Expert Opinion
Mordialloc Bypass Freeway EES

Address of Property: South eastern precinct of Kingston City Council
Report Prepared For: Kingston City Council
Instructed By: Russell Kennedy Lawyers
Date of Report: 14 February 2019
1 REPORT AUTHOR

Warwick Bishop
Senior Principal Engineer, Director
Water Technology Pty Ltd
15 Business Park Drive
Notting Hill, VIC 3168

Qualifications:
• B.E. (Hons), University of Melbourne, 1993
• MEngSci, Monash University, 2000

Affiliations:
• Charter Member, Institution of Engineers, Australia
• Chair, Engineers Australia, Victorian Water Engineering Branch Committee
• Member, International Association for Hydraulic Research
• Member, Australian Water Association
• Member, River Basin Management Society
• Member, Stormwater Victoria

Area of Expertise
Key areas of expertise relevant to this report are summarised below.
• Assessment of flooding related issues associated with residential, industrial and wetland development proposals;
• Hydraulic modelling of flood flows for major flood studies, including assessment of existing problems and evaluation of alternative floodplain management options; and
• Expert witness for flooding related issues at planning appeals and civil actions.

2 STATEMENT OF EXPERTISE

With my qualifications and experience, I believe that I am well qualified to provide an expert opinion on the floodplain matters for the subject site.

3 REPORT CONTRIBUTORS

Niels Unger
Senior Engineer
Water Technology Pty Ltd
15 Business Park Drive
Notting Hill, VIC 3168
Qualifications:
- B.E. (Civil), Monash University 2007
- G.D. Planning & Design (Architecture), Melbourne University 2012

Affiliations:
- Member, Engineers Australia

Area of Expertise:
Key areas of expertise relevant to this report are summarised below.
- Assessment of urban flooding including hydrologic and hydraulic modelling
- Urban waterway design and management
- Application of GIS

Scope of contribution:
Niels undertook data analysis and figure preparation under my supervision.

4 SCOPE OF REPORT

I have been requested to provide an expert opinion on the potential impacts on surface water of the proposed Mordialloc Bypass Freeway as documented within the Environmental Effects Statement (EES) report written by and on behalf of the Major Roads Project Authority (MRPA).

The scope of work undertaken for this assessment included the following:

1. Review all reports, maps and appendices provided and provide opinions and recommendations based on the outcomes detailed;
2. Review and provide a response to all public submissions which pertain to surface water issues or concerns;
3. Review the hydraulic modelling results and create flood level difference (afflux) plots for key flooding events including the 1% and 20 % AEP; and

5 BASIS OF THIS REPORT

This report is based on the following sources of information:
- Public Submissions (As supplied by Russel Kennedy Lawyers)
- TUFLOW Hydraulic Modelling Results (WSP, various dates)
- Memo: Mordialloc Freeway: Climate Change Flood Impacts Summary (WSP, Nov 2018)
- Hydrologic and Hydraulic Modelling Report (WSP, Aug 2018)
- Vicmap planning layers and cadastral information (2016).

This report has been prepared in accordance with the Expert Witness Code of Conduct. I have read the code and am aware of my overriding duty to assist the Panel on matters relevant to my expertise.
6 INTRODUCTION

The project consists of a new section of freeway which is to connect the Dingley Bypass to the Mornington Peninsula Freeway. Because of the proximity of the project to the Edithvale-Seaford Wetlands (Wetlands) which is a Ramsar-listed site, in September 2017 the Minister for Planning requested under the Environmental Effects Act 1978 that an EES be prepared by the Major Road Projects Authority to assess the potential environmental effects of the project. Additionally, the Commonwealth Minister for the Environment and Energy determined that the project required approval under the Environment Protection and Biodiversity Conservation Act 1999, due to the potential cumulative impact on the Wetlands, listed threatened species and migratory species. The EES also assesses and considers impact on Matters of National Environmental Significance under the Environment Protection and Biodiversity Conservation Act 1999.

This report draws conclusions and recommendations based on the contents of the EES report (supplied by Russell Kennedy lawyers 09/01/2019) including its Attachments and Appendices in addition to raw hydraulic model results (prepared by WSP on behalf of the MRPA, supplied by Russell Kennedy Lawyers 12/02/2019).

