

Our Ref: B13343.W.11L.AMP.cm.docx
Contact: Andrew McPhail

**PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL**



Approval no: DEV2016/811

Date: 21 September 2017

2 May 2017

Marco Bonotto (EDQ)
C/- PSA Consulting
PO Box 10824
Brisbane, QLD 4000

Attention: Marco Bonotto

Dear Marco,

**Jimboomba Celestino Master Plan Development within the Greater Flagstone Priority Development Area (PDA)
Cumulative Impact Assessment for Final Response to Item B-1 of Summary of Flood Investigation and
Stormwater Management Review document (received by Calibre on 19 January 2017).**

Calibre Consulting (QLD) has previously submitted a *Concept Stormwater Management Plan Report (Concept SWMP, No. B13343.W-02A* dated November 2016) and a *Flood Investigation Report (No. B13343.W-01B* dated November 2016) for the Jimboomba Celestino master plan development within the Greater Flagstone Priority Development Area (PDA). Since the submission of the abovementioned reports to Economic Development Queensland (EDQ), EDQ have requested further information as per their *Summary of Flood Investigation and Stormwater Management Review* document (received by Calibre on 19 January 2017).

A meeting with EDQ and applicant was held on the 2nd February 2017 to discuss the information request items (meeting minutes are provided in **Attachment 1**). Calibre Consulting has also been in contact with BMT WBM Consultant Martin Giles to confirm the scope required to address EDQ's IR Items. This has informed Calibre's responses. An initial response was submitted to EDQ in Letter No. **B13343.W.10L.AMP.cm.docx** dated 20 April 2017, which covered all IR items except for the cumulative impact assessment to fully satisfy Item B-1. This letter provides the required cumulative impact assessment and demonstrates no adverse impact when considering potential future development discharging directly to the Logan River or Teviot Brook.

Note that an impact assessment of the master plan development only (i.e. Dot Point 3 below) has already been provided in Letter No. **B13343.W.10L.AMP.cm.docx** dated 20 April 2017. Investigation of TUFLOW modelling results (rather than XP-RAFTS only) was undertaken for this previous assessment, which is more rigorous and does not require additional calibration.

The following scope was provided by Martin Giles to address potential cumulative impact of providing no detention.

Scope Provided By BMT WBM (Updated XP-RAFTS Modelling Only)

In summary, the following would be considered appropriate to demonstrate that the development can proceed without detention basins being provided.

- *Confirm that the Council XP-RAFTS model is suitable for the assessment of impacts on flood warning times (i.e. that it has either been calibrated to results at stream gauges or the flows predicted by the model agree within reasonable limits to those obtained from the TUFLOW hydraulic model.*

- *Refine the XP-RAFTS model to ensure that the discharge from the site is modelled as occurring to the Logan River from the site and not at the downstream end of the sub-catchment that contains the model.*
- *Assess the impact of developing without detention on the flood warning time at a suitable number of points downstream of the site.*
- *If it is proposed to not include detention basins within the development, then modify the RAFTS model to reflect all PDA's and areas zoned for future development by Councils within the Logan River floodplain assuming no detention basins. The analysis would exclude development on areas that discharge to creeks prior to discharging to the river as such development would be expected to include detention basins.*
- *Optionally complete modelling to determine the impact of a 1% AEP detention basin within the Celestino development using the TUFLOW model of the catchment.*

Refer to BMT WBM's Letter No. L.B22170.005.Celestino Additional Notes.docx (dated 28 March 2017) provided in **Attachment 1** for further details.

Scope Undertaken by Calibre (Updated TUFLOW Modelling)

In Calibre's investigations, multiple iterations were undertaken to calibrate the existing XP-RAFTS model to existing TUFLOW results. Due to the storage and conveyancing properties of the river an acceptable calibration could not be achieved. As such, Calibre's has undertaken a more rigorous approach of updating the TUFLOW model to incorporate potential future development (without detention) along the Logan River and Teviot Brook. The following outlines Calibre's scope to address cumulative impact:

- *Update to XP-RAFTS Models for Input into TUFLOW* – The XP-RAFTS models for the Lower Logan River, Upper Logan River and Teviot Brook were updated to incorporate any future development within the Logan River or Teviot Brook floodplain (assuming no detention) for input into TUFLOW. This is consistent with methodology adopted in Calibre Consulting's previous analysis as per the *Flood Investigation Report* (No. **B13343.W-01B** dated November 2016).
- *Update to TUFLOW Model Inflows* – The developed TUFLOW model was updated to incorporate potential future development within the Logan River and Teviot Brook floodplain upstream of the site, i.e. any PDA's and Council areas zoned for future development in the SEQ Regional Plan 2009-2031 (also including the DRAFT 2016 regional plan). This is consistent with methodology adopted in Calibre Consulting's previous analysis as per the *Flood Investigation Report* (No. **B13343.W-01B** dated November 2016), i.e. no TUFLOW elements such as boundary input (tbc), 1D network (ecf), rainfall (tef) or geometry data (tgc) were changed.
- *Impact Assessment* – An assessment of peak flood level impact and changes to flood warning times was undertaken at key locations downstream of the site (Payne Bridge along Cusack Lane, Maclean Bridge along the Mt Lindesay Highway and adjacent to Wendt Park & Road at the most downstream extent of the TUFLOW model) to demonstrate no adverse impact.

Our responses to EDQ's Review (January 2017) are as follows:

B-1 Detention

It is proposed to develop the site without detention basins for the majority of catchments. As the development is located well upstream of the river mouth, in order for such an approach to be acceptable, it will be necessary to demonstrate that the cumulative impact of similar development in the floodplain (based on the Council Planning Scheme and the PDA's defined by EDQ) will not result in an adverse impact, both in terms of flood levels and flood warning times in downstream areas affected by flooding.

Alternatively, on-line detention can be provided within the west-east internal drainage corridor. If it is demonstrated that the on-line detention is sufficient to attenuate the impact of development for the full range of storm durations for the full range of flood events for the entire development area and that the resultant site runoff would not significantly impact on warning times, then the need for a cumulative assessment would be obviated.

Response

As mentioned above, an investigation has already been undertaken to demonstrate no adverse impact as a result of the master plan development only. Refer to Letter No. **B13343.W.10L.AMP.cm.docx** dated 20 April 2017 for details.

Updates to XP-RAFTS Models for Input Into TUFLOW

Lower Logan River, Upper Logan River and Teviot Brook XP-RAFTS models have been updated to incorporate potential future development upstream of the master plan development. The following development areas were incorporated in the *Potential Future Development Scenario*:

- All Priority Development Areas (PDA's) within the Logan River & Teviot Brook floodplain upstream of the site and downstream within the TUFLOW modelling extents;
- All areas zoned for future development by Council's within the Logan River & Teviot Brook floodplain (as per the current SEQ Regional Plan 2009-2031 and DRAFT 2016 SEQ Regional Plan) upstream of the site and downstream within the TUFLOW modelling extents;
- All PDA's discharging directly to Woollaman Creek prior to Teviot Brook and Logan River – this is a conservative assumption.

Refer to Drawing No. **B13343.W-SK13** in **Attachment 3** for development areas included in the *Potential Future Development Scenario*.

This is in accordance and more conservative than Dot Point 4 of BMT WBM's Scope (March 2017), which indicates that fraction impervious values in the XP-RAFTS models are to be updated to "reflect all PDA's or and areas zoned for future development by Councils within the Logan River floodplain assuming no detention basins. The analysis would exclude development on areas that discharge to creeks prior to discharging to the river as such development would be expected to include detention basins."

To remain consistent with the analysis undertaken in the *Flood Investigation Report* (No. **B13343.W-01B** dated November 2016) a Fraction Impervious value of 0.8 was assumed for development areas. Updated catchment details are outlined in **Table 1** below.

Table 1: Potential Future Development Scenario Catchment Details

XP-RAFTS Model	Sub-Catchment	Area (ha)	Existing Fraction Impervious (%)	Potential Future Developed Fraction Impervious (%)
Lower Logan River Model	LR026	619	33.6	45.9
	LR027 ¹	494	32.5	58.3
	LR028_YAR ¹	320	30.9	51.1
	LR029 ¹	2,148	19.1	28.8
Upper Logan River Model	LR033	1,768	3.2	7.2
	LR034	2,607	0.2	5.7
	LR035	1,704	0.0	8.9
	SAN001	1,264	0.0	28.6
Teviot Brook Model	TB001	1,115	20.5	55.4
	WYR001	1,127	14.7	92.6
	UND001	1,132	13.9	81.0
	UND002	1,800	14.4	31.2
	WOOL001	746	13.1	28.0
	WOOL002	777	12.2	84.7
	WOOL003	1,146	13.2	50.5
	WOOL004	1,625	14.5	23.7
	WOOL005	1,451	13.6	21.4

¹Includes Master Plan Development areas as per previous *Developed Scenario Model*

Updates to TUFLOW Model

The cut-down TUFLOW Model received from Council and used for analysis in the *Flood Investigation Report* (No. **B13343.W-01C** dated April 2017), utilised upstream inflow boundary lines with input from flow hydrograph results extracted from XP-RAFTS output. Refer to **Figure 1** for a summary. Therefore, it was appropriate to update the upstream inflow hydrographs with outputs from the *Potential Future Development Scenario* XP-RAFTS model (details above).

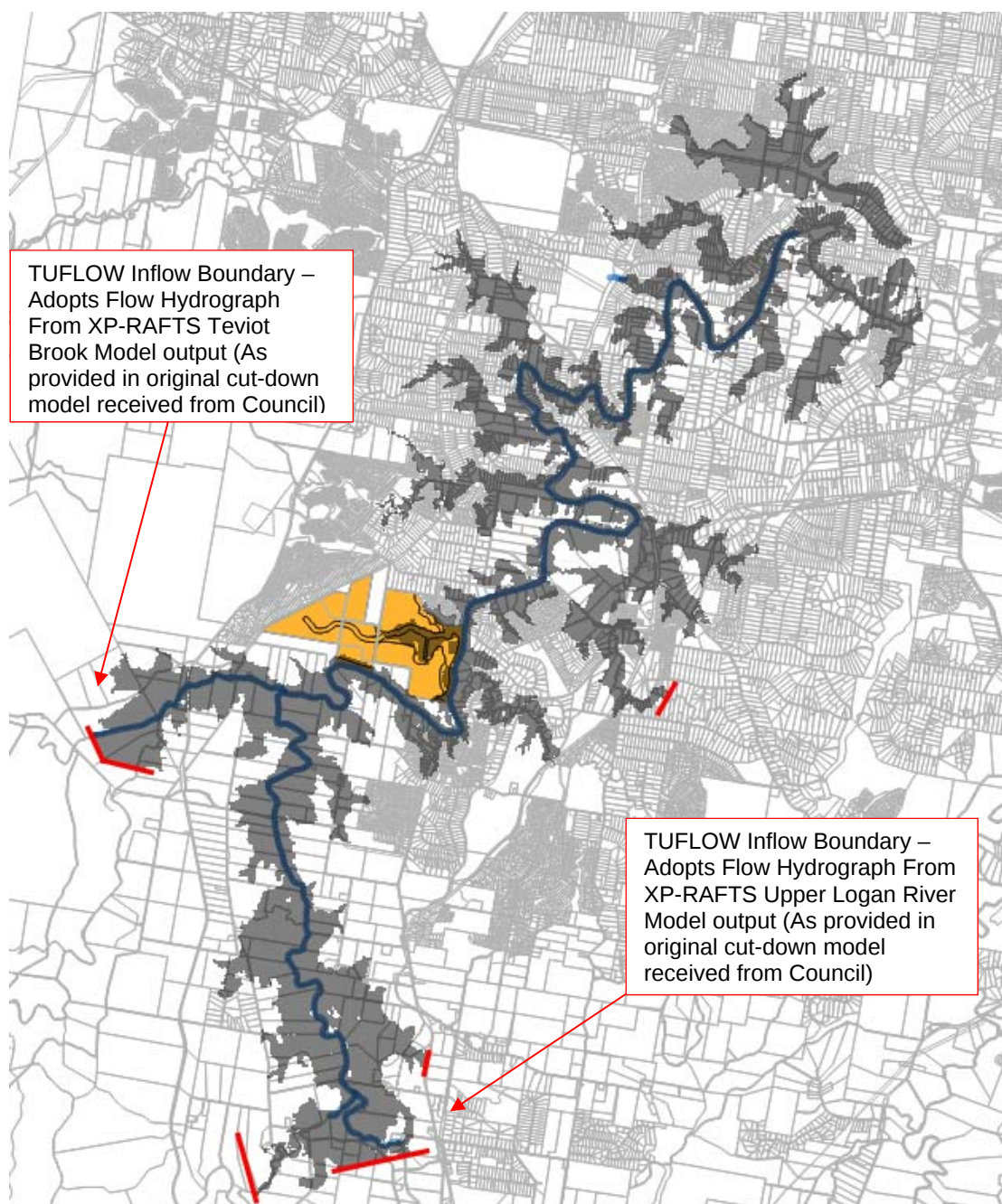


Figure 1: Cut-Down Model Inflow Boundary Configuration (As Received From Council, April 2016)

Updating the hydrological data (for the *Potential Future Development Scenario*), was the only change made to the TUFLOW model. All other details are as per the *Developed Scenario* indicated in Section 4.2 of the *Flood Investigation Report* (No. **B13343.W-01C** dated April 2017).

Impact Assessment – TUFLOW Results

The 2D flood modelling previously undertaken in the *Flood Investigation Report* (No. **B13343.W-01C** dated April 2017) extended 26km downstream of the site (following the Logan River). Modelling incorporated critical crossing locations such as Payne Bridge along Cusack Lane, Maclean Bridge along the Mt Lindesay Highway and adjacent to Wendt Park & Road at the most downstream extent of the model. Flood level and flow results from the *Existing* and *Potential Future Development Scenarios* were determined from Plot Output (PO) result lines and investigated at the three critical locations listed above. A summary of the results are provided in **Table 2**.

Table 2: Summary of Results at Critical Locations

Location	Description	Approximate Bridge Levels (m AHD)	Change in Flood Warning Time (mins) ²	Change in Peak Flood Level (mm) ²
Cusack Lane Payne Bridge	2.2km downstream of master plan development	25.5m AHD	+7 to -10.5mins	+4 to -13mm
Mt Lindesay Highway Maclean Bridge	13km downstream of master plan development	21.5m AHD	+4 to -10mins	+3 to -20mm
Wendt Park (LR012)	26km downstream of master plan development	14.5m AHD ¹	+3 to -7mins	+3 to -9mm

¹Relates to sag level along Wendt Road adjacent to the Logan River

²Results indicate the range of change in flood warning times or peak levels over the various storm durations (6hr to 72hr) modelled

The summary provided in **Table 1** indicates that there is no adverse impact to flood warning times or peak flood levels at the three critical locations. Results indicate that peak flood levels are lowered by 6 to 25mm as a result of cumulative development impact (without detention). Time from start of rainfall to inundation of bridge crossing or road occurs after approximately 20 to 30 hours at each location. Flood warning time is changed by a maximum of 10.5 minutes as a result of the potential future development. This is not a significant change considering the time until inundation is 20 to 30 hrs from the start of the rainfall event (i.e. a change from 27:01 to 26:51). It is highly unlikely for this level of change to hinder potential for flood evacuation.

Figure 1 below indicates the change in flood level hydrograph from existing (blue) to developed (red) 2km downstream of the development (at Cusack Lane) where the impact is most prominent.

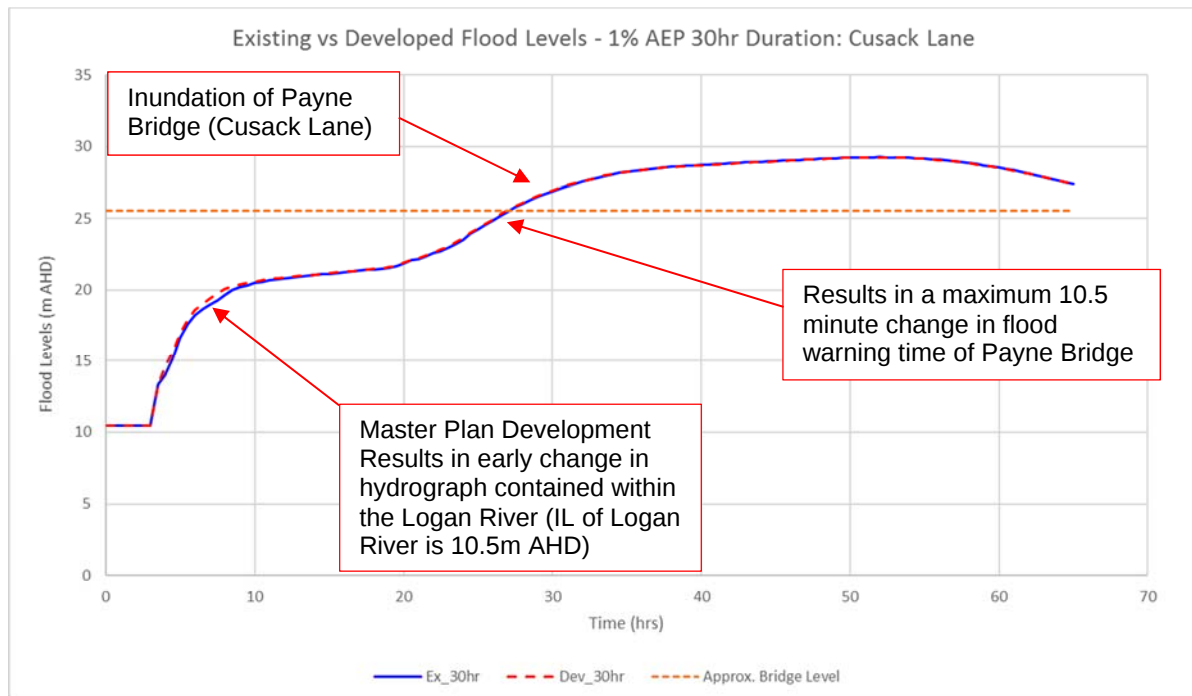


Figure 2: Flood Level Hydrograph Comparison at Payne Bridge (Cusack Lane) 1% AEP 30hr Duration

As indicated in **Figure 2** there is an early increase in flood levels as a result of the master plan development. However, this is wholly contained within the Logan River and does not adversely affect flood warning times. Time until inundation of Payne Bridge or Cusack Lane occurs after 20 to 30 hours and is only reduced by a maximum

of 10.5 minutes. This insignificant change in flood warning time is not expected to hinder flood evacuation of residents considering the long lead up time to inundation.

