Queensland Government

Department of Infrastructure, Local Government and Planning

Our reference: 1710-1754 SRA
Your reference: MCUI/2017/4863

23 November 2017

Chief Executive Officer
Toowoomba Regional Council
PO Box 3021
TOOWOOMBA QLD 4350
By email - development@tr.qld.gov.au

ATTENTION: NADIA MCLEOD

Dear Nadia

Referral Agency Response – With Conditions – Development Application – Material Change of Use – Child Care Centre
(Given under section 56 of the *Planning Act 2016*)

The development application described below was properly referred to the Department of Infrastructure, Local Government and Planning (DILGP) on 6 October 2017.

Applicant details

Applicant name:	Mrs Hazel Coalter
Applicant contact details:	18 Thirteenth Avenue KEDRON QLD 4031 By email - hazel@hccplanning.com

Location details

Street address:	24A – 28 James Street, RANGEVILLE QLD 4350
Real property description:	Lots 1 & 2 on RP77100 and Lot 3 on RP838211
Local government area:	Toowoomba Regional Council

Application details

Development permit	Material Change of Use for a Child Care Centre

Darling Downs South West regional office
PO Box 825
Toowoomba QLD 4350

Referral triggers

The development application was referred to DILGP under the following provisions of the Planning Regulation 2017:

- 10.9.4.2.4.1 State transport corridors and future State transport corridors

Conditions

Under section 56(1)(b)(i) of the *Planning Act 2016* (the Act), the conditions set out in Attachment 1 must be attached to any development approval.

Reasons for decision to impose conditions

DILGP must provide reasons for the decision to impose conditions. These reasons are set out in Attachment 2.

Advice to the assessment manager

Under section 56(3) of the Act, DILGP offers advice about the application to the assessment manager—see Attachment 3.

Approved plans and specifications

DILGP requires that the plans and specifications set out below and enclosed must be attached to any development approval—see Attachment 4

Drawing/report title	Prepared by	Date	Reference no.
Aspect of development: Material Change of Use – Child Care Centre			
Site Plan (showing location of vehicular access)	Australian Project Management	13 September 2017	16006 DA 100 F
Noise Impact Assessment	ASK Consulting Engineers Pty Ltd	13 September 2017	9055R02V01
Concept Stormwater Management Plan	Harrison Infrastructure Group	14 September 2017	BNE-1147-SWMP-A (revision A)

A copy of this response has been sent to the applicant for their information.

For further information please contact Hayley O'Brien, Senior Planning Officer, on 07 4616 7307 or via email ToowoombaSARA@dilgp.qld.gov.au who will be pleased to assist.

Yours sincerely

Isaac Harslett
A/Manager, Planning and Development Services (Darling Downs South West)

cc Mrs Hazel Coalter, hazel@hccplanning.com

enc Attachment 1—Conditions to be imposed
Attachment 2—Reasons for decision to impose conditions
Attachment 3—Advice to the assessment manager
Attachment 4—Approved plans and specifications

Attachment 1—Conditions to be imposed

No.	Conditions	Condition timing
Development Permit for a Material Change of Use – Child Care Centre		
10.9.4.2.4.1 – State Controlled Road (SCR) — The Chief Executive administering the *Planning Act 2016* nominates the Director-General of the Department of Transport and Main Roads (DTMR) to be the enforcement authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following conditions:		
1.	Any excavation, filling/backfilling/compaction, retaining structures, stormwater management measures and other works involving ground disturbance must not encroach or de-stabilise the SCR or the land supporting this infrastructure, or cause similar adverse impacts.	At all times.
2.	The development must be carried out generally in accordance with the following plans: • Site Plan (showing location of vehicular access) prepared by Australian Project Management dated 13 September 2017, drawing no.16006_DA_100_F.	Prior to the commencement of use and to be maintained at all times.
3.	The development must be generally in accordance with the Noise Impact Assessment prepared by ASK Consulting Engineers Pty Ltd dated 13 September 2017, reference Report: 9055R02V01, in particular: • Chapter 6 – Road Traffic Noise Assessment • Chapter 10 – Recommendations & Conclusion	Prior to the commencement of use and to be maintained at all times.
4.	(a) The development must be in accordance with the Concept Stormwater Management Plan prepared by Harrison Infrastructure Group dated 14 September 2017, report reference no. BNE-1147-SWMP-A (revision A). (b) Registered Professional Engineer of Queensland (RPEQ) certification with supporting documentation must be provided to DTMR, confirming that the development has been designed and constructed in accordance with part (a) of this condition.	(a) At all times. (b) Prior to the commencement of use.
5.	Direct access is not permitted between James Street (Warrego Highway) and the subject site.	At all times.
6.	Signage, indicating “No Right Turn” (sign R2-6) is to be installed on the back of the existing “Keep Left” sign located on the raised centre median in James Street (preventing the right turn into Cohoe Street) in accordance with DTMRs’ *Manual of Uniform Traffic Control Devices.*	Prior to the commencement of use and to be maintained at all times.

Attachment 2—Reasons for decision to impose conditions

The reasons for these conditions are as follows:

- Condition 1 is to ensure the development and its construction does not cause adverse structural impacts on state-transport infrastructure.
- Condition 2 is to ensure the development is carried out generally in accordance with the plans of development submitted with the application.
- Condition 3 is to ensure the development is carried out generally in accordance with the Noise Impact Assessment submitted with the application.
- Condition 4 is to ensure that the impacts of stormwater events associated with development are minimised and managed to avoid creating any adverse impacts on the state transport corridor.
- Condition 5 is to ensure access to the SCR from the site does not compromise the safety and efficiency of the SCR. Direct access to the SCR is prohibited where not required.
- Condition 6 is to maintain the safety and efficiency of the SCR generally.

Attachment 3—Advice to the assessment manager

Further development permits, compliance permits or compliance certificates	
1.	**Road access works approval**: Under sections 62 and 33 of the *Transport Infrastructure Act 1994, w*ritten approval is required from DTMR to carry out road works that are road access works (including driveways) on a SCR. Please contact the DTMR on 07 4639 0828 to make an application for road works approval. This approval must be obtained prior to commencing any works on the SCR reserve. The approval process may require the approval of engineering designs of the proposed works, certified by a RPEQ. **The road access works approval process takes time – please contact DTMR as soon as possible to ensure that gaining approval does not delay construction.**

Attachment 4—Approved Plans and Specifications

Queensland Government

Department of Infrastructure, Local Government and Planning

Department of Infrastructure, Local Government and Planning (DILGP)
Statement of reasons for application 1710-1754 SRA
(Given under section 56 of the *Planning Act 2016*)

Departmental role: Referral agency

Applicant details

Applicant name:	Mrs Hazel Coalter
Applicant contact details:	18 Thirteenth Avenue KEDRON QLD 4031 By email - hazel@hccplanning.com

Location details

Street address:	24A – 28 James Street, RANGEVILLE QLD 4350
Real property description:	Lots 1 & 2 on RP77100 and Lot 3 on RP838211
Local government area:	Toowoomba Regional Council

Development details

Development permit	Material Change of Use for a Child Care Centre

Assessment matters

Aspect of development requiring code assessment	Applicable codes
1. Material Change of Use	State Development Assessment Provisions (SDAP): • State code 1: State-controlled roads (SCR) environment

Reasons for the DILGP's decision

The reasons for the decision are:

- The development has been conditioned to ensure its construction does not cause adverse structural impacts on state-transport infrastructure.
- The development has been conditioned to be developed in accordance with the submitted noise report which has identified that the impacts of noise generated from the SCR do not affect the operation of the proposed use.
- The development has been conditioned to ensure the impacts of stormwater events associated with development are minimised and managed to avoid creating any adverse stormwater impacts on the state transport corridor.
- The development will maintain the safety and efficiency of the SCR as the number of access points are being reduced.

Decision:
- Material change of use for a childcare centre.
- Approved – with conditions.

Darling Downs South West regional office
PO Box 825
Toowoomba QLD 4350

- Decision issued 23 November 2017.

Relevant Material:
- Development application material.
- SDAP published by DILGP.
- Technical agency response.
- Road Planning and Design Manual
- *Transport Infrastructure Act 2009.*
- *Planning Act 2016.*
- Planning Regulation 2017.
- DA Rules.

Our ref TMR17-022699
Your ref HCC-ACS-JAM
Enquiries Jeff Lavey

Queensland Government

Department of
Transport and Main Roads

1 November 2017

Decision Notice – Permitted Road Access Location

(s62(1) *Transport Infrastructure Act 1994***)**

This is not an authorisation to commence work on a state-controlled road[1]

Development application reference number MCUI/2017/4863, lodged with Toowoomba Regional Council involves constructing or changing a vehicular access between Lot 1RP7710 and Lot 3RP838211, the land the subject of the application, and James Street (Warrego Highway), a state-controlled road.

In accordance with section 62A(2) of the *Transport Infrastructure Act 1994* (TIA), this development application is also taken to be an application for a decision under section 62(1) of TIA.

Applicant Details

Name and address	Australian Childcare Solutions c/- HCC Planning Pty Ltd 18 Thirteenth Avenue Kedron QLD 4031

Application Details

Address of Property	26 and 28 James Street, Toowoomba QLD 4350
Real Property Description	Lot 1RP77100 and Lot 3RP838211
Aspect/s of Development	Material Change of Use for Child Care Centre

Decision (given under section 67 of TIA)

It has been decided to approve the application, subject to the following conditions:

No.	Conditions of Development Approval	Condition Timing
Removal of Redundant Road Access Works		
1	(a) The existing vehicular property access locations between Lot 1RP77100 & Lot 3RP838211 and James Street (Warrego Highway) must be permanently closed and removed. (b) The kerb/channelling and footpath between the pavement edge and the property boundary must be reinstated in accordance with the relevant Toowoomba Regional Council standards.	(a) and (b) Prior to commencement of use.

Reasons for the decision

[1] Please refer to the further approvals required under the heading 'Further approvals'

The reasons for this decision are as follows:

a) Where applicable, the Department seeks to minimise the number of road access locations to maintain the efficiency, safety and operation of the state-controlled road network.

Please refer to **Attachment A** for the findings on material questions of fact and the evidence or other material on which those findings were based.

Information about the Decision required to be given under section 67(2) of TIA

1. There is no guarantee of the continuation of road access arrangements, as this depends on future traffic safety and efficiency circumstances.

2. In accordance with section 70 of the TIA, the applicant for the planning application is bound by this decision. A copy of section 70 is attached as **Attachment B**, as required, for information.

Further information about the decision

1. In accordance with section 67(7) of TIA, this decision notice:
   a) starts to have effect when the development approval has effect; and
   b) stops having effect if the development approval lapses or is cancelled; and
   c) replaces any earlier decision made under section 62(1) in relation to the land.

2. In accordance with section 485 of the TIA and section 31 of the *Transport Planning and Coordination Act 1994* (TPCA), a person whose interests are affected by this decision may apply for a review of this decision only within 28 days after notice of the decision was given under the TIA. A copy of the review provisions under TIA and TPCA are attached in **Attachment C** for information.

3. In accordance with section 485B of the TIA and section 35 of TPCA a person may appeal against a reviewed decision. The person must have applied to have the decision reviewed before an appeal about the decision can be lodged in the Planning and Environment Court. A copy of the Appeal Provisions under TIA and TPCA is attached in **Attachment C** for information.

Further approvals

The Department of Transport and Main Roads also provides the following information in relation to this approval:

1. Road Access Works Approval Required – Written approval is required from the department to carry out road works that are road access works (including driveways) on a state-controlled road in accordance with section 33 of the TIA. This approval must be obtained prior to commencing any works on the state-controlled road. The approval process may require the approval of engineering designs of the proposed works, certified by a Registered Professional Engineer of Queensland (RPEQ). Please contact the department to make an application.

If further information about this approval or any other related query is required, Mr Jeff Lavey, Planner, should be contacted by email at Jeffrey.J.Lavey@tmr.qld.gov.au or on (07) 4639 0828.

Yours sincerely

Jason McGuire
Senior Town Planner

Attachments: Attachment A – Decision evidence and findings
Attachment B - Section 70 of TIA
Attachment C - Appeal Provisions

Attachment A

Decision Evidence and Findings

Findings on material questions of fact:

- Access to the proposed development will be via a local road (Cohoe Street);
- The existing road accesses servicing Lot 1RP77100 and Lot 3RP838211 will no longer be required for access into these properties; and
- Removal of the accesses requires the kerb/channelling and footpath to be reinstated to match in with the existing infrastructure in the road reserve.

Evidence or other material on which findings were based:

- Development application report “Childcare Facility – 24A-28 James Street, Rangeville”, prepared by HCC Planning for Australian Childcare Solutions and dated September 2017 (Final version) and
- State Development Assessment Provisions (v2.1) Assessment State code 1 – Development in a state-controlled road environment.

Attachment B

Section 70 of TIA

Transport Infrastructure Act 1994
Chapter 6 Road transport infrastructure
Part 5 Management of State-controlled roads

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70 Offences about road access locations and road access works, relating to decisions under s 62(1)

(1) This section applies to a person who has been given notice under section 67 or 68 of a decision under section 62(1) about access between a State-controlled road and adjacent land.

(2) A person to whom this section applies must not—

(a) obtain access between the land and the State-controlled road other than at a location at which access is permitted under the decision; or

(b) obtain access using road access works to which the decision applies, if the works do not comply with the decision and the noncompliance was within the person's control; or

(c) obtain any other access between the land and the road contrary to the decision; or

(d) use a road access location or road access works contrary to the decision; or

(e) contravene a condition stated in the decision; or

(f) permit another person to do a thing mentioned in paragraphs (a) to (e); or

(g) fail to remove road access works in accordance with the decision.

Maximum penalty—200 penalty units.

(3) However, subsection (2)(g) does not apply to a person who is bound by the decision because of section 68.

Attachment C

Appeal Provisions

Transport Infrastructure Act 1994
Chapter 16 General provisions

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485 Internal review of decisions

(1) A person whose interests are affected by a decision described in schedule 3 (the *original decision*) may ask the chief executive to review the decision.

(2) The person is entitled to receive a statement of reasons for the original decision whether or not the provision under which the decision is made requires that the person be given a statement of reasons for the decision.

(3) The *Transport Planning and Coordination Act 1994*, part 5, division 2—

(a) applies to the review; and

(b) provides—

(i) for the procedure for applying for the review and the way it is to be carried out; and

(ii) that the person may apply to QCAT to have the original decision stayed.

485B Appeals against decisions

(1) This section applies in relation to an original decision if a court (the appeal court) is stated in schedule 3 for the decision.

(2) If the reviewed decision is not the decision sought by the applicant for the review, the applicant may appeal against the reviewed decision to the appeal court.

(3) The Transport Planning and Coordination Act 1994, part 5, division 3—

(a) applies to the appeal; and

(b) provides—

(i) for the procedure for the appeal and the way it is to be disposed of; and

(ii) that the person may apply to the appeal court to have the original decision stayed.

(4) Subsection (5) applies if—

(a) a person appeals to the Planning and Environment Court against a decision under section 62(1) on a planning application that is taken, under section 62A(2), to also be an application for a decision under section 62(1); and

(b) a person appeals to the Planning and Environment Court against a decision under the Planning Act on the planning application.

(5) The court may order—

(a) the appeals to be heard together or 1 immediately after the other; or

(b) 1 appeal to be stayed until the other is decided.

(6) Subsection (5) applies even if all or any of the parties to the appeals are not the same.

(7) In this section—

original decision means a decision described in schedule 3.

reviewed decision means the chief executive's decision on a review under section 485.

31 Applying for review

(1) A person may apply for a review of an original decision only within 28 days after notice of the original decision was given to the person under the transport Act.

(2) However, if—

(a) the notice did not state the reasons for the original decision; and

(b) the person asked for a statement of the reasons within the 28 days mentioned in subsection (1)

the person may apply within 28 days after the person is given the statement of the reasons.

(3) In addition, the chief executive may extend the period for applying.

(4) An application must be written and state in detail the grounds on which the person wants the original decision to be reviewed.

32 Stay of operation of original decision

(1) If a person applies for review of an original decision, the person may immediately apply for a stay of the decision to the relevant entity.

(2) The relevant entity may stay the original decision to secure the effectiveness of the review and any later appeal to or review by the relevant entity.

(3) In setting the time for hearing the application, the relevant entity must allow at least 3 business days between the day the application is filed with it and the hearing day.

(4) The chief executive is a party to the application.

(5) The person must serve a copy of the application showing the time and place of the hearing and any document filed in the relevant entity with it on the chief executive at least 2 business days before the hearing.

(6) The stay—

(a) may be given on conditions the relevant entity considers appropriate; and

(b) operates for the period specified by the relevant entity; and

(c) may be revoked or amended by the relevant entity.

(7) The period of a stay under this section must not extend past the time when the chief executive reviews the original decision and any later period the relevant entity allows the applicant to enable the applicant to appeal against the decision or apply for a review of the decision as provided under the QCAT Act.

(8) The making of an application does not affect the original decision, or the carrying out of the original decision, unless it is stayed.

(9) In this section—

relevant entity means—

(a) if the reviewed decision may be reviewed by QCAT—QCAT; or

(b) if the reviewed decision may be appealed to the appeal court—the appeal court.

35 Time for making appeals

(1) A person may appeal against a reviewed decision only within—

(a) if a decision notice is given to the person—28 days after the notice was given to the person; or

(b) if the chief executive is taken to have confirmed the decision under section 34(5)—56 days after the application was made.

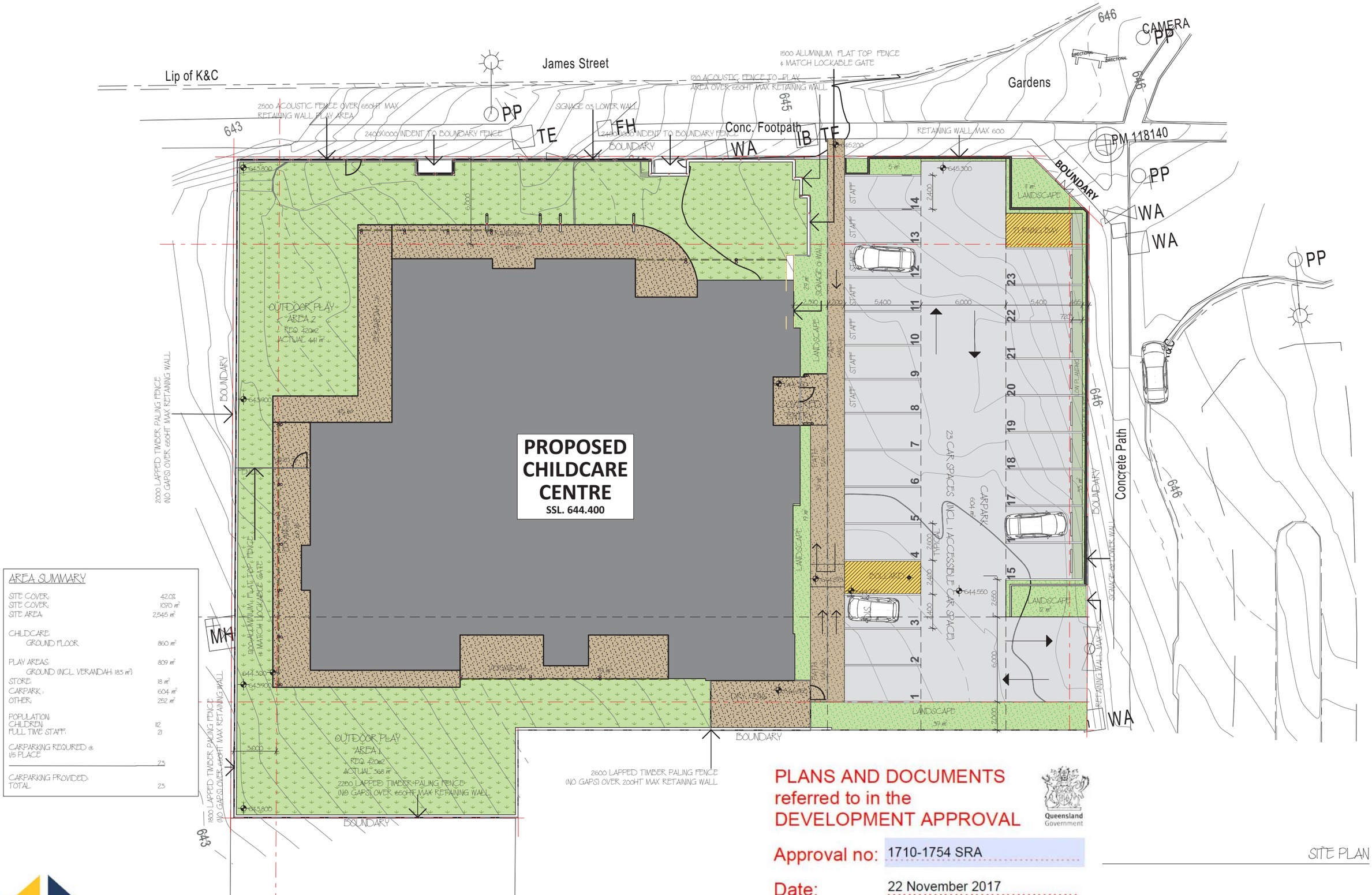
(2) However, if—

(a) the decision notice did not state the reasons for the decision; and

(b) the person asked for a statement of the reasons within the 28 days mentioned in subsection (1)(a);

the person may apply within 28 days after the person is given a statement of the reasons.

