

Your Ref: D20/24418  
Our Ref: DA0830/15



23 October 2020

Ms Christine Allen  
Director, Regulation and Compliance  
Independent Pricing and  
Regulatory Tribunal NSW  
Level 15, 2-24 Rawson Place  
Sydney NSW 2000

Dear Ms Allen

**Invitation to make a submission on Licence Applications made under the *Water Industry Competition Act 2006 (WICA) (NSW)* for 67 Kurrajong Road, Kurrajong**

Thank you for your invitation to make a submission on the licence application for the sewerage scheme at the above address.

Council has reviewed the modified proposal and provides the following responses in relation to the questions in your letter.

**Question 1**

*Do you consider that our understanding of the approvals that have been obtained under the EP&A Act (as outlined in Attachment A) is correct for the activities the network operator's licence would authorise, if granted? If not, in your opinion, what approvals have been obtained or are required to be obtained?*

Response

No. Council is concerned that appropriate consent has been not been obtained for the sewerage scheme proposed to service the subdivision as it is significantly different to what was considered and approved by the NSW Land and Environment Court.

Item 30 of the Land and Environment Court Judgment for PRJM Pty Ltd v Hawkesbury City Council 2016/162961 clearly states that:

*The proposal provides for the collection of domestic sewage via a reticulated sewer system from the 35 proposed dwellings, with recycled water returned to dedicated sub-surface irrigation areas on each lot. The reticulated sewer flows either directly to the packaged Water Recycling Facility (WRF) on Lot 21, or to a pump station on Lot 1 for conveyance to the WRF. Reclaimed water will be pumped to each of the 35 lots for sub-surface irrigation onto a dedicated sub-surface irrigation area for dispersal. The WRF and the effluent recycling are proposed to be operated and managed under community title.*





The modified proposal is further considered to be inconsistent with the approved plans and conditions imposed by the Court which expected wastewater to be recycled and dispersed over all of the residential lots via a sub-surface irrigation system as opposed to a number of selective lots using absorption trenches.

This is specifically highlighted under condition 64(e) and 79(h) of the consent which have been reproduced below:

64. A public positive covenant pursuant to the s.88E Conveyancing Act shall be submitted to Council for approval and registered on the title which provides the following:
  - a) The Community Association will at all times maintain, repair and keep the OSD and Bio-basin facilities in a good and safe condition and state of repair, in accordance with the approved design to the reasonable satisfaction of Council, having due regard to the Plan of Management for the operation and maintenance of the OSD and Bio-basin facilities
  - b) The OSD and Bio-basin areas must be fenced off with minimum 1.8 m high fences and sign posted for public safety
  - c) A prohibition on any further subdivision or strata subdivision of any of the proposed lots.
  - d) Prohibiting the use of the utility lots for residential purposes.
  - e) Each residential lot is to have a minimum area of 203 sqm for on site effluent disposal and setbacks.
  - f) A development application or Complying Development Certificate for a dwelling and any ancillary buildings must consider the existing trees shown on the approved Tree Retention Plan.
  - g) The proposed areas for effluent disposal area within each lot is to be
    - i. appropriately signposted
    - ii. landscaped with grasses or ornamental vegetation only;
    - iii. if landscaped with grass the grass shall be mown regularly and clippings removed;
    - iv. not unduly shaded by adjacent vegetation or structures;
    - v. prohibiting structures from being built or any other items which may damage the reticulated irrigation system (including vehicles) from being placed over or under the dedicated disposal area within each lot; and
  
79. The Recycled Water Management Scheme shall operate at all times so that the following is achieved:
  - a) *E. coli* of less than 10cfu/100ml
  - b) BOD5 of less than 20mg/L
  - c) suspended solids of at least 30mg/L
  - d) total nitrogen of less than 18mg/L (90<sup>th</sup> percentile)
  - e) total phosphorus of less than 9mg/L (90<sup>th</sup> percentile)
  - f) a design irrigation rate of not more than 4mm/day
  - g) the effluent disposal area has setbacks of 1m to site boundaries, 3m to swimming pools and 1m to dwellings unless those dwellings are downslope of the effluent disposal area in which case the setback shall be 3m
  - h) the effluent disposal area has a minimum area of 203sqm, including setbacks



The modified proposal is materially different to what has been originally considered and accepted by the NSW Land and Environment Court and the potential environmental impacts of the modified proposal have not been able to be fully considered and assessed under the *Environmental Planning and Assessment Act 1979*.

Finally the proposal relies on changes to the type and style of fencing along property boundaries and the creation of surface diversion channels and internal fencing which were not considered as part of the original approval.

Council would expect that any proposal to modify the proposed method of effluent disposal must be covered by an appropriate consent under the *Environmental Planning and Assessment Act 1979*.

## **Question 2**

*Are you aware of any unacceptable health and environmental risks posed by the activities proposed to be licensed, especially in regard to disposal of treated effluent via sub-surface absorption trenches? If so, what are these risks?*

### Response

Yes. Council has engaged independent experts Atom Consulting who are in the field of wastewater management to review the application and comment on the modified proposal. The subsequent report has been attached to this correspondence for your reference and has identified the following gaps:

- No plan on how to manage low sewage flows in the early stages of the development when they are too low to be treated at the STP. There is also no information on management of septicity in the early stages of development due to long detention times in the sewerage network and pump station.
- The risk to the proposed treatment and disposal of sewage production is higher or lower than design due to different occupancy or sewage flows has not been identified or managed.
- It is not clear in the proposal how tankers will connect to the sewage pump station or the STP in the event that the STP or the EMA are offline. There is no information on what roads these tankers will use, whether they are designed for heavy vehicles and how they will access the site without blocking traffic.
- While the water balance addresses disposal of effluent in average weather conditions, there will be rain events that are extreme in intensity or duration that cause the EMA to become waterlogged. No information is provided on how effluent will be managed during these events.
- No information is provided on how the increase in sewage flows in wet weather due to asset deterioration or illegal connection of stormwater will be managed.
- The log10 reduction values for treatment do not reflect recent experience in validating membrane bioreactors.
- The UV transmissivity used to design the UV disinfection system has not been provided. There is no information on what provision for upgrade of the system if the UV transmissivity is lower than design.
- The fence around the effluent management area must be designed to prevent unauthorised access.



Council's internal departments have also reviewed the proposal and identified the following concerns in relation to potential unacceptable health and environmental risks associated with the proposal:

- The application does not consider the frequency and servicing associated with desludging the proposed system and direct impacts on the locality in relation to traffic and odour.
- It is unclear as to who, when and how the absorption trench area will be managed and maintained over multiple private lots. Particularly in relation to access, mowing, pest and weed control, bushfire asset protection zones and maintenance of fencing.
- The system relies on effluent disposal areas to be spread over private lots and do not appear to be within the control of the proposed retail licensee or network operator.
- There is a concern that individual private lots will be required to be used to dispose of treated effluent from other lots which significantly differs from the original concept to recycle and disperse treated wastewater over the entire subdivision. This will disproportionately burden the lots which will be dedicated to being used for the disposal of effluent.
- The irrigation areas significantly impede on useable private open space which would otherwise be expected to be made available to the residents of the lots containing effluent irrigation areas.
- The proposed system does not provide sufficient emergency storage for untreated or treated effluent in the event of a system failure.
- It needs to be made clear as to who would be responsible for any pollution incident or remediation of land should any of the proposed trench system impact the quality of water and or soil on the lots which will contain effluent irrigation areas.
- There is a significant risk that the effluent irrigation areas will be used as part of the calculation of minimum private open space and landscaping requirements as part of the development of the lots in the future.

Private open space and landscape areas are generally expected to be made directly accessible to residents in order to provide for a good level of amenity. The restrictions associated with the effluent irrigation areas has the potential for building envelopes to cover a significant part of the developable part of the land and result in the loss of accessible private open space and landscape areas. This is not considered to be a good outcome.

### **Question 3**

*If granted, should the network operator's licence contain any specific conditions in relation to protection of the environment? If so, what conditions do you recommend?*

#### Response

The following conditions are recommended should a network operator's licence be issued:

- An emergency storage tank system should be incorporated into the design of the system in order to account for periods of extended wet weather, catastrophic failure of the system and potential issues that may be associated with servicing or accessing the site in the event of a bushfire or flood event



along the Hawkesbury River. This emergency storage tank system should be provided on the lots containing the pump station and the treatment facility.

- An emergency warning system must be put in place to advise residents of a system failure in order to prevent wastewater continuing to enter the system.
- A site monitoring program must be established to ensure that lots containing the irrigation areas are maintained and operated in a good working order. This monitoring program must include the regular testing of water and soil for potential contamination and must be reported to the owners of affected lots. This reporting should be included as part of any community management statement.
- Operational costs should be capped and standardised over all lots within the subdivision and not be based on a usage sliding scale. Charging residents based on the amount of wastewater entering the system significantly increases the risks associated with residents who may consider alternate ways to dispose of wastewater or divert wastewater from entering the system.
- Persons responsible for rectifying system failures and or remediating the site must be clearly outlined and covered by appropriate insurances to cover any unexpected costs.

#### **Question 4**

*If the licences are granted, what planning measures or risk controls should be in place to ensure activities do not interfere with the safe operation of the effluent disposal mechanisms for the scheme, namely the sub-surface disposal of treated effluent via absorption trenches?*

#### **Response**

The following planning measures and risk controls should be put in place, should a network operator's licence be issued:

- Any potential purchaser, future owner or resident associated with the lots containing effluent irrigation trenches must be clearly informed of the restrictive nature of these lots and limitations on use of this part of the land.
- All potential owners of lots within the subdivision must be made aware that the lots are connected to a private sewerage scheme and be subject to connection, operating and servicing costs.
- Any future development of the site must be accompanied by a plan stamped and authorised by the sewerage provider prior to the lodgement of any development application or complying development certificate.

In addition to the questions raised in your letter Council have identified a number of additional matters in relation to the proposal which should be considered.

#### **Connection and Operational Costs**

Council is concerned that the cost of operating the system will put significant financial implications on the people looking to purchase the lots, connect to the proposed new system and or reside on the land. The application states that:

*Aquacell adopts a policy of aligning its cost of operations to the neighbouring area, wherever practical. The relevant costs in the 67 Kurrajong Road development are those for sullage pump-out. This is because potential purchasers of a home in the 67 Kurrajong Road development may compare those costs to the surrounding area, when considering their*



*purchase. Costs for the scheme cannot be compared to say, Sydney Water sewage charges, because Aquacell's costs must be spread across a small number of residential customers (a maximum of 35 in this case), whereas the public utilities achieve economies of scale by recovering costs across a much larger customer base.*

Council has not endorsed the subdivision of land that relies on the removal of sewage via a pump-out since 1999. Hawkesbury Local Environmental Plan 2012 and Hawkesbury Development Control Plan 2002 require new residential subdivisions less than 4000sqm to connect to a reticulated sewer system. This is largely due to the extensive community concerns Council has received in relation to servicing, odour, traffic and operational costs associated with servicing lots via a pump-out service.