Figure 2 below indicates the change in flood level hydrograph from existing (blue) to developed (red) 26km downstream of the development (at Wendt Road) where the impact of the development (due to 26km of conveyance through Logan River) is less significant.

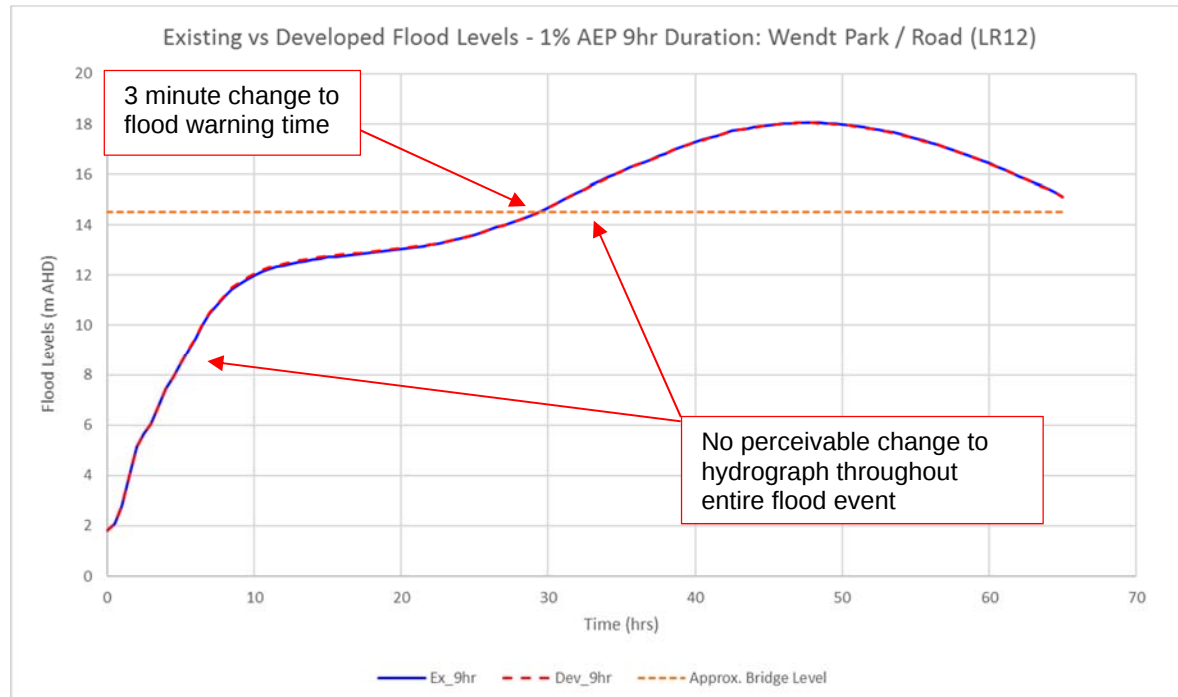


Figure 3: Flood Level Hydrograph Comparison at Wendt Park 1% AEP 30hr Duration

As demonstrated in **Figure 2**, there is no significant change to the hydrograph (such as the early impact observed at Cusack Lane, closer to the development). These results demonstrate that the impact to flood hydrographs as a result of the development disseminates as runoff is conveyed further downstream (i.e. due to the 26km of runoff conveyance through Logan River impact to flood hydrograph is reduced). It is expected that this pattern will occur as runoff is conveyed further downstream beyond the modelled extents.

A full suite of results for each modelled storm duration for the 1% AEP at the three critical locations is provided in **Attachment 2**. The same results occur for other modelled storm durations (the storm durations presented above indicated the worst-case impact at Cusack Lane and Wendt Park).

Conclusion

Updated TUFLOW modelling demonstrates that the cumulative impact (considering the site and future development on Logan River and Teviot Brook with no detention) results in lower peak flood levels at critical locations downstream of the site and a maximum 10 minute change in flood warning time (with average flood warning time until inundation of bridge or road being 20 to 30 hours in total). These results demonstrate that cumulative development without detention will not result in a perceivable, let alone adverse, impact to flood levels or flood warning times downstream. This cumulative impact assessment therefore addresses Item B-1 of EDQ's IR and justifies providing no detention for the master plan development.

We trust the information provided in this letter is acceptable and satisfactorily addresses Item B-1 of EDQ's Information Request. We respectfully request that the master plan approval for stormwater management be approved.

Should you require any further information please do not hesitate to contact the undersigned or Andrew McPhail on (07) 3895 3444.

Yours sincerely,
Calibre Consulting



Matthew Starr
Senior Engineer – Water & Environment

Attachments:

1. BMT WBM's Letter No. *L.B22170.005.Celestino Additional Notes.docx* (dated 28 March 2017)
2. Further Details for Response to Item B-1 (No Detention)
3. Concept Drawings

Attachment 1

BMT WBM's Letter No. L.B22170.005.Celestino Additional Notes.docx (dated 28 March 2017)

Our Ref: mpg: L.B22170.005.Celestino Additional Notes.docx

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28 March 2017

EDQ Development Assessment
DILGP
Level 14 1 William Street
Brisbane Qld 4000

Attention: David Elliott

Dear David

**RE: JIMBOOMBA CELESTINO MASTER PLANNED COMMUNITY, GREATER FLAGSTONE PDA
PROPOSED SCOPE TO ADDRESS FLOODING AND STORMWATER FLOODING ISSUES**

We refer the meeting held subsequent to our high level review of the flooding and stormwater quality issues associated with the Celestino Master Planned Community application. Calibre provided a proposed scope (attached) to address stormwater and flooding issues. A review of the proposed methodology is provided below.

Detention

The review raised the issue that no detention is proposed for the development. While such an approach, which relies on flow being discharged from a catchment prior to the peak in the downstream watercourse, is acceptable in the lower parts of a catchment, the site is located in the middle reaches of the catchment. As a consequence, the issue of detention is complicated.

While it is likely that the effect of a single development will be negligible given the flow in the river, there could be a cumulative effect if multiple developments were to occur over time or if the development and others reduce the warning time available in areas downstream of the site.

In relation to the first point, it would appear that the number of potential development areas according to the urban footprint is limited. However, this could change in the future. To justify the removal of detention basins from the development, it will be necessary to confirm that their removal does not impact on conditions downstream.

Calibre proposes the following work (Section 1.4):

To address potential impacts to downstream flood warning times and flood levels (potentially caused by positioning within the catchment) the following information will be provided:

- *Calibre will provide further results (i.e. hydrograph plots) from current XP-RAFTS model at key locations downstream (i.e. significant crossings or constricted channels) to confirm no adverse change in flood warning times or peak flows.*
- *From the current TUFLOW modelling, Calibre will provide flood level hydrograph information to assess impact of development on downstream extents of the model. Note that Calibre received a cut-down model from Council.*

To address cumulative impact of other development upstream not providing detention, the following will be undertaken:

- *A 1% AEP detention scenario will be undertaken in TUFLOW to determine the impacts of providing detention storage and prolonging the hydrograph. A detention basin and outlet configuration will be sized in XP-RAFTS and the mitigated hydrograph will be incorporated into the new TUFLOW run (i.e. hydrology of Catchment LR027 will be updated in Calibre's Regional Developed Scenario).*
- *Results will be assessed to determine if providing detention results in only minor change in flood levels, or whether it will slightly increase flood levels.*

XP-RAFTS modelling could be undertaken for an "ultimate case scenario (without detention)". However, as identified at the meeting there are limited urban footprint areas planned within the Logan River Catchment upstream of the structure plan and no other PDA's. Refer to the Figure A below. Since an "ultimate case scenario" would produce similar results to the current developed scenario, this extra modelling would not be warranted and therefore is not proposed.

Noting that Council has only supplied part of its TUFLOW model, the use of the XP-RAFTS model is acceptable provided it provides results that are reasonably similar to those obtained from TUFLOW. Provided the hydrologic model was calibrated to the stream gauges on the Logan River, it will be acceptable for the assessment of development impacts on flood warning times. Alternatively, if the model provides flow estimates which agree reasonably well with those obtained from the TUFLOW hydraulic model, then the model can still be used.

If the RAFTS model is confirmed to be acceptable, then it can be used to provide advice in regard to the impact of the Celestino development on flood warning times. Beyond this, if no detention is proposed as part of the development, it will be necessary to confirm that this does not provide the development with an unreasonable benefit compared to other development. On this point, I disagree with Calibre and recommend that the XP-RAFTS modelling be undertaken for an ultimate case scenario without detention. The ultimate case scenario would consider the development of all PDA's and areas zoned by Council for future development within the Logan River floodplain (i.e. those developments that discharge directly to the Logan River and not those that discharge to creeks which in turn discharge to the Logan River due to the expectation that such developments would include detention basins).

For the analysis, it will be necessary to refine the RAFTS model of the catchment and ensure that runoff from the site is input to the river at the site rather than at the downstream end of the sub-catchment in which the site lies.

Beyond this, while Calibre is welcome to complete the suggested 1% AEP detention scenario, it is expected that the analysis will not indicate a significant impact.

Detention- Proposed Analysis

In summary, the following would be considered appropriate to demonstrate that the development can proceed without detention basins being provided.

- Confirm that the Council XP-RAFTS model is suitable for the assessment of impacts on flood warning times (i.e. that it has either been calibrated to results at stream gauges or the flows predicted by the model agree within reasonable limits to those obtained from the TUFLOW hydraulic model.
- Refine the XP-RAFTS model to ensure that the discharge from the site is modelled as occurring to the Logan River from the site and not at the downstream end of the sub-catchment that contains the model.
- Assess the impact of developing without detention on the flood warning time at a suitable number of points downstream of the site.
- If it is proposed to not include detention basins within the development, then modify the RAFTS model to reflect all PDA's and areas zoned for future development by Councils within the Logan River floodplain assuming no detention basins. The analysis would exclude development on areas that discharge to creeks prior to discharging to the river as such development would be expected to include detention basins.
- Optionally complete modelling to determine the impact of a 1% AEP detention basin within the Celestino development using the TUFLOW model of the catchment.

Flood Storage

Filling into the floodplain of the Logan River is proposed as part of the development. In the information request, it was noted that such filling was not considered to be acceptable. The flood analysis completed by Calibre indicated an increase of the order of 5-10 mm adjacent to the site. Given that the filling does not significantly affect the conveyance of the river, it is considered that the impact is due to the loss of floodplain storage.

While the quantum of the increase is lower than the range typically considered as being an increase of concern, other development could potentially cause a similar increase and a cumulative impact that does exceed 10 mm in flood sensitive areas. The potential for cumulative impact is typically avoided by completing compensatory earthworks or storing water on site so that the impact on volume is negated.

The Calibre response suggests that the requirement for a compensatory earthworks solution is a Logan City Council requirement and that the cumulative impact of development will be zero due to the fact that the Celestino site is the only PDA on the river. The response also notes that EDQ guidelines do not require a compensatory solution to be achieved and quotes a number of approvals where compensatory earthworks were not required.

In the case of the EDQ guidelines, no direct reference is made to compensatory earthworks. However, this does not mean that the need for compensatory earthworks can be disregarded as it is necessary to consider both the site and the overall floodplain. Similarly, although other approvals are cited, these are not of direct relevance in this case. In particular, the Flagstone development included detention basins to offset the impact of development and resulted in the storage of water during floods.

The argument that the development is unique because development in areas controlled by Council will be subject to a requirement for compensatory earthworks could also result in the development gaining an advantage over other development in the floodplain.

Flood Storage

It is considered that the development should achieve no or close to no loss of floodplain storage, either by the completion of compensatory earthworks or by the completion of works to allow the storage of water at a higher level than occurs at present.

Other Matters

The comments by Calibre for the remaining issues (C, D, E, and F) are considered to be generally reasonable. However, the concern remains that sufficient area needs to be provided to ensure that stormwater management measures can be accommodated without the need for retaining walls or other design features that compromise the amenity of the measures. Despite the fact that Calibre notes that further details will be provided during the ROL phase, it is recommended that any approval stress the need for the next application to include full consideration of the area occupied by stormwater management measures.

If you have any queries in relation to the notes, please do not hesitate to contact us.

Yours Faithfully
BMT WBM



Martin Giles
Senior Principal
Enc. Calibre Response and Notes

PROPOSED SCOPE TO ADDRESS SW & FLOOD IR ITEMS FOR JIMBOOMBA CELESTINO MASTER PLANNING – 22 FEBRUARY 2017

1 REGIONAL FLOODING (ITEM B-1 DETENTION)

1.1 EDQ Information Request - Detention

It is proposed to develop the site without detention basins for the majority of catchments. As the development is located well upstream of the river mouth, in order for such an approach to be acceptable, it will be necessary to demonstrate that the cumulative impact of similar development in the floodplain (based on the Council Planning Scheme and the PDA's defined by EDQ) will not result in an adverse impact, both in terms of flood levels and flood warning times in downstream areas affected by flooding.

Alternatively, on-line detention can be provided within the west-east internal drainage corridor. If it is demonstrated that the on-line detention is sufficient to attenuate the impact of development for the full range of storm durations for the full range of flood events for the entire development area and that the resultant site runoff would not significantly impact on warning times, then the need for a cumulative assessment would be obviated. For the *Existing Scenario Model* a range of existing land uses were determined based on aerial imagery and information obtained from the superseded planning scheme land use maps. The existing land uses adopted in the existing scenario is highlighted on Drawing No. **B14111.W-SK400** attached.

1.2 Calibre's Comments – Meeting 2nd February 2017

Calibre understands the concerns for providing no detention, however detention is still not warranted based on analysis and for the following reasons:

- The model extends 14-15km downstream of the site and has been modelled for durations 6H to 72H.
- Peak flows from the study area are in the order of 40m³/s while peak flows within the Logan River are 4,000m³/s (1%)
- Hydrological, XP-RAFTS analysis indicates no change to peak flows (i.e. 0%) at Catchment LR015 and further downstream (refer to Section 3 of report).
- As indicated in the PO line results peak flood levels will not impact downstream levels within Logan River let alone at the mouth of the river.

Regarding cumulative impact the following is considered:

- This development is providing no detention because it is discharging directly to Logan River, which is the lawful point of discharge. Future development not directly adjacent to the river will require detention if adverse impact on adjacent properties.
- Under "ultimate conditions" there could be adverse impact with providing detention, which QUDM highlights.
- We could potentially assess impact of ultimate conditions in RAFTS.

1.3 Summary of EDQ Comments – Meeting 2nd February 2017

Martin Giles raised following concerns:

- Positioning of development in the overall catchment – further results are required to determine development impacts flood warning times further downstream and flood level increases before the peak.
- Cumulative impact – development of upstream catchment without detention.

PROPOSED SCOPE TO ADDRESS SW & FLOOD IR ITEMS FOR JIMBOOMBA CELESTINO MASTER PLANNING – 22 FEBRUARY 2017

1.4 Calibre's Proposed Scope to Address No Detention

To address potential impacts to downstream flood warning times and flood levels (potentially caused by positioning within the catchment) the following information will be provided:

- Calibre will provide further results (i.e. hydrograph plots) from current XP-RAFTS model at key locations downstream (i.e. significant crossings or constricted channels) to confirm no adverse change in flood warning times or peak flows.
- From the current TUFLOW modelling, Calibre will provide flood level hydrograph information to assess impact of development on downstream extents of the model. Note that Calibre received a cut-down model from Council.

To address cumulative impact of other development upstream not providing detention, the following will be undertaken:

- A 1% AEP detention scenario will be undertaken in TUFLOW to determine the impacts of providing detention storage and prolonging the hydrograph. A detention basin and outlet configuration will be sized in XP-RAFTS and the mitigated hydrograph will be incorporated into the new TUFLOW run (i.e. hydrology of Catchment LR027 will be updated in Calibre's Regional Developed Scenario).
- Results will be assessed to determine if providing detention results in only minor change in flood levels, or whether it will slightly increase flood levels.

XP-RAFTS modelling could be undertaken for an "ultimate case scenario (without detention)". However, as identified at the meeting there are limited urban footprint areas planned within the Logan River Catchment upstream of the structure plan and no other PDA's. Refer to the Figure A below. Since an "ultimate case scenario" would produce similar results to the current developed scenario, this extra modelling would not be warranted and therefore is not proposed.