(3) Also, the appeal court may extend the period for appealing.



AREA SUMMARY

SITE COVER:	42.0%
SITE COVER:	1070 m²
SITE AREA:	2,545 m²
CHILDCARE:	
GROUND FLOOR	860 m²
PLAY AREAS:	809 m²
GROUND (INCL. VERANDAH 183 m²)	
STORE:	18 m²
CARPARK :	604 m²
OTHER:	252 m²
POPULATION:	
CHILDREN	112
FULL TIME STAFF:	21
CARPARKING REQUIRED @ 1/5 PLACE	23
CARPARKING PROVIDED:	
TOTAL	23

PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL

Queensland Government

Approval no: 1710-1754 SRA

Date: 22 November 2017

SITE PLAN

JAMES STREET CHILDCARE CENTRE

JAMES STREET, TOOWOOMBA, QLD, 4350

For AUSTRALIAN CHILDCARE SOLUTIONS

DA ISSUE
NOT FOR CONSTRUCTION

scale:	1:250 @ A3	project no:	APMS 16006
issue date:	13/09/2017	dwg no:	16006_DA-100_F

6. Road Traffic Noise Assessment

6.1 Overview

Road traffic noise has been assessed from James Street/Warrego Highway onto the proposed development. The relevant assessment criteria are outlined in **Section 4**.

TMR recommends that the prediction of road traffic noise is to be conducted according to the United Kingdom Department of Transport (1988) procedure published as "Calculation of Road Traffic Noise" (CoRTN88). The road traffic noise levels have been predicted using SoundPlan (version 7.4) computer modelling software, based on the CoRTN88 traffic noise prediction method and is approved by TMR.

6.2 Data

The following data has been used in the noise calculations:

- Noise source height of 0.5 m.
- Ground contours for the site have been obtained from Toowoomba Online Mapping, Queensland Spatial online mapping and observations made at site.
- Finished floor levels (FFL) for the buildings have been obtained from the project drawings. Receiver heights of 1.5m above the FFL levels have been used in the noise model. Receiver heights for the outdoor play areas were placed 1.0m above finished ground level.
- Road width as per site inspection and Google Earth Pro images.
- Traffic data shown in **Table 6.1** has been obtained from TMR for the year 2016, and has been adjusted for the years 2017 and 2027 (ten year planning horizon) using a growth rate of 5% per annum, obtained from the historical traffic data.
- The 18-hour traffic flow is taken to be 94% of the ultimate daily traffic flow.
- The road surface for all the roads used in the noise model is dense graded asphalt (DGA).
- The CoRTN road traffic noise model predicts the L_{10}(18 hour). Predicted L_{10}(18 hour) noise levels are converted to maximum L_{eq}(1 hour) day levels using corrections obtained from the noise monitoring data. A correction of -1.4 dBA has been applied to the L_{10}(18 hour) predicted levels to predict the to maximum L_{eq}(1 hour) day value.
- Predicted L_{10}(18 hour) noise levels have been converted to maximum L_{10}(1 hour) and L_{10}(12 hour) noise levels using corrections obtained from the noise monitoring data. Corrections of +1.9 dBA and +1.1 dBA have been applied to the L_{10}(18 hour) predicted levels to predict the to maximum L_{10}(1 hour) and L_{10}(12 hour) values respectively.
- TMR's CoRTN calibration factors of -1.7dBA (facade corrected) and 0.7dBA (free-field) have been applied to the road traffic noise level predictions.
- A +2.5 dBA facade reflection allowance is included in the road traffic noise level predictions.

Table 6.1 Road Data for Traffic Noise Modelling

Road	Traffic Volume (AADT)			Speed (km/h)	Percentage Heavy Vehicle (%HV)
	2016	Existing 2017	Future 2027		
James Street / Warrego Highway	16,407	17,227	28,062	60	22.95

6.3 Verification

The results of the noise survey carried out at Location A have been used to verify the road traffic noise model of James Street/Warrego Highway.

The road traffic verification model uses the 2017 traffic flow, as stated in **Section 6.2** and current road alignment to determine the L_{10}(18hour). **Table 6.1** compares the results obtained from the noise survey with the calculated results from the computer model.

Table 6.1 Existing and Calculated Road Traffic Noise Level

Receptor Height metres	Measured Noise Level L_{10}(18 hour) dBA	Calculated Noise Level L_{10}(18 hour) dBA
1.3m	70.6	70.7

The road traffic model is considered to be verified since the calculated level is within ± 2.0 dBA of the measured level. The road traffic noise model can be considered to be slightly conservative as it is over-predicting by 0.1 dBA.

6.4 Calculations

The road traffic noise levels for 2027 have been predicted for all facades of the proposed child care centre.

As outlined in **Section 4**, the outdoor play area criterion is 63 dBA L_{10}(12 hour) free field. The development currently proposes a 1.8m high noise barrier (located on top of a retaining wall) along the northern, western and southern boundaries of the site. With the inclusion of this noise barrier the predicted noise level in Outdoor Play Area 1 is 56 dBA L_{10}(12 hour) and in Outdoor Play Area 2 is 65 dBA L_{10}(12 hour). Since the noise level in Outdoor Play Area 2 exceeds the criterion, it is proposed to upgrade the height of the noise barrier to 2.1m to 2.5m high along the northern boundary of the site and 2.0m along half of the western boundary of the site. The extent of the proposed noise barrier upgrades and the Top of Barrier RL's are shown in **Figure C.1** within **Appendix C**. The barrier height is to be relative to the finished height of the proposed retaining wall, which should be equal to the finished pad level of the development.

The noise barrier may be constructed using a number of different materials, including timber, fibre-cement sheeting, brick, concrete block or sheet metal. A solid timber barrier with overlapping palings is usually the most economic. The minimum acoustic requirement of the noise barrier is that it be solid and continuous with negligible holes and gaps between palings or panels or near the ground. The minimum surface density is 15 kg/m2.

As the barrier is mitigating noise from a TMR road it should comply with Main Roads Technical Standard MRTS15 'Noise Fences' dated July 2017. This standard includes requirements for the barrier construction.

The predicted L_{10}(12 hour) noise levels for the outdoor play areas associated with the proposed development are outlined in **Table 6.2**. Noise levels have been predicted with the inclusion of the noise barrier shown in **Figure C.1**.

Table 6.2 Predicted Road Traffic Noise Levels in Outdoor Play Areas

Location	L_{10} (12 hour) dBA (free field)
Outdoor Play Area 1	63
Outdoor Play Area 2	56

From **Table 6.2** the highest predicted noise level in the outdoor play areas is 63 dBA L_{10}(12 hour) free field, which complies with the criterion.

The predicted L_{10}(18 hour) noise levels for all facades of the proposed child care centre, with the inclusion of the proposed noise barrier, are presented in **Table 6.3**.

Table 6.3 Predicted Road Traffic Noise Levels at Facades of Child Care Building

Room	Facade	Predicted Noise Levels dBA		
		L_{10}(18hour) dBA	L_{10}(12hour) dBA	Maximum Day L_{eq}(1hour) dBA
Room 6 (ages 3+)	North	67	69	65
	West	64	66	63
Room 5 (age 3+)	North	67	69	66
	East	66	68	64
Room 4 (ages 0-3)	North	62	64	61
	West	61	63	60
Room 3 (ages 0-3)	West	58	60	57
	South	53	54	51
	East	53	55	51
Room 2 (ages 0-2)	South	53	55	51
Room 1 (ages 0-2)	South	52	54	51
Bath/Prep 1	West	53	55	51
	South	53	55	51
	East	52	54	51
Bath/Prep 2	West	59	61	58
Bath/Prep 3	North	67	69	65
Director	North	67	69	65
	East	68	70	67
Reception	East	67	69	66
Entry	East	62	64	61
Interview	East	66	68	65
Program	East	65	67	63
Staff	East	65	67	63
Laundry	East	64	66	63
	South	52	54	51
Store 1	North	66	68	65
Store 2	South	53	55	51
	West	53	55	51

Note: All noise predictions in **Table 6.3** include façade reflection.

From **Table 6.3** the highest predicted noise level is 68 dBA L_{10}(18 hour) at the eastern façade of the Directors Office. To achieve the 58 dBA L_{10} (1 hour) maximum criterion would require a noise barrier in excess of 3m in height. Such a barrier is unlikely to be considered practical, and therefore it is proposed to achieve the internal noise criteria through facade treatment.

6.5 Internal Noise Assessment - Child Care Centre

The applicable noise criteria to assess internal noise levels have been presented in **Section 3**. The internal design noise level is 35 dBA L_{eq}(1 hour) for indoor education areas and indoor play areas, and 45 dBA L_{eq}(1 hour) for office areas.

The required construction upgrades have been determined for the proposed development in order to achieve the recommended noise criteria. Calculations have assumed the minimum construction as follows:

- Lightweight external walls (Rw 41): 6mm fibre cement sheeting lined internally with 10mm plasterboard sheeting and 50mm glasswool insulation in the cavity.
- Roof/ceiling in Play Areas (Rw 41): Pitched metal roof with internal acoustic ceiling tiles (NRC 0.65) for the ceiling and 50mm glasswool insulation in the cavity.
- Roof/ceiling in Offices (Rw 41): Pitched metal roof with internal 10mm plasterboard sheeting for the ceiling and 50mm glasswool insulation in the cavity.
- Glazing (Rw 23): Standard construction glazing 3mm.
- Sliding Doors (Rw 23): Sliding glazed doors with 3mm glazing.
- External Timber Doors (Rw 15): Hollow core door.

The building construction requirements have been calculated using the algorithms in AS3671-1989 Acoustics – Road traffic noise intrusion – Building siting and construction, and the building plans as shown in **Appendix B**. The calculations consider the following data:

- Room area.
- Wall, window, door and roof areas.
- Typical room reverberation characteristics.
- Building construction details.

These calculations have been conducted to determine where construction upgrades are required for the proposed development to meet the applicable noise criteria. The predicted construction upgrades that are required to meet the internal noise criteria are outlined in **Table 6.4**.

Table 6.4 Building Construction Upgrade Requirements

Room	Required Acoustic Ratings (Rw)	
	Windows	Glazed Doors
Room 6	32	32
Room 5	-	30
Room 4	27	27

The acoustic ratings above for walls, windows, doors and roof/ceiling can typically be achieved with the following construction:

- Windows/Doors (Rw 26 to Rw 32): Acoustic certification is required to be provided by the window/door supplier. The certification is to be based on acoustic testing of the overall window/door system (i.e. testing of the frame, glass and seals as proposed to be installed). ASK would expect the following glazing systems in a residential building:
  - (Rw 26 to Rw 32): Standard aluminium framed sliding window/door with 5mm (Rw 26) to 8mm laminated (Rw 32) glass and acoustic seals.

To achieve the target noise reductions from external noise to internal noise levels will require the construction details are of an appropriate acoustic standard, and that all external openings to be closed when these habitable rooms are occupied. Therefore, an air-conditioning/mechanical ventilation system that does not degrade the internal acoustic environment or the sound isolation of the building envelope, and also meets the ventilation requirements of the Building Code of Australia may need to be installed.

7. Child Care Centre Noise Assessment

The proposed outdoor play areas are located in the north-western and south-western corners of the subject site as shown in **Figure 3.1**. Noise emissions from outdoor play areas are required to be assessed.

Noise emissions from children in outdoor play areas have been predicted at the nearest sensitive receivers using the following sound power levels (L_w) for a group of 10 children:

- 0-2 years general activity in outdoor play areas: 79 dBA L_w L_{eq}
- 2-3 years general activity in outdoor play areas: 85 dBA L_w L_{eq}
- 3-6 years general activity in outdoor play areas: 87 dBA L_w L_{eq}
- Children yelling/shouting (all ages): 101 dBA L_w L_{max}

This is in accordance with the Association of Australian Acoustical Consultants (AAAC) Guideline for Child Care Centre Acoustic Assessments, which gives the L_w of 10 children aged 0 to 2 years to be 77 to 80 dBA, 2 to 3 years to be 83 to 87 dBA and children aged 3 to 6 years to be 84 to 90 dBA. The nominated sound power level for children yelling is from ASK's noise source database based on published noise data for children under the age of 13 years speaking loudly. The nominated sound power levels are considered appropriate for this assessment.

The proposed maximum capacity for the child care centre is 112 children. However due to the relative size of the outdoor play areas, it is proposed by the centre that the outdoor play areas will never be in use by all 112 children at any one time. Outdoor Play Area 1 is accessible by Rooms 1, 2, 3 and 4, with Outdoor Play Area 2 accessible by rooms 4, 5 and 6. Under the worst case it is proposed that two rooms will be using each outdoor area simultaneously. Therefore noise predictions have been undertaken including 36 children within Outdoor Play Area 1 and 44 children within Outdoor Play Area 2. Noise predictions have been modelled assuming a source height for children of 1m above finished ground level.

Noise emissions from general activity in outdoor play areas have been predicted assuming that every child in each outdoor play area is generating noise.

The proposed hours of use for the outdoor play areas are from 8:00am to 4:30pm. As presented in **Section 4.3**, P08 in the TRC Environmental Standards Code presents noise limits for noise emissions onto sensitive uses based on the measured background noise level, plus an allowance of 5 dBA for daytime uses (7am to 10pm). The rated background noise level (RBL) measured at Location B (shown in **Table 5.6**) will be used to determine appropriate noise limits for sensitive receivers R1 and R2. As R3 has a street frontage on James Street and is subject to higher levels of road traffic noise, the RBL measured at Location A (shown in **Table 5.4**) will be used to determine noise limits for R1. This is considered to be more representative of the ambient noise environment at that location.

Due to the elevated background noise levels in the area as a result of proximity to James Street/Warrego Highway, it is proposed to achieve the 'Background Creep' criteria in the EPP Noise Policy in place of the Acoustic Quality Objectives.

Measured background levels and applicable noise limits for all nominated sensitive receivers are presented in **Table 7.1**.

Table 7.1 Noise Limits at Nearest Sensitive Receivers

Receiver	Measured Noise Level L_{90} dBA (RBL)	Allowable Exceedance dBA	Assessable Noise Limit L_{eq} (1 hour) dBA
R1	44	5	49
R2	44	5	49
R3	57	5	62

The applicable parameter for the assessable noise limit is the L_{eq}(1 hour) noise level. Based on the nominated assumptions, noise levels have been predicted at each of the sensitive receivers including the influence of the current 1.8m high noise barriers and the upgraded barrier along the James Street frontage. Predicted noise levels are presented in **Table 7.2**.

Table 7.2 Predicted Noise Levels from Outdoor Play Areas with Current 1.8m High Noise Barrier

Receiver	Façade	Predicted Noise Level L_{eq}(1 hour) dBA	Noise Limit L_{eq}(1 hour) dBA	Complies with Noise Limit
R1	North	52	49	No
	West	53	49	No
R2	North	47	49	Yes
R3	North	51	62	Yes
	South	48	62	Yes
	East	53	62	Yes

As can be seen from **Table 7.2** the highest predicted noise levels are 53 dBA L_{eq}(1hour) at the northern façade of R1, which exceeds the nominated noise limit by 4 dBA at that location. All other noise levels predicted at R2 and R3 comply with nominated noise limits.

In order to meet the nominated noise limits at all sensitive receivers, noise barriers are proposed around the outdoor play areas. The proposed noise barriers and the Top of Barrier RL's are presented in **Figure C.1** within **Appendix C**. The proposed noise barriers range in height from 2.2m to 2.6m high along the southern boundary of the subject site. Predicted noise levels including the proposed noise barriers are presented in **Table 7.3**.

Table 7.3 Predicted Noise Levels from Outdoor Play Areas with Proposed Noise Barriers

Receiver	Façade	Predicted Noise Level L_{eq}(1 hour) dBA	Noise Limit L_{eq}(1 hour) dBA	Complies with Noise Limit
R1	North	48	49	Yes
	West	49	49	Yes
R2	North	47	49	Yes
R3	North	50	62	Yes
	South	48	62	Yes
	East	53	62	Yes

As can be seen from the **Table 7.3** the highest predicted noise level from general activity in the outdoor play area is 49 dBA L_{eq}(1 hour) at the western facade of R1. Based on the results in **Table 7.3**, predicted noise levels at all facades of sensitive receivers R1, R2 and R3 comply with the nominated noise limits and therefore noise emissions from outdoor play areas are predicted to be compliant with construction of noise

barrier shown in **Figure C.1** and the inclusion of the following limits on children using the outdoor play areas:

- Outdoor Play Area 1: 36 children maximum (2 classes from Rooms 1, 2, 3 and 4)
- Outdoor Play Area 2: 44 children maximum (2 classes from Rooms 4, 5 and 6)

10. Recommendations & Conclusion

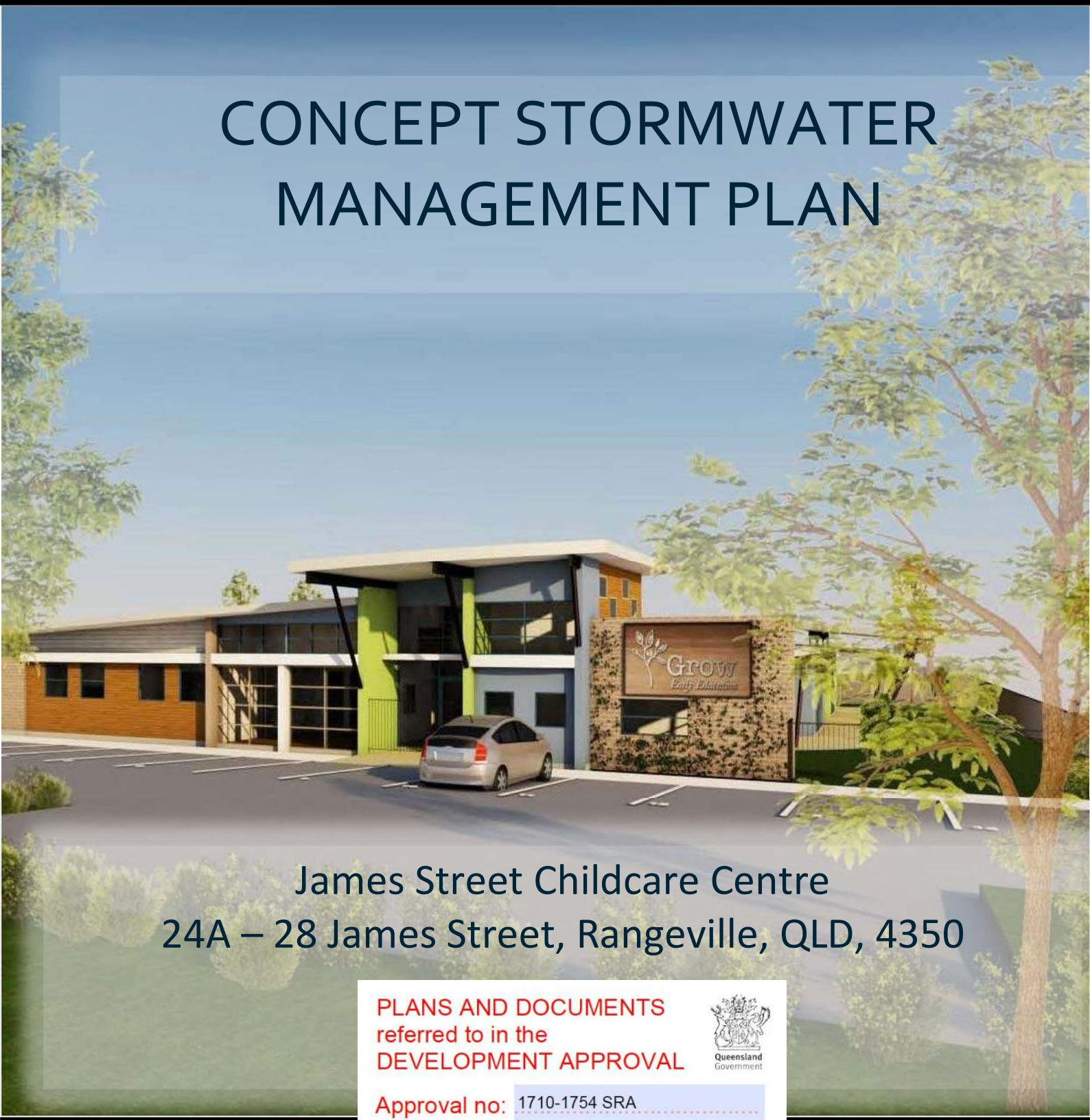
A noise impact assessment has been conducted for the proposed child care centre to be constructed at 24A-28 James Street, Toowoomba. The results and recommendations of the assessment are as follows:

