

MEMORANDUM

REQUEST FOR PLANNING PROPOSAL 251, 260R, 278 AND 280-282 CAPTAIN COOK DRIVE, KURNELL

18 July 2024

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Entity	Civil - Brownfields
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RECIPIENTS

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This memorandum has been prepared by Egis on behalf of Besmaw Pty Ltd, the proponent of the Kurnell Planning Proposal, to address comments from various agencies and departments regarding the Stormwater Management Plan V05 and the Hydrology and Hydraulic Analysis submitted by Egis Group on 6 March 2024.

This response includes reviews and comments on the Request for Further Information (RFIs) raised by the relevant departments. Additionally, it presents the outcomes of supplementary flood mapping and investigations, providing detailed insights into the impacts of flooding, climate change, and sea level rise on the development and the wider modelled area.

The department comments on flooding and stormwater management, which have been reviewed and addressed in this memorandum, include:

- Department of Climate Change, Energy, the Environment and Water (DCCEEW), Ref DOC24/145531, dated 7 April 2024.
- DPI Fisheries, a division of NSW Department of Primary Industries, Ref C23/562, dated 27 March 2024.
- NSW State Emergency Service (NSW SES), Ref ID 2305, dated 13 March 2024.

This letter has been structured as follows:

- **Section 1:** A review of the agreed-upon general flood modelling strategy, including an overview of the modelled scenarios.
- **Section 2:** Summary of outcomes from the additional flood modelling to determine the time and depth of inundation along Captain Cook Drive in response to the RFI from DCCEEW.
- **Section 3:** Summary of the additional modelling undertaken to consider the effects of climate change and sea level rise for the wider modelled area.
- **Section 4:** Specific response to each individual agency RFIs.

1 GENERAL FLOOD MODELLING STRATEGY

In 2019, it was agreed with the Department of Planning, Housing and Infrastructure (**DPHI**), that the rehabilitated site at the completion of sand extraction and its replacement with virgin extracted natural material (VENM) should form the base case for the majority of the site on Lot 2 South for impact assessment. Refer to **Appendix A** for a copy of the Directions on Study Methodologies - Assumptions for modelling base-case (Modelling Direction).

As confirmed by the DPHI Modelling Direction, the stormwater modelling should account for the following distinct scenarios for the hydraulic models:

1. Base Case ('The Rehabilitated Site');
2. The developed case (The Rehabilitated Site + Modified levels for Lot 2 North and Lot 8 + Development).

This approach has been used to form the foundation of the Hydrology and Hydraulic Analysis prepared in support of the planning proposal.

The three scenarios that had been nominated previously in the Hydrology and Hydraulic reporting are outlined below.

- Scenario 1 – Current Case ('Pre-Rehabilitated Site')
- Scenario 2 – Base Case ('The Rehabilitated Site')
- Scenario 3 – Developed Case

The current sand mining operation complies with the permit for the sand extraction, which stipulates that rehabilitation is to be carried out by backfilling with VENM. VENM, by definition is free from contamination. However, there are no requirements for VENM to have a specific permeability. To achieve permeability that replicates the site conditions prior to removal of sand would require backfilling with sand. This is plainly unrealistic.

Due to the ongoing sand mining operation and subsequent replacement with VENM, the current landform and soil composition has changed substantially from the pre-sand extraction landform and soil composition, and as such the hydrology and hydraulic state of this pre-extraction landform cannot be re-established.

As a result, there is little to no value in modelling the existing landform (current case) due to the continual changes in the landform under current extraction operations and the ongoing and progressive rehabilitation. This has been agreed by the DPHI as outlined in the Modelling Direction.

In order to align the different scenarios in the revised Hydrology and Hydraulic report (V07, dated 10/07/2024) with the overarching reporting, only the base case and developed case modelling have been applied. For clarity an overview of these applicable modelled scenarios is provided below:

1.1 Base Case (Rehabilitated Site):

The existing site contains a large depression from the sand mining operations that are still being undertaken on the site in accordance with existing approvals and conditions. Rehabilitation of the site is currently progressing to fill the extracted areas, including a large lake, with imported VENM to create the base landform for the future development.

An overview of the rehabilitated base case landform is outlined below:

- Lot 2 North as it exists today.
- Lot 8 and Lot 9 as they exists today.
- Lot 2 South following the completion of sand extraction and replacement of VENM, is graded so that surface runoff is directed and discharged northwards into Botany Bay or directed into the sand environment along the southern, eastern and western boundaries of the site, infiltrating to recharge the freshwater aquifer, with the terrain consistent with the 'developed' scenario.

