Attention: Director – Transport Assessments

Submission relating to Western Harbour Tunnel Environmental Impact Statement

Name: Dr Bill Ryall

Address: [not for publication]

Western Harbour Tunnel and Warringah Freeway Upgrade

Environmental Impact Statement: project 1045

Application No: SSI 8863

Declaration: I have made no reportable political donations in the past 2 years

Date: 17 March 2020

Objection

I object to the methods proposed for excavating, transporting and treating contaminated sediments excavated from the floor of Sydney Harbour because the WHT Environmental Impact Statement (WHT EIS) did not address the Secretary's Environmental Assessment Requirements (SEARS) that required the WHT EIS to document:

1. "…details of contamination characteristics and measures to manage this spoil to avoid adverse impacts to land and water quality"
2. "…whether the harbour sediment is likely to be contaminated and identify if remediation is required"
3. "… that remediation would be undertaken in accordance with current guidelines"
4. "Where contaminated spoil and/or sediments are to be handled at Glebe Island and/or White Bay, the Proponent must provide details of contamination characteristics and measures to manage this spoil to avoid adverse impacts to land and water quality."

With respect to contaminated sediments, the SEARS assigned as requirements for the WHT EIS are not suitable because the project has been addressed in the WHT EIS as a construction project and SEARS aligned to remediation of the contaminated sediments should have been included.

The fundament requirement of an EIS to be transparent has failed to be addressed in the WHT EIS due to the withholding of information critical to the contamination characterisation that is required by the SEARS.

In particular, I object to the failure of the WHT EIS to reliably document:

- that results and conclusions relating to the environmental condition of sediments are reliable and that the sediments proposed to be excavated are contaminated, as defined in guidelines made or approved by the EPA
- contamination characteristics of sediments proposed to be excavated
- the volumes of contaminated sediments in each part of the WHT project where these materials will be excavated and transported to the White Bay contaminated sediment treatment works
- excavation of contaminated sediments as a construction element of the WHT project, whereas it should have addressed the requirement to excavate contaminated sediment as remediation works, in accordance with the requirements of guidelines made or approved by the EPA relating to remediation of contaminated materials
- that Transport for NSW to have notified the EPA of the presence of contaminated sediments as required by guidelines made or approved by the EPA under the Contaminated Land Management Act 1997
- adequate references to supporting documentation from experienced consultants and contractors informing the WHT EIS of the preferred method for excavating and treating the contaminated sediments
- environmental protection measures to prevent migration of suspended contaminated sediments into the western of Sydney Harbour during excavation works in the event of

mishaps, spills, failure of closure of the environmental bucket or of sediments escaping from the shallow silt curtain in the event of strong winds
- a conservative method to address generation of odours from excavated contaminated sediments at the locations proposed for the cofferdams, the immersed tube tunnel, during transport by barge and at the location of the contaminated sediment treatment works at White Bay
- details of the method for treatment of contaminated sediments and contaminated water derived from the sediments and to ensure these materials meet the requirements of regulatory authorities
- the impact of wind events stronger than considered in the WHT EIS for operation of environmental protection measures during excavation of contaminated sediments, transport of the sediments and loading, unloading and treating contaminated sediments at the White Bay treatment works
- excavation of contaminated sediments located in the western part of Berrys Bay within the proposed construction support site WHT7 that would be disturbed by transit of vessels
- the requirement to excavate, transport and treat contaminated sediments from Berrys Bay
- the preferred method for treatment of contaminated sediments to ensure the sediments can be disposed lawfully
- the preferred method for treatment of contaminated sediments to ensure the water can be legally disposed
- criteria agreed to by regulatory authorities for discharge of contaminated water
- criteria agreed to by regulatory authorities for treatment of contaminated sediments that are to be disposed to landfill.

I conclude that the SEARS provided for the WHT project by the Department of Planning, Industry and Environment, as documented in the WHT EIS, relate predominately to construction and operation of the road tunnels and related on-shore infrastructure and are not applicable to critical issues related to the remediation of contaminated sediments that the WHT EIS states are required or be excavated, transported and treated to allow for construction of the immersed tube tunnel and for construction of the immersed tubes at White Bay.

The SEARS do not include requirements appropriate for application to the major remediation program of remediating contaminated sediments that is required to be completed prior to installation of the immersed tube tunnel and uses of the Berrys Bay construction support site. In this respect, the processed documented in the WHT EIS differ markedly from EISs prepared for other major sediment remediation works at Homebush Bay and Kendall Bay.

The WHT EIS in its current form does not and cannot, based on current knowledge, document the processes to be employed in addressing the contaminated sediments.

I conclude that an amendment to the WHT EIS is required to address issues related to characterisation of contaminated sediments and their remediation, as set out in this submission, including consideration of all feasible methods of remediating contaminated sediments, as required by guidelines made or approved by the EPA.

Details of my objections are set out below.

1. Introduction

This submission is made by Dr Bill Ryall, independent consulting environmental scientist, who has had extensive experience over almost 30 years in the assessment and remediation of contaminated soil, groundwater and sediments in the capacities of consultant, site auditor accredited by NSW Environment Protection Authority (EPA) and as a remediation advisor to private and public companies and to Commonwealth and State government entities.

I have participated in the programs of assessment and remediation of sediments in Homebush Bay , which were contaminated with dioxins, chlorinated organic compounds, tars and heavy metals, and of Kendall Bay, which were contaminated principally by coal tar residues. The experience gained in these major projects is relevant to the excavation and treatment of contaminated sediments addressed in the WHT EIS.

I have also assessed approximately 20 projects in which the waters of Sydney Harbour, its estuaries, Botany Bay and other water bodies that were required to be protected during proposed construction projects.

In this submission I have addressed aspects of excavation and treatment of contaminated sediments, but I do not have experience as a remediation contractor and my comments relating to methods proposed in the WHT EIS result from my project experience in evaluating remediation programs and observing and auditing contractors' practices when remediating contaminated land and sediments.

This submission also addresses aspects of noise, wind, odour, currents and waves that are relevant to the WHT project and my comments are made from my personal observations, but I don't claim expert knowledge in these matters.

This submission addresses only issues related to the excavation, transport and treatment of contaminated sediments at:

- the corridor of the immersed tube tunnel, which is proposed to be installed within a trench excavated into sediments and to extend from Yurulbin Point, Birchgrove, to the Waverton Coal Loader
- the part of the wharf at White Bay (WHT3) which is proposed to be used for treatment of excavated sediments for their subsequent disposal to landfill
- Berrys Bay, which is proposed to be used as a construction support site (WHT7) and for which the identification of contaminated sediments and the requirement for excavation of contaminated sediments were not addressed in the WHT EIS.

1.1 Failure of Transport for NSW to provide a critical report

Some comments made in this submission relate to the failure of the WHT EIS to characterise contaminants in accordance the Secretary's Environmental Assessment Requirements (SEARS). The WHT EIS presented no quantitative results of contaminant concentrations and no volumes of contaminated sediments at each location where contaminated sediments were proposed to be excavated.

To allow me to address the characterisation of the contaminated sediments in my submission, I requested by email (30 January 2020), in a phone conversation with Transport for NSW (4 February 2020) and at the community meeting at Balmain Town Hall (6 February 2020), access to the report "Western Harbour Tunnel and Beaches Link Geotechnical Investigation. Contamination Factual Report – Marine Investigations (Douglas Partners and Golder Associates (DPGA), 2017a)", which was referred to in Appendix M *Contamination* of the WHT EIS.

I expected the DPGA (2017a) report should have contained detailed characterisation of the contaminated sediments, such as sampling and laboratory methods, quality control assessing the reliability of field and laboratory results, concentrations of contaminants identified by chemical analysis, lateral and depth extents and of each contaminant, observations made when collecting samples of sediment (such as odour, grain size, presence/absence of gravels, rocks, natural wood and anthropogenic materials - bricks, metal, boulders, bottles, timber, etc.) and the volume of contaminated sediments proposed to be excavated for installation of cofferdams, the immersed tube tunnel and at White Bay and the requirement to excavate contaminated sediments at Berrys Bay.

I expected that access to the DGPA (2017a) report should have allowed me to assess the reliability of information related to contaminated sediments that were addressed in the WHT EIS and of some of the other issues of concern to the Birchgrove, White Bay (Rozelle) and Waverton communities.

Access to the DGPA (2017a) report was denied by Transport for NSW, who stated the report was commercial in confidence in their email dated 11 March 2020.

My experience in compiling specifications for tenders and assessing tenders for investigation and remediation of contaminated sites, for government and industry clients, provide me with no reason why the assessment report denied to me by Transport for NSW would be commercial-in-confidence.

The decision of Transport for NSW to deny access to DGPA (2017a) report addressing sediment contamination was all the more puzzling as very detailed information relating to physical and chemical characteristics of groundwater were documented in Appendix N of the WHT EIS and the chemical

characteristics of soil present in on-shore components of the WHT EIS were documented in Appendix M.

Although I do not have expertise in geotechnical engineering, I wanted to refer to an expert the bore logs of the DGPA (2017a) report that would be expected to contain details of the fracturing of sandstone bedrock, which was one of the principal reasons documented in the WHT EIS against the harbour crossing being bored through the sandstone bedrock.

If the DGPA (2017a) report was made publically available, there could be no question that a contractor tendering for all or part of the WHT project could have been disadvantaged.

The failure of Transport for NSW to make the report commercial in confidence has prevented the WHT EIS providing information critical to the assessment of the excavation, transport and treatment of contaminated sediments and in doing so has violated the fundamental requirement for an EIS that addresses a project of state significance – that the EIS be transparent. With respect to the absence of critical information relating to contaminated sediments, the WHT EIS fails.

1.2 Concerns relating to failures of the WHT EIS

The WHT EIS presents a number of significant concerns to me personally, to the communities of Birchgrove, White Bay (Rozelle) and Waverton, and technically in its failure to address the manner in which contaminated sediments were required to be assessed and remediated in accordance with guidelines made or approved by the EPA under the Contaminated Land Management Act 1997 (CLMA) and disposed to landfill in accordance with guidelines made or approved by the EPA under the Protection of the Environment Operations Act (POEOA).

A summary of the reasons for each of my concerns is provided in this section of my submission and is considered in more detail in following sections.

Personal concerns

I have personal concerns relating to the WHT project as I am a resident of Wharf Road, Birchgrove. My home is located adjacent to Snails Bay at a distance of approximately 500 m from Yurulbin Point (which is the location proposed for the Sydney Harbour south cofferdam), 1 km from the Waverton Coal Loader (which is near the location proposed for the Sydney Harbour north cofferdam) and 300 metres from the temporary mooring facility proposed for immersed tube tunnel units in Snails Bay.

The enjoyment of my home will be impacted by the preparatory works and by excavation of contaminated sediments to allow installation of the cofferdams and the immersed tube tunnel and by transport of the contaminated sediments to White Bay if stringent environmental and human health control measures are not implemented.

I am also concerned by the high risk of contamination of the marine environment during excavation of contaminated sediments for installation of the cofferdams and the immersed tube tunnel, excavation of contaminated sediments at White Bay and operation of vessels in the shallow waters of the construction support site at Berrys Bay. The concern is heightened because although the WHT EIS identified the contaminants by name, it did not provide their concentrations, distribution and volumes at each location.

The chemical substances documented in the WHT EIS in sediments included dioxins, tributyltin (TBT), organochlorine pesticides (OCPs), polynuclear aromatic hydrocarbons (PAHs) and heavy metals, including mercury, and perfluoroalkyl and polyfluoroalkyl substances (PFAS), all of which are toxic to human health and to the marine ecosystem. However, without the concentrations, distribution and volumes of contaminants being provided in the WHT EIS, the risk posed to human health and to the marine environment cannot be assessed. This is a major failure of the WHT EIS and does not address a requirement of the SEARS.