The costs associated with a pump-out service is a legacy matter associated with older lots within the locality and should not be used as a benchmark for new residential lots which seek to increase residential densities in unsewered areas.

Aligning costs of the proposed system against the pump-out service is not comparable nor is it reflective of what Council and the public expects in the locality for new residential development within unsewered areas. Comparison costs should be made against the operational costs that would be associated with connecting to a public reticulated sewerage system and or a private onsite effluent disposal system.

It is further noted that Council has received significant concerns from the public in relation to a community title subdivision that proposes to connect to a private sewerage scheme within the locality and the significant costs associated with connection and operation.

#### **Burden on Restricted Lots**

The original subdivision proposal involved treating effluent and distributing wastewater though all of the residential lots within the subdivision. The current proposal seeks to distribute treated effluent to a select number of lots which would not be able to access or use these areas. Disposing of treated effluent onto individual lots is not considered to be equitable.

Based on the matters raised above Council is not in a position to be able to support the modified proposal. If you have any questions in relation to the above and or would like to discuss the proposal please feel free to contact me on the contact details below.

Yours faithfully



**Linda Perrine** | Director of City Planning | Hawkesbury City Council

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Att:

- Land and Environment Court Judgment for PRJM Pty Ltd v Hawkesbury City Council 2016/162961
- Land and Environment Court Conditions for PRJM Pty Ltd v Hawkesbury City Council 2016/162961
- WICA application review by Atom consulting



Land and Environment Court  
New South Wales

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Case Name: PRJM Pty Ltd v Hawkesbury City Council

Medium Neutral Citation: [2017] NSWLEC 1339

Hearing Date(s): 8,9,10 February 2017, 1 May 2017

Date of Orders: 30 June 2017

Decision Date: 30 June 2017

Jurisdiction: Class 1

Before: Brown C

Decision: See orders at [88]

Catchwords: DEVELOPMENT APPLICATION: subdivision - inconsistent with some aims of the local environmental plan - inconsistent with some objectives of the zone - impact on existing vegetation - inappropriate method of disposal of sewage - inadequate arrangements for water supply, stormwater disposal, waste collection and road access – appropriate conditions of consent

Legislation Cited: Environmental Planning and Assessment Act 1979  
Hawkesbury Local Environmental Plan 2012  
Sydney Regional Environmental Plan No 20-  
Hawkesbury-Nepean River (No 2-1997)

Category: Principal judgment

Parties: PRJM Pty Ltd (Applicant)  
Hawkesbury City Council.(Respondent)

Representation: Counsel:  
Mr P Tomasetti SC (Applicant)  
Ms R McCullough (Respondent)

Solicitors:  
Brock Partners (Applicant)

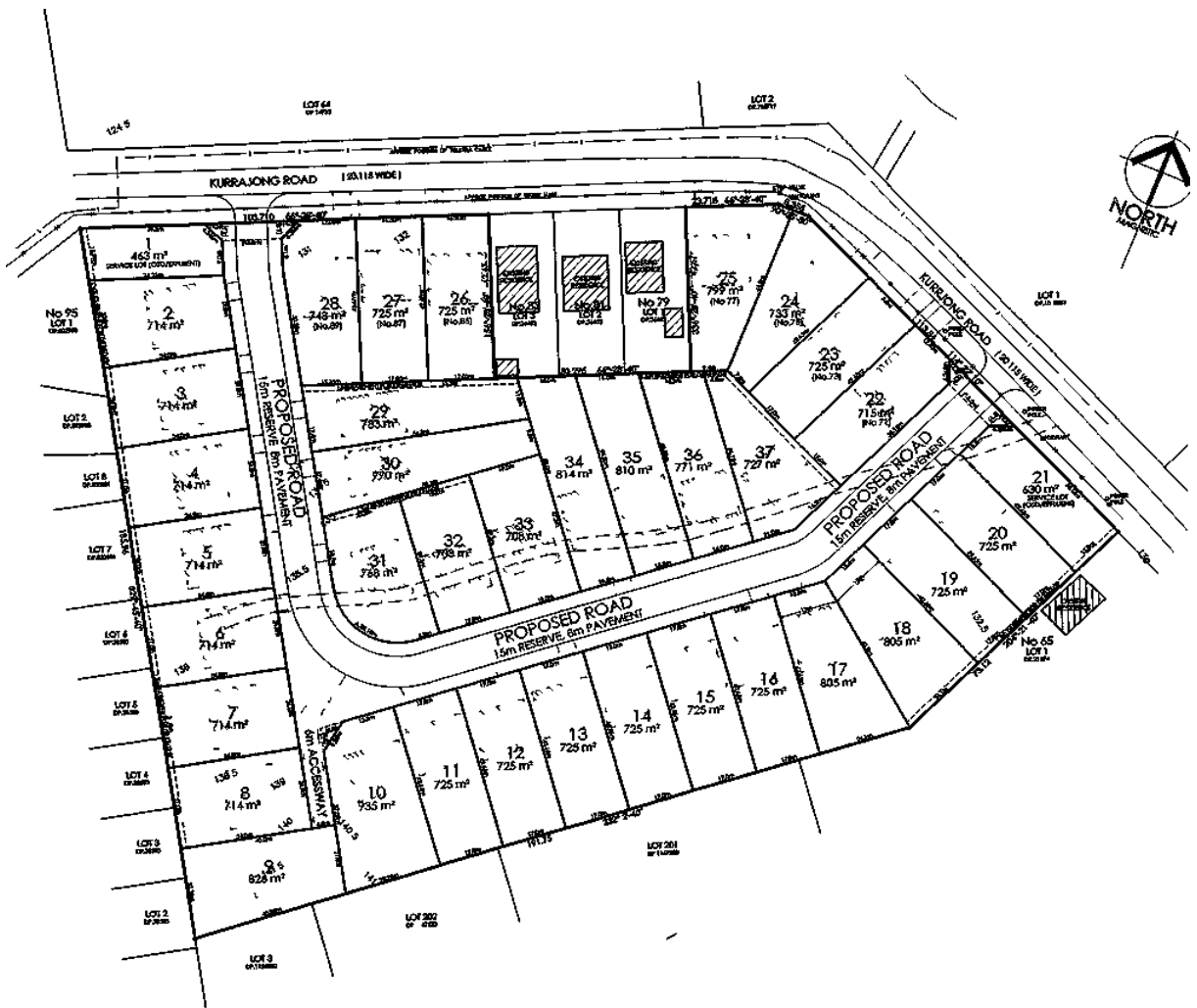


File Number(s): 2016/162961

Publication Restriction: No

## JUDGMENT

- COMMISSIONER:** This is an appeal against the refusal of Development Application DA0830/15 that proposes a 37 lot community title subdivision, including the construction of a new private road, drainage system and installation of a water recycling facility to treat sewage. Two lots (Lots 1 and 21) would be used for these services and the remaining 35 lots would be used for residential development and range in size from 708 sqm to 1355 sqm.



- The council maintains that the application should be refused because the proposal will:



- be inappropriate for the site,
- have an adverse impact on existing vegetation,
- have an inappropriate method of disposal of sewage, and
- have inadequate arrangements for water supply, stormwater disposal, waste collection and road access.

### **The site**

- 3 The site is 67 Kurrajong Road, Kurrajong and is Lot 1 in DP 1185012. It is irregular in shape with an area of 3.23 ha and is vacant. The site is intersected by an access track, covered in vegetation, consisting of canopy trees and lower level weeds and does not have access to reticulated sewer.
- 4 The site has direct access to Kurrajong Road, surrounds three residential lots along Kurrajong Road and shares property boundaries with 13 other residential lots. The majority of land uses surrounding the site are used for residential purposes. The residential properties surrounding the site range from medium sized residential lots to larger residential lots with a land area of approximately 2ha.
- 5 Prior to July 2015, the site was Crown Land owned and managed, known as Lot 63 in DP 14736 and was created for future public requirements.

### **Relevant planning controls**

- 6 The site is within Zone R2 Low Density Residential under *Hawkesbury Local Environmental Plan 2012* (LEP 2012). The subdivision of land is permissible, with consent. Clause 2.3(2) provides that the Court must “have regard to the objectives for development in a zone when determining a development application in respect of land within the zone”.
- 7 Clause 4.1 permits subdivision of the land provided that the new lots created are not less than the minimum subdivision lot size shown on the Lot Size Map. The Lot Size Map identifies that a minimum lot size of 450 sqm applies to the land and that the land is located within “Area A”. “Area A” refers to cl 4.1D (1) of LEP 2012.
- 8 Clause 4.1D(1) provides an exception to the minimum lot size for certain land and the relevant section of this clause is:

(1) Despite clauses 4.1, 4.1AA and 4.1A, development consent must not be granted for the subdivision of land that is identified as “Area A” and edged heavy blue on the Lot Size Map if:

(a) arrangements satisfactory to the consent authority have not been made before the application is determined to ensure that each lot created by the subdivision will be serviced by a reticulated sewerage system from the date it is created, and

9 Clause 6.4(4) states:

(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or

(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

10 Clause 6.7 states:

6.7 Development consent must not be granted to development unless the consent authority is satisfied that any of the following services that are essential for the proposed development are available or that adequate arrangements have been made to make them available when required:

(a) the supply of water,

(b) the supply of electricity,

(c) the disposal and management of sewage,

(d) stormwater drainage or on-site conservation,

(e) suitable road access.

11 Clauses 4.1D(1), 6.4(4) and 6.7 contain requirements that require a positive response to allow the further consideration of the application. A negative response to any of the clauses must see the application refused.

12 *Hawkesbury Development Control Plan 2002* (DCP 2002) applies, particularly Part C Chapter 7 - Effluent disposal and Part D Chapter 3 - Subdivision

13 *Sydney Regional Environmental Plan No 20-Hawkesbury-Nepean River (No 2-1997)* (SREP 20) applies to the site. Clause 4 relevantly states:

**4. Application of general planning considerations, specific planning policies and recommended strategies**

(1) The general planning considerations set out in clause 5, and the specific planning policies and related recommended strategies set out in clause 6

which are applicable to the proposed development, must be taken into consideration:

- (a) by a consent authority determining an application for consent to the carrying out of development on land to which this plan applies, and
- (b) by a person, company, public authority or a company State owned corporation proposing to carry out development which does not require development consent.

### **Inappropriate development**

- 14 The Council contends that the development is inappropriate on planning grounds as the proposal is contrary to the overall aims and objectives of LEP 2012, the objectives of the R2 Low Density Residential zone, the subdivision layout has not been planned having regard to site constraints and insufficient information has been submitted in support of the application to approve the proposed subdivision.

