Figure 9 – Option 1 – Medium/High Quality habitat + the 20 metre wide buffer zone excluded from the 150 metre wide bushfire protection zone.

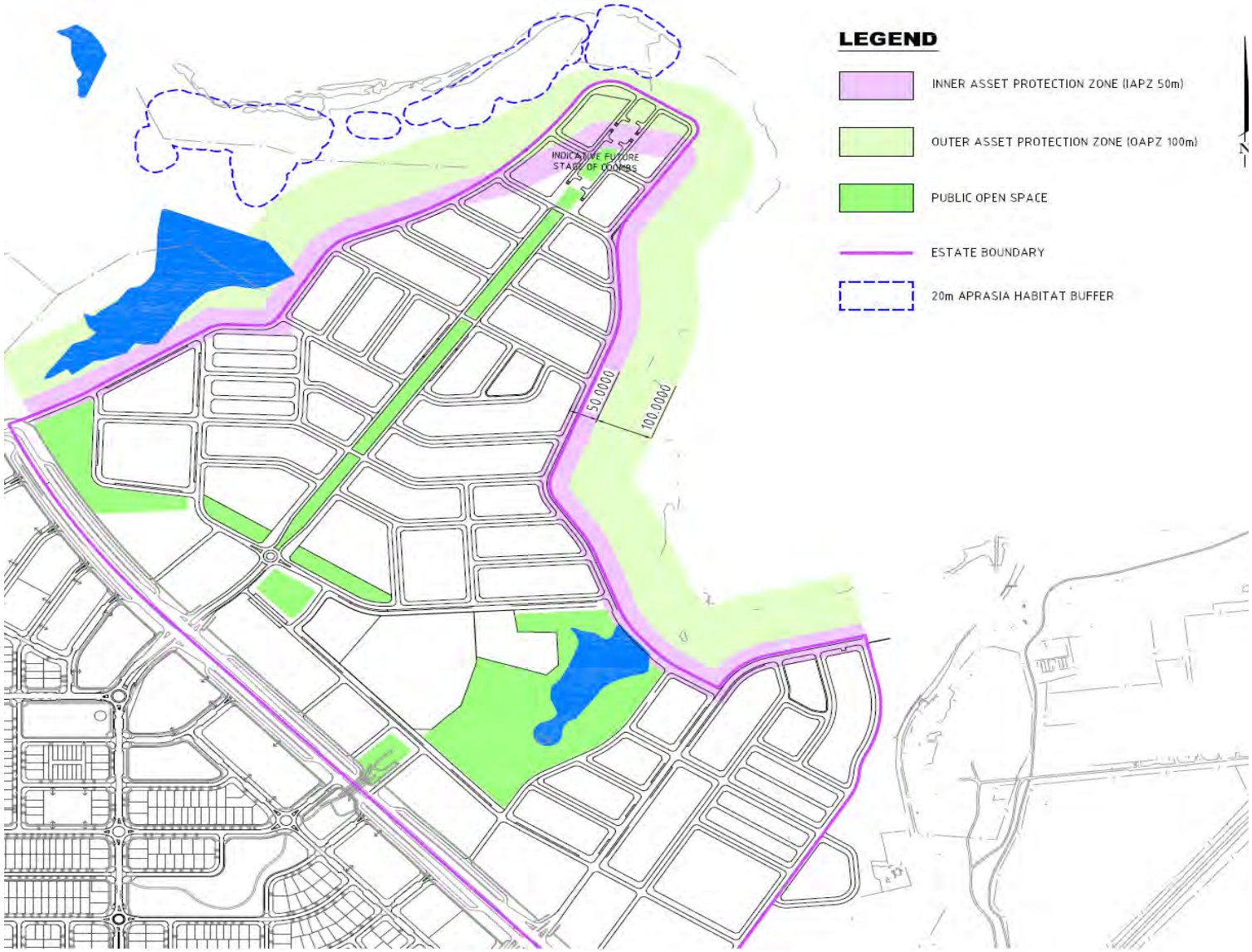

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Figure 10 – Option 2 – Medium/High quality habitat excluded from 150 metre wide bushfire protection zone – 20 metre wide buffer zone to medium/high quality habitat included in the bushfire protection zone

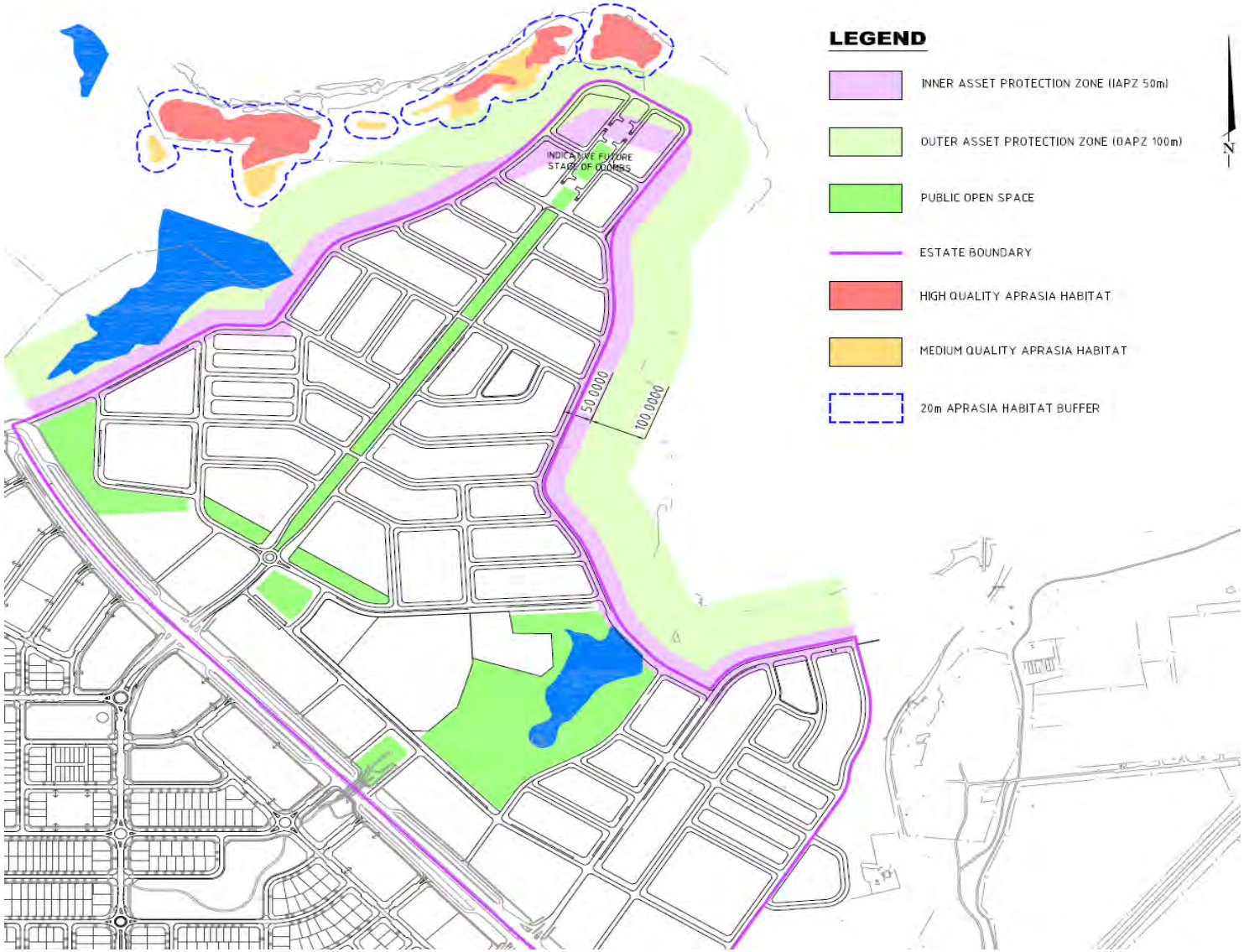

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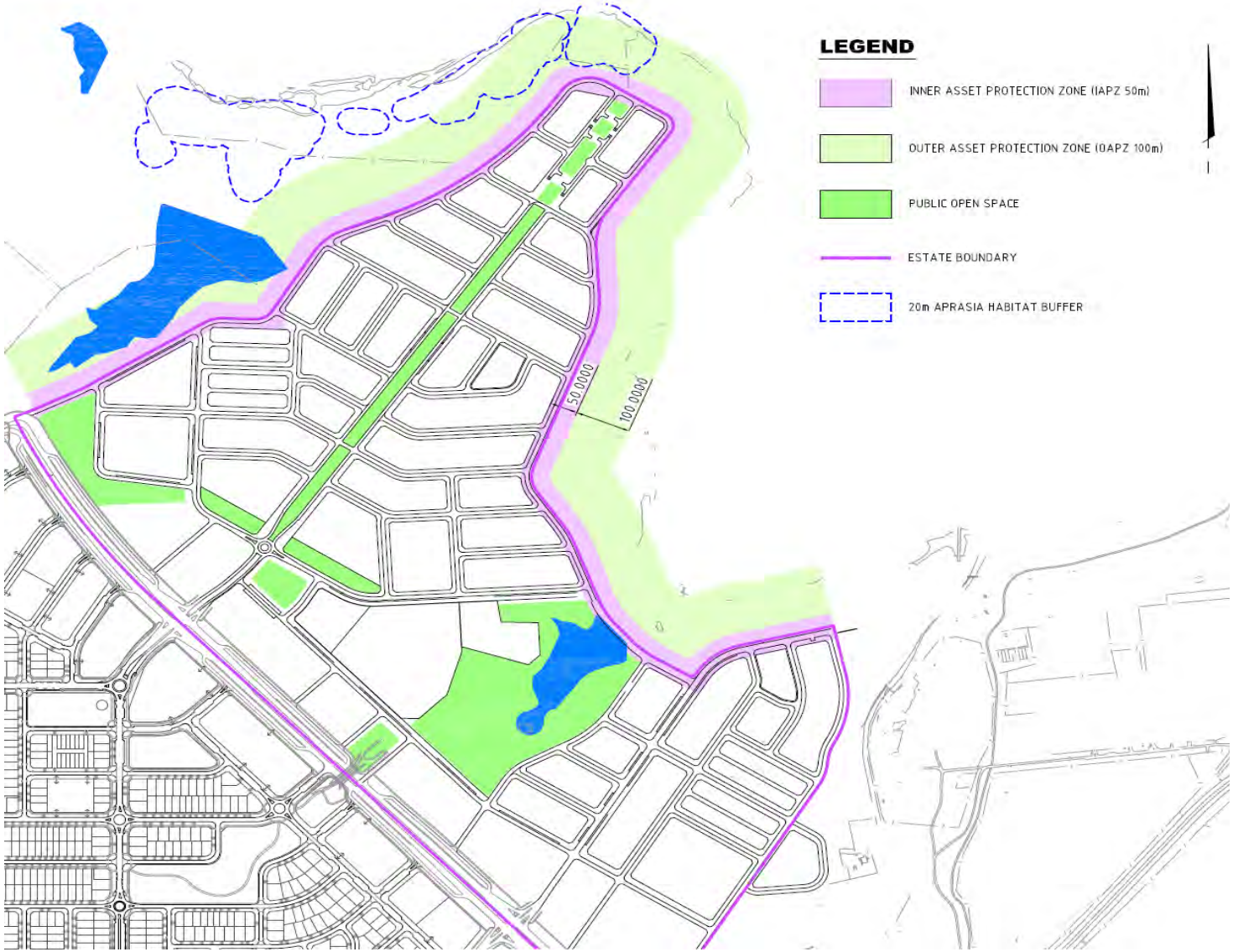
Figure 11 – Option 3 – The medium/high quality habitat & 20 metre wide habitat buffer zone included in the 150 metre wide bushfire protection zone.