I am also concerned by the duration of the proposed program, which in my opinion is most likely to be far longer than the schedule set out in the WHT EIS.

Community concerns

I have spoken with residents both of Wharf Road and Louisa Road, Birchgrove and Rozelle (White Bay) with respect to the impacts resulting from excavation and treatment of contaminated sediments. Residents have expressed their concerns relating to:

- concentrations of contaminants in sediments to be excavated
- whether suspended components of contaminated sediments will migrate into Snails Bay and to Iron Cove/Parramatta River
- release of toxic contaminants into the water column, particularly dioxins, TBT, OCPs, PAHs and heavy metals during excavation of contaminated sediments to allow installation of the immersed tube tunnel and excavation works at White Bay to accommodate cast tunnel segments
- noise during construction of cofferdams and sediment excavation works
- preparation for and operation of the White Bay contaminated sediment treatment works
- offensive odours during construction and sediment excavation works, during transport of contaminated sediments by barge and during unloading, stockpiling and treatment of contaminated sediments at White Bay
- long duration of construction and sediment excavation and treatment processes.

Most of the residents' concerns result from the failure of the WHT EIS to clearly quantify concentrations and the volumes of contaminants, odours, noise and the methods proposed to excavate and treat the large volume of contaminated sediments so as to minimise pollution of waters of western Sydney Harbour.

The failure of the WHT EIS to characterise contamination of the sediments has led to members of the community fearing the WHT EIS has concealed important information related to contamination and treatment of contaminated sediments – resident asked me "Why didn't the WHT EIS provide the concentrations of contaminants?" and "Are they hiding something?"

I have also spoken to residents of Waverton who will be impacted by works proposed in establishing the Harbour north cofferdam (WHT6) and establishing and operating the construction support site in the western part of the Berrys Bay (WHT7). Residents of these areas have concerns similar to those of the Birchgrove and White Bay communities.

With respect to the excavation, transport and treatment of contaminated sediments proposed to be excavated to allow installation of cofferdams, construction support sites and the immersed tube tunnel, the WHT EIS did not satisfactorily address issues of concern to the Birchgrove, White Bay (Rozelle) and Berrys Bay communities.

The WHT EIS is required to be amended to address the community concerns, as explained below

Technical concerns

Overall, with respect to the excavation and treatment of contaminated sediments, the deficiency of the WHT EIS relates to its prescriptive nature in which decisions have been documented to excavate contaminated sediments without consideration of the sediments being contaminated with a number of significant contaminants – the WHT EIS has addressed these issues as a construction project, rather than as a remediation project, as required by guidelines made or approved by the EPA.

The presence of the contaminants requires the sediments to be remediated in accordance with guidelines made or approved by the EPA relating to the processes by which the contaminated sediments will be remediated. The remediation of the contaminated sediments can also accommodate excavation of the sediments, as discussed in the WHT EIS, but the requirements of guidelines made or approved by the EPA as they apply to contaminated sediments must be addressed, as discussed further in section 5 of this submission.

To allow the contaminated sediments to be excavated, guidelines made and endorsed by the EPA require the contamination be remediated to make the site suitable for the proposed development. It is not legally possible to excavate and dispose of contaminated materials without their first being remediated.

The decision to excavate contaminated sediments without critical information being available in the WHT EIS without having addressed the requirements of the EPA's guidelines prevents an informed assessment of the project to be made. The WHT EIS did not provide documentation of the:

- concentrations of contaminants or their reliability
- volumes of contaminated sediments proposed to be excavated to allow installation of the immersed tube tunnel
- volumes of contaminated sediments proposed to be excavated at each of the sites where the sediments were required to be excavated
- volumes of contaminated sediments required to be excavated at western Berrys Bay
- consideration of all feasible remediation methods
- contingency measure/s to be employed to prevent migration of suspended sediments from shallow silt curtains at each of the sites where the sediments were required to be excavated.

Chapters and technical appendices in the WHT EIS relating to remediation and treatment of contaminated sediments did not provide details of experts' investigations, consideration of all feasible remediation options and adoption of a preferred remediation method, in accordance with guidelines made or approved by the EPA.

The required level of information relating to contaminated sediments was not provided in the WHT EIS, but was documented for other components of the WHT project in other parts of the WHT EIS. The failure of the WHT EIS to address remediation of contaminated sediments in accordance with guidelines made or approved by the EPA is a serious failure of the WHT EIS.

With respect to the excavation of contaminated sediments, the WHT EIS set out prescriptive methods that were to be adopted without consideration of guidelines made or approved by the EPA relating to remediation of contaminated materials. In this respect the WHT EIS addressed the excavation of contaminated sediments as a construction project, whereas it should have addressed this component of the WHT project as a remediation project that was required to be carried out in accordance with guidelines made or approved by the EPA.

The purpose of the remediation works would have been to make the various construction sites suitable for their proposed uses.

The WHT EIS is required to be amended to address requirements of guidelines made or approved by the EPA with respect to remediation, including excavation, transport and treatment of contaminated sediments.

Explanation of my concerns with the WHT EIS is addressed in the following sections of this submission.

2. Secretary's Environmental Assessment Requirements

2.1 Fundamental SEARS requirement

The fundamental requirement for an EIS, is set out in the document "Critical State Significant Infrastructure. Standard Secretary's Environmental Assessment Requirements (SEARs)" published by NSW Planning and Environment" (SEARS Requirements), is:

- "1. Environmental Impact Assessment Process. The process for assessment of the proposal is transparent, balanced, well focussed and legal."

2.2 Contaminated sediments

With respect to contaminated sediments within the corridor of the immersed tube tunnel proposed to join Yurulbin Point, Birchgrove, to the vicinity of the Waverton Coal Loader, and within cofferdams and construction support sites, the following SEARS were required to be addressed in the WHT EIS:

- "12.3.3. The Proponent must assess whether the land and harbour sediment is likely to be contaminated and identify if remediation is required, having regard to the ecological and human health risks posed by the contamination in the context of past, existing and future land uses. Where assessment and/or remediation is required, the Proponent must document how

the assessment and/or remediation would be undertaken in accordance with current guidelines"

- "12.3.4. Where contaminated spoil and/or sediments are to be handled at Glebe Island and/or White Bay, the Proponent must provide details of contamination characteristics and measures to manage this spoil to avoid adverse impacts to land and water quality."

2.3. Noise and odour

With respect to noise and odour the SEARS required the WHT EIS to address:

- "4. Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity.
    - "2(g) a cumulative noise and vibration assessment inclusive of impacts from the project (including concurrent project construction activities)";
    - "2(h) a cumulative noise and vibration assessment of the impacts from the project and the construction of other relevant development in the vicinity of the proposal".

- 2. Air Quality. The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent practicable.
    - "(l) a description and assessment of the impacts of potential emissions sources relating to construction, including details of the proposed mitigation measures to prevent the generation and emission of dust (particulate matter and TSP) and air pollutants (including odours) during the construction of the proposal, particularly in relation to ancillary facilities (such as concrete batching plants), dredge and tunnel spoil handling and storage at Glebe Island and White Bay, the use of mobile plant, stockpiles and the processing and movement of spoil".

2.4 Requirement to follow current guidelines

With respect to contaminated sediments, the SEARS required the WHT EIS to address:

- "Where assessment and/or remediation is required, the Proponent must document how the assessment and/or remediation would be undertaken in accordance with current guidelines".

2.5 Requirement to amend current SEARS

The SEARS for the WHT project (SEARS), as documented in the WHT EIS, relate predominately to construction and operation of the road tunnels and related on-shore infrastructure and are not suitable to apply to critical issues related to the remediation of contaminated sediments that are required or be excavated, transported and treated to allow for construction of the immersed tube tunnel, cofferdams and construction support sites.

The excavation of the contaminated sediments is required to be addressed as a remediation project, which is subject to guidelines made or endorsed by the EPA and a reliable WHT EIS can be completed only after documenting measures that will be implemented to satisfy the EPA's guidelines.

The failure of the WHT SEARS to address critical issues related to the contaminated sediments has resulted in the WHT EIS not addressing issues that have potentially serious impact to human health, protection of the marine environment, method of excavating the contaminated sediments and environmental protection measures and the duration of excavation, transport and treatment of the contaminated sediments.

The WHT EIS assumes that remediation of contaminated sediments can be addressed following approval of the EIS by the Department of Planning, Industry and Environment but this assumption is incorrect as the remediation works are most likely to be regulated by the EPA when they become aware of the nature and extent of the contaminated sediments and the risk posed to human health and to the marine environment of western Sydney Harbour.

The SEARS Requirements, sets out SEARS that did not address the remediation of the contaminated sediments. If the additional SEARS were applied to are amended WHT EIS uncertainties would be reduced and justification for the processes required to address the contaminated sediments would be documented in consideration of:

- protection of human health
- protection of the marine environment
- protection of the amenity of communities in proximity to the excavation and treatment works
- the duration of excavation and related works for the immersed tube tunnel
- certainty that the contaminated sediments can be treated to allow disposal to landfill
- contaminated water being be disposed lawfully
- satisfying requirements of authorities who would regulate the remediation works.

Relevant parts of the SEARS Requirements for CSSI projects, as set out in the SEARS Requirements that have not been addressed appropriately in the WHT EIS relating to excavation, transport and treatment of contaminated sediments are set out below.

I acknowledge that the requirements set out below may not be complete and should be revised by an expert in planning requirements applicable to remediation projects.

Section 3. Approach to environmental assessment of CSSI projects

"Information provided in the EIS must be sufficient to ensure that decision-makers, government regulators and government advisory agencies are able to understand and assess a project and its impacts without seeking further information from the Proponent. It is intended that this approach will provide greater clarity and certainty regarding the impacts of a project and the effectiveness of the proposed mitigating measures in the EIS to reduce the level of post-approval investigation."

Section 4. General Standard SEARS

2. Environmental Impact Statement

Requirement

- "(f) a description of feasible options within the project;
- (g) a description of how alternatives to and options within the project were analysed to inform the selection of the preferred alternative / option. The description must contain sufficient detail to enable an understanding of why the preferred alternative to and options(s) within the project were selected;
    - a demonstration of how the project design has been developed to avoid or minimise likely adverse impacts;
- (p) a chapter that synthesises the environmental impact assessment and provides:
    - a succinct but full description of the project for which approval is sought;
    - a description of any uncertainties that still exist around design, construction methodologies and/or operational methodologies and how these will be resolved in the next stages of the project;
        - a compilation of the impacts of the project that have not been avoided;
        - a compilation of the proposed measures associated with each impact to avoid or minimise (through design refinements or ongoing management during construction and operation) or offset these impacts;
- a compilation of the outcome(s) the proponent will achieve; and
- the reasons justifying carrying out the project as proposed, having regard to the biophysical, economic and social considerations, including ecologically sustainable development and cumulative impacts."

3. Assessment of key issues

Requirement

"1. The level of assessment of likely impacts must be proportionate to the significance of, or degree of impact on, the issue, within the context of the proposal location and the surrounding environment. The level of assessment must be commensurate to the degree of impact and sufficient to ensure that the Department and other government agencies are able to understand and assess impacts."

"2. For each key issue the Proponent must:

(b) describe the legislative and policy context, as far as it is relevant to the issue;
(c) identify, describe and quantify (if possible) the impacts associated with the issue, including the likelihood and consequence (including worst case scenario) of the impact (comprehensive risk assessment), and the cumulative impacts;
(d) demonstrate how potential impacts have been avoided (through design, or construction or operation methodologies);
(e) detail how likely impacts that have not been avoided through design will be minimised, and the predicted effectiveness of these measures (against performance criteria where relevant); and
(f) detail how any residual impacts will be managed or offset, and the approach and effectiveness of these measures."