#### *The evidence*

- 15 Expert evidence was provided by town planners Mr William Pillon, for the council and Mr Neil Kennan for the applicant.
- 16 Mr Pillon states that the proposed development is inappropriate for the following reasons:
- contrary to the aims and objectives of LEP 2012 and the objectives of the R2 zone,
  - based on expert advice provided by Dr Patterson, the council's expert engineer on sewage disposal, the application is unable to demonstrate that arrangements satisfactory to the consent authority can be made as required by cl 4.1D(1) of LEP 2012,
  - it would set an undesirable precedent in supporting a subdivision that would have an unacceptable impact on the future design, development and management of the proposed lots,
  - the subdivision relies on the development of the land to be confined to specific areas on lots that are limited in area and are too restrictive to allow for the orderly and economic development of land,
  - the subdivision does not provide for an appropriate level of flexibility for future development of the land and achieve both the objectives of the zone and merits envisaged at subdivision stage,
  - larger residential lots would ensure that the land could be developed in a manner that provides for suitable services and land area to protect the traditional character of the surrounding residential area, and

- the subdivision relies on a sewerage system and water supply service to be approved by external agencies.
- 17 Mr Kennan states that the proposed service arrangements are suitable for a community title subdivision and would permit the orderly and economic development of land. The proposed development takes reasonable account of all the natural and other constraints of the site and will conserve the land so that it can be used for its intended purpose. Any development of the site will have an impact on the native vegetation of the site, however the relevant issue is whether that impact is acceptable. In his opinion, the subdivision design takes into account the native vegetation on the site which includes dense harmful weeds, regrowth and some older trees. The proposal provides for a subdivision pattern, character and appearance which is consistent with surrounding development.
- 18 Based on the information prepared by the applicant in this matter, Mr Kennan states that there is sufficient information available to enable the Court to determine that the subdivision has been designed to maximise the retention of significant vegetation while at the same time allowing for the orderly and economic development of the site. A suitable method of sewage reticulation is provided to the proposed development in accordance with the design prepared by Dr Martens, the applicant's expert engineer on sewage disposal.
- 19 The proposed number of lots, the proposed lots sizes, the resultant density and the associated works are perfectly consistent with the surrounding residential development of Kurrajong, its varied cadastral pattern, and will be compatible with the character of the locality.

### *Findings*

- 20 "Inappropriate development" is not a term that should be used to describe a contention. A development may be inappropriate if it does not satisfy certain criteria but it is the criteria that are the contentions – different criteria should not be grouped into one collective contention. I have attempted to extract what appears to be concerns of the council however some are repeated in other contentions.

### *Plan objectives*

21 The council contentions state that the proposed subdivision is contrary to the following plan objectives in cl 1.2(2):

(a) to provide the mechanism for the management, orderly and economic development and conservation of land in Hawkesbury,

.

(c) to protect attractive landscapes and preserve places of natural beauty, including wetlands and waterways,

(d) to protect and enhance the natural environment in Hawkesbury and to encourage ecologically sustainable development,

22 Even though cl 1.2 provides Aims of the Plan and cl 1.2(2) provides specific aims of the plan; there is no operative clause that requires consideration be given to these aims in the assessment of the application, in the same way that cl 2.3(2) requires that “regard” has to be given to the zone objectives when considering a development application in that zone. In any event, I am satisfied that any matter raised in the plan objectives is raised, in generally more detail, through the other contentions raised by the council.

### *Zone objectives*

23 The zone objectives are:

- To provide for the housing needs of the community within a low density residential environment.
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.
- To protect the character of traditional residential development and streetscapes.
- To ensure that new development retains and enhances that character.
- To ensure that development is sympathetic to the natural environment and ecological processes of the area.
- To enable development for purposes other than residential only if it is compatible with the character of the living area and has a domestic scale.
- To ensure that water supply and sewage disposal on each resultant lot of a subdivision is provided to the satisfaction of the Council.
- To ensure that development does not create unreasonable demands for the provision or extension of public amenities or services.

24 The council contentions do not identify any specific objectives but broadly state that the proposed subdivision is unacceptable because:

- the sewerage system is unacceptable,
  - the number of lots is excessive and out of character with the Kurrajong area, and
  - the subdivision does not properly address site constraints of topography, proximity to adjacent dwellings and loss of trees.
- 25 The matters relating to the sewerage system and loss of trees are addressed later in the judgment by Dr Martens and Dr Patterson and I am not aware of any meaningful evidence on the site constraint of topography and proximity to adjacent dwellings. With the benefit of the site inspection and an understanding of the subdivision layout, it would be difficult to accept that these matters would warrant the refusal or modification of the application.
- 26 On the matter of character, Mr Pillon and Mr Kennan disagreed on the impact that the proposed subdivision will have on Kurrajong. The site is located opposite land within Zone RU1 Primary Production and Mr Pillon and Mr Kennan agree that this land is different to the existing and desired future character of the R2 zone.
- 27 Mr Pillon describes the R2 zoned area as having a number of distinct areas with some areas greater than 1000 sqm in size with other areas below this size. Mr Kennan describes the area, in terms of lot size, as varied but similar to the areas of the proposed development. Mr Kennan states that any test of character should be based on the desired future character anticipated by the R2 zone requirements for lot size. LEP 2012 anticipates a minimum lot size of 450 sqm and also the opportunity to have on site disposal of sewage, subject to it being disposed on site in a satisfactory manner.
- 28 In relation to the question of whether the proposed subdivision is “compatible with the character of the living area and has a domestic scale”, I agree with the comments of Mr Kennan that the desired future character is that anticipated by the R2 zone rather than a selective assessment against parts of the R2 zoned land. With the proposed lot sizes ranging in size from 708 sqm to 1355 sqm, I can comfortably conclude that the proposed development is compatible with the R2 zoned area of Kurrajong.
- 29 If regard is had to the zone objectives in the context of those matters raised by the council in their contentions, then I am satisfied that adequate regard has

been given to the R2 zone objectives in the proceeding paragraphs, in accordance with cl 2.2(3) and the objectives present no barrier to the approval of the application.

### **Sewage disposal**

30 The proposal provides for the collection of domestic sewage via a reticulated sewer system from the 35 proposed dwellings, with recycled water returned to dedicated sub-surface irrigation areas on each lot. The reticulated sewer flows either directly to the packaged Water Recycling Facility (WRF) on Lot 21, or to a pump station on Lot 1 for conveyance to the WRF. Reclaimed water will be pumped to each of the 35 lots for sub-surface irrigation onto a dedicated sub-surface irrigation area for dispersal. The WRF and the effluent recycling are proposed to be operated and managed under community title.

31 Expert evidence on this contention was provided by Dr Martens, for the applicant and Dr Patterson, for the council. They produced a joint report that addressed the contentions raised by the council. The specific relevant matters in dispute related to:

- estimated daily water use,
- extent of soil investigation,
- seepage from irrigation areas,
- area of proposed irrigation fields,
- timing of construction of proposed irrigation fields, and
- water balance.

#### *Estimated daily water use*

32 Dr Martens states that If an average of 3 persons (EP) per house is assumed, which is the expected average occupancy rate across the sub-division irrespective of dwelling bedroom numbers, then the design flow rate would be 450 L/dwelling/day. A rate of 600 L/dwelling/day has however been adopted, which is 4EP/house, and is a conservative design allowing for an increase of 33% over design. Dr Martens also states that the Australian Bureau of Statistics (ABS) identifies an occupancy rate of 2.7 persons/dwelling for Kurrajong and that this figure was used in estimating the estimated daily water



use by the council in a recent approval for on-site disposal in a development in Vincents Road at Kurrajong.

33 Dr Patterson states that an average of 4 EP/house is assumed, for a 3-bedroom dwelling, for which the design daily flow rate would be 600 L/dwelling/day.

34 I accept that a rate of 600 L/dwelling/day is appropriate.

*Extent of soil investigation/ seepage from irrigation areas*

35 Dr Martens states that sufficient information has been provided in terms of soil properties to establish that the soils on the site soils will not constrain the application of recycled effluent. In addition to the previous testing, 6 boreholes and 2 hydraulic push tubes (for comparative purposes) were undertaken by Dr Martens on 20 January 2017. These reveal similar findings to previous boreholes, although clay content is somewhat lower at shallow depths than previous reports. Soil laboratory testing was undertaken by SESL Australia, at the suggestion of Dr Patterson, and this testing indicates that the soils are non-saline, non-sodic, non-dispersive, with a high capacity for phosphorus sorption. Field texture investigations by Dr Martens reveal that soils are well structured, well drained with no material impeding layer, and well suited to recycled water application. Dr Martens is of the view that there is no need for further soil testing based on his investigations to date.

36 Dr Martens accepts that while the words "Light clay" are used in the description of the "Soil/rock material test description" in the test bores (REF BH 001-006) to interpret the design irrigation rate in Table M1 of "*Australian and New Zealand Standard: On-site domestic wastewater management*" AS/NZS 1547:2012 (AS 1547) (p 160), his opinion, from the physical inspection of the soil profile is that the soil texture is best described as "Loams", "Sandy loams" or even "Gravels and sand" where the design irrigation rate is 4mm/day or 5 mm/day for the latter soil texture. Adopting a conservative approach, Dr Martens adopts a design irrigation rate of 4mm/day.

37 The applicant also provided evidence from Dr Pam Hazelton, although somewhat reluctantly because her involvement with the soil on the site involved 6 test pits in 2016. These were not dug for the purposes of

establishing whether it could accommodate the sub-surface irrigation but rather whether the soil characteristics were consistent with a certain endangered ecological community. In any event, her evidence was helpful in that she stated that the soil profile would not impede the flow of treated effluent from the sub-surface irrigation. She described the soil as “gradual, with no significant colour changes, no obvious layers and no perched water table”.

- 38 Dr Patterson states that it is usual to report soil structure, soil dispersibility, and salinity/sodicity and other chemical properties in determining site/soil constraints. "*Environment and Health Protection Guidelines: On-site sewage management for single households.*" Department of Local Government (1998), *Environmental Guidelines: Use of Effluent by Irrigation.* Department of Environment and Conservation, Sydney (2004) and AS 1547 all rely upon site and soil descriptions. While Dr Patterson had visited the site prior to the hearing, his soil investigations were limited to holes dug with a spade to a depth of around 250mm. Dr Patterson relies on the words “Light clay” in the description of the “Soil/rock material test description” in the test bores of Mr Martens (REF BH 001-006) to interpret the design irrigation rate in Table M1 of AS 1547 of 3 mm/day.
- 39 I accept the evidence of Dr Martens that a design irrigation rate of 4 mm/day is appropriate for a number of reasons. First, the concerns of Dr Patterson stem solely from the words “Light clay” in the description of the “Soil/rock material test description” in the test bores of Mr Martens. Given the physical investigations undertaken by Dr Martens and Dr Hazelton and their evidence on the ability of the soil to accept the sub-surface irrigation, the sole reliance on the descriptions in Table M1 should not be preferred above actual physical investigations of the soil. Second, the independent evidence of Dr Hazelton supports the conclusions of Dr Martens. Third, both Dr Martens and Dr Hazelton are experienced soil engineers and importantly, have conducted physical soil testing on the site compared to the limited testing undertaken by Dr Patterson. Fourth, the comprehensive testing through test pits, core sampling, laboratory testing and field texture testing supports the conclusions of Dr Martens.

40 I accept a design irrigation rate of 4mm/day based on the evidence of Dr Martens and Dr Hazelton.

*Area of proposed irrigation fields*

41 Dr Martens states that the soil investigations show that there is ample depth to install a shallow sub-surface drip irrigation system using a design irrigation rate of 5 mm/day however a rate of 4 mm/day as a factor of safety is adopted.