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4.2 Review of Option 1 Layout.

The Option 1 layout removes future development from the north-eastern portion of the Coombs development precinct so that the requisite 150 metre wide Outer/Inner Asset Protection Zone can be achieved without impacting on the medium/high quality PTWL habitat and the 20 metre wide buffer zone.

Figure 12 – Option 1 Layout.

This option does not require bushfire fuels within the PTWL [Aprasia] Habitat and the buffer zone to be managed to provide the approved fire protection zones to the northwest of the future development. The Inner Asset Protection Zone [Purple] and Outer Asset Protection Zone [light green] can be managed to meet the specifications of the *Strategic Bushfire Management Plan for the ACT – 2009.*

This option substantially decreases the development yield while not achieving a reduction in the bushfire risk to the future development which remains constant at extreme due to the unmanaged vegetation in the Molonglo River corridor.

4.3 Review of Option 2 Layout.

The Option 2 layout removes future development from the north-eastern portion of the Coombs development precinct so that the requisite 150 metre wide Outer/Inner Asset Protection Zone can be achieved without impacting on the medium/high quality PTWL habitat. The 20 metre wide buffer zone to the medium/high quality PTWL Habitat is included in the management of the 100 metre wide Outer Asset Protection Zone

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Figure 13 – Option 2 Layout.

This option decreases the development yield while not achieving a reduction in the bushfire risk to the future development which remains constant at extreme due to the unmanaged vegetation in the Molonglo River corridor.

The extension of the Outer Asset Protection Zone into the 20 metre wide buffer zone to the PTWL [Aprasia] Habitat requires management of the grassland fuels [within the habitat buffer] to achieve a Grass Fuel Hazard of < 35.

The following management prescriptions satisfy a Grass Fuel Hazard of < 35:

(1) Moisture Content: 30% [70% cured], density cover < 50%, fuel height < 0.7m; or

(2) Moisture Content: 30% [70% cured], density cover < 30%, fuel height < 1.0m; or

(3) Moisture Content: 30% [70% cured], density cover < 100%, fuel height < 0.3m; or

(4) Moisture Content: 30% [70% cured], density cover < 80%, fuel height < 0.4m; or

(5) Moisture Content: 30% [70% cured], density cover < 60%, fuel height < 0.5m.

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As can be observed from the above list of performance prescriptions, there are numerous management scenarios which comply with a Grassland Fuel Hazard rating of < 35, as required by the *Strategic Bushfire Management Plan for the ACT – 2009.*

Recent photographs taken of the PTWL [Aprasia] Habitat [refer to Site Photographs 5 – 11 below] to the north and northwest of the north-eastern corner of Coombs indicates that this level of variation exists within the medium/high quality habitat area with increased density cover of grassland vegetation in the habitat buffer zone.

In order to achieve the long term management goals for native grassland, *Eddy [2002]* recommends some form of defoliation is essential to maintaining the structure and botanical composition of most native grasslands. Furthermore, a suitable habitat for Pink-tailed Worm Lizard requires an open structure to the vegetation in order to prevent shading and to allow sun-light to warm the rocks under which the lizards shelter.

The *ACT Lowland Native Grasslands Conservation Strategy* recommends grazing, mowing / slashing and burning as suitable management methods, undertaken outside periods when the grassland is flowering and seed production [mainly late spring to early summer] and mowing/slashing is performed not more than once or twice a year.

The Fuel and Fire Suppression Guidelines for the Pink-tailed Worm Lizard [TAMS] suggests that slashing should not disturb surface rocks during the process and do not slash below 10cm [100mm].

Item 8.2 of the EPBC decision requires that any fire, biomass management, or fuel reduction undertaken within the 20 metre buffer zone to medium and high quality habitat shall be conducted in an ecologically sympathetic manner with the conservation of the Pink-tailed Worm Lizard.

The recommendations of *Eddy [2002]* in respect to the requirement for management of native grassland and the management recommendations of the TAMS Pink-tailed Worm Lizard Fuel and Fire Suppression Guidelines substantiates the management of the buffer zone to achieve a Grassland Fuel Hazard of < 35, without significantly impacting on the Pink-tailed Worm Lizard Habitat.

This will permit the extension of the Outer Asset Protection Zone into the 20 metre wide buffer zone to the moderate and high quality habitat with regular monitoring of curing, density and status of the growth of the grassland to ensure compliance with the ecological requirements for seed production, biomass reduction and the requirement to maintain a maximum Grassland Fuel Hazard of 35.

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Photograph No. 5 – view looking west across Aprasia habitat showing height and elevated density of grassland.

Photograph No. 6 – view looking northwest across Aprasia habitat to the Molonglo River with Misery Point on the northern side of the river.

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Photograph No. 7 – view looking northeast across Aprasia habitat showing height and elevated density of grassland

Photograph No. 8 – Close up view looking east across Aprasia habitat

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Photograph No. 9 – view showing example of rock/grass density.

Photograph No. 10 – view showing example of rock/grass density.

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Photograph No. 11 – view showing example of rock/grass density.

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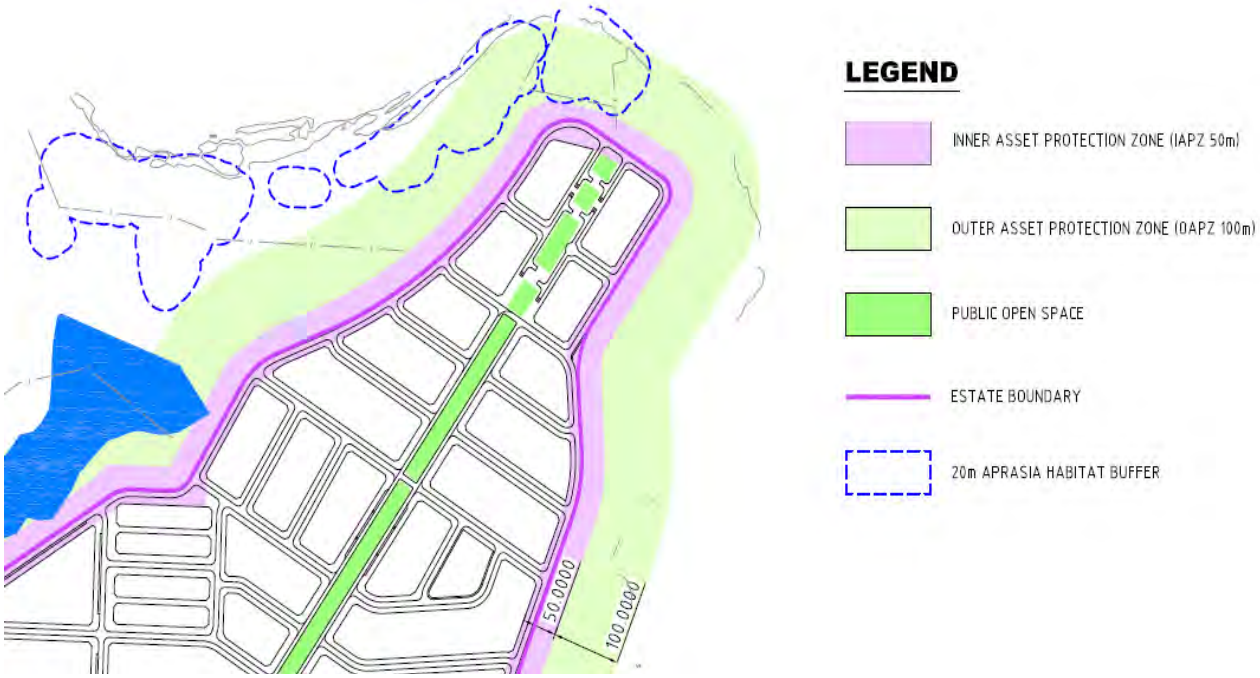
4.4 Review of Option 3 Layout.

The Option 3 layout retains the possible maximum development footprint in the north-eastern tip of the Coombs development precinct and extends the ESA approved 100 metre wide Outer Asset Protection Zone plus 50 metre wide Inner Asset Protection Zone from the block boundaries.

This extends the fire protection zone into the buffer zone and medium and high quality Pink-tailed Worm Lizard [Aprasia] Habitat.

Figure 14 – Option 3 Layout.



This option extends the 50 metre wide Inner Asset Protection up to the edge of the of the buffer zone to the medium/high quality habitat to the northeast and northwest of the development precinct with the 100 metre wide Outer Protection Zone extending across the 20 metre wide buffer and into the medium/high quality PTWL Habitat.

This option maximises the development yield while not achieving a reduction in the bushfire risk to the future development which remains constant at extreme due to the unmanaged vegetation in the Molonglo River corridor.

As discussed in Option 2, the provision of the Outer Asset Protection Zone requires management of the grassland fuels to achieve a Grass Fuel Hazard of < 35.

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The recommendations of *Eddy [2002]* in respect to the requirement for management of native grassland and the management recommendations of TAMS Pink-tailed Worm Lizard Fuel and Fire Suppression Guidelines substantiates the management of the Outer Asset Protection Zone to achieve a Grassland Fuel Hazard of < 35, without significantly impacting on the Pink-tailed Worm Lizard medium/high quality habitat.

The management of the 50 metre wide Inner Asset Protection Zone is achieved without impacting on the medium/high quality habitat or the 20 metre wide buffer zone to the PTWL Habitat and requires grassland vegetation located beyond the edge road to be maintained at less than 200mm height when grassland curing is > 70%.

4.5 Review Conclusions.

Section 4 of this report examines three development options for the north-eastern corner of the future suburb of Coombs, located adjacent to the PTWL [Aprasia] Habitat and identifies that irrespective of the option chosen, the bushfire risk from the vegetation within the Molonglo River corridor remains high to extreme on this part of the proposed new suburb.

A review of the management requirements for native grassland vegetation, provided in the *ACT Lowland Native Grassland Conservation Strategy,* has revealed that the need exists for regular defoliation of the grassland in order to maintain the structural and botanical composition of native grassland. This defoliation can be undertaken by grazing, slashing/mowing and burning to prescriptions which allow the grassland to grow freely enough to replenish root reserves, flower and set seed *[Eddy 2002]*. Furthermore, Pink-tailed Worm Lizards prefer sites that have not been heavily grazed and rocks that receive some direct sunlight, since they are used for thermoregulation *[Australian National University 2009].*

The TAMS Fuel and Fire Suppression Guidelines specify management activities for Pink-tailed Worm Lizard and potential impact on its habitat. These activities include slashing, which should be undertaken not to disturb surface rocks and to a height of not less than 100mm. The *ACT Lowland Native Grassland Conservation Strategy* recommends that this method of management should only occur once or twice in a 12 month period.

The *Strategic Bushfire Management Plan for the ACT* specifies performance standards for Inner and Outer Asset Protection Zones with the OAPZ requiring grassland to be maintained to a Grass Fuel Hazard of < 35. This prescription can be achieved in ‘cured’ grassland by modifying the density [% cover] or height of the fuel [grass].

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The site photographs of the PTWL [Aprasia] Habitat, taken in November 2010 show that whilst the ground density of the grass is 45 - 50%, the elevated density is more like 80 – 90% cover, over a given area.

