dundon, is to predict the direction of the flow of water (TS 243/7).

166 Dr Kalf said in oral evidence that modelling was done on the groundwater systems in a lot more detail during the assessment of the SEOC project (by the Department). With the additional modelling work conducted he was happy with the level of uncertainty remaining and agreed with most of the results that have been presented by Aquaterra and Mr Dundon (TS 224/33-46).

167 Whilst Associate Professor Vervoort agreed that the model has been calibrated and sensitivity tested to meet engineering practice standards (TS 226/44), he said that there are still structural uncertainties in the model, as in any model. He illustrated this point by stating that the model had failed to predict the recharge response of the groundwater level to the infiltration of floodwater in 2006, shown in a hydrograph (a plot of water level in two bore holes between 2006 and 2011), figure 6.6 of the EA Ground Water Assessment (exhibit 1A, vol 2, tab 18, figure 6.6) (TS 227/1-231/9). Mr Dundon responded to this criticism by stating that Associate Professor Vervoort had misinterpreted figure 6.6 (TS 236/34) as the hydrograph represents the recharge mechanism in the predicted model as an average process that occurs continuously, rather than one which is episodic (TS 237/37-38). Mr Dundon explained this as follows (TS 237/49-238/9):

> The model is set up so that it can simulate daily recharge based on daily rainfalls and the periodic flood events can be simulated in the same way. So the model structure is fine for doing that. What that would require would be to break up the time periods into a large number of subperiods to each of which is assigned a different rate of recharge according to what the rainfall is on that particular day. That adds substantially to the computer run time and so it's a very carefully made decision to not to try and replicate too much detail into the predicted volume, first of all because you don't know what the rainfall pattern is going to be, but based on the observations of the response of the aquifer to rainfall, it is seen that it can be acceptably represented as an average process when we are talking about long term predictions.

168 According to Mr Dundon, the model has behaved predictably in simulating the impacts from mining in the NEOC and Underground mines and that this is evidence that future model predictions for the SEOC project site are reliable, with an acceptable degree of uncertainty (exhibit F, topic 10). Mr Dundon notes that some level of uncertainty is inevitable in hydrological models, however the impacts predicted by the extreme worst case scenario modelling have been used to determine appropriate mitigation measures and water licensing requirements for the SEOC project even though the probability of the worst case scenario eventuating is less than 1 per cent (Mr Dundon affidavit par 124).

169 Associate Professor Vervoort maintains that there remains some level of uncertainty in the longer term predictions that would require either further post-mining modelling updates or post-mining monitoring to allow adaptive management (exhibit F, topics 10 and 11). In Associate Professor Vervoort's opinion, every model is a simplification of reality (TS 233/21) and that while he is happy to trust the short-term predictions of the model of a couple of years, he does not trust the longer term predictions of the model (TS 233/48 and 234/1-2).

Post-mining monitoring

170 According to Dr Kalf, the longest period for post-mining monitoring should be set at ten years with biannual monitoring during the last five years of that period (Dr Kalf affidavit par 4.18) (incorporated into condition 34). Dr Kalf said in oral evidence that recovery (of the groundwater system) is fastest during the early years post-mining and then it is very slow (TS 283/30, 35). Dr Kalf suggested, as part of the approval conditions, a series of piezometers be established, following the closure of the mine and rehabilitation, into the backfill in a line within the central part of the SEOC project site orientated in a north-south direction. The purpose of the piezometers is to monitor the rise over time of the recovering watertable elevation, with the backfill to monitor whether the groundwater levels remain below the creek alluvium and to establish the overall gradient towards the final void to allow model validation five years after mine site

rehabilitation (exhibit F, topic 1). Associate Professor Vervoort agreed with Dr Kalf that a series of piezometers should be established following the closure of the mine, to monitor the rise over time of the recovering watertable elevation (TS 263/8-9) (incorporated into condition 34).

171 Associate Professor Vervoort said in oral evidence that the length of time for post-mining monitoring is difficult to predict, because he does not know how the observations post-mining will match the model. In his opinion, adaptive management is required in order to appropriately respond to the monitoring results and the model predictions (TS 263/37-39).

172 Mr Dundon said in oral evidence that, depending on which model scenario is run, recovery has been completed in most scenarios within the first 16 years post-mining (TS 300/39). Mr Dundon states that any deviations from the predicted recovery trends, including adverse outcomes, will be very apparent within the first few years after completion of mining (Mr Dundon affidavit par 143). Associate Professor Vervoort agreed in oral evidence that the recovery trend would be very apparent on the low side of 16 years, about 10 years post-mining (TS 301/24-33).

173 Associate Professor Vervoort went on to say in oral evidence that while he initially thought monitoring should continue for 25 to 50 years post-mining, he is relatively happy with Dr Kalf's suggestion of 10 years of monitoring post-mining, as long as it can be demonstrated that the final void is on track to achieve dynamic equilibrium and that the experts can be confident that the difference between the projected outcome and the observation or extrapolated observations is indeed without impact or is on the way to recovery, and 10 years is required to have enough data to be able to be confident of that (TS 284/49-50, 286/8-11).

Submissions

174 The Applicant submitted that the SEOC project fails to address medium to long term risks to landscape functionality and is therefore contrary to the precautionary principle and the principle of intergenerational equity if

approval is given. The SEOC project site lies adjacent to Glennies Creek and the health of the creek and the Hunter River into which it flows is of critical importance to communities and businesses which depend on the system. Mr Burns of the Hunter Valley Water Users Association identified threats to the Hunter River system from over-extraction, salinity, aquifer damage and loss of base flows. Ms Beverley Smiles of the Nature Conservation Council outlined her concerns that regional impacts on groundwater drawdown, loss of base flows to the Hunter regulated and unregulated water sources and gradual increase in background salinity levels have not been researched in any way.

175 As expressed by Associate Professor Vervoort the connectivity between the saline aquifers and the less saline alluvial aquifer adjacent to Glennies Creek may be greater than modelled by Ashton. While the Applicant accepted that a LPB can be properly designed and monitored during the life of the SEOC project, it may not be a sufficient long term solution to the risk of high flow between the two aquifers in the long term. This is due to the difficulties of capturing the complexities of the groundwater system and the landscape in a numerical model and forecasting how the system will respond to changes caused by the SEOC project. Because of the structural uncertainty in the model the Court cannot be satisfied that the flows will be as predicted by the model. An example of structural uncertainty in the model was shown in fig 6.6 of the EA where the model failed to predict the response of the groundwater level to the flood peak depicted. The model does not pick up the recharge of the groundwater level of the flood peak because of the way it is conceptualised. (Dr Kalf and Mr Dundon said the model was designed to show average flow not actual variability of flow). There was no misrepresentation of fig 6.6 by Associate Professor Vervoort. As Associate Professor Vervoort pointed out it is predicting the long-term mean rather than modelling the actual variability of flows over time. That is a critical flaw in the model as where the water goes in the landscape is not known. After mining the landscape will be recovering and both averages and extremes will have an effect on the future landscape.

176 Associate Professor Vervoort also questioned the long term predictions of the model. Mr Dundon should have quantified the level of uncertainty in the model as required by par 7.6 of the Australian Groundwater Modelling Guidelines (exhibit S). Mr Dundon says the sensitivity analysis will reduce uncertainty to an acceptable degree but that is distinct from a uncertainty analysis.

177 Associate Professor Vervoort's criticism of the model used by Ashton to make long term predictions (up to 100 years) on the impact of the SEOC project on groundwater is not a criticism of the model per se, but an acknowledgment that all models contain uncertainty. The Applicant submitted that the risk of future uncertainties post-mining activates the precautionary principle.

178 Ashton submitted that the detailed assessment of groundwater and hydrology in the EA Aquaterra report of 2 July 2009 found there was unconsolidated alluvium adjacent to Glennies Creek and older colluvium not associated with the current Glennies Creek to the east away from Glennies Creek. There is poor hydraulic connection between the Glennies Creek alluvium and the colluvium to the east. During mining the maximum drawdown predicted in the Glennies Creek alluvium is 1.5m with the majority of the alluvium experiencing a drawdown of 0.5m or less. Mr Dundon comprehensively addressed the issue of model uncertainty and explained that uncertainty has been reduced by applying best practice modelling guidelines, by the fact that the model has been upgraded and improved several times, and by repeatedly calibrating and validating the model against the observed impacts from the NEOC and the Underground mines. Mr Dundon notes that the impacts predicted by the extreme worst case scenario modelling have been used to determine appropriate mitigation measures and water licensing requirements for the SEOC project even though the probability of the worst case scenario eventuating is less than 1 per cent.

179 There is a high measure of agreement between the experts in their joint report (exhibit F). The high level of agreement amongst the three experts leaves only Associate Professor Vervoort's residual contention outstanding, that there remains some (unspecified and unquantified) level of uncertainty in the longer term predictions that would require either post-modelling updates or post-mining monitoring to allow adaptive management. Ashton submitted that Mr Dundon's proposed 16 year post-mining monitoring being post the completion of coal extraction, and the model validation and the Minister's proposed amended condition 34 (as drawn from Dr Kalf's recommendations) would thoroughly and properly address this residual concern.

180 The Minister identified the process of assessment undertaken by the Department and that the DGRs expected Ashton to address the recognised potential for permeability of alluvium associated with Glennies Creek resulting in seepage from Glennies Creek into the pit with uncontrolled drawdown resulting in adverse impacts on downstream users and the environment. Measures to address this were proposed in the EA. The NOW expressed concern about the potential for uncontrolled drawdowns on Glennies Creek and to create a long-term point of salinisation of the regulated river system. Mr Dundon was engaged to undertake more sensitivity modelling and he considered the NOW's concerns were not consistent with field conditions as verified by additional investigations. The NOW advised the PAC on 1 June 2012 that it had revised its position and was satisfied that the risks to Glennies Creek were acceptable, having regard to the proposed LPB and that Ashton held or would be able to hold the necessary water entitlements required. The PAC approved the project with the extension of the LPB with improvements to design and long-term maintenance, increased setback distance from Glennies Creek (to 200m) and location and shape of the final void included.

181 The Minister submitted that there was a high level of agreement between the experts as detailed in their report and their oral evidence.

Groundwater impacts adequately addressed

182 Following preparation of the joint report and concurrent evidence by the experts, the substantive matters in contention regarding groundwater were largely agreed by the experts Mr Dundon and Dr Kalf, with substantial agreement from Associate Professor Vervoort on most issues. As the Respondents submitted:

(a) The experts agreed that the amount of groundwater investigation and sampling has been sufficient to develop an understanding of the geological sequence in the area and the hydrogeological system (the Applicant's submission that there is uncertainty about the geological sequence and the hydrogeological system is not in accordance with the evidence);

(b) Mr Dundon and Dr Kalf agreed there is generally poor hydraulic conductivity between the Permian hard rock and the overlying alluvium. Associate Professor Vervoort agreed with his improved understanding of the hydrogeological system;

(c) Mr Dundon and Dr Kalf agreed that adopting a very conservative uniform permeability over the entire younger alluvial creek flood plain and between the creek and proposed mine's western boundary reduces the uncertainty to an acceptable level about the actual heterogeneous nature of the alluvial sediment permeability distribution and that this approach is part of sensitivity analysis that is common in hydrogeological analysis and model simulation to determine a conservative outcome (that is, "worst case"). Associate Professor Vervoort agreed that a thorough sensitivity analysis can reduce uncertainty but said that this response does not cover structural

(model conceptualisation) uncertainty and uncertainty in observations (creek flow);

(d) In relation to the modelling conducted for the SEOC project site, Mr Dundon and Dr Kalf agreed that the model analysis carried out has reduced uncertainty to an acceptable level and that further monitoring over time will test any residual uncertainty. Associate Professor Vervoort agreed that a thorough sensitivity analysis can reduce uncertainty in combination with subsequent monitoring, model recalibrations and cross-validation in time, but said that this response does not cover structural (model conceptualisation) uncertainty and uncertainty in observations (creek flow);

(e) In relation to the accuracy and reliability of the model for predicting alluvial inflows into the pit during and post mining, Mr Dundon and Dr Kalf agreed that the model has behaved predictably in simulating impacts, which is evidence of reliability with an acceptable degree of uncertainty;

(f) In relation to the accuracy and reliability of the model for predicting long term saline discharge from the former pit to Glennies Creek post-mining, Mr Dundon stated that the assumed parameters in the extreme worst case model simulations are sufficiently conservative to ensure that the predicted minimal long term salinity impact on Glennies Creek is reliable with an acceptable degree of uncertainty. Dr Kalf agreed based on the modelling reported to date;

(g) The experts agreed that the groundwater modelling is of a high standard and meets industry standards (Australian groundwater modelling guidelines (exhibit 5) SKM June 2012);

(h) The experts agreed they are able to make a reasonable assessment of the potential impacts on groundwater during the operation of the SEOC project and recovery in the short term post-mining including the reliability of the model for predicting alluvial inflows into the pit during and post mining; and

(i) The experts agreed that the LPB is suitable as a contingency measure.

183 Important context for the consideration of the modelling evidence is that the experts agreed that the modelling used adopted best engineering practice in relation to modelling impacts of mining activity. The experts agreed that the model is of a high level of competence relative to industry standards. With continued recalibration, as required by the conditions of approval, the results are sufficient to make an assessment of the potential impacts during the operation of the SEOC project and the impacts in the short term following the closure of the mine (exhibit F, topic 10). According to Dr Kalf the modelling methodology is the best method to assess the interactions at the SEOC project site and is accepted as such by the NOW and the Department (Dr Kalf affidavit par 4.13).

184 Associate Professor Vervoort criticised the modelling because a particular flood event was not portrayed in the model. The Minister submitted that the response given by Mr Dundon and Dr Kalf in oral evidence adequately explains why this is not a legitimate concern. The model is effective to model long-term impacts, for the reasons explained by Dr Kalf and Mr Dundon (TS 236/20-238/32). Ashton also submitted that this concern was explained by both Mr Dundon and Dr Kalf as a misunderstanding by Associate Professor Vervoort of the predictive time scale of the model, which is designed to predict long term groundwater outcomes and trends during and post mining, rather than transient events (including floods, which are presented as an average aquifer recharge rate over time). Mr Dundon observed that this concern of Associate Professor Vervoort had nothing to do with model sensitivity or model calibration, or with the long

term picture of groundwater flow which is accurately predicted by the model. Dr Kalf agreed with Mr Dundon.

185 As the Respondents submitted, I consider the response by Mr Dundon and Dr Kalf provided an adequate explanation for why a particular flood event was not reflected in the model and was not intended to be reflected in the model as it was directed to long term impacts concerning an average process occurring continuously rather than one which is episodic.

186 Associate Professor Vervoort, while no doubt expert in the field of hydrogeological modelling, has not undertaken such modelling for a mine project (TS 276/19). His suggestion in oral evidence that other models could have been used is not grounded in any experience of mining assessment and one proposed model he suggested was described by Dr Kalf as not used commonly for mining assessment (TS 259/40-44). I agree with the Respondents that his criticism, to the extent it was maintained, was directed to theoretical or potential problems with uncertainty which are inherent in all such models. I agree with the Respondents' submission that there was no articulated magnitude of environmental risk that flowed from the theoretical issues he identified.

187 Associate Professor Vervoort's affidavit questioned the level of understanding of the hydrogeological system in and around the SEOC project site. Associate Professor Vervoort now accepts that the modelling of Mr Dundon/Aquaterra reflects the hydrogeological conditions likely to occur on the SEOC project site. The modelling before the PAC has been further considered by all the experts and further updated leading up to these proceedings and amended conditions proposed to incorporate the evidence of the experts. Dr Kalf agreed with Mr Dundon that the groundwater sampling carried out to date is more than adequate, but recommended as part of the conditions of approval an adaptive management regime so that should measured time based groundwater levels diverge by more than 20 per cent from the model predicted time based groundwater levels, this should be investigated by a qualified

hydrogeologist and recommendations provided for further mitigation action. Dr Kalf also recommended monitoring for at least 10 years after mine rehabilitation (exhibit F, topic 1). Mr Dundon has proposed 16 years of monitoring reflecting the agreement between the experts that the recovery of groundwater at the site is likely to be asymptotic, meaning more rapid recovery in early years and slower in later years.

188 The remaining criticism of Associate Professor Vervoort, to the extent there is any, concerns uncertainty in relation to long term predictions of impact after mining ceases and the need for post-mining modelling updates and post-mining monitoring in relation to the model generally as a predictor of alluvial inflows into the pit during and post-mining and long term saline discharge from the former pit to Glennies Creek. According to the Applicant's counsel, Associate Professor Vervoort did not agree that sensitivity analysis in the groundwater modelling had been undertaken using very conservative assumptions to assess the potential impacts of the SEOC project and that monitoring into the future with model calibration will further reduce uncertainty. However I consider his oral evidence confirms that he did. I do not agree with the Applicant's oral closing submissions that Associate Professor Vervoort maintained his criticism of the modelling done as being unacceptably uncertain in the medium to long term regardless of the post-mining modelling update and monitoring to be undertaken. The Applicant made this submission based on the same transcript which the Minister also referred to in submitting that there was agreement that post-mining monitoring and recalibration for a certain period would overcome Associate Professor Vervoort's concerns. The Minister's submission about that section of transcript is correct. I consider Associate Professor Vervoort's concerns can be adequately addressed by the proposed conditions requiring monitoring and adaptive management.

189 Another reason to be confident about the modelling in relation to a low level of risk of saline water discharging into Glennies Creek is that Mr Dundon modelled a worst case scenario based on there being no LPB or final void in place. As discussed in the next section there is agreement

amongst engineering experts that the LPB can be effectively implemented at the SEOC project site to prevent leakage of saline water towards Glennies Creek.

190 As the Minister submitted, under the Statement of Commitments Ashton is required to develop a mine closure plan in consultation with the OEH, the NOW and the DRE and to the satisfaction of the Department which includes, inter alia, monitoring of the LPB for a period of five years after completion of the SEOC project site rehabilitation. Rehabilitation will not be complete until eleven years after the end of mining (taking into account seven years to fill voids and four years for rehabilitation). This is subject to Ashton meeting the completion criteria in the rehabilitation management plan, which must be developed in accordance with the rehabilitation objectives (see condition 58 and 60). The Minister has proposed further amendments to conditions 34 and 58 to accommodate the suggestions by Dr Kalf. The Applicant suggested that at a minimum there should be a condition requiring mandatory site monitoring for between 25 and 100 years. The criticism and the proposal for such a condition are not sustained by the evidence of Associate Professor Vervoort. Associate Professor Vervoort suggested in the joint report with Mr Dundon and Dr Kalf that some continued monitoring post five years of mine closure, in combination with modelling audits, possibly slowly being phased out over a period of 25-50 years is needed. Mr Dundon and Dr Kalf agreed that recovery of water levels will occur asymptotically meaning that most of the recovery will occur during the earlier years of mining. Dr Kalf states in his report that the longest period for post-mining monitoring should be set at 10 years (with biannual monitoring during the last five years of that period). Mr Dundon states in his report that 16 years is an adequate period for post-mining monitoring of groundwater conditions. Condition 34 states 10 years of monitoring after completion of final landform and dewatering of the SEOC project, as Dr Kalf recommended.

191 In my view, the Applicant's contention that the precautionary principle is activated, as identified in *Telstra Corporation Limited v Hornsby Shire*

Council [2006] NSWLEC 133; (2006) 67 NSWLR 256 at 272, because of considerable scientific uncertainty in relation to groundwater and surface water impacts on Glennies Creek is not supported by the expert hydrogeological evidence.

192 On reviewing the evidence as a whole and taking into consideration the substantial agreement of the experts as outlined above together with the augmented project approval conditions, I am not satisfied that the Applicant's submission regarding the medium to long term risks to landscape functionality constitutes a ground for refusal of the SEOC project.

Rehabilitation

193 The Applicant's ASOFC also included the following paragraphs in relation to site rehabilitation:

> a) The project includes a proposal for site rehabilitation which requires biannual monitoring of trees planted within the restoration area for a period of five years only following establishment of the restoration area; [61(n)]
> b) There is risk that the rehabilitation proposed by the project will be ineffective to address the medium to long-term impacts of the project on landscape functionality; [61(o)]
> c) The project approval conditions fail to adequately address uncertainty in the response of the landscape to proposed rehabilitation activities and project impacts [61(p)].

194 No particular issue was raised in closing submissions in relation to site rehabilitation beyond what has already been discussed above in par 190. As the proposed rehabilitation management plan appears satisfactory in light of the evidence and amendments made in the course of the hearing I do not need to further consider rehabilitation issues.

Protection of downstream water users (surface water)

195 The Applicant contended that the project approval fails to adequately protect the health of the Hunter River and associated tributaries downstream of the SEOC project site, and the communities and environments that depend on that system, and is therefore contrary to the

precautionary principle, intergenerational equity, and the principle of conservation of biological diversity and ecological integrity as a fundamental consideration (ASOFC pars 61(e), (f), (g), (k) and 62). In the Applicant's ASOFC:

(a) Par 62(a) A wide range of water users depend on the maintenance of the Hunter River as a healthy working river;

(b) Par 62(c) The conditions in the project approval fail to require Ashton to account for and compensate for predicted impacts to water quantity over the long-term life of the Project (that is, approximately 100 years);

(c) Par 62(d) Project conditions fail to identify appropriate mechanisms for ensuring that the Project will not contribute to background salinity levels in the Hunter River in the medium to long term (that is, approximately 100 years);

(d) Par 61(e) Glennies Creek feeds directly into the Hunter River, and is affected by the Project. If the water quality and water quantity in Glennies Creek is adversely affected by the Project, that will have an adverse impact on the water quality and quantity of the Hunter River;

(e) Par 61(f) Communities and environments depend upon the health of the Hunter River and associated tributaries downstream from the Project site. HEL repeats paragraphs 20-25 above;

(f) Par 61(k) In circumstances where many businesses and ecological communities rely upon the water and the health of the Hunter River and associated tributaries, it is necessary that the monitoring and management of the impacts to water quality and quantity lasts for a period longer than 16 years following mining;

(g) Par 61(g) In order to adequately ensure the protection of Glennies Creek and the Hunter River, Ashton has undertaken modelling which demonstrates that if a low permeability barrier is put in place, the Glennies Creek and Hunter River water quality and quantity levels will be protected.

196 The Respondents dispute the contentions made by the Applicant in its ASOFC par 61 and 62 in their ASOFCs in reply.

Downstream water users objector evidence

197 Mr Arthur Burns, president of the Hunter Water Users Association is concerned about the cumulative impacts of open cut mining on alluvial aquifers, loss of base flow from the aquifers into the Hunter River, the possible major impacts downstream if Glennies Creek is negatively affected by the SEOC project, salinity from mining, the security of the LPB and the long term impacts after mining ceases. Mr Burns is also concerned with the conflicting advice that was received from the NOW in between the two PAC decisions. Mr Burns is concerned about the long term and unexpected environmental disasters after mining ceases. A major part of Mr Burns' concerns are based on his view that the Hunter River system is the lifeblood of the valley and Glennies Creek is a key part of that system.

198 Mr Ken Bray, operations manager for the Hunter Wine Country private irrigation district (PID) gave evidence. The PID serves 450 vineyards, golf courses and tourism facilities in the Pokolbin district. The purpose of the PID is to drought proof the vineyards and tourist area of Pokolbin. Should there be an interruption in water supply from the Hunter River, or due to increased salinity levels, the PID would be unable to pump water from the river. The health of the grape vines will suffer, the vine yields decrease and the viability of the investment will be lost. Winemakers will then not be able to satisfy their demand of delivering higher quality product lines. The other tourist associated businesses would also be affected, for example the golf courses, Hunter Valley Gardens and other tourist attractions. The value of

wine tourism is substantial to the Hunter Valley. If there is a major failure in water quality or quantity as a result of the SEOC project Mr Bray believes there should be compensation to members of the PID and other irrigators on the Hunter River to offset their losses of income.

199 Mr Brian McGuigan of McGuigan Wines is not opposed to mining, however he wants to protect the water supply relied on by wineries in Pokolbin so that this industry continues to flourish. The wine industry should not be put at risk by mining. The Hunter Valley is the second largest source of tourism in NSW, the major purpose of visits is to the wineries. It is important to the NSW economy with 2,700 jobs in 2012. A pipeline was constructed in 1986 at a cost of $1 million. It transformed wine makers in the Hunter Valley from a marginal endeavour to a successful industry. This pipeline was used as a model for the PID. The PID has drought proofed the vineyards.

200 Mr Ian Napier of Wombat Crossing Vineyard gave evidence. Wombat Crossing Vineyard is one of the smallest winegrowers in Pokolbin and is one of many PID members. It takes water to augment dams. If access to the PID is cut because of poor water quality, it would have potentially very negative impacts on the vineyard. Dust has noticeably increased in Pokolbin in the last two to three years, as a result of an increase in mining in the area.

201 Ms Beverley Smiles of the Nature Conservation Council of NSW stated that the NSW Government has not adequately considered the cumulative impact of current mining projects on the health of the Hunter River system. The cumulative loss of base flows through aquifer interference and increase in base load salinity levels due to mine disturbance has not been investigated across the region. The environmental rules and environmental contingency allowance in the water sharing plan were established to provide improved environmental health of the Hunter River and may be compromised by the SEOC project.

202 Ms Prue Bodsworth of the Wilderness Society Newcastle expressed concerns over:

(a) The health of riparian vegetation on the lower Glennies Creek and Hunter River systems being impacted by the loss of base flows and intercepted tributary inflows from the SEOC project. The recent exemption for the mining industry from acquiring unregulated and groundwater licences will result in less water for the environment.

(b) The importance of environmental flows for endangered Hunter River Red Gums. A stand of these trees was detected on Glennies Creek. Key threats to these trees are clearing and changes to hydrology including flood mitigation works and upstream water extraction.

(c) The impact on the Hunter Estuary Wetlands of the interception of groundwater and surface base flows and possible increase in salinity levels from the SEOC project.

203 There was extensive consideration of potential for impact on downstream water users by several experts who prepared joint reports and gave concurrent evidence during the hearing. The issues in dispute were refined over the course of the hearing. In final submissions the Applicant identified three specific issues as remaining in relation to downstream users.

