

PLANS AND DOCUMENTS
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DEVELOPMENT APPROVAL

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BUSHFIRE HAZARD ASSESSMENT AND MANAGEMENT PLAN 221 Teviot Road, Greenbank – Proposed Development



Client: Mr. Nicholas Campbell

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Table of Contents

Contents

Abbreviations.....	iv
1.0 INTRODUCTION	5
1.1 Site Description.....	5
1.2 Proposed Development	7
2.0 METHODOLOGY	8
3.0 BUSHFIRE HAZARD OVERLAYS – LCC AND SPP	9
4.0 SITE-SPECIFIC BUSHFIRE HAZARD ASSESSMENT	10
4.1 Current conditions.....	10
4.2 Site Sub-units	11
4.3 Assessment of Vegetation Communities	11
4.4 Assessment of Slope	14
4.5 Assessment of Aspect	15
4.6 Field Verification	15
4.7 Severity of Bushfire Hazard	15
4.8 Qualitative Review	16
5.0 BUSHFIRE HAZARD OF ADJACENT LANDS.....	17
5.1 Safety Buffers	20
5.2 Overall Hazard Rating of the Site	20
6.0 BUSHFIRE ATTACK LEVEL	21
6.1 Construction Requirements	22
7.0 BUSHFIRE MANAGEMENT PLAN.....	23
7.1 Assessment of Site Characteristics (Future).....	23
7.2 Emergency Response Plan	23
7.3 Vegetation Management.....	24
7.4 Water Supply and Firefighting Infrastructure.....	25
7.5 Roads and Access.....	26
7.6 Bushfire Attack Levels	26
7.7 Rural Fire Service Recommendations	26
8.0 SUMMARY OF RECOMMENDATIONS	28
9.0 CONCLUSIONS	30
10.0 REFERENCES	31

Figures Section	Overall Site & Roof Plan (Merrin & Cranston drawing DA.102 (Revision P05), dated 24 June 2019)
	Figure 4 – Bushfire Hazard Sub-Units
	Figure 5 – Bushfire Hazard Rating for Site and Surrounds
	Figure 6 – Bushfire Attack Level Assessment
Appendix A	Bushfire Hazard Units Slope Calculations
Appendix B	Bushfire Hazard Map (State Planning Policy, 2016)

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Disclaimer

S5 Consulting Pty Ltd trading as S5 Environmental has developed this Bushfire Hazard and Bushfire Attack Level Assessment, taking into consideration the Australian Standards (AS3959-2009) - Construction of building in bushfire-prone areas, the State Planning Policy (including the Draft Bushfire Model Code) and relevant local authority policies and guidelines. However, there can be no guarantee that following the recommendations made in this assessment can guarantee safety of property and human life.

Fire is an element of nature, and as such fire events (small or large) can have disastrous outcomes even with the best planning in place. The authors of this report and S5 Consulting Pty Ltd accept no responsibility for any harm to property or human life caused by fire or any other cause to persons utilising property or structures

Abbreviations

AS	Australian Standards
BAL	Bushfire Attack Level
BHU	Bushfire Hazard Sub-Unit
DES	Department of Environment and Science
DET	Department of Education and Training
DNRME	Department of Natural Resources, Mines and Energy
DoEE	Department of Environment and Energy
DSDIP	Department of State Development, Infrastructure and Planning
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EDQ	Economic Development Queensland
ESD	Ecologically Sustainable Development
Ha	Hectares
LCC	Logan City Council
PDA	Priority Development Area
QFES	Queensland Fire and Emergency Services
SPP	<i>State Planning Policy</i>
TOR	Terms of Reference
VMA	<i>Vegetation Management Act 1999</i>

1.0 INTRODUCTION

S5 Environmental was commissioned by Mr Nicholas Campbell to undertake a Bushfire Hazard Assessment and develop a Bushfire Management Plan for the proposed development on the site located at 221 Teviot Road, Greenbank. The property is further described as Lot 9 on RP184971 and has a total area of 2.01 hectares (ha) and is herein known as the 'site'. The property is located within the Logan City Council (LCC) Local Government Area.

This Bushfire Hazard Assessment aims to determine the site-specific hazard in relation to bushfire on and around the site and management actions required to mitigate the risk.

1.1 Site Description

The site is located in the suburb of Greenbank, within the Logan City Council (LCC) Local Government Area. Greenbank is characterised by Rural Residential, Environmental Management and Conservation, Special Purpose Defence Zones and Priority Development Areas. The site falls within the Priority Development Area of Greater Flagstone and is, therefore, subject to the requirements of the *Greater Flagstone Priority Development Area* (PDA) Development Scheme.

The site is bound by Teviot Road on its eastern boundary and surrounded by rural residential properties to the north and west of the site. Adjoining the southern boundary of the site is a large commercial precinct. Located approximately 350 metres (m) to the west is the Brisbane-Sydney Rail network.

A residential dwelling is located within the eastern portion of the site. The frontage of the site supports native woodland canopy species with a slashed understorey, and, a regrowth vegetation community in the adjoining fenced yard at the northern boundary. The western portion of the site contains a dam and is characterised by woodland and open forest dominated by natives. Refer to **Site Location** in **Figure 1** and **Site Aerial** in **Figure 2**, below.



Figure 1 Site Location

Source: Google Maps 2017



Figure 2 Site Aerial Source

Source: Google Earth Pro. 2017, Imagery Date, 06/09/2016

1.2 Proposed Development

S5 Environmental understands the proponent is proposing the development of a childcare centre within the north-eastern portion of the site. The existing house and garage are to be retained in the south-eastern portion of the site and the vegetated western portion of the site is to be retained at this stage. Refer to Merrin and Cranston **Overall Site and Roof Plan** (Drawing No. DA.102, Revision P06, dated 11 June 2020) in **Figure 3**, below, and in detail in the **Figure Section** of this report.



Figure 3 Proposed Development

Source: Merrin and Cranston, 11 June 2020

2.0 METHODOLOGY

The purpose of this report is to provide an informed assessment of the potential bushfire hazard within the site and surrounding areas in relation to the proposed development. Accordingly, S5 Environmental's approach involved both quantitative and qualitative assessments of the site. The quantitative assessments included a review of the vegetation communities, slope and aspect. The qualitative assessments were based upon the known bushfire behaviour of the subject land. S5 Environmental's Ecologist and Principal Environmental Manager conducted a review of the site and surroundings lands, vegetation communities, slope angles and aspects on Tuesday, 24th of January 2017.

A measured walkover of the entire site was achieved with a particular focus on the areas of the site mapped within a Bushfire Prone Area. Vegetation communities were inspected in order to assess their structure, dominance, associations and connectivity to adjoining bushland. The vegetation community structure, fuel loads and potential hazards were also assessed and documented.

S5 Environmental utilised the elevations and contours indicated in the Detailed Survey (prepared by Ian Davies Surveys, 4961 Drawing A , dated the 1st of February 2017, attached in the **Figures** section of this report) in order to complete the quantitative assessment.

