

16 September 2021

Public Works Committee

NSW Legislative Assembly

## TABLED DOCUMENT

This submission supplements our Submission (471) and Supplementary Submission (471a) in relation to those parts of the Terms of Reference (**TOR**) referred to below.

### (b) the adequacy of the consideration of alternative options

This screenshot extract from a GIPA response dated 16 August 2021 to a GIPA request from Mr Ted Nye seeking documents supporting the assertions made at e.g. page 4-13 of the Beaches Link EIS, in relation to the feasibility of a rail line, makes it clear that any option other than a motorway option was never to be considered:

- 4.11 In June 2014, the NSW Government developed the Northern Beaches Transport Action Plan. That Plan identifies the action being taken by the NSW government to deliver transport improvements to the Northern Beaches, and planning for future growth in the area. The plan identifies road improvements (including feasibility studies for a Northern Beaches Motorway Tunnel), faster and more frequent ferries to the CBD, and the development of a Kerbside Bus Rapid Transit from Mona Vale to the Sydney CBD (see pages 1, 4, 7 in particular). The Transport Action Plan does not identify rail as an option being considered or pursued.
- 4.12 Accordingly, leading up to the development of the SBC TfNSW (at the time, Roads and Maritime Services (RMS)) was not commissioned to consider or develop a rail option to the Northern Beaches.
- 4.13 The understanding of TfNSW is that the decision for the Beaches Link to be developed as a motorway tunnel was made prior to the project being transferred to RMS. Accordingly, there is no real expectation that TfNSW would prepare a feasibility report in relation to a government decision which has already been made.
- 4.14 Consistently with this position, the SBC, which TfNSW prepared, is only directed to the development of road transport. It does not contain the information sought by the access application and it is outside the scope of the access application.
- 4.15 As noted above at [1.4], the EIS developed as part of that project included brief analysis as to why a rail option to the Northern Beaches presents challenges. Before identifying the reasonable searches which have been undertaken by TfNSW for any analysis or work underlying those statements, I note the following by way of summary:
  - There is no reference to any feasibility work being required from TfNSW for a rail link to the Northern Beaches
  - At least since 2012, there is no suggestion that the NSW Government has been considering a rail option to the Northern Beaches
  - Infrastructure NSW, which advises the NSW Government on major infrastructure strategy, has not publicly referred to any work or priorities relating to a rail link to the Northern Beaches.
- 4.16 Having regard to the above, I consider it unlikely that TfNSW holds any reports or detailed analysis beyond the statements in the EIS.

<sup>&</sup>lt;sup>4</sup> Accessible:

https://www.infrastructure.nsw.gov.au/media/1090/inf j14 871 sis report book web new.pdf

It is understood that the SBC – Strategic Business Case – referred to in the screenshot was for both the Beaches Link Tunnel (**BLT**) and the Western Harbour Tunnel (**WHT**).

If what is stated at 4.16 in the screenshot is correct it is concerning that the following statement is made at page 4-13 of the EIS regarding the feasibility of a rail link:

The topography on either side of Middle Harbour introduces challenges for constructing a tunnel with a gradient that would be acceptable in terms of engineering design and safety for rail infrastructure, with steep elevation changes as well as geology characterised by substantial rock fracturing.

Did the author just make it up? If so, one can hardly say that serious consideration is being given to alternatives. On the other hand, it would hardly be surprising given the government's mandate to RMS to only consider tollway options.

Mr Nye, who has extensive experience in these types of projects has told WEPA that he sees no particular challenges in building a rail link across Middle Harbour, and this prompted his GIPA application. Mr Nye has developed his own alternative to the Beaches Link consisting of a light rail or electric bus tunnel between Frenchs Forest and Chatswood which traverses Middle Harbour. Although an image of that proposal was included in WEPA's submission an updated image is provided below.

Other options could also be considered, for instance, the establishment of the proposed rapid bus service from Dee Why to Chatswood could be accelerated with buses given some priority on the Warringah Road corridor.

**Annexure A** suggests that claimed travel time savings for the Beaches Link are not based on current travel times as traffic volumes are being increased by planned development particularly around Frenchs Forest.



As regards alternatives to the WHT, not only has inadequate consideration been given to the impact of public transport initiatives such as the B-line, as outlined in our Submission, but inadequate consideration has been given to alternative alignments. It is our understanding that the current alignment was developed at a time when the WHT and the BLT were part of the same project with the result that the WHT needed to surface where the BLT did. Mr Nye has told WEPA that this is what has necessitated an immersed tube design across Sydney Harbour – a far more expensive solution than a tunnel cut deeper through rock (see Annexure A prepared by Mr Nye).