A. Salinity

204 The first issue is the importance of maintaining the integrity of the HRSTS (about which there was universal agreement) by ensuring that saline water does not flow into Glennies Creek from the SEOC project. Related to this issue are the measures proposed to minimise/eliminate salinity run-off from the SEOC project site, being the implementation of a LPB (ASOFC par 61(g)) and the creation of a permanent final void to receive saline

water during and after mining at the southern end of the project site to which saline water will flow with planting of salt tolerant trees and other vegetation.

205 Expert evidence was presented in relation to the proposed LPB. As identified below, there was agreement by all three geotechnical engineering experts called that the proposed LPB was adequately designed and could be implemented with appropriate conditions.

Low permeability barrier an appropriate measure

206 Professor Nasser Khalili-Naghadeh (on behalf of the Applicant) provided expert evidence regarding the effectiveness of the LPB. Professor Khalili-Naghadeh affirmed an affidavit dated 17 May 2013, to which his expert report is annexed. He is the Associate Dean (Research) Faculty of Engineering, University of NSW. The Minister again called Dr Frans Kalf. Mr Garry Mostyn (on behalf of Ashton) swore an affidavit dated 21 June 2013 annexing his expert report. Mr Mostyn is a geotechnical engineer with 39 years experience and has qualifications in civil and geotechnical engineering. Mr Mostyn and Professor Khalili-Naghadeh prepared a joint report dated 7 August 2013 (exhibit C). Dr Kalf, Mr Mostyn and Professor Khalili-Naghadeh prepared a joint report dated 7 August 2013 (exhibit D).

207 Mr Mostyn described the LPB as a 3m wide zone of low permeability material that is placed between the mine void and Glennies Creek. It is a homogenous zone of low permeability material which is a thousand times less permeable than natural materials (TS 319/18-25). Professor Khalili-Naghadeh said in oral evidence that one of the key functions of the LPB is to prevent migration of saline water towards the creek (TS 322/9-10).

208 Professor Khalili-Naghadeh said in oral evidence that he and Mr Mostyn have agreed on correct measures (incorporated into the conditions, Appendix 7) to alleviate the matters of concern raised in his expert report (Professor Khalili-Naghadeh affidavit) regarding potential threats to the integrity of the LPB post construction (TS 323/1-3), including internal

erosion and piping, cation exchange and chemically induced cracking, poor construction, faulting and monitoring. The experts agreed that the LPB is an adequate contingency measure.

209 The Applicant accepted that the LPB can be properly designed and monitored during the life of the SEOC project but maintained its reservations concerning long term uncertainties relying on Associate Professor Vervoort. The Minister submitted that there was complete agreement between the experts, Professor Khalili-Naghadeh and Mr Mostyn, about this topic and that there is no basis to doubt the reliability or operation of the proposed LPB. The expert evidence has served to confirm that any potential theoretical threats to the integrity of the LPB can adequately be addressed in its design and construction. This is to be secured through conditions 35, 37 and Appendix 7 of the conditions, which now take account of the recommendations of the experts. Ashton submitted that the joint reports (exhibits C and D) regarding the LPB render the LPB issue a matter for conditions. The Respondents' submissions correctly reflect the evidence and suggest that the Court should impose a requirement for the LPB to be implemented in accordance with conditions. The Minister has proposed amended conditions to take account of the recommendations made in the joint report, which Ashton agreed should be implemented. I accept the complete agreement of the experts on the topic of the LPB being an appropriate measure to minimise the transfer of saline water from the SEOC project site to Glennies Creek.

Final void for saline water

210 Associate Professor Vervoort in his affidavit dated 17 May 2013 challenged the adequacy of the final void proposed as a measure to capture saline water in terms of its design and implementation. Associate Professor Vervoort expressed concern about the uncertainty of the modelling and the need for long-term monitoring more generally in relation to assumptions made about landscape rehabilitation in the project assessment and questioned how well the measures proposed, such as the

void, would operate. In relation to the final void, he stated that the groundwater seepage into the projected final void is based on a 100 year forward projection of Ashton's groundwater modelling, which he considered was significantly uncertain. The void is designed to have significant salt accumulation in the void and there will be significant concentration of salt in the water of the void. It is unclear how this will impact on the survival of the proposed salt resistant vegetation. There is a likelihood that the proposed void will result in a 35ha anoxic salt lake with no vegetation (Associate Professor Vervoort affidavit par 77-79).

211 With regard to the final void, Associate Professor Vervoort contended in par 78 that with concentration of salt water in the void "it is unclear how this will impact on the survival of the proposed tree vegetation, even if the trees are salt tolerant". His statement does not consider that there would also be inflow of lower salinity surface water runoff and direct recharge of rainfall within the rehabilitated spoil materials. Under such circumstances there would be a tendency toward groundwater density separation in the surrounding groundwater system over time with lower salinity groundwater overlying higher salinity groundwater in the long term. This is quite a common feature of groundwater occurrence in coastal areas for example, where fresh rainfall recharged groundwater "floats" on saltwater at depth. Under such conditions therefore the scenario that he imagines of ultimately no tree and vegetation growth seems unlikely.

212 Dr Kalf and Mr Dundon considered the final void will act successfully as a means of preventing salt water accession to Glennies Creek and recent alluvium after mine decommissioning and final recovery. This was the view expressed in their joint report. Dr Kalf emphasised in oral evidence that the void must be of an adequate size and drainage catchment to ensure it can be used for watering stock (TS 303/20-33). Mr Dundon agreed with this proposition (TS 303/44). Associate Professor Vervoort agreed concerning this in terms of hydrology but was concerned about the impact this would have on agriculture and rehabilitating the landscape (TS 303/47-304/10). As already identified in the previous groundwater modelling section

Associate Professor Vervoort agreed following joint conferencing with Mr Dundon that the modelling undertaken for the SEOC project did appear to adequately identify the hydrogeological system and its predicted behaviour. No criticism was expressed in the joint report about the final void or in oral evidence by Associate Professor Vervoort, his ongoing reservation expressed in oral evidence was that uncertainty in the predictions of the modelling meant that the success of all proposed measures including the final void was also uncertain. Associate Professor Vervoort accepted that on the modelling done even if there is no vegetation, the model predictions are undertaken on the basis that there is no vegetation with a water balance to have a final void (TS 226/35, 234/15, 307/42-45). The Applicant did not raise any specific concerns with the implementation of the final void in closing submissions. Given the evolution of the expert evidence on this topic there does not appear to be any issue that cannot be addressed by appropriate conditions of consent.

213 The expert evidence confirms, subject to an unquantified level of uncertainty expressed by Associate Professor Vervoort, that little to no saline water should discharge from the SEOC project site during and after mining as a result of the correct implementation of the final void and the LPB for which conditions of approval can provide. Separately to saline discharge Associate Professor Vervoort expressed the view that the extent to which recharging of Glennies Creek by groundwater from the SEOC project site will be compromised by the presence of the LPB is unknown. The other area of concern of Associate Professor Vervoort was how the final void would interact with the agricultural use of the land and how the landscape would work generally. These issues were considered in large part in relation to the rehabilitation management plan concerning the loss of agricultural land and landscape viability. As with other concerns raised by Associate Professor Vervoort, his evidence suggested that adequate conditions for continued monitoring and model recalibration (TS 234/21) would be important in addressing uncertainty.

Hunter River Salinity Trading Scheme (HRSTS)

214 Mr Garry Hunt (on behalf of the Applicant), Dr Frans Kalf (on behalf of the Minister) and Mr Theodorus Johannes (John) Verhoeven (on behalf of Ashton) provided expert evidence regarding water licensing. Mr Hunt affirmed an affidavit dated 16 May 2013, to which his expert report is annexed. He is a retired civil engineer who worked in water delivery and catchment management in the Hunter River from 1998 until his recent retirement and in other NSW catchments for 23 years prior to that. Between 2002 and 2005 Mr Hunt was employed as the Upper Hunter Catchment Co-ordinator at the Hunter Central Rivers Catchment Management Authority. Between 2005 and 2013 Mr Hunt was Water Delivery Co-ordinator at the State Water Corporation (Mr Hunt affidavit attachment 1).

215 In his report Mr Hunt states that he is concerned about the potential transmission of saline water through disturbed bedrock stratum, that situation arising in relation to the Underground mine to the west of the SEOC project site. Mr Verhoeven swore an affidavit dated 21 June 2013, to which his expert report is annexed. He is a civil engineer with 39 years experience in the water industry. Mr Hunt and Mr Verhoeven prepared a joint report dated 8 August 2013 (exhibit E). Mr Hunt and Dr Kalf prepared a joint report dated 2 July 2013 (exhibit B).

216 In their joint report the experts agreed that salinity levels in the Hunter River are high due to natural geological conditions. Increases in baseline salinity in the Hunter River led to less opportunities for salt discharges under the HRSTS. Mr Hunt and Mr Verhoeven agreed that members of the HRSTS can make controlled releases of saline water into the Hunter River, using salinity credits available through the HRSTS (exhibit E, p 2-4). Mr Hunt and Mr Verhoeven agreed that Ashton could apply to purchase salinity credits at the next two year auction in June 2014. Mr Verhoeven considered that Ashton will not be required to purchase any salinity credits on behalf of the SEOC project, as the project uses physical measures,

such as the LPB and the final void, to prevent saline water discharging into the Hunter alluvials and to Glennies Creek during and after mining (exhibit E, p 5) (TS 359/4-10). Mr Hunt and Mr Verhoeven agreed, on the basis that the LPB is properly designed, constructed and managed together with other proposed mitigation measures, that the physical measures proposed by the SEOC project should prevent saline water discharging into the Hunter alluvials and to Glennies Creek during and after mining (exhibit E, p 6). Dr Kalf advised the Court that the licensing and operation of the HRSTS was outside his area of expertise (TS 364/34-35). It is unnecessary to identify further the operation of the HRSTS identified in the evidence and joint report of Mr Hunt and Mr Verhoeven on pages 2-6 about which the experts agreed.

217 While this issue was expansively identified in the Applicant's ASOFC, in closing it was not pressed beyond what is articulated above in par 204. I note for completeness that Mr Hunt's concerns expressed in his report about bedrock stratum are not founded in his relevant expertise as he is not qualified in hydrogeology and has not undertaken appropriate modelling (such as I considered in the previous section on hydrogeological modelling). Mr Hunt states this in the joint report prepared with Dr Kalf.

218 In the joint report it is agreed that monitoring is required and that is to be done in consultation with relevant agencies (exhibit E, p 6). The experts also agreed that the monitoring regime required under the proposed conditions is appropriate. Conditions 34 and 38 for monitoring are described as rigorous.

219 Mr Hunt states that a detailed monitoring program required for the SEOC project site is outside the area of his specific expertise, but has yet to be developed and implemented. It is important that the results from the program are fully reported in a timely way to the community. As far as he is aware from 20 years experience in the Hunter region there has never been an assessment of long term groundwater regimes as a result of individual mining activities (monitoring tends to cease once the mine is not

operational), nor a cumulative impact assessment on regional groundwater regimes as a result of the highly saline post-mining areas. Mr Verhoeven comments that this is an issue for the NOW to address as part of its water management responsibility and accountability, not an issue for an individual company such as Ashton. He states the issue is not relevant to these proceedings.

220 There was agreement by all the experts in relation to the LPB that proposed consent conditions 34 to 38 in Sch 3 and Appendix 7 of the conditions were adequate and provide for monitoring to assess the potential for salinity impacts of the SEOC project and also provide for response protocols for exceedences of surface water and groundwater assessment criteria. A suitable monitoring regime is provided for ten years in the conditions and Professor Khalili-Naghadeh and Mr Mostyn agree that monitoring in perpetuity is not necessary.

221 As the Respondents identified, there is general agreement between the experts that there is limited risk of the export of saline flows from the SEOC project to Glennies Creek given the measures proposed (assuming their successful implementation). All the relevant experts agree that the LPB is an appropriate means of reducing the risk of saline water entering Glennies Creek provided this is implemented in accordance with the proposed conditions amended to take account of their evidence. Together with the final void, the SEOC project poses minimal risk to the health of Glennies Creek in relation to the discharge of saline water and therefore proposes no threat to the integrity of the HRSTS.

222 It is agreed by the experts that the system for tracking saline water along the Hunter River through the purchase of salinity credits will allow for discharge of saline water from the SEOC project site within the limits imposed by the scheme if this should unexpectedly occur. Proposed condition 33(b) reflects this.

B. Impact of the SEOC project on Glennies Creek and the Hunter River (water licensing)

223 Two of the three issues identified in the Applicant's closing submissions relate to water licensing. One issue is that approval of the SEOC project will create an exemption for Ashton from needing a licence to take up to 451ML of water per annum. Secondly, after mining ceases and the water licences obtained by Ashton are retired, up to 115ML of water per year, in the worst case scenario, will continue to be taken by the SEOC project. It is intended that the NOW will require Ashton to retire licences which are equivalent to 130 per cent of the possible maximum take, the equivalent of a high security licence being retired.

224 In order to understand all the water licensing issues raised during the hearing, the evidence of the experts Mr Hunt and Mr Verhoeven will be identified briefly. In their joint report they agreed on the water licensing framework which applies, identifying two water sharing plans and three relevant water sources. The amount of surface and alluvial water required during and after the SEOC project was agreed and identified in Table 2 of their joint report. Any licence requirements and the availability of regulated and unregulated water was identified in Table 3.

225 In relation to the Hunter Regulated River Water Sharing Plan (2004) (HRRWSP), the predicted impact of the SEOC project of a reduction of 9.4ML/year with a maximum possible worst case of 65.2ML/year is agreed. The area covered by the HRRWSP is the Hunter River and Glennies Creek area downstream of large State owned dams including within 40m of these rivers. Most of the water in this water source originates from Glennies Creek Dam. Water also moves naturally between the river and its associated alluvium, in both directions. No proposed mining of land is associated with this water source, but water may be taken (pumped) from the water source at times. In addition, because during the mining phase the groundwater in the alluvium will be drawn down, some additional water may be "drawn" away from the river (through the alluvial water pressure drop). Mr Hunt and Mr Verhoeven agreed that Ashton holds water access

licences for the HRRWSP far in excess of the maximum modelled worst case water take (TS 359/12-15 and 361/10-12) (exhibit E, table 3, p 24 "water entitlements held by Ashton"). They also agreed the water balancing model for the SEOC project is appropriate (p 13-14).

226 In relation to the Hunter Unregulated and Alluvial Water Sharing Plan (2009) (HUAWSP) the Hunter Regulated River Alluvium water source (Glennies Creek Management Zone) as defined by a map in the water sharing plan (WSP) is the underground water in alluvial aquifers associated with the regulated Glennies Creek (Hunter alluvium). Water in this water source originates from the Hunter regulated, groundwater from alluvial areas upstream, or surface water infiltrating from the Glennies Creek water source. The predicted impact of the SEOC project of a reduction of 1.6ML/year with a maximum possible worst case of 50.1ML/year was agreed. Water take from the Glennies Creek Management Zone alluvial water source is associated with depressurisation of the underlying coal seam aquifers and general mine pit interactions. Ashton does not currently hold any entitlements for water from the Hunter alluvium and intends to trade to obtain sufficient entitlements to compensate for the 1.6ML/year (predicted) to 50ML/year worst case take from the alluvium. The experts agreed that trading is possible (exhibit E p 14). The Applicant raised concern about the impact of the ongoing take of alluvial water after licences for this take are retired of 115ML/year worst case scenario, being 65.25ML of Hunter regulated and 50.1ML of Hunter alluvium totalled.

227 In relation to the HUAWSP, Glennies Creek water source with unregulated streams and alluvium within 40m of these rivers (Glennies Creek unregulated), water in this source originates from catchment runoff. It is a source of water for the Hunter regulated and Hunter alluvial water sources. The maximum predicted worst case reduction would be 451ML/year (in years 5 to 13 of the SEOC project), decreasing to a small volume of 34ML/year within a maximum harvestable right of 35.8ML/year. Mr Hunt and Mr Verhoeven agreed that there is no requirement to hold a licence for

the 451ML/year reduction in surface flows (for years 5 to 13 of the SEOC project) in the six tributaries that run through the SEOC project site and feed into Glennies Creek as there is an exemption for specified activities (exhibit E p 16) (TS 361/25-26) provided in cl 18 of the Water Management (General) Regulation 2011 (Water Management Regulation). The Applicant raised concern about this impact.

228 In relation to the take and drawdown due to mine operations the non-alluvial fractured and porous rock aquifers groundwater (not covered by a water sharing plan), the predicted reduction/take is 71ML/year with a maximum possible worst case of 81ML/year.

229 Mr Hunt in his affidavit and oral evidence considered that the exemption allowed under cl 18 of the Water Management Regulation led potentially to a large number of extractions at the level predicted in this case of 451ML worst case scenario. This would result in a substantial cumulative loss of water in the system overall. He considered in the joint report that the approval of the SEOC project will create the exemption (exhibit E p 16-17).

230 In response Mr Verhoeven said the issue raised by Mr Hunt is not relevant to these proceedings. His issue is with the NSW Government and the NOW specifically, who are responsible for establishing, amending and implementing legislation, not with Ashton. Mr Hunt agreed that the SEOC project can be licensed in accordance with the WSP under the *Water Management Act* 2000.

231 Furthermore, Ashton is operating within the WSP and the Water Management Act and is an existing, not a new, taker of water. The period of 451ML/year water reduction in surface water flows in the tributaries from the Glennies Creek unregulated during years 5 to 13 of the SEOC project results in minor reductions of flows in Glennies Creek of 0.8 per cent. The value of shares held by other water users is not diminished by 451ML/year as implied by Mr Hunt. Much of the 451ML/year occurs as part of runoff flows resulting from high rainfall events, and would pass down Glennies

Creek and the Hunter River as a very small part of flood flows, not impacting on the water take of downstream water users.

232 There are no water users within the Glennies Creek water source downstream of the SEOC project. For those water users further downstream in the much larger catchment of the Hunter River, once flood flows are removed, the impacts of short term water reduction in Glennies Creek on downstream water users is minor, as identified by the Department.

233 The retirement of licences for up to 115ML/year once the mine has ceased is also problematic in drought years in particular according to Mr Hunt. Mr Hunt states that after mining the water take will continue and that may be difficult to manage as Ashton may no longer have an "interest" in the site. Retiring of water licences, where the actual take is not measured, is not a satisfactory outcome because it transfers costs (full cost recovery) to the remaining licence holders. Water charges are a two part tariff, based on entitlements and usage, with usage being the larger cost. It is not clear how, and if, usage charges could be raised during the life of the mine as there is no measurement site (works). In any case entitlement and usage charges would not be raised once the licences are retired, although the usage will continue. Approval of the SEOC project creates this longer term anomaly and inequity (exhibit E p 14-15).

234 In response Mr Verhoeven said (exhibit E p 15-16):

(a) The SEOC project is restricting and reducing water access after the completion of mining by the construction of the LPB before the commencement of mining (reducing water take to the predicted 11ML/year) and by rehabilitating disturbed sub-catchments. The NOW requires Ashton to hold 130 per cent of water entitlement for the full amount of predicted impacts. After mining, Ashton will "retire" the water licence(s) it obtained to provide the expected

11ML/year, up to the maximum possible worst case of 115ML/year. The "retired" licences should be able to address those years when water availability is less than 100 per cent.

(b) The issue raised by Mr Hunt about transferring costs to remaining water licence holders once Ashton's water licence(s) are retired is not relevant to these proceedings. His issue is with the NSW government and the NOW specifically, who are responsible for establishing, amending and implementing legislation, not with Ashton. However, the magnitude of the transferred costs to other licence holders will be negligible because the retired licences of up to 115ML/year worst case is a negligible component of the Hunter Valley-wide total water licences, and the valley-wide cost of water management is met by all licence holders on the shares they have and the water they use, and by a NSW government contribution.

Exemptions under Water Management Act 2000

235 Under Ch 3 Pt 2 Div 1A s 60A of the Water Management Act it is an offence to take water from a water source to which the Act applies without an access licence for that water source. Clause 18 of the Water Management Regulation relevantly provides:

> **18 Exemption from requirement for access licence**
>
> (1) A person is exempt from section 60A (1) and (2) of the Act in relation to the taking of water from a water source if the person:
> (a) is specified in any provision of Part 1 of Schedule 5, and
> (b) takes water for any of the purposes, and in the circumstances, specified in that provision.

236 Schedule 5 of the Water Management Regulation relevantly provides:

> **Schedule 5 Exemptions**
>
> **Part 1 Access licence exemptions**
> **12 Excluded works**

(1) Any landholder—in relation to the taking of water from or by means of an excluded work referred to in item 1, 2, 3, 4, 6, 7 or 9 in Schedule 1 that is situated on the land, for the purposes and in the circumstances specified in Schedule 1 in respect of the work.

...

237 Schedule 1 of the Water Management Regulation relevantly provides:

Schedule 1 Excluded works

1 Dams solely for the control or prevention of soil erosion:
(a) from which no water is reticulated (unless, if the dam is fenced off for erosion control purposes, to a stock drinking trough in an adjoining paddock) or pumped, and
(b) the structural size of which is the minimum necessary to fulfil the erosion control function, and
(c) that are located on a minor stream.

2 Dams solely for flood detention and mitigation:
(a) from which no water is reticulated or pumped, and
(b) that are located on a minor stream.

3 Dams solely for the capture, containment and recirculation of drainage and/or effluent, consistent with best management practice or required by a public authority (other than Landcom or the Superannuation Administration Corporation or any of their subsidiaries) to prevent the contamination of a water source, that are located on a minor stream.

4 Dams approved in writing by the Minister for specific environmental management purposes:
(a) that are located on a minor stream, and
(b) from which water is used solely for those environmental management purposes.

...

6 Works impounding water that exceeds the harvestable rights referred to in an order under section 54 of the Act:
(a) that were constructed before 1 January 1999, and
(b) that are used solely for domestic consumption and stock watering or that do not result in the extraction of water, and
(c) that are located on a minor stream, and
(d) from which water is being used only on the landholding on which the dam is located.

7 Dams or excavations located on a river or lake constructed under section 7 of the Water Act 1912 before 1 January 2001 that are used solely for stock, domestic or stock and domestic purposes, or for purposes which do not require extraction of water.

...

9 Works in the Western Division constructed before 1 January 1999:
(a) impounding water on the areas of land shown in the legend of the 1:100 000 topographic maps issued by the Land Information Centre applying at 1 January 1999 to that Division as land subject

to flooding or inundation, or lakes shown as "perennial" or "intermittent", and
(b) from which water is used solely for stock, domestic or stock and domestic purposes, or for purposes which do not require extraction of water.

238 There were similar provisions under the Water Management (General) Regulation 2004 cl 18(1)(i) and in Sch 1 (repealed by the 2011 Regulation).

Applicant's submissions

239 Firstly, approval of the SEOC project will result in the exemption of Ashton from the requirement to obtain water entitlements for components of their water take as the water will be taken through an excluded work being a dam located on a minor stream by operation of cl 18 of the Water Management Regulation. The modelling shows the SEOC project will reduce surface water flows into the tributaries flowing into Glennies Creek by up to 451ML/year during years 5 to 13 of the SEOC project. This will result in less water for other water users, such as vineyards in Pokolbin. Mr Hunt considered that is a considerable amount of water to be taken out of the system, being an amount required by more than eight vineyards in the Pokolbin district. Much of this 451ML flows during floods but that does not reduce the scale of the impact as Pokolbin users take the bulk of their water during flood flows. The environment in the Hunter estuary gets less water if 451ML is taken out of the system, with potential biodiversity impacts downstream. The importance of the Hunter estuary for Hunter River Red Gums was identified by the evidence of Wilderness Society representatives (see par 202). The major concern as expressed by Mr Hunt is cumulative impacts of numerous exemptions of a similar size. Cumulative impacts have not been assessed and the Court should not grant consent in the absence of such an assessment. The Court cannot assume that the public interest has been considered. *Terrace Tower Holdings Pty Ltd v Sutherland Shire Council* [2003] NSWCA 289; (2003) 129 LGERA 195 at [81] identified that a consent authority may consider a range of material, not just environmental planning instruments, in considering the public interest.

240 Secondly, the continued take of up to 115ML of base flow from the alluvium per year from Glennies Creek once the licences held during the mining period are retired after mining has ceased is significant, thus depriving other users of this amount of water indefinitely. This continued take could be problematic in drought years according to Mr Hunt. The importance of water to downstream vineyards was identified in submissions to the Court from several vineyard owners. The need for environmental flows in the Hunter River to support the Hunter estuary, an important ecological area, is also identified by a representatives of the Wilderness Society and the Nature Conservation Council. The income to the State for this water will also be lost as Mr Hunt identified in his evidence.

Minister's submissions

241 The impact of the SEOC project on surface water and alluvial aquifers, and the consequential reduction in inflows into Glennies Creek and the Hunter regulated river system is minimal and largely temporary. The most significant impact is the reduction of surface runoff to Glennies Creek. According to modelling referred to in the Director-General's report the reduction will be in project years 5 to 13 of up to 451ML/year, a reduction of 0.8 per cent in the Glennies Creek flow in those years. Mr Hunt's criticisms are directed to cl 18 of the Water Management Regulation and do not arise from the environmental assessment of the SEOC project.

242 The Applicant incorrectly criticised the fact that Ashton will not have to hold a licence for the reduction in surface water runoff (because of the operation of the Water Management Regulation) as creating an exemption if approval is given. That lack of obligation arises from the Water Management Regulation, not from the approval process under the EPA Act. The exemption exists because of the need to preserve water quality, which in this case would arise because the water in question is passing through the mine site. This reflects a policy choice. That is one aspect of

the regulatory regime the SEOC project will operate under but does not bear on the Court's analysis.

243 The Applicant also identified a failure to undertake a cumulative impact assessment of all the other "451s", meaning the other water users entitled to the benefit of the exemption. The Director-General's report concluded that such a loss was minimal in the context of the flows in Glennies Creek, a cumulative impact. There are many environmental and regulatory factors which reduce the flow into Glennies Creek. Measuring existing flows is the best means of assessing any impact. There are other exemptions from licensing requirements such as the allowance for harvestable rights whereby landowners may capture a certain quantity of water relative to their size of land. There is no evidence to support the Applicant's assertion of biodiversity impacts.

244 The NOW is the organisation responsible for the management of the State's surface water and groundwater resources. The NOW was consulted about the SEOC project. The NOW raised a number of concerns about the possibility that the SEOC project may have greater adverse impacts on Glennies Creek and downstream water sources than had been suggested in the EA. It is noteworthy that the NOW did not express any concern about any adverse impacts on water users pursuant to the statutory exemption resulting in a possible diversion of up to 451ML/year from Glennies Creek.