From Table 4 – *Grassland Fuel Hazard* of the *Strategic Bushfire Management Plan for the ACT,* the height of fuel should be 300 – 400mm to achieve a Grass Fuel Hazard of < 35 for a density cover of 80 – 90%.

It is recognised that the management of the Outer Asset Protection Zone to achieve a Grass Fuel Hazard of < 35 is compatible with the defoliation requirements of native grassland.

The performance standard for an Inner Asset Protection Zone is for the grassland to the maintained at less than 200mm height when grassland curing is > 70%. However, the options reviewed locate the Inner Asset Protection Zone on the land beyond the medium/high quality PTWL Habitat and also outside the 20 metre wide buffer zone to the medium/high quality PTWL Habitat and this management prescription can be achieved without impacting on the medium/high quality PTWL Habitat or the buffer zone to the habitat.

It is therefore concluded that:

- Irrespective of the layout chosen, the bushfire risk to the future development, from a bushfire occurrence in the unmanaged Molonglo River corridor is constant;

- Option 1 layout substantially reduces the development yield but will require additional management costs and possible duplication of the Outer Asset Protection Zone to achieve the management outcomes for native grassland and PTWL Habitat as recommended by *Eddy* and the *ACT Lowland Native Grassland Conservation Strategy*;

- Option 2 layout reduces the development yield, retains an unmanaged medium/high quality Pink-tailed Worm Habitat whilst managing the 20 metre wide buffer zone to the medium/high quality Pink-tailed Worm Habitat as an Outer Asset Protection Zone. This option provides a compromise between exclusion of all management from the PTWL Habitat for bushfire protection and Option 3 which proposes management of the PTWL Habitat/Buffer zone as an Outer Asset Protection Zone.

  This option will also need additional management costs and possible duplication of the Outer Asset Protection Zone to achieve the ecological outcomes for native grassland and PTWL Habitat as recommended by *Eddy* and the *ACT Lowland Native Grassland Conservation Strategy*;

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- Option 3 maintains maximum development yield, places the Inner Asset Protection Zone outside the medium/high quality PTWL Habitat and buffer zone to the medium/high quality PTWL Habitat.

  The maintenance of the Inner Asset Protection Zone can be undertaken to achieve the management requirements of an Inner Asset Protection Zone pursuant to the specifications of the *Strategic Bushfire Risk Management Plan for the ACT* and will not impact on the medium/high quality PTWL Habitat.

  The Outer Asset Protection Zone is located within the medium/high quality PTWL Habitat and buffer zone to the medium/high quality PTWL Habitat. The recommendations of *Eddy [2002]* in respect to the requirement for management of native grassland, the management recommendations of TAMS Pink-tailed Worm Lizard Fuel and Fire Suppression Guidelines and the *ACT Lowland Native Grassland Conservation Strategy,* substantiates that the management of the Outer Asset Protection Zone can be undertaken to achieve a Grassland Fuel Hazard of < 35, without significantly impacting on the Pink-tailed Worm Lizard habitat.

  The interval of the management will be based on the maximum twice annual period as recommended by *Eddy [2002]* and will be dependent on winter/spring rainfall and vegetation growth with some years probably not requiring any management due to dry conditions and the cropping by Kangaroos.

It is therefore concluded that Option 3 provides a development layout which maximises yield whilst ensuring that the benefit gained through the required management of the medium/high quality PTWL Habitat/buffer zone, in order to maintain the structural and botanical composition of the native grassland and the PTWL Habitat, is not lost.

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SECTION 5

BUSHFIRE PROTECTION MEASURES.

5.1 Introduction.

On the basis that the following assumptions are correct:

- The open grassy woodland vegetation on the land to the north of Holdens Creek is not managed to prevent the spread of fire towards the northern edge of Coombs, under north-westerly and northerly wind influences;

- The development and management of the Stromlo Forest Park does not adequately address the potential for fires to occur and spread across the landscape towards the western edge of the new suburb of Wright and therefore into the Holdens Creek corridor;

- The Molonglo River is not dammed to create Lake Molonglo as assessed in the Molonglo Stage 2 Bushfire Risk Assessment and the river corridor is retained and rehabilitated as a habitat/open space corridor;

- The re-growth forest to the northeast of the Molonglo River corridor remains unmanaged; and

- The management of the vegetation in the open space corridor to the south of Coombs does not adequately address the reduction of the fire hazard.

the following fire protection measures shall be implemented:

5.2 Bushfire Protection Measures.

The following fire protection measures shall apply to the proposed development:

5.2.1 Northern aspect to Coombs

(a) Management of the Holdens Corridor:

The full width of the Holdens Creek corridor, including the edge road and landscape buffer as shown on Section D [Page 24] of the Wright/ Coombs Concept Plan shall be maintained as an Inner Asset Protection Zone. The minimum width of the IAPZ shall be 50 metres, as agreed by ESA.

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(b) Provision of Managed Outer Asset Protection Zone:

There shall be provided an Outer Asset Protection Zone, of a minimum width of 100 metres, to the north of the Holdens Creek corridor, measured from the northern edge of the Inner Asset Protection Zone, as agreed by ESA.

(c) Provision of Ember [HAPZ] Zone:

There shall be provided an Ember Zone of a minimum width of 100 metres, measured from the Inner Asset Protection Zone, where those buildings erected within the first 25 metres of the HAPZ are constructed to comply with BAL 19 and the remainder to BAL 12.5, in accordance with A.S. 3959 – 2009 – *'Construction of Buildings in Bushfire Prone Areas'.*

5.2.2 Northern aspect to the north-eastern portion of Coombs

(a) Provision of Inner Asset Protection Zone:

There shall be provided a 50 metre wide Inner Asset Protection Zone [as agreed by ESA], measured from the block boundary.

(b) Provision of Managed Outer Asset Protection Zone:

There shall be provided an Outer Asset Protection Zone, of a minimum width of 100 metres, measured from the northern edge of the Inner Asset Protection Zone, as agreed by ESA. The OAPZ shall incorporate the land within the medium/high quality PTWL Habitat and shall be manually maintained to the satisfaction of TAMS in order to address the *ACT Lowland Native Grassland Conservation Strategy* and to achieve a Grassland Fuel Hazard of < 35, without significantly impacting on the Pink-tailed Worm Lizard habitat.

(c) Provision of Ember [HAPZ] Zone:

The Ember Zone [HAPZ] to the residential precinct which faces Misery Point and the remainder of the river corridor shall be BAL 19 for 25 metres plus BAL 12.5 for the next 75 metres, in accordance with A.S. 3959 – 2009 – *'Construction of Buildings in Bushfire Prone Areas'.*

5.2.3 South-western edge to Coombs.

(a) Management of the future suburb of Wright:

Should the construction of the new suburb of Wright not occur concurrently or before the new suburb of Coombs, the regenerating vegetation within the future suburb of Wright shall be slashed or removed in order to minimise the change of a fire starting and spreading, under south-westerly winds, towards the south-western edge of Coombs.

The management prescription for this work shall be that combustible fuels shall be maintained to a maximum height of 100mm.

The minimum width of this management shall be 500m, including the width of the proposed north-south arterial road corridor.

5.2.4 North-western corner to Coombs.

(a) Provision of Managed Outer Asset Protection Zone:

Until such time that the Stromlo Forest Park development can provide a managed buffer zone to the northwest corner of Wright, capable of minimising the passage of fire from the northwest, there shall be provided, to the northwest of the Uriarra Road corridor a minimum 400 metre wide managed Outer Asset Protection Zone.

5.2.5 Molonglo River Corridor.

(a) Rehabilitation and bushfire hazard management of the vegetation within the river corridor.

The Molonglo Stage 2 Bushfire Risk Assessment recommended a 30 metre wide IAPZ and a HAPZ of between 30 – 50 metres – based on the advice that the river would be dammed and that the river corridor would be managed as a 'foreshore reserve'. This advice has now been withdrawn as the proposal is for the river corridor to be rehabilitated as a habitat/riparian corridor, increasing the potential bushfire risk from unplanned bushfire events occurring in unmanaged vegetation.

The reduction of the fuel hazard in this corridor is critical to the safety of the occupants of the future suburb of Coombs [and North Weston] and the emergency services that will attend to fire events in the river corridor. The difficulty is however, reaching a balance between retaining a habitat corridor and reducing the bushfire risk, exacerbated by the difficulty of managing steep, rough land which is also the habitat for the Pink Tailed Worm Lizard, whilst retaining water quality in the river.

The rehabilitation of the vegetation within the corridor should remove the introduced species and replicate the natural River Sheoak community with scattered 'patches' maintained along the edge of the river bank – broken by wide sections of native grasses in order to provide a disconnected canopy along both sides of the river.

The steeper, rocky sections of the higher river bank shall be retained as open grassland with the remainder of the corridor rehabilitated and maintained as an 'open woodland community' with an open, separated tree canopy and a grassy understorey. Canopy separation between the River Sheoak and the woodland community is important.

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Management of bushfire fuels, by traditional methods such as slashing, is impractical due to the nature of the landform and the requirement to minimise damage to the Pink Tailed Worm Lizard habitat [surface rocks] which prevails across much of the river corridor.

It is therefore recommended that a Fire Management Plan be prepared specifically for the corridor which establishes a management protocol based on the primary management being by stock grazing, hand slashing in the PTWL Habitat areas, mechanical slashing [where possible] and periodic ecological hazard reduction burning in order to provide certainty over the reduction of the bushfire fuels to levels which are identified, in the Strategic Bushfire Management Plan for the ACT – Version Two, to maintain the corridor as an Outer Asset Protection Zone.

The corridor should not be gazetted as a 'Nature Reserve' and annual funding shall be provided, specifically [& separately] for the fuel management of the river corridor. Funding for the maintenance of the existing fire access trails along the north-eastern side of the river corridor shall also be provided in order to provide access for maintenance and fire-fighting access.

An edge road shall be provided to the full perimeter of the river corridor including across the stormwater detention ponds in order to provide continuity of fire-fighting access.

A 50 metre wide Inner Asset Protection Zone shall be provided to the blocks facing the river corridor with a 100 metre wide Outer Asset Protection Zone extending from the outer edge of the IAPZ and managed to provide a maximum Overall Fuel Hazard Level of < 35 – as agreed by ESA.

The Ember Zone [HAPZ] to the residential precinct which faces the river corridor shall be BAL 19 for 25 metres plus BAL 12.5 for the next 75 metres, in accordance with A.S. 3959 – 2009 – *'Construction of Buildings in Bushfire Prone Areas'.*

The stormwater detention ponds on Holdens Creek, Weston Creek and the internal creek lines shall be maintained as an Inner Asset Protection Zone.

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5.2.6 Southern edge to Coombs [Cotter Road]:

The southern edge to the new suburb of Coombs adjoins the Open Space corridor between Warragamba Avenue and Cotter Road. This corridor has been replanted with various species of trees.

The Molonglo Stage 2 Bushfire Risk Assessment [ABPP – 2006] identified that this corridor, if unmanaged, would provide a high level of risk to the southern edge of Coombs [& Coombs]. This level of risk has been determined by this risk assessment.

The Risk Assessment also recommended that a 40 metre wide IAPZ and 50 metre wide HAPZ be provided to this aspect of the new suburbs.

Therefore, it is recommended that the full width of the Cotter Road corridor, the landscape buffer zone, Service Street and the front of the blocks facing Cotter Road shall be managed as an Inner Asset Protection Zone.