3. "Where multiple reasonable and feasible options to avoid or minimise impacts are available, they must be identified and considered and the proposed measure justified taking into account the public interest."

5. Air quality

Requirements

"1.The Proponent must undertake an air quality impact assessment (AQIA) for construction and operation of the project in accordance with the current guidelines."

11. Noise and vibration - Amenity

Requirement

"The Proponent must assess construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must include consideration of impacts to sensitive receivers including small businesses, and include consideration of sleep disturbance and, as relevant, the characteristics of noise and vibration (for example, low frequency noise)."

20. Waste

Requirements

"1. The Proponent must assess predicted waste generated from the project during construction and operation, including:

(a) classification of the waste in accordance with the current guidelines;
(b) estimates / details of the quantity of each classification of waste to be generated during the construction of the project, including bulk earthworks and spoil balance;
(c) handling of waste including measures to facilitate segregation and prevent cross contamination;
(d) management of waste including estimated location and volume of stockpiles;
e) waste minimisation and reuse;
f) lawful disposal or recycling locations for each type of waste."

22. Water quality

Requirements

"1. The Proponent must:

(a) state the ambient NSW Water Quality Objectives (NSW WQO) and environmental values for the receiving waters relevant to the project, including the indicators and associated trigger values or criteria for the identified environmental values;
(b) identify and estimate the quality and quantity of all pollutants that may be introduced into the water cycle by source and discharge point and describe the nature and degree of impact that any discharge(s) may have on the receiving environment, including consideration of all pollutants that pose a risk of non-trivial harm to human health and the environment;
(c) identify the rainfall event that the water quality protection measures will be designed to cope with;

(d) assess the significance of any identified impacts including consideration of the relevant ambient water quality outcomes;
(e) demonstrate how construction and operation of the project will, to the extent that the project can influence, ensure that:

- where the NSW WQOs for receiving waters are currently being met they will continue to be protected; and
- where the NSW WQOs are not currently being met, activities will work toward their achievement over time;

(h) identify sensitive receiving environments (which may include estuarine and marine waters downstream) and develop a strategy to avoid or minimise impacts on these environments; and
(i) identify proposed monitoring locations, monitoring frequency and indicators of surface and groundwater quality."

3. Chemical substances identified in sediments

Sediments within the proposed corridor for placement of the immersed tube tunnel and sediments proposed to be excavated in White Bay and Snails Bay were stated in Appendix M to be contaminated with a suite of chemical substances and were stated "…to pose a high contamination risk to construction given that contamination is known to be present in sediments which are likely to be excavated and exposed during construction of the Sydney WHT".

Sediments in unidentified locations in Berrys Bay were also stated to be contaminated although the WHT EIS did not document that these sediments were required to be excavated to allow the western part of Berrys Bay to be used as a construction support site.

The following contaminants were identified in selected sediment samples above the respective investigation guidelines:

- PAHs (polynuclear aromatic hydrocarbons) – exceeded sediment quality guidelines and offshore dumping guidelines
- TPH (petroleum hydrocarbons) – exceeded offshore dumpling guidelines
- TBT (tributyltin) – exceeded sediment quality and offshore dumpling guidelines
- Heavy metals – exceeded sediment quality guidelines
- Arsenic – exceeded sediment quality guidelines
- Copper – exceeded sediment quality guidelines
- Mercury – exceeded sediment quality guidelines
- Lead – exceeded sediment quality guidelines
- Silver – exceeded sediment quality guidelines
- Zinc -– exceeded sediment quality guidelines
- OCPs (organochlorine pesticides) – exceeded sediment quality guidelines (White Bay and Berrys Bay).

In addition to the above suite of chemical substances, section 4.4.2 also stated in the text, but not in the table of chemical substances identified in sediments, that "…perfluoroalkyl and polyfluoroalkyl substances (PFAS) and dioxins were detected above laboratory levels of reporting in sediment samples collected for Western Harbour Tunnel" and "Dioxins were detected above laboratory levels of reporting in sediment samples collected from White Bay" but that "PFAS analysis was not carried out on White Bay sediment samples. PFAS and dioxin analysis was not carried out on sediment samples collected from Berrys Bay."

"Above laboratory levels of reporting" is open-ended and can refer to any concentration greater that the detection limit to any concentration less than infinity. It is a serious failure of the WHT EIS to not document the concentrations of dioxins and PFAS in sediments.

The reason the DGPA (2017a) report not classifying whether dioxins and PFAS in the sediment represented contamination or not was stated as "The nominated guidelines (detailed above) do not include criteria for PFAS and dioxins". However, suitable

concentration criteria to compare results of chemical analyses for PFAS and dioxins in the sediments could have been sourced from the scientific literature or have been obtained by consultation with the EPA.

Given the concern of the community to PFAS and dioxins, it is unacceptable for the WHT EIS not to have made enquiries relating to whether these compounds were identified at levels of concern or not.

In addition, section 4.4.2 also stated "Limited samples were collected for ASS (acid sulfate soils) …Total peroxide oxidisable sulphur results reported at location B824W-B (0.072% from the Western Harbour Tunnel component investigation area … exceed the oxidisable sulphur action criteria of 0.03%." However, the WHT EIS did not document the common odours released by these sediments after excavation. This information may have been available in the DGPA (2017a) report.

3.1 Inability to assess the reliability of the WHT EIS

The reliability of the WHT EIS in respect of chemical substances in sediments cannot be independently assessed because the WHT EIS did not include a summary of appropriate measures to ensure the reliability of the results, as required by guidelines made or approved by NSW Environment Protection Authority (EPA), such as:

- Data Quality Objectives for the investigation program
- Data Quality Indicators to assess the achievement of project Data Quality Objectives, including
    - locations of samples
    - depth intervals from which samples were collected for chemical analysis
    - assessment of the representativeness of sample locations and depth intervals samples for chemical analysis
    - details of sampling methods, including quality control measures implemented during collection, storage and transport of samples to the analytical laboratory
    - details of observations made during collection of samples, such as odours, grain size of sediments, colour, organic content, presence/absence of anthropogenic items
    - assessment of the reliability of the field and laboratory programs
    - identification of chemicals of concern, their concentrations and distribution in the sediments
    - the volume of contaminated sediments in all locations where contaminated sediments were to be excavated.

The WHT EIS did not quantify the concentrations of the chemicals of concern, i.e. list the concentrations in conventional units of concentration, such as mg/kg (milligrams per kilogram) or ug/kg (micrograms per kilogram), which are the units of concentrations referred to in guidelines made or approved by the EPA.

Section 4.4.2 *Harbour sediments* of the WHT EIS compared the results of chemical analyses of sediments to criteria stated to be sourced from "ANZECC (2000) High and Low Interim Sediment Quality Guidelines". These guidelines have been superseded by the "Revision of ANZECC/ARMCANZ Sediment Quality Guidelines (2013)". Without the ability to review the DGPA (2017a) report it is not possible to assess whether the sediment quality guidelines were applied reliably.

The WHT EIS did not address offensive odours that are emitted when sediments classified as acid sulfate soils which are known to give rise to offensive odours when excavated.

The WHT EIS is required to be amended to include the matters addressed in this section of my submission.

3.2 Duty to report contamination to the EPA

The WHT EIS did not state whether the contamination in sediments had been reported to the EPA in accordance with the requirements of the EPA's "Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997".

In respect as to whether contamination of sediments is required to be notified to the EPA, the CLMA states "land includes water on or below the surface of land and the bed of such water". Consequently, contaminated sediments were required to be notified to the EPA. In instances where doubt exists whether to report of not, the EPA should have been consulted to seek their requirements.

Inspection of the EPA's website listing sites notified under the above guidelines indicated no notifications to 18 February 2020 of any of the sites related to the contaminated sediments within WHT project.

The EPA's website at 18 February 2020 lists nine locations where sediments are currently being or have been regulated under the CLMA.

A notification of Woodleys Marina, Berrys Bay, was recorded as "formerly regulated land". No notification relating to contaminated sediments in Berrys Bay was recorded.

Consultation with the EPA as to whether the EPA would regulate of any of the sites where contaminated sediments were identified in the WHT project should have been undertaken and documented in the WHT EIS. The duty to report the contaminated sediments to the EPA arises irrespective of the SEARS not addressing the requirement.

4. Volume of contaminated sediments

The volume of contaminated forms part of the "contaminant characterisation" required by the SEARS.

The locations and volumes of contaminated sediments and uncontaminated materials proposed to be excavated to allow installation of the immersed tube tunnel and excavation for immersed tube construction activities at White Bay was documented in Chapter 24 Resource Use and Waste Management and was set out in Table 24-8, below.

Source: WHT EIS Table 24-8 Indicative dredged material volumes

Construction area	Dredged material volume (cubic metres)	Indicative composition of dredged material
White Bay (WHT3) construction support site	142,500	Dredged sediment not suitable for offshore disposal
Sydney Harbour south cofferdam (WHT5) and Sydney Harbour north cofferdam (WHT6) construction support sites	44,000	Sandstone suitable for offshore disposal under Commonwealth permit
Sydney Harbour immersed tube tunnel construction	610,000	Sediment suitable for offshore disposal under Commonwealth permit
	108,000	Sandstone suitable for offshore disposal under Commonwealth permit
Total dredged material	904,500	

Table 24-8 assigns volumes of materials to specific locations where excavation by dredge is proposed in the WHT EIS.

Comment

Volumes of contaminated sediments may not include immersed tube tunnel and do not include Berrys Bay

Chapter 24 of the WHT EIS, stated "Of the 904,500 cubic metres of material to be removed from Sydney Harbour, it is expected that about 142,500 cubic metres from the top 1.5 metres of the harbour bed would not be suitable for potential offshore disposal".

Inspection of Table 24-8 indicates that the volume of 142,500 cubic metres of contaminated sediments applies to only contaminated sediments excavated from the White Bay construction support site (WHT3), but does not provide explanation of the derivation of this volume.

Table 24-8 did not assign any volume of contaminated sediments that Appendix M of the WHT EIS stated in would be excavated from the corridor of the immersed tube tunnel, cofferdam WHT5 at Yurulbin Point, cofferdam WHT6 near the Waverton Coal Loader and at White Bay.

Table 28-4 is misleading because it is not clear if the volume of 124,500 cubic metres includes all contaminated sediments that would be excavated for the WHT project or whether that volume applies only to contaminated sediments to be excavated from White Bay.

The failure of the WHT EIS to clearly document the volumes of contaminated sediments required to be excavated from each of the corridor of the immersed tube tunnel, cofferdam WHT5 at Yurulbin Point, cofferdam WHT6 near the Waverton Coal Loader, at Berrys Bay and at White Bay is a major failure of the WHT EIS that does not allow an independent assessment of the applicability of the excavation method proposed for each part of the WHT project where sediments are required to be excavated and does not allow duration of works at each construction site to be reliably estimated or of the scale of the contaminated soil treatment works at White Bay.

If the volume of 142,500 cubic metres does not include contaminated sediments from locations other than White Bay, a much larger volume of contaminated sediments is required to be treated at White Bay. For example, inspection of Figures 6-21 and 6-29 indicated the additional volume of contaminated sediments for the immersed tube tunnel and the two cofferdams may be approximately 132,000 cubic metres.

It is a failure of the WHT EIS to not have made clear the volume of contaminated sediments at each location where the sediments are required to be excavated, transported and treated at the White Bay treatment works since this volume listed in Table 6-24 would be almost double the amount of contaminated sediments required to be excavated, transported and treated.

It is also a failure of the WHT EIS that Appendix M *Contamination*, in which all aspects of the contaminated sediments should have been documented, does not document the volumes of contaminated sediments to be excavated, transported and treated for each of the locations of does not provide a total volume of contaminated sediments. In addition, I could not find in other parts of the WHT EIS reference to 142,500 cubic metres of contaminated sediments – even in Appendix M, where <u>all</u> aspects of the contaminated sediments should have been documented.