Aerial photography was utilised to discern connectivity of the site to bushland areas in the locality. The State Planning Policy, 2016 Natural Hazards Map (refer to **Appendix A** attached) was reviewed prior to the field assessment in order to inform potential bushfire hazard areas.

The site-specific Bushfire Hazard Assessment (including the Bushfire Attack Level (BAL) Assessment) and Bushfire Management Plan have been completed in accordance with the Australian Standard 3959:2009 *Building in Bushfire Prone Areas* and the superseded *SPP 1/03: Mitigating the adverse Impacts of Flood, Bushfire and Landslide* and SPP Guideline. The superseded SPP 1/03 was used as per the Greater Flagstone Priority Development Area Development Scheme. Accordingly, S5 Environmental's approach involved both quantitative and qualitative assessments of the site. The quantitative assessments included a review of the vegetation communities, slope and aspect. The qualitative assessments were based upon the known bushfire behaviour of the subject land.

3.0 BUSHFIRE HAZARD OVERLAYS – LCC AND SPP

As this development is within the Greater Flagstone PDA it is the responsibility of Economic Development Queensland (EDQ) to assess Development Applications under the *Economic Development Act 2012*. EDQ will assess the Development Application against the Greater Flagstone Development Scheme ('the scheme') rather than Logan City Council assessing it against the *Logan Planning Scheme 2015 v6.0*. The Greater Flagstone Development Scheme turns to the following State Planning Policies to guide bushfire hazard assessment;

- SPP 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide; and
- SPP 1/03 Guideline for information and assessment criteria for landslip and bushfire hazard.

The State Planning Policy 2016 (SPP) Bushfire Hazard Area map (attached in **Appendix A**) was consulted to determine the preliminary bushfire hazard ratings for the site. This map indicates a Medium Potential Bushfire Intensity Hazard area in the western half of the site with the remaining area within the Potential Impact Buffer area.

Given this review of the available mapping, further investigation of the site-specific bushfire hazard characteristics of the site has been undertaken to determine the actual status of the site. This data is presented in **Section 4.0** of this report.

4.0 SITE-SPECIFIC BUSHFIRE HAZARD ASSESSMENT

The following provides a detailed, site-specific, technical assessment of the site to determine the actual level of potential bushfire risk. It is understood that this assessment will be used as supporting documentation for the Development Application to EDQ.

Accordingly, this site-specific assessment has been prepared in accordance with the SPP Guideline 1/03.

The site-specific bushfire hazard assessment involves a quantitative assessment utilizing a cumulative scoring system accounting for vegetation communities, aspect, and slope. The following sections are in accordance with this approach.

4.1 Current conditions

The subject site consists of the existing residence surrounded by various vegetation communities. Until recently, the areas of the site were grazed by horses and goats. The site contains internal fences used for restricting horse and goat access to the site frontage. The internal fences broadly delineate the vegetation communities within the site. The frontage of the site contains a native canopy over a slashed understorey. The northern portion of the site indicates a native regrowth community and the western half of the site is heavily vegetated. An existing dam is located within the western portion of the site.

The site falls gently down gradient from the south-east extent of the site towards the north-western extent.

Plates 1 – 4, below, show the subject site and vegetation present.



Plate 1. View from existing residence towards Teviot Road across Eucalypt woodland with slashed understorey



Plate 2. View of existing residence with scattered landscaping species.



Plate 3. View of regrowth community, note, internal fence separated this from the adjacent Vegetation Community.



Plate 4. View of existing earthen base dam with dense leaf littered banks.

4.2 Site Sub-units

An assessment of the vegetation community, slopes and aspects displayed across the site was undertaken with the goal of breaking the site down into areas referred to as 'sub-units'. Each sub-unit is essentially an area of land with a particular combination of vegetation, slope and aspect characteristics. Three Bushfire Hazard Sub-Units (BHU) have been determined appropriate for the subject site based on variations in vegetation communities. The slope and aspect remain the same throughout.

BHU 1 is characterised by native canopy over a slashed understory and contains the existing residence. BHU 2 is located along the north-eastern portion of the site and is characterised by a fenced regrowth community. The western portion of the site is BHU 3 and is characterised by the native open forest to woodland and includes the existing dam. Refer to **Figure 4** in the Figures section of this report for these BHUs.

4.3 Assessment of Vegetation Communities

Hazard scores for the vegetation communities associated with each BHU have been taken from the SPP1/03 Guideline – *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, Appendix 3 Table A3.1 – Hazard Scores and Associated Fire Behaviours for Various Vegetation Communities. Below is a description of vegetation communities within each BHU.

BHU 1 – Native Woodland with slashed understorey

The vegetation located within the south-eastern portion of the site was characterized by a native Woodland with a slashed understorey. This BHU included the existing house and garage. The vegetation was characterised by semi-mature Lemon-scented Gum (*Corymbia citriodora*), Forest Red Gum (*Eucalyptus tereticornis*), Narrow-leaved Ironbark (*Eucalyptus crebra*), Narrow-leaved Red Gum (*Eucalyptus seeana*) with Smooth-barked Apple (*Angophora leiocarpa*), River She-oak (*Casuarina cunninghamiana*) and Pink Bloodwood (*Corymbia intermedia*) also present. Landscaping trees surrounding the existing residence included an African Tulipwood (*Spathodea campanulata*), a Queensland Bottle Tree (*Brachychiton rupestris*) and Leopard Trees (*Libidibia ferrea*).

The shrub layer is largely absent with exception for common landscaping species surrounding the existing residence including Geisha Girl (*Duranta repens*), juvenile Weeping Bottlebrush (*Melaleuca viminalis*) and Tuckeroo (*Cupaniopsis anacardioides*). The gravel driveway was lined with juvenile Leopard Trees.

The understorey indicated a maintained slashed lawn of predominately exotic grasses including Sir Walter Buffalo (*Stenotaphrum spp.*), Red Natal Grass (*Melinis repens*) and Signal Grass (*Brachiaria decumbens*). Native understorey species were scattered within the slashed exotic grass including Barbed Wire Grass (*Cymbopogon refractus*) and Yellow Buttons (*Chrysocephalum apiculatum*). This community was fenced with chain wire fencing on all sides. Refer to **Plates 5-6**, below.

Based on the proposed development layout, the vegetation in the northern portion of BHU 1 (north of the existing house) is expected to be cleared as part of the development.



Plate 5: View from the existing residence towards Teviot Road across Eucalypt Woodland with slashed understorey.



Plate 6: View of existing residence and surrounding landscaping.

BHU 2 – Regrowth vegetation community

The vegetation located within the fenced northern-eastern portion of the site was characterised by a native regrowth vegetation community of predominately Lemon-scented Gum, Forest Red Gum, Narrow-leaved Red Gum. The regrowth community at the frontage of Teviot Road was fairly sparse and became dense towards the centre of the site. The sub-canopy was characterised by Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Black Wattle (*Acacia leiocalyx*).