Mr Nye's alternative alignment for the WHT is shown below, in plan and elevation (purple route). However, while he has told WEPA that this is his preferred alignment, there is no technical reason why the gradient couldn't continue at 4% with the tunnel surfacing further south than in the preferred alignment.



E. J Nye & Associates Pty Ltd - 16 Sep 2021



Mr Nye has told WEPA that his alignment for the WHT, with the tunnel going deep beneath the harbour without the need for dredging, coffer dams etc, would be considerably cheaper than the alignment currently proposed involving immersed tube tunnels – see **Annexure B**.

## (c) the cost of the project, including the reasons for overruns

Since making our Submission WEPA has become aware of further complexities in relation to the projects which are likely to add to the cost of the project, including:

- PFAS chemicals were used as a fume suppressant in chrome plating, an activity likely undertaken at the Hallstrom refrigerator factory at the top of Flat Rock Gully. These chemicals have caused enormous cost problems for the West Gate project in Melbourne - <u>https://www.abc.net.au/news/2021-06-25/west-gate-tunnel-toxic-soildecision/100243366</u>
- There was open burning of waste at the Flat Rock Gully tip which probably generated dioxins
- Cammeray Golf Course appears to have been used for landfill with one likely source being the former coal gasification plant at Neutral Bay
- DPIE writing to TfNSW on 14 May 2021 requiring the preparation of a Preferred Infrastructure Report, viz:

The Department requires further assessment and, in accordance with Section 5.17(6)(b) of the Environmental Planning and Assessment Act 1979, the preparation of a Preferred Infrastructure Report (PIR), in addition to a Response to Submissions Report, that further: a) assesses alternative locations, social and environmental impacts of the proposed construction ancillary facility located at Flat Rock Drive (BL2) and assesses the construction impacts to recreational users of Spit West Reserve (BL9)

*b)* assesses the impacts to Middle Harbour from the introduction of a sill (due to the placement of immersed tube tunnels) including appropriate measurements/monitoring data and impact assessment

c) assesses the treatment and handling of contaminated material and any temporary onshore transfer/handling sites associated with the proposed dredging of Middle Harbour d) identifies local road intersections impacted by traffic changes as a result of the operation of the project. Consideration and assessment of the impact of those changes and identification of measures to mitigate the impacts is also required.

• Further testing being required by the EPA pursuant to the notification by Willoughby City Council under s 60 of the *Contaminated Land Management Act*, in relation to groundwater at Flat Rock Gully and Bicentennial Reserve – **Annexure C**.

# (f) the consultation methods and effectiveness, both with affected communities and stakeholders

Our Supplementary Submission mentions the apparent absence of any process to prevent a proponent from watering down commitments given in the EIS without any consultation with the public.

It also appears that a Preferred Infrastructure Report (**PIR**) which will often be generated due to concerns raised by members of the public and community organisations, and has been generated here, can be assessed without the PIR being placed on exhibition. The anomalous result is that persons and organisations who raised concerns in the first place cannot comment on whether those concerns have been adequately addressed.

In this regard I refer to the email trail between John Moratelli, the President of WEPA, and Belinda Scott from DPIE – **Annexure D**.

Given the seriousness of, amongst other things, the contamination concerns raised in relation to Flat Rock Gully in particular, the PIR should be placed on exhibition.

# (k) the adequacy of processes for accessing (sic) and responding to noise, vibration, and other impacts on residents, during construction and operationally

We assume "accessing" should be "assessing".

Since making our Submission and Supplementary Submission WEPA has become aware of a number of other issues of concern regarding the assessment of contaminants:

• A report of a review (Annexure E) conducted by Dr Kevin Hayley, who is regarded by his peers as an expert in groundwater processes and modelling of the Groundwater Impact

Assessment of the Beaches Link EIS. The review was commissioned by DPIE. Dr Hayley summarised his conclusion thus:

It is this reviewer's opinion that while the work meets the standards of the Australian Groundwater Modelling Guidelines, and is likely consistent with historical practice, it is not consistent with more recent guidance documents on modelling and uncertainty analysis (Middlemis & Peeters, 2018) and this reviewer's opinion of current best practice. The document reviewed was completed by Jacobs. WEPA is unaware of whether DPIE has required the assessment to be re-done so that it does comply with current best practice. WEPA has commented in its Supplementary Submission on Jacob's lack of independence.