In my opinion, the volume 142,500 cubic metres has not been justified and is speculative. A reliable estimate of the volume of contaminated sediments is an essential component of the WHT EIS since so much of the project depends upon this parameter for estimating time, cost, requirements for plant and machinery, design, construction and operation of the White Bay treatment works, etc.

The failure of the WHT EIS to document the volumes of contaminated sediments at each location where they are required to be excavated is not in accordance with the requirement of the SEARS and is a serious failure of the WHT EIS.

Volumes of contaminated sediments do not include Berrys Bay

The WHT EIS did not assign any volume of contaminated sediments known to be present at Berrys Bay and which would be required to be treated at White Bay and subsequently disposed to landfill, were not contained in volumes set out in Table 24-8 of the WHT EIS. The volume of contaminated sediments in Berrys Bay may be in the order of 30,000 cubic metres and represent an unquantified increase in the volume of contaminated sediments that are proposed to be treated at White Bay contaminated sediment treatment works.

The failure of the WHT EIS to document the contamination characteristic of contaminated sediments in Berrys Bay that will be disturbed by operation of the construction support site (WHT7) is not in accordance with the requirement of the SEARS.

Likely large increase in volumes of contaminated sediments to be excavated

In consideration of the failure of the WHT EIS to document the total volume of contaminated sediments to be excavated for cofferdams, the immersed tube tunnel and construction support site in Berrys Bay, is likely to be approximately twice the volume documented in Table 24-6 of the WHT EIS and to result in overruns for in time required for excavation, transport and treatment of contaminated sediments at the White Bay treatment works and for a great increase in cost of the WHT project.

Failure to document characterisation of contaminated sediments

The WHT EIS failed to document the volumes of contaminated sediments that were required to be excavated, transported and treated at the White Bay treatment works.

One of the fundamentally important metrics used in the characterisation of the contaminated sediments are the locations and volumes of contaminated sediments present in each part of the WHT project where these sediments are proposed to be excavated.

The WHT EIS did not address whether contaminated sediments within cofferdam sites WHT5 and WHT6 would be required to be treated prior to disposal to landfill. It is unclear from inspection of Figure 6-13 of the WHT EIS "*Indicative process for constructing the tunnel interface structures*" whether the volumes listed in Table 24-8 included volumes of contaminated sediments to be removed from the proposed cofferdam sites.

In summary, the WHT EIS failed to document the contamination characterise of contaminated sediments as required by the SEARS.

Human health and environmental protection measures

As noted above, the WHT EIS did not address the concentrations of contaminants in sediments proposed to be excavated. If the concentrations are close to guidelines values, it may be possible to employ less stringent control measures to protect human health and the environment, but if the concentrations of one or more contaminants are significantly higher than the guideline values there would be a requirement to employ stringent control measures.

Acceptability to dispose treated sediments to landfill

In particular, the WHT EIS did not address whether the concentrations of dioxins in excavated sediments from the WHT project would be required to be reduced to allow the treated sediments to be disposal to landfill.

Requirement for amendment to the WHT EIS

The issues referred to above should have been addressed in the WHT EIS and their omission renders the EIS unacceptable to address the impact contaminated sediments will have on the WHT project and on the communities of Birchgrove, White Bay (Rozelle) and Berrys Bay (Waverton).

The issues referred to above are required to be addressed in an amendment to the EIS.

5. Suitability of sediments for offshore disposal

The WHT EIS set out in Table 24-8 that a volume of 610,000 cubic metres of excavated sediments underlying the contaminated sediments at the immersed tube tunnel were suitable for offshore disposal.

Comment

Sediments from within the immersed tube tunnel corridor

The WHT EIS did not document:

- the locations, depth extents and volumes of uncontaminated sediments excavated from beneath the contaminated sediments within the corridor of the immersed tube tunnel or of any other part of the WHT project where contaminated sediments were encountered
- the results of laboratory chemical analysis testing of sediments claimed to be suitable for offshore disposal
- the method proposed to ensure contaminated sediments were not contained in excavated materials proposed for offshore disposal
- whether any samples of sediments from beneath the 1.5 metres of contaminated sediments were submitted for chemical analysis
- whether results of chemical analyses in Table B.1 of Appendix M of the EIS included any samples of sediments that were stated to be suitable for offshore disposal
- whether any sediment samples identified by “x” Table B.1 referred to so-called clean samples beneath the 1.5 metres of contaminated samples.

Inspection of Table B.1 of Appendix M indicated that 13 of 18 (72 %) of sediment samples collected from the corridor of the immersed tube tunnel contained concentrations of chemical substances that would not be suitable for offshore disposal. The EIS did not document whether any of the 13 samples were from contaminated near-surface samples or were from so-called uncontaminated samples deeper than 1.5 metres.

Table B.1 of the WHT EIS did not report whether the unquantified concentrations of dioxins and of PAHs and mercury, which are bioaccumulative, would prevent offshore disposal sediments considered to be uncontaminated.

The issues referred to above are not in accordance with the requirements of the SEARS and are required to be addressed in an amendment to the WHT EIS.

Sediments from within White Bay

Although excavated sediment of 142,000 cubic metres of contaminated sediments are not suitable for offshore disposal, the WHT EIS did not document the whether any uncontaminated sediments were proposed to or were suitable for offshore disposal.

Results of chemical analysis of all sediment samples collected from White Bay set out in Table B.1, exceeded concentrations of TBT that are permitted for offshore disposal and

concentrations of dioxins, PAHs and mercury that are bioaccumulative require additional testing to demonstrate their suitability for offshore disposal.

The issue referred to above is required to be addressed in an amendment to the WHT EIS.

Sediments from Berrys Bay

The WHT EIS did not document whether any sediments from Berrys Bay are suitable for offshore disposal. However, all sediment samples set out in Table B.1 reported concentrations of TBT that may preclude offshore dumping. No sediment samples from Berrys Bay were analysed for dioxins.

The WHT EIS should have documented whether sediments excavated from Berrys Bay were required to be excavated and treated at the White Bay contaminated sediments treatment works or were suitable for offshore disposal.

The issues referred to above are required to be addressed in an amendment to the WHT EIS.

6. Method for excavating and treating sediments

6.1. Use of clamshell buckets for excavation of contaminated sediments

With respect to excavation of sediments to allow positioning of the immersed tube tunnel, the WHT EIS stated:

- "A backhoe dredge with a closed environmental clamshell would be used to remove the top 1.5 metres of sediment. This would reduce the potential for release of contaminated sediments into the water (refer to Chapter 6 (Construction). On this basis, it is unlikely that marine water quality would be substantially impacted"
- "A clamshell (or open bucket) would be used to bring stiff ground materials to the surface. This material would be loaded into hopper barges positioned next to the dredge and then disposed of at the designated offshore disposal site".

Comment

I agree that the use of a closed environmental clamshell bucket would provide a better method than use of an open bucket for excavation of contaminated sediments. However, both buckets give rise to dispersal of suspended sediments as the bucket plunges into the fine-grained, contaminated sediments at the seafloor.

However, rocks, logs and anthropological items anthropogenic materials such as bricks, metal, pipes, bottles, timber, and the like present at the seafloor and deeper within the contaminated sediments can prevent the closure of the buckets and thereby result in significant mobilisation of suspended fine-grained contaminated sediments into the water column as the environmental bucket is retrieved to the barge.

The DGPA (2017a) report may have provided information related to the presence of objects on the seafloor or within the contaminated sediments that could prevent tight closure of the clamshell bucket.

6.2 Migration of suspended sediment into the water column during excavation of contaminated sediments

Section 17.4 of the WHT EIS and Appendix P documented modelling of sediment dispersion during dredging of contaminated sediments stated:

- "Dredging and piling activities associated with the establishment of the Sydney Harbour south cofferdam (WHT5) and Sydney Harbour north cofferdam (WHT6), as well as adjacent land based activities at White Bay construction support site (WHT3), Yurulbin Point construction support site (WHT4) and Berrys Bay construction support site (WHT7) have the potential to reduce water quality and disturb contaminated sediments."
- "The results indicate that the dredging program would not have a significant impact on marine water quality. The dredging and construction activities for the project are likely to cause localised increases in suspended sediment concentrations but due to the rapid dispersion in Sydney Harbour is not likely to result in significant water quality impacts."
- "The extent of the dredge plume (two milligrams per litre suspended sediment concentration) throughout the water column would be limited to a relatively small area, concentrated at the north eastern end of the dredging footprint near Balls Bay and around Balls Head."
- "The extent of the visible plume (suspended sediment content >20 milligram per litre) is expected to be very small, and would be contained in the dredging footprint next to the Sydney Harbour north cofferdam (WHT6)".

Figure 17-2 showed results of modelling of sediment dispersion and deposition in the vicinity of the Waverton Coal loader and Balls Head resulted in a plume of contaminated sediments within the bottom layer of water to extend west and north-west across most of Balls Head Bay and to the east extend some distance around Balls Head.

No figures showed results of modelling of sediment dispersion and deposition in Snails Bay or in Parramatta River/Iron Cove at Birchgrove.

Comment

Although the modelling of dispersion of contaminated sediments set out in Appendix P was carried out by a consultant I know to have recognised expertise in hydrological modelling, the WHT EIS did not explain to the satisfaction of community members to whom I have spoken to as to why modelling addressed dispersion of suspended contaminated sediments only around the Sydney Harbour north cofferdam (WHT6) at Balls Head when suspended contaminated sediments would be generated for all activities when contaminated sediments were excavated within the corridor of the immersed tube tunnel, in White Bay and in Berrys Bay.

The community and I do not understand why the WHT EIS did not explain the reason drawings illustrating results of modelling of dispersion of suspended contaminated sediments around Yurulbin Point eastwards into Snails Bay and westwards into the Parramatta River were not included in the WHT EIS in consideration of the known strong tidal and wind currents in this area.

The community requires the WHT EIS address the impact of contaminated sediments suspended in the water column to the health of:

- persons exposed to the fine-grained suspended sediments in Snails Bay and in Parramatta River/Iron Cove, Birchgrove
- the marine ecosystem in the above locations.

I do not have relevant expertise to allay the concerns of the community in this matter of concern.

By not addressing the concerns of the community relating to dispersion and migration of suspended sediments, the WHT EIS does not comply with guidelines made by the EPA and is not in accordance with the requirements of the SEARS.

The WHT EIS is required to be amended to address the concerns of the community in relation to this matter.

6.3 Use of shallow silt curtains

Section 17.4 of the WHT EIS stated:

- "…the dredging program would not have a significant impact on marine water quality. The dredging and construction activities for the project are likely to cause localised increases in suspended sediment concentrations but due to the rapid dispersion in Sydney Harbour is not likely to result in significant water quality impacts."

- "Monitoring during the dredging activities would provide data to assess the compliance of the activities with this assessment. Along with the use of shallow silt curtains around dredging activities, additional shallow silt curtains would be installed where appropriate to mitigate the potential impact to adjacent ecologically sensitive areas (e.g. seagrass beds). The use of deep draft silt curtains during dredging activities would not be possible, due to tidal currents and maritime traffic within Sydney Harbour."

Comment

The WHT EIS did not justify the use of shallow silt curtains, stated to extent 2 to 3 metres below the water surface, during dredging activities and whether the shallow curtains would be adequate to prevent mobilisation of sediments at the sea floor and their migration from all work areas in currents.

The WHT EIS failed to consider mishaps during the excavation of contaminated sediments and the impact of stronger winds and wind currents than were assessed in the WHT EIS and the consequent loss of suspended sediments from within the proposed shallow silt curtains.