- In relation to road traffic noise intrusion from James Street, the currently proposed 1.8m noise barrier is to be upgraded to 2.1m to 2.5m high along the northern boundary and 2.0m for part of the western boundary of the site. The full extent of the required barrier upgrades and the Top of Barrier RL's are shown in **Figure C.1** within **Appendix C**, with construction requirements presented in **Section 6.4**. Façade construction upgrade are required to achieve internal noise level criteria for some windows and glazed doors in the play rooms as described in **Table 6.4** within **Section 6.5**.
- Noise emissions from all outdoor play areas are predicted to comply with noise limits outlined in **Section 7**, with the inclusion of the proposed 2.2m to 2.6m high noise barriers presented in **Figure C.1** and with the following limits on usage:
  - Outdoor Play Area 1: 36 children maximum (2 classes from Rooms 1, 2, 3 and 4)
  - Outdoor Play Area 2: 44 children maximum (2 classes from Rooms 4, 5 and 6)
- Noise emissions from the carpark and driveway are predicted to comply with the L_{eq}(1 hour) noise limits with the inclusion of the 1.8m noise barrier shown in **Figure 8.1**, with construction details as outlined in **Section 8**. The predicted L_{max} noise levels exceed the nominated noise limit of 52 L_{max} dBA for the early morning period, however the noise emissions are considered acceptable given consideration to the existing traffic noise levels from James Street and the infrequent use of the carparks nearest, as described in **Section 8**.
- Mechanical plant is to be designed, selected and located to the noise limits presented in **Table 9.1**.

Compliance with the above recommendations is predicted to result in compliance with relevant noise criteria.

HARRISON INFRASTRUCTURE GROUP

CONCEPT STORMWATER MANAGEMENT PLAN



James Street Childcare Centre
24A – 28 James Street, Rangeville, QLD, 4350

PLANS AND DOCUMENTS
referred to in the
DEVELOPMENT APPROVAL

Queensland Government

Approval no: 1710-1754 SRA

Date: 22 November 2017

Document control sheet

If you have any questions regarding this document, please contact:

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Report Reference No. BNE-1147-SWMP-A

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A	14/09/2017	J.Menne Brandt	Ian Wuersching	Tony Zimmerle	Original issue

Final Report

Approved by: Tony Gallagher, RPEQ #13396

Table of Contents

1. Introduction

Harrison Infrastructure Group (HIG) has been engaged by Australian Childcare to produce a Concept Stormwater Management Plan (CSWMP) for a proposed Early Learning Centre on the corner of James Street and Cohoe Street, Rangeville. The three lots to be consolidated for this development are Lot 3/RP838211, Lot 1/RP77100 and Lot 2/RP77100. The CSWMP is to be submitted as part of the Development Application to Toowoomba Regional Council.

The aim of this CSWMP is to ensure the generated stormwater runoff from the site causes minimal nuisance, danger and damage to people, property and the environment. This CSWMP identifies the stormwater quantity and quality management measures required for the operational phase of the proposed development. This report will demonstrate that the development can be undertaken in accordance with the Toowoomba Regional Council (TRC) Planning Scheme, the Queensland Urban Drainage Manual (QUDM), and best stormwater management practices. Specific reference is made to the TRC's Schedule 6 Planning Scheme Policy No.2, Engineering Standards – Roads and Drainage Infrastructure.

2. Site Analysis and Data Collection

The subject site is a combination of three urban residential properties located in a Low-Medium Density Residential zone according to the Toowoomba Regional Planning Scheme (9th June 2017, V15.0). The site has a total area of 2,545m^2 and is bounded by James Street to the North, Cohoe Street to the East, and residential properties to the South and West. There are currently three timber dwellings on the site with one garage, one carport, a covered tank in addition to concrete vehicle tracks and walkways.

Figure 1 shows the aerial image of the subject site.

Figure 1 – Subject Site 24A – 28 James Street, Rangeville

A topographical survey was executed by Boland Survey and Design in July 2017 to verify the existing terrain and site feautures, including the adjoining the roads, Cohoe Street to the East (James Street to shoulder only). Additional information on the terrain and utilities in the vicinity was obtained from the Queenland Globe GIS, TRC's online resources, namely TRMaps-Infrastructure and the Toowoomba Regional Planning Scheme.

The provided survey data and site observations reveal that the site has a general fall (3-6%) from East to West with the lowest point on the property located in the south-west corner. There is no formal surface water drainage system. There are a few downpipes from the roofs that discharge freely to the ground. Surface runoff from the site can drain towards James Street via the driveways on the two western most properties, and into the adjacent properties in the form of sheet flow under the fences on the southern and western boundaries. No flow from James Street or Cohoe Street discharges into the site.

The photo gallery provided in Figure 2 through to Figure 9 shows the existing site conditions.

Figure 2 – View uphill from NW corner, near the driveway of 28 James St property.

Figure 3 – View looking southwards into site from NW corner, at the driveway of 28 James St property. This access to become redundant.

Figure 4 – View looking southwards into site from the driveway of 26 James St property. Carport visible in the backyard. This access to become redundant.

Figure 5 – View looking south-west into the site from NE corner of 26 James St property.

Figure 6 – View looking south-west into the site from NE corner of 24A James St property.

Figure 7 – View looking west into the site from existing driveway of 24A James St property (western site boundary)

Figure 8 – View towards site showing existing driveway of 24A James St property (access location to be retained for the proposed development)

Figure 9 – View of Cohoe Street looking southwards from existing driveway of 24A James St.

3. Stormwater Quantity Management

The formulation and implementation of the stormwater quantity management plan for the proposed development is based on the following key principles:

- Utilising the existing drainage flow regime in so far as possible to reduce any post development impacts; and
- Incorporating structures as may be required to provide no increase in peak flows downstream of the site.

3.1. Design Philosophy and Methodology

The DRAINS software program performs design and analysis calculations for stormwater drainage systems and models the flood behaviour of rural and urban catchments. DRAINS displays the components of a drainage system as “objects”, and presents information about these objects and the results of calculations pictorially.

DRAINS adopts the ILSAX method for hydrological calculations which is based on the time-area method and Horton infiltration procedure. ILSAX method is an event model, in which the sub-catchments of a stormwater drainage area are divided into the following land uses:

- Impervious areas directly connected to the main drainage system,
- Impervious areas not directly connected (supplementary), and
- Pervious areas (grassed areas).

For each land use, a time of travel of stormwater is specified or may be calculated by the program. The infiltration model for pervious areas is based on Horton's equation as used in the ILSAX method.

The model employs parameters that define the soil type and its antecedent moisture condition. These can be defined from knowledge of the local soils and climate.

DRAINS calculates the full hydrographs of flows resulting from the specified rainfall hyetographs. Multiple storm burst patterns can be selected, with the worst case results reported.

DRAINS models for the existing and developed phases were developed to calculate the peak runoff from the site's sub-catchments. The sub-catchments were identified from the terrain files generated from the topographical survey (for the existing case) and earthworks design (for the post-development case), segregating impervious areas (e.g. buildings, driveways) from pervious areas (i.e. open space, landscape and grassed areas).

The Time of Concentration for each sub-catchment was calculated using Friend's equation for overland sheet flow in accordance with the Queensland Urban Drainage Manual (QUDM) and this was compared with the standard inlet times provided in the QUDM. A time of 5 minutes was adopted across each lot for the roof to main system connection and 13 minutes adopted for pervious grassed areas in accordance with QUDM Section 4.6.5. The minimum time of concentration applied in all instances is 5 minutes.

The Intensity, Frequency and Duration chart was generated for the region using the Australian Bureau of Meteorology website tool. The adopted Intensity Frequency Distribution data for the site is given in Appendix A.

3.2. Stormwater Quantity

QUDM specifies that any proposed development must demonstrate that the development shall have a lawful point of stormwater discharge and the proposed development must not cause 'actionable nuisance', or, as per QUDM, 'non-worsening' must be achieved.

Attenuation of stormwater to pre-developed conditions is required due to the expected increase in the peak flows of stormwater run-off caused by increasing the paved area. To achieve this 'non-worsening', the development was modelled with DRAINS for the pre-development and post-development conditions for the Annual Recurrence Interval (ARI) of 2, 5, 10, 20, 50 and 100 years.

The fraction impervious values and catchment area used in the DRAINS model were based on the survey plan, aerial images and site observation. The summary of total sub-catchment details for the current site are given in Table 1. The location of sub-catchments is given in Figure 10.

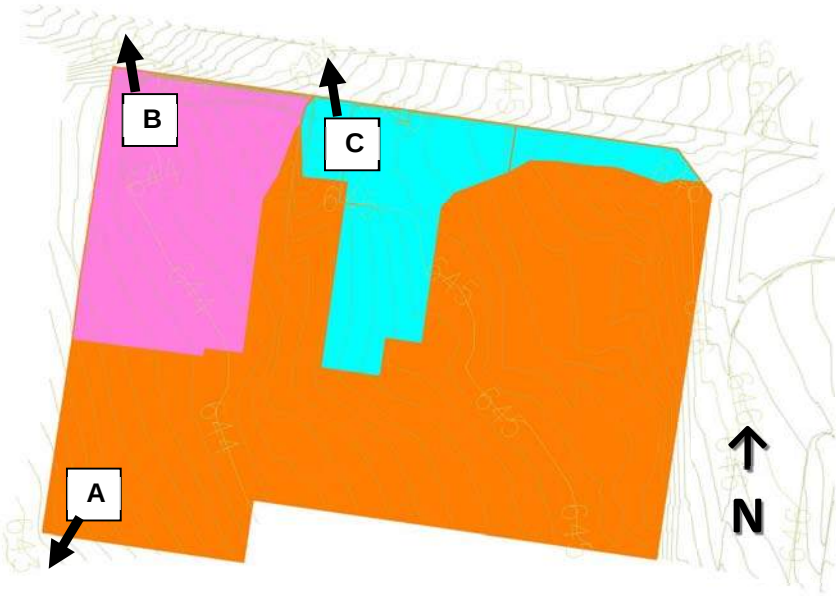

Figure 10 – Existing Sub-Catchments Locality Map

Table 1- Existing Sub-Catchments

Sub-Catchment	Surface Type	Area (m^2)	Fraction Impervious (%)
Outfall A	Impervious (incl. building, bitumen, concrete)	206	12
	Pervious (grassed open space)	1500	
Outfall B	Impervious (incl. building, bitumen, concrete)	259	55
	Pervious (grassed open space)	208	
Outfall C	Impervious (incl. building, bitumen, concrete)	167	45
	Pervious (grassed open space)	205	
Total	**-**	**2545**	**25**

3.2.1. Existing Condition

Rational Method calculations (as per QUDM guidelines) were undertaken to estimate the peak discharge during various storm events for the existing condition. These calculated peak discharges were then used and compared to DRAINS model results for calibration and verification. DRAINS model uses ILSAX computation of several hydrographs to calculate peak stormwater flows, as opposed to the Rational Method using a single intensity peak runoff.

The runoff generated in the pre-development or existing condition by each method was calculated for the site based on the sub-catchments detailed in Table 1. The comparison of DRAINS and Rational Method estimates is given in Table 2.

Table 2 – Comparison of Existing Peak Discharges

	Existing Catchment A		Existing Catchment B		Existing Catchment C	
ARI (years)	Rational Method Peak Flow (l/s)	DRAINS Peak Flow (l/s)	Rational Method Peak Flow (l/s)	DRAINS Peak Flow (l/s)	Rational Method Peak Flow (l/s)	DRAINS Peak Flow (l/s)
1	12	13	5	7	4	5
2	16	22	7	10	6	7
5	23	31	10	13	8	9
10	26	37	12	14	10	10
20	32	45	14	17	12	12
50	41	54	18	18	15	13
100	48	62	21	21	18	15

The DRAINS results appear to have reasonable correlation to the Rational Method results in the investigated storm events.

3.2.2. Proposed Development Conditions

The proposed development site has been assessed in accordance with QUDM for minor and major storms of 1, 2, 5, 10, 20, 50 and 100 years Annual Return Interval (ARI). The proposed development category is Commercial. The fraction impervious for the proposed development was obtained from site layout plans provided by HCC Planning on behalf of Australian Childcare.

The proposed development plans indicates that the existing buildings will be demolished entirely and replaced with a single building comprising the childcare facility, and a carpark accommodating 24 cars and turning bays. The existing crossover will be widened to facilitate two-way traffic.

On this basis, the total redeveloped impervious areas for the post development stage will be increased to 1851 m^2 from the 632m^2 existing impervious area – an increase from 25% to 73% fraction impervious.

As shown on the catchment locality map and table below, the developed site is divided into three discrete catchments – the south-west corner (Outfall A) comprising Outdoor Play Area 1 and some ground level hardstand (bin area and path up to carpark level); the north-west bulk of the site (Outfall B) comprising the proposed new building and Outdoor Play Area 2; and the eastern extent at higher level (Outfall D) comprising the carpark with associated verges/landscaping.

It is proposed to build a short retaining walls along the site boundaries to accommodate some lot filling (maximum 700mm high in the south-west corner) and to mitigate some cut (maximum 900 deep on the northern face) to facilitate milder slopes for the play areas and carpark within the site boundaries. Additional retaining walls are proposed between the carpark to the East and the building with play areas to the West. Major storm overflow from catchment D will be guided down the footpath between the carpark and the building to discharge out the north-west corner to James Street.

The summary of the redeveloped sub-catchment areas and fraction impervious of the site is given in Table 3. The location of sub-catchments is given in Figure 11.

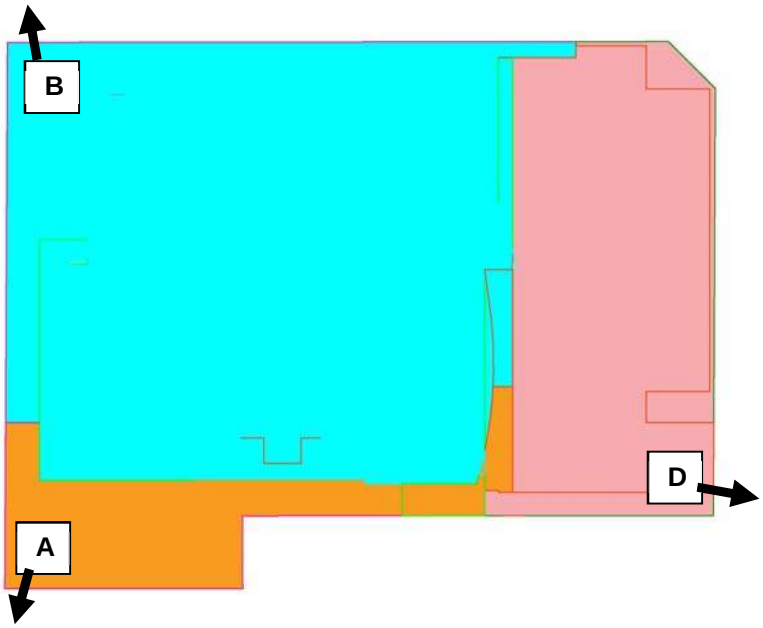

Figure 11 – Proposed Site Redeveloped Sub-Catchments Locality Map

Table 3- Proposed Site Redeveloped Sub-Catchments

Sub-Catchment	Surface Type	Area (m^2)	Fraction Impervious (%)
Outfall A	Impervious (incl. building, bitumen, concrete)	39	14
	Pervious (grassed open space)	244	
Outfall B	Impervious (incl. building, bitumen, concrete)	1208	77
	Pervious (grassed open space)	366	
Outfall D	Impervious (incl. building, bitumen, concrete)	604	88
	Pervious (grassed open space)	84	
Total	**-**	**2545**	**73**

There is no formal drainage proposed in the south-west corner (Outfall A). Stormwater runoff from this area is proposed to infiltrate and/or overflow as sheet flow off the proposed retaining wall to the neighbouring properties below. Infiltration planting is to be resolved with the landscape architect in the detailed design stage.

Runoff from the bulk of the side is mostly generated on the roof on the lower western extents of the site (Outfall B). It is proposed to intercept all the roof runoff with rainwater tanks for the primary purpose of attenuation and secondary purpose of stormwater harvesting for irrigation. Above-ground modular slim line steel tanks are proposed to be integrated with the landscape finish, avoiding to impact too much of the outdoor play areas. It may be considered in the detail design stage to replace the above ground tanks with an underground solution. A field inlet is proposed in the northern Outdoor Play 2 to collect surface runoff at ground level. The tanks and field inlet will discharge into the kerbside channel in James street as there is no existing pit and pipe system available at this location.

A small pit and pipe system is proposed for the carpark area and contributing landscape catchment at higher level (new Outfall D) with a new connection to the existing 750mm diameter trunk main in Cohoe Street. The carpark itself will attenuate major storm runoff on the surface to a maximum water depth of 250mm before overflowing via the footpath to catchment B.

For more details of the proposed post-development stormwater system refer to plan BNE-1043-009 in Appendix B.

A summary of the combined peak discharges using DRAINS software for the existing phase and developed phase without attenuation practices is given in Table 4. It is noted that the Outfall C (via the existing driveway of 26 James Street property) will be redundant in the developed case. Outfall D is a proposed connection to Cohoe Street trunk main which does not appear in the existing case.

Table 4 – Comparison of Combined Discharges for Existing and Developed Phases without Attenuation Practices

DRAINS Peak Flow (l/s)	Sub-Catchment A		Sub-Catchment B		Sub-Catchment C		Sub-Catchment D		COMBINED		Impact
	Exist	Dev.	Exist.	Dev.	Exist.	Dev.	Exist.	Dev.	Exist.	Dev.	
Q1 –	13	2	7	30	5	N/A	N/A	15	25	47	+ 88%
Q2 –	22	4	10	40	7	N/A	N/A	19	39	63	+ 62%
Q5 –	31	5	13	50	9	N/A	N/A	24	53	79	+ 49%
Q10 –	37	6	14	55	10	N/A	N/A	27	61	88	+ 44%
Q20 –	45	7	17	64	12	N/A	N/A	31	74	102	+ 38%
Q50 –	54	9	18	76	13	N/A	N/A	37	85	122	+44%
Q100 –	62	10	21	86	15	N/A	N/A	42	98	138	+ 41%

It is evident from this summary that the increase in impervious area in the developed phase causes a significant increase in peak discharges across all return intervals which will require attenuation.

It is proposed to capture all roof runoff generated from the new childcare facility and direct it to rainwater tanks located on either side of the building – one 8KL slimline tank proposed on the south side (Tank A, located in Outdoor Play Area 1) and three 8KL slimline tanks on the north side (Tank B, located in Outdoor Play Area 2). The tanks will allow for some stormwater harvesting for irrigation backup (approximately 600mm depth of water), with the volume above being reserved for attenuation of runoff to achieve a gross site runoff for storms up to the 100year ARI comparable with the existing condition.