• Very slow investigations by DPIE into what would appear to be the provision of false and misleading statements in Detailed Site Investigation reports, which is a breach of section 10.6 of the *Environmental Planning and Assessment Act*. This is a matter of some importance, particularly when the reports are being done by Jacobs, a partner in the Sydney Program Alliance and, therefore, not independent and DPIE is not having the reports reviewed by EPA accredited auditors. The particular complaint WEPA raised is not complicated as it relates to whether Jacobs had or had access to certain documents, but the investigation has been running for six weeks.

Sincerely

John Moratelli, President, Willoughby Environmental Protection Association Inc (WEPA)

## **ANNEXURE A**

#### TFNSW TRAVEL TIME SAVINGS CLAIMS

#### The suggested savings are not based on current travel times

There are a number of indicators that this is the case the most obvious being that a number of suggested time savings, if based on current travel times, would result in arriving at a destination before getting in the car, e.g. the 20 minute reduction in travel time from North Sydney to Leichhardt mentioned at page 5 of the TfNSW submission to the parliamentary inquiry (**the TfNSW sub**).

It is apparent from the TfNSW submission to the current Public Works Committee inquiry that the travel time savings are based on what the travel times would supposedly be in 2037 if and if not the Beaches Link and Western Harbour Tunnels were built.

But no information is given as to current travel times, and savings from current travel times would only be those shown if there was no increase in traffic volumes between 2017 and 2037. But this is not what TfNSW predicts – it predicts a considerable increase in traffic volumes over the Spit Bridge during this period. The RMS Project Update document for the BLT dated August 2018 shows this:



### Projected growth in traffic not based on historical growth patterns

This is clear from data from the RMS traffic monitoring station near Spit Bridge which shows essentially stable traffic volumes for the past ten years with some decrease in 2018 and again in 2019:



Exported on Mon Dec 07 2020 at 18:9:48. © Roads and Maritime Services 2015.

### Frenchs Forest growth area

Most likely the projected growth in traffic volume is mostly attributable to the planned development of Frenchs Forest - <u>https://www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Frenchs-Forest</u>

More detail about planned development is given in the DPIE's *Frenchs Forest 2041 Place Strategy* draft document - <u>https://shared-drupal-s3fs.s3.ap-southeast-2.amazonaws.com/master-</u> test/fapub\_pdf/Frenchs+Forest+2041+Draft+Place+Strategy.pdf

The Greater Sydney Commission's North District Plan also makes it clear that the Beaches Link provides an opportunity to increase housing on the Northern Beaches: <u>https://www.greater.sydney/north-district-plan/introduction</u>

### E J Nye & Associates Pty Ltd

#### Why an immersed tube tunnel is more expensive than a conventional Sydney bored tunnel.

- 1. The immersed tube tunnel will require the construction of a facility to construct the immersed tube units. The crossing would require at least 8 steel reinforced concrete units each weighing over 30,000 tonnes each. The units are then floated and transported (over water) to the site of the open dredged trench.
- 2. Sinking and locating the immersed tube units requires specialist expertise including divers. Sand will have to be pumped under the immersed tubes (which will be supported on concrete blocks initially) to provide an even bearing surface.
- 3. The land connection on both sides of the harbour require expensive coffer dams.
- 4. The immersed tubes have expensive and very large rubber gaskets at each end to create the watertight seal between units. Sea water pressure forces the gaskets together to create a seal. The last unit will require divers to install an external steel plate around the unit.
- 5. The marine dredging works are very expensive and even more so because of the environmental constraints applied to protect the harbour. The immersed tubes will also have to be backfilled over to fill the remaining trench and rock rubble place over on the sea floor to protect the immersed tubes from dragging anchors and sinking ships. The stability of the slopes on the sides of the dredged trench determine the final volume of material to be excavated and of the backfill.
- 6. The above is not a full list of the reasons why immersed tube tunnels are so much more expensive than conventional ones (i.e. typical Sydney Road Tunnels). The contrast in cost between much cheaper road header excavated tunnels, at depth in good sandstone rock, compared to the immersed tube tunnel option which could be in the range of 6 to 8 more expensive.