245 In relation to the impacts on alluvial aquifers, the worst case scenario suggests that up 115ML/year will be lost. Licenses will be obtained for this during the mine operation. The conditioned requirement to acquire and retire high security equivalent water entitlements to account for these losses is appropriate to ameliorate this impact. The Applicant suggested that an inequity will result for active users who will pay a proportionately higher amount because some usage has been removed from the management of the system. That complaint is about the water management scheme operation not the environmental impact of the SEOC

project. The scale of any inequity is negligible given the very small proportion of licences represented by 115ML/year worst case scenario and that costs are spread throughout the scheme. There is no quantification of the costs involved.

246 Concern was also raised that in drought years there will be less water available due to the ongoing take of water to which the retirement of licences will be directed. The scale of extraction does not suggest this is a real threat given the total water usage under the HUAWSP is 70,000-80,000 ML/year. The maximum potential take of 65ML/year in Glennies Creek is less than 0.1 per cent of the average annual flow (exhibit A, vol 3, tab 32, p 2778). Ashton is required to retire licences equating to 130 per cent of its actual needs so that a buffer is in place. The retired licence is treated as if for high security category water. There is no evidence to substantiate assertions by the Applicant concerning biodiversity impacts. They are directly contrary to the conclusions reached in the Director-General's report, which are based on an explicit analysis of the extent of the impact and its relative significance.

247 The complaint that mines, including Ashton, are not required to comply with the usual "cease to take" or "cease to pump" conditions is similarly irrelevant. As explained by Mr Hunt, the recent regulatory change reflects the practical reality that mines which hold licences corresponding to the water impacts of their operations are unable to cease those impacts in the same way other licence holders are able to. This eminently sensible adjustment to licence conditions in the water management regime has no bearing on the environmental impacts which the Court is being asked to consider.

Ashton's submissions

248 The 451ML worst case scenario estimate is part of a much larger catchment for Glennies Creek. It is not ongoing at the worst case scenario level predicted beyond years 5 to 13, after which it is expected to reduce. Thereafter the effect of taking the estimated 35.8ML is lower than the

amount of harvestable rights allowed under the current system calculated by multiplying land area by a defined multiplier of 0.07, according to Mr Verhoeven. To provide context, the figure of 451ML represents 0.8 per cent of the Glennies Creek flow released from Glennies Creek dam to the north, 0.05 per cent of the whole of the Hunter River flow excluding the estuary of 890,000ML (TS 724/11-34). Water only runs off in high rainfall events through ephemeral water courses. The effect is very small and very limited in time whether in Glennies Creek, the Hunter River or the Hunter estuaries.

249 The exemption in cl 18 of the Water Management Regulation exists because of the water management framework. It is not particular to this project approval or to mining activity. Schedule 5 contains a large number of exemptions from the requirement to obtain a licence. These exemptions operate as part of the scheme under the Water Management Act. Under Sch 1 dams for various purposes are excluded. The capture and containment of drainage to prevent contamination of a water source ensures that water pollution does not occur. The operation of the schedule creates the exemption and there is no direct connection with a project approval under the EPA Act. The complaint of lack of cumulative assessment of all the "451s" there might be is misplaced as the legislature was presumably aware of this issue when it promulgated the exclusions from the requirement to obtain a water licence.

Impact on water licensing regime acceptable

250 The experts Mr Hunt and Mr Verhoeven helpfully agreed on the requirements of the SEOC project regarding the operation of the water licensing regime as identified above in the summary of their evidence. There was no dispute about how this was planned to occur and no disagreement that for the two takes of water requiring licences this was already or could be accommodated in the existing water HUAWSP trading system. Both draws of water for the SEOC project which give rise to water licence requirements Ashton either currently holds or is able to acquire on

the open market, as any water user for whatever purpose is able to do. This includes for the modelled worst case reduction scenarios. The water licensing system allows for the purchase of water entitlements regardless of the use to which the water is to be put. Further the recovery of the water table is predicted to continue into the future and will reduce the take over time according to the groundwater modelling experts. It was also agreed that if carried out the SEOC project site would have the benefit of harvestable rights of the water runoff which all landowners have based on the size of their properties.

251 A remaining issue identified in closing by the Applicant concerns the operation of the exemptions under cl 18 of the Water Management Regulation in relation to the reduction of surface water flow to Glennies Creek from the SEOC project site, based on Mr Hunt's opinion that this was a issue of concern arising from this project approval process. Mr Hunt's lengthy professional experience was as part of the State Water Corporation which operates the HRSTS, a role to be distinguished from oversight of the water regulatory system managed by the NOW. Mr Hunt is essentially providing an informed personal opinion that he considers that the water regulatory system established through the provisions identified above are relevant to the assessment of this project under the EPA Act. This question is more readily characterised as a legal interpretation of the operation of two separate statutory systems.

252 As the Respondents submitted, for this project and for many other land uses (and users), the Water Management Regulation sets out in Sch 1 a wide range of exemptions from having to obtain a water access licence for excluded works. The applicable exemption in this case is a dam for retention of water which would otherwise contaminate a water source, a measure directed to the prevention of saline water entering Glennies Creek. The exemption is intended to operate in a protective manner in that the exemption for the dam in this case under cl 3 of Sch 1 is to allow the containment of polluted water. Other exemptions specified in Sch 1 set out above include dams intended for use for the control of soil erosion (cl 1),

for flood retention and mitigation (cl 2), for specific environmental management purposes and for watering stock (cl 4 and cl 6) inter alia. The regulatory scheme deliberately provides for a wide range of dams to be constructed without a water access licence. I do not agree with the Applicant that the approval of the SEOC project gives rise to the exemption under the Water Management Regulation. That it will arise as a matter of course if approval is granted can be accepted but it is not correct to say it arises as part of the approval process under Pt 3A of the EPA Act. It is a function of the operation of the statutory water management regime administered by the NOW. The dicta from *Terrace Towers* at [81] relied on to the effect that a consent authority can look beyond an instrument, there an environmental planning instrument, when considering the public interest does not apply in this situation.

253 For the reasons provided by the Respondents there is no practical basis for any greater cumulative assessment to be undertaken than can be done now by considering the present flow of the Glennies Creek system. The potentially large number of possible exemptions provided under the Water Management Regulation in Sch 1 means this is practically impossible. As the Respondents also identified, the predicted worst case take of 451ML is for a relatively limited period of years, 5 to 13, decreasing to 34ML per year. The experts agreed that is within the SEOC project site's harvestable water rights for which no water access licence is required. Mr Verhoeven identified (see par 231) the minor reduction in flow overall and that the value of shares of other water users is small to negligible. I do not consider the impacts will be as serious or permanent as the Applicant submitted.

254 As the Minister submitted the relevant government organisation responsible for the management of water under the Water Management Regulation is the NOW. It did not raise concerns in relation to this issue.

255 The other issue raised by the Applicant is the requirement that Ashton retire water licences which equate to 130 per cent of the possible maximum predicted continued take of 115ML/year from the alluvium near

Glennies Creek, the worst case maximum take from the HRRWSP source and from the HUAWSP. Once the licence is retired nobody else can purchase that amount of water in the trading system for these water sources. The requirement to retire the licence ensures that the water cannot be allocated again once the mine ceases its licensed use of the water after which time the "take" will continue. As Ashton submitted, the predicted take is of a more modest 11ML/year and the worst case predicted of 115ML/year was not modelled to continue indefinitely given the expected recovery period. Mr Dundon and Dr Kalf agreed that recovery of water levels will occur asymptotically meaning that most of the recovery will occur during the earlier years of mining (see above par 190). The oral evidence of the experts Mr Verhoeven and Mr Hunt supports these conclusions.

256 Mr Hunt and hence the Applicant criticised the removal of this much water permanently from the Glennies Creek system. Given that retirement means that no one else can be allocated this water I do not completely understand the logic of this concern in that this amount of water could still be extracted if the licence is not so retired. The principal concern is whether in a drought the absence of this water in the system will impact on other downstream users and the environment. Mr Hunt considered that it potentially will. That potential does exist but appears very limited given that the water to be retired is treated as high security water which is one of the most protected categories of water in times of drought. A requirement that 130 per cent be retired provides a large buffer. As the Minister and Ashton submitted the possible take from a very large flow of 70,000-80,000ML is very small.

257 Ashton also emphasised the needs of other users to provide context for its use of water. The water take of the SEOC project is commensurate with or less than other takes of other water users who gave evidence at Singleton Local Court. Mr Redgrove stated that his dairy operation required 2,000ML/year. The vineyards in the Pokolbin area require 5,000ML/year according to Mr Bray and Mr McGuigan. The amount of water likely to be

taken by Mrs Bowman's property was estimated by Mr Hunt as about 120-130ML/year. This comparison suggests that the predicted water take of the SEOC project is not out of the ordinary and is of a scale similar to other users.

258 Another concern according to Mr Hunt was the foregoing of income to the State water agency that manages the rivers. As Mr Verhoeven stated that concern should be directed to how the NOW oversees the regulatory system. That is no doubt a well informed view of Mr Hunt's arising from his many years in the State Water Corporation, but if the statutory water regulator the NOW considers this regulatory response is appropriate, with any financial income lost presumably within its contemplation, I do not consider that alone is a basis for refusing consent. Of more relevance is Mr Hunt's evidence that the costs of water for other users may increase in times of drought because of the need to spread the cost of water. As Mr Verhoeven stated that cost will be negligible in the context of the Hunter River as a whole and in the Glennies Creek catchment.

Conclusion on downstream water impacts

259 There is understandable community concern about water quality in the Hunter River and its tributaries, reflected in the lay evidence the Court heard which is summarised above at par 197-202. The groundwater modelling experts agreed that the model the subject of evidence before the Court is of a high level of competence relative to industry standards. With continued recalibration, as required by the conditions of approval, the results are sufficient to make an assessment of the potential impacts during the operation of the SEOC project and the impacts in the short term following the closure of the mine (exhibit F, topic 10). According to Dr Kalf the modelling methodology is the best method to assess the interactions at the SEOC project site and is accepted as such by the NOW and the Department (Dr Kalf affidavit par 4.13).

260 The proposed conditions contain a comprehensive suite of conditions related to water quantity, water quality and land quality to ensure that the actual impacts of the SEOC project do not exceed the predicted impacts, provide safeguards for surrounding water users, offset any loss of baseflow to Glennies Creek, the alluvial aquifer and the hard-rock Permian aquifer, and ensure that the project has no long-term impact on water quantity, water quality or land quality. Some conditions have been modified in response to expert evidence in these proceedings.

261 Mr Hunt has not identified any threats of serious or irreversible harm resulting from the taking of water. The Applicant pleaded in its ASOFC that the SEOC project is contrary to the precautionary principle, the principle of intergenerational equity and the principle of the conservation of biological diversity and ecological integrity. It follows from my conclusions above that I do not consider these principles should apply to the extent of refusing approval because of potential for impacts on downstream water users. The precautionary principle in particular does not require a zero risk approach, and requires a proportionate response which can be achieved through appropriate conditions of consent.

Air quality modelling

262 The ASOFC state at par 57 that the SEOC project will have a significant impact on the health and wellbeing of the residents of Camberwell village and other residents in the vicinity of the project, contrary to the public interest, the precautionary principle, and the principle of intergenerational equity. The particulars relevant to the issue of air quality modelling are:

> a) Current levels of particulate matter with a diameter less than 10 micrometres (PM_{10}) at and around Camberwell exceed national health standards set for PM_{10};
> b) The project is likely to result in an increase in PM_{10} at and around Camberwell;
> c) The project is also likely to result in an increase in particulate matter with a diameter less than 2.5 micrometres ($PM_{2.5}$) at and around Camberwell;
> ...
> h) There is also a risk that predicted emissions of PM_{10} will result in an increase in cases when there is an exceedence of 24-hour concentration criteria for PM_{10} at and around Camberwell;

i) HEL does not accept that the modelling which has been undertaken by Ashton will correctly predict the levels (cumulative and otherwise) and therefore impacts of PM_{10} emissions; ...

263 The Minister's ASOFC in reply (at par 57):

...
d) contends that the conditions in the Project approval contain a broad suite of measures aimed at ensuring that the air quality impacts of the Project are acceptable, including:
i) conditions 1-3 and 22-27 of Schedule 3;
ii) Schedule 4;
iii) Schedule 5; and
iv) Commitments C1, D2, E1-E9;
e) contends that with the implementation of these mitigation measures the Project is likely to have a negligible impact on existing ambient air quality levels in the surrounding area, including the Camberwell Village, but acknowledges that these levels would continue to exceed the daily PM_{10} criteria at some properties surrounding the Project on some days of the year, but comply with the annual average PM_{10} criteria at all but two of the privately-owned properties surrounding the Project;
...

264 Ashton's ASOFC in response state (at par 18):

...
f) Air quality modelling undertaken by the Second Respondent complies with the requirements of the Office of Environment and Heritage for air dispersion modelling in its Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW DEC, 2005) and hence the conclusions reached in the air quality impact assessment are reliable.
...

265 Important context for the consideration of this topic is that the Minister and Ashton accept that there is potential for unacceptable air quality impacts on five rural properties where houses are located near the proposed SEOC project site. The proposed conditions provide the option to the owners of the identified lots where these houses are located of purchase by Ashton according to the procedure set out in conditions 7 and 8 of Sch 4. The properties are identified in condition 1, table 1 of Sch 3, Environmental Performance Conditions (acquisition properties). According to the Minister, the acquisition properties fall within an area in which, because of their proximity to the SEOC project and prevailing winds, high levels of dust and/or noise impacts are expected to result from the SEOC

project. Conditions 1, 2 and 3 in Sch 3 impose a number of obligations on Ashton in relation to the acquisition properties. Upon request from an owner, Ashton must acquire the acquisition property (condition 1). Upon request from an owner of an acquisition property or any of the properties listed in Table 2 of Sch 3, Ashton must find alternative accommodation of an equivalent standard in the Muswellbrook, Singleton or Cessnock local government areas and meet the reasonable costs of relocation and rent (condition 2). Upon request from an owner of an acquisition property or any of the properties listed in Table 2 of Sch 3, Ashton must implement additional reasonable and feasible noise and/or dust mitigation measures in consultation with the owner (condition 3). The conditions are also intended to ensure that the beneficiaries of these conditions are properly informed of their rights and the adverse impacts that have been assessed. Ashton is required within three months of the date of the project approval to notify in writing the owners of the acquisition properties and the properties in Table 2 of their rights pursuant to conditions 1, 2 and 3 of Sch 4. Condition 2 of Sch 4 requires Ashton to also provide them with a NSW Health fact sheet regarding air quality impacts. Condition 3 of Sch 4 requires Ashton within two weeks of obtaining monitoring results showing an exceedence of the relevant criteria in Sch 3 to notify the affected landowner and/or tenants in writing of the exceedence and provide regular monitoring results to them until the SEOC project is complying with the relevant criteria again. Any exceedence of condition 22 in Sch 3 requires Ashton to send a copy of the NSW Health fact sheet "Mine Dust and You" to the affected landowners and/or existing tenants (including tenants of mine-owned land).

266 The proposed conditions in the Statement of Commitments land acquisition section also provide that properties located in Camberwell village can require that Ashton acquire their properties (commitment 1). The obligation is not expressly tied to the properties specified in Table 2, condition 1 in Sch 3 but that is the intention as I was informed. The Respondents submitted that this condition is not proposed because the air quality impacts likely to result from the SEOC project will result in

unacceptable health impacts on residents of these properties but is proposed in the interests of alleviating community concern about these.

267 The Applicant submitted that conditions enabling acquisition of these properties by Ashton is not an appropriate mitigation strategy and does not address the fact that air quality impacts are significant for these properties.

268 A number of proposed conditions deal with air quality. Condition 22 Sch 3 requires Ashton, except for the acquisition properties in Table 1, to ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the Ashton mine complex does not cause or contribute to exceedence of the air quality criteria in tables 8, 9 and 10 (annual average PM_{10} of 30 mcg/cubic metre; 50 mcg/cubic metre 24 hour average standard at any residence on privately owned land or on more than 25 per cent of any privately owned land). Condition 23 requires Ashton, except for the acquisition properties, to ensure that particulate matter emissions generated by the Ashton mine complex do not exceed the criteria listed in table 11 at any residence on privately owned land or on more than 25 per cent of any privately owned land. If emissions generated by the Ashton mine complex cause or contribute to exceedence of the cumulative criteria in tables 12, 13 and 14 at any residence on privately owned land or on more than 25 per cent of any privately owned land, upon receiving a written request for acquisition from the landowner Ashton shall acquire the land. Condition 26 requires Ashton to implement best practice air quality management, minimise the air quality impacts of the SEOC project during meteorological conditions when winds blow from a southerly direction, particularly when PM_{10} levels are elevated or likely to be elevated. An active dust management plan is required in conditions 26 and 27.

269 The Minister relied on the assessment process undertaken by Ashton in response to the DGRs and consideration by the Department/PAC. Following the review, consultation with the Department and the receipt of input from other government agencies (including the OEH and NSW Health), Ashton revised the proposal for the SEOC project to set back the

proposed pit a further 200m from Camberwell village and to commit to daytime operations only during the first two years of mining (when the operations would be closest to Camberwell village) (exhibit A, vol 1, tab 7 p 502). As part of that assessment process NSW Health wrote to the PAC on 5 October 2011 stating that it continued to have concerns about the adverse health impacts from the SEOC project relating to particulate matter (and noise, about which no issue arises in these proceedings). The PAC refused approval because of air quality issues together with water impacts. This decision was later reversed when the Director-General's addendum report was considered by the PAC and approval granted.

270 The EA considered air quality in appendix 3 through an air quality impact assessment undertaken by PAE Holmes (exhibit 1A, vol 1, tab 16). The DGRs sought a quantitative assessment of the potential air quality impacts of the SEOC project (exhibit 1A, vol 1, tab 13, p 4).

Documentary evidence

271 A letter dated 5 October 2011 from Professor Wayne Smith, Director, Environmental Health Branch NSW Health expressed opposition to the SEOC project. This is based on the "substantial underestimate" of the background PM_{10} levels in the modelling conducted by PAE Holmes which resulted in the view that there would be more unacceptable exceedences than modelled. NSW Health considered that approval of the SEOC project should be deferred until other coal mines in the region cease to operate (exhibit A, vol 3, tab 20, p 2513).

272 A further letter dated 4 June 2012 from Dr Chant, Deputy Director-General, Population and Public Heath and Chief Health Officer to Ms Webb, Senior Planner at the PAC, expressed opposition to the SEOC project (exhibit A, vol 3, tab 31). A report by Dr Hibberd, CSIRO scientist, headed "PM_{10} Concentrations at Camberwell" (the Hibberd Report) (p 2743) was attached. NSW Health was concerned about the long running history of exceedences above the impact assessment criterion for the PM_{10} 24 hour average at Camberwell. Data from the air quality monitoring network

station records that this criterion had been exceeded eleven times in the last nine months including four times since open cut operations at the NEOC mine ceased in September 2011. As that period of time had been wetter than average, it was probable that a higher number of PM_{10} exceedences would have occurred during a more typical or drier year by reference to the Hibberd Report. Increases in 24 hour average PM_{10} concentrations have consistently been associated with increases in human mortality and morbidity in a wide range of populations and there is no known threshold for which these effects are considered not to occur.

273 NSW Health was also concerned about the modelling carried out by Todoroski Air Sciences. The high 24 hour average PM_{10} concentrations were underplayed by only considering the short-term land acquisition criterion (incremental increase in PM_{10} due to the SEOC project) which is the criterion used to predict "nil days above criteria." The air quality assessments are silent on cumulative 24 hour average PM_{10} concentrations which are relevant for the health of residents and should be assessed against the impact assessment criterion (cumulative impact). Given the measured (not modelled) data shows exceedences of the 50mcg/cubic metre guideline (both before and after the NEOC mine ceased production) and the considerable dust suppressing impact of a very wet summer, any potential development approval for the SEOC project should be delayed until there is a full assessment of the cumulative impact of the SEOC project on 24 hour average PM_{10} concentrations for residents in Camberwell.

274 NSW Health considered that the assertion that the modelling will not underestimate the air quality impacts from the SEOC project may not be correct. As shown by the Hibberd Report, an analysis of how the annual average modelling could underestimate the total air quality levels subsequent to the closure of some mines and the opening of others is due to the initial overestimate of the contribution from the NEOC mine forcing an underestimate of background air particulate levels.

275 The EPA's submission in March 2013 to the Senate Standing Committee on Community Affairs Inquiry into the Impacts on Health of Air Quality in Australia (the EPA submission) was in evidence (exhibit A, vol 5, tab 114, p 4663). It states that the NSW Air Emissions Inventory 2008 presents data for NSW's greater metropolitan regions (GMR) of Sydney, Wollongong and Newcastle (which includes the Hunter region). The inventory includes sources from industrial premises, examples of which are EPA licensed coal mines, oil refineries and power stations (p 4667). The inventory shows that from 1992 to 2008 PM_{10} emissions have steadily decreased in the Sydney region whereas in the GMR emissions of PM_{10} have increased due largely to coal mining primarily in the Hunter Valley (p 4667-4668). Unregulated sources of air pollution are now becoming more significant with growing contributions from non-road diesel fuelled equipment used in mining (p 4668).

276 The EPA stated that, according to the World Health Organisation (WHO), particulate matter affects more people than any other pollutant. Its effects on health occur at levels of exposure currently being experienced by most urban and rural populations in both developed and developing countries.

277 The EPA identifies broad management principles to give effect to the Government's priorities on air. These include engaging and informing the community, managing particles to achieve the health based national air quality goals, reducing exposure and promoting continuous improvement, ensuring industry minimises emissions where feasible and cost effective, and improving the evidence base of impacts and controls (p 4689-4690). Industry initiatives identified by the EPA include the dust stop program and best practice diesel emissions management strategy at mine sites (p 4691 – 4692).

278 The NSW Air Quality Index Monitoring Data for Camberwell from July 2011 dated 26 April 2013 was in evidence (exhibit A, vol 5, tab 110, p 4563). The EPA Report titled "Hunter Valley Annual Air Quality 2012 – fine particles" dated January 2013 was in evidence (exhibit A, vol 5, tab 111, p

4565). It stated that Singleton Central was the only monitoring station that did not meet the annual goal of the National Environment Protection Measure (NEPM) for PM_{10} of no more than five days above the daily average as it recorded exceedences on six days (p 4569). It contained data showing Camberwell and Mason Dieu with higher PM_{10} levels than larger towns (p 4571).

279 The EPA Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2005 (Approved Methods) was before the Court (exhibit A, vol 5, tab 112, p 4575). The Upper Hunter Air Particles Action Plan (by the EPA) dated April 2013 was also in evidence (exhibit A, vol 5, tab 113, p 4639). It outlines the aims for the Department in assessing new mining proposals (p 4649).

Expert evidence – air quality modelling

280 Dr Bridgman, called on behalf of the Applicant, and Mr Todoroski, called on behalf of Ashton, gave expert evidence on the topic of air quality modelling. Dr Bridgman affirmed an affidavit dated 16 May 2013. Dr Bridgman is a Conjoint Associate Professor in the School of Environmental and Life Sciences at the University of Newcastle and has recognised expertise in air pollution, climate change, climatology and environmental studies. Dr Bridgman is currently working on air quality management problems in the Lower Hunter Region, fine particulate chemistry and dispersion from urban and mining sources, and the history of air pollution and its problem in Newcastle (Dr Bridgman affidavit par 1-2). Mr Todoroski swore an affidavit dated 21 June 2013. Mr Todoroski has been an air quality specialist for 22 years and previously worked for the EPA as a principal technical policy adviser in air policy and as the assessments manager in the noise and air policy sections for 10 years (Mr Todoroski affidavit appendix B).

281 Dr Bridgman and Mr Todoroski prepared a joint report dated 16 August 2013 (exhibit H). The experts were in agreement on all key air quality matters regarding the SEOC project. The experts noted that there was

initial disagreement in their expert evidence but after discussion a better understanding occurred between both experts (exhibit H par 13). The expert evidence confirmed that there is likely to be unacceptable air quality impacts in relation to the acquisition properties (table 1). As noted in their joint report in relation to dust "[i]t is not possible to reasonably prevent the impacts at these few receptor locations" (par 85). Much of the expert evidence addressed the issue of air quality impacts in Camberwell village.

282 The experts agreed that the applicable air quality criteria is the Approved Methods (exhibit H par 16). The NEPM standards for PM_{10} and $PM_{2.5}$ are not directly applicable to data measured at Camberwell (exhibit H par 18) because NEPM standards apply to monitoring data collected at performance monitoring sites and Camberwell is not such a location (exhibit H par 34). The Approved Methods reflect the NEPM standards but serve a different purpose in that impact assessment criteria are applied to evaluate individual projects whereas NEPM standards are applied to evaluate average community exposure and influence wider policy decisions (exhibit H par 38). There are no directly applicable $PM_{2.5}$ criteria in NSW (exhibit H par 19).

283 Appendix A to the joint report contains a detailed description of how the criteria should be applied (exhibit H par 20). Appendix A outlines that the stated objective of the Approved Methods is to list "the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in the state" (exhibit H par 112). At s 7, the Approved Methods state that "the assessment criteria outlined below reflect the environmental outcomes adopted by the EPA" (exhibit H par 114). Table 1 in the joint report titled "Applicable NSW EPA impact assessment" (exhibit H par 114) extracts relevant standards contained in table 7.1 of the Approved Methods (exhibit A, vol 5, tab 112, p 4606). Table 1 states that for PM_{10} in the averaging period of 24 hours the criterion is 50 mcg/cubic metre and for the annual averaging period the criterion is 30 mcg/cubic metre. The criteria for total suspended particulates and deposited dust are also included in table 1 by the experts.

284 The experts agreed that PM_{10} criteria are the key criteria important to health and wellbeing (exhibit H par 115). The total suspended particulates and deposited dust are relevant to amenity and are not further considered by the experts. The criterion of PM_{10} in the averaging period of 24 hours of 50 mcg/cubic metre is the same value as the NEPM standard but the Approved Methods operate differently by using two tiers of assessment (exhibit H par 41-42) as outlined in the following paragraphs. Mr Todoroski in oral evidence further explained that "sometimes one criteria can be more stringent than the other, but it will actually vary year to year. So, for example, the NEPM permits five days of exceedence to occur, so it really applies to the sixth highest day, whereas the EPA impact assessment criteria [Approved Methods] don't permit any day of exceedence. However, if there are already exceedences, they apply to any additional exceedence being caused" (TS 603/11-16).