A minimum 50 metre wide Ember [HAPZ] Zone shall be established inside southern edge of the new suburb, to the east from the eastern edge of the Stromlo Rural Village, measured from the Inner Asset Protection Zone, where those buildings erected are constructed to comply with BAL 12.5 in accordance with A.S. 3959 – 2009 *'Construction of Buildings in Bushfire Prone Areas'.*

5.3 Fuel Management Protocols:

(a) Asset Protection Zones:

The management of the Inner Asset Protection Zones, the Outer Asset Protection Zones recommended in this report shall comply with the management protocols as provided in Schedule C – Fuel Management Standards for Fire Management Zones of the '*Strategic Bushfire Management Plan for the ACT – Version 2 – October 2009'.*

The management of the Outer Asset Protection Zone located within the PTWL Habitat shall be shall be manually maintained to the satisfaction of TAMS in order to address *ACT Lowland Native Grassland Conservation Strategy* and to achieve a Grassland Fuel Hazard of < 35, without significantly impacting on the Pink-tailed Worm Lizard habitat.

(b) Parks, Recreation Urban Open Space Zones and Stormwater Detention Ponds:

The management of the Neighbourhood Parks/Recreation Open Space Zones and Stormwater Detention Ponds within the new suburb of Coombs shall include the regular maintenance of lawns/grasses to minimize combustible ground litter, to the standards of an Inner Asset Protection Zone.

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Landscaping and trees shall be maintained in discrete clumps with limbs to trees under-pruned to provide a 2m clearance to the lower branches.

5.4 Access for Fire-fighting Operations:

Edge roads shall be constructed within the Inner Asset Protection Zone setback to all bushfire prone interfaces and shall be continuous to allow access to the full length of the bushfire prone interface and constructed to a width of 7.5 metres with corners, intersections and turning heads designed to accommodate both an Urban Pumper and Aerial Appliances in locations with multi-level development and Rural Fire Service Tankers (Refer to Access provisions provided by each Service).

Corners and round-abouts shall be constructed to provide access for urban and rural fire service vehicles with a turning circle of 24 metres, with an inner radius of 6 metres and an outer radius of 12 metres for corners. Bridges and road surfaces shall be designed to carry a live load of 25 tonnes.

Internal estate roads shall have a minimum width of 5.5 metres with parking/passing bays located clear of the formed road width and a 3 metre verge to each side to allow unencumbered access by emergency crews to all sides of their vehicles. Corners and round-abouts shall be constructed to accommodate Urban Pumpers, Aerial Appliances in locations of multi-level medium density development.

Turning circles of 24 metres for Rural Fire Service Vehicles with internal corners having an inner radius of 6 metres and an outer radius of 12 metres.

5.5 Water Supplies for Fire Fighting Operations:

A hydrant supply shall be installed to comply with the agreed standards for water supply and require type F5 standard 45 l/s single standard hydrants at 60 metre intervals.

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SECTION 6

RESIDUAL RISK.

6.1 Introduction.

Table 6 evaluates the residual bushfire risk to the future development within the new suburb of Coombs, following the implementation of the recommended bushfire protection measures, and determines the vulnerability of the proposed development, the possible consequences and residual bushfire risk during catastrophic fire danger periods.

Table 6 – Bushfire Risk Register & Action Treatment Plan – catastrophic bushfire events, post implementation of the recommended protection measures.

The Risk **What can happen?** **Fire Scenario**	**The consequences of an event happening** **Consequences**	**Likelihood**	**Risk before mitigation**	**Strategy to reduce the risk**	**Consequences & Likelihood after mitigation measures applied**	**Residual Level of Risk**	**Risk Priority**
(1) Fire burning in unmanaged open grassy woodland to the north of Coombs – under north-westerly wind influences	Catastrophic – long fire run through unmanaged vegetation	Almost Certain	Extreme	Provision & management of Asset Protection Zones & construction standards to buildings	Moderate/ possible	High risk	1
(2) Fire burning in the Woodland / Forest vegetation in the Stromlo Forest Park, to the west of Wright/Coombs – under NW, westerly wind influences.	Catastrophic – long fire run through unmanaged vegetation	Almost Certain	Extreme	Manage vegetation within Stromlo Forest Park	Moderate/ Likely	High risk *[Refer to Section 6.2 below]*	1
(3) Fire burning in the Molonglo River corridor – under the influence of north-westerly winds	Catastrophic – long fire run through unmanaged vegetation	Almost Certain	Extreme	Vegetation rehabilitation to specification provided plus management of river corridor as an Outer Asset Protection Zone	Moderate/ Likely	High risk	1
(4) Fire burning in the re-growth Pinus Radiata Forest vegetation on the land to the northeast of Coombs – under NE wind influences.	Major – long fire run through unmanaged vegetation	Likely	Extreme	Provision & management of Asset Protection Zones, construction standards to buildings	Moderate / unlikely	Moderate risk	2
(5) Fire burning in the vegetation between Cotter Road and the suburb of Holder – under SE wind influences	Major – long fire run through unmanaged vegetation	Possible	High		Moderate/ Unlikely	Moderate Risk	2

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6.2 Summary of Residual Bushfire Risk.

Table 6 provides a review of the residual level of risk to residents and emergency services personnel and others within the future suburb of Coombs and has been determined on the basis that the recommended bushfire mitigation measures are implemented and maintained over the life of the development.

[This level of residual risk to the north-western corner of Coombs will remain until such time that the Stromlo Forest Park development is completed and a positive bushfire fuel management program is implemented. Should this not occur the risk will remain as determined in Table 6].

The implementation and management of the temporary and permanent Asset Protection Zones, the construction of the buildings to standards [which mitigate the potential levels of ember attack] will play a significant role in decreasing the bushfire hazards and the level of risk from fire events within the open grassy woodland vegetation to the north; the forest/woodland vegetation in the Stromlo Forest Park to the west of Wright and Holdens Creek; the habitat corridor along the Molonglo River corridor and the threat from fires that may occur in the vegetation to the south of the new suburb of Coombs.

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SECTION 7

CONCLUSION.

The development proposal reviewed in this risk assessment is the Draft Estate Development Plan [DEDP] for the new suburb of Coombs which, with the new suburb of Wright, is the first development precinct within the Molonglo Valley urban release area.

The development proposal is for the subdivision of the Coombs development precinct into RZ1 Residential Suburban Zone; RZ5 Residential Zone [High Density]; CZ5 Commercial Mixed Use Zone and PRZ1 – Parks and Recreational Urban Open Space Zone.

The development precinct occupies the south-eastern corner of the Molonglo Valley Urban release area with the new suburb of Wright occupying the land to the southwest of the proposed north/south arterial road.

The Stage 1 & 2 Bushfire Risk Assessments prepared for the Molonglo Valley [ABPP 2005 & 2005] identified that the Molonglo Valley is one of the driest areas of the ACT and has a known fire path from the northwest and west with catastrophic fires occurring in this area in 1952 and again during the 2003 Canberra Bushfires. The recommendations of the Stage 2 Bushfire Risk Assessment were based on the advice that the Molonglo River corridor was to be dammed and the provision of a 'managed foreshore reserve' provided along both sides of the river in order to mitigate the bushfire risk to the future residential development.

The current advice is that the dam will not be constructed and that a riparian/habitat corridor will be provided in lieu of the managed foreshore reserve, resulting in the river corridor retaining vegetation and therefore increasing the bushfire risk rating to extreme. This bushfire threat will remain, even after the Molonglo development precinct is fully established, due to the exposure of the river corridor to hot, dry northwest, west and southwest 'fire winds' which are prevalent during summer.

There also remains a concern over the management of the proposed re-vegetation of those areas of the Stromlo Forest Park which could continue to provide a fire path to the north-western corner of Wright and Holdens Creek Coombs.

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This report has examined the likely fire-paths and the resultant bushfire risk to the development within the new suburb of Coombs and has recommended number of protection strategies aimed at reducing the assessed level of risk to the future residents and emergency services personnel, if the predicted fire event occurs and the suburb is exposed to the effects of a catastrophic fire event.

These measures include advice on the rehabilitation of the Molonglo River corridor and the need to manage this corridor to minimise the bushfire fuels whilst observing the need to maintain, protect and enhance the habitat for the Pink Tailed Worm Lizard [PTWL].

In this respect the report examines the management of the PTWL Habitat in relation to the establishment of the Outer Asset Protection Zone within the medium/high quality habitat and draws on a number of existing ecological studies on PTWL and native grasslands [including TAMS Pink Tailed Worm Lizard Fuel and Fire Suppression Guidelines] to establish that the OAPZ and the ecological management of PTWL habitats are compatible.

It is evident from the Confirmation Surveys for Pink Tailed Worm lizards [Aprasia parapulchella] by David Wong and William Osborne in 2010, that PTWL potential habitats are classified into High, Moderate and Low quality habitats based on the species and coverage of native grasses.

High quality potential PTWL habitats are dominated by Kangaroo Grass while moderate habitats are dominated by Spear Grasses and low habitats are dominated by exotic species and no longer support native ground cover.

In order to conserve the health and native grass cover of the PTWL habitats the bushfire plan has incorporated the ongoing protection, management and restoration strategies outlined in the ACT Lowland Native Grassland Conservation Strategy Action Plan 28.

The ACT lowland Native Grassland Conservation Strategy was developed in 1990 and builds on more than ten years of survey, monitoring, research, conservation planning and management in relation to lowland native grasslands in the ACT and region. These management practises protect grassland habitats for a range of endangered species and are still considered to be best practise today.

The Action Plan clearly states defoliation is essential to maintaining the structure and botanical composition of most native grasslands. Without regular removal of some herbage, excess grass will accumulate and die and can inhibit the growth of many plant species in the sward.

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There may also be a loss of vigour of dominant grasses, e.g. Kangaroo grass. The amount of defoliation required is related to the productivity of the site and the dominant grass species found there. Productive areas carrying Kangaroo Grass will need more intensive treatment than areas of poorer soils carrying spear grasses which have much less biomass and shorter life spans [The ACT lowland Native Grassland Conservation Strategy].

The three main forms of grassland defoliation are grazing, mowing and slashing, and burning. The timing of defoliation must allow native grasses to grow freely to replenish root reserves, flower and set seed which mainly occur late spring / early summer [The ACT lowland Native Grassland Conservation Strategy].

The management of the fuel loads in the OAPZ allow grasses up to 1m high depending on their moisture content. The report has concluded that the timing and amount of fuel reduction is compatible with the ecological management of the native grasses and management methods permitted in the TAMS PTWL Fuel and Fire Suppression Guidelines.

Graham Swain
Managing Director
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REFERENCES:

- *Strategic Bushfire Management Plan for the ACT* – January 2009;
- *The Canberra Spatial Plan* – ACT Planning & Land Authority – March 2004;
- *AS/NZ - 4360 : 2004 Risk Management;*
- *Emergency Risk Management – Applications Guide. (EMA) 2000);*
- Overall Fuel Hazard Guide – NRE. May 1999;
- *Planning for Bushfire Risk Mitigation* 2006 & Update 2009;
- *ACT Lowland Native Grassland Conservation Strategy – Action Plan No. 28;*
- *Confirmatory surveys for Pink-tailed Worm Lizards – Department of Applied Ecology – University of Canberra;*
- *TAMS Fuel and Fire Suppression Guidelines – Pink-tailed Worm Lizard;*
- *Restoring Kangaroo Grass [Themeda triandra] to grassland and woodland understoreys –a review of establishment requirements and restoration exercises in south-east Australia – Ecological Management & Restoration Vol. 6 No. 1 April 2005;*
- *Draft Flora and Fauna Guarantee Action Statement – Pink-tailed Worm Lizard – DSE Victoria;*
- *Bushfire Risk Assessment – ABPP – April 2010.*

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SECTION 8 – Plan of Bushfire Protection Measures.