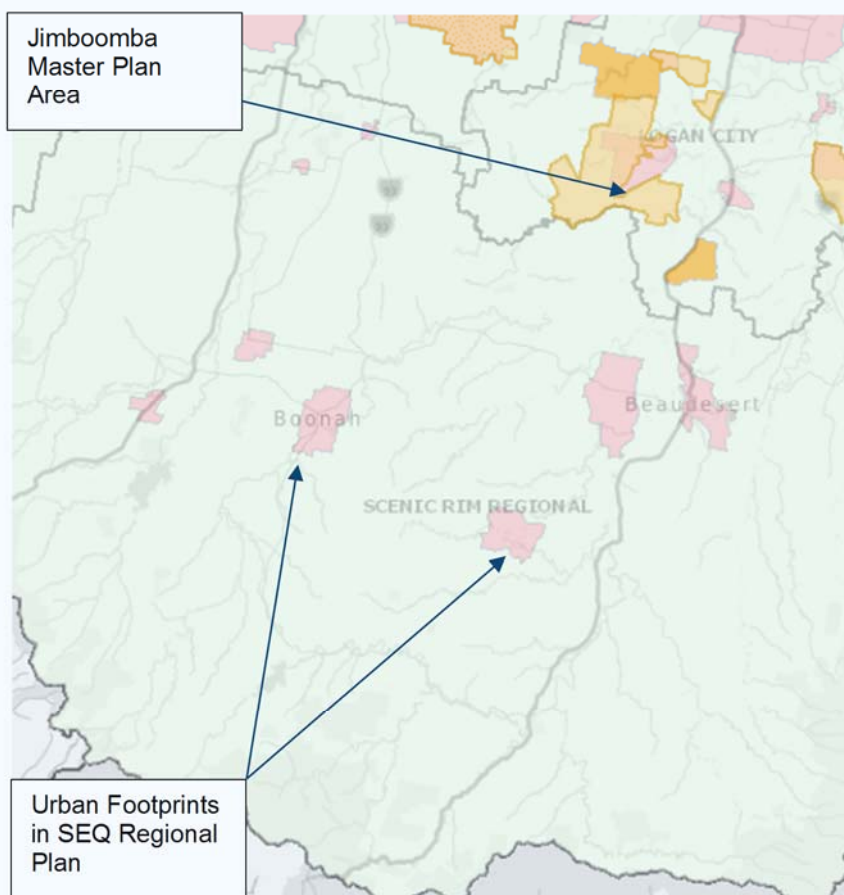


Figure A – Urban Footprints in SEQ Regional Plan within Logan River Catchment U/S of Study Area

PROPOSED SCOPE TO ADDRESS SW & FLOOD IR ITEMS FOR JIMBOOMBA CELESTINO MASTER PLANNING – 22 FEBRUARY 2017

2 REGIONAL FLOODING (ITEM B-2 FLOOD STORAGE)

2.1 EDQ Information Request – Flood Storage

In either case, it will be necessary to achieve a balanced flood storage solution up to the 1% AEP event. The proposed filling without providing compensatory flood storage is not acceptable.

2.2 Calibre's Comments – Meeting 2nd February 2017

Calibre understands the concerns for filling of floodplain and LCC's typical compensatory earthworks solution. Firstly, this is a LCC requirement not a UDA or EDQ or requirement of any of the below approvals or guidelines.

- UDA Development Approval for MCU DEV2012/244 dated 12 September 2012 for 72 Riverbend Blvd, Cedar Grove;
- UDA Development Approval for MCU DEV2012/312 dated 21 November 2012 for 368 Bushman Dr, Jimboomba;
- Greater Flagstone Urban Development Area Development Scheme dated October 2011;
- EDQ Guideline 12 Park Planning (May 2015);
- EDQ Guideline 13 Engineering Standards (May 2015);
- EDQ Guideline 14 Environmental Values & Sustainable Resource Use (May 2015);
- EDQ Guideline 15 Protection from Flood and Storm (May 2015);
- SEQ Water Development Guidelines (June 2012); and
- Queensland Urban Drainage Manual (QUDM, 2013).

Current flood analysis demonstrates insignificant impact and non-worsening, which meets the above relevant requirements (including QUDM which is EDQ's priority)

Secondly filling within the floodplain is deemed acceptable for the following reasons:

- The filling proposed is confined to the west-east corridor, which is a minor "offline" non-conveyance area, which has insignificant impact on the hydraulics of the Logan River.
- Overall balanced fill volume is approx. 100,000m³. The volume of Logan River adjacent to the study area is approximately 18,000,000,000m³ (for the smaller 6hour duration storm). The balance fill is 0.001% of this Logan River Volume. For a longer duration storm the balance fill would be a lower percentage of the Logan River Volume.
- Regarding concerns of cumulative floodplain storage loss, only additional filling within the surrounding area could have a cumulative impact. However as indicated the filling is proposed in an offline non-conveyance area. Future development will need to undertake their own assessment.

Calibre and project team concluded the following during the meeting.

- Impact of flooding is negligible as results indicate.
- The actual cumulative impact will be zero since no other PDA is located on the Logan River. Only Council areas requiring compensatory earthworks are located on the river.

2.3 EDQ Comments – Meeting 2nd February 2017

BMT WBN and EDQ put forward the following:

- While it is understood that there may be no cumulative flood storage loss, it would be equitable and part of good practice to achieve no loss in floodplain storage.

2.4 Calibre's Proposed Response

Calibre & project team are striving to achieve balance flood storage where it is practical and doesn't conflict with other objectives (i.e. environmental values, etc.).

Item	EDQ Summary of Comments	Calibre Response	Comments / Actions Required
A	Overall		
A-1	Overall, while it is considered that the development can proceed, additional detailed modelling will be required to confirm that the nominated outcomes in the reports can be achieved in practice. Recognising that the application is a high level MCU, EDQ can determine whether to require none, part, or all of these studies to be completed prior to granting the approval for the development.	1) Appreciated the comments and thank you for the opportunity to discuss and subsequently to provide further details in a formal reply. 2) Confirm the assessment guideline to follow (EDQ & QUDM) 3) What can be addressed at associated ROL?	
A-2	In particular, although the areas allocated in relation to detention and water quality treatment are suspected to be inadequate by the time due allowance has been made for batters etc, this does not mean that the adopted approach is inappropriate. While not an immediate concern to EDQ, if the nominated areas are not revised then difficulties can arise when the urban design is advanced if insufficient area is provided for stormwater management. Similarly, additional modelling will be required to confirm flood levels within the west-east drainage corridor.	Refer to Item D-1 General Note: Values indicated on plans are for storage were nominated volumes not areas.	
B	Regional Flooding		
B-1	<u>Detention</u> It is proposed to develop the site without detention basins for the majority of catchments. As the development is located well upstream of the river mouth, in order for such an approach to be acceptable, it will be necessary to demonstrate that the cumulative impact of similar development in the floodplain (based on the Council Planning Scheme and the PDA's defined by EDQ) will not result in an adverse impact, both in terms of flood levels and flood warning times in downstream areas affected by flooding. Alternatively, on-line detention can be provided within the west-east internal drainage corridor. If it is demonstrated that the on-line detention is sufficient to attenuate the impact of development for the full range of storm durations for the full range of flood events for the entire development area and that the resultant site runoff would not significantly impact on warning times, then the need for a cumulative assessment would be obviated.	Calibre understands the concerns for providing no detention, however detention is still not warranted based on analysis and for the following reasons: • The model extends 14-15km downstream of the site and has been modelled for durations 6H to 72H. • Peak flows from the study area are in the order of 40m³/s while peak flows within the Logan River are 4,000m³/s (1%) • Hydrological, XP-RAFTS analysis indicates no change to peak flows (i.e. 0%) at Catchment LR015 and further downstream (refer to Section 3 of report). • As indicated in the PO line results peak flood levels will not impact downstream levels within Logan River let alone at the mouth of the river. Regarding cumulative impact the following is considered: • This development is providing no detention because it is discharging directly to Logan River, which is the lawful point of discharge. Future development not directly adjacent to the river will require detention if adverse impact on adjacent properties. • Under "ultimate conditions" there could be adverse impact with providing detention, which QUDM highlights. • We could potentially assess impact of ultimate conditions in RAFTS.	Martin Giles raised following concerns: • Positioning of development in the overall catchment – further results are required to determine development impacts flood warning times further downstream and flood level increases before the peak. • Cumulative impact – development of upstream catchment without detention. Calibre will action the following: • Further results will be extracted from current models to highlight the changes to flood level increases further downstream prior to the peak and changes to flood warning time. • Scope to address cumulative impact will be discussed and confirmed with Martin Giles prior to modelling. To address this item, we would propose undertaking 1% AEP detention scenario in TUFLOW to determine if impacts of providing detention are negligible and if required undertaking hydrological (XP-RAFTS modelling) for an ultimate case scenario.
B-2	<u>Flood Storage</u> In either case, it will be necessary to achieve a balanced flood storage solution up to the 1% AEP event. The proposed filling without providing compensatory flood storage is not acceptable.	Calibre understands the concerns for filling of floodplain and LCC's typical compensatory earthworks solution. Firstly, this is a LCC requirement not a UDA or EDQ or requirement as indicated below. • UDA Development Approval for MCU DEV2012/244 dated 12 September 2012 for 72 Riverbend Blvd, Cedar Grove; • UDA Development Approval for MCU DEV2012/312 dated 21 November 2012 for 368 Bushman Dr, Jimboomba; • Greater Flagstone Urban Development Area Development Scheme dated October 2011; • EDQ Guideline 12 Park Planning (May 2015); • EDQ Guideline 13 Engineering Standards (May 2015); • EDQ Guideline 14 Environmental Values & Sustainable Resource Use (May 2015); • EDQ Guideline 15 Protection from Flood and Storm (May 2015); • SEQ Water Development Guidelines (June 2012); and • Queensland Urban Drainage Manual (QUDM, 2013). Current flood analysis demonstrates insignificant impact and non-worsening, which meets the above relevant requirements (including QUDM which is EDQ's priority) Secondly filling within the floodplain is deemed acceptable for the following reasons: • The filling proposed is confined to the west-east corridor, which is a minor "offline" area, which has insignificant impact on the hydraulics of the Logan River.	Andrew McPhail & project team discussed the following: • Impact of flooding is negligible as results indicate. • The actual cumulative impact will be zero since no other PDA are on the Logan River. Council areas require compensatory earthworks. Martin Giles and David Elliot put forward the following: • While it is understood that there may be no cumulative flood storage loss, it would be equitable and part of good practice to achieve no loss in floodplain storage. Calibre & project team to determine areas where balance flood storage may be achieved (i.e. areas of cut to offset fill).

Item	EDQ Summary of Comments	Calibre Response	Comments / Actions Required
		- Overall balanced fill volume is approx.100,000m³, the volume of Logan River at study area is approx. 18,000,000,000m³ or 0.001% for smaller 6hr duration storm (55hr storm run). A lower percentage for larger storms. - For concerns of cumulative floodplain storage loss, hydraulically only filling within the surrounding area could have cumulative impact. However, as indicated this is an offline non-hydraulic area. Future development will need to undertake their own assessment.	
C	Local Flooding		
C-1	Although the flood analysis presented with respect to the west-east internal drainage corridor indicates that it should be possible for the area to be developed, more detailed modelling will be required to establish final levels for earthworks design. In particular, the sensitivity analysis completed using a high vegetation roughness shall ensure that all ground areas and not just floors are above flood level for the sensitivity case.	Detailed 1D analysis can be undertaken in future ROL application.	Calibre to highlight in amended report that analysis & results are subject to detailed analysis which is to be provided in future ROL phase.
D	Stormwater Management – Quantity		
D-1	The catchments referred to below are those presented in Calibre Consulting Drawing No. B13343.W-SK09.	General Note: Values provided in documents are for storage volumes not areas.	
D-2	<u>Catchments A, B, C, G, H, and I</u> It will be necessary to determine whether detention basins will be required to limit the flow in the watercourses that drain Catchments A, B, C, G, H, and I to the Logan River. In the absence of a Waterway Stability Assessment, it is recommended that basins capable of attenuating the impact of development for at least the 63% AEP event be nominated provisionally in the event of it being necessary to limit flows. The basins can be removed if it is subsequently demonstrated that they are not required.	<u>Catchment A, B, C, G, H and I</u> - Catchments A, B, C, G, H, and I discharge directly into the Logan River. From a catchment perspective XP-RAFTS analysis indicates that water stability management objectives are achieved (i.e. no increase in 63% AEP peak flows in Logan River). Runoff from these catchments do not discharge into significant watercourse, creeks or gullies. - Furthermore, mitigation measures will be provided for minor gullies prior to Logan River, i.e. energy dissipaters at outlets, scour protection as required (address at ROL & Certification phase).	Scour protection will be provided for minor gullies prior to Logan River. Calibre to indicate in amended report. Further details of scour protection to be provided in future ROL phase.
D-3	<u>Catchments D and V</u> Similarly, it will be necessary to determine whether detention basins will be required to limit the flow in the watercourses that drain Catchments D and V. As the watercourses draining these catchments are located in private property, it may ultimately be necessary to provide basins capable of attenuating the impact of the 1% AEP event.	<u>Catchment D</u> - Runoff from the development can discharge to public road prior to Logan River; and/or - Top end of catchment may be modified to divert runoff north <u>Catchment V</u> - Runoff from the development can discharge to public road or site (Catchment G) prior to Logan River; and/or - Top end of catchment may be modified to divert runoff north	Calibre to indicate in amended report. Further details to be provided in future ROL applications. David Elliot indicated that approval from LCC is not required for stormwater measures within LCC land.
D-4	<u>Catchments J, K, and L</u> For Catchments J, K, and L, no detention basins are proposed in favour of gaining approval from the downstream property owner for the discharge of unattenuated flow from the site. Given that such approval is not in place and that it may prove necessary to provide detention depending on the outcome of the Waterway Stability Assessment/ channel design, it is necessary to provisionally nominate detention basins to attenuate the peak flow from these catchments. In the event of downstream approval being gained, then the basins can be deleted.	<u>Catchments J, K, and L</u> - Discharge approvals will be granted by adjoining owner. - From a catchment perspective, XP-RAFTS analysis indicates that water stability management objectives are achieved, i.e. no increase in 63% AEP peak flows. 63% AEP peak flow mitigation (i.e. detention) may be provided within the water quality controls.	Calibre to indicate detention volume required to mitigate 63% AEP, to be removed when discharge approval is granted. Discharge approvals will be pursued in future ROL phase.
D-5	<u>Catchments M and N</u> The basin area nominated for Catchments M and N may not be sufficient when allowance for batters is made.	<u>Catchments M and N</u> Disagree. Further details can be provided during ROL application.	Further details to be provided during future ROL phase.
D-6	<u>Catchments O</u> The basin nominated for Catchment O is located within an area designated as a future school. As it is expected that the Department of Education will not accept a basin in its grounds, either the location of the school or the basin will need to be revised. Further, the nominated area for the basin may be too small when batters are considered.	<u>Catchments O</u> - Subject to ROL. - Many school sites have detention basins (i.e. located within sports fields). - School sites also have Bioretention sometimes used for educational purposes. - Less maintenance for Council if stormwater management devices provided in school.	Calibre to provide options showing indicative footprint area with and without the external catchment. Concept strategy is to be provided if school site does not treat external catchment flows.
D-7	<u>Catchments P Swale</u>	<u>Catchments P Swale</u> To be addressed in future ROL Application.	Further details to be provided during future ROL phase.