(note: the road header tunnel option is only possible for the north-south tunnel at depth and as it is not required to rise up to the meet the Gore Hill/Warringah Expressway and Berry Street in North Sydney with the tunnel alignment option I proposed to Chatswood)

Ignore any issues raised re using 16m diameter TBM driven tunnels – a red herring in this discussion piece.



Figure 1 Image of Typical Road Header



# **PLANNING & INFRASTRUCTURE**

Compliance Unit

22 February 2021

Contaminated Land Management Environment Protection Authority Locked Bag 5022 PARRAMATTA NSW 2124

Dear Sir/Madam

#### RE: Notification under Section 60 of the Contaminated Land Management Act 1997

Please find attached a notification under section 60 of the Contaminated Land Management Act 1997 relating to potential contamination arising from a former landfill waste and incinerator site previously operated by Council on the current site of the Willoughby Leisure Centre and in the vicinity of Bicentennial Reserve and Flat Rock Gully.

Council has become aware of the potential contamination through the release of the Transport for NSW Beaches Link and Gore Hill Freeway EIS - Appendix N Groundwater (attached) and notes the indications in the EIS that mitigation measures are being considered to address potential contamination in the context of that infrastructure proposal.

Council officers are available to discuss this matter further if required. In this regard, please contact Council's Environmental Health Officer, , in the first instance by phone on

Yours sincerely

Manager Compliance Unit

Willoughby City Council 31 Victor Street Chatswood NSW 2067 PO BOX 57 Chatswood NSW 2057

www.willoughby.nsw.gov.au

Phone 02 9777 1000 Email: email@willoughby.nsw.gov.au ABN 47 974 826 099



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# **Contaminated Land Notification Form**



Section 60 of the Contaminated Land Management Act 1997

<ul> <li>This form should be completed by:</li> <li>a) a person who becomes aware that the person's activities in, on or under land have contaminated the land, or</li> <li>b) an owner of land who becomes aware that the land has been contaminated (whether before or during the owners ownership of the land).</li> </ul>					
To learn more about the information required to be included with th <u>Contamination under the Contaminated Land Management Act 19</u>	nis notification form, refer to the <u>Guidelines on the Duty to Report</u>				
1. Where to send completed forms					
By post: Contaminated Land Management Environment Protection Authority Locked Bag 5022 PARRAMATTA NSW 2124	IMPORTANT TYPE OR PRINT INCOMPLETE FORMS WILL NOT BE ACCEPTED				
By email: contaminated.sites@epa.nsw.gov.au					
2. Reporter details	,				
Name:	Telephone Number (business hours):				
	Email Address:				
Address:	l am:				
	the owner of the site				
	the person whose activities have contaminated the land				
3. Site details					
Site or establishment name (if appropriate): Bicentennial Reserve/Flat Rock Gully/Willoughby Leisure Centre	Street address: Small Street, Willoughby				
Lot and DP number: Lot 2 DP 57586, Lot 869 DP 752067, Lot 1 DP 81035, Lot 3 DP 522788, Lot 1 DP 524253, Lot 1 DP 334861, Lot 7 DP 666241	Local Government Area: Willoughby				
Owner(s): Willoughby City Council	Occupier(s): Willoughby City Council				
4. Cause of contamination					
Previous/present activities that caused or could have caused the contamination (where known, please specify): Former landfill & incinerator site					
5. Contamination					
Contaminants of concern: Ammonia Heavy metals – cobalt, copper, manganese & zinc Hydrocarbons – BTEX, TPH, TRH	Source of information on contamination. (Attach all relevant reports or information, or specify why this information cannot be provided): Appendix N – Groundwater for Transport for NSW Beaches Link and Gore Hill Freeway Connection EIS Flat Rock Gully and Bicentennial Reserve Water Quality Investigation Report No. 1 – May 1996 Flat Rock Gully and Bicentennial Reserve Water Quality Investigation				
н -	Report No. 2 – September 1996 Flat Rock Gully and Bicentennial Reserve Water Quality Investigation Report No. 3 – December 1996				
6. What aspects of the environment are affected? Contaminated groundwater possibly affecting the aquatic environment of Flat Rock Creek and Long Bay					