42 Dr Martens concludes that the irrigation area is therefore 150 sqm and when the agreed setbacks are applied, an area of 203 sqm is required for the sub-surface irrigation area.

43 Dr Patterson maintains that 3mm/day is appropriate thus, a minimum area of 200 sqm for dedicated irrigation area is required however when the agreed setbacks of are applied to the design area, an area of 270 sqm is required.

44 Based on a design irrigation rate of 4 mm/day, I accept the irrigation field for each lot (including setbacks) is 203 sqm.

*Timing of construction of proposed irrigation fields*

45 Dr Martens states that at the development application stage for a dwelling, applicants will be required to prepare a landscape plan that shows the final location and set-out of the recycled water irrigation areas. This will need to comply with the conditions of approval in terms of area and setbacks. Ultimately the entirety of the recycled water management scheme will be overseen and managed by the community association, thus ensuring long-term operation. Dr Martens sees no reason why council would require a separate approval under s68 of the *Local Government Act 1993*. However, if council does require this, then a separate and additional mechanism can be put in place for the long-term operation of the scheme to be overseen. Dr Martens notes also that it is expected that the IPART license operating conditions will cover operation of the irrigation areas and usually negates the need for any further s68 approval.

46 Dr Patterson states that it appears that the proposal requires each lot owner to be responsible for a s 68 application to council for the location and set out of the irrigation area, its maintenance and continued operation without any input

from the developer. Such actions may limit the functioning and long term viability of the irrigation area, particularly if the soil profile in the effluent irrigation area no longer resembles the soil profile used for the current development application for subdivision.

- 47 As a general approach, I agree with Dr Martens that applicants should be required to prepare a landscape plan at the dwelling application stage that shows the final location and set-out of the recycled water irrigation areas. It would seem impractical to set aside areas for irrigation that may conflict with a future dwelling on each lot. The only caveat is that prospective purchasers need to be fully aware of their obligations in terms of the sewage disposal for each new residential lot.

#### *Water balance*

- 48 Dr Martens states that no water balance for the dedicated effluent re-use fields is required. The fields have been sized in accordance with AS 1547 which does not rely on water balances. Dr Patterson states that it is usual that local conditions of rainfall, and evaporation are taken into account.
- 49 I accept Dr Martens evidence that water balances are not required.
- 50 For the reasons in the preceding paragraphs, I am satisfied that pursuant to :
- clause 4.1D(1) of LEP 2012, “arrangements satisfactory to the consent authority have been made before the application is determined to ensure that each lot created by the subdivision will be serviced by a reticulated sewerage system from the date it is created”,
  - clause 6.4(4)(a) of LEP 2012, “the development is designed, sited and will be managed to avoid any significant adverse environmental impact”, in this case disposal of sewage,
  - clause 6.7(c) of LEP 2012, adequate arrangements have been made for the “the disposal and management of sewage” available when required,
  - clause 3.8.4, Part D of DCP 2002 Effluent Disposal, the Aims and Objectives are satisfied,
  - clause 5 of SREP 20 in relation to General planning considerations, particularly sub sec (d) “the relationship between the different impacts of the development or other proposal and the environment, and how those impacts will be addressed and monitored” have been taken into consideration, and

- clause 6(3), (4) and (17) of SREP 20 in relation to the specific planning policies and related recommended strategies for Water quality, Water quantity and Sewerage systems and works, have been taken into consideration.

## **Impact on existing vegetation**

### *The evidence*

- 51 The contention raised by the council is that the proposed development application should be refused as it would have an adverse impact on the trees located on the land and on the surrounding locality and consequently the loss will have an unacceptable impact on the scenic quality of the area.
- 52 Expert evidence was provided by Mr Guy Paroissien, an arborist for the council and for the applicant by Ms Narelle Sonter, a landscape designer and Dr Anne Marie Clements, an ecologist.
- 53 Mr Paroissien states that the retention of larger canopy trees is less likely on smaller lots due to higher potential for conflict with infrastructure and perceived threats from large trees in the vicinity of dwellings (branch/tree failure, bush fire risk etc). The proposed lot layout will result in the short and long term removal/loss of a significant number of trees in the north-west area of the site and the loss of these trees will impact the landscape character of the site.
- 54 Mr Paroissien notes that the proposed subdivision layout is uniform throughout the site and makes no particular design allowance for tree retention in the north-west part of the site, indicating that the proposed tree retention is incidental to, rather than a result of the proposed lot layout. He acknowledges that the most significant tree on the site (Tree 42), is now proposed to be retained rather than initially removed.
- 55 In terms of replacement plantings, Mr Paroissien states that the proposed plantings on the Landscape plan prepared by Botanica include *Brachychiton populneus* (Kurrajong) and *Hymenosporum flavum* (Native Frangipani) as proposed street tree plantings however these are not considered to be locally native species. The Landscape Plan also nominates tree locations in the rear gardens of the proposed lots but does not specify whether these are to be locally native, native or exotic species. Mr Paroissien notes that the evidence from the applicant's ecological expert, Dr Clements, recommends native trees with local provenance, which he supports.

- 56 Mr Paroissien notes that tree survey (the Travers plan) identifies 171 trees on the site and that numerous trees are missing. The Landscape Plan identifies that 107 trees are proposed to be retained however in the absence of detailed arboricultural assessment from the applicant, Mr Paroissien states that 6 trees indicated in the schedule on the Landscape Plan to be retained are not actually shown on the Landscape Plan but are shown to be within either the proposed road or nominated dwelling footprints and therefore cannot be retained as nominated. The remaining 89 trees are considered likely to be impacted by the development, many of them significantly so.
- 57 Ms Sonter states that in the orderly development of a residential subdivision with a number of trees, there will inevitably be a loss of some existing trees. However, the proposal incorporates the retention of more than 60 canopy trees on site and notwithstanding that some of these trees may later be removed to accommodate wastewater irrigation areas on individual lots, this does represent a significant retention of existing canopy on the site.
- 58 The natural beauty of the locality is also enhanced by the plantings within the gardens of existing residential development in the locality. The size and shape of each of the proposed lots is generous and provides ample opportunity to establish gardens with the diversity of species over several canopy levels that typifies the existing residential landscapes within the locality.
- 59 Ms Sonter states that the applicant acknowledges the significance of the trees on site and the contribution that they make to the landscape character of the locality. Accordingly it is proposed to retain as many of the existing trees on site as can possibly be retained with the orderly and reasonable development of the site as a residential subdivision. The trees that are shown as being retained are those which are located to allow for:
- a road through the site,
  - adequate driveway access from that road to each lot,
  - a reasonably sized building footprint with appropriate setbacks,
  - adequate room for wastewater irrigation requirements, and
  - maintenance as an Inner Protect Area (IPA).

- 60 Ms Sonter states that in response to Mr Paroissien that attractive, small to medium size trees which should perform well in the locality have been included in the list of indicative trees for street tree planting. The Street Tree species list can be amended to include alternative species, as preferred by council.
- 61 In response to the concerns expressed by Mr Paroissien; Ms Sonter states that the amended landscape plan will remove reference to the proposed irrigation areas as these areas will not be constructed until the time of construction of the future residence for each lot. Whilst it is acknowledged that in some instances the construction the irrigation area may require the removal of a tree, it is not necessarily the case. Also, the landscape plan shows indicative footprints only and the actual future building footprint on any lot and its proximity to and impact on any existing tree to be retained will be the subject of a future development application for the lot. Similarly, for each lot, the development application will generally be required to incorporate a landscape plan which identifies all species to be planted.
- 62 Dr Clements and Mr Paroissien agree that the site contains a moderate to high levels of *Eucalyptus amplifolia* (Cabbage Gum) in the north-west of the site, with limited occurrences elsewhere on the site. Dr Clements is of the opinion that the canopy species *E. amplifolia* is not likely to be the original species of the site, as *E. amplifolia* is a species usually associated with watercourses and low-lying sites, not on well-drained slopes typical of the site. From recent observations Dr Clements notes that not all of the individuals of *E. amplifolia* in the north-west corner of the site were recorded on Travers plan and there is significantly more saplings of *E. amplifolia* in the north-west than indicated. There are also minor occurrences of saplings of *E. amplifolia* (up to approximately 20 m) near the southern boundary from seed showers from former paddock fence line trees offsite to the south.
- 63 Dr Clements states that the pattern of *E. amplifolia* occurrence onsite may be indicative in soil moisture, as well as the source of the seed showers being from trees visible on the 1961 aerial photograph. From the quadrat data and confirmed by inspections, the most frequently recorded (and with the highest



percent projected foliage cover in the unslashed areas) was the noxious weed *Ligustrum* spp.

64 In Dr Clements' opinion , the site does not represent a natural environment in the Hawkesbury area, as it is:

- former cleared grazing land colonised by *E. amplifolia* and *Acacia parramattensis* from a small number of native trees visible on the 1961 aerial photograph, and
- the understorey vegetation on the site is dominated by exotic species, mainly *Ligustrum* spp. and *Lantana camara*, with vegetation recorded in Quadrats 3, 6, 7, 8, 9 close to or over the 75% weed cover threshold for non-recovery of native vegetation.

### Findings

65 The comments of Ms Sonter and Dr Clements must be largely accepted in relation to the impact on existing vegetation and the scenic quality of the area. The site has a considerable tree cover but also has a high proportion of weeds that adds to the perception of dense vegetation. There was no dispute that the existing trees are regrowth based on the site being used previously for grazing – a fact clearly established by aerial photographs. Of considerable importance to this contention is that the site is also zoned for low density residential development. The consequence of the zoning is that there is a reasonable and justified expectation that some form of residential form of development, consistent with the zoning of the site, will occur and this will necessitate the removal of some of the existing vegetation.

66 I accept that the Travers report was only accurate to about 1m or 2m by satellite positioning, as well as the difficulty in accessing some trees because of the weed infestation. Given the zoning of the site and the minimum lot size, it would seem that the focus should be to maximise the retention of trees on the site while allowing development to occur , consistent with the R2 zone.

67 While the council adopts the approach the trees need to be accurately defined in relation to the hypothetical building platforms and irrigation areas; I am not satisfied that this is the optimal solution. It would seem that in order to maximise tree retention, the applicant should be required to remove the weed infestation and accurately plot and assess the trees on the site with a BDH>300mm. Until a development application is submitted, the retained trees

on each of the residential lots should remain. On lodgment of a development application for a dwelling and any ancillary buildings, an assessment can be made on the retention of any trees, taking into account the design of the dwelling, the irrigation area and the value of the tree. Of the trees on the site, it was agreed that Tree 42, which was considered to be tree of some importance, would now be retained.