Item	EDQ Summary of Comments	Calibre Response	Comments / Actions Required
	It is proposed to divert runoff from Catchment P to the open space area to the north-east of the site to avoid increasing the discharge to private properties. As the swale is only proposed to cater for the increase in flow as a result of development, it will be necessary to demonstrate how the swale will work in practice. Further, it may be necessary for the swale to convey an increased flow as the calculations for the existing case would appear to include an area that currently drains to the north-west.	Possible Top-end catchment diversion.	
D-8	<u>Catchments P, S, T</u> For catchments P, S, and T, it is proposed to provide detention basins capable of attenuating the impact of development up to the 63% AEP event, and for the basins to be located above the water quality treatment devices. While such an approach is acceptable, it will be necessary to increase the plan area of the treatment devices to ensure that the depth of ponding in the basins is not excessive.	<u>Catchments P, S, T</u> - Volumes have been nominated not areas - There is adequate available area on fringe of watercourse.	Further details to be provided during future ROL phase.
E	Stormwater Management - Quality		
E-1	The stormwater quality solution relies on the use of rainwater tanks to capture roof runoff for reuse and the harvesting of stormwater from the proposed wetland. Although the capture and re-use of stormwater runoff is desirable, as the Queensland Development Code does not include the previously mandatory requirement for the inclusion of rainwater tanks, it is doubtful whether tanks could be relied upon in the long term. It will be necessary to demonstrate how rainwater tanks could be made mandatory, adopt an alternate regional reuse strategy, or increase the size of other treatment devices to achieve the water quality objectives applicable to the site without considering rainwater tanks.	<u>Rainwater Tanks</u> - RWT's are only proposed for Catchment M, N and O. - RWT's are proposed for frequent flow management to provide less "soggy" areas - RWT's are proposed as a part of Integrated Water Cycle Management measures, which is an EDQ objective.	Calibre to check sensitivity if RWT's are removed and provide details in amended report. Calibre to provide MUSIC model schematic to Martin Giles for review.
E-2	The proposed configuration of the wetland will need to be revised to reflect current guidelines with respect to wetland depth and to either make the wetland off-line or demonstrate that it will not be damaged in the event of a flood if subject to flood flows.	<u>Wetland</u> - Proposed wetland indicates intent only. Design will be revised during ROL application and layout reconfigured. - Wetland will be semi-offline and only receive minor flows from large upstream catchment.	Further details to be provided during future ROL phase.
F	Water Play Area		
F-1	Insufficient information has been provided in relation to the water play area. In particular, confirmation is required that no direct runoff to the water play area will be permitted and that all water for the play area will either be sourced from potable supplies or from treated stormwater runoff. The potential impact on the reliability of water supply to the play area given the need to collect and then treat runoff shall also be considered. Consideration will also be required in relation to the flood risk presented by the depth of water in the play area.	<u>Water Park Area</u> - Agree only concept information has been provided. Water Park Area could be incorporated as various other features: i.e. kids play fountain, shallow pool, wave pool etc. Will provide further details at ROL phase. - Water Park Area will receive runoff from catchment. Bioretention is pre-treatment. Plus Secondary Water treatment prior to water park area. - Flood risk subject to the above, however, likelihood and consequence would be assessed. Plan is for a Regional flood immunity of 5% AEP. - Appropriate flood risk management will be provided. It is considered that the proposed water park area would likely have less flood risk than South Bank Beach and similar to Orion Lagoon – Springfield.	Calibre to amend report highlighting that details are concept only and will be changed (with safety measures, etc. addressed) in future ROL phase.
G	SEQ Water		
G-1	The proposal involves the use of stormwater quality treatment devices (bioretention basins and wetlands) to manage stormwater flows from the development. It would appear that catchments L, K, J, I, H, G, V and D will discharge to the Logan River upstream of the Cedar Grove Weir, whilst all other areas will be discharged to the east, downstream of the weir. Stormwater which enters the weir pool may present a risk to drinking water quality. According to the proposal plans, some areas of the development contains setbacks of approximately 100-150m to the Logan River. In accordance with the SEQ water Development Guidelines, development is to maintain a setback of 400m from a water storage. It is noted that SEQ Water maintains	Seqwater Development Guidelines Table 8 Specific Outcome S26 indicates criteria for Stormwater/Runoff Management. "Stormwater management does not cause an adverse impact on flooding, drainage or water quality". Stormwater management must ensure no adverse impact on water quality outside the boundaries of the site. We will do revised MUSIC modelling to demonstrate no increase in pollutant loads. A buffer has also been provided to the Logan River.	Calibre to undertake find data/testing of pollutants in Logan River compared to pollutants in Urban Catchment (i.e. Norman Creek) and demonstrate that meeting SPP (2014) objectives is a substantial improvement to water quality. If further modelling (i.e. MUSIC) is required to demonstrate non-worsening of pollutant loads we can defer to future ROL Stage. We will highlight in report that there is adequate capacity to increase basins or provide other upstream controls (i.e. GPT's to help remove metals & some grease and oil) if necessary.



Item	EDQ Summary of Comments	Calibre Response	Comments / Actions Required
	easements on the banks of the Logan River for the purpose of water storage and any setback should be based on the outmost edge of the easement (refer to further advice note below regarding easement details)		MUSIC modelling to achieve non-worsening would entail (if required in future stages): • Base Case Existing Scenario - Agreement with SEQ Water on modelling program used and base case scenario assumptions. • Developed Mitigated Scenario – Update stormwater quality strategy to meet non-worsening objectives. Further details of erosion vegetation management and stabilisation of minor gullies to be provided in future ROL phase.

Celestino Stormwater, SEQ Water, Traffic and Natural Environment Meeting

Date: 2 February 2017

Location: 1 William Street, Brisbane

Attendees:

Name	Initial	Company	Discussion Item Attended
Brandon Bouda	BB	EDQ	Stormwater SEQ Water Traffic Natural Environment
Marco Bonotto	MB	EDQ	Stormwater SEQ Water
David Elliott	DE	EDQ	Stormwater SEQ Water Traffic
Robert Kwok	RK	EDQ	Traffic
Llyod Gomez	LG	Celestino	Stormwater SEQ Water Traffic Natural Environment
David Ireland	DI	PSA Consulting	Stormwater SEQ Water Traffic Natural Environment
Peter Sipple	PS	Veris	Stormwater SEQ Water Traffic Natural Environment
Kris	K	Veris	Stormwater SEQ Water
Andrew McPhail	AM	Calibre	Stormwater SEQ Water Traffic Natural Environment
Martin Giles	MG	BMTWBM	Stormwater
David Brown	DB	SEQ Water	SEQ Water
Nigel Kimball	NK	SEQ Water	SEQ Water
Catherine Bennie	CB	ARUP	Traffic
Brett Eddie	BE	ARUP	Traffic
Murray Saunders	MS	Saunders Havill	Natural Environment
Dan Clowes	DC	Litoria	Natural Environment

Definition

APP – Collectively the Applicant and the Applicants consultants

EDQ – Economic Development Queensland

1. STORMWATER

Discussion

The APP requested clarification about the references to Logan Policies in the peer review, as their report was based on QUDM as per EDQ Guidelines.

MG explained that the report makes several references to the LCC policies and therefore he has considered that in the assessment for consistency.

The APP requested to identify any issues that could be held off until the ROL.

Regional B

The App advised that there regional basins are not required. It was also noted that the peak flows are substantially smaller than the peak flows in the catchment as a whole. The analysis also shows that there is no change as a result in warning times.

MG recommended that such approach needs to be supported by an analysis of cumulative impacts from potential flows external to the site.

The APP will liaise with MG and prepare a response.

Flood Storage

The APP was concerned that the requirement for flood storage this is a LCC and not a QUDM requirement. The proposed filling will not have an insignificant impact on the flood level (10mm).

DE advised that EDQ does not support filling in a flood plain without the provision of compensatory storage, which is good practice.

The APP advised that they can carry out some earthworks near the river, but it is unlikely that they will be able to provide 100% of compensatory volume.

MG – advised that the applicant should consider cumulative impacts from other development within the catchment that may increase the 10mm flood level

The APP advised they were unsure why they need to provide compensatory storage when they are the only DPA development within the catchment and LCC will not allow filling within the floodplain as per their policy.

However, the APP will prepare a response for EDQ consideration

Local Flood

EDQ agreed that detailed local flood assessment can be provided as part of future ROL as part of the detailed stormwater management plant to be provided at catchment basis.

Stormwater Quantity

The APP is not proposing detention treatment for catchments A, B, C, G, H, and I.

MG recommended that waterways stability assessment be undertaken for the downstream gully. That is particularly necessary due to the existing poor soil characteristic. Detailed design can be provided at the ROL stage.

Catchment D and V – The APP is proposing to locate downstream stormwater infrastructure within the road reserve. This should be further investigated at ROL stage.

Catchment - J, K and L – The APP is proposing to these catchment unmitigated to Gittens's property. DE suggested that without a Gittens' consent, the no net worsening principle should be applied. MG suggested that detention basins being shown in the plans if negotiations fall down with Gittens as a fall back plan.

Catchment M and N - MG identified that the size of the basins shown in the plans appears to be underestimated. The APP clarified that the these size are indicative only and the detailed design provided at ROL stage will ensure that the basin will be properly sized and fully integrated with the development

Catchment O - The APP advised the detention basin is in the school and about 4000sqm in size that will hold 6,000m³. DE noted that there are detention and wetlands approved in the school property for Aura (Caloundra South). However this is for flows created only by the school site and DET may not be supportive to have a detention basin within their site for the management of external flow.

EDQ sought clarification if the Department of Education and Training have been made aware of this and if they have had any comments. EDQ can arrange for a meeting between the APP and the Department of Education and Training to discuss further.

The APP advised that will look at options.

Catchment P – MG recommended more details on the swale to be provided at ROL stage.

Water Play areas

The APP advised that the water play area is an aspirational asset and only identified at concept level. The water play area, if constructed, may be top up by bio-retention basin after adequate treatment. The APP noted the flood risk will be similar to Southbank beaches or Orion lagoon, so will not be immune.

The APP is interested in a stormwater harvesting scheme and would like to see any issues raised from Council about the Yarrabilba stormwater harvesting to irrigate sport field and potential open space.

MB advised that EDQ is working with LCC to set up agreed standards for TWCM projects. Currently Council is not supportive of open space irrigation, but things may change. The APP noted they will need to look at TWCM, but they will not raise any 'outlandish' things as they may not get the greenlight from Council.

The APP will provide amended plan clarifying that these are subject to further design etc. MG further noted that the water play areas will be primary contact so the treatment of the water needs to be considered.

MG requested the inclusion of a music model, schematic.

2. SEQ WATER

Issue 1 - Temporary Sewerage Treatment Plant

- The APP advised that they are proposing a treatment plant in area 4.01 (as shown on the Context Plan) and not within the catchment of the weir.
- The applicant will clarify that the effluent irrigation area will be provided on the catchment discharging downstream of the weir.
 - SEQ advised this is not an issue because it is not located in the same catchment for the weir.
- EDQ advised that a temporary treatment plant may not be required if Cedar Grove is operational by 2019.

Issue 2 - Stormwater Management

- The APP advised SEQ Water that the first stage of the development will be occurring on the northern part of the site and it will be a number of years before development occurs in the catchment that impacts on SEQ water storage. The APP proposed to address into the details the water quality management at the ROL stage, and provide at the MCU/Context Area stage adequate information to ensure that can be dealt at that time. SEQ Water was supportive of this approach.
- The APP has reviewed SEQ water guidelines - table 8 - Quantity perspective and has advised this is not an issue unless there is erosion. The APP is to ensure erosion is not an issue.
- With regards to Stormwater quality, modelling would need to be undertaken to establish the current baseline for quality, and then propose suitable mitigation measures to ensure no worsening.
 - SEQ Water advised that the drinking water EV shall be the first point of call.
 - SEQ Water queried the scope of the model, but advised they expect no worsening of water quality flowing into Logan River than what is currently occurring.
 - The APP will ensure non-worsening.
- The APP did advise that they will need to make assumptions on base conditions for the short gullies in the model, however they were willing to discuss with SEQ Water their assumptions.
 - SEQ Water was happy for this to occur.
- SEQ Water queried the discharging of stormwater at a location downstream of the weir for the development. The APP advised that only Catchment D could potentially be undertaken to accommodate this, while it is not feasible to divert the other catchments downstream of the weir.
- EDQ queried SEQ Water about the 400m setback they have recommended if no net worsening.
 - SEQ Water is happy to discuss at the ROL stage and it may be relaxed based on the stormwater outcomes.

Issue 3 - Riparian Vegetation Management

- The APP advised they want to activate the buffer along Logan River and allow for interaction with the water etc.
 - SEQ Water advised they will need to see what is actually proposed and then discuss with their recreational team.
- EDQ noted that they have concerns about erosion and sediment. The applicant may be required to provide a waterway stabilisation report and erosion and sediment control measures.

Issue 4 - Water Treatment Plant Activities

- SEQ Water advised that the potential plant location could be in the top right corner of their lot (lot 15.01 on the context plan) as this is the highest part of the lot. However at this stage

no concept plan is available. SEQ Water estimated that the construction of the plant will be over 2019/20 and it will be a smaller plant in the interim and then eventually the ultimate plant.

- SEQ Water advised that the lot should be treated like it is an industrial zoned area in terms of providing buffers to sensitive uses.
- The APP advised SEQ Water that the development site already has an approval which allows for urban development without the potential need for buffers.
- SEQ Water iterated the current State Interests, which is protection of assets, water supply and mitigate the adverse impacts of the treatment facility. The main impacts are noise and storage of chemicals. These require buffers.
- The APP requested an indication of what that buffer can be and SEQ Water advised that this information is not available yet as this will depend on the final design of the plant.
- SEQ Water advised that will provide details of the plant design as soon as available.
- The APP advised they do not want their land disadvantaged and as previously stated, they already have an approval that does not require buffers or easements on the site.
- The APP suggested SEQ Water should look at the need for their buffer and the location of their proposed plant if a buffer it required.
 - SEQ Water advised a risk assessment usually undertaken and this assessment will determine the buffers. However these buffers usually extend outside the lot boundary of the plant.
 - The APP suggested the state interest should be looking at how they can work with the existing developments that have been approved.

3. TRAFFIC

The APP raised two (2) issues:

1. Access Point from Teviot Road into the site (between 2.02 and 10.01); and
2. Modelling

1. Access Point from Teviot into the site (between 2.02 and 10.01)

- The APP advised that the location requested to align with Drover Court is too far south to catch decent amount of traffic. The location was then split to take a lot more traffic volumes off the northern entrance. The alignment of the second is along an existing gully area and does not require much cut and fill and also is better for sight lines, stormwater.
- The APP further noted that splitting into two t intersections will have more benefits with at least a 400m separation between both southern intersections on Teviot Road.
- EDQ noted that the current traffic model is to provide a link over the railway on Drovers Court, with an extension of Drovers Court to Teviot Road.

Action: EDQ is to review giving the constraints identified by Celestino.

2. Modelling

- EDQ gave an update on the Greater Flagstone Model being prepared by Veitch Lister Consulting (VLC). As such all developers in Greater Flagstone are required to seek a cordon matrix from VLC to facilitate their own modelling.
- The APP noted that the information from VLC has completely different assumptions of what is occurring on the site and what has been included in the cordon matrix.
- The APP advised they have only received the plots and have queried if the higher order plan can be brought in at ROL stage.
- The APP queried what they need to do in terms of this application and possible approval?

- o EDQ advised the applicant needs to do cordon matrix/extract values. This will require input from VLC.
- EDQ did advise they can condition the PA to provide the relevant information for the traffic network with the first ROL application.

Action: EDQ to send Celestino the necessary VLC info.

Road Cross Sections

- EDQ noted that the road cross section for Teviot Road should include dedicated cycleway of 3.0m with the 1.0m between the footpath and cycleway being reduced from 1.0m to 0.5m.
 - o EDQ recommended the APP to review the TMR guidelines on Separated cycleway.
- EDQ noted that some limited parking could be supported on the trunk collector. The APP noted that there will be no direct access to the trunk collector roads.
- The APP will seek to gain a copy of the new guideline 6.

Public Transport

- EDQ advised that they are currently talking with Translink, DTMR and all developers about the early providers of services in Greater Flagstone. It is likely that EDQ, Translink and DTMR will contact Celestino later this year to discuss potential PT services.

5- Way Intersection

- The APP queried what is happening to the Existing 5 way intersection (Bushland, Homestead, Teviot). The APP noted this is essential for the stage 1 development.

Action: EDQ to provide information to Celestino.

4. NATURAL ENVIRONMENT

a. Significant terrestrial biodiversity values

DC advised that the applicant needs to address Guideline 14 and 17 and noted that it is proposed to clear high value bushland habitat.

The APP advised that they have been on-site and surveyed this area. The AP considers the vegetation to be revegetation and not a high value habitat for koala. The APP also advised they have an EPBC application with the Commonwealth for determination on the clearing of koala habitat.

b. Connectivity

The APP advised they see a better connectivity outcome for a biodiversity corridor from the state land, the creek to Logan river (east-west) as opposed to the north-south link to the Logan river. APP sees this as a better outcome

EDQ advised the north-south linkage is shown on Council's mapping and EDQ has given a previous undertaking to Council to retain their biodiversity corridor where possible.

c. Infrastructure in the corridors

EDQ suggested keeping infrastructure (parks etc) that require a lot of works outside the corridor to minimise impacts on vegetation.

d. Adequate Buffers

EDQ advised that the development should provide a core corridor, untouched and then limited infrastructure. The core should be shown on the Ecological report.

EDQ recommended strategies to be put in place for addressing Koala Sensitive urban design that will enable koalas to move through the corridor. The APP agreed to this.

f. Survey methods –

EDQ noted that it was hard to reconcile the outcomes on the terrestrial survey effort because the sampling is not included. It is recommended that the more details are provided such as timing, hours undertaken etc

g. Melaleuca irbyana

EDQ recommended that the APP show us the clusters of the irbyana in more detail. EDQ also noted that in the past they have required the protection of this. The APP advised they can show more detail on a separate map, however did not want to protect all the irbyana because some are only individual trees and not part of a cluster.

Attachment 2

Further Details for Response to Item B-1 (No Detention)

1 FURTHER DETAILS FOR RESPONSE TO ITEM B-1

Further details have been provided in this document to support the response provided for Item B-1. As indicated, review of current TUFLOW modelling results demonstrate that there will be no adverse impact to flood levels and flood warning times downstream as a result of the master plan development and potential future development along Logan River and Teviot Brook providing no detention.

Three critical locations were investigated downstream of the development as summarised in **Table A** below.

Table A: Summary of Results at Critical Locations

Location	Description	Approximate Bridge Levels (m AHD)	Change in Flood Warning Time (mins) ²	Change in Peak Flood Level (mm) ²
Cusack Lane Payne Bridge	2.2km downstream of master plan development	25.5m AHD	-0.6 to -1.4mins	+3 to +7mm
Mt Lindesay Highway Maclean Bridge	13km downstream of master plan development	21.5m AHD	-1.8 to -2.3mins	+4 to +6mm
Wendt Park (LR012)	26km downstream of master plan development	14.5m AHD ¹	-0.9 to -0.45mins	0 to +2mm

¹Relates to sag level along Wendt Road adjacent to the Logan River

²Results indicate the range of change in flood warning times or peak levels over the various storm durations (6hr to 72hr) modelled

Further details are provided in the following sections.

1.1 Cusack Lane (Payne Bridge) – 2.2km Downstream of Development

A summary of the peak flood level difference for each storm event is indicated in **Table B** below.