The shrub layer indicated regenerating River She-oaks and Eucalypts with Lantana (*Lantana camara*) also present. The understorey indicated exotic and native species including Red Natal Grass, Barbed Wire Grass and Yellow Buttons. This community was fenced with chain wire fencing with the exception for the western boundary of this community. Anecdotal evidence from the previous owner indicated that this area of the site was utilised as a horse paddock and had been grazed until recently. This vegetation community indicated a regenerating system which had been historically cleared and grazed. Refer to **Plates 7-8**, below.

Based on the proposed development layout, the majority of the vegetation within BHU 2 is expected to be cleared as part of the development.



Plate 7: View of regrowth community, note, internal fence separated this community from Vegetation Community 1.



Plate 8: Dense native regrowth with spot Lantana infestations.

BHU 3 – Native remnant Woodland-Open Forest with regrowth vegetation and dam

The vegetation located within the western portion of the site was characterised by a native remnant Woodland to Open Forest of varying integrity with areas of sub-canopy regrowth vegetation. The remnant canopy consisted of predominately Lemon-scented Gum, Forest Red Gum, Narrow-leaved Ironbark, Narrow-leaved Red Gum with Brush Box (*Lophostemon confertus*) and White Cedar (*Melia azedarach*) also present. The sub-canopy contained Broad-leaved Paperbarks, River she-Oaks, Red Ash (*Alphitonia excelsa*) and areas of dense regenerating Eucalypts and Paperbarks.

The shrub layer was sparse and contained Black Wattle and spot Lantana infestations. The eastern extent of this vegetation community indicated a slashed grass understory, in contrast the remainder of this community indicted moderate leaf litter and fallen timber with native and exotic understorey species including Flannel Weed (*Sida cordifolia*), Signal Grass, Gamba Grass (*Andropogon gaynus*) with native Barbed Wire Grass also present.

This community contained an existing dam with banks indicating thick leaf litter with a canopy of Broad-leaved Paperbarks, Narrow-leaved Red Gum, Black Wattle, River-She Oak, Swamp Box (*Lophostemon suaveolens*) over an understory of sparse Common Rush (*Juncus usitatus*). The vegetation to the west of the existing dam indicated semi-mature canopy with a regrowth sub-canopy which indicates a level of historical clearing, likely from the earthworks associated with the construction of the dam. Further historical clearing was indicated in this community by the presence of stumps of mature native canopy trees. Refer to **Plates 9-10**, below.



Plate 9: View west from central fence towards native canopy with slashed understorey.



Plate 10: View of moderate leaf litter within native woodland, note regrowth vegetation in the background.

Table 1, below, identifies the Vegetation Community that most closely describes site conditions and the associated hazard score rating for the vegetation communities present on the site.

Table 1 Hazard Score and Associated Fire Behaviour for the Vegetation Communities on Site

Sub-unit	Vegetation Communities	Fire Behaviour	Hazard Score
BHU1	Native grasslands (ungrazed), open woodlands, canefields.	Fast moving fires, available to fire annually to 4 years. Usually no ember attack, radiant heat for >10m, duration <2 minutes.	5-2=3*
BHU2	Grassy eucalypt and acacia forest, exotic pine plantations, cypress pine forests, wallum heath.	Fire intensity may be severe with flame lengths to 20m, but less attack from embers.	6-2=4*
BHU3	Grassy eucalypt and acacia forest, exotic pine plantations, cypress pine forests, wallum heath.	Fire intensity may be severe with flame lengths to 20m, but less attack from embers.	6
Note: * Consideration has been given to the lack of structural complexity and maintained understorey with no leaf litter or fallen woody debris within this BHU (minus 2 from hazard score).			

4.4 Assessment of Slope

The severity of a slope and location of the slope in relation to the subject site is relevant as fire travels faster upslope than downslope and steeper slopes can potentially increase the speed the fire travels. The Detailed Survey (refer to the **Figures** section of this report) was used to calculate the slope of the land under each BHU. **Table 2**, below, summarises the hazard score for the slope measured for each BHU. Refer to **Appendix A** for Slope Calculation of each BHU.

Table 2 Hazard Score for Slope

Sub-unit	Slope	Hazard Score
BHU 1 (3.8%)	Plain (0% to 5%)	1
BHU 2 (3.1%)	Plain (0% to 5%)	1
BHU 3 (2.8%)	Plain (0% to 5%)	1

4.5 Assessment of Aspect

The land generally slopes down from the south-eastern portion of the site to the north-western extent. **Table 3** provides the hazard scores for the aspect occurring on the site.

Table 3 Hazard Scores for Aspect

Sub-unit	Aspect	Hazard Score
BHU 1	East to South and all land under 5% slope	0
BHU 2	East to South and all land under 5% slope	0
BHU 3	East to South and all land under 5% slope	0

4.6 Field Verification

As stated above, S5 Environmental's Ecologist conducted a site inspection of the site and surroundings lands, vegetation communities, slope angles and aspects on Tuesday the 24th of January, 2017 and verified the on-ground site conditions.

4.7 Severity of Bushfire Hazard

In accordance with SPP1/03 Guideline – *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* Appendix 3 the scores for the individual factors determined for vegetation community, slope and aspect have been summed to provide a total for each sub-unit as follows:

Total hazard score = vegetation community hazard score + slope hazard score + aspect hazard score.

The total fire hazard scores calculated for the site as per the SPP1/03 Guideline are shown below in **Table 4** below and also in **Figure 3 Bushfire Hazard Rating for Site and Surrounding Areas** attached in the **Figures** section of this report.

The scores for the individual factors determined for vegetation communities, slope and aspect have been summed to provide a total for each sub-unit as follows:

Table 4 Sub-unit Hazard Score

Sub-unit	Vegetation Score	Slope Score	Aspect Score	Total Hazard Score	Hazard Rating
BHU 1	3	1	0	4	LOW
BHU 2	4	1	0	5	LOW*
BHU 3	6	1	0	7	MEDIUM
Note: * While BHU 2 scores a MEDIUM hazard rating, following development the majority of this vegetation will be cleared, reducing the hazard to LOW.					

In accordance with the SPP1/03 Guideline, a total fire hazard score of 13 or greater is considered to be 'High' bushfire hazard areas, a total fire hazard score of 6 to 12.5 is considered 'Medium' Hazard Areas and a hazard score of 1 to 5.5 is considered 'Low' Hazard. Therefore, the site itself is considered a MEDIUM Bushfire Hazard Area.

4.8 Qualitative Review

S5 Environmental investigated any known bushfire behaviour. No formal information regarding past bushfire activity was available at the time of writing this report. Anecdotal evidence from the previous owner indicated the site was impacted by a fire in 1998.

5.0 BUSHFIRE HAZARD OF ADJACENT LANDS

It is important to have an understanding of the adjacent properties when developing a risk profile and management strategies for a site. The site is within an area characterised by what appears to be rural residential properties within the Greater Flagstone Priority Development Area. Of note, the site is centrally located within Greenbank and there are existing development applications over large tracts of land surrounding the property. Therefore, over time the bushfire risk associated with the site will decrease.