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Tick all that apply: Air Groundwater Surface water Sediments		Soil Soil vapour Stormwater Drinking water	catchment	Wetlands Other: (Please specify):		
7. Who/what is potentially at ris Fresh and marine aquatic environ of EIS project infrastructure	k? ment of Flat Rock Creek	and Long Bay,	human aquatic recreatio	nal users, potential future workers/users		
Tick all that apply:         ✓       Residents         ☑       Workers on commercial / i         ☑       School / kindergarten chilc         ☑       Threatened species	ndustrial sites Iren	✓ □ ✓	Aquatic life Plants Animals Other: (Please specify) Tunnel workers & future	e staff		
8. Are any other sites affected of	or at risk?					
Tick appropriate box: No ✓ Yes If 'yes' is ticked, indicate which of the matters listed in items 6 and 7 apply to other sites and where those sites are located: All matters ticked in items 6 & 7. Downstream in a south-easterly direction						
9. Supporting information attac	hed					
If you have attached supporting information to this notification (such as consultant's reports), indicate the document titles and number of pages for each. When the notification is certified, the person/s who certify the notification must initial the attached pages relating to the notification. Title of Document/s: Transport for NSW Beaches Link and Gore Hill Freeway Connection – Appendix N Groundwater Number of pages attached: 475						
10. Certification (in the case of a notice lodged by a corporation or a body corporate)						
I/We declare that the information i	n this form and any acco	mpanying docu	ments is not false or mis	leading in any material particular.		
Name: Position: Signature:	Name: Position: Signature:	an a	COMMON SEAL AFFI RELEVANT LAWS	XED IN ACCORDANCE WITH ANY		
11. Signature (in the case of a notice lodged by one or more individuals)						
I/We declare that the information in this form and any accompanying documents is not false or misleading in any material particular.						
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If the notification is made by one or more individuals, the form must be signed by each individual concerned.

If the notification is made by a company, the form must be signed:

- by affixing the common seal of the company in accordance with the Corporations Act 2001, or
- by two directors, or
- by a director and a company secretary, or

• if a proprietary company that has a sole director who is also the sole company secretary – by that director. If the notification is made by a body corporate, the form must be signed in accordance with any applicable laws. If the notification is made by a local council, the form must be signed:

• by the general manager in accordance with s. 377 of the Local Government Act 1993 ('LG Act'), or

• by affixing the seal of the council in a manner authorised under the LG Act.

If the notification is made by a public authority other than a local council, the form must be signed:

• by the chief executive officer of the public authority, or

• by a person delegated to sign on the public authority's behalf in accordance with its legislation. (Please note: a copy of the relevant instrument of delegation must be attached to this form.)

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# **RE: Clarification sought re planning process for Beaches Link Tunnel** 1 message



Dear Mr Moratelli,

2 September 2021 at 09:50

2280010

A decision on whether the documents will be formally exhibited has not been made for the Beaches Link project. Typically this decision is made based on the level of impact of any new changes to the project.

Any correspondence relevant to the Department's assessment is considered up until determination. This correspondence is not reported on in the Department's assessment as it does for the submissions, however, new issues raised are typically mentioned.

Regards,

In relation to the Beeches Link and Sone Hill Freewey Connection project, once the PiR and RtS have been all publicity available anyone is able to provide comment to the Department, whether or not it is formally exhibite Anyone who subsorbed to the project dege will be notified when the documents are publicly available.

# From: Sent: Monday, 30 August 2021 12:22 PM To: Belinda Scott < Subject: Re: Clarification sought re planning process for Beaches Link Tunnel

Dear Ms Scott,

Thank you for your further reply.

As I understand it, there is an important distinction between a document being exhibited and a document being available to comment on. In the former case the DPIE would await the close of submissions before considering the submissions and determining its position whilst in the latter case the DPIE could be determining its position while comments are coming in or have determined its position before comments come in.



Can you advise as to why the RtS report and the PIR won't be publicly exhibited with a closing date for submissions?

Can you also advise as to the length of the period which will be allowed between the public release of those documents and the acceptance of comments?

Finally, can you advise as to whether such comments from members of the public and concerned organisations will be summarised and responded to in the DPIE's Assessment Report?

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Gmail - RE: Clarification sought re planning process for Beaches Link Tunnel

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Any correspondence relevant to the Danadmant's

documents and the acceptance of comments?

be summarised and responded to in the OPIE's Assessment Report?

wrote:

ISSU05 raised are typically inter

Given the risks presented by the use of Flat Rock Gully as a diversite, and the experience of Conditions of Approval being watered down, as in the case of SG6, I'm sure you'll understand why residents are concerned about these matters.

regards,

John Moratelli

2 September 2021 at 09.50

A decision on whether the documents will be formally exhibited has not bean made for the Beaches Link project. Typically this decision is made based on the level of impact of any new changes to the project.