The storage-elevation graphs of the two tanks are shown in Figure 12 and Figure 13.

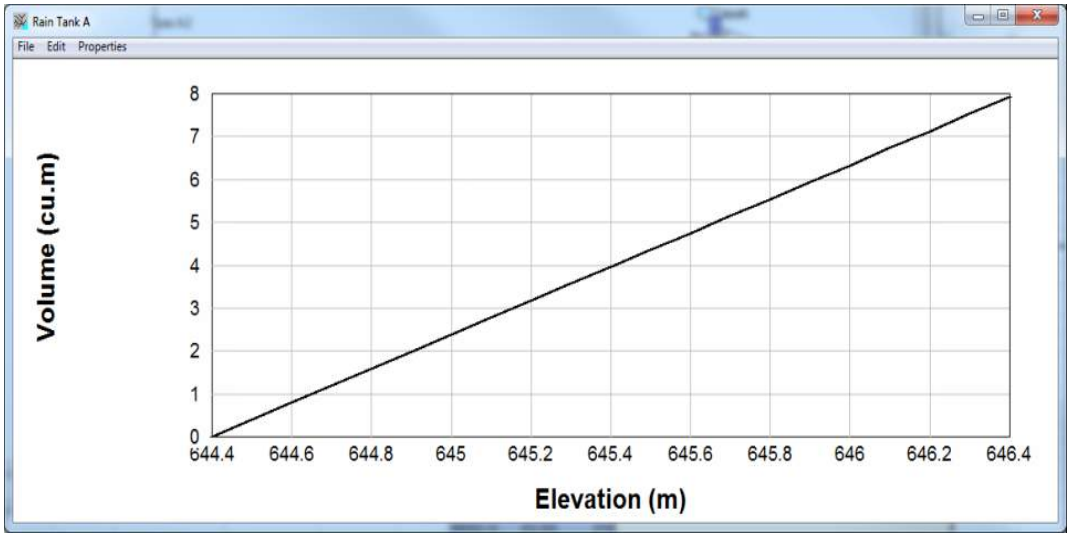

Figure 12 – Storage-Elevation Graph of Proposed Detention Tank A (South side, Outdoor Play Area 1)

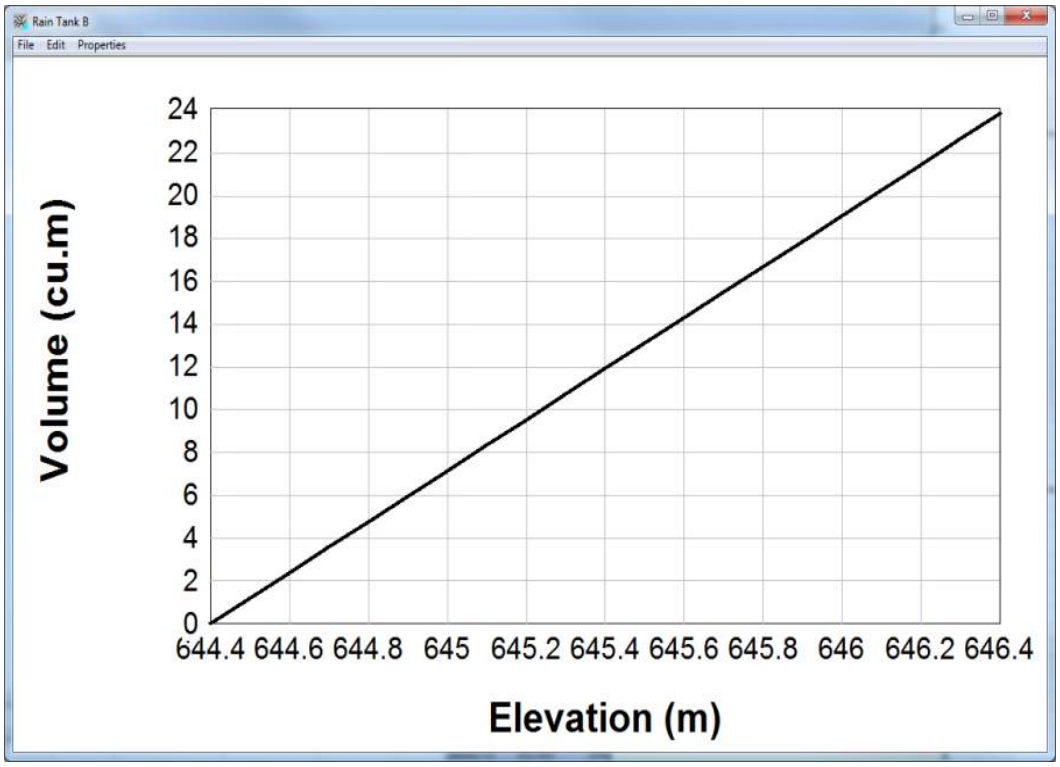

Figure 13 – Storage-Elevation Graph of Proposed Detention Tank B (North side, Outdoor Plan Area 2)

Tank A will have low 90mm diameter orifice with centroid elevation of RL +645.00 mAHD discharging water via a 100mm diameter UPV pipe to the immediate connection pit. Any surcharge in the tank will overflow through a 100mm diameter outlet pipe at the higher centroid elevation of RL +646.25 mAHD and flow to the same connection pit which joins the field inlet chamber in Outdoor Play Area 2 via a 150mm diameter uPVC pipe system.

Tank B will have low 75mm diameter orifice with centroid elevation of RL +644.90 mAHD discharging water via a 100mm diameter UPV pipe to the immediate connection pit. Any surcharge in the tank will overflow through a 100mm diameter outlet pipe at the higher centroid elevation of RL +646.25 mAHD and flow to the same connection pit which joins the downstream field inlet chamber in Outdoor Play Area 2 via a 150mm diameter uPVC pipe system.

From the field inlet in Outdoor Play Area 2, the bulk runoff from the site will flow to the kerb and channel on James Street via a galvanised 200x75 roofwater drain and kerb adaptor and overland flow in extreme storm events. Only a small portion of the runoff from the site will discharge to the neighbouring properties (Catchment A reduced to 0.028ha in the developed case).

A summary of the combined peak discharges using DRAINS software for the existing phase and developed phase after attenuation practices is given in Table 5.

Table 5 – Comparison of Combined Discharges for Existing and Developed Phases after Attenuation Practices

DRAINS Peak Flow (l/s)	Sub-Catchment A		Sub-Catchment B		Sub-Catchment C		Sub-Catchment D		COMBINED		Impact
	Exist	Dev.	Exist.	Dev.	Exist.	Dev.	Exist.	Dev.	Exist.	Dev.	
Q1 –	13	2	7	19	5	N/A	N/A	14	25	35	+40%
Q2 –	22	4	10	25	7	N/A	N/A	18	39	47	+21%
Q5 –	31	5	13	30	9	N/A	N/A	23	53	58	+9%
Q10 –	37	6	14	33	10	N/A	N/A	25	61	64	+5%
Q20 –	45	7	17	38	12	N/A	N/A	29	74	74	0%
Q50 –	54	9	18	43	13	N/A	N/A	34	85	86	+1%
Q100 –	62	10	21	47	15	N/A	N/A	42	98	97	-1%

As shown in Table 5, the DRAINS modelling results indicate that the peak discharges from the developed catchments have been successfully attenuated to negligible worsening levels compared to the existing situation for all investigated return periods. Although there are marked increases in the lower return intervals, these increases relate to small flows. The maximum noted 40% increase in the Q1 (1yr ARI event) represents just a 10l/s increase in discharge. In general, the increased flows are being directed towards James St (Outfall B). The downstream capacity of the James Street roadside channel has adequate capacity to receive the increased flows, given that the arterial road channel is designed for a Q10 as a minimum. It may be necessary in the detailed design stage to consider further attenuation options and/or split the flows discharging to James Street for TMR approval.

The discharge to neighbouring properties is significantly reduced in the developed case for all return intervals which alleviates the need for any new easements to be pursued across these already developed properties.

4. Stormwater Quality Management

The State Planning Policy (SPP) July 2014 requires development areas over 2,500m^2 which result in an impervious area greater that 25% of the net developable area to provide stormwater quality treatment. The area of the site being redeveloped in this case is just over at 2,545m^2 triggering the need for a stormwater quality analysis and appropriate treatment.

4.1. Methodology

Stormwater treatment modelling for James Street Childcare Centre was undertaken using MUSIC software. MUSIC – getting its name from Model for Urban Stormwater Improvement Conceptualisation – is an industry standard program that simulates pollutant removal potential for various stormwater treatment devices.

The following water quality objectives for West Queensland climatic region were adopted from the State Planning Policy July/2014, Table B of Appendix 3.

Table 6 – Load based Reduction Targets (West Queensland Climatic Region)

INDICATOR	LOAD BASED REDUCTION TARGETS (%)
Total suspended Solids (TSS)	85% reduction in average annual load of pollutants leaving the developed unmitigated scenario compared to the developed mitigated scenarios
Total Phosphorus (TP)	60% reduction in average annual load pollutants leaving the developed unmitigated scenario, compared to the mitigated scenario
Total Nitrogen (TN)	45% reduction in average annual load pollutants leaving the developed unmitigated scenario, compared to the mitigated scenario
Gross Pollutants (GP)	90% reduction in average annual load pollutants leaving the developed unmitigated scenario, compared to the mitigated scenario

4.2. MUSIC Model Parameters

The MUSIC model was setup in accordance with Water by Design's MUSIC Modelling Guidelines Version 1.0 (2010). The source nodes were set up as 'Urban'. No routing of drainage links was adopted for the purpose of taking a conservative approach. This approach assumes that the flow through the drainage system takes no time, which tends to overestimate the likely pollutant load.

The analysis has adopted SEQ data available for Brisbane, including a soil storage capacity of 120mm and a field capacity of 80mm.

4.3. Area of Treatment

The total area of the development site is approximately 0.255ha which is 73% impervious in the developed scenario.

4.4. MUSIC Model Pollutant Loads

The MUSIC model was set up for both the existing and developed scenario to be able to determine the impact of the proposed development on the quality of the stormwater runoff generated on site.

A comparison of the base flows and the pollutant loads for the existing and developed scenarios is provided in Table 7 below.

Table 7 – Comparison of Existing and Proposed Pollutant Loads

Pollutant	24A – 28 James Street, Rangeville

	Existing	Developed	Comparison (%)
Flow (ML/yr)	0.503	1.62	222%
Total Suspended Solids (kg/yr)	81.9	31.8	-61%
Total Phosphorus (kg/yr)	0.185	0.144	-22%
Total Nitrogen (kg/yr)	1.36	2.41	77%
Gross Pollutants (kg/yr)	9.56	0.00	-100%

4.5. Proposed Treatment Train

A variety of hypothetical treatment options were investigated for the developed site, including swales, bio-retention ponds and propriety products. To meet the Load Based Reduction Targets set out in Table 6, a stormwater treatment train using a proprietary filtration product, a 1000mm diameter SPEL Hydrosystem or similar unit, upstream of the both the building catchment B outfall and the carpark catchment D outfall was found to be the most feasible treatment solution. The Hydrosystem units require only a 250mm hydraulic fall, take up very little space, and are proven highly effective in the removal of the TP and TN pollutants. A brochure and detail drawing of the unit is included in Appendix D.

4.6. MUSIC Model Treatment Results

MUSIC is used to model the effectiveness of stormwater treatment trains. The target reductions in stormwater pollutants are based on a comparison of an unmitigated scenario, having no treatment on site, and a mitigated scenario, which has stormwater treatment measures incorporated on site. MUSIC requires the user to specify the type and parameters for both the source and treatment nodes.

The MUSIC analysis for the James Street Childcare was undertaken based on the proposed treatment concept using the proprietary filtration product described in Section 4.5 of this report. Refer to Appendix B for a schematic diagram of the existing and developed stormwater treatment trains.

A summary of the treatment train results from the MUSIC modelling is given in Table 8.

Table 8 – Treatment Train Effectiveness (Developed Scenario with Proposed Treatment Train)

Pollutant Load	James Street Childcare – Developed Case with Proposed Treatment Train			
	Source (Pre-treatment)	Residual (Post-treatment)	% Reduction	Compliance
Total Suspended Solids (kg/yr)	512.0	31.8	93.8%	>85% - PASS
Total Phosphorus (kg/yr)	1.030	0.144	86.1%	>60% - PASS
Total Nitrogen (kg/yr)	7.23	2.41	66.7%	>45% - PASS
Gross Pollutants (kg/yr)	47.6	0.0	100%	>90% - PASS

The MUSIC results show that the proposed stormwater treatment train for the developed scenario will meet the prescribed load reduction targets given in Table 6.

4.7. Maintenance

The treatment devices recommended will require nominal maintenance, comprising inspection, cleaning and replacement as necessary. Sediment collected inside the filtration product (SPEL Hydrosystem or similar) would need to be removed with an eduction truck, and the depleted cartridges manually removed and replaced. Field inlets will also need to be checked to ensure blockages and gross pollutant are removed.

5. Erosion and Sediment Management

Areas to be disturbed during construction of the works are to be protected to ensure there will be no deterioration of water quality as a result of erosion and sedimentation arising from construction works or from fuel/oil/chemical discharges from vehicles and plant equipment associated with the construction.

All erosion and sediment control measures should be in accordance with the International Erosion Control Association (IECA) Best Management Practices, and the latest version of the Institute of Engineers (QLD) 'Sediment and Erosion Control Guidelines'. All erosion and sediment control devices implemented onsite should represent current best management practices and all practical measures applicable to the site. These best management practices must be applied to all stages of the project including installation, operation, and management of the control measures including maintenance and monitoring of the devices.

The Contractor shall be responsible for establishment, management and maintenance of the erosion and sediment control measures to ensure minimal environmental harm and to comply with Council's standards. It is the Contractor's responsibility to maintain all erosion and sediment control measures on site until all disturbed areas are reinstated and for the length of the defects liability period.

6. Conclusion

In preparing this stormwater management plan, a stormwater quantity analysis was undertaken for the subject site, followed by a stormwater quality analysis. The main objective of the stormwater quality analysis was to establish the impact of the new development on runoff water quality and identify appropriate treatment devices to be included in the stormwater system. The main objective of the stormwater quantity analysis was to limit the post–development peak discharge to the equivalent pre-developed peak flow discharging off-site for rainfall events up to and including a 100 year ARI event.

The proposed drainage solution includes collecting all roof water and most surface water and discharging this after attenuation and treatment to James Street and Cohoe Street.

A significant portion of the runoff is collected on the carpark at high level, where a shallow connection to the existing trunk main in Cohoe Street is feasible. It needs to be checked in the detailed design stages if there is a conflict with the existing 100mm diameter AC watermain located in the verge. If the stormwater drainage from the carpark cannot cross the watermain, the carpark catchment will need to be diverted to James Street. It is generally not feasible to disturb an asbestos cement pipe. A non-return valve is proposed upstream of the connection to prevent any surcharge from the trunk main discharging into the site.

Most of the runoff from the childcare facility at lower level is collected on the roofs and is intercepted by rainwater tanks for the primary purpose of attenuation and secondary harvesting for irrigation. The bulk runoff is discharged out towards James Street, with a small but nominal increase in the flows (in the order of 10 l/s) evident at the discharge location. It may be necessary in the detailed design stage to consider further attenuation options and/or split the flows discharging to James Street for TMR approval.

A small amount of surface water will not be collected in the south-west corner of the site, however the amount of surface water discharging into the neighbouring properties from here is much less than in the existing case. The increased flow to James Street and the proposed connection to Cohoe Street have been consciously incorporated into the stormwater management plan in consideration of the benefit of significantly reducing discharge towards neighbouring properties.

For the purpose of water quality control it is proposed to incorporate two 1000dia SPEL hydrosystem devices, one intercepting runoff from the carpark at the higher level (discharging to Cohoe Street), and one intercepting the bulk of site runoff from the building and outdoor play at lower level, discharging to James Street, in addition to the grassed swales and buffer strips where feasible. The Hydrosystem filter pods are chosen over bio-retention basins to preserve as much as possible of the outdoor area for playground. It may be established in the operational works stage that a headworks contribution (based on equivalent bio-retention basins) is preferred over installing the water treatment devices on site.

As the investigations for this conceptual stormwater management plan were preliminary only, all analysis will need to be confirmed during the detailed design stage of the development to ensure compliance.

7. References

Bureau of Meteorology website, IFD chart creation tool

Department of Natural Resources and Water, Queensland Urban Drainage Manual, 3rd Edition, Brisbane, QLD. (2013 Provisional)

Drains User Manual, Geoffrey O'Loughlin and Bob Stack, Watercom PTY Ltd, August, 2013

Healthy Waterways 2006, Water Sensitive Urban Design- Technical Design Guidelines for South East Queensland, Version 1 -June 2006, Brisbane, QLD.

State Planning Policy, July 2014, Department of State Development, Infrastructure and Planning

Appendix A

Stormwater Quantity Calculations

IFD Table – Toowoomba							
DURATION	1 Year	2 years	5 years	10 years	20 years	50 years	100 years
5Mins	91.3	117	146	164	189	224	251
6Mins	85.1	109	136	153	177	209	234
10Mins	69.8	89.3	111	124	142	168	188
20Mins	51.7	65.7	80.4	89.2	102	119	132
30Mins	42.2	53.5	65	71.9	81.9	95.2	106
1Hr	28.2	35.6	43.1	47.5	53.9	62.5	69.2
2Hrs	17.7	22.4	27	29.7	33.7	39	43.2
3Hrs	13.2	16.7	20.1	22.2	25.1	29.1	32.2
6Hrs	7.94	10	12.1	13.4	15.2	17.7	19.6
12Hrs	4.84	6.14	7.49	8.31	9.48	11.1	12.3
24Hrs	3.01	3.86	4.81	5.4	6.23	7.35	8.25
48Hrs	1.86	2.42	3.11	3.56	4.16	5.01	5.68
72Hrs	1.35	1.76	2.31	2.67	3.14	3.83	4.37

Rainfall Intensity-Duration-Frequency (IFD) Table

Time of concentration - Friend's equation - Overland sheet flow

Hydrological parameters	Value	Unit	Description
Overland sheet fow length, L	65	m	
Hortons roughness, n	0.045		from Table 5.7.3.3(b)
Slope of surface, S	4.3	%	
Time of concentration, Tc =	14	min	

Parameter	Value	Unit	Description
Catchment Area	0.1710	ha	
1 yr discharge coefficient, C_2	0.39		from equation 4.4, QUDM ($C_y = F_y . C_{10}$)
2 yr discharge coefficient, C2	0.42		from equation 4.4, QUDM (Cy = Fy . C10)
5 yr discharge coefficient,C_5	0.47		
10 yr discharge coefficient, C_{10}	0.49		from Tables 4.5.3 and 4.5.4, QUDM
20 yr discharge coefficient,C_{20}	0.51		
50 yr discharge coefficient,C_{50}	0.56		
100 yr discharge coefficient,C_{100}	0.59		
T_c =	13	minutes	Adopt 13 < 14 = conservative
1 yr rainfall intensity, I_2	64.4	mm/hr	from IFD curves - using BOM database
2 yr rainfall intensity, I2	82.2	mm/hr	from IFD curves - using BOM database
5 yr rainfall intensity, I_5	101.8	mm/hr	from IFD curves - using BOM database
10 yr rainfall intensity, I_{10}	113.6	mm/hr	from IFD curves - using BOM database
20 yr rainfall intensity, I_{20}	130.0	mm/hr	from IFD curves - using BOM database
50 yr rainfall intensity, I_{50}	153.3	mm/hr	from IFD curves - using BOM database
100 yr rainfall intensity, I_{100}	171.2	mm/hr	from IFD curves - using BOM database
1 yr runoff value, Q2 =	0.012	m^3/s	
2 yr runoff value, Q2 =	0.016	m3/s	
5 yr runoff value, Q5 =	0.023	m^3/s	
10 yr runoff value, Q10 =	0.026	m^3/s	
20 yr runoff value, Q20 =	0.032	m^3/s	
50 yr runoff value, Q50 =	0.041	m^3/s	
100 yr runoff value, Q100 =	0.048	m^3/s	
Fraction impervious, fi	0.14		from survey (cf QUDM Table 4.5.1)