Table B: Peak Flood Level Comparison – Cusack Lane (Payne Bridge)

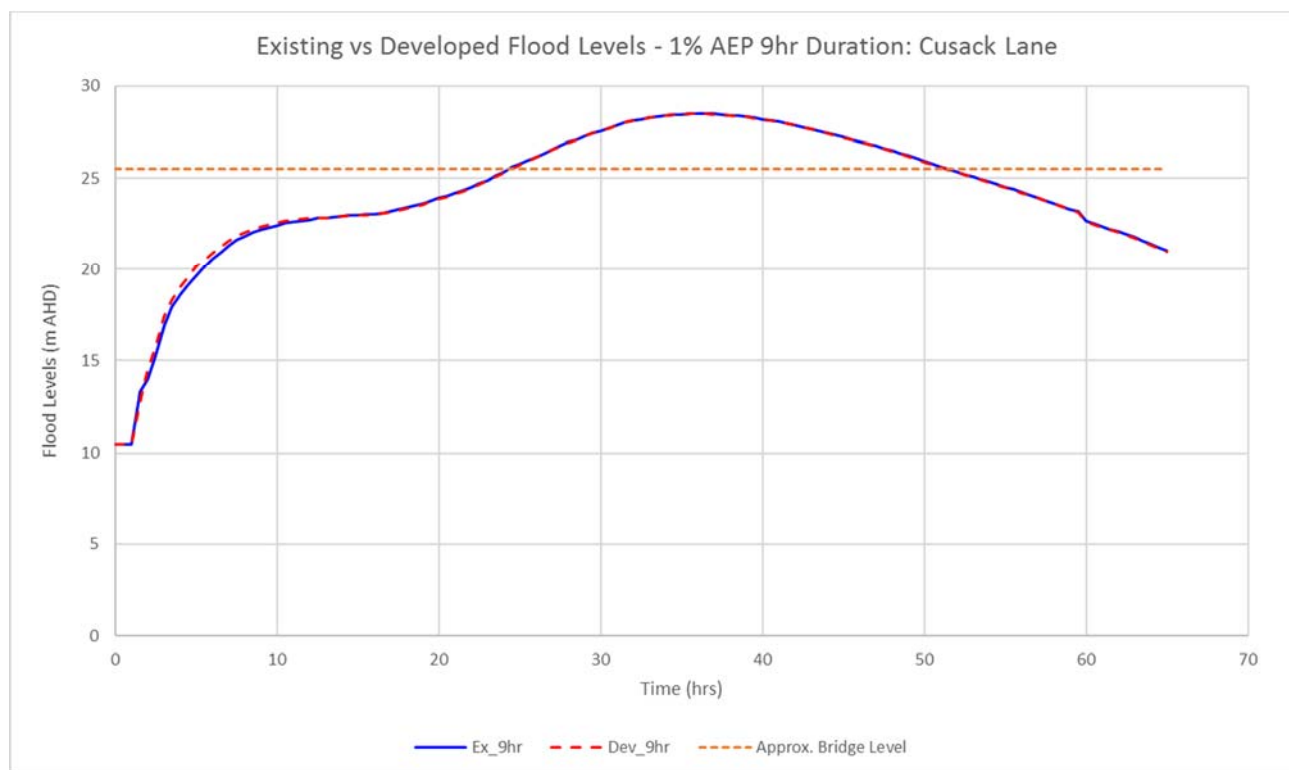
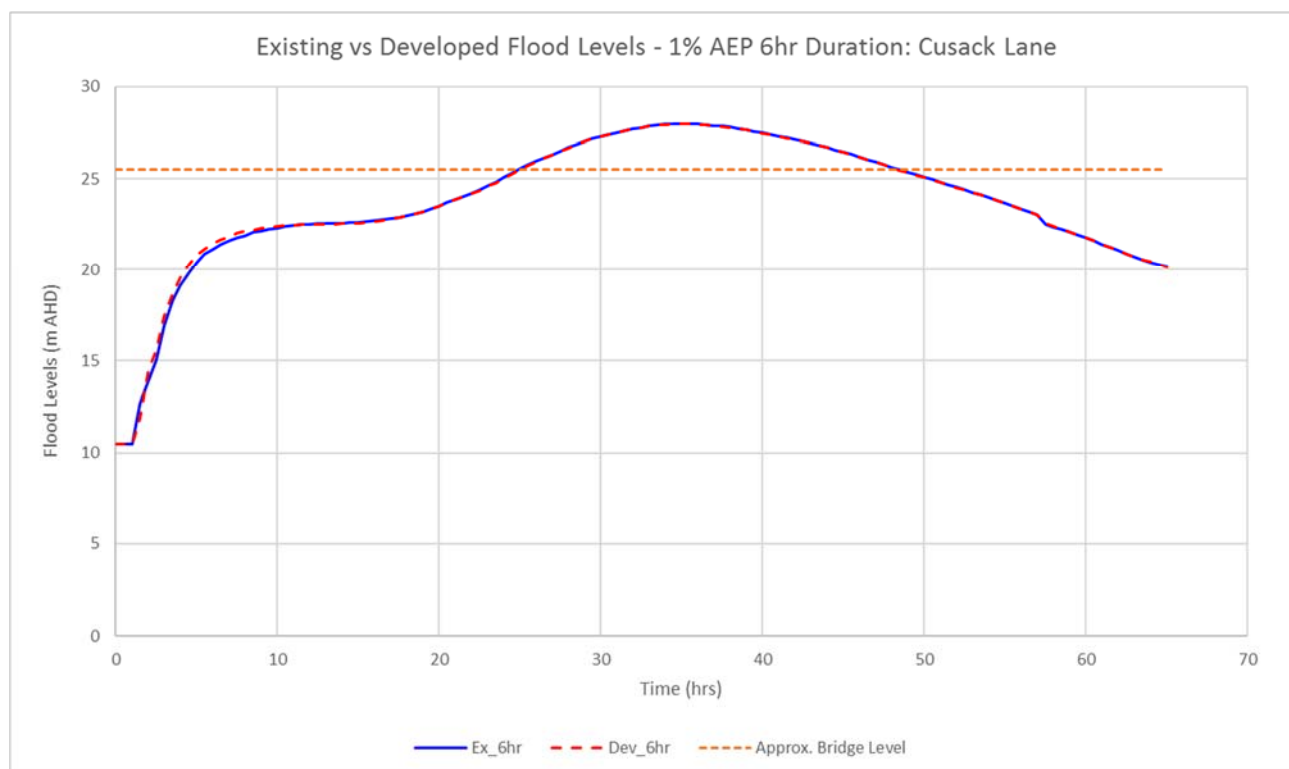
Storm Duration	6hr	9hr	12hr	18hr	24hr	30hr	72hr
Existing Peak Flood Level (m AHD)	27.9751	28.4912	28.8429	29.2159	29.2153	29.2375	29.2087
Developed Peak Flood Level (m AHD)	27.9679	28.4832	28.8350	29.2061	29.2024	29.2279	29.2127
Difference (mm)	-7.2	-8	-7.9	-9.8	-12.9	-9.6	4

A summary of the flood warning time comparison is provided in **Table C** below.

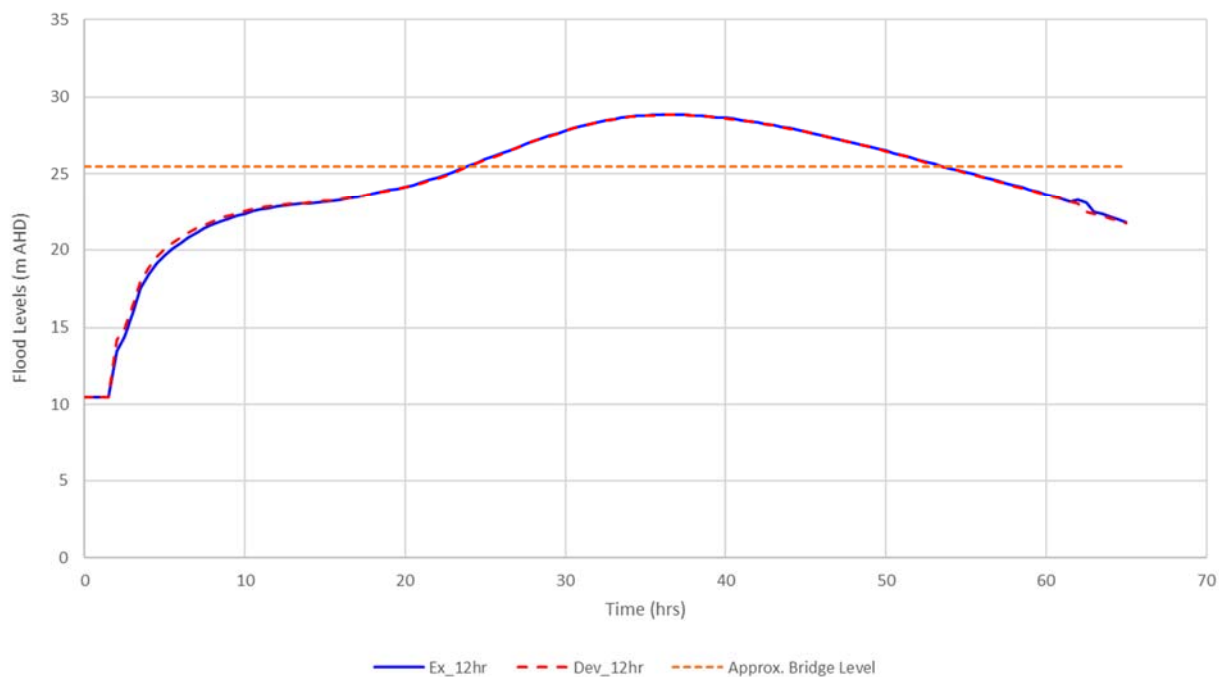
Table C: Flood Warning Time Comparison – Cusack Lane (Payne Bridge)

Storm Duration	6hr	9hr	12hr	18hr	24hr	30hr	72hr
Existing Time to Inundation (hrs)	24.899	24.334	23.848	24.357	22.534	27.021	28.009
Developed Time to Inundation (hrs)	24.997	24.454	23.970	24.473	22.463	26.846	27.956
Difference (mins)	5.9	7.2	7.3	7.0	-4.2	-10.5	-3.2

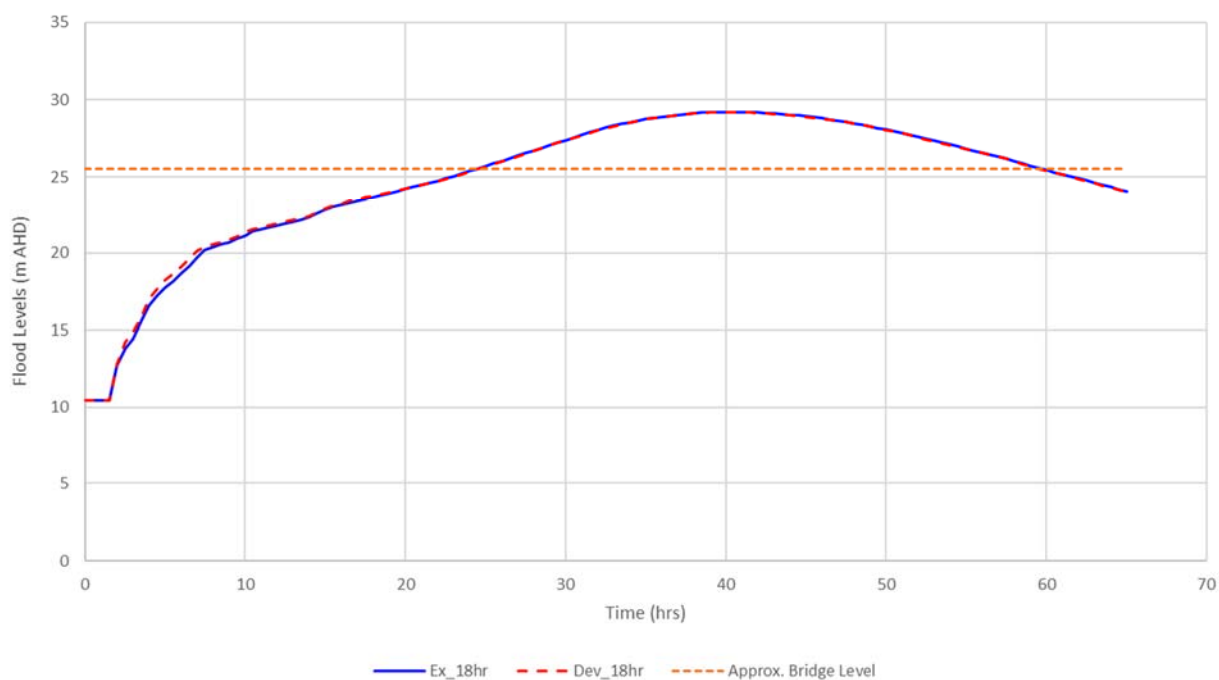
The below flood level hydrographs demonstrate that the impact as a result of the master plan development occurs early in the rising limb of the hydrograph and is wholly contained within Logan River (i.e. well below bridge levels)



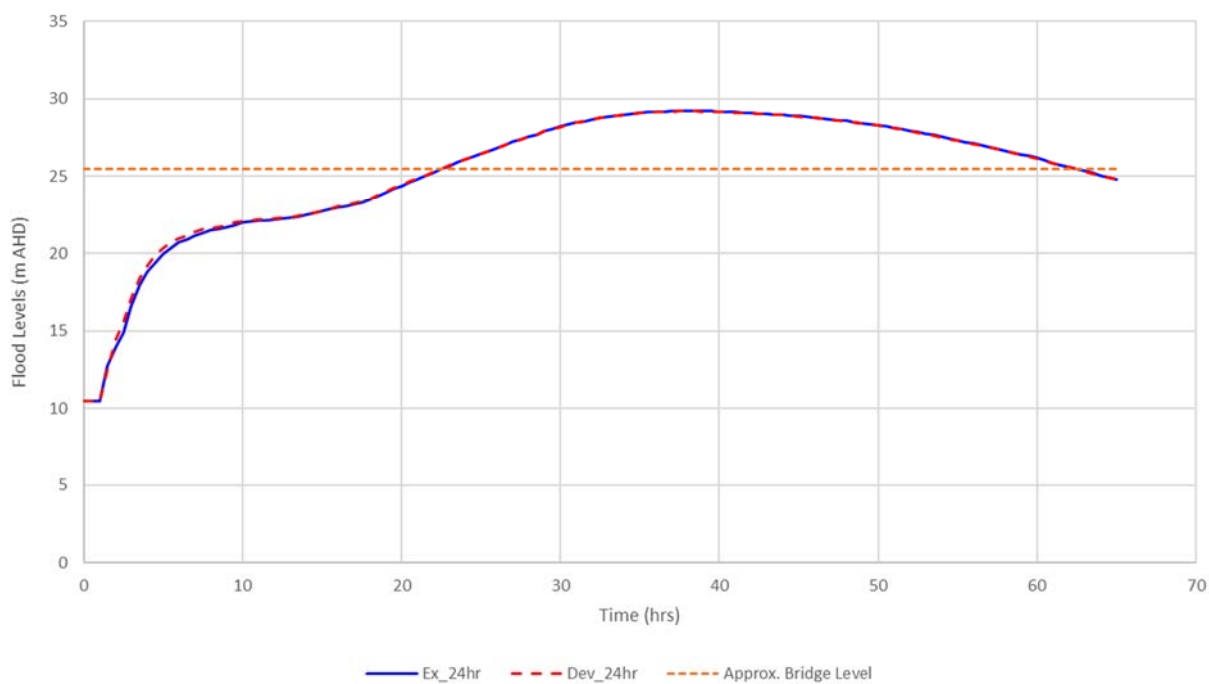
Existing vs Developed Flood Levels - 1% AEP 12hr Duration: Cusack Lane



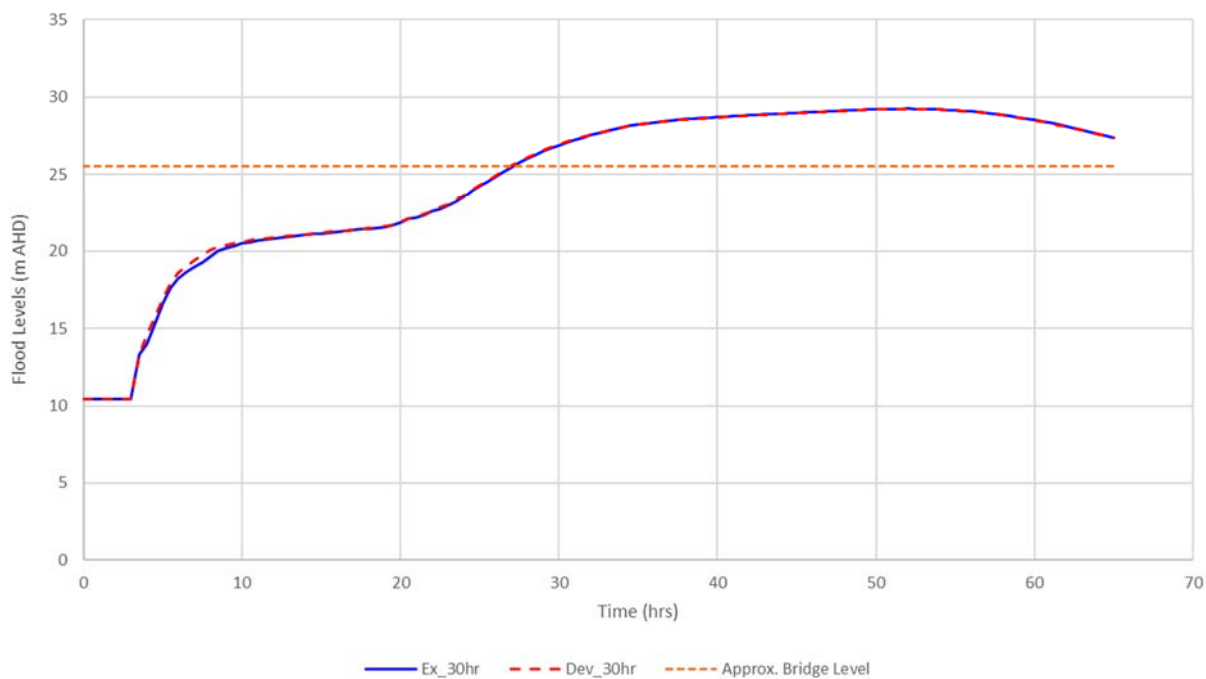
Existing vs Developed Flood Levels - 1% AEP 18hr Duration: Cusack Lane