285 Mr Todoroski in oral evidence also explained the relevance of the WHO guidelines by stating:

> The WHO has interim targets for PM_{10} and they range from 70 to 30 micrograms per cubic metre in ambient air and it varies according to the jurisdiction that you are in, and it's up to the jurisdiction and the State regulator, whoever the responsible body is, if they should choose to do so, to select the appropriate criteria to apply. The WHO also has a quite a [sic] long-term and it's a fairly aspirational target of, of [sic] 20 milligrams per cubic metre in ambient air for PM_{10}. Now, as a number, that 20 is actually lower than the number that's used in New South Wales, but if there's a very important distinction to make. The WHO does not per se seek to limit PM_{10}. It specifically seeks to limit $PM_{2.5}$...(TS 603-604/2)

286 Mr Todoroski considered that applying the WHO guidelines to Camberwell would result in a less stringent criterion than the Approved Methods (TS 603/45-47).

287 As explained in oral evidence, s 5 of the Approved Methods adds maximum existing background levels to maximum predicted incremental levels from a project and compares the total with the impact assessment criteria in order to assess the potential cumulative impact of a project

(exhibit H par 122). Where 24 hour average PM_{10} levels are greater than impact assessment criteria the Approved Methods in dealing with elevated background concentrations in s 5.1.3 specify (exhibit H par 124):

> In some locations, existing ambient air pollutant concentrations may exceed the impact assessment criteria from time to time. In such circumstances, a licensee must demonstrate that no additional exceedences of the impact assessment criteria will occur as a result of the proposed activity and that best management practices will be implemented to minimise emissions of air pollutants as far as is practical. Refer to the worked example included in Section 11.2.

288 Section 11.2 of the Approved Methods is a worked example of a proposed mine where background PM_{10} levels are elevated (exhibit H par 128-129). This example states that where no further exceedences are shown (exhibit H par 144), no further assessment is required (exhibit H par 147). Where additional exceedences might be predicted at a receptor the applicant should either (exhibit H par 149):

> Review site selection and/or apply more effective mitigation measures or emission controls that reduce emissions to a greater extent, and revise the impact assessment, or
>
> If emissions and impacts have been reduced to the maximum extent achievable, consider whether there are opportunities to mitigate impacts through other measures such as negotiated agreements and/or acquisition of sensitive receptors. (exhibit H [150]-[151])

289 The experts set out in the joint report the nature of the existing air quality in Camberwell village in figures 1 and 2 of appendix B (exhibit H par 22). Figure 1 shows a large variability in the PM_{10} levels between any monitor in Camberwell on any given day (levels ranging from levels consistent with the best and worst relative to NSW NEPM monitoring sites (exhibit H par 33). On average across all four monitors on any one day the PM_{10} levels are below criteria levels at least 98.2 per cent of the time. Annual average PM_{10} levels are below the criteria 100 per cent of the time (exhibit H par 23). An estimate of the annual average variation is shown in figure 3 (exhibit H par 59). Figure 4 shows dust levels at Camberwell, Muswellbrook and Singleton with 24 hour averages and 25 day moving averages.

290 The experts stated that figure 2 shows that 24 hour average and annual average $PM_{2.5}$ levels are below NEPM advisory reporting standards 100 per cent of the time. Twenty-four hour average $PM_{2.5}$ levels are very good or good (that is, less than two thirds of the advisory standard) 98.6 per cent of the time (exhibit H par 24). Data in table 2, figure 2 and figure 4 show that the $PM_{2.5}$ levels in Camberwell are among the lowest measured of data available in the Hunter Valley, are consistent with the State average and show no discernible seasonal variation (exhibit H par 60). The experts considered that the $PM_{2.5}$ metric is a better indicator of potential health impacts than the PM_{10} metric, levels of which in Camberwell are commensurate with the NSW average (exhibit H par 25).

291 The air quality model used is approved by the EPA (exhibit H par 69). The experts considered that the model used is subject only to the normal, inherent inaccuracy in any such model, and that there is no untoward error, omission or inaccuracy (exhibit H par 26). Overall, the results are robust and the results seem accurate to both experts (exhibit H par 74-75). The predicted dust levels can be compared with the applicable criteria to assess the impact of the SEOC project on air quality and permit reliable planning for the likely effects on air quality of the SEOC project (exhibit H par 90).

292 The experts stated that the operation of the SEOC project is unlikely to result in any significant contribution to dust levels in Camberwell village, and is unlikely to result in any additional exceedence of the applicable PM_{10} standard in Camberwell village (exhibit H par 27). This is because the contribution to dust levels in Camberwell from the SEOC project would be small since winds rarely blow from the SEOC project towards Camberwell (that is, from the SSW to SSE). When winds blow towards Camberwell from the SEOC project the existing dust levels are low (in oral evidence Mr Todoroski described it as "on the occasions that it does blow in that direction there tends to be relatively good air dispersion" (TS 594/37-38)). Adding a small amount of dust from the SEOC project to low

dust levels would not cause any additional day to exceed the impact assessment criteria or elevate the annual average levels above criteria. The experts noted that existing 24 hour average dust levels in Camberwell are above the criteria and whether or not the SEOC project is present would not change this situation (exhibit H par 84).

293 In oral evidence Mr Todoroski stated in relation to the duration of exposure that:

> As the mine moves from the north to the south the impacts will slowly increase, they will hit a peak, and then as the mine moves back out of the prevailing wind the impacts will fall, so it won't be a flat line of impact over seven years, it will rise and then fall. So the actual exposure would be substantially less, perhaps a third, perhaps a half, over the seven year period as opposed to just taking the maximum and using it as a flat rate over seven years.
>
> ... A slightly more subtle point is about the impacts within the village. In the first few years the mine has been scaled back and it doesn't operate at night. Now, what that means is the first few years of impacts are actually quite low, but as the mine moves away from the village it will move to 24 hour operations and its impacts will expand. So in approximate terms the first half of the operation of the mine at the village would be relatively flat and relatively constant, but then it will taper off very dramatically at the end. So perhaps something like half of the maximum exposure flatline might occur at the village overall ... (TS 605/17-33).

294 Modelling results were set out by the experts in appendix C of the joint report. Figure 5 in appendix C was explained in oral evidence by Mr Todoroski as "an annual average contour plot of the resultant dust levels from the project alone. This is for year 5, which is the maximum impacting year of the project" (TS 595/17-19). An enlarged version of this was tendered (exhibit 11A). Figure 6 shows the 24 hour average maximums over a whole year which shows the worst case day at any location (TS 595/49-50). Figure 6 shows as Mr Todoroski explained in oral evidence that receptors that are inside the red circle would be experiencing at least one day of exceedence from the mine alone, that is, more than 50 mcg/ cubic metre (TS 598/2-6). Receptors 121, 129, 130A are inside that circle, so they would be affected (TS 598/7-8). Figures 7 and 8 show individual 24 hour impacts (TS 596/17). Figure 7 relates to the Ashton 2 monitor near receptor 18 (Ms Turner's property) and Figure 8 relates to the Ashton 8

monitor near receptor 23 (Mr Lane's property). Figures 7 and 8 show that no more exceedences of the 24 hour standard will be caused by the SEOC project in Camberwell village (TS 597/1-2).

295 Graphs showing daily averages of PM_{10} and $PM_{2.5}$ from 2 September to 12 September 2013 in Camberwell and Mason Dieu were tendered by the Applicant (exhibit Q) and were discussed by the experts in oral evidence. As this material did not ultimately take the evidence further I do not need to refer to this exhibit.

296 The experts recommended a number of mitigation measures which were incorporated into the proposed conditions provided to the Court.

Respiratory health

297 The particulars relevant to the issue of respiratory health in the Applicant's ASOFC par 57 are:

> ...
> d) There is a risk that existing levels of PM_{10} are having a negative impact on the health and wellbeing of the residents in Camberwell and surrounds;
> e) In those circumstances, there should be no further increase in PM_{10}. Any increase in PM_{10} from the existing 24 hour baseline at and around Camberwell will result in a reasonable risk of serious or irreversible harm to human health, in particular cardiovascular and respiratory health;
> f) $PM_{2.5}$ is also harmful to human health. There should be no further increase in $PM_{2.5}$ at and around Camberwell;
> g) The greater the concentration of PM_{10} and $PM_{2.5}$ in the air, the greater the risk of serious or irreversible harm to human health, regardless of whether levels are above or below national health standards;
> ...
> j) The cumulative impacts of dust on the health and wellbeing of the residents in Camberwell and surrounds cannot be adequately mitigated;
> k) The project will result in health impacts for the residents that will be ongoing beyond the life of the project.

298 The Minister's ASOFC in reply (at par 57):

> ...
> f) contends that the residual health impacts of the Project are acceptable, and would be significantly outweighed by the broader social and economic benefits of the Project. ...

299 Ashton's ASOFC in response state (at par 18):

> ...
> e) Based on the projected levels of PM_{10} and $PM_{2.5}$ in the air quality impact assessment there is not predicted to be any effect on mortality, lung development or rates of asthma or respiratory symptoms in the nearby area.
> ...

300 Clinical Professor Marks (Professor Marks), called on behalf of the Applicant, and Associate Professor McKenzie, called on behalf of Ashton, gave expert evidence on the topic of respiratory health. Professor Marks affirmed an affidavit dated 14 May 2013. Professor Marks is a respiratory physician and epidemiologist with expertise in lung health and disease, and in the adverse effects of air pollution on respiratory health (Professor Marks affidavit par 1). He is currently Head of Respiratory and Environmental Epidemiology at the Woolcock Institute of Medical Research and a Senior Staff Specialist Physician in the Department of Respiratory Medicine, Liverpool Health Service (Professor Marks affidavit par 3). Professor Marks's report considers the impacts of PM_{10} and $PM_{2.5}$ on human health, whether compliance with the national health standards prevents impacts on human health from PM_{10} and/or $PM_{2.5}$, the risks to residents of Camberwell and surrounding areas associated with existing levels of PM_{10} and/or $PM_{2.5}$ and the likely impact of the SEOC project if approved on the health of residents in the Camberwell area.

301 Associate Professor McKenzie who affirmed an affidavit dated 21 June 2013, is a respiratory and sleep physician and has worked as a respiratory physician for 27 years (Associate Professor McKenzie affidavit par 1). Associate Professor McKenzie is currently head of the Department of Respiratory and Sleep Medicine at the Prince of Wales Hospital and Director of Cardiac and Respiratory Clinical Stream, South Eastern Sydney Local Health District (Associate Professor McKenzie affidavit appendix B). Associate Professor McKenzie commented on Professor Marks' report. In par 39 and 40 Associate Professor McKenzie calculated the possible adverse outcomes as a result of the predicted increase in

PM_{10} and related this to the population of Camberwell. Associate Professor McKenzie used the predicted increase in $PM_{2.5}$ with an assumption that 10 per cent of the additional PM_{10} is in the $PM_{2.5}$ fraction resulting in an increase of 0.5 mcg/cubic metre. This increase would increase the risk of death by 0.3 per cent equating with less than one extra death per 100,000 assuming long-term exposure and a current death rate in the Hunter New England of about 650/100,000. The risks to the residents of Camberwell including the five sensitive receptors outside Camberwell from short-term increases in PM_{10} are even lower than those described above because the bulk of any increases will be in the coarse fraction (that is, $PM_{2.5}$ to PM_{10}) and therefore relatively harmless. For there to be an extra death or hospitalisations due to the predicted worst case daily increases in PM_{10} (assuming 10 per cent is $PM_{2.5}$) would require a population of tens of millions.

302 Professor Marks and Associate Professor McKenzie prepared a joint report dated 8 August 2013 (exhibit J). Concerning the impact of PM_{10} and $PM_{2.5}$ on human health, the experts agreed that increased long-term and short-term exposure to PM_{10} and $PM_{2.5}$ are correlated with increased risk of deaths and hospitalisations due to heart and lung disease and asthma. They also agreed that there remains some uncertainty and conflict within the published literature and that most published literature is based on studies in urban settings. Given this uncertainty, the experts disagreed on whether the conclusions in the literature on death and hospitalisation rates apply to Camberwell.

303 In cross-examination Associate Professor McKenzie was taken to sections of the EPA Submission (exhibit A, vol 5, tab 114, p 4675) (TS 144-148). Associate Professor McKenzie agreed that there are increases in risk associated with increases in average concentrations of PM_{10} and those health risks are associated with mortality and hospitalisations from cardiovascular and respiratory diseases and in the longer term a robust association has been demonstrated between annual average $PM_{2.5}$ and mortality from all causes and cardiopulmonary causes (TS 146/18-23). By

reference to p 4677 Associate Professor McKenzie did not disagree with the proposition that groups living closest to roads and industrial emissions sources are at greater health risk because they are more likely to be exposed to high levels of air pollution (TS 148/38-45).

304 Regarding the specific impact of $PM_{2.5}$ relative to PM_{10} the experts agreed that emerging evidence suggests that the health effects of $PM_{2.5}$ are greater than the health effects of $PM_{2.5}$ - PM_{10}. The experts disagreed on whether the health effects of PM_{10} mainly reflect the effect of $PM_{2.5}$. The experts disagreed moderate increases in $PM_{2.5}$ - PM_{10} have not been definitively linked with increased mortality. Associate Professor McKenzie stated that the evidence suggests that the health effects of airborne particles are predominantly due to the $PM_{2.5}$ fraction, which includes the bulk of the products of combustion. In oral evidence Associate Professor McKenzie expanded on this and stated that the most harmful substances in urban pollution are the products of combustion (TS 115/45) because they contains many carcinogens and elements that cause inflammation (TS 116/16-17). Associate Professor McKenzie stated that it makes sense that $PM_{2.5}$ causes more damage because they get further into the lungs and are small enough to get into the blood stream via the alveoli (TS 116). Therefore Associate Professor McKenzie is convinced that the finer fraction (less than $PM_{2.5}$) is more important (TS 116/15).

305 Concerning whether compliance with the NEPM standard prevents impacts on human health the experts agreed that the NEPM standards are set in response to health, social, environmental and economic impacts, feasibility and informed by a cost-benefit analysis (that is, not health alone). The experts agreed that there is some evidence that the exposure response relationship at very high levels (for example bushfires) is not linear. The experts also agreed that individuals vary in susceptibility to the effects of air pollutants and there are likely to be some who will experience adverse effects at levels within the standards. The experts disagreed on the likely shape of the relationship between exposure and health effects at

low levels. The experts also disagreed on whether compliance with the standards will protect the bulk of the population.

306 Professor Marks stated that there is evidence the effect of particulates on health increases with increasing exposure and there is no evidence of a threshold, hence compliance with the standard does not necessarily protect health. In oral evidence the health effects were expressed as behaving in a linear fashion (TS 112/127) citing a paper titled "Using Meta-Smoothing to Estimate Dose-Response Trends across Multiple Studies, with Application to Air Pollution and Daily Death" by Joel Schwartz and Antonella Zanobetti which was tendered (exhibit P). Professor Marks explained in oral evidence that this paper:

> ... shows a dose response relationship between the level of PM_{10} in the atmosphere and the risk of death in 10 US cities going down to a level of 5 micrograms per cubic metre. So quite a low level of exposure. Some studies, it has to be said, have been negative and have not shown adverse effects at lower levels, and some of the reason for negative studies is related to the design of the studies. The fact is that these effects are relatively small and require very large populations in order to be able to demonstrate statistically significant associations, and so the strongest evidence and the studies which mostly show adverse effects at low levels are those that are based on a combination of data from a number of different studies, pooling of data, which allows you to have a bigger sample size and therefore find smaller effects at lower levels, and it's my conclusion that, that there is no evidence of a lower limit at which effects can be seen. (TS 112/31-46).

307 In cross-examination Professor Marks stated that his view is that the greater the exposure, the greater the risk of health effects in a diverse range of settings (TS 120-121). Associate Professor McKenzie states that it is likely that the exposure response relationship between particulate matter and health effects is not linear at high and low levels.

308 Regarding the risks to Camberwell residents associated with existing levels of PM_{10} and $PM_{2.5}$ the experts agreed that there are exceedences of the PM_{10} standard in Camberwell. They also agreed that there may be some increase in the statistical risk of health effects due to these exceedences. They agreed that there were no exceedences of the $PM_{2.5}$

advisory standard over the last two years but the levels approached this standard. The experts disagreed on the extent of risk associated with the exceedences of PM_{10}. Professor Marks states that exceedences of the PM_{10} standard in Camberwell will be associated with increases in the risk of death and hospitalisation due to heart and lung disease. Associate Professor McKenzie states that the exceedences are mainly attributable to the coarse fraction which the US EPA regards as unlikely to be associated with adverse health effects. Associate Professor McKenzie states that exceedences are well below 150 mcg/cubic metre which is the current US EPA standard. In cross-examination Associate Professor McKenzie was taken to the EPA report headed "Hunter Valley Annual Air Quality 2012 Fine Particles" (exhibit A, vol 5, tab 111 p 4569) concerning PM_{10} on p 4573, by reference to which and the WHO standards he stated that "in an ideal world you'd set the threshold as low as you can" (TS 151/131).

309 Professor Marks stated in cross-examination that there is no "number" by which to set a standard to protect health but that standards should be moved away from and there should be a process of continuous improvement (TS 125/11-14). The health effects are best summarised by the linear dose-response relationships not the NEPM standards (TS 130/31-36). Professor Marks stated that an "increase in exposure will be relevant whether or not it's an increase below the threshold or above the threshold. If the levels are above the threshold now, then an increase in exposure would still be relevant there. If they are below the threshold now, then an increase in exposure will still be relevant there. It's the amount of the increase in exposure that's important, not whether or not it's above or below the threshold" (TS 130/41-45). In re-examination, Professor Marks was taken to the NSW Air Quality Index Monitoring Data for Camberwell section titled "PM_{10} and $PM_{2.5}$ levels in New South Wales" dated 26 April 2013, from the Department of Environment with graphs and tables for Camberwell (exhibit A, vol 5, p 4563-4564) (TS 131). Professor Marks stated that "long periods of exposure to relatively low levels are harmful, and shorter periods of exposure to very high levels are harmful. Very short periods of exposure to very high levels of PM_{10}, as in Camberwell would

be expected to have some of the effects that have been seen in the studies relating to daily average levels of exposure which are heart attacks, respiratory problems, respiratory conditions, strokes, those sort of health problems. So one could imagine that very high levels of exposure by analogy could have those sort of health effects, increased risk of death." If this pattern of exposure were replicated over seven years Professor Marks stated that "those risks would occur every time these maxima occurred over that seven year period, so would cumulatively be increased" for both PM_{10} and $PM_{2.5}$ (TS 131-132/29-133/1).

310 Concerning the likely impact of the SEOC project on the health of Camberwell residents, the experts agreed that the operation of the mine will result in an increase in the levels of PM_{10} and $PM_{2.5}$ in the Camberwell area. They also agreed that this increase will have some influence on the statistical risk of health effects. They agreed that due to Camberwell's small population, it would not be possible to measure health effects resulting from the predicted increase in particles. The experts disagreed on the likely size of the health impacts. This disagreement revolves in part around the attribution of health effects to $PM_{2.5}$ versus PM_{10}. Professor Marks states that it is expected that the operation of the mine and associated activities will be associated with an increased risk of adverse health outcomes among Camberwell residents. Associate Professor McKenzie states that annual average particulate matter levels are predicted to decrease during the period of the mine's operation. Associate Professor McKenzie states that data from NSW Health shows no increase in cardiopulmonary disease or death rate in the Hunter compared with the rest of NSW. Associate Professor McKenzie also states that more than 90 per cent of the dust released from mining operations is in the $PM_{2.5}$ - PM_{10} fraction which has not been definitively linked to health effects. Professor Marks said in oral evidence that there are few studies that have been done showing the particulates produced by the coal mining process. His view is that a diverse range of particulates are produced and it cannot safely be said that these are not harmful (TS 118/27-33).

311 After the conclusion of concurrent evidence, Professor Marks wrote a short report titled "Estimates of the relative increase in risk of adverse health outcomes at specified locations within Camberwell village that can be attributed to the operation of the proposed SEOC mine" dated 12 September 2013 (exhibit R) in response to par 39 and 40 of Associate Professor McKenzie's affidavit. Professor Marks concluded that for the 95th and 99th percentile of the 24 hour concentration of PM_{10} and $PM_{2.5}$ attributable to the operation of the SEOC project at specified receptors being properties 130A, 121, 18 and 184A for year 5 of the mine's operation, the 24 hour concentration is likely to be equalled or exceeded on 5 per cent of days (18 days) and 1 per cent of days (3 days) in a year respectively. (Two of the properties 130A and 121 are identified in Table 1 as suitable for acquisition). These receptors (properties 130A and 121) have higher annual mean values and substantially higher 99th and 95th percentile values for PM_{10} compared to the other properties 18 (in the village) and 184A (not in the village, rural property to the south of the SEOC project site). Professor Marks did not attempt to estimate the absolute increase in risk attributable to the predicted increase in pollutant exposure as he did not know the baseline risks of the individuals who live in the specified residences. His analysis was limited to the relative increase in risk. The Applicant's counsel did not refer to this report in closing submissions.

312 Associate Professor McKenzie responded in a document titled "Comments on report of Professor Marks dated 12 September 2013" (exhibit 9A) stating at par 5 that Professor Marks assumed an increase for all-cause mortality of 0.6 per cent for a 1 mcg/cubic metre increase, the same value as Associate Professor McKenzie. Both experts concluded that an increase of $PM_{2.5}$ of 0.5 mcg would increase the risk of death by 0.3 per cent, which in Professor Marks's case was derived from averaging the values obtained from the four properties. According to Associate Professor McKenzie, he and Professor Marks are in agreement in relation to the increased relative risk of all cause mortality for increments of $PM_{2.5}$ from the SEOC project. Associate Professor McKenzie in his original report

estimated the absolute risk as less than one extra death per hundred thousand per annum, as a statistical approach to estimating potential absolute risk. Associate Professor McKenzie agreed with Professor Marks's calculations for increased risk for a range of specific health outcomes such as cardiovascular deaths, cardiac hospitalisation and emergency department visits for asthma due to short-term increases in the 24 hour average value for $PM_{2.5}$. The relative risk for these outcomes is smaller than the risk for all-cause mortality. If properties 130A and 121 are excluded from analysis the risks are extremely low in Associate Professor McKenzie's opinion.

Applicant's submissions on air quality modelling and health impacts

313 The Applicant submitted that the evidence demonstrates that there is a potential serious impact to health even from periods of short-term exposure to particles PM_{10} and $PM_{2.5}$ (opening submissions par 58). NSW Health has remained opposed to approval of the SEOC project on the basis of health concerns arising from exposure to air particles (TS 11/43-45).

314 The Applicant relied on the written statement of Mr Drinan made on behalf of the Singleton Shire Healthy Environment Group, regarding concerns about air quality and health impacts of coal mining generally and of the SEOC project (closing submissions par 7). The area of Camberwell is at the epicentre of mining in the Hunter Valley region. The nature and extent of its exposure to both open cut and underground operations is confrontingly illustrated on figure 1 "Location of the Ashton Coal Project" submitted with the Major Project Application (exhibit A, vol 1, tab 1, p 16) (closing submissions par 9). The effect of the SEOC project is to expose the residents to yet more particulate matter, thus further increasing the risk to their health and further impacting on their amenity.

315 The Applicant relied on the EPA submission (exhibit A, vol 5, tab 114) and the observations made by WHO concerning the health effects of exposure to particulate matter. During the course of oral evidence, Associate

Professor McKenzie expressed the view that the EPA submission which identified populations most at risk did not include those living near mines. This was subsequently shown to be erroneous (TS 146-147). Groups living near roads or industrial emission sources, which would include Camberwell residents, are at greater risk because they are more likely to be exposed to high levels of air pollution. Groups that are more susceptible include children and older adults. The EPA submission identifies that from 1992 to 2008 emissions of PM_{10} have steadily decreased in the Sydney region. In contrast, emissions of PM_{10} in the GMR (which includes the Hunter Valley) are stated as having increased by 20 per cent. This increase is largely attributed to coal mining. Associate Professor McKenzie agreed that impacts from coal mining would also include the diesel-fuelled machinery which it relies on to operate (TS 147).

316 Figure 6 to the EPA submission identifies the top ten sources of PM_{10} for the GMR. The dominant source identified is that attributable to mining for coal, at 58.4 per cent. Similarly, figure 5 identifies the top ten sources of $PM_{2.5}$ as being mining for coal, at 27.8 per cent. Most notably, the EPA submission specifically considered emissions trends and sources for the Upper Hunter region. Figure 7 identifies the top ten sources of PM_{10}, with mining for coal at 87.6 per cent. Figure 8 attributes mining for coal as responsible for 66 per cent of $PM_{2.5}$ in the Upper Hunter. More particularly, particle pollution in Camberwell and Maison Dieu is the highest for any community in NSW (p 4573). The Applicant in closing submitted that the terms used to describe the air quality in Camberwell in figures 1 and 2 of the joint report of Dr Bridgman and Mr Todoroski were interpretation on the part of the experts which the Applicant did not rely upon (TS 650/38, 651/39).

317 Evidence before the Court has demonstrated that the levels of $PM_{2.5}$ and PM_{10} are predicted to increase as a result of the SEOC project from presently existing levels within Camberwell village and its surrounds. Figure 1 of the joint report of Dr Bridgman and Mr Todoroski illustrates that whilst the 24 hour average for PM_{10} was exceeded on 10 occasions, there

are many more instances where the maximum PM_{10} recorded on a given day exceeds 50 mcg/cubic metre (exhibit H).

318 It continues to be undisputed that residents' exposure to particulate matter will grow, including those residents in Camberwell village (exhibit H Figure 6). Indeed Dr Bridgman and Mr Todoroski in their joint report at par 85 state:

> The SEOC mine will result in large impacts at several residences located outside of Camberwell village. These residences are located within the mine boundary or to the NW or SE of the SEOC mine. Due to their NW or SE position relative to the mine, these receptors would experience high levels of dust from the mine and also high levels of dust borne on the prevailing winds due to existing conditions. It is not possible to reasonably prevent the impacts at these few receptor locations. These receptors are identified as RXXXXX [sic] and are afforded acquisition rights.