The indicative rehabilitated landform on Lot 2 south is outlined below.



1.2 Developed Scenario:

The 'developed' scenario represents the final landform post-rehabilitation of 'Lot 2 South', 'Lot 2 North' and Lot 8, incorporating site levels for future building footprints.

Egis prepared an initial bulk earthworks model in support of the planning proposal, based on the layout and Masterplan prepared by GroupGSA. Egis created a 3D terrain using 12D software, which was then adopted as the landform for flood modelling in TUFLOW. This proposed developed scenario builds upon the base case and seeks to change the landform on Lot 2 North and Lot 8, while maintaining the direction of flows established in the base case.

An overview of the developed landform is outlined below:

- Lot 2 North is proposed to be raised to address sea level rise and coastal inundation and provide a construction platform and management of stormwater flows for future urban development.
- Lot 8 is proposed to retain sections of its hilly landform to the north, as an area to be recognised as a cultural site, whereas sections to the lot close to the Southern will be modified as an overland flow path to enable runoff to be directed and discharged northwards.
- Lot 9 as it exists today
- Lot 2 South following the completion of sand extraction and replacement of VENM, is graded so that surface runoff is directed and discharged northwards into Botany Bay or directed into the sand environment along the southern, eastern, and western boundaries of the site, infiltrating to recharge the freshwater aquifer; and
- Elements of native vegetation such as the frontal dune which has been the subject of an ongoing program of planting native species propagated on site.

An extract from Appendix A of Stormwater Management Report V06 outlining the proposed developed case landform for the entire site is outlined below.



2 TIMES OF INUNDATION (CAPTAIN COOK DRIVE)

The hydraulic modelling has been undertaken using the TUFLOW software package using the 'rain-on-grid' method.

As demonstrated in the Stormwater Management Report and Hydrology and Hydraulic analysis prepared in support of the planning proposal the developed case scenario for the site is not subject to significant inundation over the built-up areas during PMF events.

Evacuation of a site only needs to occur if a habitable portion of that site was to become isolated and fully inundated by floodwaters during a flooding event. Given the habitable areas of the site will not be inundated during the PMF event, evacuation is not required for flood related purposes and as such, it is not a relevant consideration.

Instead, the primary concern is confirming whether the site becomes isolated and specifically whether emergency vehicles can access the site effectively during a flooding event. However, it is important to note that the inundation of Captain Cook Drive (CCD) is only a consideration until such a time that CCD is upgraded because the levels of the road can be raised above the level of inundation. It is anticipated that the opening of Stages 2 and 3A (Town Centre and Boat Harbour South) in 2038 will trigger the need to upgrade CCD. As such, the project serves as a catalyst for the upgrades to CCD and will solve a wider existing issue faced by current residents within the surrounding context.

During larger flood events three locations along CCD are subject to inundation, as identified in the following sub-sections. The flood impacts have been further investigated to understand the duration and depth these areas will be inundated during the 0.2% AEP flood event (500 years ARI) and the PMF. Maximum depths of inundation for these three locations along CCD for existing road levels and conditions have been provided in Table 1 below.

TABLE 1: MAXIMUM DEPTHS OF INUNDATION

LOCATION	REHABILITATED CASE (MAX DEPTH) m		DEVELOPED CASE (MAX DEPTH) m	
	0.2% AEP	PMF	0.2% AEP	PMF
1	0.212	0.317	0.227	0.317
2	0.347	0.613	0.364	0.592
3	0.439	0.617	0.443	0.643

The effect of Climate Change and Sea Level Rise have also been modelled and are summarised in Table 2 below.

TABLE 2: MAXIMUM DEPTHS OF INUNDATION (CLIMATE CHANGE AND SLR)

LOCATION	REHABILITATED CASE (MAX DEPTH) m		DEVELOPED CASE (MAX DEPTH) m	
	0.2% AEP	PMF	0.2% AEP	PMF
1	0.252	0.34	0.247	0.34
2	0.395	0.615	0.372	0.592
3	0.501	0.631	0.49	0.656

The full range of results have been provided in the attached flood maps in Appendix B and are expanded upon in the following sub-sections.