The WHT EIS did not address where suspended sediments were most likely to be generated as a result of plunging the clamshell bucket into the unconsolidated fine-grained contaminated sediments, closing the bucket and withdrawing the bucket to the surface. If the bucket closed securely as intended, it is most likely that sediment would be suspended into the water column at the seafloor, rather than in shallower water. The suspended sediment would then be dispersed close to the seafloor by the tidal currents that the WHT EIS documented.

Even "localised impact" of harbour waters beyond immediate work areas by suspended sediments generated by dredging and construction activities may constitute contamination of waters and would not be permitted by the EPA. It is most likely that dispersion into waters of Sydney Harbour of sediments contaminated with dioxins, TBT and mercury, in particular, would not be permitted by the EPA. In this respect the use of shallow silt curtains does not give confidence that contaminated sediments mobilised into the water column could be contained.

The WHT EIS dismissed the use of full-depth (i.e. from the surface to the seafloor) silt curtains due to currents and maritime traffic.

However, bottom-sealed filter barriers that are anchored to the seafloor are suitable for use in tidal marine environments where bottom currents, as strong as expected adjacent to Yurulbin Point and Balls Head, have been used successfully in sediment remediation projects in marine estuaries.

With respect to, the use of full-depth silt curtains, the curtains would be expected to progressively enclose a number of work areas where sediments are being excavated and it is not envisaged that the full-depth silt curtains would be deployed across the entire corridor of the immersed tube tunnel. This mode of deployment would allow ample room for

movement of maritime traffic. When materials had been excavated from one work area, it is envisaged that new full-depth silt curtains would be installed around the new work area.

Appendix P of the WHT EIS identified that fine-grained components of contaminated sediments (less than 63 micrometres – i.e. mud) was 69 % for soft silt and clay and 15 % for silty sand and that fine-grained material lost to the waters of Sydney Harbour would be 1.5 %, giving rise to a loss of approximately 1300 cubic metres of fine-grained contaminated sediments for the duration of the immersed tube tunnel excavation works if only 142,500 cubic metres was excavated.

However, it is most likely that more than 142,500 cubic metres of contaminated sediments would be required to be excavated as explained in section 4 of this submission and that more than 1300 cubic metres of fine-grained contaminated mud would be lost suspended in the waters of Sydney Harbour.

The WHT EIS did not provide any assurances from the EPA that any quantity of fine-grained contaminated sediments would be acceptable for release in to Sydney Harbour. In opinion, the EPA would not permit the risk posed by 1300 cubic metres of contaminated fine-grained sediments to be discharged into the waters of Sydney Harbour, particularly as the contaminants would be adsorbed to the surfaces of the fines and be likely ingested by fish, crustaceans and oysters. It is likely that even short-term releases of contaminated sediments to the waters of Sydney Harbour would not be permitted by the EPA.

As a conservative measure to minimise dispersion of sediments into the water column, consideration is required to be given to first stabilise the sediments (as the WHT EIS proposed for sediments within cofferdams and for treatment of sediments at the White Bay treatment works) and subsequent excavation of the contaminated sediments within a full-depth bottom-sealed filter barrier.

If monitoring demonstrated insignificant release of suspended sediments occurred during excavation of contaminated sediments in the first stage of excavation works while full-depth bottom-sealed filter barriers were deployed, the EPA may permit use of shallow silt curtains in subsequent stages of excavation works.

By considering the use of only shallow silt curtains without proper consideration of other sediments control options, the WHT EIS does not comply with guidelines made by the EPA and is not in accordance with the requirements of the SEARS.

The WHT EIS is required to be amended to address this issue.

6.4 Consideration of other remediation methods

The WHT EIS presented excavation of contaminated sediments using a bucket as the only method considered for the excavation of contaminated sediments.

Comment

The WHT EIS addresses the excavation of contaminated sediments as a construction project, whereas this activity should have been presented as a remediation project, for which all feasible remediation scenarios and measures to protect human health and the marine environment had been considered for excavation of the contaminated sediments.

It is a failure of the WHT EIS to adopt one method for excavating the contaminated sediments without documenting consideration of other methods that have been employed successfully elsewhere and as required by guidelines made or approved by the EPA.

Sophisticated models have been developed that allow quantitative assessment of potential remediation methods. The WHT EIS should have presented, or at least referred to, the

method by which excavation by bucket of untreated contaminated sediments was selected as the preferred remediation method over other methods.

One scenario that should have been assessed for excavation of contaminated sediments along the extent of the immersed tube tunnel and sediments proposed to be excavated at White Bay is *in situ* stabilisation of the contaminants prior to their excavation and followed by excavation and transport of the stabilised sediments to White Bay.

It is all the more surprising that *in situ* stabilisation of contaminated sediments by grouting was not addressed in the WHT EIS as a feasible option to stabilise contaminated sediments to be excavated to allow installation of the immersed tube tunnel whereas this process was proposed in section 6.4.4 of the WHT EIS to be used in the construction of cofferdams at Yurulbin Point (WHT5) and Waverton Coal Loader (WHT6), as follows:

- "Ground treatment – before the construction of the cofferdam can occur, the upper layer of the bed of the harbour would be injected with a permanent grouting material to improve its strength and make water-tight. Ground treatment would be carried out by drilling holes into the bed of the harbour. These holes would then be injected with grout by a grouting machine located on a flat top barge."

If the WHT EIS should have considered other remediation methods and ranked then to arrive at the preferred option, consideration of the *in situ* stabilisation of contaminated sediments along the extent of the immersed tube tunnel and possibly also in White Bay and Berrys Bay the benefits of this method would have been apparent, including:

- reduction or near elimination of suspended sediments in the water column during excavation of contaminated sediments
- suppression of odours generated during excavation, transport, stockpiling and treatment of contaminated sediments
- reduction or elimination of the requirement for dewatering of sediments at the White Bay contaminated sediment treatment works
- elimination or minimisation of the requirement for treatment/stabilisation of contaminated sediments at the White Bay contaminated sediment treatment works
- shortening the time required for operation of the White Bay contaminated sediment treatment works.

Shortening the time required for operation of the White Bay contaminated sediment treatment works would have resulted in large time and cost savings for the project and would minimise odour, noise and traffic impacts to the White Bay (Rozelle) community.

In consideration of the great benefits *in situ* stabilisation of contaminated sediments would have provided, the *in situ* grouting of contaminated sediments should also have been considered in the WHT EIS for treatment of contaminated sediments at the immersed tube tunnel corridor, White Bay and Berrys Bay.

By documenting only one method to excavate the sediments, the WHT EIS does not comply with guidelines made by the EPA and is not in accordance with the requirements of the SEARS.

The WHT EIS is required to be amended to address this issue.

7. Failure of the WHT EIS to address the SEARS requirement for contamination characteristics of sediments

7.1 Unresolved contamination characteristics of sediments

The WHT EIS described sediments within the corridor of the proposed immersed tube tunnel to be contaminated and referred to a number of specific contaminants, but did not present "details of contamination characteristics", as required by the SEARS.

Comment

The information provided in the WHT EIS is not sufficient to independently assess whether the WHT EIS has reliably classified sediments as being contaminated, which is defined in the CLMA to refer to chemical substances that pose an unacceptable risk to human health or to the environment and require remediation to make the subject site suitable for the proposed use.

The WHT EIS compared the concentrations of identified chemical substances to "respective guidelines". However, these guidelines are more than likely "trigger values", which if exceeded require additional assessment to identify whether the concentrations pose an unacceptable risk to human health or to the environment. Only if the concentrations are demonstrated by further assessment to pose an unacceptable risk, can the chemical substances in the sediments be classified as "contamination". If the chemical substances are properly classified as contamination, remediation is required to be implemented in accordance with guidelines made or approved by the EPA.

In summary, the WHT EIS did not comply with the SEARS relating to "details of contamination characteristics" of sediments proposed to be excavated, because it did not reliably document in accordance with guidelines made or approved by the EPA, the following:

- the reliability of results of field and laboratory methods addressed in the DGPA (2017a) report
- the locations of bores from which samples of sediment for chemical analysis were collected and the depth intervals sampled and chemically analysed
- concentrations of identified contaminants, which include dioxins, TBT, OCPs, PAHs and mercury, which are toxic to human health and to the marine ecosystem and which are bioaccumulative toxins
- range and mean concentrations of each chemical contaminant, especially dioxins TBT and mercury
- human health and environmental toxicity profiles for each significant contaminant
- volumes contaminated sediments for each chemical contaminant, both laterally across the areal extent of the sediments to be excavated and at relevant depth intervals over the 630 metre length of the five Immersion Tubes (as described in the WHT EIS) and the cofferdams at Yurulbin Point (WHT4) and at the Waverton Coal Loader (WHT6), each approximately 100 metres x125 m
- drawings showing the extent and concentrations of each chemical of concern, both laterally and vertically
- physical characteristic of the contaminated sediments, such as grain size, odour, organic content and presence/absence of anthropogenic materials
- an estimate of the volume of contaminated sediments at each location where sediments were required to be excavated
- a Remediation Action Plan.

The failure of the WHT EIS to reliably address "details of contamination characteristics", as required by the SEARS, relating to the harbour sediments within the cofferdams WHT5, WHT6 and the immersed tube tunnel corridor presents a critical failure of the WHT EIS

because it does not allow assessment of the scope of work and, consequently, the time that will be required to excavate the contaminated sediments, transport and treat the contaminated sediments at White Bay and subsequent transport of treated sediments to landfill.

The failure of the WHT EIS to properly address the contamination characteristics has not permitted the proper assessment of unacceptable impacts to:

- the amenity of the communities of Birchgrove, White Bay (Rozelle) and Berrys Bay
- the volume of sediments to be excavated and treated
- the time required to excavate and treat contaminated sediments
- environmental protection measures, which will be required to be more stringent if concentrations of chemicals of concern are high
- sustainability issues, including cost of the immersed tube tunnel program and supporting programs
- amenity impacts, particularly duration of noise and odour to the communities over an extended and unquantified time.

It is a serious failure for the WHT EIS to not have addressed the SEARS requirement to present contamination characteristics in accordance with guidelines made or approved by the EPA.

The failure of the WHT EIS to quantify the concentrations and distribution of dioxins in the sediments gives rise to serious concern to the community considering the toxicity of these substances and their presence has given rise to dietary restrictions relating to consumption of fish caught west of the Harbour Bridge.

The failure of the WHT EIS to properly address the details of contamination characteristics has not permitted the proper assessment of unacceptable impacts to:

- the amenity of the communities of Birchgrove, White Bay (Rozelle) and Berrys Bay
- the volume of sediments to be excavated and treated
- the time required to excavate and treat contaminated sediments
- environmental protection measures, which will be required to be more stringent if concentrations of contaminants are high
- sustainability issues, including cost of the immersed tube tunnel program and supporting programs
- social impacts, particularly duration of noise and odour impacts to the communities over an extended and unquantified time.

Given the strong regulatory focus relating to dioxins in Sydney Harbour due to the impact to human health by accumulation of dioxins in fish, the community concern relating to these compounds and the extreme toxicity to the marine ecosystem by TBT, the reference to sediments within the WHT corridor and in White Bay being contaminated by these chemical substances is a significant failing of the WHT EIS.

The WHT EIS should have documented the concentrations of all chemical substances in sediments referred to in Appendix M and is unacceptable for the communities to be kept in ignorance of the concentrations of the chemical substances in the sediments.

In contrast to the sparse and inconclusive results reported for contamination of sediments in Appendix M, Appendix N (*Technical Working Paper: Groundwater*) provided 31 tables of detailed results of various groundwater tests and chemical analyses and 27 Figures and in this respect provided detailed quantitative results in stark contrast to the lack of quantitative information in Appendix M. A comparable amount of quantitative information should have been presented in Appendix M to properly characterise contaminated sediments so that the community was fully informed.