Catchment A – Rational Method Runoff Calculation (Existing Case)

Time of concentration - Friend's equation - Overland sheet flow

Hydrological parameters	Value	Unit	Description
Overland sheet fow length, L	**15**	m	
Hortons roughness, n	**0.035**		from Table 1
Slope of surface, S	**4.4**	%	
Time of concentration, Tc =	7	min	

Parameter	Value	Unit	Description
Catchment Area	**0.0470**	ha	
1 yr discharge coefficient, C_2	0.63		from equation 4.4, QUDM ($C_y = F_y . C_{10}$)
2 yr discharge coefficient, C2	0.67		from equation 4.4, QUDM (Cy = Fy . C10)
5 yr discharge coefficient,C_5	0.75		
10 yr discharge coefficient, C_{10}	**0.79**		from Tables 4.5.3 and 4.5.4, QUDM
20 yr discharge coefficient,C_{20}	0.83		
50 yr discharge coefficient,C_{50}	0.91		
100 yr discharge coefficient,C_{100}	0.95		
T_c =	5	minutes	Adopt 5 < 7 = conservative
1 yr rainfall intensity, I_2	64.4	mm/hr	from IFD curves - using BOM database
2 yr rainfall intensity, I2	82.2	mm/hr	from IFD curves - using BOM database
5 yr rainfall intensity, I_5	101.8	mm/hr	from IFD curves - using BOM database
10 yr rainfall intensity, I_{10}	113.6	mm/hr	from IFD curves - using BOM database
20 yr rainfall intensity, I_{20}	130.0	mm/hr	from IFD curves - using BOM database
50 yr rainfall intensity, I_{50}	153.3	mm/hr	from IFD curves - using BOM database
100 yr rainfall intensity, I_{100}	171.2	mm/hr	from IFD curves - using BOM database
1 yr runoff value, Q2 =	0.005	m^3/s	
2 yr runoff value, Q2 =	0.007	m3/s	
5 yr runoff value, Q5 =	0.010	m^3/s	
10 yr runoff value, Q10 =	0.012	m^3/s	
20 yr runoff value, Q20 =	0.014	m^3/s	
50 yr runoff value, Q50 =	0.018	m^3/s	
100 yr runoff value, Q100 =	0.021	m^3/s	
Fraction impervious, fi	0.75		from QUDM Table 4.5.1 (cf survey 0.77)

Catchment B – Rational Method Runoff Calculation (Existing Case)

Time of concentration - Friend's equation - Overland sheet flow

Hydrological parameters	Value	Unit	Description
Overland sheet fow length, L	**35**	m	
Hortons roughness, n	**0.045**		from RDDM Table 5.7.3.3(b)
Slope of surface, S	**5**	%	
Time of concentration, Tc =	11	min	

Parameter	Value	Unit	Description
Catchment Area	**0.0370**	ha	
1 yr discharge coefficient, C_2	0.62		from equation 4.4, QUDM ($C_y = F_y \cdot C_{10}$)
2 yr discharge coefficient, C_2	0.65875		from equation 4.4, QUDM ($C_y = F_y \cdot C_{10}$)
5 yr discharge coefficient,C_5	0.73625		
10 yr discharge coefficient, C_{10}	**0.78**		from Tables 4.5.3 and 4.5.4, QUDM
20 yr discharge coefficient,C_{20}	0.81375		
50 yr discharge coefficient,C_{50}	0.89125		
100 yr discharge coefficient,C_{100}	0.93		
T_c =	10	minutes	Adopt 10 < 11 = conservative
1 yr rainfall intensity, I1	69.8	mm/hr	from IFD curves - using BOM database
2 yr rainfall intensity, I_2	89.3	mm/hr	from IFD curves - using BOM database
5 yr rainfall intensity, I_5	111.0	mm/hr	from IFD curves - using BOM database
10 yr rainfall intensity, I_{10}	124.0	mm/hr	from IFD curves - using BOM database
20 yr rainfall intensity, I_{20}	142.0	mm/hr	from IFD curves - using BOM database
50 yr rainfall intensity, I_{50}	168.0	mm/hr	from IFD curves - using BOM database
100 yr rainfall intensity, I_{100}	188	mm/hr	from IFD curves - using BOM database
1 yr runoff value, Q1 =	0.004	m^3/s	
2 yr runoff value, Q2 =	0.006	m^3/s	
5 yr runoff value, Q5 =	0.008	m^3/s	
10 yr runoff value, Q10 =	0.010	m^3/s	
20 yr runoff value, Q20 =	0.012	m^3/s	
50 yr runoff value, Q50 =	0.015	m^3/s	
100 yr runoff value, Q100 =	0.018	m^3/s	
Fraction impervious, fi	0.75		from Table 4.5.1, QUDM (cf survey 0.88)

Catchment C – Rational Method Runoff Calculation (Existing Case)

Appendix B

Drawings

DIAL BEFORE YOU DIG www.1100.com.au

Discharge via kerb adapter to James Street
Approx IL = 642.90

Hot dipped galvanised RHS Roofwater Drain 200x75 or equivalent

225Ø RCP High Flow Bypass

1050Ø Stormwater inspection manhole
USIL = 643.13
DSIL = 643.11

Ø150 UPVC

Roof drainage connection pit
IL = 643.75

150Ø uPVC Outlet

11.25° bends
Ø150 UPVC
(2 No.)

1000Ø SPEL Hydrosystem or equivalent approved
USIL = 643.39
DSIL = 643.14

300x300 Field Inlet
CL = 644.0
IL = 643.4

Attenuation/Storage Roofwater Tank B
3 No, 8kL Slimline steel water tank or equivalent,
2.05m high, Base RL = 644.40
Ø75 orifice - Centroid RL + 644.90
Tank shape and positions to be confirmed with landscape architect in the detailed design stage

Outdoor Play Area 2

Roof drainage connection pit
IL = 643.71

Proposed Building

Ø150 UPVC

Ø100 UPVC

Stormwater junction pit
IL = 643.81

Roof drainage connection pit
IL = 643.95
CL = 644.30

Attenuation/Storage Roofwater Tank A (8kL Slimline Steel Water Tank or equivalent, 2.05m high, Base RL + 644.40, remove brackets, Ø90 orifice, Centroid RL + 645.00

Outdoor Play Area 1

644.875

Existing Conc. Footpath

James Street

PM 118140

Subsoil drainage from behind retaining wall to discharge at lower ground level into swale

Proposed Carpark (Asphalt)

Cohoe Street

Existing Concrete Path

Lip of K&C

Gardens

600x600
Grated Inlet
CL = 644.50
IL = 644.00

150Ø UPVC Inlet

1050Ø Stormwater manhole with low flow diversion to water treatment device
IL= 643.95

Ø225 RCP High flow bypass

Ø150 UPVC outlet

Conflict with existing 100mm AC watermain to be resolved in detailed design

300Ø RCP
USIL 643.67
DSIL 643.64

1000Ø SPEL Hydrosystem or equivalent approved
USIL = 643.95
DSIL = 643.70

1050Ø Stormwater Manhole with Non-return flaps on both incoming pipes to protect site from any surcharge within existing 750Ø trunk main
USIL = 643.68
DSIL = 643.67

Connect to existing Ø750 RCP (Approx IL 643.42) with pre-cast saddle.

LEGEND

- Electricity (overhead)
- Sewer Main
- DBYD Sewer
- DBYD Trunk Water Main
- Reticulation Water Main
- DBYD Telstra (Copper Cable)
- DBYD Telstra (Optic Fibre)
- Storm Water Pipe
- Proposed major contour (1m interval)
- Proposed minor contour (0.5m interval)
- Proposed open drain
- Proposed retaining wall
- Proposed Fence
- Barrier kerb
- Stormwater Pipe
- Stormwater Swale
- Proposed Roof Outline
- PC Spoon Drain
- Major Storm Overflow
- Proposed Rainwater Tank
- Proposed Building
- Proposed Carpark (Asphalt)
- Proposed Turfed Area
- Proposed Concrete Hardstand
- Proposed Gardenbed

Dwg Ref: h:\projects - bne\bne-1147 james cohoe child care swmp\4.0 drawings\4.1_Dwg\DRAINAGE LAYOUT PLAN.dwg Plot Date: 15.09.2017

A	DA SUBMISSION		
REVISIONS		APPD	DATE

NOTE: FIGURED DIMENSIONS TO TAKE PRECEDENCE OVER SCALED MEASUREMENTS. VERIFY ALL ON SITE DIMENSIONS & LEVELS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES. COPYRIGHT OF THIS DRAWING IS VESTED WITH HARRISON INFRASTRUCTURE GROUP.

Original Size - A1

CLIENT:
Australian Childcare Solutions
Level 18, Riverside Centre
123 Eagle Street
BRISBANE QLD 4000
P: 07 3112 2681 F: 07 3112 2601

SCALES:
0 1 2 3 4 5m
Plan - Scale 1:100 (A1)
Dimensions in metres except where shown otherwise.

HIG HARRISON INFRASTRUCTURE GROUP
CONSULTING ENGINEERS
Toowoomba Office
230 James St
TOOWOOMBA QLD
P: (07) 4639 4188
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PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
DRAINAGE LAYOUT PLAN

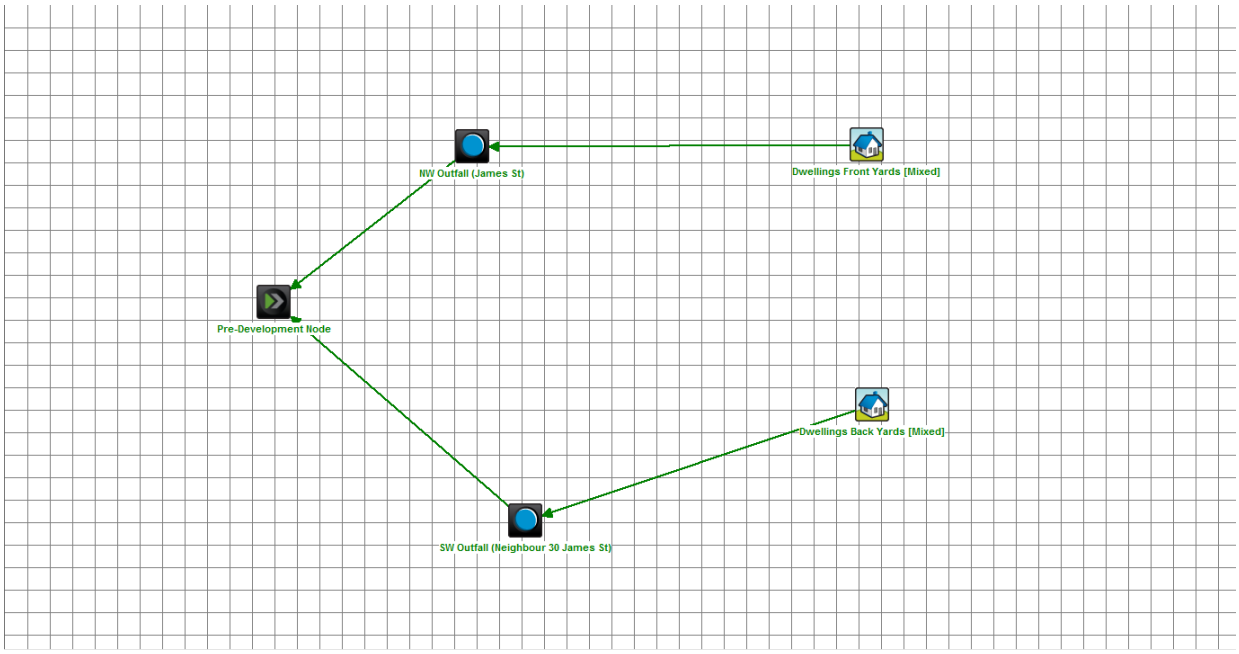
Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	9 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

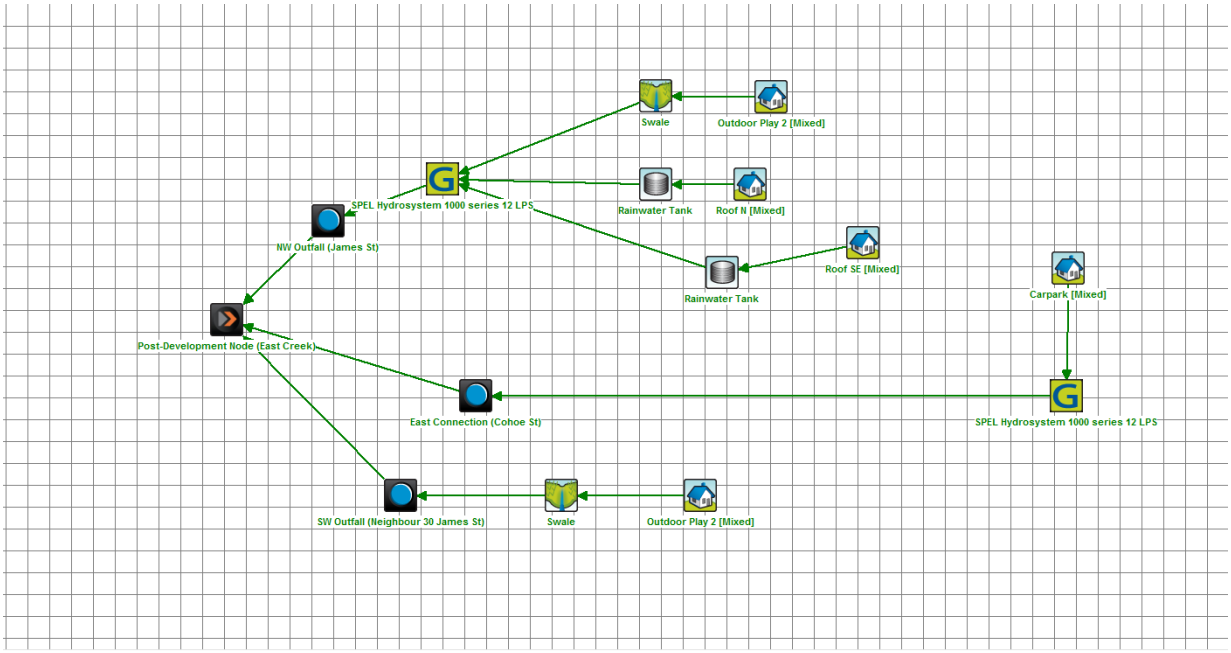
Project No.: BNE-1147
Dwg. No.: 1043-009
Revision: A

Appendix C

MUSIC Modelling



MUSIC Model Diagram – Existing Scenario



MUSIC Model Diagram – Developed Scenario

Appendix D

SPELFilter Hydrosystem

SPELFilter Hydrosystem

Environmentally aware and efficient.

www.spel.com.au

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS

The Technology

A specialist rainwater filter, designed for installation within load bearing shafts and chambers of concrete or plastic construction. The pre fitted plastic housing is safe and easy to fit at site.

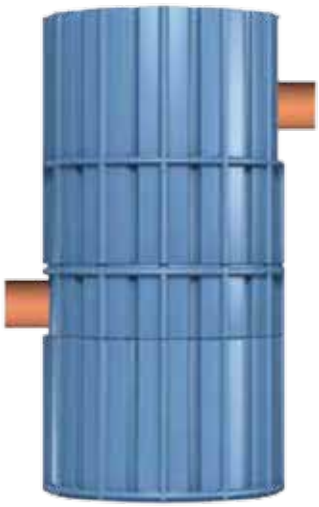
The Hydrosystem 1000 Filter uses an up-flow process. This means there is a minimal head drop between the inlet and the outlet. The cleaned water is of an outstanding water quality. The rainwater is treated within the unit by the following processes: sedimentation, filtration, adsorption and precipitation.

The initial treatment steps take place in the Dynamic Separator, where sedimentation of solid particles occurs within a radial flow regime, characterised by secondary flows.

A settling funnel to the silt trap chamber entrance ensures sediments are not remobilised. Above the separator are the filter inserts, covering the entire diameter of the unit's housing, where the second treatment step takes place.

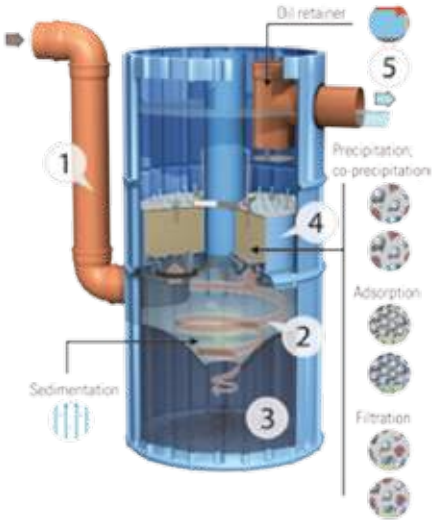
Water flows upwards through the removable filter element. As a result of both the upward flow within the filter element and the fact that the filter remains saturated, the rate of filter clogging by solids is both very limited and slow.

The filter inserts are easy to exchange.



How it works

1. The stormwater from the drained area is fed into the inlet, which is at the lower end of the shaft. A deflector plate sets up a radial flow.
2. Here, sedimentation of particles, especially the sand faction and above, takes place in the hydrodynamic separator. This is due to turbulent secondary flows within a radial laminar flow regime.
3. The settlable solids are collected via an opening in the silt trap chamber. This chamber is evacuated periodically, via the by-pass central tube at intervals.
4. Four filter elements are located within the filter shaft. As waters flow upwards the finer particles are filtered out, whilst the dissolved pollutants are precipitated and absorbed. The filter is easily backwashed, and if completely clogged or exhausted, is easily replaced.
5. Clean water above the filter elements passes to discharge via an oil trap assembly. In the event of major spill, free floating oils etc are retained here. Normal concentrations of dissolved oils are retained within the filter elements.



Technical Data

Stormwater filter complying with DIN 1989-2. Connections: DN 200; the various types of filter elements have different material structures.

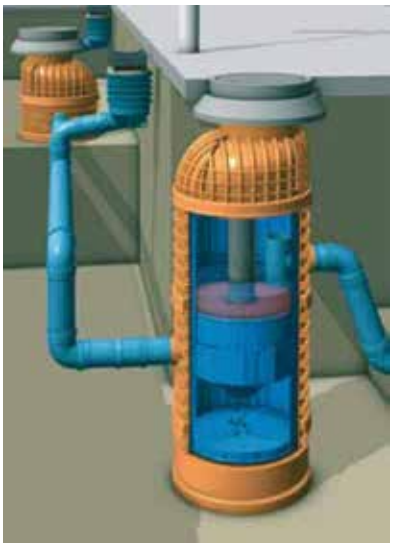
Housing material: Polyethylene
Housing weight: 68 kg
Total weight: 220 to 350 kg depending on filter type
Packing unit SPEL Hydrosystem 1000: Pallet: 1 piece

Accessories 1

SPELFilter element
Weight per filter element:
34 kg (roof / traffic)

Accessories 2

SPELFilter element
Weight per filter element:
54 kg (heavy traffic)
66 kg (metal)



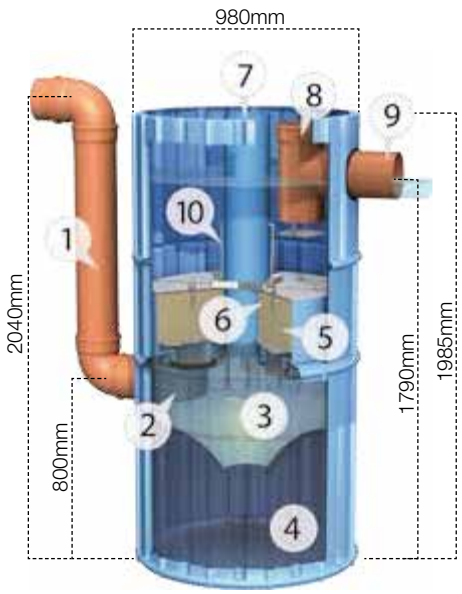
Example: Installation in a shaft made of plastic

Example:

The SPEL Hydrosystem 1000 traffic installed in a concrete shaft DN1000.