A detailed technical review of the hydrologic and hydraulic models was outside the scope of this assessment due to:

a) Time constrains such that a thorough technical review was not possible;
b) Melbourne Water supplying the MRPA with the ‘base’ modelling, implying that the base model was adequately reviewed prior to application to the EES studies; and
c) The MRPA (and WSP) working closely with Melbourne Water throughout the development of the modelling, providing a reasonable level of confidence that the modelling is to an acceptable standard.

7 SITE DESCRIPTION

The proposed bypass alignment crosses Smythes Drain open channel, Mordialloc Creek, Dingley Drain open channel, Gartsides South Drainage Scheme open channel, Gartsides Drainage Scheme underground drainage, Braeside West Drainage Scheme open channel, Old Dandenong Road Drain waterway and Gartsides North Drainage Scheme underground drainage. Stormwater runoff from the proposed road will enter the downstream drainage system (generally on the west side) or main waterway through discharge points (Outfalls) at impacted sub-catchments.

The open land flood flow associated with these drains will also interact with the Bypass as the Bypass will tend to block some of the existing overland flow paths. The proposed roadway runs through the western part of the Mordialloc Creek Wetlands (Waterways wetlands) and the stormwater runoff from the road discharges to Woodlands Industrial Estate Wetlands and Edithvale Wetlands, which is a declared Ramsar site downstream of the project area. All stormwater runoff from the project will eventually drain to Edithvale Wetlands or Port Phillip Bay.
Figure 7-1  Study Area with the Proposed Bypass Alignment Superimposed
8 ANALYSIS – REVIEW OF EES TECHNICAL CONTENTS

8.1 Water Quality

The water quality impact assessment undertaken is generally considered to be appropriate for the purposes of identifying potential impacts to the receiving wetland environments. It appears the increase in downstream flows into the receiving wetlands, changes in flow regime and increases in pollutant loads have been thoroughly assessed.

8.1.1 Impacts of Afflux during Flood Events

Whilst changes in flow regime affecting the downstream wetland systems are reported to have negligible impact, it appears the impacts of an increase in flood levels (and depths) during flood events occurring within the receiving wetland systems have not been assessed. Although the changes in flood depth are minimal (approximately 35 mm within the Woodlands Wetlands during the 1% AEP event), they are widespread.

Recommend confirmation of the impacts of afflux on the general health and ecology of the receiving wetland systems downstream, particularly the Woodlands Wetlands.

8.1.2 Water Sensitive Urban Design (WSUD)

According to Section 16.8.2 of the ESS, “Modelling results indicated increased pollutant loading to the three wetlands when compared to existing conditions when only standard grassed swales are in place. As such, further mitigation measures, including adoption of WSRD and implementation of bio-retention systems, are necessary to ensure that water body health is maintained (EPR W1)”.

The reliance on bio-retention systems to maintain current pollutant loads (and therefore mitigate impacts associated with the bypass) introduces numerous points of failure into the system as they:
1. Are highly sensitive assets which present a challenge to construct correctly and require experienced/specialised Contractors to undertake the works.
2. Require a higher degree of on-going maintenance during the life of the asset (when compared to vegetated swales); and
3. Have a short lifespan before treatment effectiveness is impaired relative to the lifespan of the road network they support. As a result, they generally require a full-reset every 7-10 years.

However, considering the constraints of the freeway corridor (relative to available area) and the highly efficient nature of bio-retention systems with respect to pollutant removal, it is not unreasonable to utilise these assets within the project.

Recommend an Asset Management Plan be established to cover all proposed on-going maintenance and “full reset” activities including lifecycle costing. Considering these assets are also proposed to play a part in spill containment, the management plan must contain specific actions related to when oil/petrol spills occur.
8.2 Flood Risk

8.2.1 Hydrology: AR&R 1987 Methodology

Section 4.2.3 within the Surface Water Impact Assessment Report (Appendix J) identifies the use of Australian Rainfall and Runoff (AR&R) 1987 rainfall depth and temporal patterns to generate runoff hydrographs for input to the hydraulic models. Whilst it is industry standard to utilise a revised version of AR&R from 2016 for the generation of inflows, it appears Melbourne Water were agreeable to the utilisation of 1987 methodologies as per the following statement: “The flood assessment for the project has proceeded in advance of the formal adoption of the AR&R 2016 guideline. Therefore, continued use of the AR&R 1987 has been discussed and agreed with Melbourne Water.”