It was clear during the field assessment that the **highest potential for Bushfire Attack** is from the retained vegetation within the site and adjoining the northern and western boundaries.

Lands to the East of the Site

Adjoining the eastern boundary of the site is a wide road reserve containing a cleared powerline easement and a sparsely vegetated strip along Teviot Road. The canopy of the road reserve vegetation was separated from the site and had a 10m wide maintained turf understory. The road reserve vegetation indicated semi-mature native canopy including Narrow-leaved Ironbark (*Eucalyptus crebra*), Forest Red Gum (*Eucalyptus tereticornis*), Pink bloodwood (*Corymbia intermedia*) with scattered Acacias in the sub-canopy. Further east of Teviot Road is a large freehold lot that is currently being redeveloped. Refer to **Plates 11 and 12**, below.



Plate 11. View north along site boundary from powerline easement.



Plate 12. View south along site boundary from powerline easement.

Adjacent lands to the West

Adjoining the western boundary of the site is a large (2 hectare) rural residential property. The property contains a residence, a dam, cleared and vegetated areas of land. The vegetation on the western adjoining property is described in Sub Unit 3 on the subject site. Refer to **Plate 13**, below.



Plate 13. View west of the site illustrating native canopy with leaf litter understory.

Adjacent lands to the North

Adjoining the northern boundary is another large rural residential property. The property also contains a residence, a dam, cleared areas of land and vegetated portions. The vegetation adjoining the northern boundary appeared heavily thinned with native regrowth vegetation regenerating amongst cleared areas. Refer to **Plate 14**, below.



Plate 14. View of fence line looking north from the site indicating native regrowth community.

Adjacent Lands to the South of the Site

Adjoining the southern boundary of the site is an easement containing a retaining batter with a 1.5m high fence at the top of the batter. This batter separates the site from the adjoining commercial precinct. The batter contains juvenile and semi-mature native canopy in a narrow stand. It is understood that this commercial precinct will expand with future development. Adjoining the south-western boundary is an overgrown storm water bio-retention. This indicates Cadaghi (*Corymbia torelliana*) and regenerating acacias. Refer to **Plates 15 and 16**, below.



Plate 15. View from the site of the retaining batter located in the adjoining easement to the south.



Plate 16. View south of overgrown storm water bio-retention area.

Table 5, below, summarizes the potential bushfire hazard of the lands to the north and east of the site and provides a classification in accordance with the SPP 1/03.

Table 5 Lands to the East - Bushfire Hazard

Adjacent Land	Vegetation	Slope	Aspect	Hazard Score	Severity of Bushfire Hazard
East	Native grasslands (ungrazed), open woodlands, canefields Score 5-1*	Plain (0% - 5%) Hazard Score 1	East to South and all land under 5% slope, Hazard Score 0	5	LOW
North	Native grasslands (ungrazed), open woodlands, canefields Score 5-2**	Plain (0% - 5%) Hazard Score 1	East to South and all land under 5% slope, Hazard Score 0	4	LOW
West	Grassy eucalypt and acacia forest, exotic pine plantations, cypress pine forests, wallum heath. Score 6	Plain (0% - 5%) Hazard Score 1	East to South and all land under 5% slope, Hazard Score 0	7	MEDIUM

South	Desert lands (sparse fuels, mown grass) Score 1	Plain (0% - 5%) Hazard Score 1	East to South and all land under 5% slope, Hazard Score 0	2	LOW
Note: * The vegetation community to the east is a narrow stand of vegetation which is separated from the site by a powerline easement. Therefore, the score has been downgraded by 1. ** Consideration has been given to the lack of structural complexity and maintained understorey with no leaf litter or fallen woody debris within this BHU (minus 2 from hazard score).					

It was evident from the assessment of adjacent lands that the highest risk to development is from the vegetated areas to the west and north of the site. Refer to **Figure 5 Bushfire Hazard Rating for the Site and Surrounding Areas** within the **Figures Section** of this report. This information has been utilised in the BAL Assessment in **Section 6**, below.

5.1 Safety Buffers

The final step for a site-specific Bushfire assessment in accordance with the SPP1/03 Guideline is the inclusion of a safety buffer for 'Medium' rated bushfire hazard areas. It states that land within 50 m of an area identified as having a High bushfire severity classification should be included in the 'Medium' bushfire hazard area. Therefore, a portion of the site is within the Medium Bushfire Hazard Buffer Area. Refer to **Figure 5 Bushfire Hazard Rating for Site and Surrounding Areas** within the **Figures Section** of this report.

5.2 Overall Hazard Rating of the Site

S5 Environmental's site specific Bushfire Hazard Rating for the development site is considered **MEDIUM** and surrounded on all sides by Low bushfire hazard with the exception for the **MEDIUM** Bushfire Hazard Area adjacent to the west of the site. **Figure 5 Bushfire Hazard Rating for Site and Surrounding Areas**, attached in the **Figures Section**, details the hazard score of the site with the application of the Bushfire Buffers described above. The site within the context of the Greater Flagstone Priority Development Area will experience rapid growth of the surrounding areas. In time the bushfire hazard of the site and surrounding areas will likely be greatly reduced and considered 'Low'.

6.0 BUSHFIRE ATTACK LEVEL

In March 2009, the *Australian Standards (AS) 3959-2009 Construction of Buildings in Bushfire Prone Areas* came into effect. This Standard puts in place a system of scoring a site's Bushfire Attack Level (BAL) based on the distance of a construction site to specific vegetation types. This score is used to ascertain building and construction requirements for any buildings on the site.

A BAL scores were generated, using the procedure specified in Section 2.0 of AS3959-2009, Determining the Bushfire Attack Level (Method 1). The following 5 steps are used in this method to determination the BAL of a construction site:

- Step 1 – Determine the relevant Fire Danger Index (FDI);
- Step 2 – Determine the classified vegetation type(s);
- Step 3 – Determine the distance of the site from the classified vegetation type;
- Step 4 – Determine the effective slope (2) under the classified vegetation type; and
- Step 5 – Determine the BAL from the appropriate tables within the AS3959-2009 (Section 2.0).

Note: The sixth and final step is to use the BAL score to determine the appropriate construction materials and requirements, however this is outside the scope of this Bushfire Hazard Assessment report.

BAL's are classified into the following score categories from highest attack level to the lowest:

- BAL – Flame Zone (FZ);
- BAL – 40;
- BAL – 29;
- BAL – 19;
- BAL – 12.5; and
- BAL – LOW.

The proposal has been assessed, using the information and data gathered as part of the Site-Specific Bushfire Hazard Assessment and field investigations described in the sections above. The FDI is determined on a State or regional basis, the FDI for areas within Queensland is 40. 'Slope', in this method, is determined based on the slope of the land under the classified vegetation, not the slope of the land between the construction/building and the edge of the vegetation. It is noted that AS3959-2009 outlines a number of exclusions, however, none apply in this instance.