319 What they do not say is that the residents within the village will also be exposed to an increase in particulate matter, although figure 6 makes it clear that they will, even in year 5 of the SEOC project when the mine pit is furthest away from the village. The air contours predicted for the village are not provided for in year 1, when the pit is closest to the village.

320 This is a real effect that is already experienced by the residents of Camberwell. In his oral statement to the Court, Mr de Jong said "I don't want to leave here but I don't want a heap of dust either". Even supporters of the SEOC project recognise the impact on their lives. Mrs Richards's comments in her oral statement to Court, were telling: "We've lived through it, dust and dirt everywhere."

321 The conclusions to be drawn by the Court in the light of this evidence is that the residents are already exposed to very high levels of particulate matter. Their exposure to particulate matter, including $PM_{2.5}$, increases as a result of the SEOC project. Ashton and the Department do not know what levels of dust emissions will be experienced by some of the residents of Camberwell as a result of the SEOC project in conjunction with all the other mines in the area.

322 Associate Professor McKenzie agreed with the proposition that short-term health risks occur not just with increases in 24 hour average concentration of $PM_{2.5}$ but also PM_{10}. Those health risks are associated with mortality and hospitalisations from cardiovascular and respiratory diseases. He also accepted that in the longer term a robust association has been demonstrated between annual average $PM_{2.5}$ and mortality from all causes and cardiopulmonary causes (TS 146). The acceptance by Associate Professor McKenzie of the above propositions supports the identification by Professor Marks of threats of serious or irreversible harm from both long and short-term exposure to $PM_{2.5}$ and PM_{10} as including deaths, particularly due to heart and lung diseases, hospitalisation for heart and lung diseases and asthma.

323 Particulate matter is harmful. The science shows that there is no known safe level of exposure to $PM_{2.5}$ or PM_{10}. Professor Marks stated that (TS 112/8-16):

> ...there is emerging evidence that finer particles are, are particularly hazardous, and most data are, are - but there's no good evidence that, in my view, that the coarser fraction is a safer fraction, and in fact there are studies recently published showing evidence that this coarser fraction, the fraction of particles between 2.5 microns and 10 microns, is in fact associated with adverse health effects, both studies from, both from the USA and from Sweden showing increased risk of mortality, and also studies showing increased risks of hospitalization for heart disease and lung disease in association with - that are correlated with exposure to that coarser fraction of particles.

324 Associate Professor McKenzie deposed that "Occasional exceedences of the 24 hour average values will mostly relate to increases in the course fraction of PM_{10} which have not been definitively linked to health problems." In response to this, Professor Marks indicated that he interprets the evidence and studies upon which he relies as demonstrating a correlative health effect attributable to particles in general. He did not accept that those studies should be limited in a narrow way by reference to the specific process by which the particle is emitted (for example, combustion). He noted that there were few studies specifically in regards

to the coal mining process. Moreover, it was his expert opinion that it is not possible to safely say that the particulate matter falls outside the scope of being harmful.

325 In the course of oral evidence before the Court, Associate Professor McKenzie clarified that he would not say that the course fraction, being $PM_{2.5} - PM_{10}$ was harmless. A specific example of asbestos and silica was given to demonstrate particles within the range of size that is said to be highly dangerous. However, in his view finer particles do more damage as they can get further into the lungs.

326 The Court heard evidence from Professor Marks that the health effects from exposure to particulate matter do not depend upon levels of matter in the air reaching an identified threshold. Health effects are best summarised by the "linear-dose" relationship. A relationship between exposure and health effects, the greater the exposure to particles within the respirable range, the greater the risk of health effects. Professor Marks explained that health effects may be experienced having regard to both the duration and level of exposure. Short periods of exposure to very high levels of particulate matter could result in an increase in heart attacks, strokes, and increased risk of death. Professor Marks distinguished between short-term (24 hour) and annual average exposure. In the seven year life of active open cut mining of coal he said that each day there would be an episode of exposure (short-term). There is both seven years of repeated short-term (24 hour) exposure and long-term exposure to particles.

327 The Court has heard evidence that the NEPM standard is not designed purely to be protective of human health. Rather, it is a balancing exercise. Having regard to the above evidence before the Court, it is now clear that the impacts on human health are not dependent upon compliance with, or the extent of exceedence of, a NEPM standard. The issue may be more simply put as the greater the exposure to particles within the respirable range, the greater the risk of health effects.

328 Ashton, in cross-examination of Professor Marks, clarified that he was not proffering an opinion as to what threshold level of dust should be chosen. Rather, in his opinion there should be a move away from standards with a view to continuous improvement and reducing background levels. When pressed for an identified "number" at which the Court could determine whether the exposure was acceptable it was reiterated that it is the amount of an increase in exposure that is relevant.

329 In cross-examination of Associate Professor McKenzie, he agreed that "in an ideal world, seeking to minimise the risk to human health from exposure to particular [sic] matter including PM_{10}, in an ideal world you'd set the threshold as low as you can" (TS 151).

330 The evidence heard during the course of the site visit provides insight into what the community has experienced, and why the proposed conditions are completely unsatisfactory. Camberwell homes are surrounded by open cut mines. They suffer repeated exposure to dust, including $PM_{2.5}$ and PM_{10} from multiple sources as identified by Mr de Jong, amongst others.

331 The Applicant considered that the approach to the mitigation of those residents most affected by proposed dust emissions, namely the creation of an acquisition zone, is not satisfactory. The SEOC project should be refused.

Minister's submissions on air quality modelling and health impacts

332 The Approved Methods direct attention to the 24 hour average and annual average levels of PM_{10} predicted to result when particulate matter emissions from a project area combine with existing sources of particulate matter emissions in an area. The Approved Methods adopt "impact assessment criteria" of 50 mcg/cubic metre for 24 hour PM_{10}, and 30 mcg/cubic metre for annual average PM_{10}. The Approved Methods apply to the modelled air quality impacts from a project. If a project is located in an area already experiencing elevated levels of PM_{10} including

exceedences of the 24 hour average impact assessment criteria of 50 mcg/cubic metre (elevated background levels) a proponent must demonstrate that it will implement best practice management procedures to reduce the air quality impacts of the project and that the project will not result in any additional days of exceedences.

333 The 50 mcg/cubic metre criteria in the Approved Methods is sourced from the NEPM. The NEPM allows for up to five exceedences per annum of the 24 hour PM_{10} criteria, contains no annual average limit for PM_{10} and contains only advisory reporting standards for $PM_{2.5}$. The advisory reporting standards for $PM_{2.5}$ are a 24 hour average of 25 mcg/cubic metre, and an annual average of 8 mcg/cubic metre. The annual average is currently the tightest standard in the world. The air quality experts agreed that these advisory standards are not directly applicable to the assessment of air quality in Camberwell village and its surrounds.

334 The Minister's submissions identified the process of assessment undertaken by the Department, the negative views of NSW Health and an expert employed by them Dr Hibberd of CSIRO, Ashton's employment of Mr Todoroski, Dr Holmes, Associate Professor David McKenzie and the undertaking of additional modelling.

335 The air quality modelling experts agreed that the existing air quality in Camberwell village falls within the accepted limits for PM_{10} within the Approved Methods 100 per cent of the time for the annual average measure.

336 Twenty-four hour PM_{10} levels (recorded by four monitors in Camberwell, three operated by Ashton, and one by the OEH) are below criteria 98.2 per cent of the time. This equates to an average of seven days per annum above the criteria and includes data not yet validated (that is, screened out for bushfires or other events, or for instrument calibration adjustments).

337 The experts noted that average $PM_{2.5}$ levels (recorded by the OEH monitor only) are consistent with the State average and lower than the averages recorded in Singleton and Muswellbrook. Average $PM_{2.5}$ levels are below the NEPM advisory reporting criteria 100 per cent of the time, and are predominantly very good or good (while noting the NEPM standards do not apply).

338 The experts agreed that the SEOC project is not predicted to result in any significant contribution to air pollution within Camberwell village, and will not result in any additional days above the Approved Methods criteria. However, the air quality impacts are predicted to be above the impact assessment criteria for some rural receivers outside the village, corresponding to the properties to which the proposed acquisition conditions apply.

339 The Approved Methods identify that where there are elevated background levels two things must be demonstrated, firstly, that no additional exceedences will occur and secondly the proponent must demonstrate the implementation of best practice management procedures to reduce air quality impacts of the project. There have been a number of modifications to the design of the SEOC project to minimise dust impacts (see Director-General's report exhibit A, vol 1, tab 6, p 502). Ashton set back the proposed pit a further 200m from Camberwell village and committed to daytime operations only during the first two years of mining when close to the village. The SEOC project will also be subject to stringent ongoing management and monitoring conditions, including a requirement to implement best practice air quality management (condition 26 Sch 3).

340 The concerns raised by NSW Health have been addressed and effectively satisfied. Its concern was based on additional exceedences of the impact health assessment criteria. The general statements of residents of Camberwell, Pokolbin and Maison Dieu about dust impacts do not assist given the specific expert analysis of the impact of the SEOC project. The EPA Upper Hunter Air Particles Plan 2013, s 4.1.1 aims to reduce particle

emissions from coal mine operations, ensure these proposals minimise the generation of particles, identify all reasonable and feasible mitigation measures consistent with best management practice, and establish an effective regulatory program for the ongoing regulation of particle emissions on mine sites. Mines are required by the Department approval conditions and the EPA's environment protection licence to operate in a proper and efficient manner to reduce dust emissions. The government's policy approach is not to stop new sources of particles. The Approved Methods recognise that there are impacts and these can be acceptable taking into account various factors such as health and the practical social and economic realities of undertaking activity.

341 The Applicant has in substance invited the Court to ignore the agreed expert evidence and seeks to draw broad conclusions from documents that do not seek to measure or assess the air quality impacts of this project.

342 The figures 1 and 2 pie charts in the joint report of Dr Bridgman and Mr Todoroski reflect the proportion of the time the air is very good, good, fair, or poor reflects a mathematical exercise applying EPA air quality criteria. The Court can have regard to that description.

343 In terms of adverse health impacts from air quality the experts agreed there may be some increase in the statistical risk of health effects due to these exceedences. There is a link between exposure to particulate matter and increased mortality and morbidity. The health effects of exposure to $PM_{2.5}$ are likely to be greater than the health effects of exposure to particulate matter larger than $PM_{2.5}$. The health experts accepted that the air quality impacts within Camberwell village will be within accepted limits but disagreed concerning whether there is a safe level of particulate matter exposure. The experts agreed that the standards in the NEPM are set in response to health, social, environmental and economic impacts, not by reference to health effects alone. Implicit in the joint opinion is that determining the appropriate level of exposure to particles is a polycentric

decision best suited for policy-makers. There is uncertainty about where the safe threshold for exposure to particulate matter lies. Nevertheless the air quality impacts of the SEOC project are predicted to be acceptable both by reference to current government standards, including by reference to non-binding advisory standards for $PM_{2.5}$ and in comparison with the effects of other coal mines in the area. That there may be stricter standards in the future can be accommodated through requiring Ashton to comply with relevant air quality standards as amended from time to time. The Minister proposes a condition requiring that Ashton manage $PM_{2.5}$ levels in accordance with any requirements of an environmental protection licence. This would provide a mechanism to enforce any standards which come to be adopted in relation to $PM_{2.5}$ levels. The experts do not agree on the extent of the risk associated with the exceedence of PM_{10}.

Ashton's submissions on air quality modelling and health impacts

344 Dr Bridgman and Mr Todoroski agreed on all key air quality matters in relation to the SEOC project. Consequently particulars (a), (b), (c) and (i) are not supported by expert evidence. Concerns about health impacts are consequently removed. As the experts conclude the SEOC project will have no significant impact on dust levels in Camberwell and impacted surrounding residents have acquisition rights, it cannot be concluded that there will be significant health impacts as contended by the Applicant.

345 The health experts agreed that while the operation of the mine will result in an increase in levels of PM_{10} and $PM_{2.5}$ in the Camberwell area and while this increase will have some influence on the statistical risk of health effects, due to the small population of Camberwell it would not be possible to measure health effects resulting from the predicted increase in particles. These findings do not support a finding that provides evidence of serious or irreversible risk of environmental harm sufficient to trigger the precautionary principle. If it is triggered then the measures proposed in the project approval conditions are a proportionate response to the increased statistical risk that is unable to be measured and are not characterised in magnitude as serious or irreversible (see Associate Professor McKenzie

affidavit). According to Associate Professor McKenzie the most harmful substances in urban pollution are the products of combustion. Smaller fraction particles $PM_{2.5}$ and below are the most damaging as they can migrate from the lungs into the bloodstream.

346 While the Applicant's counsel cross-examined Associate Professor McKenzie about the EPA submission, this was to confirm that the passage was present in the EPA submission not whether he agreed with the passages read. Associate Professor McKenzie did not express agreement with those passages and his view expressed to the PAC was that the prevalence of asthma in the Hunter is not statistically significant compared to other areas of the State.

347 The SEOC project will not contribute greatly to $PM_{2.5}$ levels and the project is acceptable as it is well below the 25 mcg/cubic metre (24 hour) and 8 mcg/cubic metre (annual average) NEPM $PM_{2.5}$ reporting guideline, and will not contribute to any additional exceedence of the PM_{10} 24 hour 50 mcg/cubic metre standard or the 30 mcg/cubic metre (annual average) Approved Methods standard at Camberwell village. The data is shown graphically at figures 7 and 8 of Dr Bridgman's and Mr Todoroski's joint report. The modelled results not only show (most importantly) that there is no additional day of impact predicted to arise due to the SEOC project, but also show that the project's impacts on any given day are low and the project's impacts on worst case background level days are lower than at other times.

348 The air quality analysis shows throughout the project's assessment that the SEOC project will have a low air quality impact on Camberwell village due to it not being upwind of Camberwell and not on the prevailing NE-SE wind axis.

349 As explained by Dr Todoroski the WHO guidelines do not prescribe a single number but provide a guideline. The WHO guidelines properly

applied in fact recommend a level of 35.2 mcg/cubic metre PM_{10} which is less stringent than the Approved Methods that apply at Camberwell.

350 The Applicant's reliance on the NEPM standards is misplaced as these are intended for broader populations not for point sources. There are presently dust exceedences of the NEPM criteria in the village. The Approved Methods use the NEPM criteria for some licensing criteria and these are not breached. The Approved Methods do not allow any exceedences (the NEPM allows five per year) and where background levels already exceed the criteria no more exceedences are permitted. This project will not have additional exceedences of the $PM_{2.5}$ fraction of PM_{10}. This addresses NSW Health's concerns expressed in the letter dated 4 June 2012.

351 Associate Professor McKenzie concludes at par 39 and 40 of his affidavit that for there to be an extra death or hospitalisation due to the predicted worst-case daily increases in PM_{10} would require a population in the tens of millions. This is not challenged by Professor Marks's further note dated 12 September 2013 (exhibit R) and was not challenged in cross-examination by the Applicant or Professor Marks in oral evidence. Professor Marks's further note when read with Associate Professor McKenzie's note in reply (exhibit 9A) confirm that the Court can rely on the detailed calculations based on referenced sources set out in Associate Professor McKenzie's affidavit at par 39 and 40, the principal conclusion of which as regards both $PM_{2.5}$ and PM_{10} Professor Marks does not challenge.

352 The Applicant's reliance on the EPA submission in express substitution for the joint report and expert evidence in the proceedings is misplaced and illustrates well that the Applicant's case as regards air quality has no proper evidentiary foundation.

Finding on air quality modelling and respiratory health impacts

353 The Applicant submitted that the SEOC project will have a significant impact on the health and well being of the residents of Camberwell village and other residents near the project, and should be refused on this basis. The air quality modelling experts Dr Bridgman and Mr Todoroski have agreed all aspects related to the modelling of air impacts in and around Camberwell in their joint report. The modelling undertaken for the SEOC project while having limitations inherent in such models, as specified in par 70-75 of the joint report, was agreed to be robust and is the model approved by the EPA for modelling potential impacts from coal mines. The relevant criteria derived from the Approved Methods is PM_{10} 24 hour and annual average PM_{10} levels. The application of the Approved Methods where there are background levels which exceed the impact assessment criteria were identified by the experts above at par 287-288.

354 Dr Bridgman and Mr Todoroski do not identify any exceedences of concern within Camberwell village in the sense that the SEOC project contribution of PM_{10} particles and smaller, while further elevating particle levels, will not cause more exceedences of the PM_{10} 24 hour average as specified in the Approved Methods.

355 In figure 1 of the joint report 24 hour average PM_{10} concentrations air quality based on data from four monitoring sites (Ashton 1, 2, 8 and Camberwell OEH) was described as good to very good for the Camberwell village minimum 87 per cent of the measured time with fair 2.6 per cent and poor 0.46 per cent, good to very good 89 per cent of the measured time with fair 9.1 per cent and poor 1.8 per cent for Camberwell Average, and good to very good 74 per cent, fair 19 per cent, poor 5.7 per cent and very poor 0.62 per cent for Camberwell maximum (pie charts). In Figure 2, 24 hour average $PM_{2.5}$ levels at the Camberwell OEH monitor for the period August 2011 to May 2013 air quality is recorded as good 31 per cent and very good 68 per cent with fair 1.4 per cent. Contrary to the Applicant's submission, the pie charts are not the opinion of the experts

but reflect the EPA's categories for air quality as applied to what was modelled.

356 There were no exceedences of the NEPM advisory reporting standard for $PM_{2.5}$ modelled. The experts concluded at par 224 and 225 that PM_{10} levels increase in the spring and summer months, and this is likely to be a combination of emissions from mining, some from agriculture and increased wind erosion in the natural environment. During these times $PM_{2.5}$ emissions which are generally regarded as a better indicator of potential health impacts remain low. $PM_{2.5}$ levels in Camberwell are predominantly very good or good. Whilst there are likely effects from mining on PM_{10} levels in spring and summer, the PM_{10} material contributed by mining activity is predominantly in the coarse fraction, not the fine $PM_{2.5}$ fraction. The experts concluded that $PM_{2.5}$ levels at Camberwell are better than in Singleton and Muswellbrook and around the NSW average (exhibit H par 25). The experts concluded that the SEOC project will have minimal influence on air quality in Camberwell village (exhibit H par 27).

357 There is currently no Australian standard limiting exposure to $PM_{2.5}$ as it is difficult to measure, according to Mr Todoroski with Dr Bridgman agreeing (exhibit H par 36). There is a reporting advisory standard for $PM_{2.5}$ under the NEPM.

358 The modelling undertaken confirms that there are exceedences of the relevant air quality levels at the properties listed in Table 1. The owners of those properties have the ability to require acquisition by Ashton. The experts stated that the SEOC project is likely to lead to dust levels above criteria at several residences located outside of Camberwell village (exhibit H par 28) and therefore suggested a number of mitigation measures should be implemented (exhibit H par 29). These residences are located within the mine boundary or to the NW or SE of the SEOC project. Due to their NW or SE position relative to the SEOC project, these receptors would experience higher levels of dust from the SEOC project and also higher levels of dust borne on the prevailing winds due to existing

conditions. The experts stated that it is not possible to reasonably prevent the impacts at these locations which are afforded acquisition rights (exhibit H par 85).

359 In terms of the particulars in the Applicant's ASOFC (a) levels of particulate matter around and in Camberwell do exceed the EPA air quality monitoring standards as stated in the Approved Methods. To say they exceed national health standards which I understand to mean the NEPM is problematic in the sense that the NEPM is not intended to be used for measuring air quality at a particular location. There is no site specific $PM_{2.5}$ criteria in NSW. The air quality modelling experts applied the EPA assessment criteria in the Approved Methods in their modelling. The SEOC project is likely to increase PM_{10} and $PM_{2.5}$ in and around Camberwell village to varying degrees over the seven year life of the mine project. It is agreed by the experts that the worst year for air quality impacts is year 5 ((b), (c)). The expert modelling evidence is that there will not be an increase in the exceedence of 24 hour concentration criteria for the predicted emissions of PM_{10} in Camberwell village ((h)). While the Applicant stated ((i)) that it does not accept the modelling undertaken by Ashton will correctly predict levels of PM_{10} emissions, there is agreement by the air quality modelling experts including Dr Bridgman that the modelling is reliable. According to the air quality experts, where a project meets air quality criteria as this modelling suggests the SEOC project will, it would not have significant health effects as the project is not upwind of Camberwell and not on the prevailing NE-SE wind axis (exhibit H par 84). They also agreed that with the adoption of the proposed project approval conditions and the measures outlined in paragraphs 96-104 of the joint report, the SEOC project will be commensurate with best practice in regard to minimising the effects on air quality (par 29 exhibit H).

360 The Applicant in closing submissions relied on the EPA submission made in March 2013, which refers to the poor air quality in Camberwell because of its location close to numerous mines, not the conclusions in the joint expert report of Dr Bridgman and Mr Todoroski. The EPA submission is

summarised above at par 275-277. The submission identifies that particulate levels in the Hunter Valley of PM_{10} have increased due mainly to coal mining. Concerns about health impacts from particulate matter are identified as based on the WHO guidelines which state that short-term and long-term exposure to particles are associated with mortality and morbidity from cardiopulmonary disease. Over the short-term, increases in 24 hour average concentrations of $PM_{2.5}$ and PM_{10} are associated with mortality and hospitalisations from cardiovascular and respiratory diseases. Short-term exposure appears to exacerbate pre-existing diseases while long-term exposure most likely causes disease and increases the rate of progression of disease. The evidence shows that long-term exposure to $PM_{2.5}$ has a larger health effect than short-term exposure, suggesting that strategies that provide long-term reductions in particulate pollution are likely to produce the greatest health benefit (p 4675). Some groups such as those living near roads or industrial emissions sources are at greater risk because they are more likely to be exposed to high levels of air pollution. Individual susceptibility to air pollution depends on individual characteristics (p 4677). As the Respondents identified, the management of multiple sources of air pollution proposed by the EPA is through measures such as implementation of best practice management at particular locations and other programs.

361 NSW Health was critical of the SEOC project, identifying the potential for air quality and related health problems. NSW Health's concerns as stated in letters dated 5 October 2011 and 4 June 2012 focussed in part on air quality modelling undertaken by Todoroski Air Sciences. One concern was a failure to model air quality based on cumulative 24 hour average PM_{10} concentrations. This was addressed in the joint report in figures 1 and 2 in relation to PM_{10} as monitored at four receptor stations in Camberwell village and for $PM_{2.5}$ at the OEH monitoring station. As identified above in par 289 the experts considered that annual average PM_{10} levels are below the criteria 100 per cent of the time. For $PM_{2.5}$ the annual average levels are below the NEPM advisory reporting standard. Concern about overestimation of the NEOC mine's contribution to background levels, and

a wet summer suppressing dust levels, appears to be addressed by the agreement of the experts that the modelling accurately reflects within the model limits the predicted air quality impacts from the SEOC project. NSW Health does not distinguish between the rural properties outside the village and those within. The modelling undertaken and the expert consideration of this in these proceedings address the concerns of NSW Health about modelling methodology.

Respiratory health impacts

362 The Applicant relied on the concern expressed by several objectors about dust levels and their impact on health resulting from the large number of mining operations in the Pokolbin and Maison Dieu areas. During the course of the site visit, Mrs Bowman noted that she had dust in her lungs and had a 20 per cent loss of lung function. She expressed concern as to what the dust was doing to children. Mr Shearer from Maison Dieu commented that he "gets a lot of dust here, I am virtually in the centre of the mines". He expressed concern about getting even more dust consequent upon the SEOC project than what he currently experiences. In his view too many mines have been given approval to be mined in too small an area and there should not be another one.

363 Mr Napier is the operator of a small vineyard and wine tourism business in Pokolbin. He gave evidence at Singleton Local Court and spoke not only of his concern as to the health effects of dust but also the impact that it has on tourists' perception of the Pokolbin wine region. He stated that (TS 98-99):

> The last issue I wanted to speak to is dust, the extent of dust generated by the extensive number of coal mines in the Upper Hunter and Singleton area has increased the amount of black dust fallout that we each appreciate every time we wash off outdoor furniture, or wash down paths. It has noticeably increased over the past two to three years, with the train number movement increases and the train line building projects which have happened at the end of Hermitage Road.

364 Some of the residents in Camberwell village who addressed the Court expressed concerns in relation to the health impacts of dust. Mr de Jong

spoke to the Court about his experiences living in a place surrounded by mining. He talked about both his past and present experiences that all mines have noise and dust. In his view he said that you cannot build a mine without more dust. Within the context of his past experiences he said "it was tough before, really tough... It has been bad with the first mine, can't handle another one, dust, noise and blasting. We would never want to complain a great deal". Mr de Jong spoke of members of the Camberwell community having left the area because they were sick of being exposed to the impacts of mining. He lamented about being one of the few long-standing members of that community to remain. Mr de Jong noted that his grandchildren live in Camberwell and that they visited his place all the time. He expressed his desire not to have to leave the area and in effect split up his extended family. In particular he said "I don't want to leave here, but I don't want a heap of dust either...Monitors go off all the time, being closer to the mine will mean more." Mr Bowman who owns a dairy farm which will abut the SEOC project site expressed concern about dust impacts on both health grounds and financial impact grounds given possible disruption to his dairy operation.

365 As already identified, the air quality modelling experts agreed there is potential for unacceptable impacts outside Camberwell village. They do not consider the air quality impacts in the village will be unacceptable because there is no additional exceedence of the PM_{10} 24 hour criteria and no exceedence of the $PM_{2.5}$ advisory reporting standard identified by the modelling.

366 In terms of health impacts, Professor Marks's opinion is that there is no known threshold of safe exposure to PM_{10} and finer particles. NSW Health in the letter dated 4 June 2012 stated that increases in 24 hour average PM_{10} concentrations are associated with increases in human mortality and morbidity in humans and no threshold is known for which these effects are not considered to occur. The experts correctly identified that the NEPM standards are not solely focussed on protection of health but are a balancing of economic and social factors also. This is stated in s 15 of the

National Environment Protection Council Act 1994 (Cth). In Professor Marks's view the use of such standards does not mean that no health impacts result if these are met. He preferred a best practice management approach to ensure that particle levels are reduced as much as possible overall. Based on that evidence the Applicant submitted that any increase in particle levels whether $PM_{2.5}$ or coarser from the SEOC project must be avoided by refusal of the project because of the potential to adversely impact human health, as reflected in particulars par 57(e), (f), (g) and (k).