On Mon, 30 Aug 2021 at 08:59, Belinda Scott <

considered up until determination. This

Dear Mr Moratelli,

In relation to the Beaches Link and Gore Hill Freeway Connection project, once the PIR and RtS have been made publicly available anyone is able to provide comment to the Department, whether or not it is formally exhibited. Anyone who subscribed to the project page will be notified when the documents are publicly available. Correspondence received in relation to the PIR or RTS will be considered as part of the Department's assessment process.

In relation to your question about Council involvement, all councils and agencies that made a submission on the EIS will be advised that the RtS and PIR are available and will be requested to make comment.

I note your concerns regarding the WHTWFU. I am aware of the concern and understand this has also been raised with the compliance team. I am not able to provide an update on this.

# Regards,

# Belinda

As I understand it, there is an important distinction between a document being exhibited and a document being available to comment on. In the former case the DPIE would await the dose of submissions before considering th submissions and determining its position whilst in the latter case the DPIE could be determining its position while

Can you also advise as to the length of the pened which will be allowed between the public release

# From: Sent: Wednesday, 25 August 2021 11:30 AM To: Belinda Scott Subject: Re: Clarification sought re planning process for Beaches Link Tunnel

# Dear Ms Scott,

Thanks for your prompt reply and clarification.

https://mail.google.com/mail/u/0?ik=5c44c9a57b&view=pt&search=all&permthid=thread-a%3Ar5069054340160999350%7Cmsg-f%3A170974539... 2/5

18th February 2021

Ref: WRL2018014 BMM L20210218

Senior Planning Officer Transport Assessments Department of Planning, Industry and Environment 4 Parramatta Square, 12 Darcy Street Parramatta NSW 2150



Water Research Laboratory

School of Civil and Environmental Engineering

By Email:

Dear Belinda,

### Review Surface Water aspects of the Beaches Link and the Gore Hill Freeway Connection Environmental Impact Assessment

This document summarises my expert review of the surface water aspects of the above-mentioned Environmental Impact Statement (EIS) as engaged by the Department of Planning, Industry and Environment (DPIE).

I (Mr Brett Miller) have undertaken this review with particular attention paid to:

- Chapter 17 Hydrodynamics and Water Quality
- Appendix O Surface Water Quality and Hydrology
- Appendix P Hydrodynamic and Dredge Plume Modelling
- Appendix Q Marine Water Quality

In parallel, Dr Kevin Hayley of Groundwater Solutions was engaged as a subconsultant to WRL to provide DPIE with an expert review of groundwater aspects. This groundwater review is provided in a separate letter.

A previous WRL letter (3<sup>rd</sup> November 2020) provided a consistency review of groundwater and surface water aspects against the SEARS. This letter provides a review of the content in the EIS and provides recommendations.

The surface water and marine water aspects of the EIS that I have concerns about are summarised as:

- 1. Assessment and monitoring of potentially impacted waterways.
- 2. Potential changes to waterway baseflows resulting from groundwater changes.
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## 1. Assessment and monitoring of potentially impacted waterways.

Appendix O (Surface water quality and hydrology) has a summary statement that "The project construction is therefore likely to have a negligible impact on the water quality objectives (WQOs), which are currently not being met". While this statement may be accurate for some of the waterways, there is inadequate data to conclude that the WQO's are not currently being met for all waterways or to determine the relative impact during and after construction.

The EIS presents only six water quality monitoring samples in each of the waterways. Only one of these samples was during a wet weather event. All samples were undertaken over a five month period from October 2017 to February 2018. This is an inadequate sample set for determining the existing condition of each waterway. A baseline water quality monitoring program should commence immediately upon approval to sample regularly, under a range of weather conditions and over an extended period of time including both summer and winter.