Whilst the adoption of AR&R 1987 methodologies is common for current projects while there is a transition to the new guidelines, it is considered best practise when doing so, particularly for large-scale projects, to undertake some sensitivity analysis to ensure there are no considerable discrepancies between the results of the two methods.

Considering the scale, complexity and sensitivity of the study area it is recommended sensitivity testing between AR&R 1987 and AR&R 2016 be undertaken.

8.2.2 Very Rare Flood Event Assessment(s)

It is generally considered best practise when assessing the impacts of large-scale development projects such as this, to undertake flood modelling for larger, rarer design floods than the standard 1% AEP design flood. This is particularly important as conveyance of flows from the upstream catchment is reliant on lateral drainage connections (culverts) under the bypass without which the carriageway could act as a bank that causes ponding upstream to significant depth.

Recommend further modelling be undertaken to ensure no catastrophic flooding occurs as a result of the bypass in the 0.5% and 0.2% AEP design floods.

It is acknowledged that such design runs have been specified by Melbourne Water and noted in the WSP Mordialloc Freeway Hydrologic and Hydraulic Modelling Report (August 2018), as recommended for the detailed design phase. I believe checks against these more extreme flood events would have been appropriate to undertake at the EES stage in order to determine if any unexpected impacts, that may require further mitigation measures, are likely to arise.

8.2.3 20% AEP Design Flood

Based on the raw hydraulic modelling data provided, there appears to be minimal impact on existing flood risk for the 20% AEP design flood. Afflux appears to be limited to within the proposed freeway corridor, adjacent drainage easements, the floodplain and downstream wetlands. Regions of peak afflux in relation to increased flood levels are very localised and can be attributed to changes in either proposed hydraulic structures (such as open drains or storage areas) or general changes in the way flow is conveyed and distributed.

The afflux does not appear to have any affect on flood risk to private property nor does it indicate a loss in capacity of the upstream Council stormwater network. Refer to Figure 8-1 for further detail.

No recommendations relating to this section.
Figure 8-1  20% AEP Afflux - Entire Study Area
8.2.4 1% AEP Design Flood

Much like the afflux results for the more frequent 20% AEP design flood, the hydraulic modelling results for the 1% AEP design flood indicate no major increase in flood risk associated with the proposed bypass. Afflux is again contained within the proposed freeway corridor, adjacent drainage easements, the floodplain and downstream wetlands. The largest region of change occurs within the Woodlands Wetlands precinct which is predicted to experience an approximate 35 mm increase in flood depth in a 1% AEP design flood. Whilst this does not result in any significant increase in flood risk, the increase in flood depth may impact on the wetland’s general health and ecology (as highlighted within Section 8.1.1).

Areas of peak afflux generally occur within the same locations as the 20% AEP design flood and do not appear to cause any net increase in flood risk to the surrounding private properties. Refer to Figure 8-2 for further detail.

*No recommendations relating to this section.*

8.2.5 1% AEP Design Flood and the Impacts of Climate Change

The effects climate change where taken into consideration as per Melbourne Water standards for infrastructure projects in flood-prone areas (2018) which incorporate a 0.8 m Sea Level Rise (SLR) and 19% increase in rainfall intensity. For further information refer to “Mordialloc Freeway: Climate Change Flood Impacts Summary” (WSP, Nov 2018). These parameters are considered reasonable and in accordance with current industry practice and the requirements of government policy with respect to Climate Change (such as Victorian Coastal Strategy 2014).

The impacts of climate change on afflux caused an approximate 20 mm increase in flood levels resulting in several private properties on Malcom Road, Macbeth Street and Industrial Drive in Braeside to be flood affected which previously were not. Refer to Figure 8-3 for further detail.

I note that per Melbourne Water’s public submission (7984853 v 1), this predicted increase in flood risk and depth has since been abated as part of further mitigation design works.

*Based on Melbourne Water’s concerns being addressed in relation to this matter, I have no recommendations relating to this section.*
Figure 8-2  1% AEP Afflux - Entire Study Area
Figure 8-3  1% AEP Climate Change Afflux - Entire Study Area
8.1 Environmental Performance Requirements

The Environmental Performance Requirements section of the report provides a number of measures intended to ensure any potential impacts are managed appropriately. I have provided some selective comments on these below.