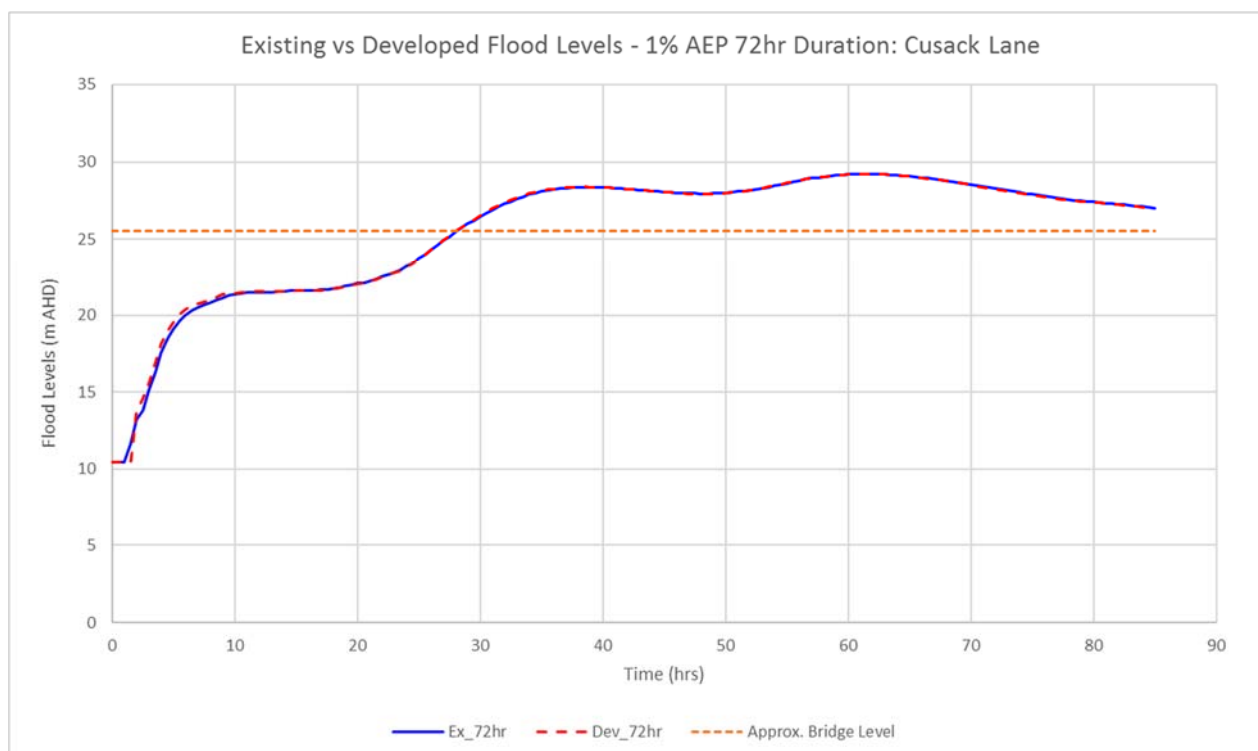


Existing vs Developed Flood Levels - 1% AEP 24hr Duration: Cusack Lane



Existing vs Developed Flood Levels - 1% AEP 30hr Duration: Cusack Lane





1.2 Mt Lindesay Highway (Maclean Bridge) – 13km Downstream of Development

A summary of the peak flood level difference for each storm event is indicated in **Table D** below.

Table D: Peak Flood Level Comparison – Mt Lindesay Highway (Maclean Bridge)

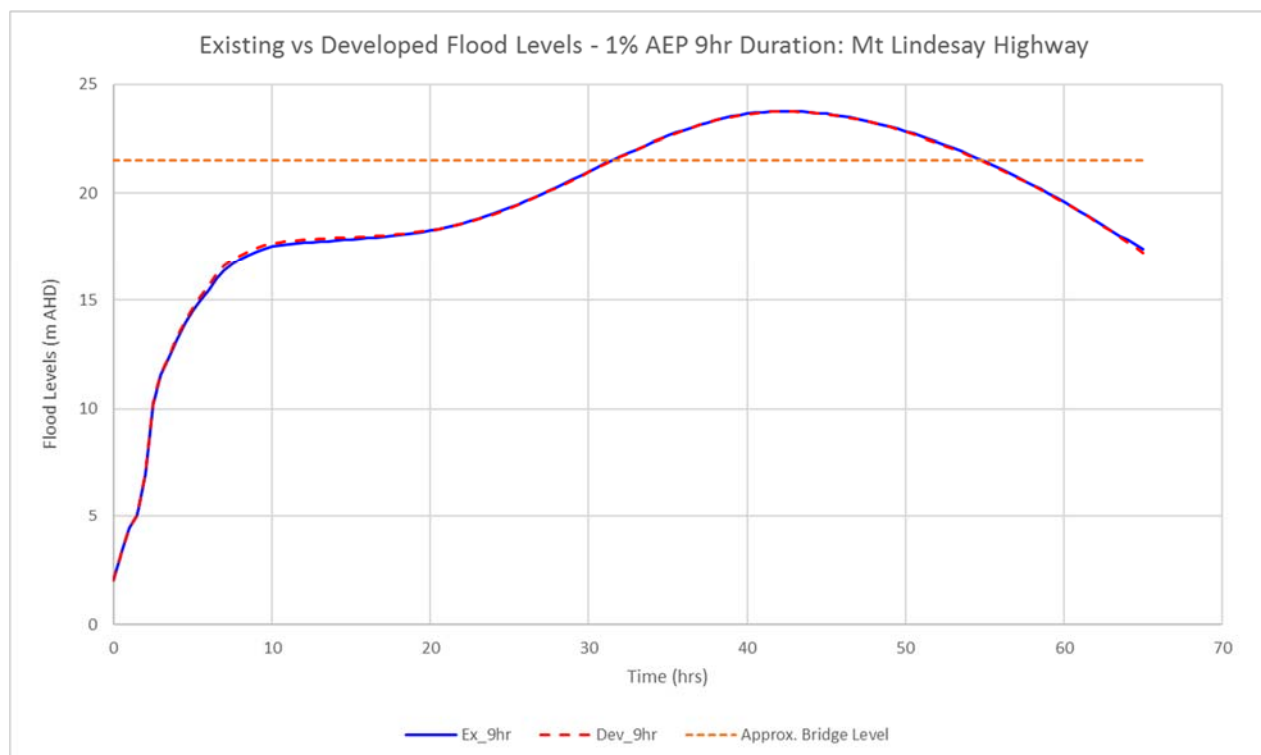
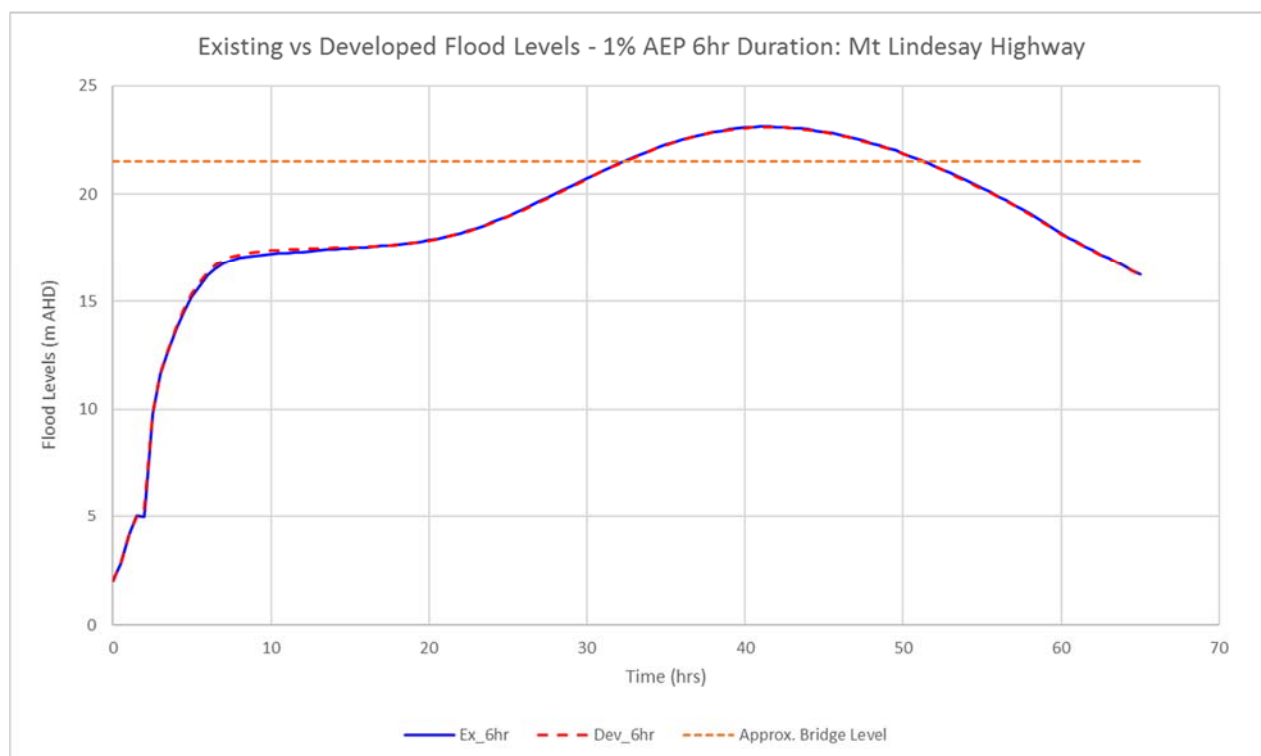
Storm Duration	6hr	9hr	12hr	18hr	24hr	30hr	72hr
Existing Peak Flood Level (m AHD)	23.1178	23.7567	24.2227	24.8293	24.9153	25.1264	25.1128
Developed Peak Flood Level (m AHD)	23.1036	23.7443	24.2093	24.8136	24.8951	25.1075	25.1157
Difference (mm)	-14.2	-12.4	-13.4	-15.7	-20.2	-18.9	2.9

A summary of the flood warning time comparison is provided in **Table E** below.

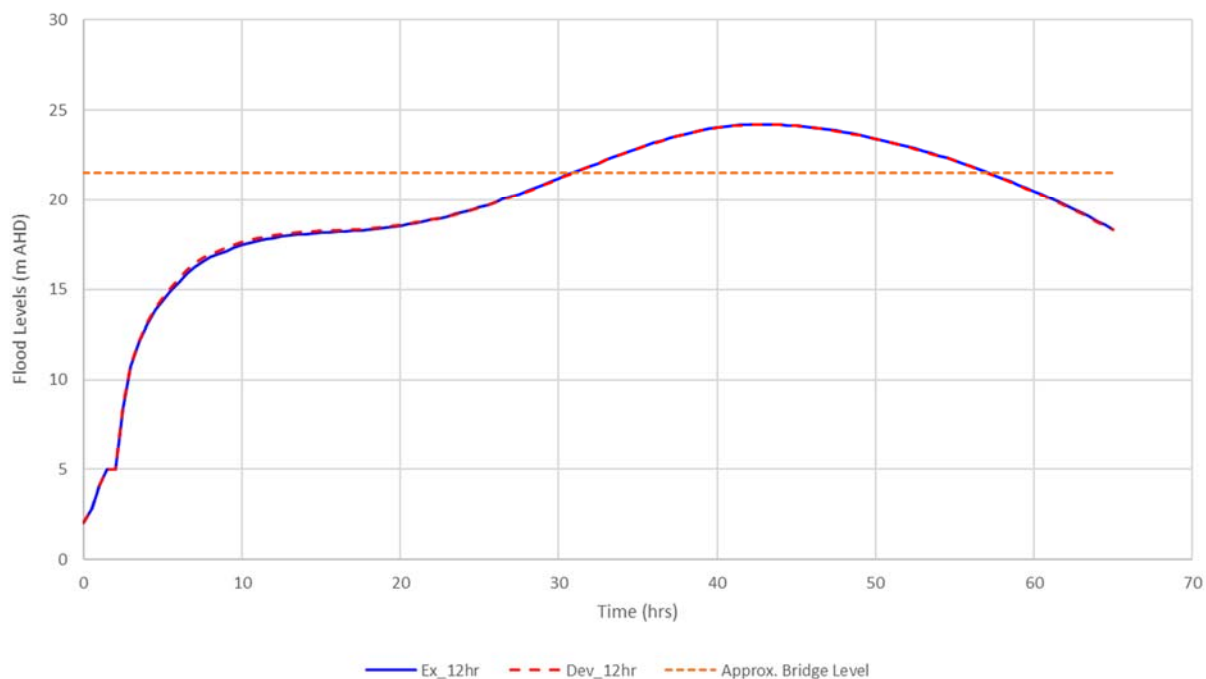
Table E: Flood Warning Time Comparison – Mt Lindesay Highway (Maclean Bridge)

Storm Duration	6hr	9hr	12hr	18hr	24hr	30hr	72hr
Existing Time to Inundation (hrs)	32.254	31.418	30.803	31.545	29.101	32.702	32.829
Developed Time to Inundation (hrs)	32.304	31.483	30.874	31.607	29.056	32.536	32.769
Difference (mins)	3.0	3.9	4.2	3.7	-2.7	-9.9	-3.6

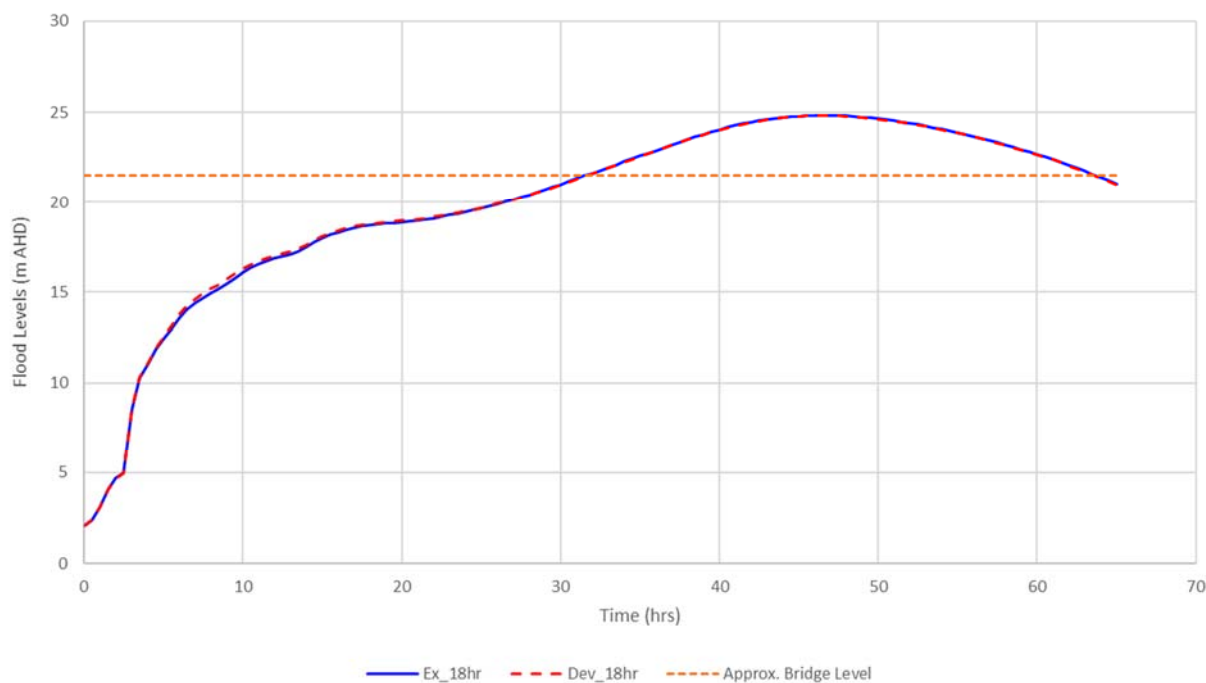
The below flood level hydrograph results indicate no significant change, demonstrating that the impact from the potential future development scenario is reduced 13 km downstream of the development.