Product structure:

1. Stormwater inlet (DN 200)
2. Deflector plate
3. Hydrodynamic separator
4. Silt trap
5. Filter element
6. Extraction aid for filter element
7. Overflow and suction pipe
8. Oil trap
9. Outlet stormwater storage, soakaway system or surface waters
10. Buoyancy restraint for filter elements



The SPEL Hydrosystem is available with various filter types, depending on the usage of the connected area. The Roof type is used for roof areas that do not have a significant proportion of uncoated metals; the Metal type is employed for metal roof areas, and the Traffic type is used for slightly polluted traffic areas.

The Heavy Traffic type is employed for heavily polluted traffic areas and has been granted general technical approval (Z-84.2-4) by the German Institute for Structural Engineering (DIBt). The maximum areas that may be drained depend on the nature of the surfaces. These are given in the following table.

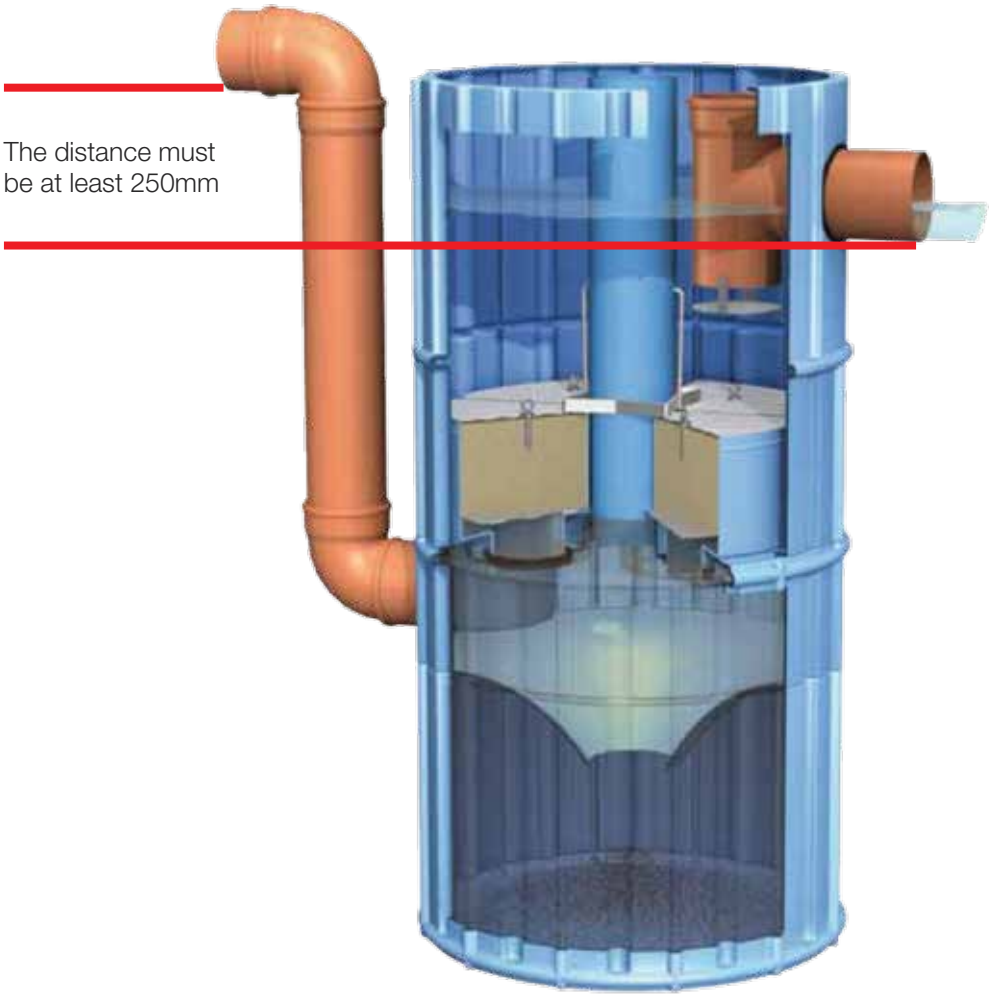
Type	**Nature of the surface to be drained**	**Weight of filter element / piece**	**Total Weight**
Heavy traffic with technical approval (Z-84.2-4)	Highly polluted traffic areas (car parks in front of supermarkets, main roads, HGV access roads)	54kg	300kg
Traffic	Slightly polluted traffic areas (side streets, staff car parks, yards)	34kg	220kg
Roof	Roofs without a significant proportion of uncoated metals (< 50m²)	34kg	220kg
Metal	Roofs made of uncoated metals (copper, zinc, lead)	66kg	350kg

Parameter	Unit	Non Metal Roof		Copper Roof		Zinc Roof		Parking lot, residential street		Main road Distributer		1 Aims of LAWA	2 Drinking Water	3 Seepage	4 SPEL Hydrosystem
		from	to	from	to	from	to	from	to	from	to	permissible limit	permissible limit	control value	aim
Phsico-chemical parameters												90 Percentile			
electrical conductivity	[uS/cm]	25	270	25	270	25	270	50	2400	110	2400	–	2500	–	< 1500
pH value	[–]	4.7	6.8	4,7	6,8	4,7	6,8	6,4	7,9	6,4	7,9	–	6,5 – 9,5	–	7,0 – 9,5
Nutrients															
phosphorous (P ges)	[mg/l]	0,06	0,50	0,06	0,50	0,06	0,50	0,09	0,30	0,23	0,34	–	–	–	0,20
ammonium (NH_4)	[mg/l]	0,1	6,2	0,1	6,2	0,1	6,2	0,0	0,9	0,5	2,3	–	0,5	–	0,3
nitrate (NO_3)	[mg/l]	0,1	4,7	0,1	4,7	0,1	4,7	0,0	16,0	0,0	16,0	–	50,0	–	–
Heavy Metals															
cadmium (Cd)	[µg/l]	0,2	2,5	0,2	1,0	0,5	2,0	0,2	1,7	0,3	13,0	1,0	5,0	5,0	< 1,0
zinc (Zn)	[µg/l]	24	4.880	24	877	1.731	43.674	15	1.420	120	2.000	500	–	500	< 500
copper (Cu)	[µg/l]	6	3.416	2.200	8.500	11	950	21	140	97	104	20	2000	50	< 50
lead (Pb)	[µg/l]	2	493	2	493	4	302	98	170	11	525	50	10	25	< 25
nickel (Ni)	[µg/l]	2	7	2	7	2	7	4	70	4	70	50	20	50	< 20
chromium (Cr)	[µg/l]	2	6	2	6	2	6	6	50	6	50	50	50	50	< 50
Organic Substances															
polynuclear aromatic hydrocarbons (PAK)	[ug/l]	0.4	0.6	0.4	0.6	0.4	0.6	0,2	17,1	0,2	17,1	–	0,1 6 compounds	0,2	< 0,2
petroleum-derived hydrocarbons (MKW)	[mg/l]	0,1	3,1	0,1	3,1	0,1	3,1	0,1	6,5	0,1	6,5	–	–	0,2	< 0,2

1 Aims of the German working group on water issues of the Federal States and the Federal Government (LAWA) for surface water, usage as potable water (1998). 2 Permessible of the German Drinking Water Ordinance (2001). 3 Control value for seepage of the German Federal Soil Protection Act an Ordinance (1999) according to § 8 1,2. 4 The aims of the system refer to average annual loads.

Installation

CAUTION! Important information, please observe.



The following is to be checked before installation:

The filter must be installed with a so-called fall. This means that the incoming pipe (stormwater inlet) is led downwards just ahead of the shaft and can be connected to the lower connection as described.

The difference in invert between the incoming pipe and the outlet to discharge must be at least 250mm.

HEAD OFFICE

PO Box is 6144
Silverwater NSW 1811

Silverwater Rd
Silverwater NSW 2128

Phone: +61 2 8838 1055
Fax: +61 2 8014 8699

DESIGN OFFICES

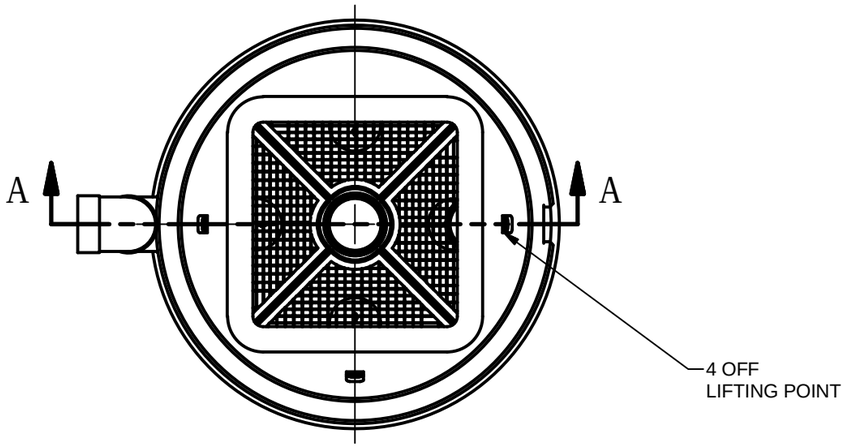
New South Wales	61 2 8838 1055
Canberra	61 2 6128 1000
Queensland	61 7 3277 5110
Victoria & Tasmania	61 3 5274 1336
South Australia	61 8 8275 8000
West Australia	61 8 9350 1000
Northern Territory	61 2 8838 1055
New Zealand	64 9 276 9045

www.spel.com.au

SPELFilter Hydrosystem 1.0

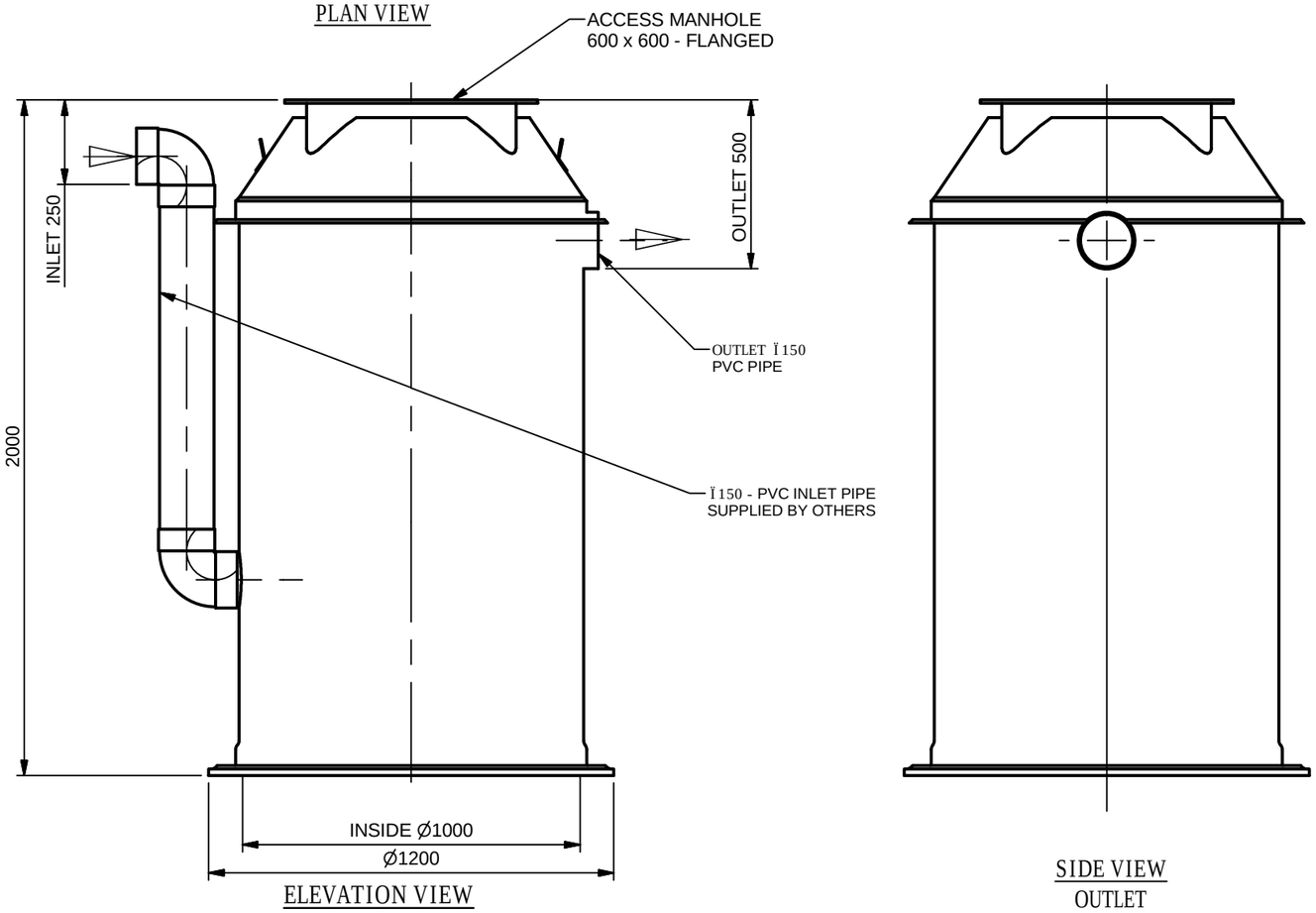
SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS

REVISION HISTORY				
REV	DESCRIPTION	DESIGNER	CREATION DAT	CHECKED BY
1	INITIAL RELEASE	M.MAKIN	20/07/2015	



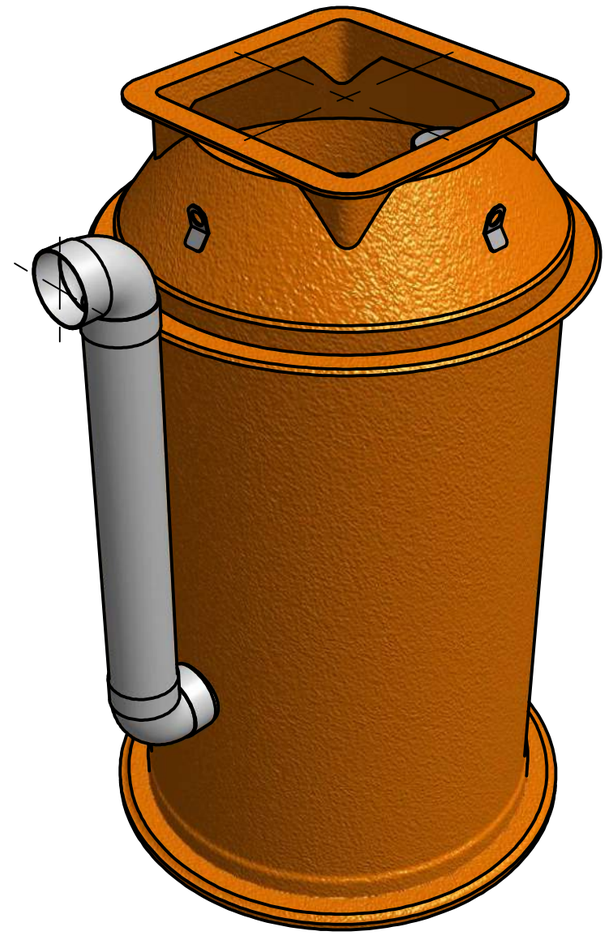
PLAN VIEW

Site Level Confirmation		
Finished Surface Level (FSL)	RL:	
Access Cover Thickness		mm
Inlet Invert Level	RL:	
Outlet Invert Level	RL:	
Company:		
Name:		
Date:		



ELEVATION VIEW

SIDE VIEW
OUTLET



ISOMETRIC VIEW

APPROVED.....

NAME.....

SIGNED.....

DATE...../...../.....

ISSUED FOR CONSTRUCTION

TOLERANCE: ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

CLIENT:

DISTRIBUTOR :

Drawn	M.MAKIN	Date	17/07/2015
Check		Date	
Verified		Date	
Approved		Date	
Request No.	RN1816		

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | E: sales@spel.com.au
www.spel.com.au

PROJECT :

TITLE
SPEL HYDROSYSTEM - 12 LPS
SHS.1000.4F.150.PVC
GENERAL ARRANGEMENT

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

CUSTOMER CODE :

DWG No. SP15-HY9020-S

D:\Vault Working Folder\Designs\SPEL\STD ITEMS\PRODUCTS\HYDROSYSTEM\1000 SERIES - FRP\SP15-HY9020-S.idw

Compliance Certificate for Civil Design Rev 12/2015

1. Property Description

Street address (include no., street, suburb / locality & postcode)

24A – 28 James Street

Rangeville, QLD **Postcode** 4350

Lot & plan details (*attach list if necessary)*

LOT 3/RP838211, LOT 1/RP77100 and LOT 2/RP77100

In which local government area is the land situated?

Toowoomba Regional Council

2. Description of Component/s Certified

Earthworks 12-d model and quantities estimate

3. Reference Documents

Report:	BNE-1147-SWMP-A : Conceptual Stormwater Management Plan
Drawings:	BNE-1043-001 Rev. A : General Arrangement Plan
	BNE-1043-002 Rev. A : Earthworks Plan
	BNE-1043-003 Rev. A : Notes and Details Plan
	BNE-1043-004 to 006 Rev. A : Longitudinal Sections, Sheets 1 to 3
	BNE-1043-007 & 008 Rev. A : Retaining Wall Sections, Sheets 1&2
	BNE-1043-009 Rev. A : Drainage Layout Plan

4. Supplied Documentation

Schedule of Quantities – Bulk Earthworks – Preliminary

5. Design Engineer RPEQ No.

Design Engineer RPEQ No.

RPEQ 13396

6. Component Person Details

Name (*in full*)

Tony Gallagher

Company name *(if applicable)* **Contact Person**

Harrison Infrastructure Group Ken Cassie

Phone no. *business hours* **Mobile no.** **Fax No.**

07-4639 4188 04 3966 8861 07-4646 2407

Email address

tony.gallagher@hig.com.au

Postal address

PO BOX 18132

Toowoomba, QLD **Postcode** 4350

7. Signature of Competent Person

Signature **Date**

15/09/2017

SCHEDULE OF QUANTITIES

Project: RANGEVILLE CHILD CARE - CORNER JAMES AND COHOE STREET
BULK EARTHWORKS

Date: 11/09/2017
Business Unit No.: BNE-1147
Project Parent W / O No.:
Revision No.: 1

PRELIMINARY

Asset No.:

W/O No.	TASK CODE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		GENERAL				
	2101A	Site Facilities	LS	1		
	2101B	Setting Out Of Works	LS	1		
		CONTROL OF EROSION & SEDIMENT				
	2211A	Temporary Erosion & Sediment Control	LS	1		
		CLEARING AND GRUBBING				
	2212A	Clearing & Grubbing	LS	1		
		EARTHWORKS				
	2213A	Remove and Stockpiling Topsoil	m3	260		
	2213B1	Earthworks on leads (solid volume) - cut to fill including compaction	m3	210		
	2213E	Earthworks to Spoil (solid volume) - including excavation and disposal off site	m3	660		
	2213A	Remove from Stockpiling Topsoil and respread	m3	160		
					Sub-total	
	DS10	Survey	LS	1		
	DS20	Concept	LS	1		
	DS30	Design	LS	1		
	DS40	Utility Services - Telstra Pit and Line	LS	1		
	2101D05	Utilities - Lighting	LS	1		
	EO01	Project Management	LS	1		
	EO04	Contingencies	LS	1		
	EO05	Digital As Constructed Fees	LS	1		
	EO16	Control/Quality Testing	LS	1		
					Total Cost of Project	

Quantities Estimated : ……KEN CASSIE……

Recommended ….TONY ZIMMERLE……..