Upon review of vegetation communities, surrounding the site, vegetation identified as Classifiable Vegetation in accordance with AS3959-2009 and subject of this BAL assessment are those communities in the western portion of the site and on the adjacent property to the west.

Vegetation in the south-eastern portion of the site and to the north and east of the site was classified as Low Threat Vegetation in accordance with the Australian Standard and has been excluded from this BAL Assessment.

Accordingly, **Figure 6** and **Table 6**, below, present the BAL assessment using Method 1 from AS3959-2009 against the vegetation on the western façade of the proposed childcare building in accordance with the Overall Site and Roof Plan prepared by Merrin and Cranston and attached in the Figures Section of this report.

Table 6 Summary of Bushfire Attack Level

Proposed Building	QLD FDI	VEGETATION CLASS	DISTANCE (APPROX)	SLOPE	EFFECTIVE SLOPE	BAL SCORE
Childcare Facility	40	Open Forest	28m	2.8%	Downslope	19

Using AS3959-2009 Method 1, the proposed Childcare Facility scored a BAL 19, which is less than ideal for a childcare facility. **Table 7**, below, provides the minimum required setbacks to achieve BAL scores for Open Forest Communities depending on the slope under the vegetation. BAL scores for vegetation in the western portion of the site are highlighted in yellow.

Table 7 Bushfire Attack Level Setback Requirements

OPEN FOREST		SETBACK REQUIREMENTS (m)				
		BAL 12.5	BAL 19	BAL 29	BAL 40	BAL FZ
S L O P E	Upslope	28 - <100	20 - <28	13 - <20	10 - <13	<10
	Downslope > 0 to 5 degrees	34 - <100	24 - <34	16 - <24	12 - <16	<12
	Downslope > 5 to 10 degrees	41 - <100	29 - <41	20 - <29	15 - <20	<15
	Downslope > 10 to 15 degrees	49 - <100	36 - <49	25 - <36	19 - <25	<19
	Downslope > 15 to 20 degrees	59 - <100	44 - <59	31 - <44	24 - <31	<24

Accordingly, a setback of 34m from the Childcare Facility would be required to achieve BAL 12.5. This setback could be achieved through the creation of a Bushfire Management Zone, refer to **Section 7.3** Vegetation Management, and **Figure 6**. S5 Environmental note that the BAL Score of 12.5 is only appropriate if this proposed vegetation management buffer is maintained long-term.

6.1 Construction Requirements

The AS 3959-2009 specifies requirements for construction of buildings that achieve a BAL Score of BAL 12.5 or greater. The proposed new Childcare Facility will score a BAL 12.5 with implementation of the proposed Bushfire Management Zone. Accordingly, the Australian Standard advises the following:

- **BAL – 12.5** indicates that classified vegetation is within 100 m of the site and heat flux exposure thresholds are $\leq 12.5 \text{ kW/m}^2$ and subject to ember attack. The Australian Standard AS 3959-2009 provides advice on acceptable construction methodologies and materials for each BAL score. The sections of the Standard relevant to BAL 19 are **Construction Sections 3 and 5**.

7.0 BUSHFIRE MANAGEMENT PLAN

This Bushfire Management Plan has identified a variety of bushfire mitigation measures based on the risks identified in the Bushfire Hazard Assessment in **Sections 4 and 5** of this report. The mitigation measures emphasize resilience to bushfire. Mitigation measures outlined below include the following strategies:

- Assessment of site characteristics (future);
- Emergency Response Plan;
- Vegetation management;
- Water supply and firefighting infrastructure; and
- Bushfire Attack Levels and construction requirements.

7.1 Assessment of Site Characteristics (Future)

Estimated Population

The estimated student and staff population at this stage is unknown. The Greater Flagstone Planning Development Scheme states that the priorities and benefits of the area are to “*provide 50,000 dwellings to house a population of 120,000 people*” (EDQ, 2011). The Greater Flagstone Development Planning Scheme indicates significant population growth within the PDA.

Transport

The Greenbank Central PDA is located adjacent to the Brisbane-Sydney Rail line. It is understood that a passenger station is proposed for future development within close proximity of the site. The site is accessed via arterial Teviot Road. It is understood that the proposed childcare centre would provide adequate parking and the design would allow for future access to the rear of the site.

Siting of Building Envelope on the Lot

The proposed childcare centre allows for setback from hazardous vegetation to the west of the site. As mentioned above the bushfire setback will include a vegetation management area. It is understood that the western portion of the site is proposed for potential future development.

7.2 Emergency Response Plan

The childhood education and care providers are administered in accordance with the National Quality Framework for Early Childhood Education and Care (NQF) and provides a uniform approach to regulation and assessment for these educational services in Australia. The Quality Area 2 within the NQF outlines standards for child safety. Element 2.3.3 states that “*plans to effectively manage incidents and emergencies are developed in consultation with relevant authorities, practiced and implemented*”. The childcare must ensure the completion of an Emergency Response Plan.

Queensland Fire and Emergency Services

The Greenbank Fire Brigade is located approximately 850m from the site. The contact details for the Greenbank Fire Brigade are as follows:

- Address: 133 Teviot Road, Greenbank 4124
- Phone: (07) 3297 5896

Please note that in fire emergencies the triple zero (000) emergency number should be used.

7.3 Vegetation Management

As discussed in **Section 6**, the Bushfire Management Zone has been proposed as a bushfire buffer area. Vegetation management within this zone is to include the clearing of regrowth, shrub and understorey. The Bushfire Management Zone is to be comprised of an inner and outer protection zones which are to be managed as explained in **Table 8**, below, refer to **Figure 6**. In addition, the cleaning of gutters and removal of any fuel should occur prior to and throughout summer months. Limiting fuel accumulation on the site and ensuring landscape utilises low fuel generating planting pallets and low flammability treatments is important to ensure bushfire hazards on the site are reduced. A useful guide for this type of landscaping is *Landscaping for Bushfire* (CFA, 2011).

Table 8. Summary of Bushfire Management Zone Requirements

Zone	Width	Management
Inner	15 m	• All shrub and canopy vegetation (both weeds and exotic) is to be cleared to prevent continuity of fuel both vertically and horizontally. This excludes one mature eucalypt on the outside edge of the inner zone (within the Endangered Regulated Vegetation), which is shown to be retained subject to arborist inspection (refer to S50249VRP). • Surface treatment can be a combination of paving, managed lawn, or other non-combustible material, such as gravel mulches and concrete sleepers. • No trees are to be planted in this area. Any gardens should be restricted to groundcovers under 100 mm (mature height), with gravel mulch.
Outer	20 m	• Native canopy trees are to be retained. • Retained vegetation should have vertical and horizontal separation. • Low-flammability native shrubs and ground covers can be planted clumps in areas with canopy gaps (ie not at the base of retained canopy trees). Shrub clumps should not cover more than 30% of the Outer Management Zone. • Prune branches of retained trees to a height of at least 2-3 meters to ensure discontinuity between surface and canopy fuel loads.