The communities of Birchgrove, Rozelle and Waverton rely on the WHT EIS to provide reliable quantitative results of all potential contaminants identified in sediment samples referred to in the WHT EIS, particularly for dioxins that have been subject to the emotionally charged issue of contamination of fish flesh, banning of commercial fishing in Sydney Harbour and limitations to consumption of fish caught west of the Sydney Harbour Bridge. The WHT EIS has failed the communities in this regard.

To document the contamination characteristics in conformance with the requirements of the SEARS and of guidelines made or approved by the EPA, the issues set out in section 7.2 of this submission are required to be addressed.

In failing to document the contamination characteristics of the sediments, the WHT EIS is not transparent as required as the fundamental requirement of the SEARS Requirements.

The WHT EIS is required to be amended to address conformance with the requirements of the SEARS and of guidelines made or approved by the EPA.

7.2 Requirements to achieve contamination characterisation of sediments

The failure of the WHT EIS to address contamination characteristics of sediments is of critical importance to preparation of a reliable WHT EIS due to the toxicities of the contaminants identified, the large scale of the excavation works and the large volume of contaminated sediments, the large volume of and contaminated water required to be excavated and treated at the White Bay treatment works, the risk of pollution of marine waters and the proposed offshore disposal of uncontaminated sediments.

The concentrations of contaminants, their distribution within the sediments, their toxicity and volumes (contamination characteristics) are matters of fundamental importance to the success of the WHT project because these parameters affect all components of the program, including excavation method, environmental protection measures, transport of contaminated sediments, their treatment at White Bay, disposal of contaminated water, duration and cost of the immersed tunnel component and community concerns.

The failure of the WHT EIS to provide quantitative concentrations, in particular of dioxins, TBT and mercury, unfortunately leads to the conclusion that the WHT EIS has something to hide with respect to contamination of sediments and this omission devalues the integrity of the WHT EIS.

Given the presence of unquantified concentrations and distributions of dioxins, TBT and other toxic chemical substances in sediments in the WHT corridor and in White Bay and of TBT and heavy metals in sediments located in shallow waters of Berrys Bay, the WHT EIS has not met the SEARS relating to characterisation of contamination of sediments and has presented no justifiable conclusions of whether sediments are contaminated and require remediation.

To characterise the contaminated sediments in conformance with the requirements of the SEARS and of guidelines made or approved by the EPA, the issues set out in this submission are required to be addressed in an amendment to the WHT EIS.

7.3 Contamination within Balls Head Bay

With respect to contamination of sediments in Balls Head Bay the WHT EIS stated “The historical use of the coal loader wharf at Balls Head Road at Waverton may have caused localised contamination associated with the loading and unloading of materials (coal and potentially other materials) and general maritime activities”.

With respect to the likely presence of contamination within sediments of Balls Head Bay, in which the coal loader wharf is located, the WHT EIS did not address the impact of the likely presence of contamination sourced from the former Waverton gasworks, which is located adjacent to Balls Head Bay approximately 600 metres north of the coal loader wharf.

In my experience contamination of sediments by a cocktail of chemical contaminants within sediments commonly extends for considerable distances from former gasworks into adjacent bays and that the contaminants are characterised by tars and other chemicals of concern that are toxic to human health and to the marine environment. In addition, contamination from gasworks waste, particularly tars, is characterised by persistent odours.

An environmental investigation of the quality of sediments adjacent to the Waverton Coal Loader, commissioned by the former NSW Maritime Authority was reported in "Report for Balls Head Coal Loader Terminal" by GHD, dated March 2010. This report should be available to TfNSW and should have been referred to in the WHT EIS.

With respect to contamination of sediments in Balls Head Bay, the WHT EIS failed to address characterisation of contaminants, which was required by the SEARS. The WHT EIS is required to be amended to address this issue.

7.4 Contaminated sediments in Berrys Bay

With respect to contamination of sediments in shallow waters of western Berrys Bay, Appendix M of the WHT EIS stated "This area poses a moderate contamination risk to construction considering the potential presence of soil contamination and that soils are likely to be excavated and exposed during construction of the Berrys Bay construction support site (WHT7)."

Appendix M stated sediment sampling and chemical analyses were carried out from sediments collected from Berrys Bay (WHT7) as part of the DGPA (2017a)[1] investigation and contaminants identified on Table B.1 reported "Contaminant compounds exceeding the nominated" at sediment samples locations in Berrys Bay to be:

- TBT exceeded sediment guidelines
- PAHs exceeded sediment guidelines
- Heavy metals, particularly mercury, lead and zinc, exceeded sediment guidelines.

Sediments from Berrys Bay were not analysed for dioxins and the concentrations of other contaminants were not compared with guidelines for offshore dumping.

Comment

The WHT EIS did not address excavation of contaminated sediments in Berrys Bay but Section 7.4 of Appendix P of the WHT EIS addressed the requirement for excavation of uncontaminated sediments in Berrys Bay using a Trailer Suction Hopper Dredge (TSHD).

How uncontaminated sediments would be excavated in Berrys Bay given the presence of contaminated sediments in shallow waters was not documented in the WHT EIS.

The WHT EIS did not refer to the requirement to excavate contaminated sediments in Berrys Bay and characterisation of contaminants identified in the sediments in Berrys Bay were not quantified in the WHT EIS, which was required by the SEARS.

The environmental condition of soil and groundwater on the on-shore part of the Berrys Bay construction support site (WHT7) and of sediments in the offshore parts of the former Woodleys Boatshed, located in the south-western part of Berrys Bay, were reported to the

then NSW Maritime Authority by Parsons Brinkerhoff in 2008 and by KPMG SGA in 2015. These reports should now be in the possession of the Transport for NSW and should have been addressed in the WHT EIS.

In addition, in 2008 I prepared a report for the then NSW Maritime Authority, which identified high levels of contamination of sediments in the vicinity of Woodleys Boatshed, which is proposed in the WHT EIS to be used as a construction support site. This report should also be in the possession of Transport for NSW and should have been addressed in the WHT EIS.

The reports by Parsons Brinkerhoff and my report identified high concentrations of a cocktail of chemical contaminants, including very high concentrations of TBT, heavy metals and tars (PAHs) in sediments at shallow to moderate depths in the south-western part of Berrys Bay, ranging in depth from less than 0.7 m to 9.4 metres, according to the then NSW Maritime Authority's survey 'Bathymetry of Berrys Bay'.

The depth of water in western Berrys Bay is less than reported in Chapter 17 of the WHT EIS that stated "Vessel movements have the potential to generate localised plumes of excess suspended sediments associated with vessel wash in shallower waters, generally less than five to ten metres water depth."

The presence of significant contamination of sediments in the shallow waters of Berrys Bay gives rise to operation of work boats at the Berrys Bay construction support site (WHT7) generating unacceptable suspension of contaminated sediments into the water column and their likely dispersion into other parts of Berrys Bay and Sydney Harbour.

It is most likely that further investigation and remediation of contaminated sediments is required to be undertaken prior to use of Berrys Bay as a construction support site to prevent migration of contaminated sediments into the water column and their transport into Sydney Harbour.

The contamination characteristics, excavation, transport and treatment of contaminated sediments in western Berrys Bay should have been addressed in the WHT EIS in accordance with the requirements of the SEARS and are required to be addressed in an amendment to the WHT EIS.

7.5 Failure of the WHT EIS to address the SEARS requirement for remediation to follow current guidelines

The WHT EIS addressed only the contamination characteristics of soil in on-shore locations and did not address the requirement of the SEARS to follow current guidelines for contaminated sediments to be excavated. Although the WHT EIS identified the sediments to be excavated are contaminated, it did not address the requirement for excavation of these sediments as a remediation project, as defined in the CLMA, and thus it did not follow current guidelines made or approved by the EPA relating to remediation of contaminated materials.

The EPA's "Guidelines for Consultants Reporting on Contaminated Sites" relating to remediation of contamination require a Remediation Action Plan (RAP), which must contain:

- discussion of the extent of remediation required in consideration of the concentrations of contaminants, their toxicity and their distribution
- discussion of possible remedial options and how risk can be reduced
- rationale for selection of recommended remedial option
- proposed testing to validate the site after remediation
- contingency plan if the selected remedial strategy fails
- identification of regulatory compliance requirements such as licences and approvals

The WHT EIS did not address any of the above requirements of the EPA's guidelines and did not address the relevant SEARS requirement relating to remediation of contaminated

sediments.

The WHT EIS failed to address the requirement of excavation, treatment and disposal of contaminated sediments was required by the SEARS and the CLMA to be part of a remediation program, in accordance with guidelines made or approved by the EPA.

The WHT EIS has not provided a high degree of confidence to the communities of Birchgrove, White Bay (Rozelle) and Waverton that the excavation, transport and treatment of contaminated sediments can be completed without significant environmental and aesthetic impact over a long period of time.

The remediation of contaminated sediments in accordance with guidelines made or approved by the EPA should have been addressed in the WHT EIS and is required to be addressed in an amendment to the WHT EIS.

The failure of the WHT EIS to refer to completed RAP/s addressing remediation of sediments is in contrast to the EIS prepared to address the sediment remediation works at Homebush Bay, "Remediation of the Lednez Site, Rhodes and Homebush Bay", by Parsons Brinkerhoff dated December 2002 (Homebush Bay EIS) and at Kendall Bay, "Kendall Bay Sediment Remediation Project. Environmental Impact Statement" by Jemena dated September 2018.

The Homebush Bay EIS and the Kendall Bay EIS documented extensive and meaningful consultation with communities, the EPA and other regulatory authorities, the investigation programs undertaken in the bays to define the locations, concentrations, extent and volumes of contaminated sediments and the RAPs that had been prepared as the guidance document for the sediment remediation works. The RAPs for both projects addressed all feasible remediation methods and defined a preferred method. The RAPs had been provided to the EPA and to the site auditor for approval prior to preparation of each EIS.

The WHT EIS in its present form is unacceptable and is required to adopt a similar staged approach that was adopted for the Homebush Bay and Kendall Bay remediation works.

7.6 Failure of the WHT EIS to address the SEARS requirement for background and cumulative environmental conditions

7.6.1 Tidal flows

Chapter 17 and Appendix O (*Technical Working Paper: Surface Water quality and hydrology*) of the WHT EIS addressed dispersion of sediments in the water columns in tidal flows only adjacent to Balls Head.

Comment

The Australian nautical chart AS-200 indicates tidal currents in the narrow part of western Sydney Harbour between Yurulbin Point, Manns Point (Greenwich) and Balls Head of 1.5 knots (2.8 km/hour) and adjacent to Balls Head to be 2 knots (3.7 km/hour).

In consideration of the strong tidal flows adjacent to Yurulbin Point, modelling of sediment dispersion around this location was required to address concerns of the Birchgrove community that during excavation works, contaminated sediments may extend eastwards at ebb tides some distance into Snails Bay and westwards at flood tides so as to impact the quality of water at the Balmain Sailing Club, the Dawn Fraser pool and the beach at Elkington Park that is used by small children.

In addition, the WHT EIS did not address the impact of wind currents transporting suspended contaminated sediments around Yurulbin Point.

7.6.2 Winds

Chapter 17 and Appendix O of the WHT EIS addressed wind velocities and stated "The bathymetry near the proposed immersed tube tunnel crossing of Sydney Harbour is relatively deep, meaning that the potential effect of waves (either wind waves or boat wakes) on hydrodynamic or sediment plumes at the bed of the harbour is minimal."

The WHT EIS considered "…wind speeds to ranged range from 4.2 to 4.7 metres per second (50th percentile) and 6.7 to 8.3 metres per second (90th percentile throughout the year)."

The wind speeds set out in the WHT EIS equate to speeds of approximately 14 km/hour to 17 km/hour and 24 km/hour (50th percentile) to 30 km/hour (90th percentile).