- 68 The contentions specifically identify that the proposal is contrary to s 3.7.5 of the subdivision chapter of DCP 2002 which specifies that vegetation which adds to the visual amenity of a locality and/or which is environmentally significant should be conserved in the design of the subdivision proposal. Also, the contentions states that the proposal does not comply with s 3.2 of the subdivision chapter of DCP 2002 which specifies that vegetation should be retained where it forms a link between other bushland areas and that all subdivision proposals should be designed to minimise fragmentation of bushland.
- 69 While these are requirements should be considered, they are not an absolute requirement and any application for subdivision must take into account the other circumstances that relate to the site, particularly in this case, the R2 zoning of the site, the minimum lot size of 450 sqm and the quality of the vegetation on the site.
- 70 For the reasons in the preceding paragraphs, I am satisfied that pursuant to :
- clause 6.4(4)(a) of LEP 2012, “the development is designed, sited and will be managed to avoid any significant adverse environmental impact”,
  - clause 3.2 and cl 3.7.5 of DCP 2002 have been appropriately considered,
  - clause 5 of SREP 20 in relation to General planning considerations, particularly sub sec (d) “the relationship between the different impacts of the development or other proposal and the environment, and how those impacts will be addressed and monitored” have been taken into consideration, and
  - clause 6(6) of SREP 20 in relation to the specific planning policies and related recommended strategies for Flora and fauna, have been taken into consideration.

## Conditions

- 71 There are a number of conditions in dispute and also a number of conditions that will require amendment based on the finding in the judgment. The condition numbers relate to the original condition numbers of the council.
- 72 **Condition 9 and 10** – these conditions make reference to a Rehabilitation Plan when no plan is required however the council maintains that it is necessary to ensure that weed management will occur as part of the proposal. I agree with applicant that the reference to the Rehabilitation Plan should be deleted as management of weeds can be done without the need for a Rehabilitation Plan. A separate condition addresses the removal of the weeds.
- 73 **Condition 12** - these conditions relate to earthworks and the applicant and makes reference to “effluent disposal areas”. The applicant states that these areas should not be designated at this time but rather at the DA stage for a dwelling. The council states that the subdivision time is the appropriate time for designating the areas and if the areas need to be changed then this can be done as part of the DA stage. I agree with the applicant that the most efficient approach is to define the area when the design of the proposed dwelling is known although greater information needs to be available to any prospective purchaser through the s 88E Instrument.
- 74 **Condition 16** - this condition requires an arboriculture report to, in part, identify the trees to be retained. The applicant states that this report is not required because of the zoning of the land, the trees have been previously identified and the work required by the current Weed Order will likely require tree removal. The council states that the condition should remain as there is no objective analysis as to whether the trees proposed for retention can be sustainably retained.
- 75 The Travers report was generally accepted as being inaccurate and not containing all trees that were greater than a Diameter Breast Height (DBH)>300mm. The identification of all trees on the site with a DBH>300mm should be provided (the Tree Location Plan) with sufficient accuracy so that potential house footprints can be located and the impacts on any tree with a DBH>300mm clearly identified. The significance of each tree should also be

identified although trees in the road reserve need not be identified. Clearly, this must be done after the removal of the existing extensive weed infestation on the site.

- 76 **Condition 23, 53** - this condition requires certain infrastructure to be provided and approved prior to a Construction Certificate: kerb and gutter (condition 23(a)), sealed road shoulder (condition 23(b)), stormwater drainage (condition 23(c)), and footpaving (condition 23(d)). The applicant argues that all conditions should be deleted whereas the council maintains that the conditions are warranted based on the additional traffic generated by the development.
- 77 On this condition, expert evidence was provided by Mr Brodie, for the applicant and Mr Vaby, for the council. The conditions sought by the council are not unreasonable for the subdivision of land within a R2 zone. The applicant has sought to develop the land to a level anticipated by the zone and there is consequential infrastructure that should be provided as part of that redevelopment that includes kerb and gutter, construction of a road shoulder, stormwater drainage and footpaving, as would be expected in a R2 zone. However, I do not accept the council's position that the applicant should be expected to carry out those works for the existing properties in Kurrajong Road although there may be benefits if the engineering work for the existing dwellings is conducted concurrently with the proposed development, at the cost of the council.
- 78 **Condition 25, 41** - this condition requires an approval under s68 of the *Local Government Act 1993* and a license under the *Water Industry Competition Act 2006*. It is not clear from the evidence whether both are required or only one so the condition can remain.
- 79 **Condition 28** - this condition requires the preparation and notification of an owners operating manual for the proposed sewerage system, including a schematic cross-section of the irrigation field. The council seeks the inclusion of the conditions to alert potential buyers and the applicant seeks the deletion of the condition as this matter will be addressed at the DA stage.
- 80 I accept the condition can be retained so that prospective owners are aware of the operation of the sewage disposal system.

- 81 **Condition 40-** this condition requires compliance with the Environmental Management and Rehabilitation Plan, the arboricultural impact assessment and the Tree Protection Plan. I accept that this condition be amended to refer only to the Environmental Management Plan as the Rehabilitation Plan, and the Tree Protection Plan are no longer required and the arboricultural assessment of the trees with BDH>300mm is addressed elsewhere.
- 82 **Condition 64 –** this condition requires that certain matters are to be included in a public positive covenant under s88E of the *Conveyancing Act 1919*. These include the responsibilities of the Community Association, including the fencing of the OSD and basin areas. These are not opposed by the applicant.
- 83 Having found that the location and configuration of the irrigation areas is best left to the submission of a DA for a dwelling on each lot, it is appropriate that additional requirement should also be included in the s88E public positive covenant so that prospective purchasers are fully aware of their obligations if they purchase a lot in the subdivision. These are:
- the irrigation area, including setbacks,
  - activities not appropriate for the irrigation areas,
  - consideration of the Tree Location Plan when submitting a DA for a dwelling and ancillary buildings, and
  - bushfire protection areas.
- 84 **Conditions 72, 73,** – these conditions require the final plan and a survey plan to identify all water and sewerage system infrastructure as well as other matters. Water and sewerage system infrastructure are still relevant and the conditions should remain however other matters identified in the conditions can be deleted.
- 85 **Conditions 75, 77** - condition 75 requires a Community Management Statement to identify certain matters on the land. There is agreement on certain matters and disagreement on other matters however only part of sub sec (a) is in conflict with the judgment. The words “...including details of the size and desired location of effluent disposal and buffer areas within each lot” can be deleted. Sub sec (b), (c) and (f) can be deleted because of the

reference to the tree retention plan. The second dot point in condition 77 can be deleted for the same reason as sub sec (a).

- 86 **Condition 81** – this condition requires a more onerous noise standard than provided under the Noise Control Act and can be deleted.

### **Orders**

- 87 I am satisfied that approval should be granted to the proposed subdivision but on terms different to that suggested by the applicant or the council. I have attempted to amend the conditions of consent to reflect the findings in the judgment however these amendments may require further amendment. I propose to stay the orders for a period of 14 days for the parties to review the conditions to ensure that they are consistent and properly reflect the findings in the judgment. The stay and the invitation to review the conditions is not an invitation to re-argue any of the contentions or make further submissions on matters already addressed.

- 88 The orders of the Court are:

#### *Part A;*

- (1) The appeal is upheld.
- (2) Development Application DA0830/15 for a 37 lot community title subdivision, including the construction of a new private road, drainage system and installation of a water recycling facility to treat sewage with two lots would be used for services and the remaining 35 lots would be used for residential development at. 67 Kurrajong Road, Kurrajong is approved subject to the conditions in Annexure A.
- (3) The exhibits are returned with the exception of exhibits 1, B, C and D.

#### *Part B;*

- (1) The orders in Part A are stayed for a period of 14 days from 30 June 2017 for the parties to make any written submissions on the conditions in Annexure A to ensure consistency and to ensure that they fully reflect the findings in the judgment. Final orders will be made in chambers.

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**G Brown**

**Commissioner of the Court**

**162961.16 (C) gtb (54.1 KB, pdf)**

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## Annexure 'A'

### Conditions of Consent

DA0830/15 – 37 Lots  
Subdivision of 67 Kurrajong Road Kurrajong

#### Integrated Development

1. The general terms of approval from the following Authorities, as referenced below form part of the consent conditions:

**NSW Rural Fire Service** – The General Terms of Approval and dated 29 January 2016 (Reference D16/0001 DA16010600163 MA) and 2 November 2016 (Reference D16/0125 DA16010600163 MA).

#### General Conditions

2. The development shall take place generally in accordance with the following plans, specifications and documentation submitted with the application except as modified by these further conditions.

Drawing Nos.	Date of drawing	Prepared by
Plan of Subdivision 2002.DA.16 rev B	16 July 2016	Andrew P Grieve
Proposed Control Shed 2003.DA.16	7 August 2016	Andrew P Grieve
Development Overview and Viewport Reference Plan PS02-A050 rev D	14 December 2016	Martens & Associates Pty Ltd
Town Planning Layout (Viewport 01) PS02-A400 rev D	14 December 2016	Martens & Associates Pty Ltd
Soil & Water Management Plan PS02-B300 rev B	14 December 2016	Martens & Associates Pty Ltd
Soil & Water Management Plan Details Sheet 1 PS02-B310 rev B	14 December 2016	Martens & Associates Pty Ltd
Soil & Water Management Plan Details Sheet PS02-B311 rev B	14 December 2016	Martens & Associates Pty Ltd
Drainage Plan (Viewport 01) PS02-E100 rev E	14 December 2016	Martens & Associates Pty Ltd
On-Site Detention Catchment Plan Pre-development PS02-E600 rev C	14 December 2016	Martens & Associates Pty Ltd
On-Site Detention Catchment Plan Post-development PS02-E610 rev C	14 December 2016	Martens & Associates Pty Ltd
Concept On-Site Detention Typical Section PS02-E620 rev E	14 December 2016	Martens & Associates Pty Ltd

Pre-development MUSIC Catchment & Results PS02-E700 rev C	14 December 2016	Martens & Associates Pty Ltd
Pre-development MUSIC Catchment & Results PS02-E710 rev C	14 December 2016	Martens & Associates Pty Ltd
Concept Bio-retention Typical Section PS02-E720 rev C	14 December 2016	Martens & Associates Pty Ltd
Services Lot 'A' Layout Plan (Viewport 03) PS02-H101 rev D	14 December 2016	Martens & Associates Pty Ltd
Services Lot 'B' Layout Plan (Viewport 04) PS02-H102 rev D	14 December 2016	Martens & Associates Pty Ltd
Reticulated Wastewater Management Scheme (Layout 01) PS02-H200 rev C	14 December 2016	Martens & Associates Pty Ltd
Reticulated Sewer Pump Details PS02-H220 rev B	14 December 2016	Martens & Associates Pty Ltd
Concept Water Reticulation Plan (Viewport 01) PS02-H300 rev D	14 December 2016	Martens & Associates Pty Ltd
Landscape Plan LP.01/E Sheet 1 of 1	2 February 2017	Botanica
Estate Signage Details SP.01/A	15 August 2016	Botanica
Estate Signage Details SP.02/A	15 August 2016	Botanica

Reference Documentation	Date of document	Prepared by
Statement of Environmental Effects	26 July 2016	Nexus Environmental Planning Pty Ltd
Phase 1 Environmental Site Assessment	September 2015	C.M. Jewell & Associates Pty Ltd
Concept Stormwater Management Assessment	December 2016	Martens & Associates Pty Ltd
Traffic and Access Assessment Reports	17 December 2015 25 July 2016	Positive Traffic Pty Ltd
Bushfire Risk Assessments	27 July 2015 15 August 2016	Bushfire Planning Services Pty Ltd
Statement of Evidence	18 January 2016	Narelle Sonter, Botanica
Heritage Impact Statement	7 July 2016	Robert Staas, NBRS+P
Statement of Evidence	11 January 2017	Anne Clements & Associates Pty Ltd

- The Landscape Plan LP.01/E Sheet 1 of 1 by Botanica is to be amended to provide for the retention of all trees prescribed for the purposes of clause 5.9 Hawkesbury Local Environmental Plan 2012 which are within 5m of the southern boundary and to substitute *Alphitonia excels* (Red Ash) and *Glochidion fernandii* (Cheese Tree) for *Brachychiton populneus* (Kurrajong) and *Hymenosporum flavum* (Native Frangipani). That plan as amended shall hereafter be referred to as the approved tree retention plan.