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Appendix D

Stormwater Quality Modelling of Coombs & Wright

Stormwater Quality Modelling of Coombs and Wright

Summary

Table of Contents

Introduction

This study investigates the proposed development in Coombs and Wright and the stormwater treatment facilities that would be needed for this development to meet the requirements set out in the WaterWays - Water Sensitive Urban Design General Code.

Table 1: Waterways: Water Sensitive Urban Design General Code Stromwater Quality Targets

		Development or Redevelopment	*Regional or catchment - wide*
WaterWays WSUD Stormwater Quality Requirements	Reduction in average annual Suspended Solids (SS) export load	60%	85%
	Reduction in average annual Total Phosphorus (TP) export load	45%	70%
	Reduction in average annual Total Nitrogen (TN) export load	40%	60%

This works builds on the analysis carried out by Cardno Young in their "*Molonglo Valley - Stormwater Management Strategy*" Aug 2006, and "*Molonglo Valley Ponds and Lakes Options Study*" Aug 2006. The proposed areas of development that were modelled were based on the *Concept Plan* completed by ACTPLA (2008), and included in the *Territory Plan*.

Changes to Concept Plan

There have been some changes in the location of infrastructure since the compilation of the Concept Plan. It is now anticipated that Pond B will have to move upstream by about 100m to avoid potential habitat of the Pink-tailed Worm-lizard. Consequently, one of the small ponds located immediately upstream (to the South of Pond B – sub-catchment L), has been erased, as has a small pond immediately to the West of Pond B (sub-catchment Q), and there has been the inclusion of another pond in the catchment immediately to the north-east (sub-catchment K), which will pick up all the stormwater on the north-east of the Coombs 'peninsula'. This is shown in Appendix A – Territory Plan with Pond locations.

Modelling

A map of all the catchments is shown in Appendix B – Total Catchment Areas.

Three catchments where modelled – Catchments A, B and C. Each catchment flows into the Ponds A, B and C respectively. The Rural area, Stromlo Forrest Park and Stromlo Estate were modelled as they currently exist.

The characteristics of the Urban development including, density, catchment areas and flow paths, have been based on the Concept Plan 2008 and the Territory Plan (including Variation 281). Any alterations from this that have been suggested from the planning / engineering studies have been included in the modelling. When details of the development (density and form) are bedded down further, then this work may need to be revisited, altered and revised to represent these changes. This is especially true if the land use varies significantly from the Territory Plan and the Concept Plans.

For the purposes of this modelling, the following assumptions where made.

Table 2: Assumptions for MUSIC modelling

		Higher density	Lower density	Open Space
Options Modelled	% impervious	60%	50%	10%
	% roof into tank	50%	50%	-
	% of total area onto roof	20%	15%	-
	Tank Size per dwelling	2000L	2000L	-
	Density	30 dwellings/Ha	15 dwellings/Ha	-

Higher density areas include the Commercial and Community Facility zones.

Rural Catchments

When modelling the stormwater quality requirement of these catchments, it is important to consider the upstream rural catchments and the downstream effect the pollutants created from these areas have. The stormwater quality targets – under the Territory Plan – are not required to treat the pollutants from the rural catchments, only the urban catchments. The calculation method used to account for the pollutants from the rural areas is shown in the below equation.

$$\%\ \text{Pollution Reduction from Urban Area} = \frac{(\text{Pollution out of Pond} - \text{Pollution out of Rural Area})}{\text{Pollution out of Urban Area}} \times 100$$

Sub-catchment targets

Due to the range of catchment types, and the limited ability in some catchments to install large stormwater treatment facilities, it was considered too onerous to make every catchment reach the Regional stormwater quality targets. Therefore, the catchments were classified into 4 types and each catchment was assigned targets as a range of the Developer targets. These are listed in the table below.

Table 3: Pollutant reduction targets for sub-catchments

		TSS		TP		TN	
	Target	lower	upper	lower	upper	lower	upper
No Ponds Downstream	100-150% of Developer	60%	90%	45%	68%	40%	60%
Large Pond D/S only	50%-75% of Developer	30%	45%	23%	34%	20%	30%
Small Pond with Large Pond D/S	75%-100% of Developer	45%	60%	34%	45%	30%	40%
Small Pond D/S only	100-150% of Developer	60%	90%	45%	68%	40%	60%
Out flow from Large ponds	Regional	85%		70%		60%	

Results

The results of this modelling are shown Table 4. This table shows the trial stormwater features for each catchments, pollution generated from each sub-catchment and the % reduction of the pollution.

Table 4: Pollution Reduction from Sub-catchments

							Actual Reduction			Pollutant Load off Urban Area			
Sub catchment	Area (Ha)	Major Pond D/S	Minor Pond	Pond Area (m^2)	Pond Volume (kL)	Swale Length	TSS	TP	TN	TSS	TP	TN	
A	18	A	small A	2,000	2,000		116.3%	70.5%	52.0%	10,100	14.6	174	Below Target
B	*14.4*	*A*	*small B*	*2,000*	2000	*150*	*83.2%*	*54.2%*	*43.1%*	*8,100*	*11.7*	*140*	Within target
C	*3.2*	*A*	*small B*			-				*1,810*	*2.6*	*31*	Above Target
D	*7.9*	*A*	*small B*			-				*4,440*	*6.4*	*77*	
E	17.2	A		-	-	-	27.2%	25.3%	23.8%	11,200	16.2	193	
F	9.3	A		-	-	100	25.3%	24.7%	24.3%	4,110	6.0	71	
G	8.7	A		-	-	100	24.3%	20.0%	18.3%	5,680	8.2	98	
H	20.5	A		-	-	-	23.9%	20.1%	18.5%	13,400	19.4	232	
I	*16.5*			-	-	*3*60*	*81.0%*	*50.1%*	*33.7%*	*9,420*	*13.6*	*163*	+3bioretention 20m
J	*9.0*			-	-	*3*50*	*86.7%*	*56.1%*	*40.4%*	*5,050*	*7.3*	*87*	+3bioretention 20m
K	14.9		small D	1,700	1,265	80	86.1%	64.1%	53.4%	8,361	12.1	144	
L	*11.1*	*B*		-	-	-	21.0%	18.0%	17.1%	*6,230*	*9.0*	*108*	
M	*8*	*B*		-	-	-	21.2%	18.0%	16.8%	*4,490*	*6.5*	*78*	
N	*8.7*	*B*		-	-	-	27.2%	24.9%	24.2%	*5,670*	*8.2*	*98*	
O	23	B	small C	2,000	2,000	60	84.1%	59.8%	48.5%	13,500	19.5	233	
P	*3.5*	*B*		-	-	-	21.2%	17.8%	16.7%	*1,980*	*2.9*	*34*	
Q	*6.7*	*B*		-	-	-	23.5%	21.6%	20.9%	*3,360*	*4.9*	*58*	
R	*5.5*	*B*		-	-	-	27.1%	24.9%	24.2%	*3,580*	*5.2*	*62*	
S	17.2	B	small E	3,000	4,000	220	90.3%	76.6%	62.9%	8,740	12.6	151	
T	*11.4*	*C*		-	-	-	24.0%	21.4%	20.3%	*7,070*	*10.2*	*122*	
U	*3.8*	*C*		-	-	-	27.3%	25.1%	24.1%	*2,450*	*3.5*	*42*	
V	*12.3*	*C*		-	-	-	16.7%	15.3%	14.8%	*4,250*	*6.2*	*74*	
W	*7.6*	*C*		-	-	-	23.2%	20.7%	19.6%	*4,490*	*6.5*	*78*	
X	5.7	C	ret. Basin	20,000	0	-	62.0%	36.4%	22.0%	3,210	4.7	56	
Y	9.5	C	ret. basin			100				1,900	2.8	33	
Z	14.9	C	ret. basin			-				8,370	12.1	145	
Total	288.5	-	-	28,700	9,265	810	55.5%	39.9%	32.3%	160,961	233	2,781	

Table 5: Total Reduction from all Stormwater Quality measures for large Pond Catchments

				Total Reduction of urban pollutants for all Stormwater Quality measures		
	Urban Area (Ha)	Volume (ML)	SA (m^2)	TSS	TP	TN
Pond A	99.2	25	12.5	98.7%	70.5%	58.9%
Pond B	83.7	40	15	99.5%	88.1%	72.4%
Pond C	65.2	40	11	89.1%	69.7%	61.2%

Table 6: Total Reduction from all Stormwater Quality measures with no smaller ponds

				Total Reduction of urban pollutants for all Stormwater Quality measures (No small Ponds)		
	Urban Area (Ha)	Volume (ML)	SA (m^2)	TSS	TP	TN
Pond A	99.2	25	12.5	95.7%	67.5%	53.5%
Pond B	83.7	40	15	88.6%	79.1%	62.6%
Pond C	65.2	40	11	NA	NA	NA

Discussion

Rainwater Tanks

Rainwater tanks are providing a relatively small reduction is pollution levels within the urban area. TSS, TN and TP pollutant levels each being reduced by around 20% in the lower density areas and by around 25% in the higher density areas. These reductions for the sub-catchments often do not reach the target range specified in Table 3. Even though the reduction is smaller than other stormwater quality features, it is still a valuable reduction when looking at the entire treatment train – reducing the reduction requirements of the other stormwater quality measures.

Smaller Ponds

Small ponds within the urban sub-catchments provide a relatively moderate reduction in pollutants generated within the urban areas. For the small ponds small A, small B, small C and small E, the pollution reduction achieved is above the targets that have been set in Table 3. If the smaller ponds are removed from the sub-catchments, then the stormwater quality is subsequently reduced, placing additional pollutants in the larger ponds. This is particularly true for Pond A, where the targets are not met for TP and TN (see Table 6).

The viability of these smaller ponds will need to be analysed for a water balance using climatic data from the years of 2000 through until 2008 (period of reduced rainfall).

It should be noted that these ponds and associated swales are not mandatory stormwater facilities. ACTPLA suggests that the targets for each sub-catchment remain the mandatory factor, rather than the specific stormwater measures. If these

targets can be met by other means (eg, more swales, bio-retention) and this produces a high quality, urban environment, then this will be considered acceptable.

Catchments I and J

The area of Catchments I and J are less than desirable in size to support ponds and so alternative measures were modelled. The swales and bio-retention facilities were modelled for catchments I and J. If analysed as a total catchment, then the mean annual pollution levels flowing out of the treatment facilities are within the target range.

Catchment K

Sub-catchment K is also a relatively small catchment and a permanent water body may not be viable (subject to water balance analysis, sewer locations and preferred landscaping option). Once the sewer locations are bedded down further, then the option to transfer all stormwater from this sub-catchment to Pond B can be investigated further. A decision on which is the preferred option should be made shortly.

Pond B

Although urban stormwater targets are met by Pond B, there needs to be an analysis of the effects of the Rural pollutants on the Pond. The analysis should investigate the water quality within the Pond and the processes occurring within the Pond, especially to ensure that stratification, algae growth and anaerobic activity does not occur from the increased sediment and nutrient loads. The CRC eWater POND model has been suggested for use in this analysis.

The bank level, bank location and spillway requirements will be strongly influenced by the potential habitat for the PTWL, sewer levels and road requirements. The pond design will take these issues into consideration.