Comment

Appendix O did not address wind velocities exceeding the 90th percentile but did not address winds in excess of this velocity.

With respect to wind velocity in Snails Bay and at Yurulbin Point, personal observations made from my house indicate very strong wind gusts from the north-east, south and west that exceed the 90th percentile velocity.

In this regard, the Bureau of Meteorology reported wind gusts at Sydney Observatory as shown in the table below, which indicates in the year to March 2020 wind gusts exceeded the 90th percentile maximum velocity of 30 km/hour referred to in the WHT EIS in every month of the year. Inspection of the Bureau of Meteorology records for each day of the last year show that wind gust in excess of 30 km/hour were recorded on 50 to 94 % of days in each month.

Month	% days per month wind gusts exceeded 30 km/hour	Maximum velocity of wind gust per month (km/hour)	Direction of wind gusts
March 2019	93	72	W
April 2019	50	57	S
May 2019	61	76	S
June 2019	87	85	SW
July 2019	70	72	W
August 2019	65	87	WNW
September 2019	80	92	W
October 2019	93	74	WNW
November 2019	82	104	WNW
December 2019	94	70	WSW
January 2020	94	81	S
February 2020	82	104	W

In consequence of the above wind observations, the WHT EIS has understated the impact of wind on activities relating to excavation and transport of contaminated sediments from the immersed tube tunnel and on the difficulty of maintain the effectiveness of shallow silt curtains to prevent wind currents dispersing suspended contaminated sediments into Sydney Harbour.

My personal observations indicate strong winds that commonly impact waters of western Sydney Harbour, appear to be funnelled to gain strength between Yurulbin Point, Balls Head and Manns Point to generate significant wave action, commonly accompanied by white caps of breaking waves. In these periods, white caps are not apparent in Snails Bay. It is likely that wind velocity at Yurulbin Point may exceed velocities recorded at Sydney Observatory.

In my experience, the combination of winds and waves that can be expected within the corridor of the immersed tube tunnel, between Yurulbin Point and the Waverton Coal Loader, would result in waves breaking over silt curtains and thereby facilitating escape of contaminated sediments to waters of Sydney Harbour.

The WHT EIS did not address the security of shallow silt curtains to retain suspended sediments during periods of high winds.

In addition, the WHT EIS did not address the likelihood of suspension of excavation works and barge movements from the location of the immersed tube tunnel to the White Bay contaminated sediment treatment works during periods of strong winds and an increased risk in delivering contaminated sediments for treatment at the White Bay works.

The WHT EIS did not address the impact of strong wind gusts and wind currents. This matter is required to be addressed in an amendment to the WHT EIS.

7.6.3 Odour

Section 12.5.4 of Chapter 12 of the WHT EIS stated "Odour assessment has been carried out for dredging activities, stockpiling and treatment works at White Bay. As part of the harbour construction activities for the project, a large amount of material would be dredged from the harbour bed, bringing potentially odorous material to the surface. Dredged material on the barges would be wet, which would reduce any odour emissions. Any odour impacts from the dredged material would be low, given it would remain wet and located at some distance from any sensitive receiver."

At the White Bay sediment treatment works, Section 12.5.4 stated the results of odour modelling, (Figure 12-5) show that "… the predicted 99th percentile odour concentrations at all of the nearest receivers are below one OU [odour unit], the theoretical level of detection. The highest concentration across the domain is 0.1 OU, which is well below the theoretical level of detection. Odour impacts would therefore be undetectable for all sensitive receivers near the site".

Comment

The WHT EIS did not address the types of odorous substance present within and liberated from excavated sediments and the extent of areas impacted by odours.

However, significant odours are expected to be released, both when contaminated sediments containing acid sulfate soils at the point of their excavation, during transport to and during stockpiling and treatment at the White Bay works. The acid sulfate soils contain hydrogen sulfide gas (rotten egg gas) which is detectable by the human nose at concentrations as low as 0.01 parts per million (ppm). Increased hydrogen sulfide odours are expected when excavated sediments are expose to air.

In my experience, sediments within Snails Bay and within reclaimed land that forms part of Birchgrove Oval are known to release hydrogen sulfide when excavated, even when remaining wet.

In my opinion, it will not be sufficient to suppress odours emanating from excavated contaminated sediments simply because the sediments remain wet. The WHT EIS referred to no tests of odour emissions from excavated sediments.

Odour suppression of contaminated sediments and soils is routinely achieved in remediation works programs by application of foams across the surface of the sediments, mist sprays at the boundaries of the works and covers on stockpiles, barges and trucks.

With respect to the estimates of odour emissions at the White Bay sediment treatment works, the WHT EIS was not specific of what odorous substances were modelled. The extent of odours by hydrogen sulfide gas released from stockpiled sediments and from sediments being dewatered and treated was not addressed adequately in the WHT EIS, particularly in consideration of a public park being located approximately 50 metres from the boundary of

the treatment works and residential properties being located approximately 100 metres from the boundary of the works.

The WHT EIS did not address odours by reference to any odour testing. Testing of odours generated from excavated sediments at receptor locations is routinely conducted on-site by commercial laboratories located in Sydney as a precursor to remediation programs. This matter is required to be addressed in an amendment to the WHT EIS.

7.6.4 Noise

With respect to noise generated at Yurulbin Point (WHT5), Waverton coal loader (WHT6) and at the excavation sites for the immersed tube tunnel, the WHT EIS did not provide quantification of the impact of cumulative noise from existing commercial operations in western Sydney Harbour and the additional noise generated during piling operations, excavation of contaminated and uncontaminated sediments and sandstone bedrock for the immersed tube tunnel corridor and for cofferdams (WHT5 and WHT6).

7.6.5 Access shaft

Section 6.4.2 of the WHT EIS stated "A vertical access shaft would be required at the Yurulbin Point and would be constructed within a purpose-built acoustic shed construction support site (WHT4), and would be constructed within a purpose-built acoustic shed. Excavation of the shaft would be carried out by excavators and rock hammers, with spoil removed using excavators and cranes. The top of the shaft would be supported with piles driven down to rock level."

7.6.6 Cofferdam

Section 6.4.2 stated "Piling – the cofferdam structure would be made up of a series of interlocking, tubular piles. Each pile would be driven into the underlying sandstone within the areas that were subject to ground treatment. Piling would take place from a flat top barge (or similar barge) using a crane fitted with a hydraulic vibrating hammer, offshore pile driving hammer and/or a similar piece of construction equipment."

Comment

The WHT EIS did not provide a quantitative estimate of noise generated or the duration of noise at the access shaft at Yurulbin Point and cofferdams at Yurulbin Point and at the Waverton Coal Loader. Driving of piles and excavation of sandstone bedrock are known practices that generate very loud, persistent noise.

Existing significant noise experienced in proximity to proposed construction of the access shaft at Yurulbin Point and cofferdams at Yurulbin Point and the Waverton Coal Loader and excavations to allow installation of the immersed tube tunnel that are currently expected and are expected to continue throughout the duration of construction works described in the WHT EIS result from:

- Transit of commercial vessels (ferries, workboats, naval vessels, party boats) along western Sydney Harbour between at Yurulbin Point and the Waverton Coal Loader
- Transit, mostly in daylight hours, by low-flying, fixed- and rotary-wing aircraft along the western Sydney Harbour navigation corridor that passes close to Yurulbin Point
- Ship-to-shore pumps operating continuously when tankers discharge fuel at the Viva terminal (formerly Shell terminal) at Gore Cove, Greenwich (each vessel commonly operating 24/7 for 3 to 7 days duration for more than 150 days per year). Tankers discharging at the Viva terminal are located approximately 400 metres from Yurulbin Point and adjacent residences, across open water.

The WHT EIS failed to address the impact of cumulative noise from the above sources during excavation works at the excavation works at the immersed tube tunnel and at the White Bay sediment treatment works.

During berthing of tankers and subsequent operation of ships' pumps at the Viva terminal and also during transit of low-flying aircraft, the noise level commonly exceeds 80 dB as measured on my uncalibrated noise pressure meter at my home.

The cumulative impact of existing noise and noise generated by construction works described in the WHT EIS is of concern and the duration and likely noise impact was not quantitatively estimated nor were mitigation measures addressed in the WHT EIS, except for the provision of the acoustic sheds, enclosed spoil conveyors and barge sheds at construction support sites at Yurulbin Point and Berrys Bay.

With respect to construction of the cofferdams, Chapter 6 of the WHT EIS described the dimensions of "…the cofferdams would be about 50 metres wide and 25 metres long. The location and indicative layout of the Sydney Harbour cofferdams are shown on Figure 6-30". However, Figure 6-30 shows the cofferdams at Yurulbin Point and Waverton Coal Loader to have dimensions of approximately 120 metres x 100 metres and the working platform within the cofferdam to have dimensions of approximately 50 metres x 20 metres. The discrepancy in the dimensions of the cofferdams is significant because Figure 6-30 would require 420 metres of piling and the smaller coffer dam referred to in the text of the WHT EIS would require only 140 metres of piling, a difference of 300 %. Construction of the larger cofferdams would result in loud noise impact over a much longer installation time.

The WHT EIS did not address cumulative noise generated by construction activities and background noise, as required by the SEARS. This matter is required to be addressed in an amendment to the WHT EIS.

8. Time for establishment, construction and operation of facilities where contaminated sediments will be encountered

Chapter 6 *Construction work* described the activities to be carried out at a number of facilities during construction and for some activities provided tables showing times allocated for excavation and operations of contaminated sediments treatment works.

The time allocated for dredging of trench for the immersed tube tunnel was stated in Table 6-18 of the WHT EIS to be 1 year, commencing in Q4 of 2023 and ending at the end of Q3 2024.

The time allocated for "spoil handling and treatment" at the White Bay contaminated sediment treatment works (also referred to as the "White Bay construction support site") was stated in Table 6-14 to be 3 years, commencing in Q4 of 2021 and the time his facility would be established would be from Q2 2021 to completion of site clean-up and demobilisation at the end of Q4 2025, giving an aggregate time of 4.5 years.

No allocation of time was allocated for excavation or treatment of contaminated sediments that are required to be excavated from Berrys Bay.

Comment

In my experience, the time allocated in the WHT EIS for excavation of contaminated sediments and their treatment to allow disposal to landfill is underestimated in consideration of the following processes that are required to be finalised prior to establishment to conduct the relevant works:

- engagement of environment consultants to carry out additional investigations to identify locations, depths and volumes of contaminated sediments at the corridor of the immersed tube tunnel, construction support sites and at Berrys Bay
- preparation of Remediation Action Plans (RAPs) for each location where contaminated sediments have been identified, including requirements for environmental and human health monitoring
- engagement of one or more site auditors to review and approve the investigation programs, the RAPs and ultimately certification of the suitability of the various site for their proposed purposes
- approvals by relevant consent authorities for the remediation works and contaminated sediment treatment works (Environment Protection License required under the POEOA), disposal of treated water and offshore disposal of uncontaminated sediments
- approval from one or more licenced landfills of criteria for acceptance of treated sediments
- engagement of one or more environmental consultants to carry out independent monitoring of impact to marine waters and to air (odour) and noise
- laboratory trials using representative samples of contaminated sediments to identify optimal treatment of sediments and contaminated water
- identification and contract/s with one or more landfills licenced to receive the relevant class/es of waste
- preparation of tender documents for the excavation works
- preparation of tender documents for the treatment of contaminated sediments
- assessment of tender proposals
- finalising contracts with one or more experienced contractors to carry out the excavation and treatment works.

9. White Bay contaminated sediment treatment works

Section 12.5.4 stated “At the White Bay construction support site (WHT3), an area covering about 1000 square metres would be used to stockpile and treat dredged material that is unsuitable for offshore disposal. Following treatment, material would be transferred to sealed trucks for delivery to landfill. Treatment would involve the addition of lime or a polymer to the material to make it ”spadeable”.