4. The plan of subdivision shall be amended to provide for all community land (currently lots 1 and 21 and proposed road) to be in a single lot.

**Prior to Issue of Construction Certificate**

5. No work including excavation, site work, demolition, landscaping, removal of trees (with the exception of permitted weed removal) or building work shall be commenced prior to the issue of an appropriate Construction Certificate.
6. Weed removal is to be carried out in accordance with the Property Weed Management Plan of Hawkesbury County Council dated 20 July 2016 under the supervision of an AQF Level 5 Arborist.
7. Trees required to be removed for the construction of services and roads shall be nominated on the Construction Certificate plans. All vegetative debris (including felled trees) is to be chipped or mulched. Tree trunks are to be recovered for posts, firewood or other appropriate use. No vegetative material is to be disposed of by burning.
8. Pursuant to section 80A(1) of the Environmental Planning and Assessment Act 1979 and Hawkesbury City Council's Section 94A Development Contributions Plan 2015 (as amended from time to time), a contribution fee must be paid prior to the issue of the Construction Certificate.

The contributions levy is based on the cost of works associated with the proposed development. A cost estimate report prepared by a registered quantity surveyor must be submitted to Hawkesbury City Council for the calculation of applicable fees.

The amount to be paid is to be adjusted at the time of the actual payment, in accordance with the provisions of Hawkesbury City Council's Section 94A Development Contributions Plan 2015 (as amended from time to time).

Copies of receipt(s) confirming that the contribution has been fully paid are to be provided to the Certifying Authority prior to the issue of a Construction Certificate.

9. An Environmental Management Plan (EMP) for the development site shall be prepared by an appropriately qualified person. The EMP shall address (without being limited to) the clearing of vegetation, pruning and removal of trees, earthworks, erosion control, site rehabilitation and landscaping. The EMP is to be submitted to Council for approval prior to any works commencing on site.
10. All site works shall be carried out in accordance with the EMP. Implementation of the EMP shall be supervised by an appropriately qualified person.
11. Construction of the road, access, drainage, on-site detention (OSD) are not to commence until one full printed set and electronic copy of the plans and specifications of the proposed works are submitted to and approved by the Director City Planning or an Accredited Certifier.
12. All earthworks on site must comply with the following:
  - a) Earthworks areas shall be minimised and the areas likely to be used for effluent disposal areas shall not be used for vehicle access or storage of materials. In the event that earthworks are carried out within effluent disposal areas the pre-development soil profile of those areas shall be reinstated using soil reclaimed from that area.
  - b) Topsoil shall only be stripped from approved areas and shall be stockpiled for re-use during site rehabilitation and landscaping.
  - c) All disturbed areas are to be stabilised/revegetated, using a minimum 300mm surface layer of topsoil, as soon as practicable after the completion of filling works.

- d) All fill within the site shall be placed in layers not exceeding 300mm thickness and compacted to achieve a minimum dry density ratio of 95% when tested in accordance with *Australian Standard AS 1289: Methods of testing soils for engineering purposes* unless otherwise specified.
- e) Filling shall be comprised of only uncontaminated virgin excavated natural material or excavated natural material. Contamination certificates for all source material shall be provided to the Principal Certifying Authority prior to placing any fill on site.

Details satisfying the above requirements are to be included on plans submitted to the Certifying Authority prior to issue of a Construction Certificate.

13. A Construction Management Plan shall be submitted and reviewed by Hawkesbury City Council prior to issue of a Construction Certificate. The Construction Management Plan shall include the following:
  - a) Details of the proposed works including the extent, staging and proposed timing of the works
  - b) A detailed Traffic Management Plan
  - c) A detailed Soil and Water Management Plan (SWMP)
  - d) Site specific Ecological Impact Mitigation Measures
  - e) Site specific tree protection measures for all trees to be retained in accordance with the approved tree retention plan.
14. The Traffic Management Plan must include the following:
  - a) The proposed method of loading and unloading excavation and construction machinery, excavation and building materials, formwork and the erection of any part of the structure within the site.
  - b) Control of traffic within the road reserve.
  - c) The proposed method of access to and egress from the site for vehicles.
  - d) Traffic Control Plans are to be prepared in accordance with the RMS publication *Traffic Control at Worksites* by an appropriately qualified person.
  - e) Construction traffic route.
15. The SWMP must take into account the requirements of Landcom's publication *Managing Urban Stormwater - Soils and Construction (2004)* and shall contain but not be limited to:
  - a) Clear identification of site features, constraints and soil types,
  - b) Erosion and sediment control plans,
  - c) A strategy for progressive revegetation and rehabilitation of disturbed areas of earth as rapidly as practicable after completion of earthworks.
16. A detailed survey of all vegetation with a BDR>300mm is to be prepared after the removal of weeds from the site pursuant to condition 6 of this consent (Tree Retention Plan (TRP)) An arboricultural impact assessment report relating to these trees is to be prepared in accordance with *AS4970-2009 Protection of Trees on Development Sites* and approved by the council.
17. OSD shall be provided to maintain all stormwater discharges from the 1:1 year storm up to the 1:100 year storm at pre-development levels. Calculations and detailed plans are to be

submitted with the application for the Construction Certificate. Discharge from the OSD structure must be by gravity.

18. A gross pollutant trap is required to be provided before stormwater is directed into the proposed OSD systems. Details must be shown on the plans prior to the issue of a construction certificate.
19. The OSD is to be designed in accordance with Hawkesbury Development Control Plan (Appendix E, Civil Works Specification, Part 1 – Design Specifications and Part 2 – Construction Specifications and the approved plans
20. The Bio-basin or stormwater quality treatment system contained within the OSD system is to be designed to meet the targets similar to those detailed in the Managing Urban Stormwater; Environmental Targets (DECC 2007) and the approved plans.. The water quality of stormwater discharged into the Hawkesbury-Nepean River System must comply with the standards set out below:

<b>Standard Pollutant</b>	<b>Treatment Standard</b>
Suspended solids	80% retention of the average annual load
Total Phosphorous	45% retention of the average annual load
Total nitrogen	45% retention of the average annual load
Litter	Retention of litter greater than 50mm for flows up to 25% of the 1 year ARI peak flows
Coarse sediment	Retention of sediment coarser than 0.125mm for flows up to 25% of the 1 year ARI peak flows
Oil and grease	In area with concentrated hydrocarbons deposition, no visible oils for flows up to 25% of the 1 year ARI peak flow

21. Should the development necessitate the installation or upgrading of utility services or any other works on Council land beyond the immediate road frontage of the development site and these works are not covered by a Construction Certificate issued by Council under this consent then a separate road opening permit must be applied for and the works inspected by Council's Construction and Maintenance Services team. The contractor is responsible for instructing sub-contractors or service authority providers of this requirement.
22. Details of any fill material to be removed from or imported to the site shall be submitted with the engineering plans. Details to include quantities, borrow sites and/or disposal sites.
23. An infrastructure upgrade plan is required to be prepared and submitted to Council for approval prior to the issue of a Construction Certificate. This plan is required to achieve the following:
  - a) Construct kerb and gutter on the development side of Kurrajong Road for the proposed lots. The kerb alignment must provide for a 4.5m wide nature strip;
  - b) Construct a sealed road shoulder with a minimum width of 2.5m for the kerb and gutter of the proposed lots. The constructed shoulder must retain a two way traffic flow on Kurrajong Road;
  - c) Construct an underground stormwater drainage system to adequately drain the catchment including amplification of any down stream drainage system, if warranted.
  - d) Construct a 1.2m wide concrete footpath along the frontage of Kurrajong Road for the proposed lots;
  - e) Detailed engineering drawings to be submitted for approval prior to the commencement of any work.

24. Retaining walls over 600 mm in height are to be designed by a suitably qualified and experienced Structural Engineer. Where retaining walls are located along boundaries they must be of a material and colour that will reduce the visual impact of the walls from the adjoining lots.
25. A dilapidation survey and report (including photographic record) must be prepared by a suitably experienced person detailing the pre-developed condition of public road in the vicinity of the development. Particular attention must be paid to accurately recording any pre-developed damaged areas so that Council is fully informed when assessing any damage to public infrastructure caused as a result of the development.

The developer may be held liable for all damage to public infrastructure in the vicinity of the site, where such damage is not accurately recorded and demonstrated as pre-existing under the requirements of this condition.

The developer shall bear the cost of carrying out works to restore all public infrastructure damaged as a result of the carrying out of the development, and no occupation of the development shall occur until damage caused as a result of the carrying out of the development is rectified.

A copy of the dilapidation survey and report must be lodged with Council by the Principal Certifying Authority prior to the issue of any Construction Certificate.

26. A compliance certificate under s.73 Sydney Water Act 1994 must be obtained from Sydney Water Corporation.

Water and sewer infrastructure required to be built must be shown on the plans prior of the issue of a Construction Certificate.

27. Prior to issuing a Construction Certificate a licence under the Water Industry Competition Act 2006 must be obtained from IPART and an approval under s.68 Local Government Act 1993 must be obtained from Council for the carrying out of sewerage work and the operation of a sewage management system.
28. An owners' operating manual shall be prepared for the sub-surface irrigation systems explaining the irrigation system layout, buffers and landscaping. This manual shall be made available to potential purchasers to alert them to their responsibilities and irrigation area management. The manual shall include a schematic cross-section of the irrigation field showing natural soil or re-constituted soil profiles (where development has altered the existing profile) and how the irrigation field is to be installed within the profile.

#### **Prior to Commencement of Works**

29. The applicant shall advise Council of the name, address and contact number of the certifying authority appointed pursuant to s.81A 2(b) of the Environmental Planning and Assessment Act, 1979.
30. At least two days prior to commencement of work, written notice is to be given to Hawkesbury City Council of the proposed commencement of work.
31. A site meeting with Council's Engineer and the contractor must be held prior to the commencement of work on site.
32. All traffic management devices shall be installed and maintained in accordance with the approved Traffic Management Plan.
33. Erosion and sediment control devices are to be installed and maintained at all times during site works and construction. An appropriate warning sign shall be affixed to the sediment fence/erosion control devices.