The EIS makes reference to historical reports on water quality stating that various catchments are influenced by sewer overflows. Many of these reports are over ten years old. Sydney Water has spent much of this time undertaking an overflow reduction program and therefore it is uncertain whether these sewer overflows still exist. Council water quality monitoring has not been included in the water quality analysis (particularly relevant for Manly Dam). Reference is made to a 2004 UWS report stating that the Manly Dam catchment includes three sewer overflows and suffers from blue-green algae blooms. I am aware of catchment management improvements (including water management on the Wakehurst golf course) and I am not aware of an algae bloom in Manly Dam for at least a decade. *The assessment of water quality in each catchment should use all available historical data and include recent publications. Where possible assessment should include the long term improvements (or degradation) of water quality. The Response to Submissions Report is required to provide an updated assessment on existing water quality taking into consideration improvements implemented by Sydney Water and/or Council (i.e. as part of overflow reduction or other water quality programs).* 

The EIS does not discuss or analyse any impacts directly to Bantry Bay that may result from discharges to the westward flowing steep creeks draining from Wakehurst Parkway. This should be included in the analysis. It is also unclear if these creeks have been included as sensitive environments. *Bantry Bay and these above mentioned creeks should be included in the waterway assessment. Further information to address this deficiency is required to be provided in the Response to Submissions Report.* 

Appendix O lists the groundwater water quality sampling. However the table only presents median values, does not specify the range and does not provide the number of samples. *Additional information on the groundwater water quality monitoring should be provided.* 

Construction wastewater treatment plants are proposed to reduce the discharge quality to ANZG 2018 standards. In most instances this should protect waterway health. *However, should the longer term monitoring program identify that a waterway presently has quality significantly better than ANZG, then treatment to a higher level will be required.* 

Uncertainty exists in the contaminants, concentrations and volumes of groundwater flow and the treatment methods proposed. No discussion as to the technology, space, capacity or energy use of the water treatment plants could be identified in the EIS. *Information on the treatment plant technology and how these treatment methods could be expanded if so required is required to be provided in the Response to Submissions Report.* 

# 2. Potential changes to waterway baseflows resulting from groundwater changes.

Catchment runoff will potentially decrease due to groundwater infiltration, which will in-turn effect the hydrology (in particular base flows) of the catchment streams. This is particularly important for the more natural catchments. The EIS provides inadequate estimates of reduced baseflow based on the groundwater model's prediction of groundwater drawdown.

The EIS does not provide predictions of baseflow reductions during extended dry periods or drought. For the sensitive, natural waterways, predictions of baseflow reduction should be based on extended timeseries modelling so that flow frequency curves pre and post construction can be assessed on an ecological impact basis for all of the relevant flow facets. Further information on potential impacts from baseflow reductions during periods of extended dry weather or drought conditions are required to be provided in the Response to Submissions Report.

Statements such "reductions in flow are unlikely to results in a complete loss of aquatic habitat" (for Burnt Bridge Creek) are unacceptable and further modelling and assessment is required.

The groundwater model states that it provides a conservative estimate of groundwater drawdown, however as discussed in the report by Dr Kevin Hayley fractured Sydney Sandstone can result in local areas of higher drawdown. The proponent has committed to limiting groundwater drawdown by constructing the tunnel lining to meet a 1 L/s/km inflow rate. Should this specification be averaged over the full length (or sections) of the tunnel, groundwater drawdown, and hence reduction in surface water baseflows, could be greater than predicted in localised areas. *The 1 L/s/km criteria should be conditioned as being for any point along the tunnel.* 

Water balances are provided during the construction stages. However only average daily values have been presented. *The detailed groundwater and surface water balance should address the range of ratios of usage, harbour discharge and groundwater extraction through both dry weather and wet weather periods, with particular emphasis on dry weather and baseflow conditions.* 

# **3.** Treatment plant and detention basin designs and overflows during larger rainfall events.

Treatment plants and detention basins will have a particular rainfall frequency or annual exceedance probability (AEP) that will generate inflows beyond the capability of the treatment plants or sediment detention basins to effectively treat or contain. The EIS does not state this AEP nor does it contain any analysis of the water quality impacts of discharges or bypasses during these larger events.

The Response to Submissions should state the design AEP of the treatment plants and the detention basins. The predicted quality of bypass flows should be provided. Any environmental impacts of bypass flows should be assessed.

In many instances, construction and operational discharges during larger events do not have a significant impact because of the additional dilution with other catchment runoff. This may not be the case with Manly Dam where the total mass of sediments and constituents is captured within the dam.

Modelling should be undertaken to assess the cumulative water quality impacts including regular conditions and larger AEP wet weather events.

Sediment detention basins and treatment plants should be designed and operated so that previously captured materials cannot be released or scoured during these wet weather events. *The Response to Submissions Report is required to explicitly state that this will be the case.* 

# 4. The depth of contaminated sediment to be dredged using the backhoe clamshell.

The backhoe dredge with environmental clamshell for removal of the top contaminated sediment will minimise the movement and escape of contaminated materials.