Comment

Table 24-8 of chapter 24 of the WHT EIS stated 142,500 cubic metres of contaminated sediments were to be treated at White Bay but did not address the additional volume of contaminated sediments from the immersed tube tunnel corridor and Berrys Bay that will be required to be excavated and transported for treatment at White Bay.

The area of 1000 square metres (approximately 32 metres x 32 metres) is grossly insufficient for the treatment of the volume of contaminated sediments documented in the WHT EIS, (not including contaminated sediments from Berrys Bay), for stockpiling, dewatering, treatment of contaminated sediments, truck loading and movements and for the contaminated water treatment plant.

An important aspect of treating contaminated sediments involves removal of contaminated water that is contained in excavated contaminated sediments. The treatment and lawful disposal of contaminated water extracted from excavated sediments is an important component of all sediment remediation projects, and is commonly a limiting factor in the capacity and time required for treatment of contaminated sediments.

The WHT EIS did not address how the contaminated water would be treated and did not address the feasibility of treating contaminated water to meet the requirements of Sydney

Water and the EPA. The requirements of these authorities could have been obtained and included in the WHT EIS.

The WHT EIS did not document how the contaminated sediments would be treated, although it stated contaminated sediments had been treated successfully from other locations in Sydney Harbour, but no details of the locations of sediments or of treatment methods were documented. It is not sufficient for the WHT EIS to claim that same method for treating sediments from elsewhere could be applied to the contaminated sediments addressed in the WHT EIS because the contaminated sediments proposed to be excavated may have different contaminants, different concentrations of contaminants and have different physical characteristics. In these respects, it is noted that the contaminated sediments referred to in the WHT EIS were noted to have high concentrations of fine-grained sediment (mud) that may have different treatability requirements compared to sediments from other parts of Sydney Harbour. Laboratory treatability testing of sediment samples from the locations where sediments are required to be excavated as Proving Trial of the WHT project is the only process that provides certainty. The WHT EIS did not provide data identifying the sediments proposed to be excavated for the WHT project had the same properties as sediments excavated elsewhere.

The WHT EIS stated treatment at the White Bay treatment works would be addition of cement or a polymer to make the excavated sediments “spadeable” (i.e. sufficiently solid to be able to be moved by a spade at normal outdoor temperatures).

However, the WHT EIS did not document requirements of the EPA for landfill disposal to comply with leachability limits to ensure contaminants do not leak from disposed materials into the environment. For this purpose, guidelines or approved by the EPA require representative samples of materials to be disposed to landfill to be tested in a commercial laboratory by the Toxicity Characteristics Leaching Procedure (TCLP) and to meet concentrations limits to prescribed by the EPA for disposal.

In addition, the WHT EIS did not address the requirement for suppression of odours at the White Bay treatment works emanating from untreated or treated contaminated sediments or from treated sediments being transported to landfill by truck, other than truck loads would be covered.

The volume of 142,500 cubic metres of “dredged sediments not suitable for offshore disposal” almost certainly underestimates the volume of sediments to be treated at the White Bay works, which may be in the order of double this volume.

The staggering volume of contaminated sediments to be treated at the White Bay works influences the operation of the treatment works and increases processes due to:

- the inadequate space allocated for the treatment works for:
    - receiving and stockpiling excavated sediments
    - operation of the sediment dewatering facility, including storage of untreated and treated water
    - offices and amenities
    - odour suppression facilities
    - stockpiling and loading to trucks of treated sediments
    - management of truck movements in nearby streets and within the treatment works
    - management of noise
- the duration of the treatment program
- cost for establishment and operation of the treatment works
- management for truck waiting in nearby locations and movements to and from the landfill
- the large number of truck movements to transport treated sediments to landfill, stated in the WHT EIS to be 700 movements per day

- sustainability considerations related to disposal of such a large volume of treated contaminated materials to landfill at such a high cost.

To manage contaminated sediments (also referred to as 'spoil' in the WHT EIS) and their contained contaminated water, in conformance with the requirements of the SEARS, the WHT EIS failed to address the following measures and their feasibility of being implemented at the White Bay sediment treatment works:

- provision of an adequate, secure space for dewatering and treatment of the large volumes of contaminated sediments
- methods for transferring contaminated sediments and water from barges to the treatment area
- method/s for treatment of contaminated sediments
- method/s for treatment of large volumes of contaminated water and characteristics of one or more water treatment plants to allow discharge of water to Sydney Harbour, with approval of the EPA, or to sewer, with approval of Sydney Water
- an assessment of the feasibility of successfully treating the contaminated sediments and contaminated water so they can be lawfully disposed to landfill.

The WHT EIS referred only to excavation of contaminated sediments in their natural condition and failed to address stabilisation of sediments within the immersed tube tunnel corridor and White Bay prior to their excavation, as was proposed for contaminated sediments located within proposed cofferdam sites WHT5 and WHT6.

Stabilising the contaminated sediments prior to their excavation has great advantages over excavation of sediments in their natural condition because fewer fines would be released during dredging.

The WHT EIS did not address whether treated sediments excavated from the immersed tube tunnel containing dioxins would be acceptable to be disposed to landfill.

Although it is not possible from the sparse information provided in the WHT EIS to provide a even a ballpark estimate of the combined costs for excavation, transport to White Bay treatment works, treatment of contaminated sediments and contained contaminated water, transport to landfill, landfill disposal charges and the EPA waste levy may exceed $150 million.

With respect to the handling and management of contaminated sediments at the White Bay treatment works, sections 4, 4.4 and 9 of the WHT EIS did not document "…measures to manage this spoil to avoid adverse impact to land and water quality".

Overall, the WHT EIS provided no certainty that the contaminated sediments could be stabilised for disposal to landfill.

The WHT EIS is required to be amended to address the issues referred to above.

10. Requirement for the WHT EIS to be amended

Appendix M of the WHT EIS referred briefly to further investigation and remediation works to be undertaken, but this requirement appears to relate only to on-shore parts of the WHT project and not to the contaminated sediments.

In my opinion, with respect to excavation, transport, treatment of contaminated sediments and their disposal, an amendment to the WHT EIS is required to be prepared for community consultation following compilation of additional information to better inform regulatory authorities and the communities of Birchgrove, White Bay (Rozelle) and Waverton (Berrys Bay).

The amendment to the WHT EIS is required to provide at least details of:

- relevant information from results of assessment programs referred to in the references section of Appendix M of the WHT EIS
- contamination characteristics:
    - quantitative estimates of the nature, extent and volumes of contaminated sediments, particularly relating to contamination by dioxins, TBT and toxic heavy metals, particularly mercury, within the corridor of the immersed tube tunnel and within Berrys Bay
    - quantitative estimates of the nature, extent and volumes of sediments proposed for offshore disposal
- duration of excavation of contaminated sediments within the cofferdams, the corridor of the immersed tube tunnel, White Bay and Berrys Bay
- laboratory tests of treated samples to identify whether they pass the TCLP requirements of guidelines made or approved by the EPA
- confirmation of the adequacy of space for treatment of contaminated sediments at the White Bay facility
- duration of sediment treatment works at White Bay
- assessment of alternative methods for protection of the marine environment during excavation of contaminated sediments, including using full-depth bottom-sealed filter barriers
- measures to be implemented to manage spoil to avi=oit adverse impact to the env
- a desk-top study to assess whether bioaccumulative contaminants identified in sediments, such as dioxins, OCPs, mercury and PAHs, would allow offshore disposal of sediments from depths exceeding 1.5 m, considered in the WHT EIS to be uncontaminated
- the nature and extent of:
    - cumulative noise from existing operations and sediment excavation works
    - odour from sediments and relevant odour suppression methods during excavation of the sediments and their transport to and treatment at the White Bay treatment works
- improvements in methods for containing sediment suspended within the water column by excavation works to minimise to the extent practicable the migration of contaminated sediments from work areas to Snails Bay and to the vicinity of Balmain Sailing Club, Dawn Fraser Pool and the beach at Elkington Park
- impacts expected from strong wind gusts to disrupt the efficient operation of shallow silt curtains and assessment of the requirement for full-depth bottom-sealed filter barriers
- the method for ensuring that sediments proposed for offshore disposal will not be impacted by contaminated sediments
- a desk-top study and bioaccumulation tests, as required, to assess whether bioaccumulative contaminants identified in sediments, such as dioxins, OCPs, mercury and PAHs, would allow offshore disposal of sediments from depths exceeding 1.5 m, considered in the WHT EIS to be uncontaminated
- assurance from regulatory authorities that sediments proposed for offshore disposal meet criteria for this disposal option
- consultation with the EPA to ascertain whether any of the sites where contaminated sediments had been identified would be regulated under the CLMA.
- consultation with regulatory authorities to obtain goals for discharge of treated water from the White Bay sediment treatment works and acceptable concentrations for contaminants in sediments proposed for offshore dumping, particularly for bioaccumulative chemical substances referred to in the WHT EIS
- input from one or more remediation contractors experienced in excavation and treatment of contaminated sediments in the processes and infrastructure required to:
    - optimise treatment of representative samples of sediments proposed to be excavated to demonstrate that treated contaminated sediments can be legally disposed to landfill

    - conceptual design of the treatment works
    - demonstrate uncontaminated sediments can be approved for offshore dumping
    - demonstrate water extracted from excavated sediments can be approved for disposal to Sydney Harbour or to sewer
    - review by a site auditor
- preparation of one or more RAP/s addressing each location where contaminated sediments are required to be excavated and treated
- review of the RAP/s and approval by a site auditor.

It is only after completion of the above processes that an amendment to the WHT EIS can be completed reliably.

11. Concluding statement

With respect to contaminated sediments, it is unsatisfactory that the WHT EIS for a State Significant Infrastructure project did not reliably address the requirements of the SEARS and the requirements of guidelines made or approved by the EPA for the remediation of contaminated sediments.

The addendum to the current WHT EIS is required to address at least the issues addressed in this submission, the WHT EIS for the WHT project does not address:

- the legitimate concerns of the Birchgrove, White Bay (Rozelle) and Berrys Bay communities
- requirements of amended SEARS addressing remediation of contaminated sediments, including their excavation, transport and treatment
- technical requirements for addressing contaminated sediments according to current guidelines made or approved by the EPA
- the requirement to consider all contaminated sediments required to be excavated as part of the WHT project.

In my opinion, with respect to contamination characterisation of the sediments that are required or be removed, without being able to assess the reliability of the DGPA (2017a) report on which the WHT EIS relies, the WHT EIS cannot document the processes required to excavate the contaminated sediments.

The WHT EIS should have not been issued until sufficient investigations had been completed to allow RAPs to be documented for each location of the WHT project where contaminated sediments were required to be excavated, and for which a site auditor accredited by the EPA has issued as Site Audit Statement certifying each location where excavation of contaminated sediments is required can be made suitable for the proposed use if the RAPs are implemented.

It is only when the site auditor has issued the Site Audit Statement referred to in the above paragraph that there is surety, with respect to contaminated sediments, that the WHT project can be completed in accordance with guidelines made or approved by the EPA and a reliable WHT EIS can be issued as part of the public consultation process.

The WHT EIS should have been prepared following the processes documented in the Homebush Bay and Kendall Bay sediment remediation projects, which are of similar complexity to the contaminated sediment remediation project documented in the WHT EIS.

With respect to contaminated sediments, in its present state the WHT EIS does not address processes that will be undertaken and refers in a large part to process that will be undertaken following assessment of alternative processes resulting from additional environmental investigation

The environmental impact of the contaminated sediments excavation, transport and treatment as part of the WHT project can be assessed reliably only when the processes to be employed have been determined and explained in detail in an EIS. The WHT EIS does not and cannot, based on current knowledge, document the processes to be employed in addressing the contaminated sediments.