2.1 Location 1:

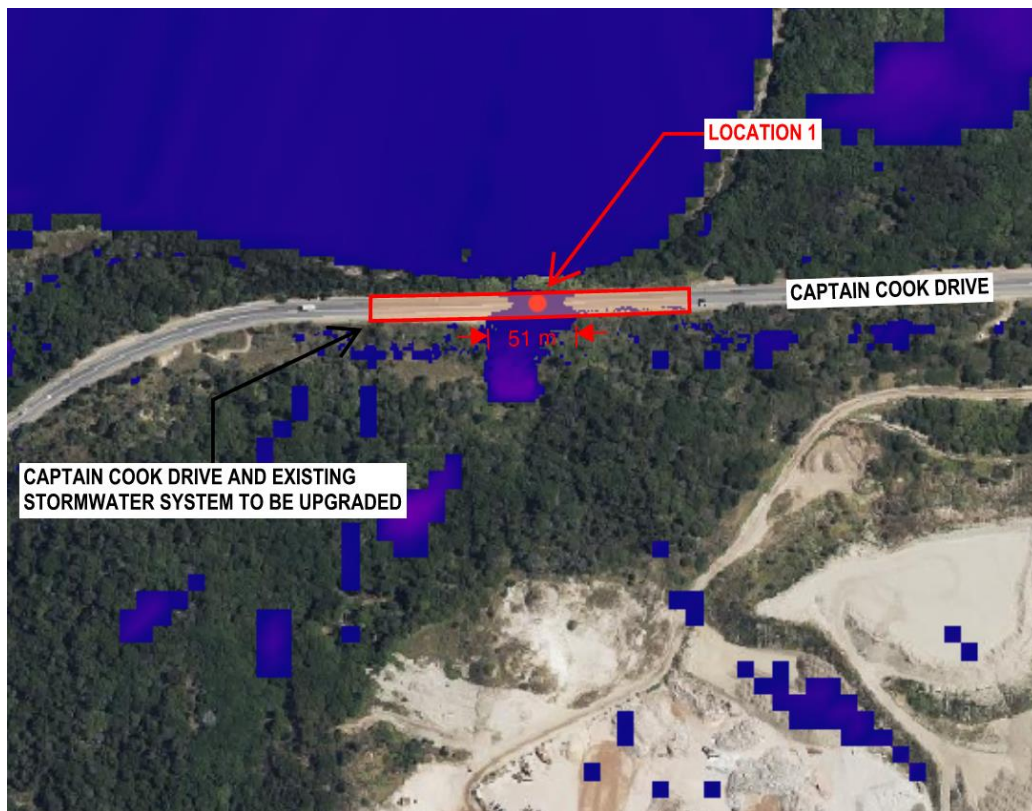


FIGURE 1: CAPTAIN COOK DRIVE UPGRADE (LOCATION 1)

Location 1 is shown in Figure 1 above and is located Northwest of the proposed development site. It would form a part of the access route during flood events. As part of the upgrade works, Captain Cook Drive and the existing stormwater system would need to be upgraded to minimise the effects of flood and ensure safe access during larger storm events.

Figures 2 and 3 provide graphical representations for the depth vs time investigation at Location 1 during the 500 year and PMF events. The criterion for inundation is depths equal to or greater than 150mm.

The time of inundation for the rehabilitated scenario is approximately 30 minutes for the critical 0.2% AEP flood event and approximately 5 hours for the PMF event. The time of inundation for the developed scenario is almost 1.5 hrs for the 0.2% AEP flood event and mimics that of the rehabilitated case for the PMF event.

Additionally, the impacts of Sea Level Rise and Climate Change have been considered as part of the inundation analysis in Figures 4 and 5. The results of the 0.2% AEP event for both rehabilitated and developed scenarios show that the time of inundation increased to almost 2 hours. However, the impacts of Sea Level Rise and Climate Change are very minor for the PMF event.