The EIS states that the top 0.5m is contaminated. It is unlikely that testing of materials would be taking place during dredging, so it is imperative that the depths of contaminated materials are accurately known before work commences. *The Response to Submissions Report should clarify what factor of safety would be used for the dredge depth. If the existing knowledge is insufficient, additional bed sediment sampling must be undertaken.* 

Continuous real-time turbidity monitoring outside the "moon pool" should be undertaken for the entire period of contaminated material backhoe dredging. Cease-to-dredge operational rules based on this real-time data should be prescribed in advance.

### 5. Monitoring of background conditions within Middle Harbour.

The EIS is lacking adequate monitoring of the background water quality and physio-chemical conditions within Middle Harbour.

The EIS states that there is limited data for turbidity during wet weather events in Middle Harbour. Collection of this background data should commence immediately for inclusion into operational limit rules.

The physio-chemical conditions of Middle Harbour were only observed twice. This is inadequate for determining the stratification and oxygen levels within the estuary. *I recommend that a minimum one continuously profiling data logging buoy be deployed at the crossing site to monitor temperature, salinity and dissolved oxygen throughout the water column for a period of at least twelve months before any construction commences. This dataset should be combined with additional monthly transects of the estuary similar to those presented in the EIS.* 

## 6. Assessment of Middle Harbour long term water quality changes.

The potential ongoing impact on marine waters in Middle Harbour resulting from the introduction of a sill at the tunnel crossing has not been adequately assessed. Numerical modelling presented in the EIS has shown that the flushing time increases in the bottom of the estuary upstream of the sill and periods of low dissolved oxygen (DO) are extended. The EIS concludes that this increase in minor, however there has been inadequate data to calibrate or verify the model for this condition.

The original current metering program appears to have been designed for calibration and verification of dredge plume modelling. Only later were two water quality transects undertaken to gather information on the potential stratification and flushing. Numerical modelling of mixing in slow moving, stratified water bodies requires appropriate verification data and (due to the inherent uncertainties) should be accompanied by modelling sensitivity analysis. The modelling presented in the EIS has not provided this verification or sensitivity analysis.

The EIS states that flows in Middle Harbour are constricted by the shallow, narrow channel at the Spit Bridge. The argument is made that since Middle Harbour is already constricted, the addition of the sill will not have an impact on flows. However, the tidal range upstream of the Spit Bridge is the same as the tidal range downstream indicating that there is no constraint to flows into and out of Middle Harbour. It is the size of the tidal prism within Middle Harbour relative to the water depths which result in slow water velocities. As such, accurate modelling of slow moving velocities and internal mixing processes is important.

The EIS does not provide any information on the vertical mixing and turbulence methods used in the numerical modelling of Middle Harbour. *This information should be provided for review.* Additional sensitivity analysis of vertical mixing and turbulence parameters should be modelled and included in the Response to Submissions Report.

The EIS states that low DO can occur at the bed while vertical mixing maintains high DO throughout the water column. The presence of any stratification of temperature or salinity will inhibit this vertical mixing of oxygen from the surface towards the bed. Subtle changes in flow patterns may change the amount of energy available to de-stratify the water column, which in turn may result in extended periods of reduced DO near the bed.

The EIS states that based on average rainfall patterns the DO depletion near the bed of middle harbour occurs "a few times per year". However, adequate monitoring of DO within Middle Harbour has not been undertaken to support this statement. The EIS states that this would be rapidly vertically mixed but no measurements of this mixing rate have been made and numerical model sensitivity analysis on the mixing parameters has not been provided. Further the EIS has not addressed potential changes in lowest DO concentrations and duration of periods when DO levels are below particular thresholds.

The EIS has not adequately addressed the potential for the tunnel sill to change flow conditions to the detriment of water quality in Middle Harbour. Monitoring (discussed at Section 5) should commence immediately upon approval and data used for additional model calibration and verification. Model predictions should include both wet weather and dry weather conditions and uncertainty analysis.

The recommended baseline data of the physio-chemical conditions in Middle Harbour will be suitable for both verification of predictive models and comparison with post construction monitoring. Should either the predictive modelling or the post construction observations indicate deteriorated water quality, *the proponent may need to consider artificial mixing devices (for example mechanical propellors or bubble plumes) to overcome the influence of the sill.* The extended baseline data and the verified numerical modelling would be crucial in the design and optimisation of such a device.

Should any of the points made in this review require clarification, please contact me on on

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