34. Measures shall be implemented to prevent vehicles tracking sediment, debris, soil and other pollutants onto any road.
35. Toilet facilities (to the satisfaction of Council) shall be provided for workmen throughout the course of building operations. Such facility shall be located wholly within the property boundary.
36. A sign displaying the following information is to be erected adjacent to each access point and to be easily seen from the public road. The sign is to be maintained for the duration of works:
  - a) Unauthorised access to the site is prohibited.
  - b) The name of the owner of the site.
  - c) The person/company carrying out the site works and telephone number (including 24 hour 7 days emergency numbers).
  - d) The name and contact number of the Principal Certifying Authority.

### **During Construction**

37. Clearing of land, running of machinery, excavation, and/or earthworks, building works and the delivery of building materials shall be carried out between the following hours:
  - a) between 7:00 am and 6:00 pm, Mondays to Fridays inclusive;
  - b) between 8:00 am and 4:00 pm, Saturdays;
  - c) no work on Sundays and public holidays.
  - d) works may be undertaken outside these hours where:
    - (i) the delivery of vehicles, plant or materials is required outside these hours by the Police or other authorities;
    - (ii) it is required in an emergency to avoid the loss of life, damage to property and/or to prevent environmental harm;
    - (iii) a variation is approved in advance in writing by Council.
38. All traffic management devices shall be installed and maintained in accordance with the approved traffic management plan.
39. All civil construction works required by this consent shall be in accordance with Hawkesbury Development Control Plan appendix E Civil Works Specification.
40. All works are to be carried out in accordance with the EMP.
41. The protection of trees to be retained on site, as shown in the Tree Retention Plan, shall be undertaken under the supervision of an AQF Level 5 Arborist
42. The Construction Management Plan (including all sub-plans) must be implemented for the duration of the proposed works in compliance with the Construction Management Plan.
43. The sewer pumping station, water treatment plant, sewerage and recycled water reticulation infrastructure, including junctions to each residential lot in the subdivision, shall be constructed in accordance with approved plans.
44. Inspections shall be carried out and compliance certificates issued by Council or an accredited certifier for the components of construction detailed in Hawkesbury Development Control Plan Appendix B Civil Works Specification, Part II, Table 1.1.
45. Inspections and Compliance Certificates for sewer works can only be conducted and issued by a public authority or any person licensed under the Water Industry Competition Act 2006.

46. Street lighting in accordance with the current relevant Australian Standard is to be installed in the new road. Street lighting must be designed to be under the control of the community title subdivision.
47. Landscaping shall be completed in accordance with the approved landscape plans.
48. All constructed batters are to be topsoiled and turfed and where batters exceed a ratio of 3 (three) horizontal to 1 (one) vertical, retaining walls, stone flagging or terracing not exceeding 600mm in height shall be constructed. Retaining walls greater than 600mm in height must be indicated on approved construction plans.
49. All necessary works shall be carried out to ensure that any natural water flow from adjoining properties is not impeded or diverted.
50. Inter-allotment drainage shall be provided for all lots which do not drain directly to a public road. Easements are to be created at the applicant's cost.
51. Erosion and sediment control devices are to be installed and maintained until the site is fully stabilised in accordance with the approved plan and Hawkesbury Development Control Plan chapter on Soil Erosion and Sedimentation.
52. Dust control measures, e.g. vegetative cover, mulches, irrigation, barriers and stone shall be applied to reduce surface and airborne movement of sediment blown from exposed areas.
53. The grading, trimming, topsoiling and turning of the footpath verge fronting the development site is required to ensure a gradient between 2% and 4% falling from the boundary to the top of kerb is provided. This work must include the construction of any retaining walls necessary to ensure complying grades within the footpath verge area. All retaining walls and associated footings must be contained wholly within the subject site. Any necessary adjustment or relocation of services is also required, to the requirements of the relevant service authority. All service pits and lids must match the finished surface level.

**Prior to Issue of Subdivision Certificate**

54. Street name signs shall be provided at the junction of the new road/s.
55. All necessary street signage and pavement markings shall be installed.
56. Any damage to existing public assets as a result of development work must be repaired by the developer at no cost to Council.
57. All approved road, sewerage and drainage works including works in the approved infrastructure upgrade plan, shall be constructed.
58. All street trees to be planted in Kurrajong Road as required by this consent shall be planted.
59. All landscaping proposed within the development site shall be planted in accordance with the approved landscape plans.
60. A works as executed plan shall be submitted to Council showing all constructed infrastructure (road, sewerage and drainage works).
61. A works as executed plan for the OSD and Bio-basin showing construction details and levels of weir, top of surcharge pit, embankment levels shall be submitted to and approved by Council.
62. A report by the Design Engineer verifying that the OSD and Bio-basin systems conform to the approved design shall be submitted to and approved by Council.



63. A Plan of Management for the OSD and Bio-basin facilities shall be submitted to and approved by Council. The Plan of Management shall set out all design and operational parameters for the detention facilities including design levels, hydrology and hydraulics, inspection and maintenance requirements and time intervals for such inspection and maintenance.
64. A public positive covenant pursuant to the s.88E Conveyancing Act shall be submitted to Council for approval and registered on the title which provides the following:
- a) The Community Association will at all times maintain, repair and keep the OSD and Bio-basin facilities in a good and safe condition and state of repair, in accordance with the approved design to the reasonable satisfaction of Council, having due regard to the Plan of Management for the operation and maintenance of the OSD and Bio-basin facilities
  - b) The OSD and Bio-basin areas must be fenced off with minimum 1.8 m high fences and sign posted for public safety
  - c) A prohibition on any further subdivision or strata subdivision of any of the proposed lots.
  - d) Prohibiting the use of the utility lots for residential purposes.
  - e) Each residential lot is to have a minimum area of 203 sqm for on site effluent disposal and setbacks.
  - f) A development application or Complying Development Certificate for a dwelling and any ancillary buildings must consider the existing trees shown on the approved Tree Retention Plan.
  - g) The proposed areas for effluent disposal area within each lot is to be
    - i. appropriately signposted
    - ii. landscaped with grasses or ornamental vegetation only;
    - iii. if landscaped with grass the grass shall be mown regularly and clippings removed;
    - iv. not unduly shaded by adjacent vegetation or structures;
    - v. prohibiting structures from being built or any other items which may damage the reticulated irrigation system (including vehicles) from being placed over or under the dedicated disposal area within each lot; and
- All costs associated with the Covenant, including any legal costs payable by Council, are to be paid by the owner or applicant.
65. A Certificate from a telecommunications carrier confirming that provision has been made for services to the development shall be submitted to the Principal Certifying Authority.
66. Written clearance from Integral Energy shall be submitted to the Principal Certifying Authority.
67. A Section 73 Compliance Certificate under the Sydney Water Act 1994 must be obtained from Sydney Water Corporation.
68. The new road shall be named. Please contact Council's Infrastructure Services.
69. A Surveyor's Certificate stating that all pipelines (interallotment drainage) are contained within the proposed/existing easements shall be submitted.
70. A plan of community title subdivision and associated documents (together with four copies), prepared in accordance with the requirements of the Community Land Development Act, shall be submitted to Council for approval.

71. The proposed community lot shall be developed in accordance with the approved Development Contract.
72. The final plan of subdivision shall show the location of all infrastructure for the Recycled Water Management Scheme and bushfire asset protection zones.
73. A survey plan showing all existing services on the lots including sewerage infrastructure and, water connections shall be submitted. The plan shall demonstrate that there are no encroachments over remaining or proposed boundaries.
74. A Plan of Management for the Recycled Water Management Scheme shall be submitted to and approved by Council. The Plan of Management shall set out all design and operational parameters for the Scheme including design levels, hydrology and hydraulics, inspection and maintenance requirements and time intervals for such inspection and maintenance.
75. A Community Management Statement pursuant to the Community Land Development Act 1989 shall be submitted to Council for approval and registered. The Community Management Statement shall include but not be limited to:
  - a) A full description of the waste management and water reticulation system
  - b) Deleted.
  - c) Deleted .
  - d) Preventing the development or construction of structures on the effluent disposal or buffer areas identified on the development sites.
  - e) Requiring a private waste collection service to remove household and “clean up” waste from the lots serviced by the community title road. All waste shall be collected from within the site.
  - f) Deleted.
  - g) Requiring landscaping within the community lot and the proposed trees along Kurrajong Road to be maintained in perpetuity, and requiring any vegetation which dies to be replaced with a species of a similar height and form as that approved.
  - h) Limiting all vehicles associated with the maintenance, repair or monitoring of the sewerage system or the removal of sludge/solids from the sewage treatment plant to park wholly within the site.
  - i) Requiring compliance by the lot owner with the approved Plan of Management for the Recycled Water Management Scheme.
  - j) Requiring land proposed for effluent disposal area within each lot to be
    - i) appropriately signposted
    - ii) landscaped with grasses or ornamental vegetation only;
    - lii) if landscaped with grass the grass shall be mown regularly and clippings removed;
    - liv) not unduly shaded by adjacent vegetation or structures, and
    - v) prohibiting structures from being built or any other items which may damage the reticulated irrigation system (including vehicles) from being placed over or under the dedicated disposal area within each lot; and
  - k) A prohibition on any further subdivision or strata subdivision of any of the lots.

All costs associated with the Community Management Statement, including any legal costs payable by Council, are to be paid by the owner or applicant.

76. A defects maintenance bond calculated in accordance with appendix E of the DCP (Chapter 15.4.4) shall be lodged with Hawkesbury City Council prior to issue of the Subdivision Certificate. The bond can be in the form of an unconditional bank guarantee or cash security. The bond is refundable on application, six months after the release of the Subdivision Certificate, upon satisfactory final inspection.
77. A Plan of Management for the Recycled Water Management Scheme shall be prepared and submitted to Council for approval. The Plan of Management including but not limited to:
- a comprehensive description of the requirements of the system
  - deleted
  - drippers with automatic shut off valves and herbicide dispersal facilities to avoid blockages
  - appropriate flushing valves and air-release valves
  - a comprehensive maintenance program for all aspects of the Recycled Water Management Scheme delineating the respective responsibilities of the Community Association and individual lot owners
  - a monitoring system for all elements of the Recycled Water Management Scheme (including effluent disposal areas) to ensure compliance with performance criteria and to avoid over-watering
  - health and safety advice to home occupants regarding recycled effluent
  - a comprehensive description of emergency and contingency plans in the event of a system failure or a failure to achieve performance criteria.