Pond C

Pond C should also have a similar analysis on the effects from Rural pollutants. In addition, there is potential PTWL habitat that needs to be considered more closely in the Pond design. A survey of the potential habitat in the area has been conducted and this will need to be considered in further design work. Further more, there is a relatively large embankment (approx 35,000m^3) for the amount of water that is stored (40ML). These factors bring into question viability of the current concept developed by ACTPLA. Bill Guy and Partners suggest the diversion of the stormwater across into Pond B, this will be analyses further through the current Study that Bill Guy and Partners are undertaking.

Other factors will come into play with the sizing and design of these ponds. These include: -

- Trunk Sewer location and level;
- Road alignment and bridge crossings;
- Potential PTWL habitat;
- Geological considerations;
- Flood flow analysis;

- Spillway requirements
- Swale treatments;
- Landscaping;
- Stormwater harvesting;
- Aesthetics / Urban Design;
- Construction Cost;
- Operation and Maintenance Cost and
- Surrounding Spoil disposal needs

Conclusion

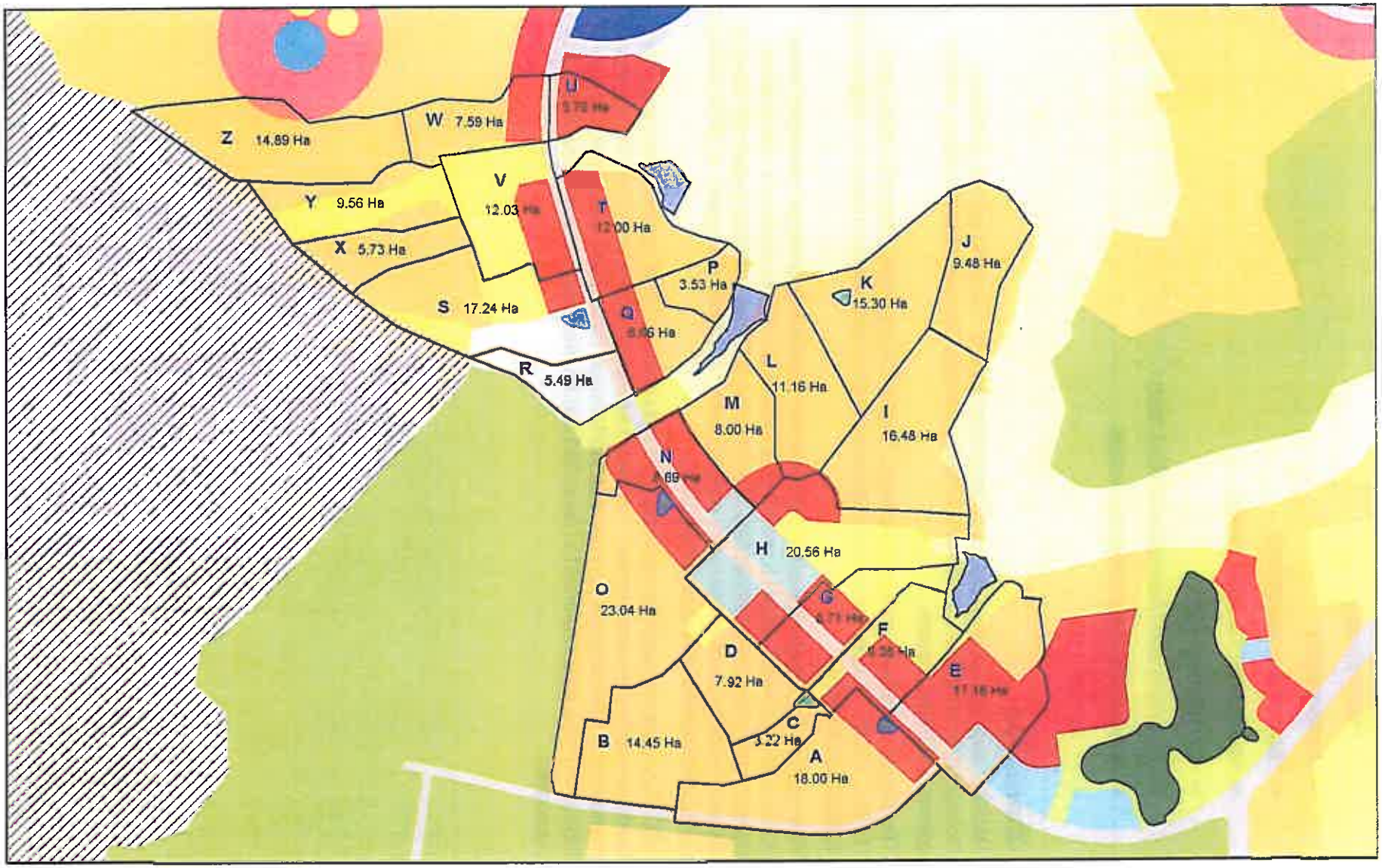
MUSIC modelling suggests that Stormwater Quality Targets can be achieved through the installation of rainwater tanks, swales, bio-retention facilities, smaller ponds and larger ponds.

The larger ponds are a significant size, Pond A being 25ML, Pond B 40ML and Pond C 40ML. These values can be increased or decreased in size as required and subject to analysis.

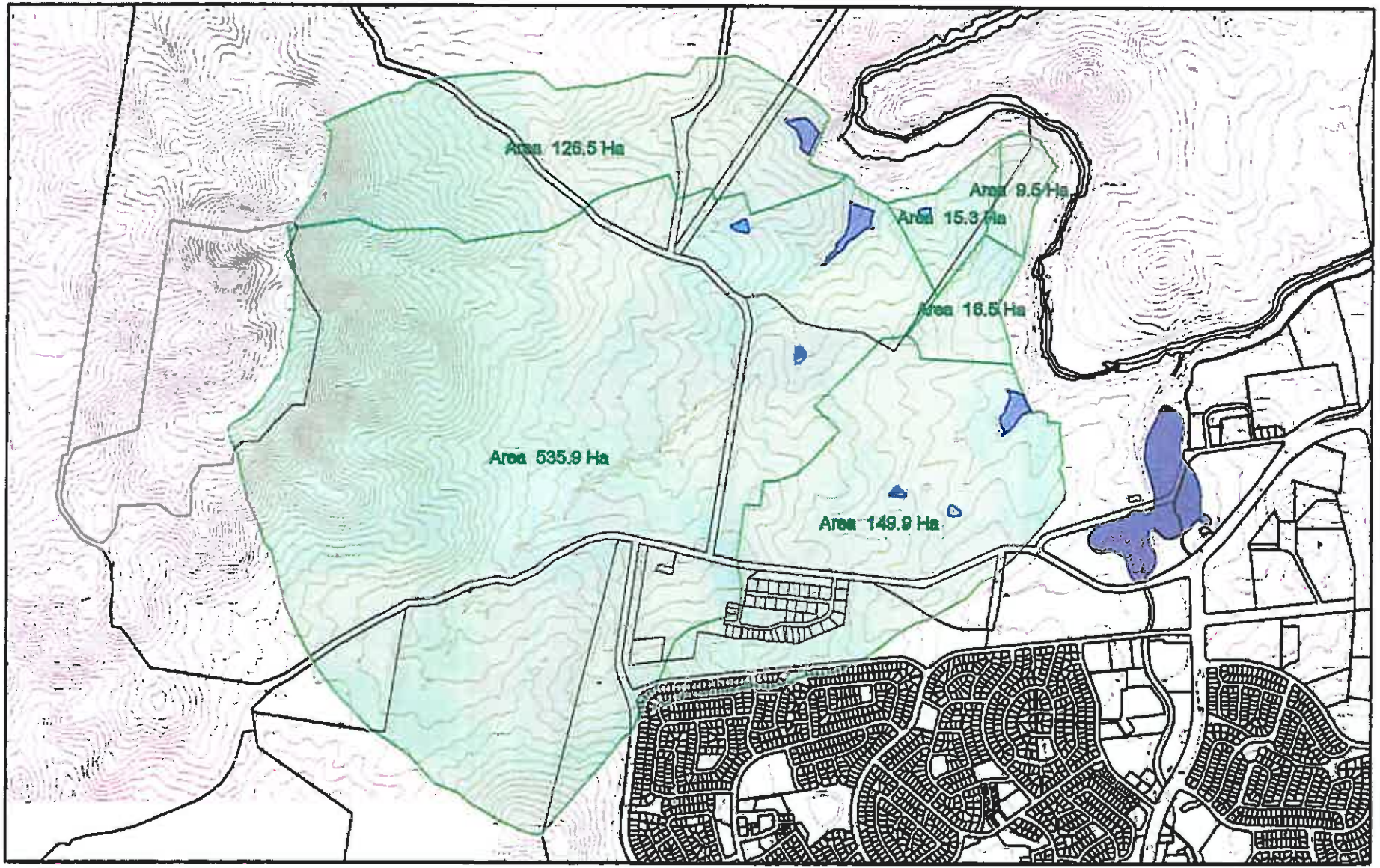
The option of additional swales, bio-retention facilities and larger rainwater tanks could also be investigated to see if these would be viable options to the smaller ponds within the sub-catchments. The viability of these smaller ponds will need to be analysed for a water balance using climatic data from the years of 2000 through until 2008 (period of reduced rainfall).

ACTPLA does not wish to mandate the type and size of all stormwater treatment facilities within the urban areas – rather it wishes to emphasise that the targets are mandated. These targets can be reached through a range of measures, ideally those that would be deemed to have the best environmental, social and financial outcome.

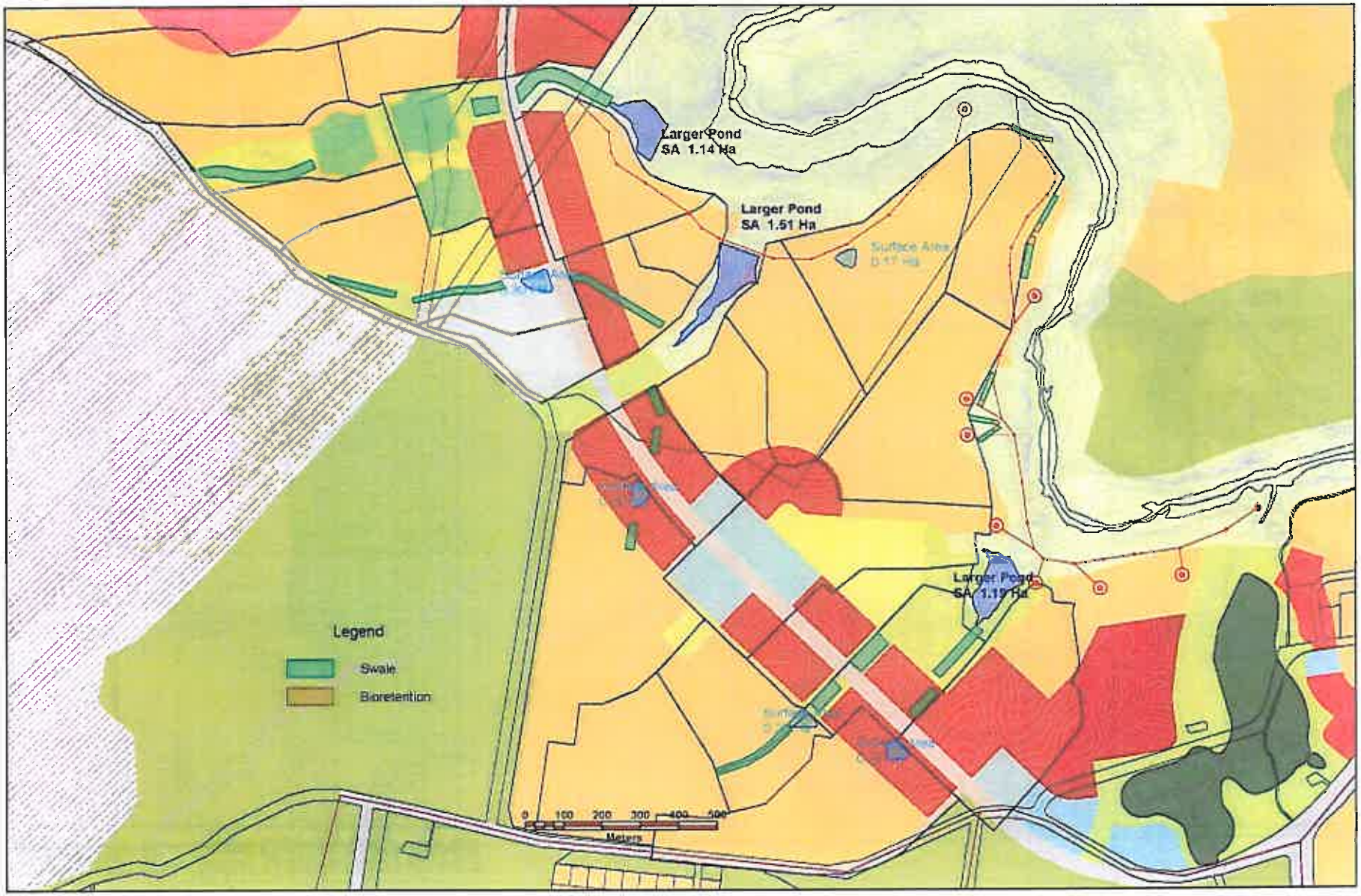
Appendix A – Territory Plan with Pond locations.