Zone	Width	Management
		With the exception of the clumps of native shrubs and ground covers, the balance of the ground-layer should utilise a low flammability ground cover such as mown turf, and maintained in a low fuel state through regular and ongoing maintenance to remove buildup of leaf litter, fallen branches and the like, and regular slashing/mowing of grass.

Landscaping

Site landscaping plays an important role in increasing a buildings' ability to endure bushfire attack. Landscaping for bushfire reduces the risk of ember attack which is the most common cause of house loss during bushfire.

The Country Fire Authority (CFA) have produced an online Plant Selection Key which facilitates landscape designers and property owners select firewise garden plants (CFA, 2012). THE CFA have also produced the publication 'Landscaping for Bushfire: Garden Design and Plant Selection' (CFA, 2011). The publication outlines planning, designing, choosing suitable plants, maintaining the garden and provides a plant selection key.

7.4 Water Supply and Firefighting Infrastructure

The site is not connected to reticulated water, however, it is understood that the proposed development will be connected to the reticulated water supply. In July 2013, a set of consolidation Design and Construction Standards came into effect in South East Queensland (SEQ). These standards are the SEQ Water Supply & Sewage Design & Construction Code, also known as the 'SEQ Code'. It is anticipated that the reticulated water network for the proposed development complies with the provisions outlined in the SEQ Code.

Water Tanks

Should the childcare centre wish to install water tanks, they must be constructed of material which can resist radiant heat from bushfire and should be sited away from bushland.

Water tanks for firefighting should be greater than 5000 litre capacity or if a single tank is used for domestic and firefighting purposes, it should have two outlets with the lower outlet being able to access the lower 5000 litres which is reserved for firefighting only. It is recommended that the local fire brigade is consulted regarding water tank specifications.

Firefighting Appliances

Firefighting appliances (such as fire extinguishers and external sprinklers) are to be installed as per the *Building Fire Safety Regulation 2008*. However, firefighting appliances have limitations and should not be used in cases where evacuation is considered the appropriate action (as per the Emergency Response Plan).

Smoke Alarms

Smoke alarms must be installed within the proposed buildings and renovated buildings in accordance with the Building Code of Australia and the AS3786-1993 - *Smoke Alarms*. The Queensland Fire and Emergency Services recommends photoelectric smoke alarms (not ionization alarms). Photoelectric smoke alarms are generally more effective than ionization types as they detect visible particles of combustion. Smoke Alarms must comply with the Department's requirements in relation to smoke alarms in state schools.

7.5 Roads and Access

As described in **Section 7.1** above the site has access via Teviot Road. The Queensland Fire and Emergency Services (2014) states a minimum roadway clearance of 3.5 m wide by 4.8 m high is required for Emergency Services Vehicle Access. S5 Environmental understands that the roads will comply with the specifications of the Department of Transport and Main Roads (TMR's), Road Planning and design Manual (TMR, 2013) for the access requirements of emergency services.

7.6 Bushfire Attack Levels

The BALs indicated in **Section 6.0** of this report, have been calculated in accordance with AS3595-2009. The BAL assessment has informed the Vegetation Management Requirements for the site and has included proposed vegetation management buffers located on the site to ensure setbacks from hazardous vegetation.

Bushfire Attack Levels are used to determine the level of bushfire attack a building is likely to experience when exposed to ember attack, radiant heat, direct flame contact and/or fire-driven wind. The construction requirements outlined in **Section 6.2** of this report are required for Building Envelope at the interface of the BAL areas. It should be noted that buildings can be designed to reduce compliance costs by choosing considered design approaches.

7.7 Rural Fire Service Recommendations

Design measures as indicated by the Rural Fire Service designs include the following:

- A concrete slab (not a wooden deck/veranda);
- Exterior walls must be constructed of non-combustible materials such as brick veneer or concrete;
- Non-combustible material on the roof, veranda or deck;
- Sealed wall and roof joints to guard against ember attacks;
- Shutters made from aluminium or other non-combustible material, or toughened glass for windows;
- Door frames made from fire resistant timber, with a weather strip at the base;
- Metal rather than plastic external trimmings such as vents, guttering and down pipes; and
- Gas cylinders being protected from radiant heat and being connected with metal piping rather than flexible mesh/plastic lines.

Provision of access to water requires the following:

- A path to within 6 m of the water supply that can be accessed via a truck including 4 m of clearance above ground and a ground surface that is capable of supporting the weight of the truck; and
- For water tanks, male camlock fittings of the appropriate size so that fire appliances can draw water from the tank.

8.0 SUMMARY OF RECOMMENDATIONS

The bushfire mitigation measures and recommendations outlined in this report are summarised below. Bushfire mitigation measures must be applied by the childcare centre as follows:

- Assessment of Future Site Characteristics:
 - It has been recommended that the design of the childcare centre allows for a setback from hazardous vegetation. This will include a vegetation management area with a maintained turf understorey with scattered mature canopy.
- Emergency Response Plans:
 - The childcare must prepare an Emergency Response Plan and practice this plan with staff and students; and
 - It is recommended that the Child Care Centre contact the local Fire Brigade to organize a bushfire information session.
- Vegetation Management:
 - The Bushfire Management Zone is to be comprised of an Inner, 15 m, Protection Zone, and Outer, 20 m, Protection Zone.
 - **Inner:** Well-maintained turf or similar low flammability ground layer, with no canopy trees (with the exception of one mature eucalypt being retained).
 - **Outer:** Canopy trees retained. Low-flammability native shrubs and groundcovers can be planted in clumps in areas with no canopy, and must cover less than 30% of the outer protection zone area. Ground-layer is to be maintained in a low fuel state.
 - Landscaping provisions (including garden design and plant selection for landscaping) should be implemented within the bushfire prone area.
- Water Supply and Infrastructure
 - Additional water tanks should consider siting and design water tanks for bushfire resilience;
 - It is recommended that the Child Care Centre consult with the local fire brigade regarding the installation of water tanks;
 - Firefighting appliances must be installed, whilst being aware of the limitation of such equipment; and
 - Buildings must be installed with smoke alarms in accordance with the Building Code of Australia and the AS3786-1993.
- Roads and Access:
 - Site roads must meet the requirements for emergency vehicles; and

- Bushfire Attack Levels:
 - The construction requirements must be applied to the childcare centre; and
 - Design measures as specified by the Rural Fire Service should be considered in the design of the building.

9.0 CONCLUSIONS

This Bushfire Hazard Assessment and Management Plan has completed a quantitative and qualitative bushfire hazard assessment of the site and surrounding areas. The assessment indicated a 'Medium' Bushfire Hazard Rating for the western portion of the site, which reflects the current State Government's SPP mapping classification of Potential Impact Buffer. Furthermore, the properties to the north, east and south of the site are classified as 'Low' bushfire hazard and the property to the west emanating a 'Medium' bushfire hazard. This also corresponds to the SPP where the land to west is indicated as having a 'Medium' Bushfire Hazard Rating. The application of a 50m bushfire buffer area from the 'Medium' Bushfire Hazard Area on the western portion of the property resulted in the majority of the site being located within the bushfire buffer area.