**W1 Water Body Health** – This is an overall requirement to manage runoff (quality and quantity) during and after construction to ensure the health of receiving waters. I believe the overall requirements for this are generally appropriate to ensure that the required outcomes are achieved. Whilst there is no specific reference to the health of the receiving waters, it is acknowledged that the over water body health will be influenced by factors mostly outside the scope of the project.

**W2 Flood Protection (operational)** – This requirement doesn’t make any specific mention of minimising impacts on current or future performance of Council drainage systems which may be helpful.

8.2 General Comments and Recommendations

8.2.1 Capacity of Lateral Drainage Connections (Culverts)

It appears the hydraulic function of the proposed bypass is heavily reliant on lateral drainage connections (culverts) to convey flow from the western upstream catchment to the eastern outfalls. No information relating to how these culvert groups were sized was evident in the ESS reports, however, it appears that detailed analysis has been undertaken on specific reference design structures within the WSP Mordialloc Freeway Hydrologic and Hydraulic Modelling (August 2018) background report. It is recommended the following factors be taken into consideration through the detailed design process:

1. The impacts of Climate Change
2. Future changes in land use within the upstream catchments
3. Impacts of greater than 1% AEP design flood flows on the system (as per Melbourne Water requirements).
4. Blockage

On review of the Hydrologic and Hydraulic Modelling report supplied, it appears blockage factors, derived utilising AR&R 2016 methods were applied within the hydraulic model.

Whilst this method of blockage consideration is generally appropriate it is noted that analysis of potentially higher blockage rates is desirable. This is because the region is quite flat resulting little grade to utilise in design of ‘self-flushing’ culverts. As a result, it is fair assume sediment loads will deposit within the culverts over time. In the event that some unexpected blockage occurs, the lack of relief overland flow paths in some areas could result in significant ponding depths on the east side of the freeway embankment.

*Recommend an Asset Management Plan be established detailing all on-going maintenance activities including a proposed maintenance frequency schedule for culverts.*

*Recommend that greater than 1% AEP design floods are considered to test the sensitivity of the structures to higher flows.*

It is noted that the Mordialloc Freeway Hydrologic and Hydraulic Modelling Report (August 2018), recommends localised hydraulic models with grid resolution of finer than 4 m should be used to test drainage around areas of sensitivity such as residences close to the bypass. I support this recommendation.
8.2.2 Asset Ownership and Connection Rights

Through previous experience in the land development sector, Water Technology has been party to several instances where disputes between road authorities and Local Government have occurred stemming from Approved Point of Discharge (APD) requests from adjacent private land owners.

These issues arise where either:

- The outfall of the Council stormwater system has gone from a Melbourne Water owned asset to that attributed to the major infrastructure project, or
- Access to the Council stormwater system has been severed by the major infrastructure project alignment.

Both cases can result in restricted access of a private land owner to connect their drainage assets to a road authority drainage outfall or allowing the private connection on the condition the local Council take on all maintenance requirements for the asset from the connection point downstream.

Recommend these issues be tabled and a formal agreement between the relevant authorities be made prior to the construction of the bypass.
9 RESPONSE TO SUBMISSIONS

The 116 submissions (as supplied by Russel Kennedy lawyers on 05/02/2019) were screened by Water Technology and an assessment made as to whether the concerns/objections raised were pertinent to surface water. Relevant submissions which required further investigation or comment were shortlisted as per the table below.

Table 9-1  Public Submission Summary

<table>
<thead>
<tr>
<th>Submission ID</th>
<th>Concern/Objection(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission 39</td>
<td>Flooding: Increase in flood risk &amp; safety within Aspendale Gardens</td>
</tr>
<tr>
<td>Submission 47</td>
<td>Flooding: Increase in flood risk within the Waterways Estate</td>
</tr>
<tr>
<td>Submission 69</td>
<td>Flooding: Surface water contamination during construction</td>
</tr>
<tr>
<td>Submission 78</td>
<td>Melbourne Water: Climate change, interim flooding &amp; water quality</td>
</tr>
<tr>
<td>Submission 83</td>
<td>KCC: Flooding &amp; water quality</td>
</tr>
<tr>
<td>Submission 84</td>
<td>Flooding &amp; Water Quality: The impacts of climate change</td>
</tr>
<tr>
<td>Submission 89</td>
<td>Flooding: Flood mapping and possible mitigation solutions</td>
</tr>
<tr>
<td>Submission 98</td>
<td>Water Quality: Construction &amp; operational phases plus monitoring</td>
</tr>
</tbody>
</table>

9.1 Submission: 39 (7984756 v 1)

The owner of one of the four properties within Maidenhair Mews, Aspendale Gardens which are predicted to experience an increase in flood levels within their property boundaries as a result of the bypass, has concerns relating to flood risk and safety.