Appendix B – Total Catchment Areas



Appendix C – Draft Precinct Code Requirements for Stormwater Management



Appendix E-1

ACTPLA Tree Assessment

TreeNumber

Tree_Centre

Suitability Areas - Cox Richardson Report

moderately modified lowland woodland dec03

partially modified lowland woodland dec03

secondary grassland dec03

substantially severely modified vegetation dec03

yellow box red gum woodland dec03

MOLONGLO VALLEY - EXCEPTIONAL TREE SURVEY

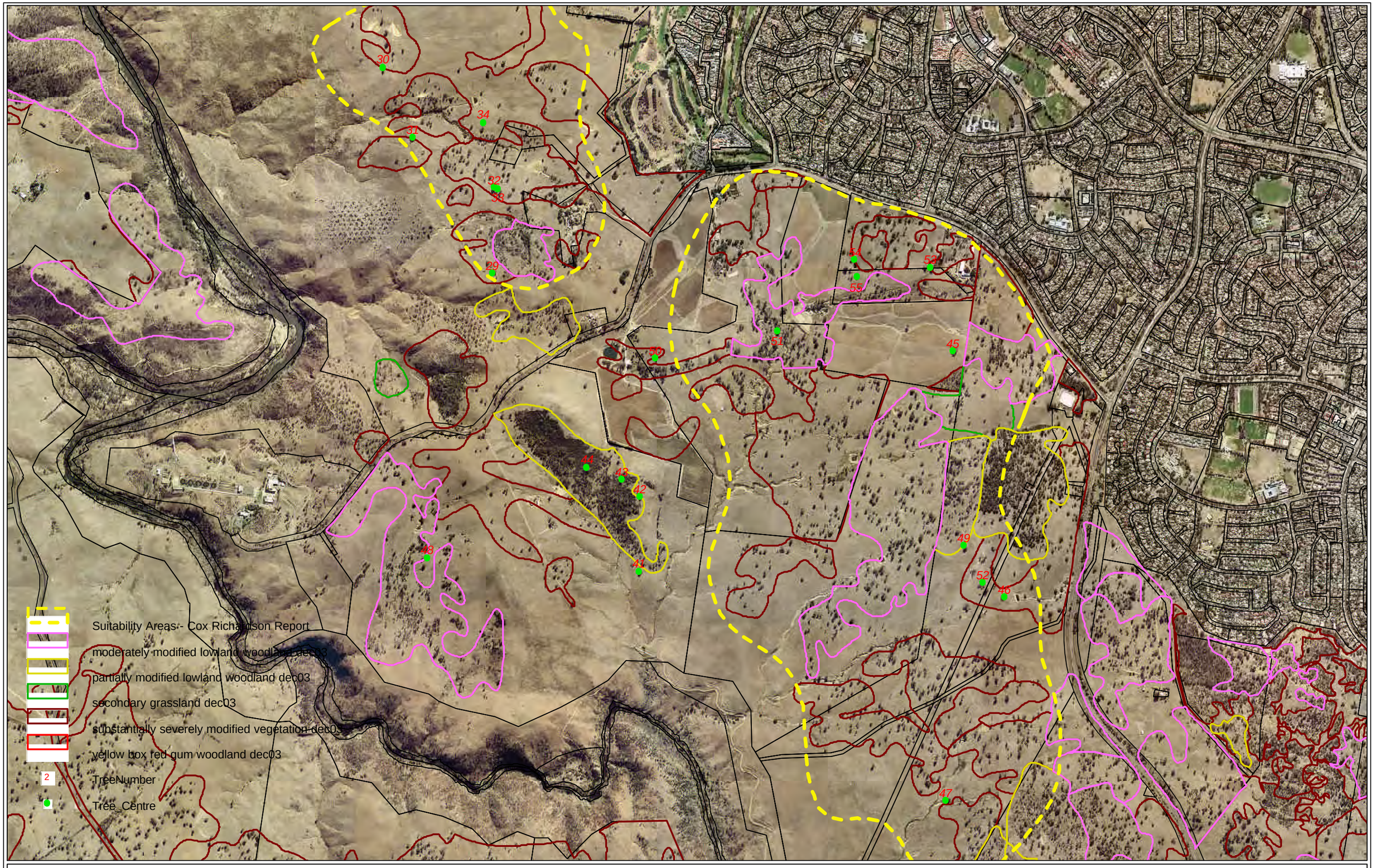
May 2005

ACT Planning and Land Authority

0.0 0.5 1.0 1.5 2.0 2.5

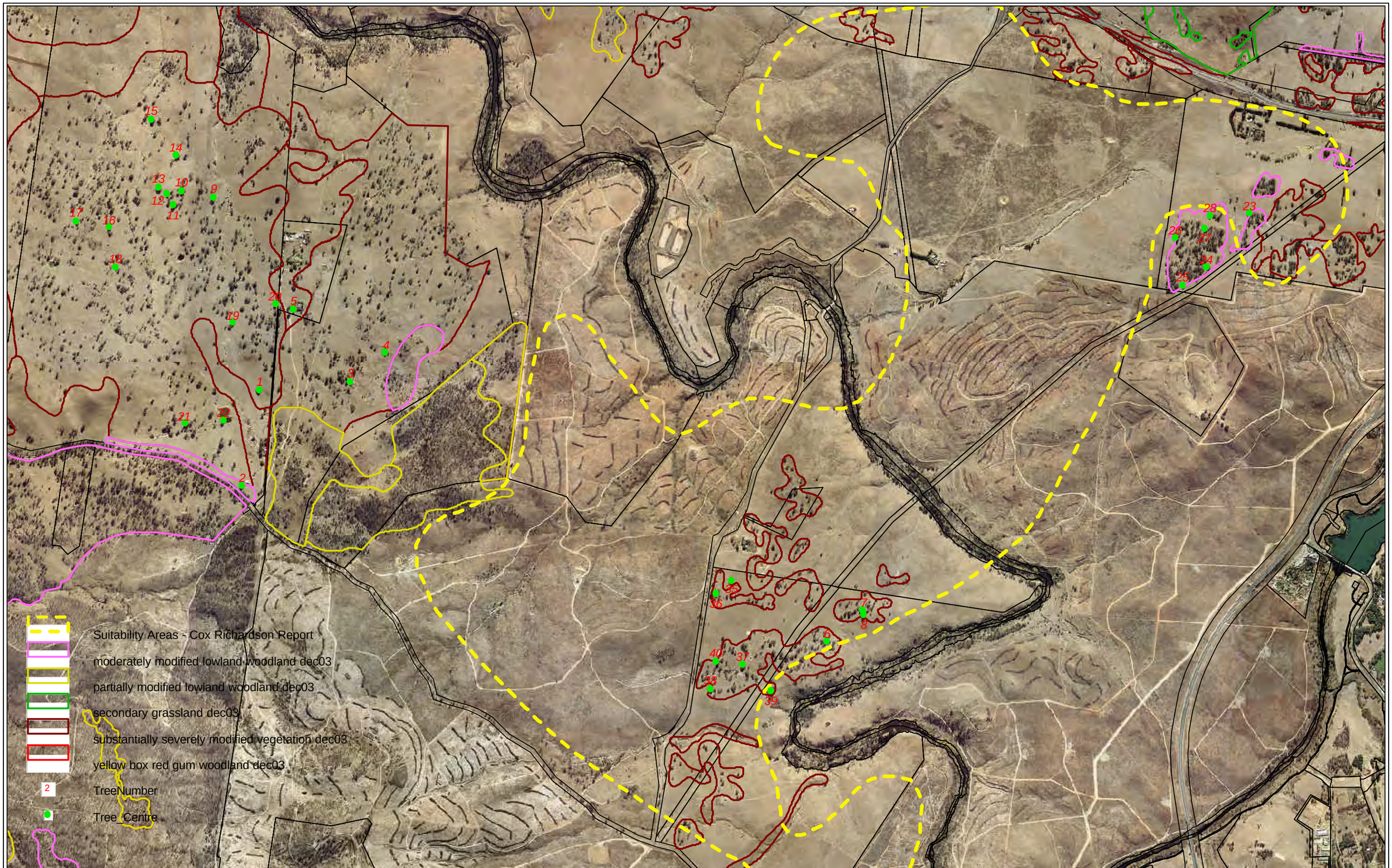
Kilometers

2004 Aerial Photography



EXCEPTIONAL TREE SURVEY - MOLONGLO NORTH

Scale 1: 20 000



EXCEPTIONAL TREE SURVEY - MOLONGLO SOUTH

Scale 1:20 000

Appendix E-2
dsb Tree Assessment

MOLONGLO / COOMBS & WRIGHT TREE ASSESSMENT

Tree N^{o} :	865

Regulated Tree:	**N**
Classification of Tree Quality:	
• Arboricultural Assessment	**M**
• Contribution to Urban Amenity	**M**
Recommendation:	**Retain**
Location	

Survey Details:

Organisation:	dsb Landscape Architects	Grid Co-ordinates:	E 203135.329 N 600604.699
Date of Survey:	4th November 2009	Assessor ID:	JL & ST

Tree Details:

Species:	Eucalyptus rubida			Common Name:	Candle bark		
Height:	10	Canopy spread:	4	Trunk Circum:	900	N$^{o.}$ of Trunks	1
Health/Condition:		Relative density of foliage					M
		Amount of dead wood in canopy					H
		Prevalence of insect attack or disease					H
		Prevalence of epicormic growth					H
		Prevalence of mistletoe					H
		Overall health/condition of the tree					G
Age:	A	Age/Health/Condition:	A/G	Form:	T	Hazard Potential:	L
Habitat Value:		N		Tolerance to Disturbance:			M