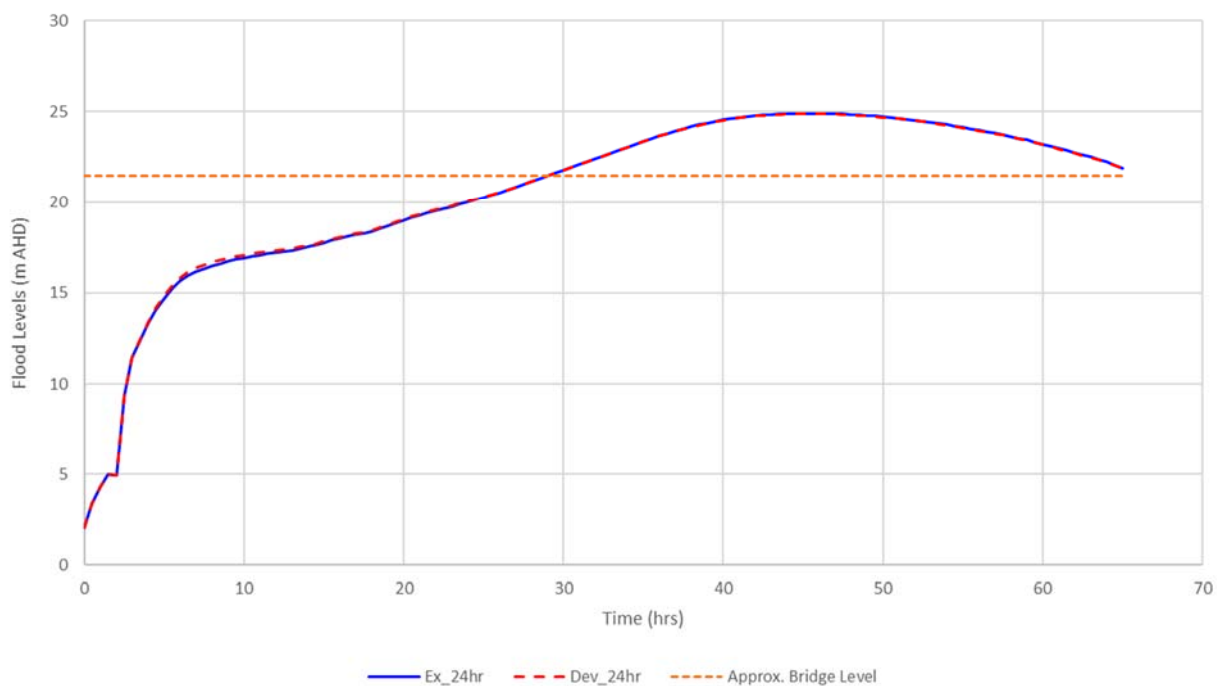
Existing vs Developed Flood Levels - 1% AEP 12hr Duration: Mt Lindesay Highway



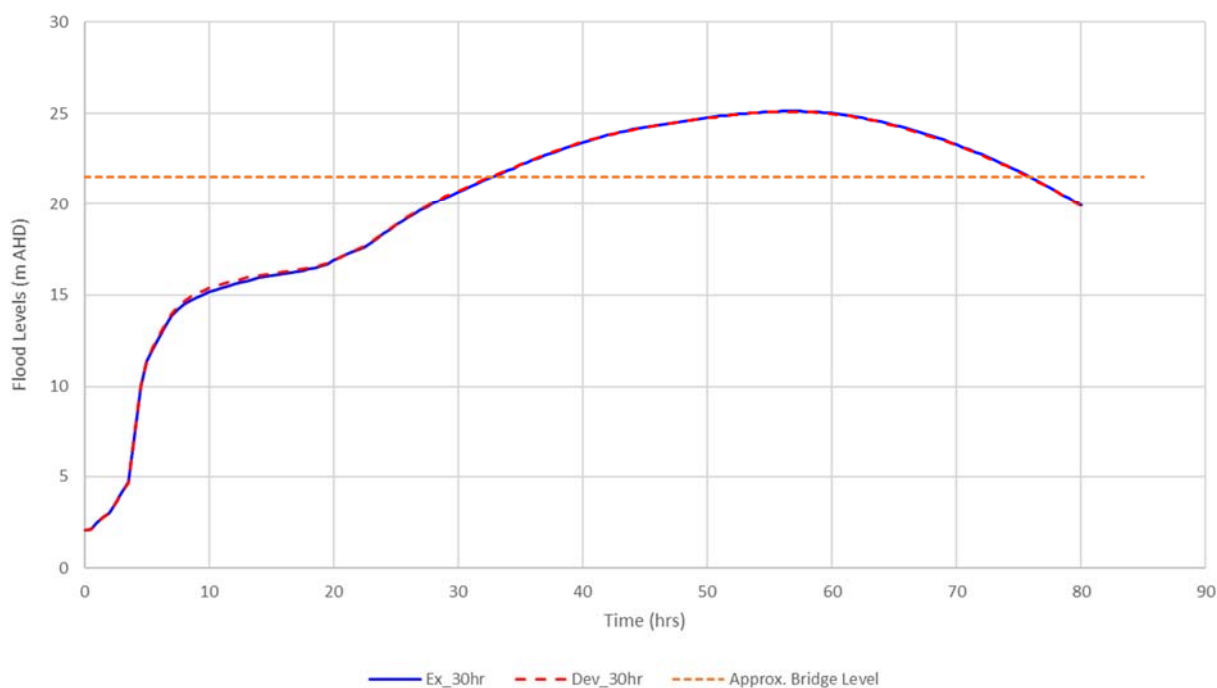
Existing vs Developed Flood Levels - 1% AEP 18hr Duration: Mt Lindesay Highway

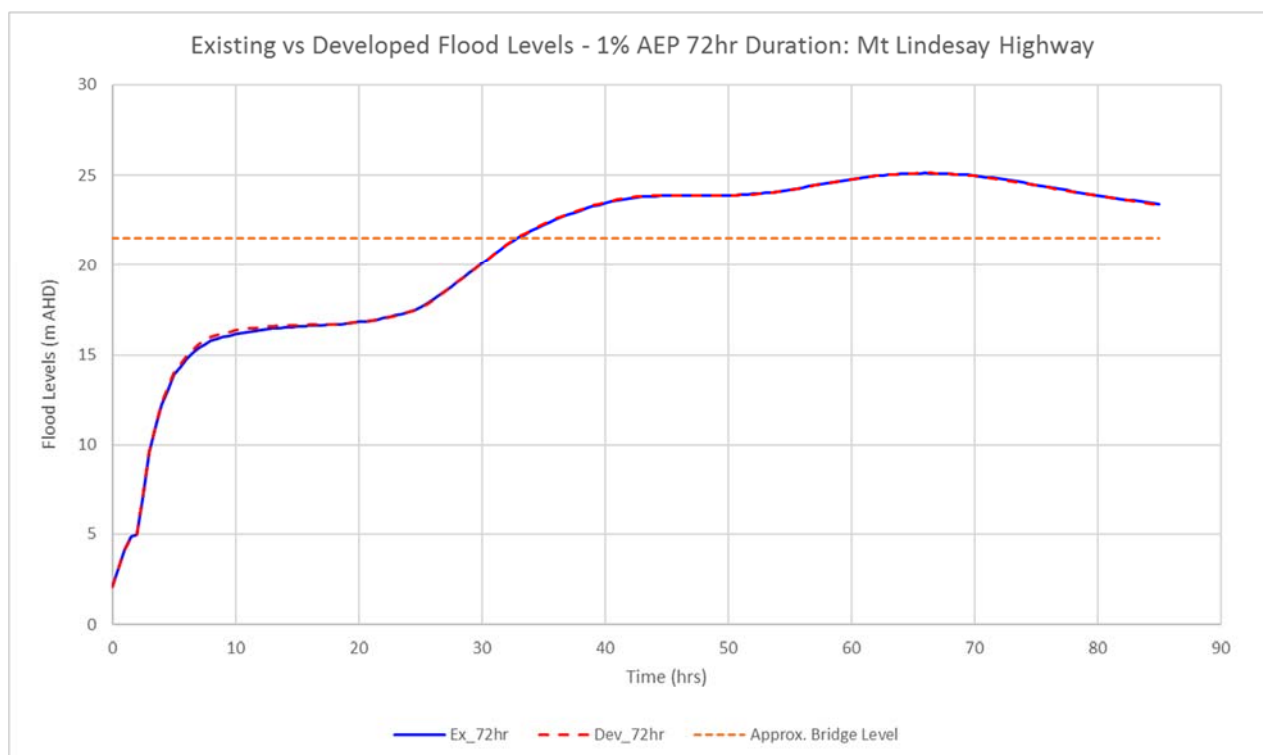


Existing vs Developed Flood Levels - 1% AEP 24hr Duration: Mt Lindesay Highway



Existing vs Developed Flood Levels - 1% AEP 30hr Duration: Mt Lindesay Highway





1.3 Wendt Park / Road (LR012) – 26km Downstream of Development

A summary of the peak flood level difference for each storm event is indicated in **Table F** below.

Table F: Peak Flood Level Comparison – Wendt Park / Road (LR012)

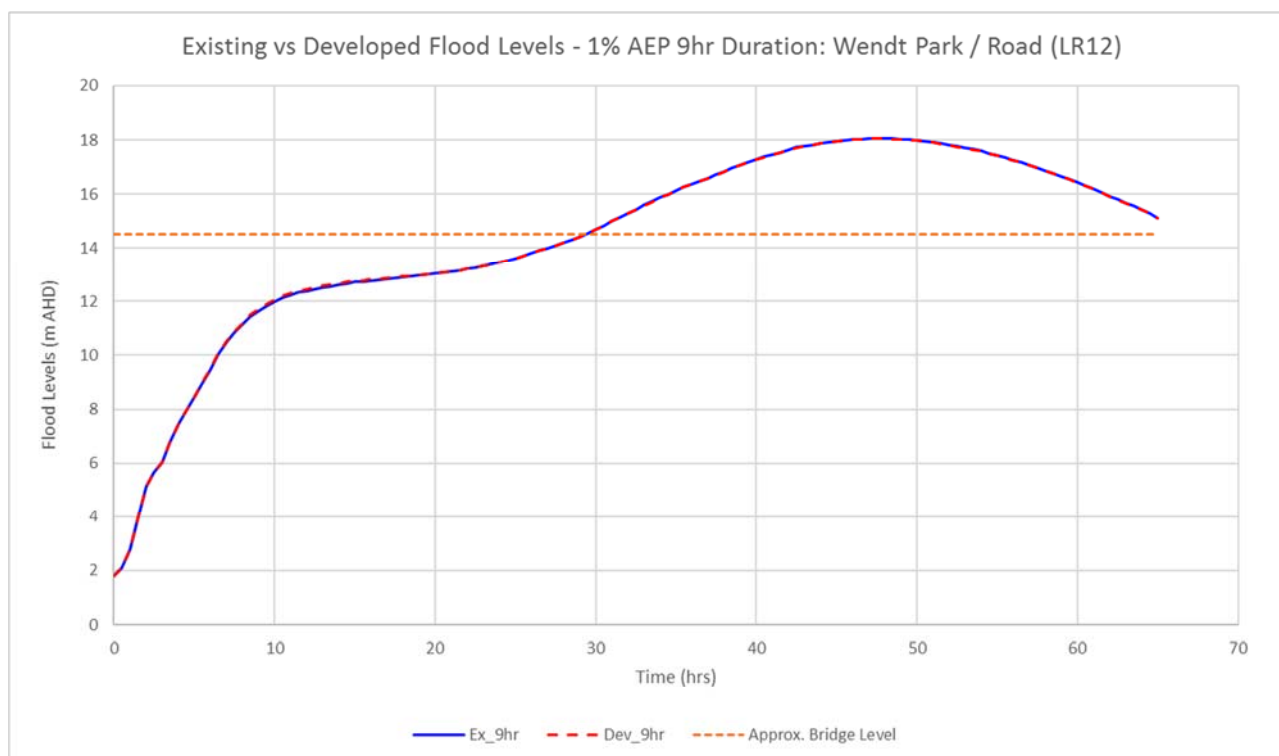
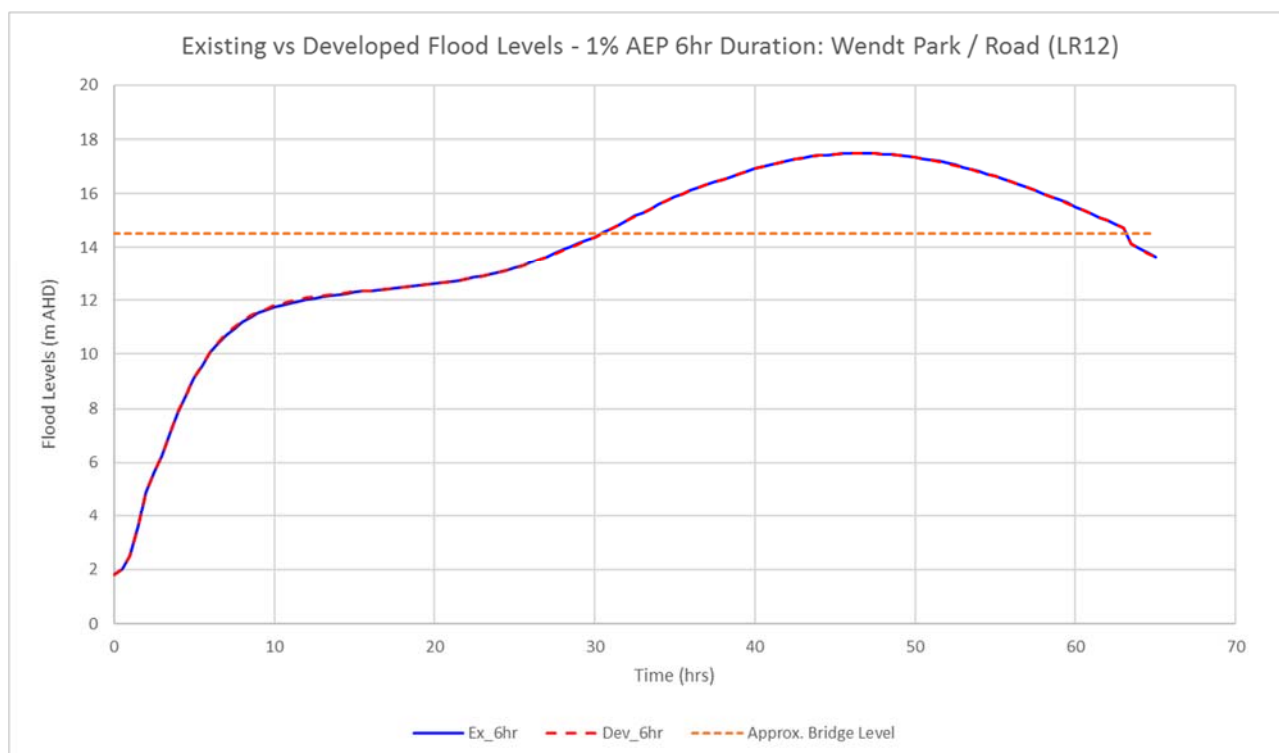
Storm Duration	6hr	9hr	12hr	18hr	24hr	30hr	72hr
Existing Peak Flood Level (m AHD)	17.4943	18.0473	18.4769	19.1301	19.3104	19.5781	19.4471
Developed Peak Flood Level (m AHD)	17.4897	18.0409	18.4704	19.1229	19.3018	19.5713	19.4500
Difference (mm)	-4.6	-6.4	-6.5	-7.2	-8.6	-6.8	2.9

A summary of the flood warning time comparison is provided in **Table G** below.