Quantities Checked : ……IAN WUERSCHING……

Construction Estimate Approved : …TONY GALLAGHER……

Signature : ……

DOCUMENT TRANSMITTAL REGISTER

QA-REG-08A

H:\Projects - BNE\BNE-1127 Scenic Rim - 8 Bridges\1.0 Job Management\1.5 Quality\[BNE-1127 Register Drawing Transmittal_20180824.xls]QA-FRM-05A R: 05-14 P 1 of 1

This revision has been approved for use by HIG

Client: **Scenic Rim Regional Council**

Project: **Bridge Replacement Concept Designs (Order No. PGO-038567)**

HIG No: **BNE-1127**

Authorised by: **Mike Harris**

Issued To

SRRC	Matthew Arnold	X

REASON FOR ISSUE

A-Approval C-Construction X-Information T-Tender P-Preliminary D-Draft F Final	F

METHOD OF DELIVERY

E-Email C-Courier P-Post H-Hand U-Picked up	P

DOCUMENT TYPE

O-Original C-Copy S-Scan	O

DOCUMENT SIZE	A4

DRAWING No.	**DESCRIPTION / TITLE**	**REVISION No.**
-	Design Report – Bridge Replacement Concept Designs, May 2017	1

DAY	24
MONTH	08
YEAR	17

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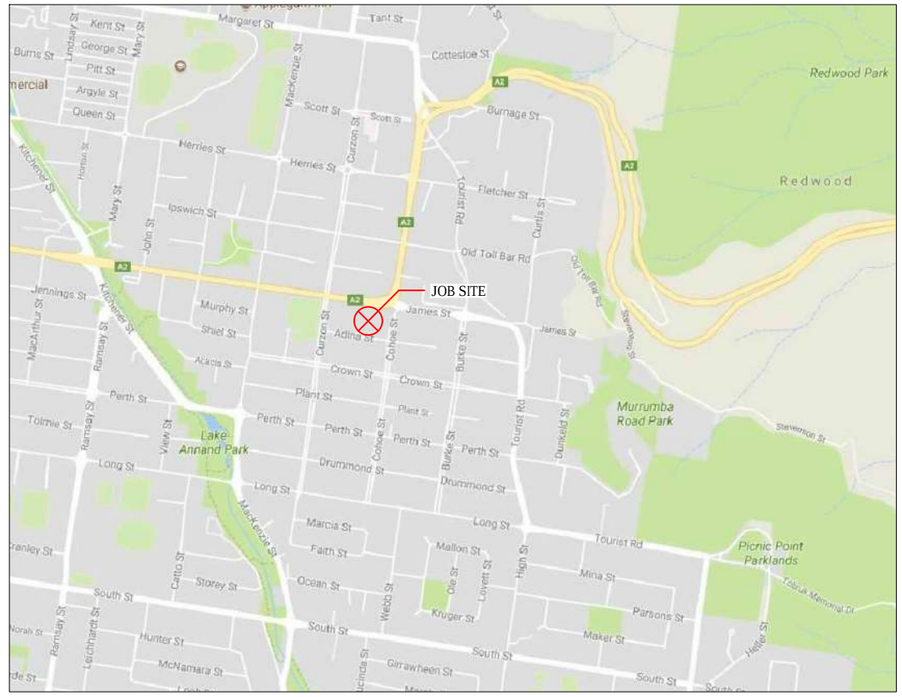
PLAN - GENERAL ARRANGEMENT
SCALE 1:250



LOCALITY PLAN
N.T.S.

DRAWING INDEX

SHEET NUMBER	SHEET TITLE
1043-001	GENERAL ARRANGEMENT PLAN
1043-002	EARTHWORKS PLAN
1043-003	NOTES & DETAILS PLAN
1043-004	LONG SECTIONS PLAN - SHEET 1
1043-005	LONG SECTIONS PLAN - SHEET 2
1043-006	LONG SECTIONS PLAN - SHEET 3
1043-007	RETAINING WALL SECTIONS - SHEET 1
1043-008	RETAINING WALL SECTIONS - SHEET 2
1043-009	DRAINAGE LAYOUT PLAN

EXISTING PUBLIC UTILITIES PLANT LEGEND

Electricity (overhead)	E E E
Sewer Main	S S
DBYD Sewer	dS dS
DBYD Trunk Water Main	dW dW
Reticulation Water Main	
DBYD Telstra (Copper Cable)	dOF dOF
DBYD Telstra (Optic Fibre)	dT dT
Storm Water Pipe	

EXISTING PUBLIC UTILITIES PLANT NOTES

The locations of visible utilities have been approximated from the known positions of valves, manholes, etc, and from information supplied by the utility authorities. Details of utility services are provided for information only, and no responsibility is taken for the accuracy or completeness of the information supplied.

Possible utility authority conflict points shown thus: SERVICE
Not all conflicts have necessarily been shown.

Positions of all conflicts shall be checked by the Contractor. Utility relocations may or may not be relocated prior to start of construction. Relocations shall be recorded by the Contractor. No construction work shall be undertaken until utility locations have been confirmed on site with the utility owner.
This is not an exhaustive list. Unknown utilities may be present, contractor to satisfy himself.

REVISIONS	APPD	DATE
A DA SUBMISSION		

NOTE: FIGURED DIMENSIONS TO TAKE PRECEDENCE OVER SCALED MEASUREMENTS. VERIFY ALL ON SITE DIMENSIONS & LEVELS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES. COPYRIGHT OF THIS DRAWING IS VESTED WITH HARRISON INFRASTRUCTURE GROUP.

Original Size - A1

CLIENT:
Australian Childcare Solutions
Level 18, Riverside Centre
123 Eagle Street
BRISBANE QLD 4000
P: 07 3112 2681 F: 07 3112 2601

SCALES:
0 2.5 5 7.5 10 12.5m
Plan - Scale 1:250 (A1)
Dimensions in metres except where shown otherwise.

HIG HARRISON INFRASTRUCTURE GROUP
CONSULTING ENGINEERS
Toowoomba Office
230 James St
TOOWOOMBA QLD
P: (07) 4639 4188
F: (07) 4639 4622

PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
GENERAL ARRANGEMENT PLAN

Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	1 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147
Dwg. No.: 1043-001
Revision: A

Dwg Ref. h:\projects - bne\bne-114-7 james cohoe child care swmp\4.0 drawings\4.1_Dwg\GENERAL ARRANGEMENT PLAN.dwg Plot Date: 15.09.2017

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James Street

RETAINING WALL 3

RETAINING WALL 2

RETAINING WALL 1

30 JAMES STREET
(LOT 2 RP97597)

FOR RETAINING WALL SETOUT
REFER DWG. NO 1043-003

SWALE

Proposed Verandah
SSL 644.30

Outdoor Play Area 2

CUT / FILL
INTERFACE

RETAINING WALL 7

MC01

MC02

MC03

MC04

MC05

Proposed Building
SSL 644.40

Proposed Carpark (Asphalt)

2.5% (1 in 40)

5% (1 in 20)

RETAINING WALL 4

Construct new manhole on existing sewer. Sewer above manhole to be removed. Install new connection – Details to be supplied by Hydraulic consultant

RETAINING WALL 6

RETAINING WALL 5

STORMWATER DRAINAGE
REFER DWG 1043-007
FOR DETAILS

Outdoor Play Area 1

Cohoe Street

PM 118140

643.800
643.900
644.300
644.350
644.550
644.725
644.875
645.200
645.300

1 ADINA STREET
(LOT 4 RP838211)

23 COHOE STREET
(LOT 3 RP77100)

FOR RETAINING WALL SECTIONS
REFER DWGS 1043-007-1043-008

LEGEND

Electricity (overhead)	E
Sewer Main	S
DBYD Sewer	dS
DBYD Trunk Water Main	dW
Reticulation Water Main	
DBYD Telstra (Copper Cable)	dOF
DBYD Telstra (Optic Fibre)	dT
Storm Water Pipe	
Proposed major contour (0.5m)	
Proposed minor contour (0.05m)	
Proposed retaining wall (max. height 1m)	
Proposed Surface Drain	
Surface to be demolished	
Proposed Building	
Proposed Carpark (Asphalt)	
Proposed Turfed Area	
Proposed Concrete Hardstand	
Proposed Gardenbed	

REVISIONS	APPD	DATE
A DA SUBMISSION		

NOTE: FIGURED DIMENSIONS TO TAKE PRECEDENCE OVER SCALED MEASUREMENTS. VERIFY ALL ON SITE DIMENSIONS & LEVELS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES. COPYRIGHT OF THIS DRAWING IS VESTED WITH HARRISON INFRASTRUCTURE GROUP.

Original Size - A1

CLIENT:
Australian Childcare Solutions
Level 18, Riverside Centre
123 Eagle Street
BRISBANE QLD 4000
P: 07 3112 2681 F: 07 3112 2601

SCALES:
0 1 2 3 4 5m
Plan - Scale 1:100 (A1)
Dimensions in metres except where shown otherwise.

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CONSULTING ENGINEERS
Toowoomba Office
230 James St
TOOWOOMBA QLD
P: (07) 4639 4188
F: (07) 4639 4622

PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
EARTHWORKS PLAN

Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	2 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147
Dwg. No.: 1043-002
Revision: A

Dwg Ref: h:\projects - bne\bne-1147 james cohoe child care swmp\4.0 drawings\4.1_Dwg\EW01 - EARTHWORKS PLAN.dwg Plot Date: 15.09.2017

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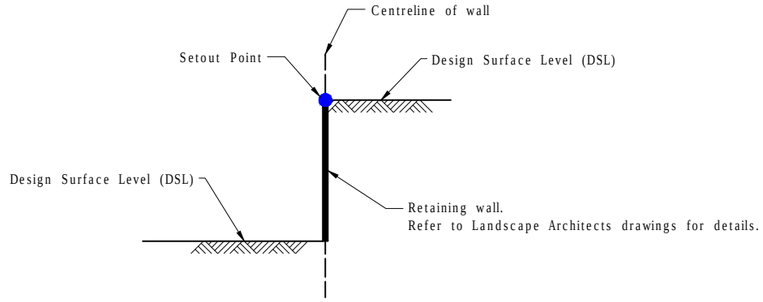
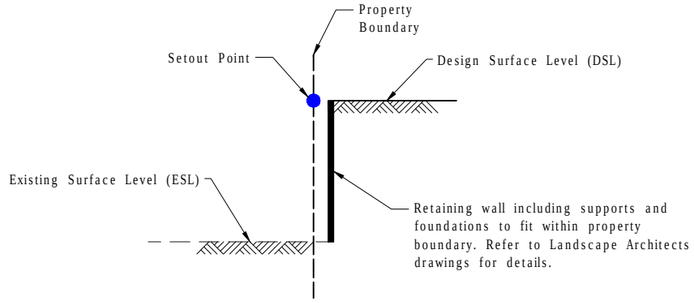
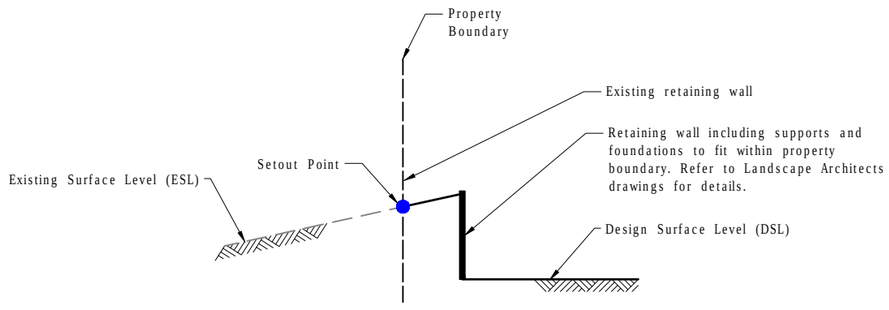


INTERNAL RETAINING WALL SETOUT POINT LOCATION DETAIL
N.T.S.



PERIMETER RETAINING WALL SETOUT POINT LOCATION DETAIL (IN FILL)
N.T.S.



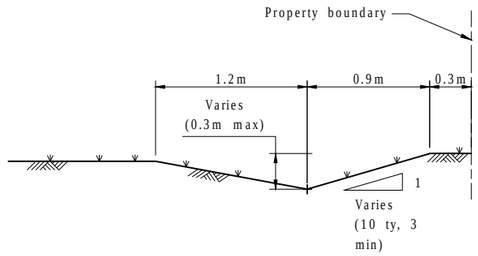
PERIMETER RETAINING WALL SETOUT POINT LOCATION DETAIL (IN CUT)
N.T.S.

GENERAL NOTES
1. All construction shall be to the approval of Toowoomba Regional Council and the superintendent.
2. Contractor shall check and confirm all dimensions on site before commencing any work.
3. The contractor shall submit an approved safety plan before any work commences.
4. For locations of earthworks sections, refer to drg no bne-1140-02.
5. Proposed surface reflects approximate ground level including topsoil, pavement layers and hardscape as applicable. Refer to architects drawings for surface finishes. Bulk earthworks to be cut back accordingly.

COMPACTION TESTING
1. All test locations are to be shown on a sketch plan showing the location on site.
2. Testing and certification of bulk earthworks compaction to be carried out to AS1289 "5 series" to achieve 95% standard compaction on allotments. All works to comply with AS 3798 "Guidelines for earthworks for commercial and residential developments" - level 1 certification.
3. Should any test fail then the material is to be re-worked and an additional two compaction tests taken. If the required compaction standard is still not achieved then the material is to be removed and replaced.
4. Any uncontrolled fill on the site is to be removed and recompacted under Level 1 supervision.

TOPSOIL AND TURFING
1. All non-hardstand areas that are affected by construction shall be top soiled and turfed as soon as possible during construction.

DAMAGE TO SERVICES AND ASSETS
1. The contractor shall undertake all reasonable measures to protect Council and Public Utility services and assets during construction of the development.
2. Any damage caused to existing services and assets as a result of the development works must be repaired at no cost to the asset owner in accordance with the following timing:
   - 2.1. Where damage would cause a hazard to pedestrian or vehicle safety or interrupts a service to the community, immediately or
   - 2.2. Where otherwise, as soon as reasonably possible, but no later than completion of the works associated with the development.
3. Any repair work which includes alteration to the alignment or level of existing services and assets must be referred to the relevant service authority for approval.



TYPICAL SECTION GRASS SWALE
N.T.S.

EROSION & SEDIMENT CONTROL NOTES
1. Stockpiles of topsoil, sand, aggregate, spoil or other material capable of being moved by the action of wind or running water must be stored clear of drainage paths and not within road reserve at any time.
2. Measures such as sediment fences, earth berms, temporary drainage, temporary sediment basins, dewatering or stormwater filtering devices to prevent eroded material, sediment or sediment laden water from being transported to adjoining properties, roads or stormwater drainage systems must be provided and maintained during construction
3. Where erosion and sediment control measures have been damaged, fail or are inadequate and erosion or the release of sediment or sediment laden water has occurred from the site or associated works, any resultant property damage or interference caused must be repaired or cleaned up within 24 hours or upon the direction of council, at no cost to the affected parties.
4. Measures such as vehicle baths, wash-down and construction matting together with dust suppressants and wraps, exposed ground and stockpile sprinkling must be put in to prevent site vehicles tracking sediment onto adjoining streets during construction period, and to prevent dust nuisance during construction and the ensuing 'On-Maintenance' period.
5. Construction of all sediment management devices shall be completed and effective prior to:
   - (i) Stripping of topsoil and grass.
   - (ii) Bulk earthworks to the site.
   - (iii) Service installations.
6. All sediment management devices are to remain in place until notice from the superintendent.
7. Both temporary and permanent sediment management devices shall be maintained at a suitable level/condition throughout construction. Sediment fences are to be cleaned out when capacity is reduced by 30%.
8. If erosion and sediment control devices that have been found to be deficient or failed in service, due to unforeseen circumstances, corrective action is to be undertaken immediately which may include amendments/additions to the original approved erosion control plans. such additions or amendments are to be approved by the superintendent.
9. All erosion and sediment control devices are to be inspected at least weekly, before and after rainfall events. Any damage or excess erosion/sediment is to be repaired/managed as required to maintain control devices.
10. Silt fences shown on the drawings shall not necessarily be limited to the locations shown.
11. Additional Silt Fences may be required as directed by Superintendent.
12. The contractor shall ensure all turfed and seeded areas are regularly watered to ensure vegetation is maintained.

RETAINING WALL SETOUT POINTS

POINT ID	EASTING	NORTHING	TOP OF WALL	BASE OF WALL	WALL HEIGHT
01	398728.882	6949766.089	643.93	643.73	0.2
02	398711.755	6949768.597	643.80	643.14	0.66
03	398715.465	6949793.108	643.90	643.72	0.18
04	398718.458	6949812.882	643.81	643.71	0.10
05	398718.697	6949814.460	643.80	643.38	0.42
06	398727.264	6949813.215	643.99	643.82	0.17
07	398738.567	6949811.576	644.34	644.12	0.22
08	398747.773	6949810.247	644.69	644.17	0.52
09	398747.612	6949809.155	644.72	644.18	0.54
10	398749.992	6949808.804	644.82	644.19	0.63
11	398750.153	6949809.903	644.81	644.19	0.62
12	398757.779	6949808.795	645.13	644.23	0.90
13	398757.577	6949807.450	645.25	644.23	1.02
14	398758.071	6949807.377	645.29	644.22	1.07
15	398757.886	6949806.120	645.31	644.22	1.09
16	398758.345	6949806.029	645.33	644.22	1.11
17	398758.034	6949803.601	645.42	644.24	1.18
18	398759.199	6949803.398	645.46	644.25	1.21
19	398755.822	6949780.465	644.83	644.83	0
20	398755.457	6949777.992	644.84	644.84	0
21	398754.439	6949770.533	644.86	644.33	0.53
22	398753.256	6949770.707	644.67	644.28	0.39
23	398753.044	6949769.160	644.61	644.27	0.34
24	398746.062	6949770.165	644.40	644.23	0.17
25	398773.732	6949776.371	645.51	645.26	0.25
26	398777.594	6949801.900	646.16	645.90	0.26
27	398774.263	6949806.392	645.91	645.79	0.12
28	398766.406	6949807.542	645.67	645.45	0.22

REVISIONS	APPD	DATE
A DA SUBMISSION		

NOTE: FIGURED DIMENSIONS TO TAKE PRECEDENCE OVER SCALED MEASUREMENTS. VERIFY ALL ON SITE DIMENSIONS & LEVELS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES. COPYRIGHT OF THIS DRAWING IS VESTED WITH HARRISON INFRASTRUCTURE GROUP.

Original Size - A1

CLIENT:
Australian Childcare Solutions
Level 18, Riverside Centre
123 Eagle Street
BRISBANE QLD 4000
P: 07 3112 2681 F: 07 3112 2601

SCALES:
NOT TO SCALE
Dimensions in metres except where shown otherwise.