Concerns relate to a specific paragraph within Section 7.1.3.1 of Appendix J (Surface Water Impact Assessment) of the ESS which states:

“In relation to private properties to the east of Wells Road at the end of Maidenhair Mews near Location 3, they could be affected by flood impact of the proposed culvert K1 in Location 3. As mentioned before, this culvert is design for ultimate flow rate provided by Melbourne Water. Thus, the proposed culvert has a greater hydraulic capacity than the existing channel its replacing, and hence allowing more water downstream causing afflux. On closer inspection, it seems that these private properties have a large drainage channel running through their backyards, so it may be possible that the drainage arrangement has recently changed at this location to allow this development. It was assumed in the assessment that the downstream drainage system has been designed with a capacity for the ultimate flow rates, which results in the afflux but all afflux are contained in bank, and hence, does not pose flood risk to surrounding properties. However, it is recommended to confirm this with Melbourne Water during detailed design stage so that the proposed culvert K1 can be sized in accordance with Melbourne Water latest drainage scheme design. No further mitigation action is recommended.”

WSP hydraulic modelling results indicate between 35 and 40 mm increase (afflux) in flood levels within the back gardens of 13 - 17 Maiden hair Mews, Aspendale Gardens for the 1% AEP design flood. As per the excerpt, the afflux is contained within the existing aboveground channel and appears to pose no threat to adjacent dwellings.

Additionally, the 35-40 mm afflux has minimal impact on flood safety relative to the 1% AEP design flood depth for existing conditions which, at its deepest point, appears to be approximately 700 mm in depth. That is not to discount the concerns of the resident with respect to the risk associated with flood waters, young children and the lack of a physical barrier. However, this risk appears to be present under existing conditions and hence needs to be managed in the current circumstances. The report recommends that the impacts at this location and the design of the culvert at this location be reviewed.
as part of the detailed design process which I consider is appropriate as there is no indication that a satisfactory outcome cannot be readily achieved.

Figure 9-1  1% AEP Afflux - Maidenhair Mews, Aspendale Gardens
Figure 9-2  1% AEP Flood Depth - Maidenhair Mews, Aspendale Gardens
9.2 Submission: 47 (7984766 v 1)

The submission raises numerous issues however, the concern over increased flooding within the Waterways estate is the only concern specifically surface water related. Specifically, the following statement was made:

“We expect that adequate drainage solutions have been incorporated in the design as Waterways has been subjected to flooding in the past.”

According to the hydraulic modelling undertaken by WSP, there is no predicted increase in design flood levels (afflux) within the Waterways estate for the 1%, 2% or 20% AEP design floods. There is also no decrease in predicted flood levels associated with the proposed bypass, so it is reasonable to expect existing flooding conditions to remain “as-is”.

9.3 Submission 69 (7984799 v 1)

The submission raises issues relating to how water quality within the receiving wetlands is to be maintained during the construction phase of the project along with broader concerns in relation to the health of the wetlands.

Section 7.4.3.2 of Appendix J (Surface Water Impact Assessment) of the ESS notes that all construction practises are to abide by Clause 56 of the State Environment Protection Policy (SEPP) which requires construction works be managed to minimise land disturbance, soil erosion and the discharge of sediment and other pollutants to surface waters. In turn a Stormwater Management Plan (SMP) is proposed to be developed prior to construction works informed by the EPA publications “Construction Techniques for Sediment Pollution Control” (1991) and “Environmental Guidelines for Major Construction Sites” (1996).

In addition, the Environmental Performance Requirement (EPR) “WS” within Table ES.1 notes a “Water Management and Monitoring Plan (WMMP) is to be prepared in consultation with EPA Victoria and relevant water authorities, and be implemented prior to construction, during construction and for five years following opening the project to the public. The WMMP must incorporate both surface and groundwater monitoring.”