Contribution to Future Urban Amenity:

Scenic:	M	Rareness or Commonness:	M	Habitat quality:	M	Cultural, Social, Scientific:	L
Contribution to Immediate Landscaping:		H	Comment:	Good tree.			
Economic justification for retention or removal:							
Ameliorative work to reduce Risk:			N	Is work cost effective?:			
Landscape Groups:		Comment:					

Tree Protection and Management:

Tree Protection Zone & Conditions:	M	b, c & d always apply
Arboricultural Notes:		

MOLONGLO / COOMBS & WRIGHT TREE ASSESSMENT

Tree N^{o} :	866

Regulated Tree:	**N**
Classification of Tree Quality:	
• Arboricultural Assessment	**P**
• Contribution to Urban Amenity	**P**
Recommendation:	**Remove**
Location	

Survey Details:

Organisation:	dsb Landscape Architects	Grid Co-ordinates:	E 203144.595 N600618.980
Date of Survey:	4th November 2009	Assessor ID:	JL & ST

Tree Details:

Species:	Eucalyptus rubida					Common Name:	Candle bark				
Height:	11	Canopy spread:	5			Trunk Circum:	900	N$^{o.}$ of Trunks	1		
Health/Condition:		Relative density of foliage								M	
		Amount of dead wood in canopy								H	
		Prevalence of insect attack or disease								H	
		Prevalence of epicormic growth								H	
		Prevalence of mistletoe								H	
		Overall health/condition of the tree								F	
Age:	A	Age/Health/Condition:	A/F			Form:	U	Hazard Potential:		M	
Habitat Value:		N				Tolerance to Disturbance:				M	

Contribution to Future Urban Amenity:

Scenic:	L	Rareness or Commonness:	M	Habitat quality:	M	Cultural, Social, Scientific:	L
Contribution to Immediate Landscaping:		L	Comment:				
Economic justification for retention or removal:							
Ameliorative work to reduce Risk:			Y	Is work cost effective?:			N
Landscape Groups:		Comment:					

Tree Protection and Management:

Tree Protection Zone & Conditions:	M	b, c & d always apply
Arboricultural Notes:	Poor union at 2.5 metres, liable to split.	

MOLONGLO / COOMBS & WRIGHT TREE ASSESSMENT

Tree N^{o} :	867

Regulated Tree:	**N**
Classification of Tree Quality:	
• Arboricultural Assessment	**P**
• Contribution to Urban Amenity	**P**
Recommendation:	**Remove**
Location	

Survey Details:

Organisation:	dsb Landscape Architects	Grid Co-ordinates:	E 203150.967 N 600628.134
Date of Survey:	4th November 2009	Assessor ID:	JL & ST

Tree Details:

Species:	Eucalyptus rubida			Common Name:	Candle bark		
Height:	8	Canopy spread:	5	Trunk Circum:	900	N$^{o.}$ of Trunks	1
Health/Condition:		Relative density of foliage					M
		Amount of dead wood in canopy					H
		Prevalence of insect attack or disease					H
		Prevalence of epicormic growth					H
		Prevalence of mistletoe					H
		Overall health/condition of the tree					F
Age:	A	Age/Health/Condition:	A/F	Form:	U	Hazard Potential:	M
Habitat Value:		N		Tolerance to Disturbance:			M

Contribution to Future Urban Amenity:

Scenic:	L	Rareness or Commonness:	M	Habitat quality:	M	Cultural, Social, Scientific:	L
Contribution to Immediate Landscaping:		L	Comment:				
Economic justification for retention or removal:							
Ameliorative work to reduce Risk:			Y	Is work cost effective?:			N
Landscape Groups:		Comment:					

Tree Protection and Management:

Tree Protection Zone & Conditions:	M	b, c & d always apply
Arboricultural Notes:	Removing one trunk at 1.5 metres will damage tree.	

MOLONGLO / COOMBS & WRIGHT TREE ASSESSMENT

Tree N^{o} :	868

Regulated Tree:	**N**
Classification of Tree Quality:	
• Arboricultural Assessment	**P**
• Contribution to Urban Amenity	**P**
Recommendation:	**Remove**
Location	

Survey Details:

Organisation:	dsb Landscape Architects	Grid Co-ordinates:	E 2203152.979 N 600636.687
Date of Survey:	4th November 2009	Assessor ID:	JL & ST

Tree Details:

Species:	Eucalyptus viminalis			Common Name:	Ribbon gum				
Height:	7	Canopy spread:	4	Trunk Circum:	600	N$^{o.}$ of Trunks	1		
Health/Condition:		Relative density of foliage					M		
		Amount of dead wood in canopy					H		
		Prevalence of insect attack or disease					H		
		Prevalence of epicormic growth					H		
		Prevalence of mistletoe					H		
		Overall health/condition of the tree					F		
Age:	A	Age/Health/Condition:	A/F	Form:	S	Hazard Potential:	L		
Habitat Value:	N	Tolerance to Disturbance:	M						

Contribution to Future Urban Amenity:

Scenic:	L	Rareness or Commonness:	M	Habitat quality:	M	Cultural, Social, Scientific:	L
Contribution to Immediate Landscaping:	L	Comment:	Stunted weak canopy.				
Economic justification for retention or removal:							
Ameliorative work to reduce Risk:	N	Is work cost effective?:					
Landscape Groups:		Comment:					

Tree Protection and Management:

Tree Protection Zone & Conditions:	M	b, c & d always apply
Arboricultural Notes:	Poor form.	

MOLONGLO / COOMBS & WRIGHT TREE ASSESSMENT

Tree N^{o} :	869

Regulated Tree:	**N**
Classification of Tree Quality:	
• Arboricultural Assessment	**M**
• Contribution to Urban Amenity	**M**
Recommendation:	**Retain**
Location	

Survey Details:

Organisation:	dsb Landscape Architects	Grid Co-ordinates:	E 203156.692 N600637.175
Date of Survey:	4th November 2009	Assessor ID:	JL & ST

Tree Details:

Species:	Eucalyptus rubida			Common Name:	Candle bark		
Height:	9	Canopy spread:	5	Trunk Circum:	800	N$^{o.}$ of Trunks	1
Health/Condition:		Relative density of foliage					M
		Amount of dead wood in canopy					H
		Prevalence of insect attack or disease					H
		Prevalence of epicormic growth					H
		Prevalence of mistletoe					H
		Overall health/condition of the tree					G
Age:	A	Age/Health/Condition:	A/G	Form:	T	Hazard Potential:	L
Habitat Value:		N		Tolerance to Disturbance:			M

Contribution to Future Urban Amenity:

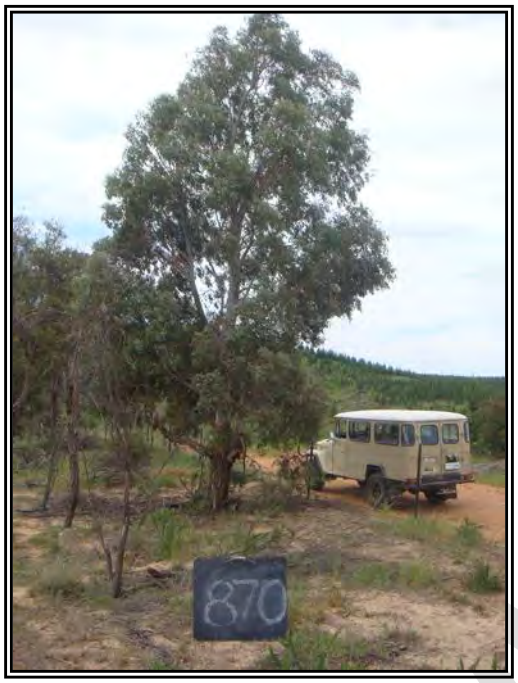
Scenic:	H	Rareness or Commonness:	M	Habitat quality:	M	Cultural, Social, Scientific:	L
Contribution to Immediate Landscaping:		H	Comment:	Good young tree.			
Economic justification for retention or removal:							
Ameliorative work to reduce Risk:			N	Is work cost effective?:			
Landscape Groups:		Comment:					

Tree Protection and Management:

Tree Protection Zone & Conditions:	M	b, c & d always apply
Arboricultural Notes:		

MOLONGLO / COOMBS & WRIGHT TREE ASSESSMENT

Tree N^{o} :	870



Regulated Tree:	**N**
Classification of Tree Quality:	
• Arboricultural Assessment	**M**
• Contribution to Urban Amenity	**M**
Recommendation:	**Retain**
Location	

Survey Details:

Organisation:	dsb Landscape Architects	Grid Co-ordinates:	E 203162.530 N 600646.672
Date of Survey:	4th November 2009	Assessor ID:	JL & ST

Tree Details:

Species:	Eucalyptus rubida			Common Name:	Candle bark				
Height:	9	Canopy spread:	6	Trunk Circum:	900	N$^{o.}$ of Trunks	1		
Health/Condition:		Relative density of foliage						H	
		Amount of dead wood in canopy						H	
		Prevalence of insect attack or disease						H	
		Prevalence of epicormic growth						H	
		Prevalence of mistletoe						H	
		Overall health/condition of the tree						G	
Age:	A	Age/Health/Condition:	A/G	Form:	T	Hazard Potential:		L	
Habitat Value:		N		Tolerance to Disturbance:				M	

Contribution to Future Urban Amenity:

Scenic:	H	Rareness or Commonness:	M	Habitat quality:	M	Cultural, Social, Scientific:	L
Contribution to Immediate Landscaping:		H	Comment:	Good form and healthy.			
Economic justification for retention or removal:							
Ameliorative work to reduce Risk:			N	Is work cost effective?:			
Landscape Groups:		Comment:					

Tree Protection and Management:

Tree Protection Zone & Conditions:	M	b, c & d always apply
Arboricultural Notes:	Retain lower branches.	

MOLONGLO / COOMBS & WRIGHT TREE ASSESSMENT

Tree N^{o} :	871

Regulated Tree:	**N**
Classification of Tree Quality:	
• Arboricultural Assessment	**P**
• Contribution to Urban Amenity	**P**
Recommendation:	**Remove**
Location	

Survey Details:

Organisation:	dsb Landscape Architects	Grid Co-ordinates:	E 203166.802 N 600659.016
Date of Survey:	4th November 2009	Assessor ID:	JL & ST

Tree Details:

Species:	Eucalyptus viminalis			Common Name:	Ribbon gum				
Height:	8	Canopy spread:	7	Trunk Circum:	1100	N$^{o.}$ of Trunks	1		
Health/Condition:		Relative density of foliage						M	
		Amount of dead wood in canopy						M	
		Prevalence of insect attack or disease						H	
		Prevalence of epicormic growth						H	
		Prevalence of mistletoe						H	
		Overall health/condition of the tree						F	
Age:	A	Age/Health/Condition:	A/F	Form:	S	Hazard Potential:		L	
Habitat Value:		N		Tolerance to Disturbance:				M	

Contribution to Future Urban Amenity:

Scenic:	L	Rareness or Commonness:	M	Habitat quality:	M	Cultural, Social, Scientific:	L
Contribution to Immediate Landscaping:		L	Comment:	Stunted tree.			
Economic justification for retention or removal:							
Ameliorative work to reduce Risk:			N	Is work cost effective?:			
Landscape Groups:		Comment:					

Tree Protection and Management:

Tree Protection Zone & Conditions:	M	b, c & d always apply
Arboricultural Notes:		