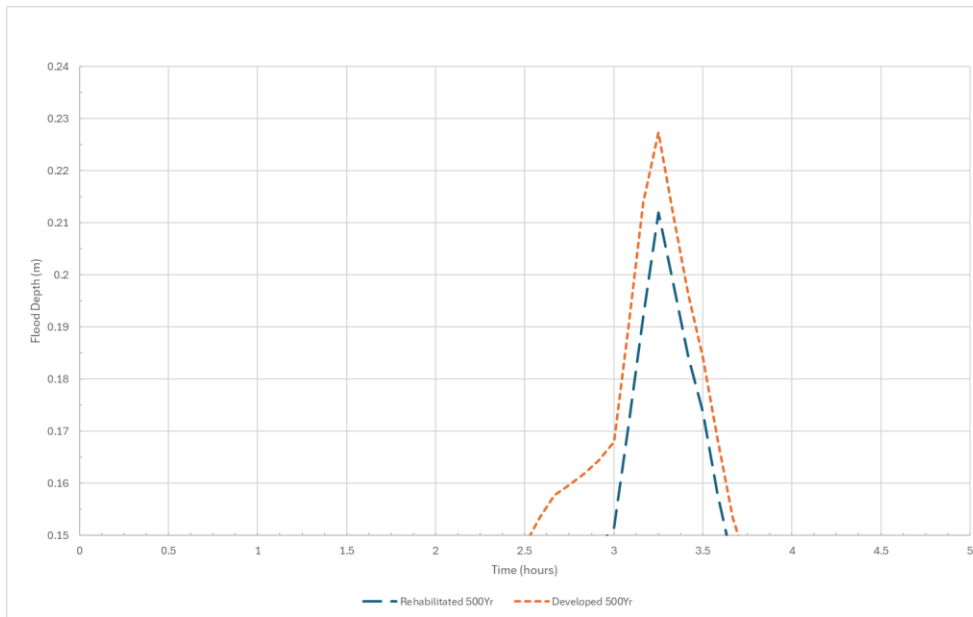


FIGURE 2: TIME OF INUNDATION – LOCATION 1 (0.2% AEP)

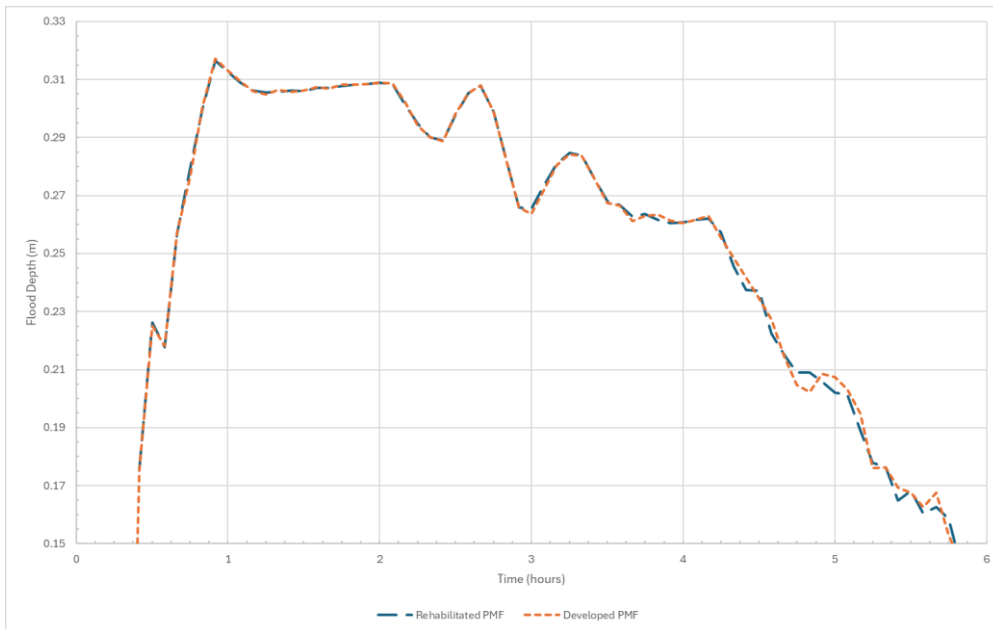


FIGURE 3: TIME OF INUNDATION – LOCATION 1 (PMF)