367 Increases are predicted to occur outside the limits in the Approved Methods in relation to the Table 1 rural properties and Ashton is not required to meet these limits at those properties. Particular (j) states that cumulative impacts of dust cannot be adequately mitigated and for the Table 1 properties that is correct, hence the conditioned acquisition option inter alia provided in relation to these. I will consider those proposed conditions as part of the social impacts which potentially result if the project proceeds later in the judgment. The focus of the rest of my analysis is the evidence about potential health impacts from dust particles in the village. Several resident objectors whose statements are summarised above live in the village.

368 Both experts on health impacts are eminently qualified in this field. They broadly agreed on the health risks associated with increases in PM_{10} and $PM_{2.5}$, including that exposure to $PM_{2.5}$ is increasingly recognised as having greater health effects than $PM_{2.5}$ to PM_{10} sized particles. They agreed that there may be some increase in the statistical risk of health effects on residents due to exceedences of the PM_{10} standard in and around Camberwell. Both experts agreed finer particles $PM_{2.5}$ are harmful to human health. While the NEPM $PM_{2.5}$ reporting standard has not been exceeded Professor Marks's view is that there is no safe level of exposure to $PM_{2.5}$ (and other particles).

369 In terms of exposure times for particles there was some disagreement about the relative impact of PM_{10} and $PM_{2.5}$ and the dose response

relationship at low and high levels. There was broad agreement that there is a linear relationship between exposures to PM_{10} and $PM_{2.5}$ and adverse health outcomes.

370 Associate Professor McKenzie considered that the products of combustion are the biggest sources of $PM_{2.5}$ particles, to which there was some challenge in cross-examination when statements in the EPA submission about the source of fine particles in the Hunter Valley being coal mining was identified to him. As Ashton submitted, he was not asked if he agreed with the views expressed in the EPA submission about the sources of particles. Associate Professor McKenzie considered that coal mining would be a source of $PM2_{.5}$ - PM_{10} particles which are possibly less harmful in Associate Professor McKenzie's view if compared to finer $PM_{2.5}$ particles. Professor Marks considered that diverse size particles would be produced from coal mining and it cannot be said that these are not harmful.

371 The experts also disagreed about the extent of the health risk posed by the SEOC project in Camberwell village. Professor Marks considered that mining and associated activities would result in increased risk of adverse health outcomes amongst Camberwell residents. Both long and repeated short-term exposures to particles can have adverse health effects. Associate Professor McKenzie considered that as the particle sizes from the SEOC project would be in the $PM_{2.5}$ - PM_{10} range the health effects would not be as great as if the particles were concentrated in the $PM_{2.5}$ range. Associate Professor McKenzie did not consider there are increased health impacts resulting from coal mines in the Hunter Valley as there is no increase in cardiopulmonary disease or the death rate identified in studies in that area.

372 Associate Professor McKenzie calculated in his affidavit the increased risk of death resulting from the SEOC project of 0.3 per cent assuming a predicted increase in $PM_{2.5}$ with an assumption that 10 per cent of any

additional PM_{10} particles are in the $PM_{2.5}$ fraction resulting in an increase of 0.5 mcg/cubic metre.

373 Professor Marks and Associate Professor McKenzie appeared to agree by inference on the relative increase in risk of health effects due to greater particle levels with an increase of $PM_{2.5}$ of 0.5 mcg/cubic metre increasing the risk of death by 0.3 per cent. Given the very small population at Camberwell both agreed it was difficult to determine the actual risk to particular individuals given that studies of impacts are conducted over much larger population samples. Professor Marks also required information about the risk factors for particular individuals in terms of their susceptibility before he was prepared to assess absolute risk. Associate Professor McKenzie calculated this as a statistical exercise of one extra death per hundred thousand per annum.

374 The Applicant pleaded in (g) that the greater the concentration of PM_{10} and $PM_{2.5}$ in the air the greater the risk of serious or irreversible harm to human health, regardless of whether levels are above or below national health standards. That represents a no risk approach to impacts from particles. That approach is supported at a broad level by Professor Marks. That is not the regulatory approach reflected in the Approved Methods which specify limits for PM_{10} on a daily and yearly average basis which if met do not justify refusal of a project. That reflects a risk minimisation approach which was accepted as appropriate by Associate Professor McKenzie. In this case the PM_{10} background levels are already elevated above the levels specified for regulatory purposes. The Approved Methods state that provided the additional contributions from a project do not lead to additional exceedences of these standards the project can be acceptable provided dust minimisation measures are able to be implemented.

375 As the Respondents submitted, applying the Approved Methods criteria to predicted particle levels in Camberwell village would not result in refusal of the SEOC project. Further, the EPA submission referred to the need to adopt best practice management procedure and the implementation of

dust reduction programs. This is provided for in the proposed conditions (conditions 3 and 26 in Sch 3).

376 Concerns about cumulative impacts from dust and excessive dust levels have been raised by a resident at Maison Dieu and winemakers in the Pokolbin area, amongst others. There are a large number of coal mines around Camberwell as can be seen in the plan location of the Ashton Coal Project (exhibit A, vol 1, tab 1, p 16). Immediately around Camberwell is the NEOC mine, now closed, and the Underground mine. The focus of the air quality modelling has been the contribution of the SEOC project to air quality in and around Camberwell. Background particle levels in Camberwell are already elevated. The predicted increases as a result of the SEOC project are within the limits identified in the Approved Methods, will be for a finite period of seven years and will vary in severity over that time. The health risks identified are based on a statistical assessment of risk which require a far larger population to detect, as the Minister submitted and as the health experts' evidence confirms.

377 The Applicant submitted that any increase in air particles from the SEOC project are unacceptable because of health impacts. As the Respondents identified, this approach would mean that logically any larger source of particles ought be refused approval. As emphasised by the Respondents the SEOC project has been modified with the mine pit moved away from Camberwell village and restrictions on mine operating hours in the first two years of operation to daytime only as measures to reduce noise and dust impacts in the village. A number of additional conditions address dust suppression during the mine operation such as enclosing the coal conveyor on four sides and implementation of a dust management plan, inter alia. The Applicant's submission that there would be serious health impacts in Camberwell village as a result of the SEOC project is not established by the expert evidence of the air quality modelling experts or the health experts. That does not mean there will be no impact on residents of Camberwell village but these impacts are likely to be moderate in terms of amenity and health impacts.

378 The Applicant submitted that the SEOC project should be refused because of the air quality impacts arguing this is contrary to the precautionary principle, the principle of intergenerational equity and the public interest. As there are a number of issues to consider in relation to air quality impacts and the social and economic effects of dealing with the predicted impacts in light of the conditions proposed I will consider these as part of the overall consideration of all issues I must undertake. I do this at the conclusion of this judgment.

Project cannot be implemented as area includes land in private ownership

379 The Applicant contended that Ashton does not own or have control of all of the land required to develop the SEOC project, in particular, property 129 is in private ownership (ASOFC par 65). The ASOFC par 66-67 state:

> 66 Under the *Mining Act* 1992 (Mining Act), a mining lease must not be granted without the owner's consent over agricultural land and significant improvements on property no 129, or within 200 metres of the dwelling house and within 50 metres from the garden on property no 129, as specified in sections 62 and 63, and Schedules 1 and 2 of Mining Act.
> 67 Unless Ashton is able to gain control over Property No. 129, the Project cannot be implemented as environmentally assessed.
>
> Particulars
>
> (a) Property no 129 is currently agricultural purposes (cattle and irrigation);
> (b) Improvements on property no 129 include a dwelling house, two sheds, six dams, electric fencing, a four-door garage, cattleworks, riparian works, irrigation pumps and pipelines, as well as cultivation of fodder crops including oats and sorghum;
> (c) The Environmental Assessment prepared for the Project assumes that property no 129 will be acquired by Ashton;
> (d) The current information is that the owner of property no 129 is unwilling to sell to Ashton.

380 The Respondents disputed the Applicant's contentions in par 65 to 67 of its ASOFC in their ASOFCs in reply.

381 The consent of a landowner is not required for a project application that relates to a mining project: EPA Regulation cl 8F(1)(c).

Submissions

382 The lay evidence adduced by the Applicant from Mrs Bowman confirms that property 129 is owned by her. Mrs Bowman is steadfastly opposed to the development and has consistently refused to sell the farm to Ashton to make way for the SEOC project. Under s 39(4) of the Court Act, the Court is required to consider other relevant Acts in making its determination. In this case it is relevant for the Court to consider the provisions of the *Mining Act* 1992 which specifically provide for the protection of privately owned agricultural land and significant improvements from open cut mines. That Act places a priority on productive agricultural land over and above exploitation of the State's mineral resources. The Court should not grant approval for an open cut coal mine over Mrs Bowman's land which is currently used for agricultural purposes and contains significant improvements.

383 The Minister submitted that the private ownership of property 129 is not a sound reason to refuse approval for the SEOC project. The private ownership of some of the land within a project area, having regard to the scheme and objects of the EPA Act, is not relevant to the determination of whether the SEOC project should be given approval. Contrary to the Applicant's submission (TS 694/7), the Court is not required to make any finding about whether it believes that Mrs Bowman is sincere in her stated position that she will not sell her land to Ashton. The Court should not be drawn into speculation about how an application for a mining lease by Ashton would be dealt with under the Mining Act by another decision-maker.

384 Ashton submitted that the purchase of land required for the SEOC project's implementation is a separate barrier to the implementation of the project which may be separately negotiated by Ashton in due course. The issue is not germane to the Court's planning assessment of whether or not

the Pt 3A approval should be granted: *Grace Bros Pty Ltd v Willoughby Municipal Council* (1981) 44 LGRA 422, *Associated Minerals Consolidated Ltd v Wyong Shire Council* [1975] AC 538.

Issue of private land ownership not determinative of application

385 EPA Regulation cl 8F (1)(c) allows lodgement, consideration and grant of a major project application for mining while land is in other ownership. Contrary to the Applicant's submission that this aspect of the statutory scheme is irrelevant I consider it must be highly relevant because that is the statutory scheme under which I must determine this application. I am not exercising, nor do I have power to exercise in this appeal, powers under the Mining Act. I agree with the Respondents' submissions and their reasoning on this issue. The Applicant's case asks the Court to speculate about the separate Mining Act approvals process. That is not relevant to my consideration in relation to the grant of project approval under the EPA Act in this matter.

386 Ashton submitted correctly that if the SEOC project is approved, Ashton will need to satisfy the requirements of the Mining Act in order to obtain a mining lease, an additional and separate requirement to the approval required under the EPA Act.

387 Whether or not Ashton and Mrs Bowman reach an agreement in the future in relation to her land is a matter for them. The Court does not need to make any predictions about that matter in order to determine whether approval for the SEOC project is warranted.

Social impacts

Unacceptable social impacts of noise and dust conditions

388 The Applicant contended that noise and dust conditions and mitigation strategies under the project approval will result in unacceptable social impacts, contrary to the public interest, and the principle of intergenerational equity (ASOFC par 58):

Particulars
a) Property acquisition and temporary relocation as mitigation strategies for health impacts fail to provide adequate social or economic protection for residents and the community in Camberwell and surrounds;
b) Property no 130 immediately to the south of the project site is located in the property acquisition area for noise and dust impacts. The owner does not want to sell the land to Ashton, however the land will be unable to be farmed because of the likely dust and noise impacts;
c) The project is likely to result in removal of the last remaining long-term residents of Camberwell village and surrounding areas, thus leading to the loss of the village and surrounds as a rural community, in circumstances where the residents do not want to move.

Submissions

389 Land identified as property 130 is owned by Mr Bowman. There are two dairy farming operations on that land (known as dairy no 1 and dairy no 2) with a dwelling for each of those dairies (Mr Bowman, 15 May 2013, par 3 and p 10). Land identified as property 120 is occupied by the Ernest family (Mrs Oloffson, 17 May 2013, par 13). Land identified as property 121 includes a residence and is owned by Mr Trevor Burgess (SEOC project approval, exhibit A, vol 3, tab 29 p 2661).

390 The Applicant submitted that it would be difficult for the Court to resolve this issue by way of conditions of approval. The only obvious avenue by which to avoid such an impact would be to require the removal of all residents from the area (not just those "privately owned" as referred to by Ashton). This measure demonstrates the polycentric nature of the problem at hand because such a course of action would then have flow on consequences to the social makeup (or lack thereof) of Camberwell, and for the individuals who do not want to leave (as supported by the affidavit evidence of Camberwell residents Mrs Bowman, Mrs Maytom, Mrs Olofsson and Ms Turner). Should the Court accept the Applicant's evidence on health impacts, this would be a significant factor in the Court's balancing exercise against approval of the SEOC project.

391 Ashton submitted that the Applicant's argument that the SEOC project should be refused as some persons given acquisition rights in condition 1 and Table 1 of Sch 3 may choose not to sell but rather expose themselves to high dust levels, is fundamentally unsound. It would not be consistent with the orderly and economic development of land, an object of the EPA Act, for a project to be refused based on such a foreshadowed action by individual property owners opposed to a project.

Landholder uncertainty

392 Given the scale of the SEOC project and environmental impacts associated with it, the Applicant submitted the Court should not grant approval where the project cannot currently be carried out due to the uncertainty this will cause landowners affected by the SEOC project (ASOFC par 68).

393 The Minister submitted that this is not a rational basis to refuse approval. If the Court is otherwise satisfied that approval should be granted for the SEOC project, it would not be appropriate to withhold approval because there may be some uncertainty about whether the project will in fact be carried out. This is a common state of affairs. Approval for a project, as with consent for a development, does not carry with it an obligation to carry it out. Ashton submitted that this is a property ownership issue, not a planning issue. Landholder uncertainty is not a reason for refusing the project. Project approval will produce certainty that the project will proceed.

Camberwell common

394 The Applicant contended that the SEOC project will have significant impact on the historic and social values of the common known as property 167L, contrary to the principle of intergenerational equity (ASOFC par 59A). It is necessary to set out the history of this land about which there was no dispute until the most recent governmental actions taken in relation to it, and therefore whether it is a common.

395 Property 167L has been used by the villagers of Camberwell for recreation and agricultural purposes (cattle grazing and horse breeding) since it was originally set aside as part of a common, known as the Camberwell Common, in 1876. Improvements constructed by the commoners on property 167L include two dams constructed over the last 70 years, environmental rehabilitation and tree planting carried out on the southern side of the common, and working fences to contain cattle and livestock. On 16 April 2010, the former Camberwell Common was revoked and reserved for the public purpose of rural services, and a licence was granted to Ashton for access, site investigation and grazing. On 9 August 2013, the Glennies Creek Common Trust was established under s 4 of the *Commons Management Act* 1989 to manage the Glennies Creek Common, including property 167L. Ownership of property 167L is vested in the Glennies Creek Common Trust pursuant to s 14 of the Commons Management Act. Ashton does not have the consent of the Glennies Creek Common Trust for the mining of the common. The project was assessed and approved by the PAC at a time when property 167L had been revoked as a common and before ownership was vested in the Glennies Creek Common Trust.

396 The proposed conditions require Ashton to prepare a detailed oral history (condition 50 in Sch 3) and to prepare a Heritage Management Plan which must include photographic and archival recording of the heritage items identified in the EA, including the common (condition 51(e)).

Applicant's submissions

397 The impact of the SEOC project on property 167L as a common has not been assessed by the Director-General or the PAC. The historic and social values associated with property 167L as a common will be lost as a result of the mining of the SEOC project site. Property 167L is managed by the Glennies Creek Common Trust established under the Commons Management Act (exhibit A, vol 5, tabs 131-132). Formerly called the Camberwell Common, this land was owned and managed by the villagers of Camberwell as a common for more than 130 years, since 1876 (Mrs

Olofsson, 17 May 2013, par 20(g)). With the recent establishment of the Glennies Creek Common Trust, property 167L is once again to be owned and managed by the community as a common under the Commons Management Act.

398 Commoners have been using this land for more than 130 years for agricultural purposes such as cattle and horse grazing and breeding (Mrs Olofsson, 21 August 2013, par 5). The land is also of high cultural significance to the Aboriginal community, in particular the PCWP, as part of the cultural landscape they are seeking to conserve and protect for future generations.

399 During the site visit, Mrs McBain gave evidence at St Clements Church that:

> The Camberwell Common and its importance both historically and socially cannot be undermined. The recent decision to have the Common returned to the people was rejoiced despite the battle. One hundred and twenty five years it was held and cared for by this community and will continue to be a very important part of life here.

400 The EA also assessed the common as being of high local heritage significance (exhibit 1A, Appendix 14). At the time of the Director-General's report and the PAC approval, the Trust had not yet been established under the Commons Management Act.

401 The residents have clearly fought hard to have the common returned to the village, and given that history, it is unlikely that it would be further revoked in the future to facilitate the SEOC project. In these circumstances, the Court should accept the recent Government decision to return the land to community ownership, and the SEOC project should not be approved over the historic common at property 167L, contrary to the principle of intergenerational equity. The common is an important part of Camberwell village with social, cultural and historical values that are tied to the land. Those values will be permanently lost if the SEOC project is allowed to proceed. Depriving future generations of the opportunity to enjoy these

diverse and unique environmental characteristics for the sake of a short-term project with marginal economic benefits, is contrary to the principle of intergenerational equity, which requires the maintenance and enhancement of those values for the benefit of future generations.

402 In light of uncertainty arising during the hearing about whether a common had been created under the Commons Management Act (as distinct from the appointment of the Glennies Creek Common Trust to manage the area of Crown land), in oral submissions the Applicant maintained that the property is a common (TS 853/20). However, whether it is a common or not is not the major issue. What is important is that the land is of heritage significance to the Camberwell community (TS 854/15).

Minister's submissions

403 It is not strictly correct to say that property 167L has been "returned to the villagers of Camberwell for continued use as a common". The status of the land as a common was revoked in 2010 and the land was reserved for rural services under the *Crown Lands Act* 1989. The validity of the revocation of the common was confirmed in proceedings in this Court: *Olofsson v Minister for Primary Industries (No 2)* [2011] NSWLEC 181. There does not appear to have been any subsequent action taken by the Minister for Regional Infrastructure and Services to declare the area as a common. The step taken by the Minister for Regional Infrastructure and Services on 9 August 2013 was to establish, pursuant to s 4 of the Commons Management Act, the Glennies Creek Common Trust (exhibit A, vol 5, tab 131, p 5015). The Glennies Creek Common Trust was appointed as trustee of the reserves specified in the declaration, including Reserve 1027028. Part of Reserve 1027028 is an area (property 167L, referred to in the Applicant's submissions as the "Glennies Creek Common") which is within the SEOC project site. It appears that the steps by the Minister for Regional Infrastructure and Services on 9 August 2013 were taken upon the assumption that land reserved for rural services under the Crown Lands Act is amenable to management by a commons management trust under the Commons Management Act.

404 Contrary to the Applicant's submission, the Court should neither proceed on the basis that the status of the land will remain unchanged nor speculate about the likelihood of there being a further decision by the Minister for Regional Infrastructure and Services varying the status or management arrangement in respect of the land. Despite the Applicant's suggestion, the principle of intergenerational equity does not dictate that development decisions be made on the basis that land which has a particular status at a particular time should have that status in perpetuity. This is not an aspect of maintaining or enhancing for future generations the "health, diversity and productivity of the environment".

405 The Applicant has not identified any particular aspects of the Glennies Creek Common that suggest that a significant change is needed to the assessment of environmental impacts conducted to date in the Director-General's report, the Director-General's Addendum report or the PAC report. At the time of the EA conducted by Ashton (prior to March 2010), the area in question was a common. The EA submitted on 21 November 2009 indicated that "[c]onsultation with the Common Trust, Department of Lands, and residents of Camberwell village will be undertaken by ACOL to negotiate the closure and or relocation of [Glennies Creek Common]". The EA also noted that there were other temporary commons and travelling stock routes surrounding Camberwell which were available to the community (exhibit 1A, vol 1, tab 6, p S4-46 to S4-48). Two of those temporary commons are included in the areas covered by the appointment of the Glennies Creek Common Trust on 9 August 2013 (namely Lot 1 – DP1114623 (Reserve 1027048) and Lot 7300 (Part of Reserve 1027028)).

406 The Applicant has not established that the Glennies Creek Common (property 167L) possesses any particular environmental or social significance or amenity, such that the impacts of the SEOC project on that land are significant to the assessment process. The villagers of Camberwell have the benefit of other commons areas and travelling stock routes (exhibit 1A, vol 1, tab 6, p S4-46 to S4-48). There is no evidence

that property 167L serves any special purposes not served by other available land. The Director-General's report concluded that the impacts on property 167L and other identified heritage items would not significantly affect the overall heritage values of the area (exhibit 1, vol 1, tab 7, p 526). Its heritage status has been assessed and covered by heritage conditions (TS 799).

407 Property 167L is owned by the Crown and is subject to further action by the Commons Management Trust, as well as the Crown, in respect of its status and ownership. This is essentially the same situation that pertained when the EA was prepared in November 2009 (exhibit 1A vol 1 tab 6 p S4-46 to S4-48). The action taken by the Minister for Lands in April 2010 revoking the common demonstrates that the status of the land is subject to change.

Ashton's submissions

408 Property 167L is not a common as established under the Commons Management Act. There has not been a declaration of the creation of the common for the purposes of the Commons Management Act. There has been a purported declaration of a trust but this is so in the absence of something to which the trust can be applied, namely the existence of a common (TS 759). Property 167L had its status as a common revoked. The alternative or replacement common has been provided by Ashton and is being used as a common.

409 The heritage value has been assessed in the EA (exhibit 1A, Appendix 14, European Heritage Assessment), and the Applicant did not adduce any expert heritage evidence to the contrary of that analysis. Page 35 of Appendix 14 assesses the heritage significance of property 167L as of high local significance. As it will be affected directly by the open cut and out of pit emplacement, an ex situ conservation by relocation is recommended as a potential solution.

Property 167L not a common

410 For the reasons outlined in the Minister's and Ashton's submissions above at par 403 and 408 property 167L is not declared as a common under the Commons Management Act. Somewhat curiously the Glennies Creek Common Trust has been established under the Commons Management Act to manage the property but that does not render it a common. Its use as a statutory common is at an end unless that status is returned to it by the relevant Minister, about which I have no evidence. Given its relatively recent revocation to enable exploration by Ashton I can infer that outcome is unlikely. Other areas of common have been identified under the Commons Management Act.

411 Regardless of whether the property is a common, the Applicant's principal submission is that property 167L has great historical and cultural significance to the Camberwell community which will be lost if the SEOC project is approved. Based on the evidence of Mrs Olofsson and Mrs MacBain of the longstanding use of the land, that is demonstrated. While the Minister and Ashton can submit that the land's heritage value has been assessed, as it appears to have been, its loss remains a relevant impact to consider as one of the social impacts of the SEOC project. The various social impacts of the SEOC project referred to in this section of the judgment, namely whether the noise and dust measures are unacceptable, landholder uncertainty and the historic significance of the common cannot be considered in isolation and will be considered as part of the balancing exercise I undertake at the end of the judgment to determine if approval ought be granted.

Economic costs and benefits

412 The Applicant contended that ESD requires consideration of the principle of improved valuation, pricing, and incentive mechanisms, such as the integration into the valuation of the SEOC project of the costs of all environmental factors including externalities of the project. The SEOC

project will result in significant social, environmental and economic costs that have not been adequately assessed for the project, contrary to ESD and the public interest. The actual or potential environmental harm arising from the SEOC project, and the consequential economic and social harm, outweighs the claimed short-term social and economic benefits of the proposed mining operation contrary to ESD and the public interest (ASOFC par 63-64).

413 This part of the Applicant's case is particularised as aspects of the methodology used to generate the cost benefit analysis (CBA) of the SEOC project are inappropriate and the CBA is deficient in that it is not supported by appropriate data. The CBA fails to appropriately assess non-market valuations. The CBA overstates the value placed on social benefits of employment. The CBA fails to adequately and appropriately assess externalities.

414 The following have not been adequately identified and weighed as a cost arising from the SEOC project:

(i) The economic costs associated with changes to mine operating procedures;

(ii) the economic costs associated with increased health impacts;

(iii) the social costs of noise, air quality and amenity impacts on residents, including acquisition and non-acquisition zone residents, are undervalued;

(iv) the economic costs of changes in landscape functionality;

(v) the risk of local farming operations closing down due to the likely health impacts of the project;

(vi) the CBA does not value the social fabric of rural communities or include an assessment of social costs of displacement of communities;

(vii) the impacts on Aboriginal cultural heritage;

(viii) the economic costs (including loss of value to the HRSTS) associated with the long term management of impacts to the Hunter River and associated tributaries;

(ix) the ecological impacts arising from the project; and

(x) the economic costs of the mitigation of climate change attributed to the project.

415 The DGRs on social and economic issues require an assessment of the potential impacts of the SEOC project on the local and regional community, paying particular attention to its potential impact on the village of Camberwell, and the demand it may generate for the provision of additional infrastructure and services. A detailed assessment of the costs and benefits of the project as a whole, and whether it would result in a net benefit for the NSW community is also required (exhibit 1A, vol 1, tab 13).

416 The Guideline for the Use of Cost Benefit Analysis in Mining and Coal Seam Gas Proposals from the Department (Department's guideline) states that estimating environmental impacts involves three stages. These are estimating the physical impacts, estimating the effects of these impacts on business and on households, and valuing these impacts. In the third stage the Department's guideline states that the impacts on health and amenity need to be valued (exhibit A, vol 5, tab 122, p 4776). The Department's guideline states that CBA should incorporate all relevant economic, social (including health) and environmental impacts (p 4778). Concerning unquantified impacts, the Department's guideline states that they should be discussed in the CBA but these impacts should be viewed in the context of the quantified net public benefit or cost (p 4778). Regarding distribution effects, the Department's guideline states that while the main objective is to estimate the impacts on NSW, in the first instance, it will generally be most practical to assess all major costs and benefits to whoever they accrue. Most public expenditure, environmental impacts and

other economic effects are likely to be NSW costs or benefits. An exception is mining, for example, which may involve non-local ownership. Most of the other economic impacts will also affect mainly NSW workers or businesses, with some benefits accruing to non-NSW interests (p 4779).