The BAL assessment indicated that the childcare centre can achieve a BAL 12.5 through the implementation of a Bushfire Management Zone. The Bushfire Management Zone is to be comprised of an Inner and Outer Protection Zone. The Inner Protection Zone is comprised of a 15 m area with no canopy trees or shrubs (except one eucalypt which is to be retained), while the Outer Protection Zone is comprised of a 20 m area with retained canopy trees and include planting of clumps of low-flammability shrubs and ground covers. The ground-layer of both management zones is to be well maintained in a low flammability state, such as mown turf. The construction requirements for the proposed buildings must be applied as per the AS3959-2009. S5 Environmental are of the opinion that the mitigation measures suggested within this report reduce the bushfire hazard of the buildings to an acceptable level.

Based on this report, a variety of recommendations and mitigation measures have been provided to address the potential risk of bushfire attack on the centre. However, fire is unpredictable and a natural process within bushland areas. Therefore, it is important that people present in facilities situated within bushfire prone areas are educated and prepared for bushfire in order to ensure the protection of property and life.

10.0 REFERENCES

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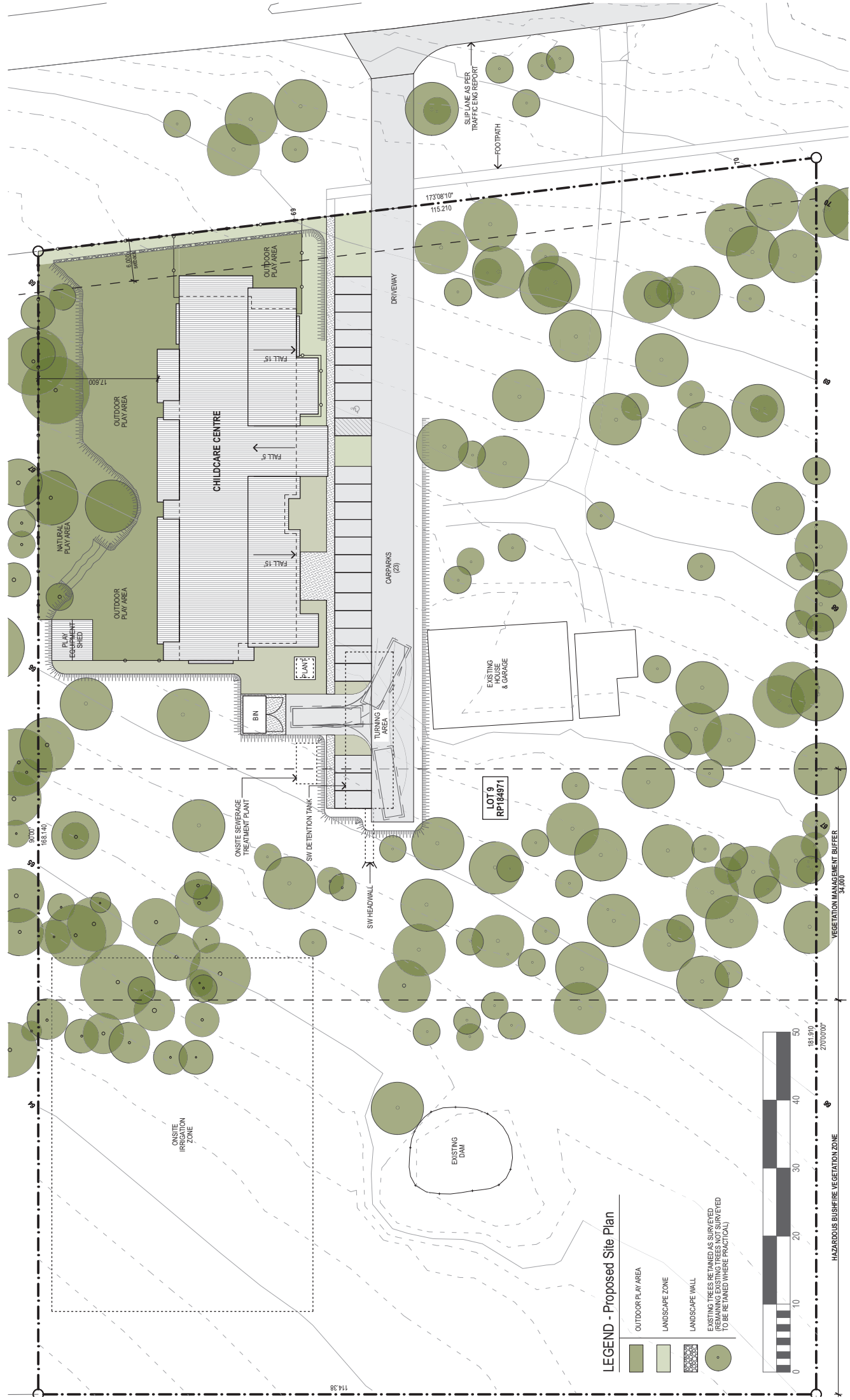
FIGURES SECTION –

Overall Site & Roof Plan (Merrin & Cranston drawing DA.102 (Revision P06),
dated 11 June 2020)

Figure 4 – Bushfire Hazard Sub-Units

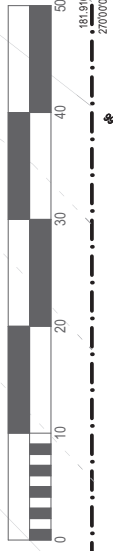
Figure 5 – Bushfire Hazard Rating for Site and Surrounds

Figure 6 – Bushfire Management Zone



LEGEND - Proposed Site Plan

- OUTDOOR PLAY AREA
- LANDSCAPE ZONE
- LANDSCAPE WALL
- EXISTING TREES RETAINED AS SURVIVED (EXISTING TREES TO BE RETAINED WHERE PRACTICAL)



NOTES	
P06	11/06/20 UPDATED DA ISSUE
P05	12/06/19 DA ISSUE
P05	24/06/19 CONSULTANT COORDINATION ISSUE
P04	20/02/19 CONSULTANT COORDINATION ISSUE
P03	12/02/19 CLIENT REVIEW ISSUE
P02	06/02/19 CONSULTANT COORDINATION ISSUE
Revised	Drawn

STATUS
PRELIMINARY

PROPRIETOR
Active Kids
early learning centre

PROJECT
PROPOSED CHILDCARE CENTRE
221-223 TEVOT RD GREENBANK

PH: 07 3320 1620
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Email: info@merrinncranston.com
Postal: 12 The Corso, Seven Hills, 4170
Nominated Architect
DANIEL CRANSTON
ABN 420 02 628 78

TITLE
OVERALL SITE & ROOF PLAN

SCALE
1:500

DRAWN
BLLO

SHEET
DA.102

PROJECT No.
A221

REVISION
P06

DATE
11/6/20



Figure 4 - Bushfire Hazard Sub-Units

Proposed development - 221 Teviot Road, Greenbank
Mr Nick Campbell C/- Urban Strategies

Job Number: S500249;
K:\01 S5 Consulting\S5 Projects\S50249 221 Teviot Rd Greenbank\04 Drawings\QGIS\2. S50249 Bushfire.qgz
Author: SYB; Date: 26/06/2019
Data: Digital Cadastral Database (C) - State of Qld, 2019.
Aerial Photography - Nearmaps 28/04/2019.CRS: MGA94 Z56
This plan may only be relied upon in relation to the project and purpose for which it was commissioned.