HIG HARRISON INFRASTRUCTURE GROUP
CONSULTING ENGINEERS
Toowoomba Office
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TOOWOOMBA QLD
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F: (07) 4639 4622

PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

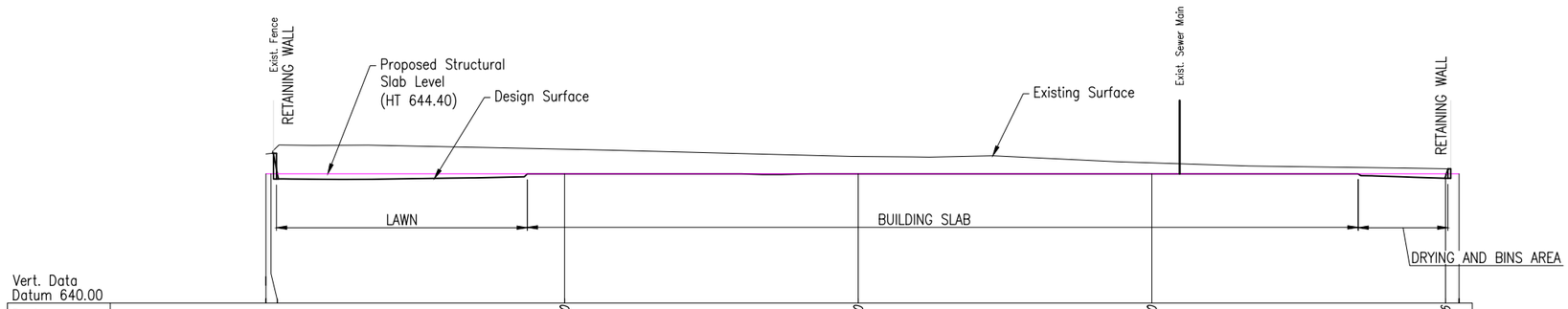
TITLE:
NOTES & DETAILS PLAN

Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	3 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147
Dwg. No.: 1043-003
Revision: A

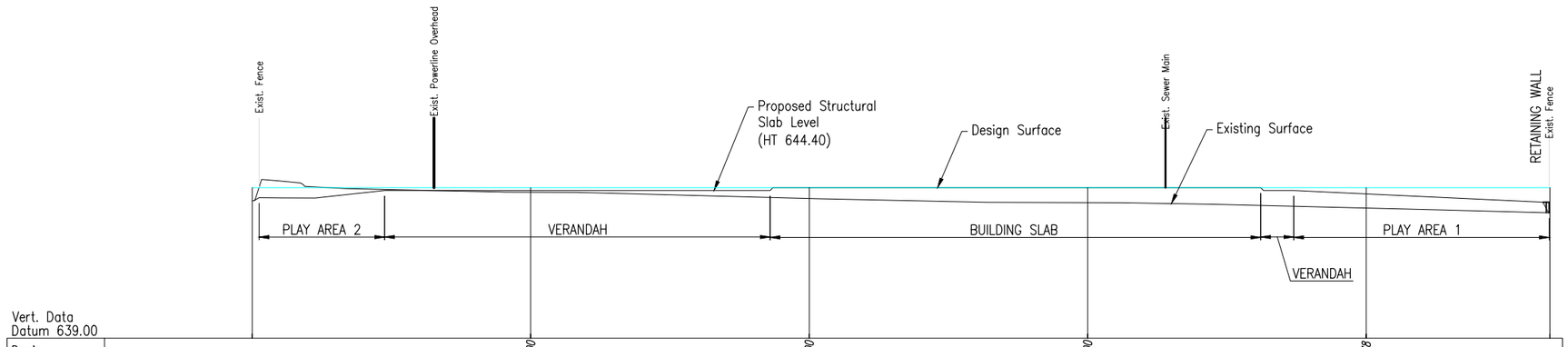
Dwg Ref: h:\projects - bne\bne-1147 james cohoe child care swmp\4.0 drawings\4.1_Dwg\NOTES & DETAILS PLAN.dwg Plot Date: 15.09.2017



Vert. Data Datum 640.00						
Design Surface Level		644.400	644.400	644.400	644.306	
Existing Surface Level	645.081 645.096	645.239	644.991	644.773	644.573	
Chainage	−0.172 0	10	20	30	40	40.464

SECTION MC02

SCALE 1:100



Vert. Data Datum 639.00						
Design Surface Level		644.300	644.400	644.400	644.178	
Existing Surface Level	643.930	644.239	644.014	643.863	643.670	643.500
Chainage	0	10	20	30	40	46.597

SECTION MC01

SCALE 1:100

REVISIONS	APPD	DATE
A DA SUBMISSION		

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Original Size - A1

CLIENT:

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Level 18, Riverside Centre
123 Eagle Street
BRISBANE QLD 4000
P: 07 3112 2681 F: 07 3112 2601

SCALES:

0 1 2 3 4 5m
Plan - Scale 1:100 (A1)

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PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
SITE SECTIONS - SHEET 1 OF 3

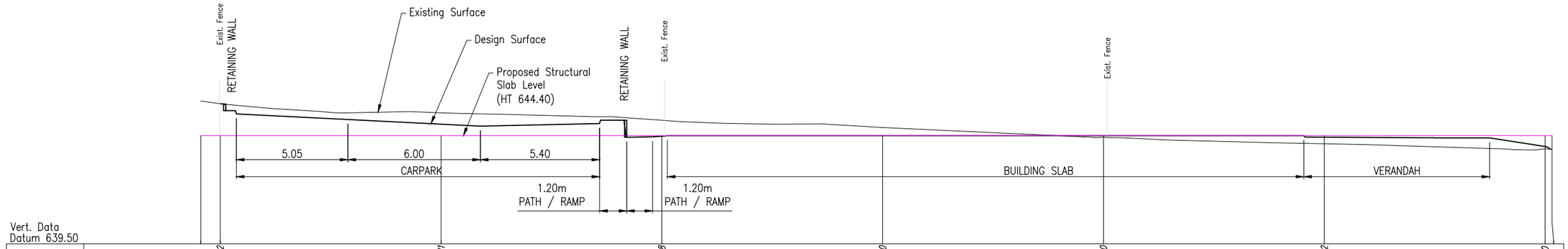
Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	4 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147

Dwg. No.: 1043-004

Revision: A



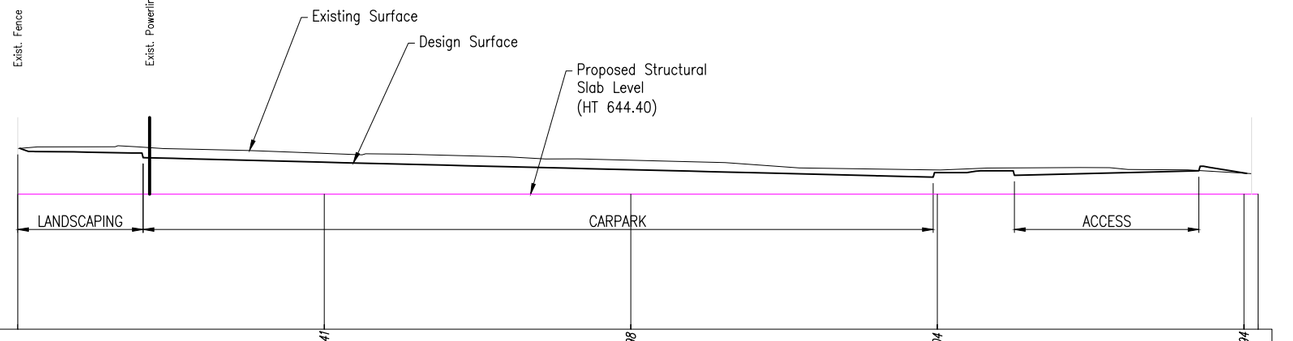
Vert. Data
Datum 639.50

Design Surface Level	645.852	644.921	644.378	644.400	644.400	644.332	643.910
Existing Surface Level	645.969	645.849	645.435	645.097	644.771	644.330	644.035	643.806 / 643.785
Chainage	−0.883	0	10	20	30	40	50	60 / 60.312

VERTICAL SCALE 1:100

SECTION MC04

SCALE 1:100



Vert. Data
Datum 640.00

Design Surface Level		645.441	645.198	645.104	645.094
Existing Surface Level	645.887	645.730	645.506	645.191	645.085
Chainage	0	10	20	30	40 / 40.464

SECTION MC03

SCALE 1:100

A	DA SUBMISSION		
REVISIONS		APPD	DATE

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Original Size - A1

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SCALES:
0 1 2 3 4 5m
Plan - Scale 1:100 (A1)

Dimensions in metres except where shown otherwise.

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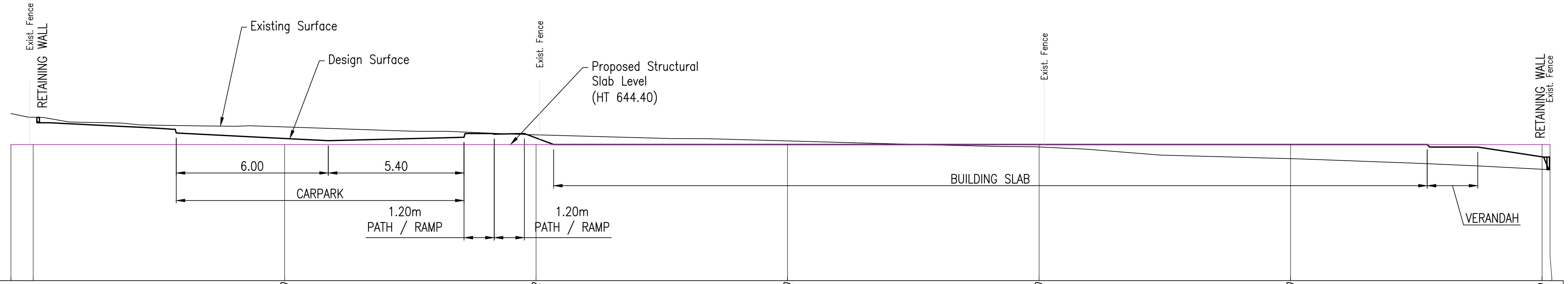
PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
SITE SECTIONS - SHEET 2 OF 3

Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	5 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147
Dwg. No.: 1043-005
Revision: A



Vert. Data Datum 639.00

Design Surface Level			644.640	644.662	644.400	644.400	644.400	643.910	
Existing Surface Level	645.629	645.481	645.100	644.788	644.543	644.305	643.839	643.421	643.405
Chainage	-0.883	0	10	20	30	40	50	60	60.314

SECTION MC05

SCALE 1:100

Dwg Ref: h:\projects - bne\bne-1147 james cohoe child care swmp\4.0 drawings\4.1_Dwg\LONG SECTIONS PLAN - SHEET 3.dwg Plot Date: 15.09.2017

A	DA SUBMISSION		
	REVISIONS	APPD	DATE

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SCALES:
0 1 2 3 4 5m
Plan - Scale 1:100 (A1)

Dimensions in metres except where shown otherwise.

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CONSULTING ENGINEERS

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PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
SITE SECTIONS - SHEET 3 OF 3

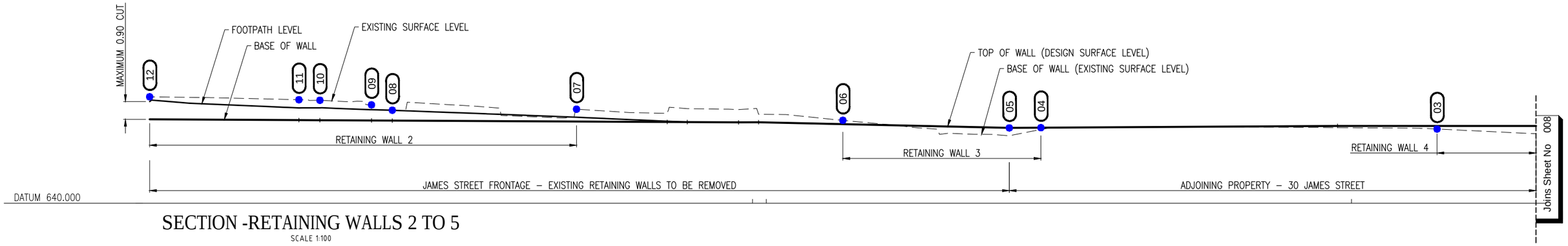
Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	6 of 9	SEP '17

Engineering Cert.
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No. BNE-1147

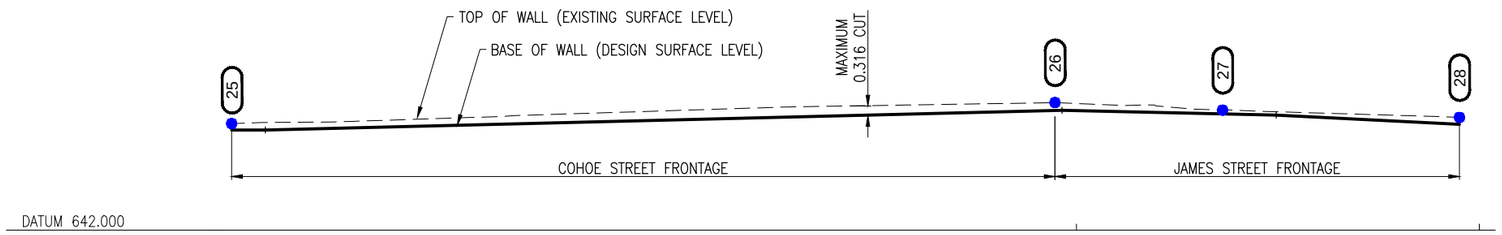
Dwg. No. 1043-006

Revision A



SECTION -RETAINING WALLS 2 TO 5

SCALE 1:100



SECTION -RETAINING WALL 1

SCALE 1:100

Dwg Ref. h:\projects – bne\bne-1147 james cohoe child care swmp\4.0 drawings\4-1_Dwg\LONG SECTIONS PLAN – RETAINING WALL.dwg Plot Date: 15.09.2017

A	DA SUBMISSION		
REVISIONS		APPD	DATE

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SCALES:
0 1 2 3 4 5m
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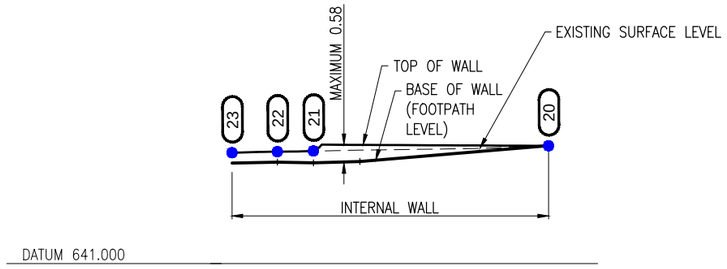
PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
RETAINING WALL SECTIONS - SHEET 1

Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	7 of 9	SEP '17

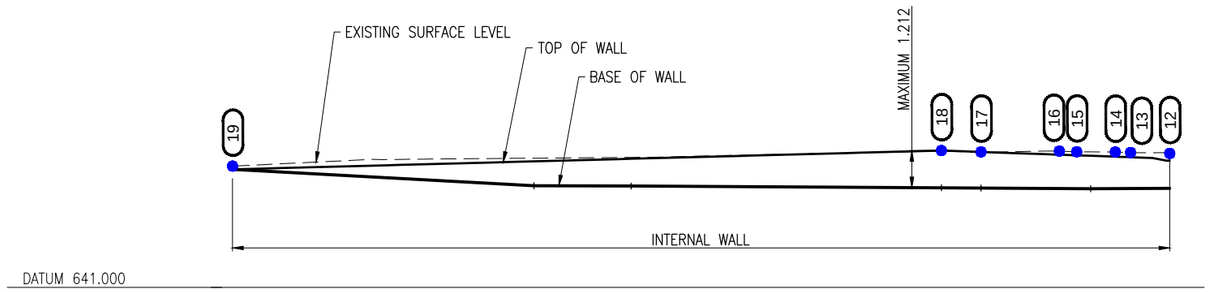
Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147
Dwg. No.: 1043-007
Revision: A



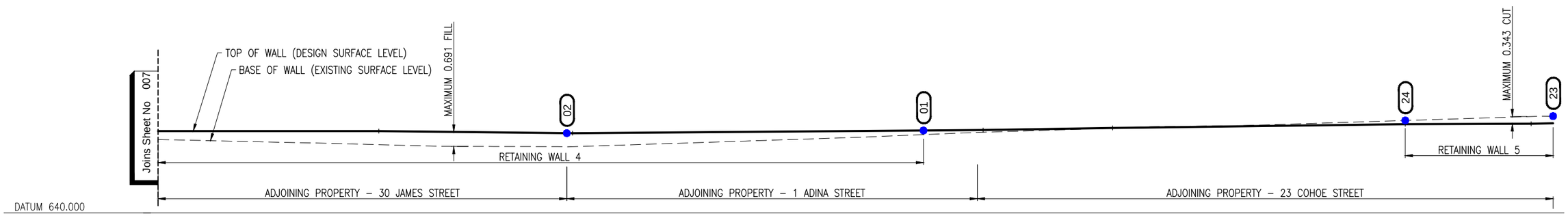
SECTION - RETAINING WALL 6

SCALE 1:100



SECTION - RETAINING WALL 7

SCALE 1:100



SECTION - RETAINING WALLS 2 TO 5

SCALE 1:100

Dwg Ref. h:\projects – bne\bne-116.7 james cohoe child care swmp\4.0 drawings\4.1_Dwg\LONG SECTIONS PLAN – RETAINING WALL – SHEET 2.dwg Plot Date: 15.09.2017

REVISIONS	APPD	DATE
A DA SUBMISSION		

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123 Eagle Street
BRISBANE QLD 4000
P: 07 3112 2681 F: 07 3112 2601

SCALES:
0 1 2 3 4 5m
Plan - Scale 1:100 (A1)
Dimensions in metres except where shown otherwise.

HIG HARRISON INFRASTRUCTURE GROUP
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PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
RETAINING WALL SECTIONS - SHEET 2

Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	8 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147
Dwg. No.: 1043-008
Revision: A

DIAL BEFORE YOU DIG www.1100.com.au

Discharge via kerb adapter to James Street
Approx IL = 642.90

Hot dipped galvanised RHS Roofwater Drain 200x75 or equivalent

225Ø RCP High Flow Bypass

1050Ø Stormwater inspection manhole
USIL = 643.13
DSIL = 643.11

Ø150 UPVC

Roof drainage connection pit
IL = 643.75

150Ø uPVC Outlet

11.25° bends
Ø150 UPVC
(2 No.)

1000Ø SPEL Hydrosystem or equivalent approved
USIL = 643.39
DSIL = 643.14

300x300 Field Inlet
CL = 644.0
IL = 643.4

Attenuation/Storage Roofwater Tank B
3 No, 8kL Slimline steel water tank or equivalent,
2.05m high, Base RL = 644.40
Ø75 orifice - Centroid RL + 644.90
Tank shape and positions to be confirmed with landscape architect in the detailed design stage

Outdoor Play Area 2

Roof drainage connection pit
IL = 643.71

Proposed Building

Ø150 UPVC

Existing Conc. Footpath

James Street

Subsoil drainage from behind retaining wall to discharge at lower ground level into swale

PM 118140

Cohoe Street

Existing Concrete Path

Lip of K&C

Proposed Carpark (Asphalt)

644.875

600x600
Grated Inlet
CL = 644.50
IL = 644.00

1050Ø Stormwater manhole with low flow diversion to water treatment device
IL= 643.95

Ø225 RCP High flow bypass

Ø150 UPVC outlet

150Ø UPVC Inlet

Conflict with existing 100mm AC watermain to be resolved in detailed design

300Ø RCP
USIL 643.67
DSIL 643.64

Ø100 UPVC

Stormwater junction pit
IL = 643.81

Roof drainage connection pit
IL = 643.95
CL = 644.30

Attenuation/Storage Roofwater Tank A (8kL Slimline Steel Water Tank or equivalent, 2.05m high, Base RL + 644.40, remove brackets, Ø90 orifice, Centroid RL + 645.00

Outdoor Play Area 1

1000Ø SPEL Hydrosystem or equivalent approved
USIL = 643.95
DSIL = 643.70

1050Ø Stormwater Manhole with Non-return flaps on both incoming pipes to protect site from any surcharge within existing 750Ø trunk main
USIL = 643.68
DSIL = 643.67

Connect to existing Ø750 RCP (Approx IL 643.42) with pre-cast saddle.

LEGEND

- Electricity (overhead)
- Sewer Main
- DBYD Sewer
- DBYD Trunk Water Main
- Reticulation Water Main
- DBYD Telstra (Copper Cable)
- DBYD Telstra (Optic Fibre)
- Storm Water Pipe
- Proposed major contour (1m interval)
- Proposed minor contour (0.5m interval)
- Proposed open drain
- Proposed retaining wall
- Proposed Fence
- Barrier kerb
- Stormwater Pipe
- Stormwater Swale
- Proposed Roof Outline
- PC Spoon Drain
- Major Storm Overflow
- Proposed Rainwater Tank
- Proposed Building
- Proposed Carpark (Asphalt)
- Proposed Turfed Area
- Proposed Concrete Hardstand
- Proposed Gardenbed

Dwg Ref: h:\projects - bne\bne-1147 james cohoe child care swmp\4.0 drawings\4.1_Dwg\DRAINAGE LAYOUT PLAN.dwg Plot Date: 15.09.2017

A	DA SUBMISSION		
REVISIONS		APPD	DATE

NOTE: FIGURED DIMENSIONS TO TAKE PRECEDENCE OVER SCALED MEASUREMENTS. VERIFY ALL ON SITE DIMENSIONS & LEVELS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES. COPYRIGHT OF THIS DRAWING IS VESTED WITH HARRISON INFRASTRUCTURE GROUP.

Original Size - A1

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SCALES:
0 1 2 3 4 5m
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CONSULTING ENGINEERS
Toowoomba Office
230 James St
TOOWOOMBA QLD
P: (07) 4639 4188
F: (07) 4639 4622

PROJECT:
RANGEVILLE CHILDCARE CENTRE
CNR JAMES & COHOE STREET

TITLE:
DRAINAGE LAYOUT PLAN

Drawn	Check	Design	Veri.	Sheet	Date
GP	JMB	LJ	IW	9 of 9	SEP '17

Engineering Cert
RPEQ: Tony Gallagher
RPEQ No: 13396

Project No.: BNE-1147
Dwg. No.: 1043-009
Revision: A