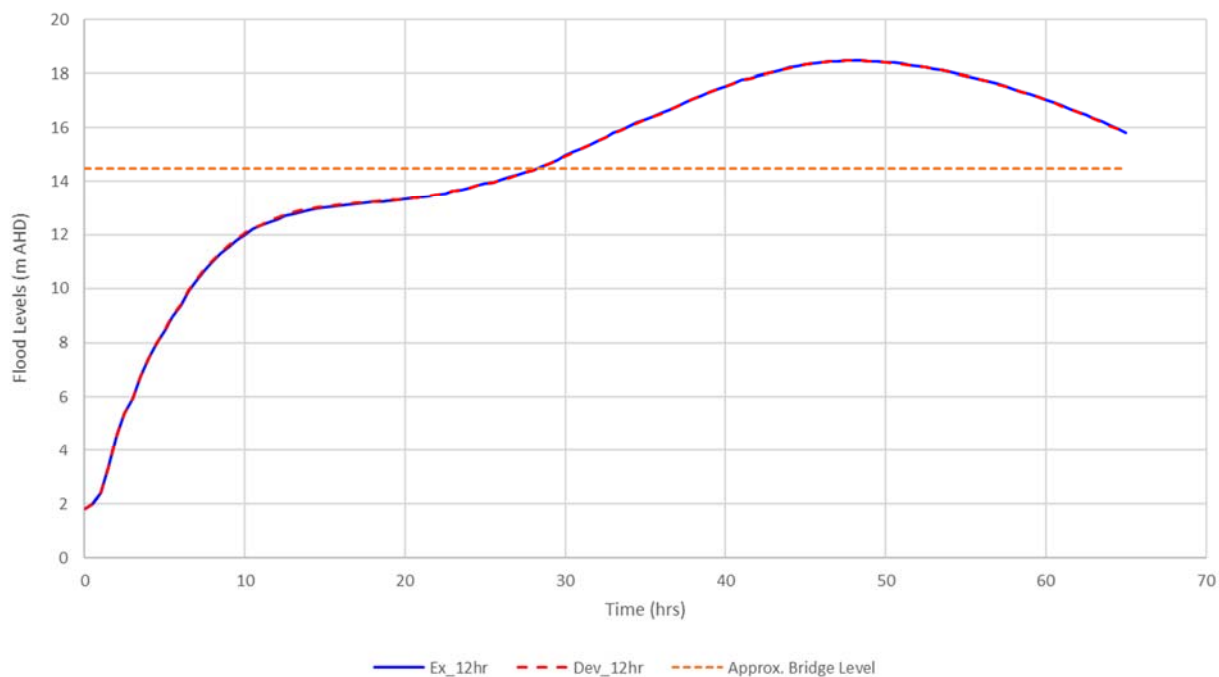
Table G: Flood Warning Time Comparison – Wendt Park / Road (LR012)

Storm Duration	6hr	9hr	12hr	18hr	24hr	30hr	72hr
Existing Time to Inundation (hrs)	30.379	29.285	28.260	27.376	24.055	28.408	30.836
Developed Time to Inundation (hrs)	30.418	29.341	28.293	27.346	23.947	28.343	30.839
Difference (mins)	2.3	3.4	1.9	-1.8	-6.5	-3.8	0.2

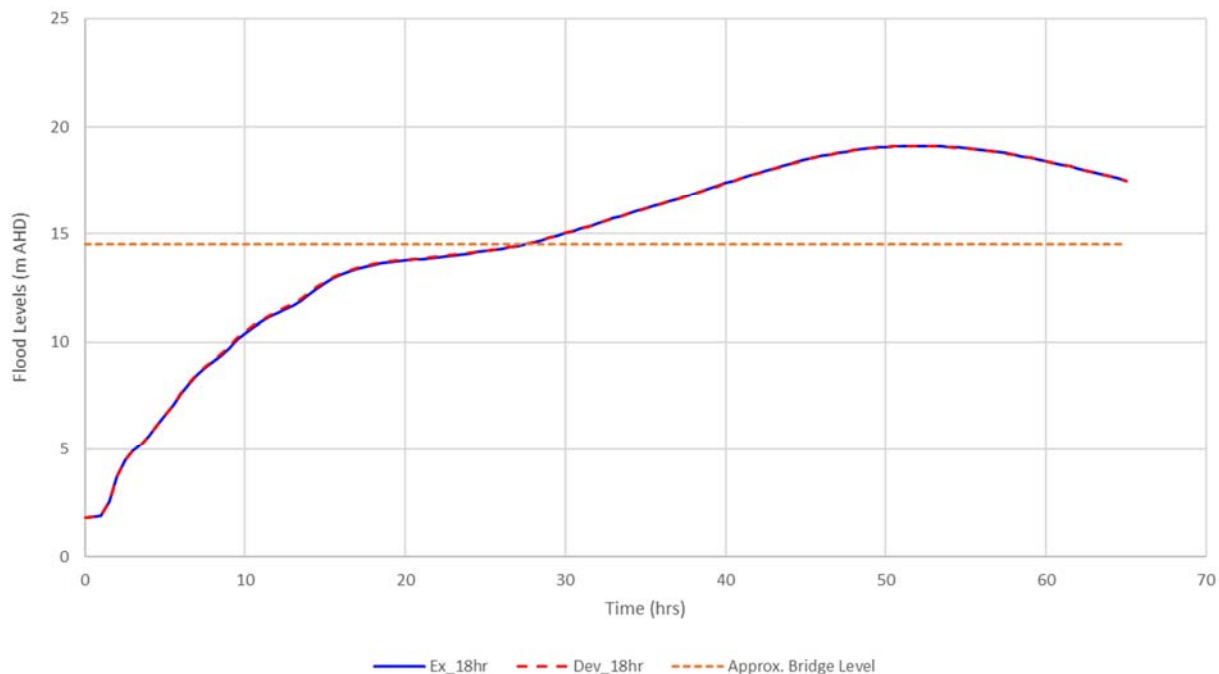
As indicated in the subsequent flood level hydrograph results there are no significant changes to the hydrograph, demonstrating that 26km downstream of the development impact from the master plan is not perceivable.



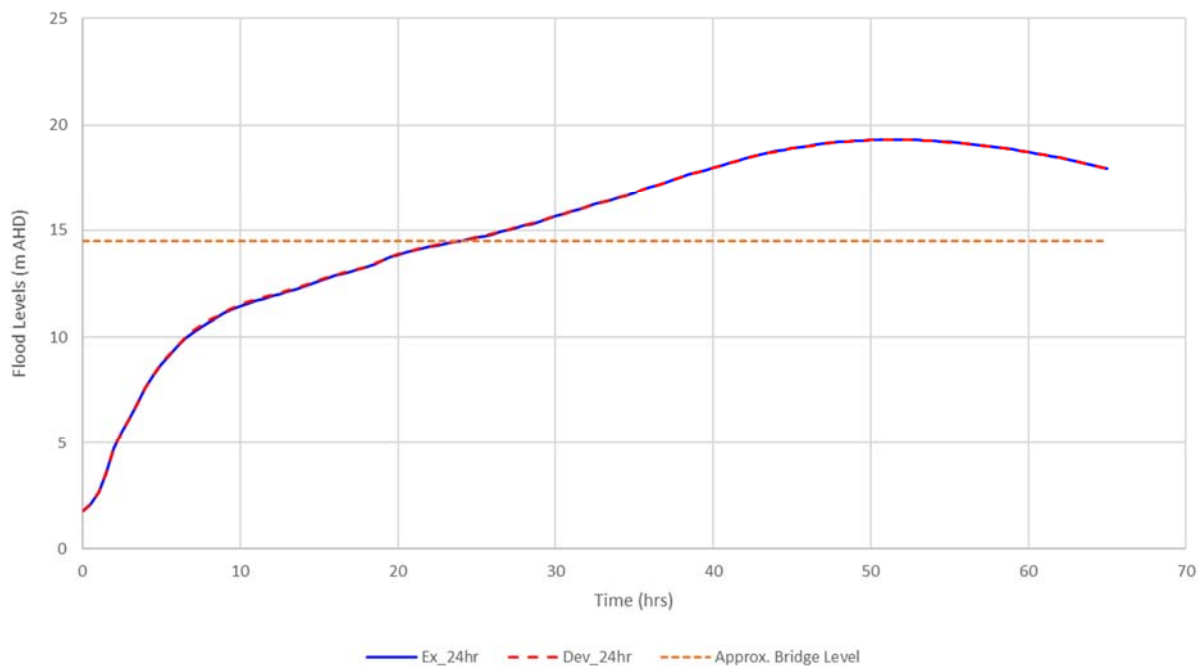
Existing vs Developed Flood Levels - 1% AEP 12hr Duration: Wendt Park / Road (LR12)



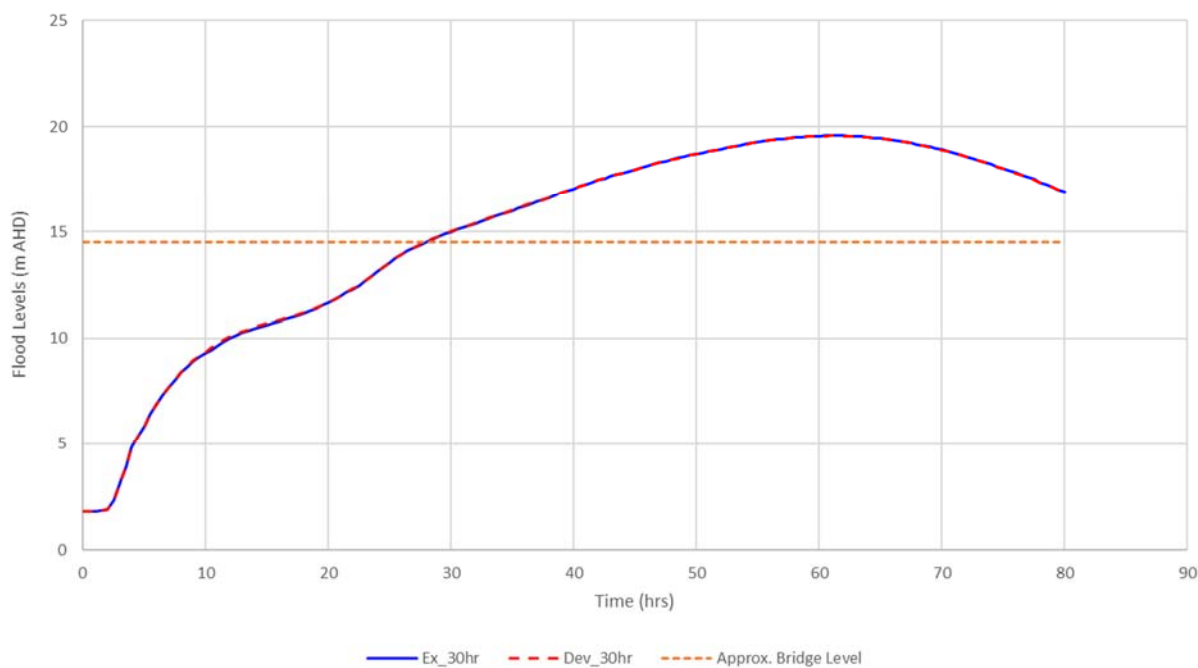
Existing vs Developed Flood Levels - 1% AEP 18hr Duration: Wendt Park / Road (LR12)

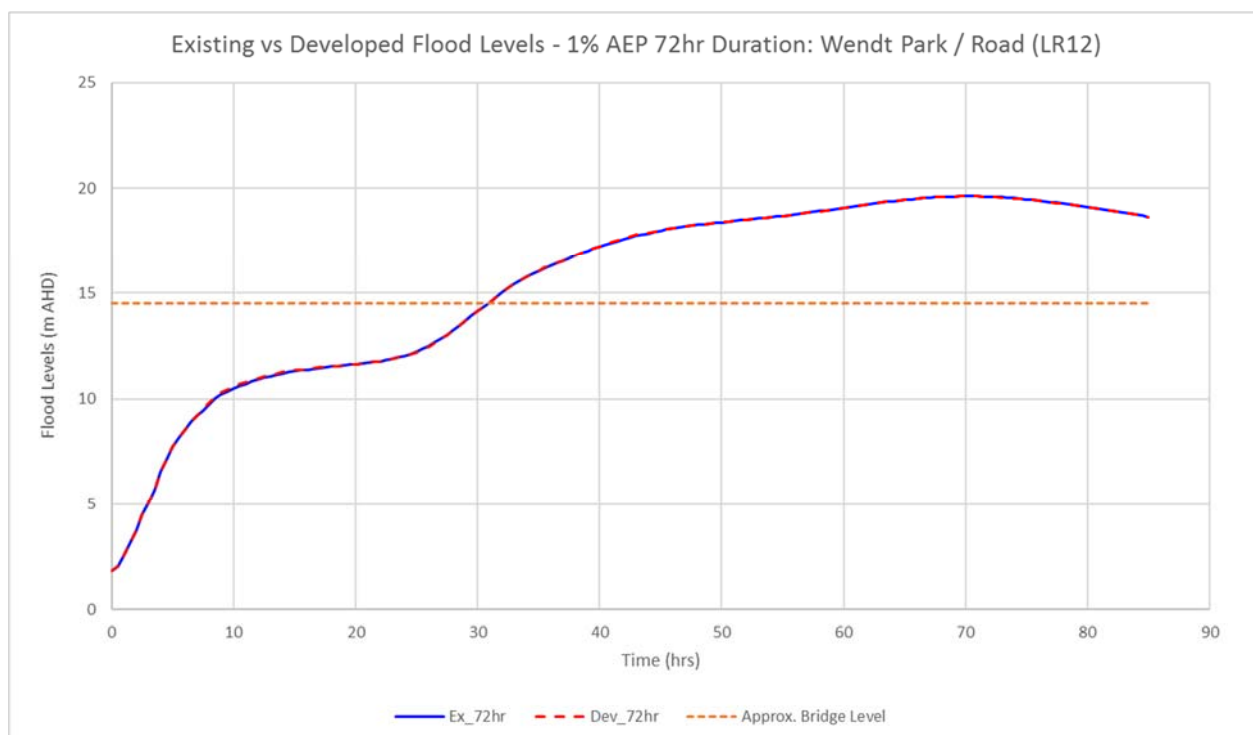


Existing vs Developed Flood Levels - 1% AEP 24hr Duration: Wendt Park / Road (LR12)



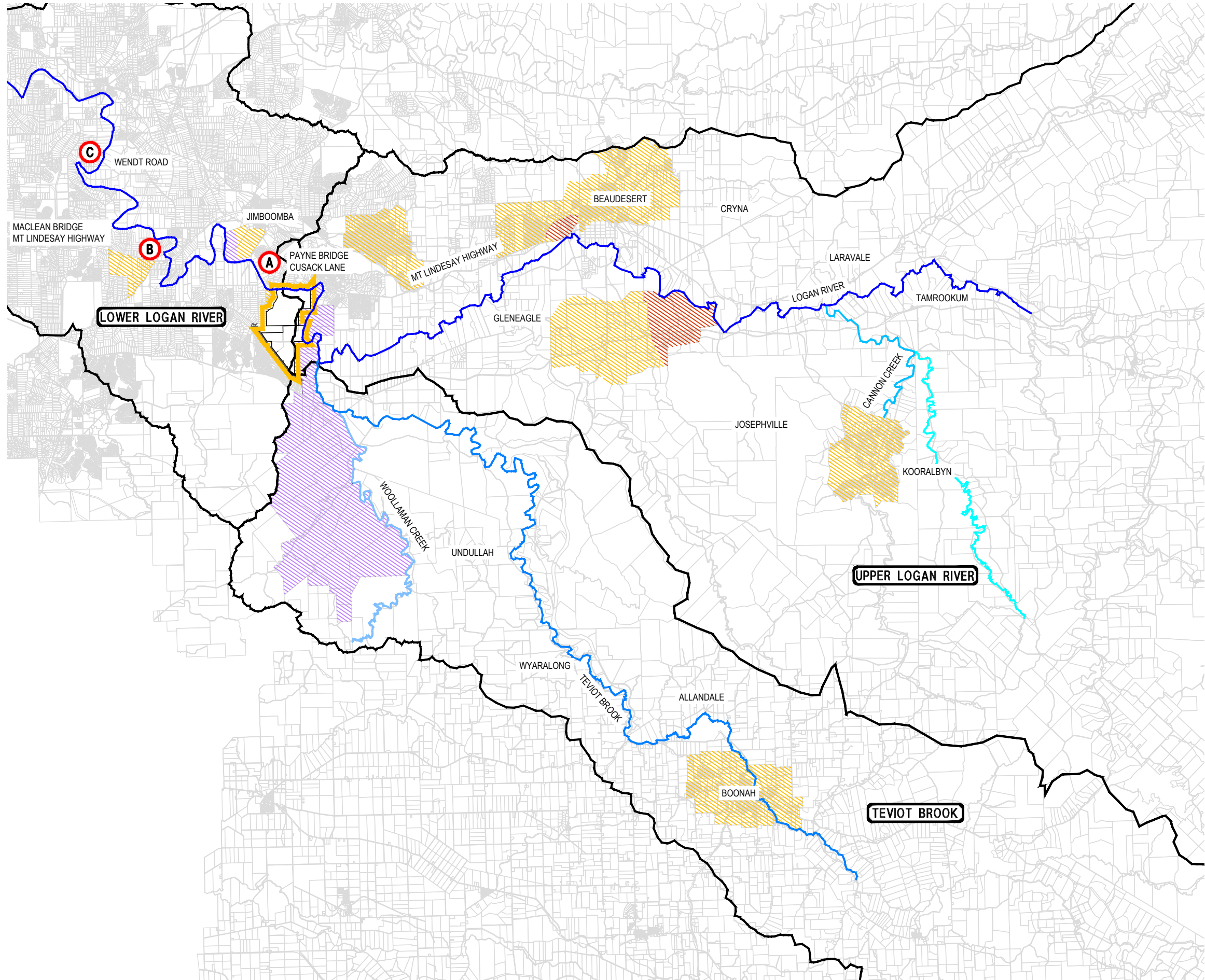
Existing vs Developed Flood Levels - 1% AEP 30hr Duration: Wendt Park / Road (LR12)





Attachment 3

Concept Drawings



- LEGEND:**
- SITE BOUNDARY
 - CADASTRE
 - CATCHMENT BOUNDARIES
 - LOGAN RIVER
 - TEVIOT BROOK
 - CANNON CREEK
 - KNAPP CREEK
 - WOOLLAMAN CREEK
 - FUTURE URBAN DEVELOPMENT AREA UNDER SEQ REGIONAL PLAN DISCHARGING TO PRIVATE PROPERTY OR CREEK PRIOR TO LOGAN RIVER OR TEVIOT BROOK (NOT MODELLED)
 - PDA OR URBAN DEVELOPMENT AREAS DISCHARGING DIRECTLY TO LOGAN RIVER OR TEVIOT BROOK (MODELLED)
 - FUTURE URBAN DEVELOPMENT AREA UNDER SEQ REGIONAL PLAN DISCHARGING DIRECTLY TO LOGAN RIVER OR TEVIOT BROOK (MODELLED)
 - ANALYSIS POINT
 - CATCHMENT LABELS

FIRST ISSUE	CALCS CM	DRAWN RH	DATE	AMENDMENT DETAILS	DESIGN CHECK	SCALE (METRES)	MICROFILM No.	PROJECT No.	APPROVED	CLIENT	PROJECT	DRAWING TITLE	DRAWING NUMBER	ISSUE
A						1:100,000 1,000 0 1,000 2,000 3,000 4,000 5,000 A1				CELESTINO	Jimboomba CELESTINO	FUTURE DEVELOPMENT SCENARIO CATCHMENT PLAN	B13343.W-SK13	
B						1:200,000 A3					JIMBOOMBA CELESTINO			
C														
D														
E														
F														

FOR & ON BEHALF OF CALIBRE CONSULTING (QLD) PTY LTD

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