#### Ongoing Conditions

78. Road and drainage works, must be maintained for a minimum period of 6 months commencing from the date of the issue of the Subdivision Certificate, unless otherwise agreed to in writing by Council. The developer must ensure that any defective works shall be rectified and/or replaced during the maintenance period in accordance with the approved construction certificate plans. All costs arising during the maintenance period must be borne by the developer. Road and drainage must be maintained in its original construction condition for this liability period. The developer must notify Council for a re-inspection at the end of the maintenance period.
79. The Recycled Water Management Scheme shall operate at all times so that the following is achieved:
- a) *E. coli* of less than 10cfu/100ml
  - b) BOD5 of less than 20mg/L
  - c) suspended solids of at least 30mg/L
  - d) total nitrogen of less than 18mg/L (90<sup>th</sup> percentile)
  - e) total phosphorus of less than 9mg/L (90<sup>th</sup> percentile)
  - f) a design irrigation rate of not more than 4mm/day
  - g) the effluent disposal area has setbacks of 1m to site boundaries, 3m to swimming pools and 1m to dwellings unless those dwellings are downslope of the effluent disposal area in which case the setback shall be 3m
  - h) the effluent disposal area has a minimum area of 203sqm, including setbacks
80. The approved Plan of Management for the Recycled Water Management Scheme shall be implemented and adhered to at all times.
81. Deleted.

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**G Brown**  
**Commissioner of the Court**



# Technical Note

67 Kurrajong Road WICA application review

## 1 Background

A development is proposed by PJRM Pty Ltd for 35 residential properties at 67 Kurrajong Road, East Kurrajong. The preferred option for sewage management is for collection, treatment and disposal within the development by Aquacell Pty Ltd. Aquacell have therefore applied under the Water Industry Competition Act 2006 (WICA) for the following:

- Network Operators Licence to construct, maintain and operate sewerage infrastructure
- Retail Supplier's Licence to supply sewerage services

Atom Consulting have been engaged by Hawkesbury City Council to review the WICA application and provide information to incorporate into their submission to IPART on the application. The following documents were reviewed:

- WICA Licence Application Form (Aquacell, September 2020)
- Wastewater Management Plan (Martens, September 2020)
- Risk Assessment Workshop Summary Paper (Praktik, September 2020)

## 2 Design loadings

The hydraulic design loadings for the sewerage scheme are shown in Table 1. This methodology is typical for design of large sewerage schemes. Caution, however, should be exercised when applying this methodology for small schemes as changes in the occupancy or flows in a few properties can have a large impact on the overall sewage flow.

**Table 1. Hydraulic design loadings**

Parameter	Value
Equivalent Tenements (ET)	35
Occupancy (EP/ET)	3
Sewage flowrate (L/EP/day)	150
Expected sewage flowrate (kL/day)	15.8
Design buffer	33%
Peak design flowrate (kL/day)	21.0

Source: Martens (2020)

While the development consists of 35 lots, it is unlikely they will all be occupied in the early stages after the development is completed. The Wastewater Management Plan does not discuss how the sewage will be managed until the flowrate is sufficient for the treatment plant to achieve the required quality. The Wastewater Management Plan also does not consider how septicity will be controlled in these early stages when there are low flows and high detention time in the pump stations.

The occupancy rate of 3 persons/dwelling is based on Census data. Individual developments however may have more or less occupancy than the census. The demographics of the population may also change the amount of sewage per person. The treatment and disposal system therefore must be designed with sufficient contingency and turndown to meet the required outcomes over a range of sewage flows.

The design flowrate of 150 L/person/day is reasonable for new sewerage systems and the increase in flows due to wet weather is likely to be very low as the length of pipework is very low. As the system ages however, underground pipework including those on the customers' property will deteriorate and could result in infiltration of stormwater to the sewerage system. Future, incorrect plumbing of rainwater or unforeseen surface runoff into manholes or pump stations may also increase inflow in wet weather. The Wastewater Management Plan does consider how inflow and infiltration will be controlled and/or managed.

### 3 Treatment design

The proposed treatment process includes the following:

- Raw sewage buffer tanks
- Screening
- Membrane bioreactor (MBR)
- UV disinfection (UV Dose of 39 mJ/cm<sup>2</sup>)
- Sludge storage tank for offsite disposal

Contingency for treatment plant or disposal failure is provided by the raw sewage buffering tanks (13 days) or by tankering offsite. At the design flow of 21 kL/day, two rigid tankers or one semi-trailer would be required each day. No information is provided on which roads and hardstands tankers would use to access the STP or pump station and how they will connect and load the truck.

The treatment plant will be designed to achieve the treated effluent quality in Table 2.

**Table 2. Design treated effluent quality**

Parameter	Units	Design value
<i>E. coli</i>	cfu/100mL	<10
BOD <sub>5</sub>	mg/L	<20
TSS	mg/L	<30
pH	-	6.5 to 8.5
Turbidity	NTU	<5
Total nitrogen	mg/L	<15
Total phosphorus	mg/L	<9

Source: Martens (2020)

No design information on raw sewage quality, MBR dimensions and flux or UV transmissivity were available. It is therefore not possible to undertake a detailed assessment of the treatment plant design. A well designed treatment plant with the proposed process units should however be capable of meeting the design effluent quality.

The design does not mention chemical dosing or design luxury phosphorus uptake. We have therefore assumed the effluent phosphorus of less than 9 mg/L is based on normal biological uptake. At typical raw sewage phosphorus levels, this is achievable but as mentioned in Section 2, the demographics of a small development like this may produce different flows and raw sewage quality that would be diluted in a large sewerage scheme. However, as noted in Section 4, the effluent management are is not limited by phosphorus loadings.

### 3.1 Log reduction values

The treatment log<sub>10</sub> reduction values (LRVs) in Table 3 were assumed for the risk assessment.

**Table 3. Assumed log<sub>10</sub> reduction values for treatment**

Treatment	Log <sub>10</sub> reduction value		
	Protozoa	Viruses	Bacteria
Biological treatment	0.5	0.5	1.0
Membrane filtration	4.0	2.5	3.5
UV disinfection	3.0	0.5	2.0
<b>Total</b>	<b>7.5</b>	<b>3.5</b>	<b>6.5</b>

Source: Praktik (2020)

Log reduction has been claimed for biological treatment and membrane filtration. However as this is an MBR both processes are occurring simultaneously in one tank. It has also been historically difficult to validate MBRs to achieve the same virus log removal as separate membrane filtration. Virus removal is also dependent on the type of membrane used.

The log reductions for UV disinfection are achievable but will be dependent on the actual UV transmission (UVT) achieved by the MBR. Atom Consulting are aware of MBRs that produce effluent with a UVT of as low as 50%. The UV system should therefore be designed for expansion if the actual UVT after commissioning is lower than assumed during design.

Typical LRVs for this treatment process are shown in Table 4

**Table 4. Recommended log<sub>10</sub> reduction values for treatment**

Treatment	Log <sub>10</sub> reduction value		
	Protozoa	Viruses	Bacteria
Biological treatment	0	0	0
Membrane filtration	4.0	1.5	3.5
UV disinfection	3.0	0.5	2.0
<b>Total</b>	<b>7.0</b>	<b>2.5</b>	<b>5.5</b>

## 4 Effluent management area

Effluent from the sewage treatment plant is proposed to be disposed of by subsurface application in a centralised effluent management area (EMA). The EMA has been designed using AS/NZS 1547 *On-site Domestic Wastewater Management*.

The EMA has been sized conservatively with a hydraulic loading rate of 30 mm/day compared with a maximum of 50 mm/day recommended in AS/NZS 1547. The Wastewater Management Plan states that the EMA is 2.2 times the minimum required area however this includes the 33% contingency in sewage flows which allows for differences in the sewage produced per

property. Based on the design wastewater flows the EMA is 1.7 times the minimum area recommended in AS/NZS 1547.

Local climate data shows that the average monthly evaporation rate exceeds the average monthly rainfall. Combined with evapotranspiration from grass on the EMA there will be no accumulation, runoff or ponding of effluent. While there may be days of high rainfall when ponding and runoff may occur, however in these there will be significant stormwater runoff from surrounding properties and roads and this will dilute any runoff from the EMA.

There will be times during extreme or extended wet weather when the EMA becomes too waterlogged to be used for disposal. The Wastewater Management Plan does not discuss who effluent will be disposed of in these events

Detailed geotechnical surveys have been undertaken of the development area to determine soil permeability, soil nutrient adsorption properties and location of groundwater and surface water. This information has been used to undertake water and nutrient balances.

The nutrient balance concluded that an area of 4,375 m<sup>2</sup> is required to assimilate the nitrogen load from the STP compared with design area of 1,880 m<sup>2</sup>. This means nitrogen will travel up to 10 m either side of the subsurface trenches. The buffer to the nearest groundwater is 250 m and to watercourses is 40 m and the transport of nitrogen is therefore not likely to have any impact. The STP is also likely to produce effluent with less nitrogen than the 15 mg/L assumed in the design.

The area required to assimilate phosphorus is only 801 m<sup>3</sup> and will therefore be contained within the EMA.

To maximise nutrient removal, grass on the EMA will be mowed to keep it in the growth phase. Grass clippings will be removed and disposed of offsite to transport nutrients out of the EMA.

## 4.1 Log reduction values

The LRVs for the effluent disposal used in the risk assessment are shown in Table 5. The recommended treatment LRVs are also shown.

The EMA will be fenced to prevent public access however no details are provided in the application. To prevent unauthorised access the EMA, the fence should be at least 1.8 m high chain-link wire topped with three strands of barbed wire. Other fence designs (eg. aluminium fencing) is also acceptable provided it is 1.8 m high and is designed to prevent climbing.

The overall LRVs are well above the required LRVs for municipal irrigation and the risk to public health have been well managed.

**Table 5. Assumed log<sub>10</sub> reduction values for disposal**

Treatment	Log <sub>10</sub> reduction value		
	Protozoa	Viruses	Bacteria
Subsurface disposal	5.0	5.0	5.0
No public access	2.0	2.0	2.0
<b>Total non-treatment (capped at 3.0)</b>	<b>3.0</b>	<b>3.0</b>	<b>3.0</b>
Treatment (from Table 4)	7.5	3.5	6.5
<b>Total treatment &amp; non treatment</b>	<b>10.5</b>	<b>6.5</b>	<b>9.5</b>
Required for municipal use	3.7	5.2	4.0



Source: Praktik (2020)

## 5 Conclusions

The following gaps were found in the documentation provided:

- No plan on how to manage low sewage flows in the early stages of the development when they are too low to be treated at the STP. There is also no information on management of septicity in the early stages of development due to long detention times in the sewerage network and pump station
- The risk to the proposed treatment and disposal if sewage production is higher or lower than design due to different occupancy or sewage flows has not been identified or managed.
- It is not clear in the proposal how tankers will connect to the sewage pump station or the STP in the event that the STP or the EMA are offline. There is no information on what roads these tankers will use, whether they are designed for heavy vehicles and how they will access the site without blocking traffic.
- While the water balance addresses disposal of effluent in average weather conditions, there will be rain events that are extreme in intensity or duration that cause the EMA to become waterlogged. No information is provided on how effluent will be managed during these events
- No information is provided on how the increase in sewage flows in wet weather due to asset deterioration or illegal connection of stormwater will be managed
- The  $\log_{10}$  reduction values for treatment do not reflect recent experience in validating membrane bioreactors
- The UV transmissivity used to design the UV disinfection system has not been provided. There is no information on what provision for upgrade of the system if the UV transmissivity is lower than design
- The fence around the effluent management area must be designed to prevent unauthorised access.