Scale: approx 1:800 @A3





Figure 6 - Bushfire Management Zone

Proposed development - 221 Teviot Road, Greenbank
Mr Nick Campbell C/- Urban Strategies

Job Number: S500249;
K:\01_S5 Consulting\S5 Projects\S50249_221 Teviot Rd Greenbank\04 Drawings\QGIS2_S50249 Bushfire.qgz
Author: CE; Date: 16/06/2020
Data: Digital Cadastral Database (c) - State of Qld, 2019.
Aerial Photography - Nearmaps 28/04/2019, CRS: MGA94 Z56
This plan may only be relied upon in relation to the project and purpose for which it was commissioned.

Appendix A – Bushfire Hazard Units Slope Calculations

Project 221 Teviot Road, Greenbank
 Number: S50249
 Client: Mr Nick Campbell C/- Urban Strategies

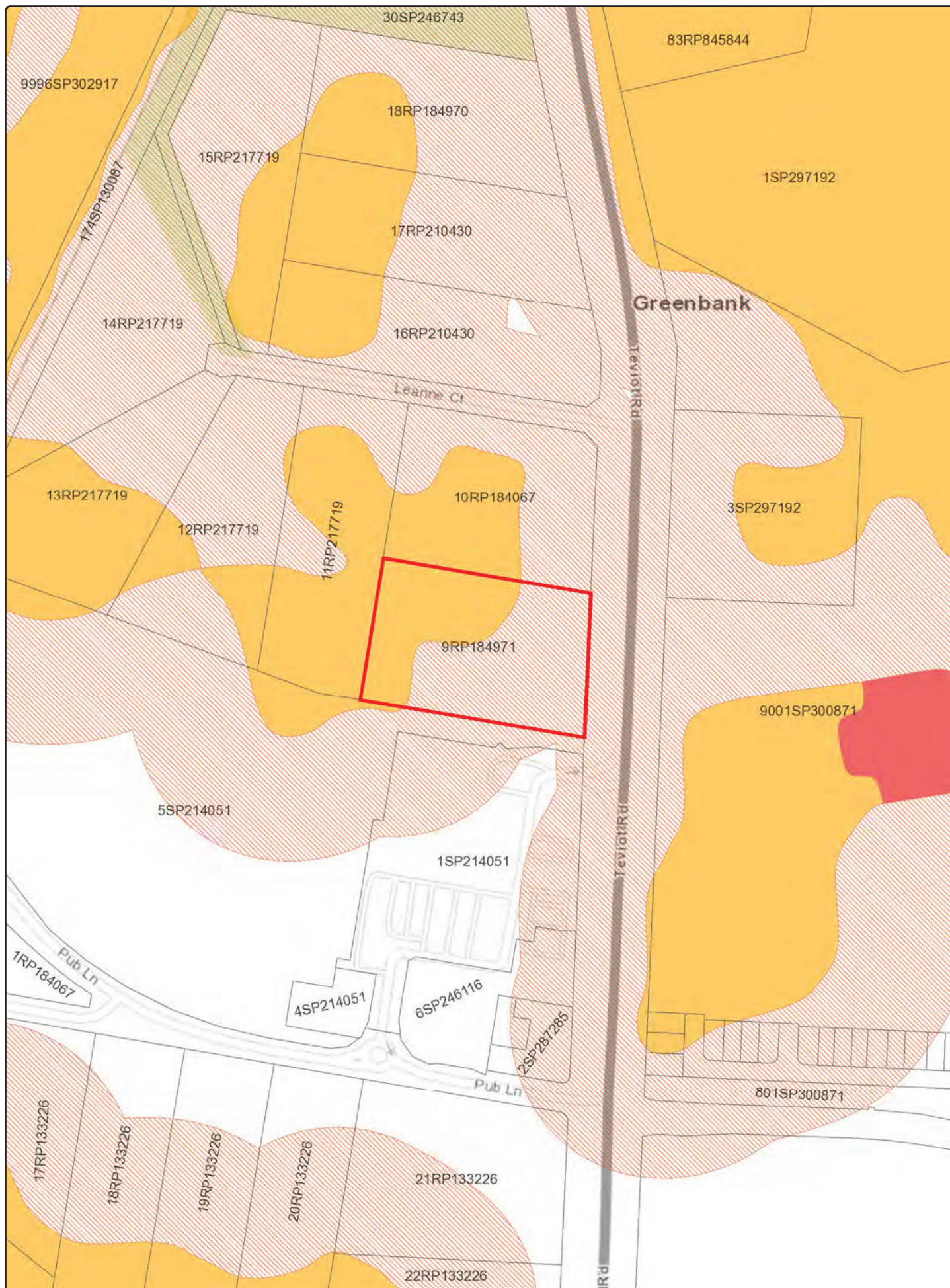


BUSHFIRE SLOPE CALCULATOR

BHU 1 SE	Top Elevation	70 m		
	Bottom Elevation	65 m	Slope % 3.85%	Slope ° 2.20
	Distance	130 m		
BHU 2 NE	Top Elevation	68 m		
	Bottom Elevation	65 m	Slope % 3.09%	Slope ° 1.77
	Distance	97 m		
BHU 3 W	Top Elevation	68 m		
	Bottom Elevation	63 m	Slope % 2.58%	Slope ° 1.48
	Distance	194 m		

BHU - Bushfire Hazard Unit

Appendix B – Bushfire Hazard Map SPP



Date: 22/05/2019

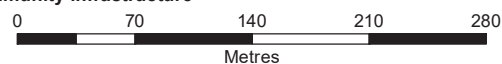
State Planning Policy

Making or amending a local planning instrument
and designating land for community infrastructure



Department of State
Development, Manufacturing,
Infrastructure and Planning

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Legend

Drawn Polygon Layer

Override 1

Cadastre (5k)

 Cadastre (5k)

Bushfire prone area

 Very High Potential Bushfire Intensity

 High Potential Bushfire Intensity

 Medium Potential Bushfire Intensity

 Potential Impact Buffer



Date: 22/05/2019

Department of State
Development, Manufacturing,
Infrastructure and Planning

State Planning Policy
Making or amending a local planning instrument
and designating land for community infrastructure

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