417 Economic costs and benefits were assessed in the EA Appendix 18 by Gillespie Economics using a CBA and in Appendix 17 by the Hunter Valley Research Foundation using an input/output model analysis.

418 The Director-General's report summarises the EA concerning economics as:

> Regional Economic Impacts
> The assessments indicate that the project would have considerable socio-economic benefits to the region and the State over its life, including:
> At the mine:
> ·160 direct jobs during operation;
> ·130 direct jobs during construction; and
> ·$50 million initial direct capital investment.
>
> For the Regional Economy:
> ·$2.3 billion in direct and indirect output; and
> ·682 direct and indirect jobs
>
> For the NSW and Federal Economy:
> ·$125 million in revenue to the NSW government, including:
> $99 million in coal royalties; and
> $26 million payroll tax; and
>
> ·$151 million in revenue to the federal government; including:
> $92 million income tax;
> $29 million indirect taxes; and
> $31 million company tax.

419 The Applicant sought the assistance of Mr Campbell, economist, whose first affidavit dated 16 May 2013 critiqued the EA studies. These studies were not ultimately relied on at the hearing by the Minister or Ashton. Further economic assessment by Dr Fahrer, director ACIL Allen Consulting, economist, was undertaken on behalf of Ashton. Mr Campbell affirmed a further affidavit commenting on the CBA undertaken by Dr Fahrer (dated 9 August 2013). Dr Denniss provided a critique of the

computable general equilibrium (CGE) modelling undertaken by Dr Fahrer on behalf of the Applicant. The Minister relied on aspects of these respective reports.

Cost Benefit Analysis (CBA)

420 Dr Fahrer, called to give evidence by Ashton, affirmed an affidavit dated 11 July 2013 to which his report was attached. Dr Fahrer conducted a CBA as set out in his report. Dr Fahrer states that CBA is a method of economic analysis with the primary objective of determining whether a proposed project is economically efficient, relative to the alternative of not doing the project (Dr Fahrer report p 17). The benefits in a CBA are amounts known as consumer surplus and producer surplus. The costs are the opportunity costs of the resources that are used up in the project (Dr Fahrer report p 18).

421 The benefits of the SEOC project according to this analysis are revenues (to Chinese national shareholders in Ashton), royalties (to the NSW government), payroll tax (to NSW government) and corporate tax (to the Commonwealth government) (Dr Fahrer report p 36). The costs of the SEOC project other than the reduction of property values in Camberwell village are capital expenditures, operating expenditures, carbon costs, water costs, land costs and mine site rehabilitation costs (Dr Fahrer report p 37 and 38). The loss of property values in Camberwell village due to the disutility from noise, reduced air quality and loss of amenity is $7.2 million (Dr Fahrer report p 38). The economic impact on seven neighbouring rural properties was also analysed. For Mrs Bowman's property it was assumed that the economic value will permanently be reduced to zero. For Mr Bowman's property it was assumed that it will lose its income stream during the life of the mine but will return after the mine is closed. The annual loss of income for these six properties is $1.4 million (Dr Fahrer report p 39).

422 The net benefits (the benefits minus the costs) from the SEOC project ($million 2014 -15 prices) at three different discount rates of four per cent, seven per cent and ten per cent are produced in the following table:

	Four per cent	Seven per cent	Ten per cent
Benefits	$1552.0	$1345.9	$1175.5
Costs	$976.3	$868.6	$778.4
Net benefits	$575.7	$477.3	$397.1
Benefit cost ratio	1.6	1.5	1.5

423 This analysis was then subjected to sensitivity testing (Dr Fahrer report p 40).

424 In relation to externalities Dr Fahrer at par 105 states:

> My reading of the documentation on the SEOC Project points to the conclusion that all three types of methods of dealing with the externalities of the SEOC Project will be employed. Inasmuch as regulation, pricing or bargaining sufficiently nullify the externalities, there is no need to add additional costs to the CBA. This being the case, the various criticisms made by Mr Campbell of the Gillespie CBA are, mostly, wrong.

425 Dr Fahrer identified the externalities associated with the SEOC project including air quality and health, greenhouse gases, property values, water licensing, biodiversity offsets, heritage and agriculture. He did not make any change to his CBA as a result of that discussion.

426 Mr Campbell in his affidavit dated 9 August 2013 criticised the CBA undertaken by Dr Fahrer because it does not attempt to estimate the costs and benefits of the SEOC project to the NSW community as required by the Department's guideline and the DGRs.

427 Dr Fahrer argued that because the Australian mining industry is heavily foreign-owned, inclusion of benefits accruing to foreign shareholders should be given weight in a CBA of a mining project. Mr Campbell disagreed stating that the high level of foreign ownership is a reason to

also consider the welfare implications of projects from an Australian or NSW point of view. Mr Campbell agreed that foreign investment increases output and the rate of development of resources above levels that would be achieved with Australian investment alone. However, whether the development of Australia's resources proceeds at a rate and in a manner which optimises outcomes for Australia is less certain. Merely maximising output levels does not ensure that Australian/NSW resources are being used in a way which maximises benefits to Australians and citizens of NSW.

428 Mr Campbell also criticised Dr Fahrer's CBA analysis for the double counting of benefits from state or federal taxes, royalties and subsidies. Mr Campbell also criticised the coal prices and exchange rates used by Dr Fahrer. Mr Campbell criticised Dr Fahrer's position on the assessment of externalities in the CBA whereby no attribution of cost for these was allowed. Where disagreement exists between technical experts in other fields, Mr Campbell stated that economists should reflect this uncertainty in their assessments.

429 Mr Campbell and Dr Fahrer prepared a joint report (exhibit M). Dr Fahrer and Mr Campbell agreed that the approach taken by Dr Fahrer gives equal weight to the welfare of overseas shareholders and to the welfare of NSW residents and that the net benefits of the SEOC project to the NSW community will be lower than the net benefits accruing globally as estimated in Dr Fahrer's affidavit (exhibit M par 10).

430 Mr Campbell stressed that the immediately quantifiable benefits of the SEOC project to NSW consist of royalties, payroll tax and a share of corporate tax. Based on the production price and cost assumptions provided to Dr Fahrer by Ashton, Dr Fahrer calculates the following present values at a 7 per cent discount rate (exhibit M par 11):

	Total (AU$ million)	Percentage accruing to NSW	Benefits to NSW (AU $ million)
Royalties	73.4	100	73.4
Payroll tax	6.6	100	6.6
Corporate tax	29.3	27	7.9
	109.3		87.9

431 Dr Fahrer believes that there are other, unquantified benefits to NSW residents from foreign investment, relating to the transfer of technology and management expertise. Mr Campbell did not agree that such benefits are likely to be significant for the SEOC project. The experts agreed that such benefits are not included under standard CBA practice and they are not mentioned in the Department's guideline (exhibit M par 12).

432 With respect to coal prices, Mr Campbell and Dr Fahrer agreed that the analysis in Dr Fahrer's report was based on semi soft coking coal prices provided to Dr Fahrer by Ashton (exhibit M par 14). The main coal prices used in Mr Campbell's report are forecasts of the average monthly spot price by the Commonwealth Bank. Mr Campbell believed that the premium paid for longer term contracts does not account for the difference between the prices provided to Dr Fahrer and those of other analysts (exhibit M par 17).

433 The experts agreed that if the data for royalty calculation provided to Dr Fahrer were applied to the Commonwealth Bank's estimates for future semi soft coking coal prices, the present value of royalty revenue to NSW would be between $55.1 and $56.1 million (exhibit M par 18).

434 The experts agreed that the net present value (NPV) of royalties (using a 7 per cent discount rate) is $73.4 million, the NPV of corporate tax (using a 7 per cent discount rate) is $29.3 million, and the NPV of payroll taxes (using a 7 per cent discount rate) is $6.6 million (exhibit M table). The experts held differing views concerning externalities in the CBA analysis (exhibit M table).

Computable general equilibrium (CGE) modelling

435 Dr Fahrer also conducted CGE modelling. Dr Fahrer describes CGE modelling as:

> CGE models mimic the workings of the economy through a system of interdependent behavioural and accounting equations which are linked to an input-output database. These models provide a representation of the whole economy, set in a national and international trading context, starting with individual markets, producers and consumers and building up the system via demands and production from each component. When an economic shock or disturbance is applied to a model, each of the markets adjusts according to the set of behavioural parameters which are underpinned by economic theory.

436 The macroeconomic impacts of the SEOC project are summarised in the following table (Dr Fahrer report p 4):

Measure	Unit	New South Wales	Australia
Real economic output (GSP/GDP) - Total	2014-15 A$ million	1,047	1,065
Real economic output (GSP/GDP) - NPV	2014-15 A$ million	598.0	607.6
Real income (consumer welfare) - Total	2014-15 A$ million	554.0	646.7
- Net present value (NPV)	2014-15 A$ million	333.5	388.1
Employment (direct and indirect)	Employee years	1,316 total FTE years Average 164 FTE	1,403 total FTE years Average 174 FTE

437 On the assumption a high proportion of potential employees for the SEOC project will live in the local region, a significant amount of the additional personal incomes that are generated as a result of the SEOC project are projected to stay in the local region. However since probably only a very small proportion of the SEOC project is owned by local residents, a significant portion of the wealth generated will be transferred outside the local region primarily to overseas shareholders (in China). The NSW Government will receive additional royalties based on the additional coal production (Dr Fahrer report p 11). The increase in the average real

income of all current residents of the local region at discounted present values using a seven per cent discount rate will be approximately $1,900 per person (Dr Fahrer report p 12). CGE modelling cannot identify the distribution of any modelling potential income.

438 There will be an average annual increase in the local region of 78 full time equivalent (FTE) jobs, in NSW as a whole of 164 FTE jobs and Australia as a whole of 174 FTE jobs (Dr Fahrer report p 13).

439 Dr Denniss, economist and executive director of the Australia Institute, was called by the Applicant. He affirmed an affidavit dated 9 August 2013. He states that the key results of Dr Fahrer's modelling are:

(a) Should the SEOC project go ahead Australia's gross domestic product (GDP) will increase by 0.04 per cent. Such a change, were it to be achieved, would be statistically invisible in the Australian National Accounts.

(b) Given that the SEOC project will be 100 per cent foreign owned, 89.4 per cent of the claimed $968.5 million increase in the local economy will flow offshore as a result of transfers to the foreign owners.

(c) The SEOC project will create 78 local jobs, a further 86 jobs across the rest of NSW and a further 12 jobs across the rest of Australia. Placed in the context of an Australian population such changes, were they to be achieved, would be statistically invisible.

(d) Even during the construction phase of the SEOC project there will be very few additional jobs created as the construction investment from the SEOC project will "crowd out" construction activity in other parts of the economy or, in the words of Dr Fahrer "the project and flow on industries will therefore need to attract workers from other industries with the result being that

the cumulative job impact is not as high as might be expected."

(e) $1,900 per person is an average which is not representative of the benefits to the vast majority of local residents.

440 Dr Denniss criticised the CGE modelling undertaken by Dr Fahrer because of a failure to identify economic benefits to NSW, the significance placed on foreign ownership, and the lack of detail concerning the terms of trade benefits he attributed to the SEOC project. In oral evidence Dr Denniss criticised the lack of assessment of the environmental, cultural and health costs (externalities) or the distribution of benefits (TS 547).

441 Dr Fahrer and Dr Denniss prepared a joint report on CGE modelling which identifies a number of issues to be considered (exhibit L).

Nature and extent of crowding out

442 The experts agreed that the increase in employment associated with the construction of the SEOC project will lead to the destruction of a similar number of jobs elsewhere in the economy. This is a result of Dr Fahrer's modelling assumption regarding the labour market that the total number of jobs in Australia will be substantially unaffected by the SEOC project.

Income remaining in the local region

443 The experts agreed that the Tasman Global model used estimates that the SEOC project will generate $968.5 million of production. The estimated production that will flow to those outside of the country is $669.7 million. The model estimates that 17 per cent of the estimated benefit will remain in the region.

Geographic distribution of economic benefits

444 Dr Fahrer writes in his report "most of the real income benefit associated with the SEOC Project, in absolute rather than per capita terms, is

projected to accrue to residents outside the local region (primarily to overseas shareholders). This was agreed by the experts.

Negative local employment effects

445 The experts agreed that the modelling conducted by Dr Fahrer shows that while the SEOC project will employ 162 people directly, local employment will only increase by 78 suggesting that 84 local jobs will be displaced by the SEOC project. This is a result of Dr Fahrer's modelling assumption regarding the labour market that the total number of jobs in Australia will be substantially unaffected by the SEOC project.

Small regional and national employment effects

446 The experts agreed that the modelling results suggest that the SEOC project will increase employment across the rest of NSW by 86 jobs and across the rest of Australia by 10 jobs. This is a result of Dr Fahrer's modelling assumption regarding the labour market that the total number of jobs in Australia will be substantially unaffected by the SEOC project.

New mines crowd out other economic activity

447 Dr Fahrer wrote in his report that "the project and flow on industries will therefore need to attract workers from other industries with the result being that the cumulative job impact is not as high as might be expected." The modelling results suggest that the cumulative job impact across Australia is 162 project jobs and 12 indirect jobs. This was agreed by the experts. This is a result of Dr Fahrer's modelling assumption regarding the labour market that the total number of jobs in Australia will be substantially unaffected by the SEOC project.

Employment

448 Dr Denniss in his report (par 10-11) notes that a result of the modelling is that while the SEOC project itself will employ 162 people the net increase in employment in the region will be 78 jobs, implying that some people who are employed in the SEOC project will live outside the local region and/or there will be crowding out of other local jobs. The experts agreed that this

is correct. As stated in Dr Fahrer's report (p A-I 1), an assumption of the modelling is that 75 per cent of the employees in the SEOC project will live in the local region with the remainder living in the rest of the Hunter region. If a greater proportion of the workforce lives outside of the local area then the benefits to the local economy would be further reduced. The labour market assumptions which lead to crowding out of other jobs (but not complete crowding out) are explained in Dr Fahrer's report (sections 2.6 and 2.7 and Attachment A).

449 Dr Denniss notes that no evidence is provided to support the assumption that 75 per cent of employees will live in the local area. Dr Fahrer's understanding is that currently around 75 per cent of Ashton's employees live in the local region. Dr Denniss notes that as mining activity expands the likelihood that workers with the necessary skills will be living locally will diminish.

Size of economic impacts

450 In his report Dr Denniss describes the economic impacts as "trivially small". The experts agreed that as a percentage of Australian GDP, NSW Gross State Product (GSP), national income or NSW income, the impacts are certainly small (0.12 per cent of NSW's current GSP and 0.04 per cent of Australia's current GDP). The impact on the Australian labour market would not be visible at the second decimal place. The process of generating an NPV involves taking a flow of benefits over many years and converting them into a lump sum benefit. Dr Fahrer did not agree with the use of the term "trivial."

Terms of trade benefits

451 Dr Denniss (par 19-22) states an increase in Australian coal production is likely to have a small, negative impact on the world price of coal. This is difficult to reconcile with positive terms of trade effects on real income. The experts agreed that the Australian Bureau of Statistics (ABS) defines the terms of trade in terms of the relative price of exports and the relative price of imports. The ABS does not include exchange rate effects in their

measure of the terms of trade. The experts also agreed that an increase in coal production from the SEOC project is likely to have a very small negative impact on the world price of coal and in turn a negative impact on the terms of trade. Dr Fahrer's modelling reports instead that a positive terms of trade effect can be expected.

452 The experts disagreed as to whether or not the ABS definition of terms of trade should be used.

Submissions

453 The Applicant submitted that the CBA is flawed for four key reasons:

(a) Arithmetic error: it is agreed that the CBA contains an arithmetic error which overstates the global value of the SEOC project by approximately $100 million, and brings its value down from $477 million to $368 million.

(b) Pricing assumptions: Dr Fahrer uses coal pricing assumptions which are the most optimistic of any analyst to examine the SEOC project and well above forecasts of independent analysts such as the Commonwealth Bank. The prices assumed by Dr Fahrer are not based on contracts obtained by Ashton.

(c) Scope: Dr Fahrer erroneously adopts a global scope for his analysis, contrary to the Department's guideline and the DGRs. It is agreed that, depending on the coal pricing assumptions, the value to NSW is between $55 million and $87 million.

(d) Externalities: contrary to the Department's guideline, no attempt has been made to cost the external costs of the SEOC project on the environment, or heritage, beyond mitigation measures included in the operating costs of the project. Any residual external costs are

borne by the NSW community, but are ignored by the CBA.

454 Dr Fahrer's CBA and CGE modelling heavily overstate the economic case for the SEOC project. The modelling contains errors, major technical flaws, and unjustified optimistic assumptions. Dr Fahrer's analysis contravenes the guidance of NSW government departments and orthodox economic practice. The analysis provides little evidence of significant economic benefit to the people of NSW and ignores serious environmental and social costs.

455 The Applicant criticised the CGE modelling because the model predicts an increase of 78 local jobs and 12 jobs nationally, a statistically invisible number. There would be loss of jobs in the local dairy industry, particularly at Mr Bowman's farm. The increase in real income to local residents of $1,900 per person is exaggerated because it is an average, covers the life of the SEOC project meaning a modest $200 per year increase and will be distributed disproportionately. The terms of trade benefits are not correctly modelled. The CGE model does not include welfare effects as well as economic benefits. It ignores external costs and takes no account of environmental costs, such as impact on Aboriginal cultural heritage.

456 The Minister submitted the Court would be comfortably satisfied that the SEOC project would present a net benefit to NSW. For example, even if the amounts attributed to "terms of trade" were wholly excluded from Dr Fahrer's calculations, the identified benefit to NSW would still be in the order of $200 million having been reduced by $100 million.

457 Ashton submitted that the SEOC project will have a positive economic benefit as confirmed by the report and oral evidence of Dr Fahrer. As a minimum Mr Campbell finds a substantial positive dollar amount of $87.9 million as a benefit to NSW from the SEOC project. There is no sound basis for concluding that any environmental costs would be anywhere near this amount. Dr Fahrer alone conducted a CGE modelling exercise. He

found that in terms of real income generated, NPV applying a 7 per cent discount rate is $A388.1 million with employment an average of 174 full time positions each year. The joint report of Dr Fahrer and Dr Denniss (implicitly) confirms that the increment to real economic output in the local region from the SEOC project will be $552 million with a real income per person of $1,900 per person. It is agreed local employment will increase by 78 jobs.

458 The CBA undertaken by Dr Fahrer considers the environmental and social costs of the SEOC project in detail. On any view of the evidence the economic benefits after environmental and social externalities are taken into account is overwhelmingly positive to an amount of many hundreds of millions of dollars. The 162 persons employed at the SEOC project will spend predominantly in the local area and help support local businesses.

459 The CBA includes the benefits and costs accruing to foreigners. That is appropriate. Further, the economic benefits of mining in the Hunter Valley would be largely absent without foreign ownership. The debate about whether foreign benefits are included or not in a CBA is not determinative of the question whether there is a substantial positive outcome for NSW resulting from the SEOC project. This is established by par 11 of the joint report of Mr Campbell and Dr Fahrer where an agreed figure of $A87.9 million for royalties, payroll tax and corporate tax is identified.

Some economic benefit established

460 Economic modelling of future projects is an attempt to define in dollar terms the costs and benefits of a project. Such modelling is not an exact science. The variation in the benefits derived from the various economic models undertaken for this project in the EA and in these proceedings underscores the different nature of those models and the potentially wide difference in outcomes these can produce. The economic models in the EA were not relied on by either Respondent. The very large economic benefits through taxes, job creation and investment incentives identified in

the Director-General's report based on that model is set out above at par 418.

461 Dr Fahrer undertook CBA and CGE modelling. These two modelling exercises were generally accepted by the experts called by the Applicant as more appropriate models to use in relation to the economic assessment of a proposed mine than an input-output model. The economic benefits of the project in terms of government and community income and job creation are far more modest in Dr Fahrer's modelling than the studies in the EA and the statements in the Director-General's report set out above at par 418. The evidence before me suggests the predicted economic benefits identified in the Director-General's report were substantially overstated particularly in relation to predicted employment.

462 Dr Fahrer's CBA did not address the requirement specified in the DGRs and the Department's guideline of quantification of the economic benefits to the State of NSW. The lack of identification of such benefits was essentially "cured" in the course of joint evidence with Mr Campbell. Failing to comply with the DGRs and the Department's guideline is regrettable. On the assumptions and modelling conducted by Dr Fahrer the greatest economic benefits by far are predicted to accrue to the Chinese shareholders of Ashton by some hundreds of millions of dollars. Regardless of the criticisms of Mr Campbell and Dr Denniss there are predicted economic benefits accruing to NSW at the government and community level, which will vary depending on the price of coal on world markets amongst a number of other variables (as reflected in the evidence summarised in par 432 and 433).

463 A summary of the expert evidence on CBA is identified above. While there was disagreement in some respects it is unnecessary to determine those disagreements. The experts agreed in relation to the CBA, as identified above in par 434, with royalties, corporate tax and payroll tax amounting to approximately $109.3 million as benefits accruing to the NSW and Commonwealth governments.

464 No specific costing of externalities was undertaken by Dr Fahrer in the CBA, a criticism made by Mr Campbell. As identified above in the quote in par 424, Dr Fahrer considered the predicted negative effects of the SEOC project and concluded that there was no need to make any specific reduction in the predicted benefits because the measures proposed by Ashton to deal with these impacts such as regulation, pricing or bargaining sufficiently nullified the externalities. Impacts on Aboriginal cultural heritage, water and air quality, health, agriculture, greenhouse gases and biodiversity offsets were considered by Dr Fahrer. To the extent externalities were part of operational costs these were otherwise accounted for and allowance was made in relation to loss of property values. Given the evidence I have heard and the conclusions I have reached that is a reasonable assumption in relation to Aboriginal cultural heritage, loss of agricultural soil (landscape functionality) and impacts on groundwater and surface water (identified in par 414 (iv), (vii), (viii)). As I have not received evidence from the Applicant in relation to ecological impacts (par ix) I cannot form a view about that matter. The greenhouse gas impacts from mining were identified as an issue and discussed extensively in *Hunter Environment Lobby Inc v Minister for Planning* [2011] NSWLEC 221. None of those issues have been identified in the Applicant's case and apart from the reference to climate change mitigation above in par 414 (x) of the ASOFC the Applicant did not make any specific submissions in relation to that topic.

465 Economic costs associated with increased health impacts, social costs of noise, air quality and amenity impacts on residents and farmers (par 414 (ii), (iii), (v)) are also not costed as an externality. One of my findings in relation to air quality impacts is that there will not be serious health impacts resulting for residents of properties in Camberwell village. There are several rural properties that the experts agree will be adversely affected and voluntary acquisition of these properties is proposed. These matters will be considered as part of my final conclusion in the next section.

466 No expert evidence related to noise has been presented. Residents of the village have expressed concern about the inevitable noise that will be caused by blasting during the SEOC project. There are conditions proposed to manage those impacts and the Applicant has not raised specific concern beyond these and expert evidence on this topic was not provided in Court. Dr Fahrer did attempt to cost the loss of property values due to disutility from noise, reduced air quality and loss of amenity. Dr Fahrer did cost total loss of agricultural productivity for Mrs Bowman's farm, and partial loss for Mr Bowman's property on the basis that production will be lost for the seven year duration of the mine.

467 As the Applicant submitted (par 414 (vi)) the CBA does not value the social fabric of rural communities or include an assessment of the social costs of displacement of communities. Whether a CBA can do so is unknown to the Court and I infer is likely to be one limit to this (or any) form of economic modelling.

468 In terms of the CGE modelling of national, regional and local economic impacts by Dr Fahrer, the evidence of the experts is summarised above at par 435-452. The experts were able to agree several matters as outlined in relation to employment generation, the impact on jobs in other sectors of the economy locally and the geographic distribution of economic benefits being largely offshore.

469 An overall increase of 78 jobs is predicted, now relatively modest compared to original forecasts. This will have a largely local benefit. The additional predicted income of $1,900 per person over seven years is modest as the Applicant submitted and would not accrue to every member of the community. While Dr Denniss criticised aspects of the CGE modelling in relation to the approach taken to the terms of trade, as the Respondents submitted that figure still suggests considerable benefits to Australia even if reduced by half. As the Respondents submitted, applying conservative figures to Dr Fahrer's CGE modelling suggests that there will

be real economic benefits at the local level with an agreed and sizeable amount of income to the NSW government in royalties.

470 The same criticism of the CGE modelling for failing to cost externalities was also made by Dr Denniss, a matter I have considered above.

471 Economic benefits are likely to result from the SEOC project, albeit markedly less than those predicted in the EA and apparently accepted by the Director-General in the Director-General's report. That the greatest predicted economic benefit is to the Chinese shareholders of Ashton is not the key issue in terms of the analysis I must undertake of whether this project should be approved or refused. On the evidence before me, the employment benefits are largely local with reasonably substantial returns to the NSW government and more modest returns to the Commonwealth government (and therefore the community) at the state and national economy levels. Overall these benefits are sizeable being many tens of millions of dollars. It is beyond the scope of this merits review of a single mining project to evaluate the wider economic policies developed in relation to coal mining in NSW. Whether royalty rates and other taxes are set at an optimum level to ensure that adequate benefits flow from this and other coal mines to the local, regional and national levels of the economy is unknown to the Court.

Further lay evidence

472 The Court heard the evidence of objectors during the view in Camberwell and at the Singleton Court House. Some of this evidence has been referred to earlier in the judgment where relevant to an issue, see par 37, 67, 70, 71, 72, 73, 75, 97, 103, 108, 174, 197, 198, 199, 200, 201, 202, 239, 240, 257, 314, 320, 330, 362, 363, 364, 367, 376, 382, 383, 390, 397, 398, 399, 411 and 466. Notes of this evidence and statements given by objectors were tendered by the Minister (exhibit 2). The Court visited a number of properties on the view.

Property 129 – Mrs Bowman's farm

473 Mrs Wendy Bowman lives at property 129 identified in the SEOC project schedule. Her property is required as part of the proposed mine site. Mrs Bowman moved to the property eight years ago. Mrs Bowman showed the Court solar panels on her roof with two cleaned panels and the rest left not cleaned. She stated that the coal dust was so thick she could not clean it. The last time she cleaned the solar panels was six months ago. She has had her water tank tested and the water is high in arsenic and mercury.