I believe the measures set out about are adequate, if applied appropriately, to manage risk of water quality impacts on the RAMSAR wetlands.

9.4 Submission 78 (7984853 v 1) - Melbourne Water

Melbourne Water’s three main concerns relating to surface water appear to be:

1. The impacts of the bypass on flood levels when taking into consideration the effects of climate change;
2. The potential to increase flood risk during the construction phase of the project; and
3. An increase in pollutant loads entering receiving wetlands during construction and operation of the bypass.

On review of Melbourne Water’s submission, it is evident that, since the EES was exhibited, all three concerns have been addressed by the MRPA and its representatives, with Melbourne Water making the following closing statement:

“MWC looks forward to engaging further with MRPA and the appointed contractor, other government agencies and the community as part of the detailed design process to achieve the best community outcome for the Project overall.”
9.5 Submission 83 (7984859 v 1) - Kingston City Council

Kingston City Council’s submission raises various concerns and requests in relation to the proposed bypass. In regard to surface water, the following statement was made:

“Flood impacts including changes to floodplain capacity and stormwater flows post construction and the implications this will have for existing Council infrastructure.”

Loss in floodplain storage (and therefore capacity) would be indicated through the hydraulic model results by afflux occurring upstream or around the outer edges of the active floodplain during peak design storms. According to afflux plots created by Water Technology for the 1% and 20% AEP design floods, increases in flood levels appear to be (for the most part) contained to the freeway corridor and drainage easements. This is a fair indication that, although flow distribution is changed as a result of the bypass, the ability for the floodplain to store and convey flows does not appear to be compromised.

As detailed within Section 8.2.5, once taking the effects of climate change into consideration this is no longer the case with numerous locations outside of the freeway corridor experiencing an increase in flood levels for the 1% AEP design flood. Based on the submissions made by Melbourne Water, this afflux has apparently been abated through additional mitigation design work.

From the raw hydraulic model results supplied, Water Technology was able to assess the difference in flood levels between existing and developed scenarios for the 1% and 20% AEP design floods. See Figures 8-1 and 8-2 for further detail.

In order to determine whether there are any negative impacts on the Council stormwater system through either reduced capacity in receiving pipe assets or a change in downstream water levels, the 20% AEP design flood results were assessed. This is due to Council stormwater systems generally being designed to a level of service which caters for flows attributed to the 20% AEP event and as such, any afflux would indicate a decrease in carrying capacity.

On inspection there appears to be no major changes in flood levels outside of the freeway corridor; even within regions such as the western portion of Dingley Village (bounded by Centre and Lower Dandenong Roads) which appears to suffer from pre-existing conveyance/capacity issues.

9.6 Submission 84 (7984861 v 1)

Statements made within the submission which pertain to surface water are as follows:

“Consideration needs to be given to the short and long term effects of climate change on groundwater dependent ecosystems, surface water, Mordialloc Creek drainage and the floodplain, as well as the impact of increased carbon emissions from increased traffic density.”

“As previously described, the hydrology of the Edithvale-Seaford wetlands and their connectivity with the aquifers of Braeside Park, Waterways wetlands and Woodlands Estate wetlands needs to be maintained. Run-off from the freeway will ultimately flow into Mordialloc creek, an important element of the drainage system into Port Phillip Bay. For protection of both the catchment areas and the Bay run-off will need to be polished up to an acceptable standard.”

The effects of climate change have been investigated from an increase in flood risk perspective in addition to a water quality and flow regime perspective within Section 16.8.2 of Appendix J (Surface Water Impact Assessment Report) of the EES. The modelling was undertaken in line with the “Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria” (DELWP, 2016) and, whilst changes to flow regimes will certainly occur as a result of the impacts of climate change, the influence of the bypass is predicted to be negligible. I agree with the assessment in the EES.
9.7 Submission 89 (7984889 v 1)

The submission questions and disputes the level of flood inundation predicted within the EES, specifically the region affecting their property in a 1% AEP design flood. Through independent two-dimensional hydraulic modelling undertaken by Engeny P/L on behalf of the property owner, a revised 1% AEP design flood extent is proposed. The discrepancy between the flood extents is apparently due to the adoption of site-specific survey (undertaken by JCA Land Consultants in 2017) within the Engeny modelling, as opposed to relying on 2006-7 Port Phillip and Western Port LiDAR information.