474 In her affidavit dated 15 May 2013 Mrs Bowman states that she is the director of the Ashton Pastoral Company which is part of the family estate of her late husband. This company runs the beef cattle operation at property 129. Mrs Bowman outlines the long connection her family has with the Camberwell area. She is unwilling to sell property 129. Mrs Bowman outlined the negative impacts mining can have on dairy cattle and the previous land uses of property 129. Mrs Bowman outlines the improvements made to property 129 and believes that the land could be used to grow anything. She states the worst impact of mining has been air pollution. She is concerned that dust pollution from mines is a very common health problem for residents in the Singleton Muswellbrook area.

475 Mrs Bowman has been approached by Ashton twice to sell property 129 but has refused because she is aware that the waterway on property 129 is very important to people downstream and she believes there is a real risk that water in Glennies Creek will be damaged by the SEOC project. She has observed animals including quolls, kangaroos, echidnas, squirrel gliders, possums and goannas on property 129 and other parts of the SEOC project site. She wants to ensure that the area of native vegetation along the ridge next to property 129 is kept as a wildlife refuge. She is concerned that if the SEOC project goes ahead the animals will be trapped. She loves living at property 129 and wants to save it for future generations. If the SEOC project does not go ahead she will keep living at property 129.

Property 130 – Mr Bowman's farm

476 The Court also heard evidence from Mr Alistair Bowman at his property (property 130 in the SEOC Project Schedule). Mr and Mrs Maytom live on property 130 as property managers. The farm provides milk for 3,000 families and some cattle are exported. There are 80 milking cows and others for beef. Mrs Maytom stated that if dust gets into the vat the milk gets dusty and would have to be disposed of as it would not be taken off site. She said a seal could be placed over the hose that goes into the vat but the door to the milking shed could not be kept shut constantly because they move in and out a lot and there needs to be ventilation. Mr Bowman stated that disposing of milk is difficult and the company Dairy Farmers determines whether the milk is dirty. Mr Bowman stated that they have not had to dump milk from the new vat which was installed three years ago at a cost of $150,000 and will take ten years to pay off. Mr Bowman and Mrs Maytom both raised water security concerns.

477 Mr Bowman affirmed an affidavit dated 15 May 2013. He annexes a copy of a submission prepared by Orbit Planning on his behalf identifying the economic impact of the SEOC project on his property. Mr Bowman and his sister Ms Elizabeth Bowman own land in the Camberwell area. His family has continuously farmed in the Camberwell district since around the 1820s. The current income earned by the farming operation is around $750,000 per annum. Most of the income earned is spent locally. He has sought to continuously improve the property and business and plans to further improve the farming operation and property in Camberwell.

478 Mr Bowman believes that if the SEOC project is approved it will destroy his business, the reasons for which are described in the Orbit Planning submissions. Mr Bowman could not operate the farm at property 130 without the managers living there, which would not be possible if the SEOC project is approved. If the managers at property 130 are lost this would have flow on effects for Mr Bowman's other dairies and the herd on the nearby lots because property 130 is the main income stream for the business. If the SEOC project is approved, the blasting and vibrations

would likely affect his dairy operation by creating an unpleasant, distracting and potentially unsafe working environment for staff in the milking shed (which is about 500m from the pit), upsetting cows and calves and altering their behaviour.

479 Mr Bowman does not wish to sell his properties to Ashton because they are not just a business for him. Because of his family connection to the land he feels he is a custodian of it and feels a heavy responsibility to maintain, improve and pass on the land to future generations. If the SEOC project does not go ahead Mr Bowman intends to continue with his business and pass it on to one of his sons.

480 Mrs Maytom affirmed an affidavit dated 15 May 2013. Mrs Maytom states that she and her husband have been working for Mr Bowman since 1998. She lives on property 130 with her husband and four children. Her two eldest children also work on the farm, her youngest children are in school. Mrs Maytom outlines her observations of the air quality, health and blasting effects of mining in Camberwell. She also outlines why she wants to stay at property 130.

481 Since the NEOC mine began Mrs Maytom has observed very thick dust in the house. She has observed that when her eldest son stays in Camberwell his asthma is very bad and needs to use his Ventolin regularly. In 2011 he went to Dubbo for eight weeks and did not need to use his Ventolin but when he came back to Camberwell his asthma returned. Since mining began in Camberwell Mrs Maytom has observed that on some days the water in Glennies Creek is clear and other days is cloudy with coal dust making it too dirty for her to use which is particularly problematic for washing white laundry. Since mining started in Camberwell Mrs Maytom has experienced the house being shaken from the blasting and items falling from her bookshelf and breaking.

482 Mrs Maytom has stayed in Camberwell because she needs to earn enough money to support her family. She does not know how her family

would survive if they were unable to continue farming at property 130. She does not believe it would be possible to live on a different property and continue farming property 130 because in her experience farming is a 24 hour a day job. She also prefers living in the countryside and does not want to return to town.

483 If the SEOC project goes ahead Mrs Maytom will move away from Camberwell because she is concerned about the increased risk to her home and family from dust, noise and blasting. She does not know where she would take her family, her husband has been a dairy farmer his whole life and their family's income depends on the business at property 130.

484 Over the last year Mrs Maytom has been searching for rural properties in the Singleton Shire and further away but has been unable to find anything equivalent to property 130. She believes that it would be disruptive to her two school age children to move and it would split up her family as she has relatives in the Singleton area.

Properties 111 and 114 – Mr Bruce Richards and family

485 Mr Bruce Richards stated that someone cannot make a living on a property that is 270ha, that income needs to be supplemented. Mr Watling, his son in law who lives in the vicinity of Camberwell, believes there is a silent majority that want the mine.

486 Mr Bruce Richards affirmed an affidavit dated 20 June 2013. He has lived in and around Camberwell village his whole working life and believes he has a strong family connection to the area. He operates a beef cattle farm on agricultural land near Glennies Creek which is adjacent to a number of mines. He has spent 40 years working on and off for coal mines in the area.

487 Based on his experience of living in Camberwell village, he does not believe that the SEOC project will affect his way of life and through his observations of the NEOC and other mines surrounding Camberwell, any

potential noise and dust impacts can be managed through approval conditions. It has been his experience that any impacts from the NEOC mine to his property have been promptly managed to a high level by Ashton when he raised his concerns with them.

488 Mr Bruce Richards believes that the SEOC project will not have any significant noise impacts on Camberwell village due to the mitigation measures proposed. From his experience living near the NEOC mine which stopped operations at 10pm this was an effective way to manage noise and would be appropriate for the SEOC project. He also believes that the project approval conditions relating to air quality will satisfactorily control dust emissions.

489 Concerning water quality Mr Bruce Richards states that his children have grown up near a number of mines and they have been healthy. Ashton cleans their water tank. In relation to the cloudiness of Glennies Creek, Mr Bruce Richards believes this is from carp disturbing the mud at the bottom of the creek, not coal dust. He has not noticed any dust impacts on his cattle. He believes that the community dynamics in Camberwell changed long before Ashton began operating near Camberwell. He believes the SEOC project will bring direct and indirect economic benefits to Camberwell and Singleton, and his family would benefit from this.

490 Mr Mark Richards affirmed an affidavit dated 20 June 2013. He states that the mining industry assists farmers in that they can supplement their incomes through work as contractors in the mines. The NEOC mine was considered one of the best mines to work for because its shifts catered to farmers and families. He believes the SEOC project should go ahead for job creation and it would mean he could earn a steady income again. He states there is a lack of community connectedness in Camberwell. He believes Camberwell has benefited from mining such as through the upgrading of roads. He has not had any health issues and his cattle have not been impacted by dust.

491 Mr Watling affirmed an affidavit dated 20 June 2013. He believes Ashton's rehabilitation efforts and intentions are first rate. He and his family have had no health problems or dust issues in their water. He believes the SEOC project will help provide jobs for people locally who are struggling to find work.

Camberwell Church

492 Mrs MacBain, a historian, gave a statement to the Court at St Clements Church. She recounted the history of Camberwell, the importance of the Camberwell common and her concerns about a burial ground which has not been identified and explored. She wants the heritage of Camberwell to be protected and she believes there is a great feeling of loss of place occurring in the community.

Property 18 in village – Ms Turner

493 The Court viewed Ms Turner's property and heard her evidence. Ms Turner also affirmed an affidavit dated 15 May 2013. She believes mining has had a negative impact on the village and the SEOC project will destroy the village. She has seen negative impacts from blasting, dust, on the water she uses, lighting from mining, and noise. Ms Turner will not move if the SEOC project is approved but she may be forced to move if the impacts are too great.

Property 23 in village – Mr Lane

494 The Court viewed Mr Lane's property and heard him give evidence there.

Property 34 in village – Mr and Mrs Olofsson

495 The Court viewed Mr and Mrs Olofsson's property. Mrs Olofsson read a statement on behalf of her husband. Mr Olofsson is concerned about blasting and the lack of cumulative assessment. Mrs Olofsson then gave evidence, she is very concerned about the lack of cumulative assessment. Access to monitoring data on dust and noise must be provided through Government Information Public Access to the Department and the EPA

which application costs $50. The rehabilitation on the NEOC mine increased the shape of the valley and where the noise and dust goes.

496 Mrs Olofsson affirmed three affidavits dated 17 May 2013, 30 July 2013 and 21 August 2013. In her affidavit dated 17 May 2013 she states that she believes that prior to the NEOC mine Camberwell was a close knit community. Since the NEOC mine she has observed negative impacts from noise, dust, blasting, organic growth media used in rehabilitation, and changes in the community. She would move if the SEOC project is approved and would not take the option of being relocated for seven years.

497 In her affidavit dated 30 July 2013 she outlines her dealings on behalf of the Camberwell common, social events that have occurred in Camberwell and her concerns about Ashton operating outside the conditions of approval for the NEOC mine. In her affidavit dated 21 August 2013 she outlines the improvements on property 167L and what that land has been used for.

Property 35 in village – Mr and Mrs de Jong

498 The Court viewed Mr and Mrs de Jong's property and heard Mr de Jong give evidence there. Mr de Jong is very concerned about relocating for seven years, he does not want to split up his family or lose his beautiful vegetable garden.

499 Mrs de Jong affirmed an affidavit dated 14 May 2013. She feels there has been a loss of community and negative impacts of dust, blasting, noise and water supply from the NEOC mine. In 2008 her drinking water was declared undrinkable because of mineral pollution from the mines, a copy of the report by the Sydney West Area Health Service is annexed to her affidavit. She wants to continue living close to her family who are all in the area. She would not take up the option of a seven year relocation.

Mason Dieu – Mr Shearer

500 The Court viewed Mr Shearer's property in Mason Dieu and heard him give evidence there. Mr Shearer believes too many mines have been given approval to mine in too small an area. He has concerns about dust, drinking water, water quality for irrigation and light impacts. Maison Dieu is a locality several kilometres south of Camberwell.

501 Ms Melanie Long, who resides in Camberwell, affirmed an affidavit dated 20 June 2013. She does not believe the SEOC project will have an impact on her way of life as they are already surrounded by other mines.

502 Ms Nancy Montgomery affirmed an affidavit dated 20 June 2013. She lives in Camberwell village. As she and her family do not have any health problems caused by the existing mines she thinks it unlikely that she will suffer any health problems from the SEOC project. She believes that the SEOC project stopping operation at 10pm during the first two years will reduce any noise impacts for residents of the village. She supports the SEOC project because she believes it will bring people back to the Camberwell area, particularly those who lost their jobs once the NEOC mine closed. She does not believe that the vibe of the Camberwell community will change if the SEOC project is approved.

503 Mr Scotney Moore, Environmental and Community Relations Coordinator for Ashton, affirmed an affidavit dated 27 June 2013. He details the properties owned by Ashton in Camberwell, the money spent on major renovations and maintenance, and the works undertaken on those properties.

Evidence in Singleton Court House

504 A number of objectors gave evidence in the Singleton Court House. Mr John Drinan of the Singleton Healthy Environment Group detailed the outcomes of their investigations into air quality and health in the area. He also outlined their concerns about air quality in the area.

505 Mr Ian Moore of Jerrys Plains is concerned about the destruction of alluvial lands and putting aquifers at risk. Mr John Redgrove a dairy farmer at Scotts Flat is concerned about the impact on water quality for the dairy industry and the destruction of alluvial lands.

506 Ms Prue Bodsworth of the Wilderness Society Newcastle expressed concerns that:

(a) The impact of clearing 25ha by the SEOC project of the endangered ecological community Central Hunter Ironbark-Spotted Grey-Gum Box Forest which provides one of the few remaining vegetation corridors in the lower Glennies Creek catchment. The area provides habitat for the endangered spotted-tailed quoil, four threatened birds and three threatened micro-bats. The flora and fauna assessment was inadequate because there was no formal trapping.

(b) The inadequacy of the proposed offset area. The loss of 50 hollow bearing tress is not being offset which could result in local extinctions. The majority of the offset areas are over mine rehabilitated areas which are poor quality and the proposed biodiversity offset of 44ha of like for like vegetation is entirely inadequate.

507 Mr Peter Dixon-Hughes gave evidence representing the NSW Farmers Federation. He is concerned about the conservation of colluvial and alluvial lands for agriculture.

508 In relation to the concerns raised by lay witnesses, those related to water and air quality impacts and loss of agricultural land have been considered in earlier sections of the judgment. In relation to loss of an endangered ecological community the Applicant did not address this as an issue and at this stage the Court does not have any specific evidence before it on that issue. I will ask the Respondents to clarify what is intended in relation to the offset area in the context of the concerns raised by Ms Bodsworth.

Conditional approval possible

509 The Court must undertake a wide ranging consideration of matters relevant to the exercise of its discretion whether to approve the SEOC project. Under s 75J(2) the Court should consider the Director-General's report which has been done with references to that report in the judgment where relevant. As this is a merits appeal in which various environmental, social and economic issues are identified by the parties' submissions and extensive conditions to manage the impacts are proposed, it is necessary to evaluate all of these matters collectively to determine if it is in the public interest to approve the SEOC project. Part of that weighing up of merit issues requires consideration of the ESD principles which have also been referred to throughout the judgment. The Court has not concluded that there are likely to be threats of serious or irreversible environmental damage in relation to any of the issues identified by the Applicant. The most serious predicted impact is to the air quality of the five (Table 1) rural properties immediately surrounding the SEOC project site, which I discuss below.

510 Impacts of concern are the predicted air quality impacts and the potential social and economic effects of dealing with these for (Camberwell village and) the surrounding rural area. I do not agree with the Applicant that the only obvious avenue by which to avoid unacceptable impacts would be to require the removal of all residents from the area, which is not a measure the Court has power to effect in any event.

511 The Court has concluded that some issues are not a basis for refusal of the SEOC project. The impact on Aboriginal cultural heritage on the SEOC project site to the extent this is reflected in the identified archaeological sites does not warrant refusal and conditions of approval can be made to adequately deal with this matter. Loss of viable agricultural land is minimal and is not a basis for refusal provided that appropriate conditions are imposed. There is little risk of harm to the HRSTS resulting from the SEOC

project if implemented in accordance with the proposed conditions which include the LPB and final void. These same measures and the adequate hydrogeological modelling suggest that the level of impact on groundwater and surface water sources will be acceptable provided the conditions imposed are rigorous. More discussion on the conditions necessary in the event that the modelling forecasts are not as predicted will be undertaken with the parties.

512 One matter I have not dealt with earlier in the judgment is that part of the Applicant's case which alleged a failure to comply with EPIs, being the Singleton LEP and the Mining SEPP identified in par 19-21. These instruments are not binding on the Court but may be taken into account as part of its deliberations. The matters identified in cl 12 of the Mining SEPP have been considered to the extent they are relevant in this case. The matters identified in cl 14 of the Mining SEPP (par 20) have been considered to the extent they have been raised by the Applicant in these proceedings in relation to the consideration of impacts on significant water resources (subcl 1(a)). No issues in relation to biodiversity impacts or greenhouse gas emissions have been identified by the Applicant. There is consideration and assessment of these topics in the DGRs, the EA prepared on behalf of Ashton and in the Director-General's report. In relation to the objects of the 1(a) Rural zone in the Singleton LEP, the issue of agricultural viability, the use of rivers and water catchments and the maintenance of landscape quality have been considered in the course of this merits appeal. There is no basis for refusal of the SEOC project based on matters identified in these EPIs.

Rural properties

513 The air quality impacts have been exhaustively discussed in the section considering air quality above. In relation to properties outside Camberwell village, Dr Bridgman and Mr Todoroski agreed that (exhibit H par 85):

> The SEOC mine would result in large impacts at several residences located outside of Camberwell village. These residences are located within the mine boundary or to the NW or SE of the SEOC mine. Due to their NW or SE position relative to

> the mine, these receptors would experience high levels of dust from the mine and also high levels of dust borne on the prevailing winds due to existing conditions. It is not possible to reasonably prevent the impacts at these few receptor locations. These receptors are identified as RXXXXX [sic] and are afforded acquisition rights.

514 The PAC considered that the direct impacts on viable rural properties on the SEOC project site (Mrs Bowman's property) and to the south of the site are substantial. Several of these properties, including a large integrated dairying operation, are predicted to be adversely affected during the mining process and will need to be acquired or be offered the option of acquisition by Ashton. The PAC considered that multiple parcels of land combined into an integrated agricultural enterprise must be considered as a single entity for acquisition for dust or noise impacts provided the parcels are in reasonably close proximity to each other. This requirement was included in the approval conditions (exhibit A, vol 3, tab 30, p 2733).

515 The draft conditions identify eight parcels of rural land which are air quality impacted listed in Table 1 of Sch 3 which must be acquired by Ashton on the request of the landowner. The conditions relating to minimum air quality requirements do not apply to these properties (particularly conditions 22 and 23). Five of the identified parcels of land contain a dwelling, properties 83, 120, 121, 129 and 130. As property 130 contains two dwellings, a total of six dwellings will be impacted. The Court was referred during the hearing to other examples where similar conditions have been imposed in relation to other mining proposals to enable the resource to be won in circumstances where other private properties not owned by the mine were affected.

516 The Applicant criticised the proposed conditions as the acquisition properties are excluded from the obligation placed on Ashton to ensure that all reasonable and feasible avoidance and mitigation measures are employed in condition 22 and the air quality criteria in condition 23. The SEOC project cannot proceed unless these conditions do not apply to these properties. As the number of properties affected is small and other

measures in addition to acquisition are offered by way of amelioration to be paid for by Ashton, the necessary balance between winning this resource, which is in a fixed location, and imposing appropriate conditions is acceptable subject to what I say below in relation to economic impacts on neighbouring rural properties wishing to remain in business during the operation of the SEOC project and once it has ceased.

Camberwell village

517 I concluded at par 377 that the SEOC project is not predicted to cause serious health problems for residents of Camberwell village and will not result in unacceptable impacts in the village. The mining will have some amenity impacts as there will be some increased dust based on the modelling undertaken. There are likely to be some impacts on the air quality of residents in the village but the extent of any health impacts is inherently difficult to quantify. The impact will be of relatively short duration as it is not expected to occur for the whole seven years of mining activity, and will change over that time given the change in distance of the pit from the village. The modelling suggests that the greatest negative impacts on air quality will be in year five. The Director-General's report explains that these residents were afforded special rights in recognition of the moderate dust impacts and other noise and visual impacts they may experience (exhibit A, vol 1, tab 7, p 507). The imposition of conditions affording special rights to residents does not signal unacceptable air quality impacts.

518 The effect of the proposed conditions is that, notwithstanding the absence of unacceptable impacts, residents of the few properties in Camberwell village not owned by Ashton have the option to seek alternative temporary accommodation at Ashton's expense and/or mitigatory measures at their homes at Ashton's expense. These properties are identified in Table 2 in Sch 3 and the possibility of acquisition of their properties by Ashton is presently identified in somewhat general terms in the Statement of Commitments. That right to request acquisition by Ashton should be located more explicitly in the conditions. The conditions must also provide

for adequate reimbursement of accommodation costs in the wider Singleton area.

Ashton owned land

519 There are different conditions for mine-owned land, which is extensive in and around the village and likely to be tenanted. Condition 24 of Sch 3 enables Ashton to exceed dust criteria at mine-owned properties if a tenant has been notified of health risks; the tenant of land owned by Ashton can move without penalty with adequate notice and Ashton must use its best endeavours to provide assistance with relocation and sourcing of alternative accommodation; mitigation measures can be installed at the tenant's request; monitoring of air quality is undertaken and monitoring data provided to the tenant in order to allow them to make an informed decision. The Court does not consider it is acceptable to treat tenanted properties owned by Ashton whether in Camberwell village or surrounds differently to other properties in terms of protection to be afforded to those residents. While I do not understand that approach to be problematic in the village there may be operational issues with the properties outside the village which I need to further discuss with the parties before finalising the conditions. Ashton advised (as identified in par 6) that temporarily occupied properties south of the New England Highway would be vacated if mining commenced.

Postpone commencement under approval

520 The Applicant submitted that approval is not in the public interest because the SEOC project in effect requires Mrs Bowman's land to be acquired. Mrs Bowman has stated she has no intention of selling her property to Ashton. I have already held that is not a matter that is determinative of this appeal except that I must determine whether to accept the Applicant's proposed condition that no mining should commence before a mining licence is granted and/or Mrs Bowman's property is purchased. The Court needs to better understand the operational impacts of this approach before determining a final condition of approval.

521 A related issue is that of landholder uncertainty identified by the Applicant and set out above at par 392. As the Respondents submitted there will be less uncertainty if approval is granted so that I do not consider that is a matter which is relevant to my consideration.

Social effects (Camberwell village viability)

522 There are varying views within Camberwell village and surrounds about the advantages and disadvantages of the SEOC project. The few residents in the village living in their own house, four households visited on the view, oppose the SEOC project because of their concerns about air quality and noise impacts with related concerns about health. Mr and Mrs de Jong do not wish to move for several years while the mine is operating. The concerns about air quality and serious health impacts are not supported by the air quality modelling evidence before the Court. The Court has not been provided with expert evidence on noise by the Applicant and notes that there are conditions which deal with the amelioration of this. Most notably the mine will not operate at night during the first two years of the proposed seven year operating period. Other residents such as the Richards family, Mrs Long and Mrs Montgomery look forward to the potential job opportunities afforded by the SEOC project which will provide much needed jobs and income. They do not have the same concerns about health impacts and consider there will be social benefits for Camberwell as people will return to the village as a result of the mining activity.

523 There are possible social impacts resulting from changes in the social makeup of Camberwell if properties are acquired voluntarily by Ashton. If all households take up the option of acquisition then Camberwell village and surrounds will be entirely owned by Ashton with further loss of that community. This is recognised in the Director-General's report which states that while this impact is recognised, Ashton has already acquired the majority of property in the village so that the impact has largely occurred. That reflects the current position. The vast majority of properties in Camberwell village and a number in its surrounds are owned by Ashton.

According to the Director-General's report (exhibit A, vol 1, tab 7, p 532), of 56 residences in the village all but seven are owned by Ashton. The evidence of land ownership before the Court was that four houses in the village are not owned by Ashton with a couple of additional lots on which no house was located were also not owned by Ashton. The evidence before the Court suggests that the amenity impacts on the few remaining residents in Camberwell village will be moderate and so may not necessarily result in those property owners taking up acquisition rights. That is ultimately a matter for those residents to choose instead of availing themselves of mitigating measures at their properties.

524 Whether all residents of the five neighbouring rural properties avail themselves of acquisition rights by Ashton is unknown as the Court did not hear from them all.

525 The mine footprint will be located over the historic common area the significance of which was referred to by Mrs Olofsson and Mrs MacBain, historian, and in the report of Dr Cotter in relation to more contemporary Aboriginal cultural heritage of PCWP members. That area is no longer a common but is Crown land the intended utilisation of which is presently unclear. While the loss of the former common site will occur if the SEOC project proceeds the Camberwell community has not been able to access that area since its status as a common was revoked in 2010. An alternative common area has been identified. The proposed conditions of approval include a heritage management plan which will include detailed archival recording of heritage items within the area and will include the preparation of an oral history of Camberwell in consultation with past and present residents of the village. These proposals are appropriate given the existing extensive impacts of mining on the village community.

526 Ashton is also required to undertake a village enhancement plan with identified measures to enhance the village environment such as a park, riparian vegetation, footpaths and cycleway, and tree plantings. These conditions do address to some extent the possible social impacts which

may result from the SEOC project and will contribute to the preservation of the social history of the village and surrounds.

Negative economic impacts on rural neighbours

527 The SEOC project will have negative economic impacts on neighbouring rural properties. The SEOC project has potentially major environmental and economic impacts on Mr Bowman's property. Land identified as suitable for acquisition includes his farm manager's house. Mrs Maytom provided an affidavit about the impossibility of managing the dairying operation if she was unable to live at the property. Her difficulties in relocating are also identified. Measures in the conditions to address these impacts are warranted and will require further discussion with the parties as identified in *Hunter Environment Lobby Inc v Minister for Planning and Infrastructure (No 3)* [2014] NSWLEC 130.

Overall conclusion

528 It is difficult to weigh up economic benefits which are identified in the modelling undertaken by Dr Fahrer with negative impacts which are likely to arise if the mitigation measures to deal with air quality are implemented with consequential social impacts. Further loss of social cohesion for the existing Camberwell community is a possible outcome if these measures are implemented but whether that eventuates is unknowable. Loss of social cohesion resulting from long term residents leaving has already largely occurred in the village. Additional residents may come to the area in search of employment at the SEOC project. The change in the social fabric of Camberwell has been ongoing for some time.

529 The loss of production from Mrs Bowman's property and the loss for seven years from other rural properties is taken into account in the economic modelling, and the return to the NSW and Commonwealth governments in terms of royalties and other taxes remains substantial. The localised employment benefits were discussed in the economics section of the judgment.

530 On balance I consider that approval can be granted but that approval must be subject to adequate conditions about which a number of issues of clarification and possible alteration remain. A number of changes to conditions were made in the course of the hearing. Further consideration of the conditions in light of matters raised in the judgment and at the end of the hearing is necessary before the Court can grant conditional approval. A timetable for discussion of issues related to the conditions will be discussed with the parties. Final orders in relation to disposition of the appeal will be made when conditions have been finalised.

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I CERTIFY THAT THIS AND THE 194 PRECEDING PAGES ARE A TRUE COPY OF THE REASONS FOR JUDGMENT HEREIN OF THE HONOURABLE JUSTICE N. H. M. PAIN

Associate

Date 27/8/14