Figure 9-3  Discrepancies between Feature Survey & LiDAR Levels (Source: 321 Old Dandenong Road Flooding Report for Panel for Mordialloc Bypass EES (Engeny, Dec 2018)
Resulting from the flood modelling analysis undertaken by Engeny, the property owner has the following expectations of the Mordialloc Bypass project:

- The Old Dandenong Road Drain culvert under Centre Dandenong Road will be increased in size to cater for the 1% AEP peak design flow and to mitigate flooding across Centre Dandenong Road;
- Part of the Mordialloc Bypass works would be to construct a defined drainage channel where Old Dandenong Road Drain is contained within the Mordialloc Bypass Right of Way in the vicinity of Centre Dandenong Road;
- The construction of the Mordialloc Bypass will not adversely impact flooding of 321 Old Dandenong Road; and
- The flood map exhibited with the EES for Old Dandenong Road Drain through 321 Centre Dandenong Road is not the “final word” in relation to the flooding of that property.

The apparent discrepancies between LiDAR and field survey levels are significant in places. Hence it is not unexpected that they would influence the localised flood paths and extent affecting the property. As a result, further investigation by WSP and the MRPA into the matter may be justified.

I note the fill that appears to have been placed on site since 2007 has partly blocked an existing flow path. According to the Engeny flood modelling results this has had some impact on areas outside the site, which is of concern. It is unclear whether this fill was placed in accordance with a permit.

The other issues raised with respect to drainage along Old Dandenong Road are covered by the general drainage provisions for the bypass.

9.8 Submission 98 (7984882 v 1) - EPA

EPA Victoria’s submission makes recommendations in a number of surface water matters including the following:

1. EPR W1 (Water body health) - Any negative change in water quality markers as a result of the construction or operation of the bypass would be considered an act of pollution. In addition, it was noted that SEPP (Waters of Victoria) 2004 that is stated in EPR W3 has been replaced by SEPP (Waters) 2018.
2. EPR W2 (Flood protection: operation) & EPR W4 (Flood protection: construction) – The EPA considered these EPR’s as outside its jurisdiction and therefore refrained from comment.
3. EPR W5 (Water management and monitoring plan) – The EPA agreed that water quality monitoring is required prior to, during and post construction as per SEPP (Waters) 2018 clause 47 and Schedule 3(4) Sediment quality objectives.

I believe the EPA position is appropriate with respect to these aspects.

10 CONCLUSION

The purpose of this report was to evaluate and provide opinion on the surface water outcomes detailed within the EES report, its appendices and attachments. Overall I consider the modelling and results to be of a reasonable standard and, for the most part, comply with all relevant guidelines and requirements. Where guidelines have not been strictly met there is scope within the EPR to ensure that any residual impacts are addressed adequately through the detailed design phase.

With the recommendation of additional modelling, sensitivity analyses and the production of supporting documentation, I do not have any significant concerns relating to the proposed freeway design with respect to surface water issues.
I recommend the following:

- Confirmation of the impacts of afflux on the general health and ecology of the receiving wetland systems downstream, particularly the Woodlands Wetlands.
- An Asset Management Plan be established to cover all proposed on-going maintenance and “full reset” activities including lifecycle costing. Considering these assets are also proposed to play a part in spill containment, the management plan must contain specific actions related to when oil/petrol spills occur (this appears to be covered by ERP W2).
- Considering the scale, complexity and sensitivity of the study area it is recommended sensitivity testing between AR&R 1987 and AR&R 2016 be undertaken.
- Recommend further modelling be undertaken to ensure no catastrophic flooding occurs as a result of the bypass in the 0.5% and 0.2% AEP design floods.
- Localised hydraulic models with grid resolution of finer than 4 m should be used to test drainage around areas of sensitivity such as residences close to the bypass.

11 DECLARATION

I have made all the inquiries that I believe are desirable and appropriate and that no matters of significance (save those covered by legal professional privilege) which I regard as relevant have, to my knowledge, been withheld from the Panel.

Warwick Bishop
B.E. (Hons), MEngSci
15 February 2019