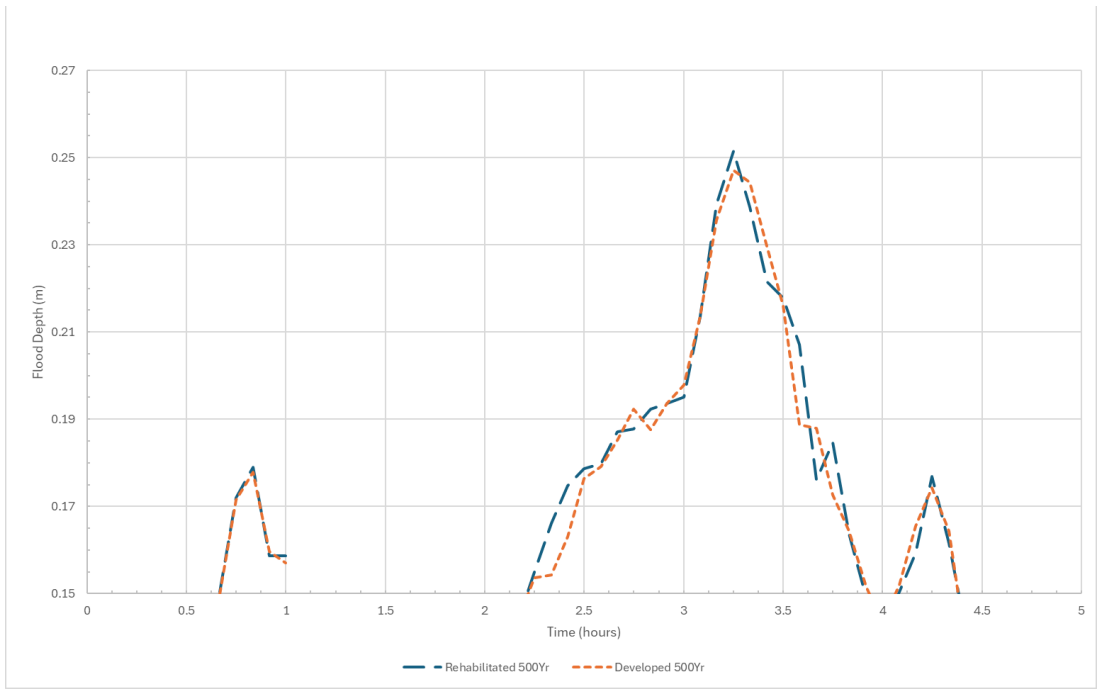


FIGURE 4: TIME OF INUNDATION – LOCATION 1 (0.2% AEP) WITH CLIMATE CHANGE AND SLR

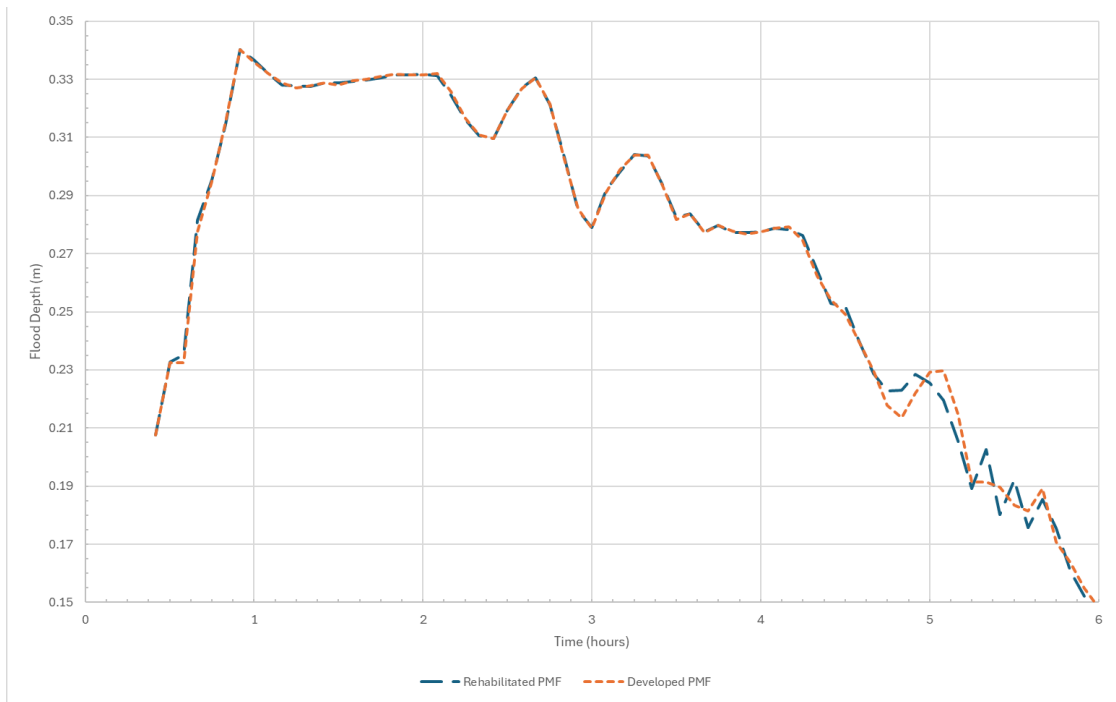


FIGURE 5: TIME OF INUNDATION – LOCATION 1 (PMF) WITH CLIMATE CHANGE AND SLR

2.2 Locations 2 and 3:

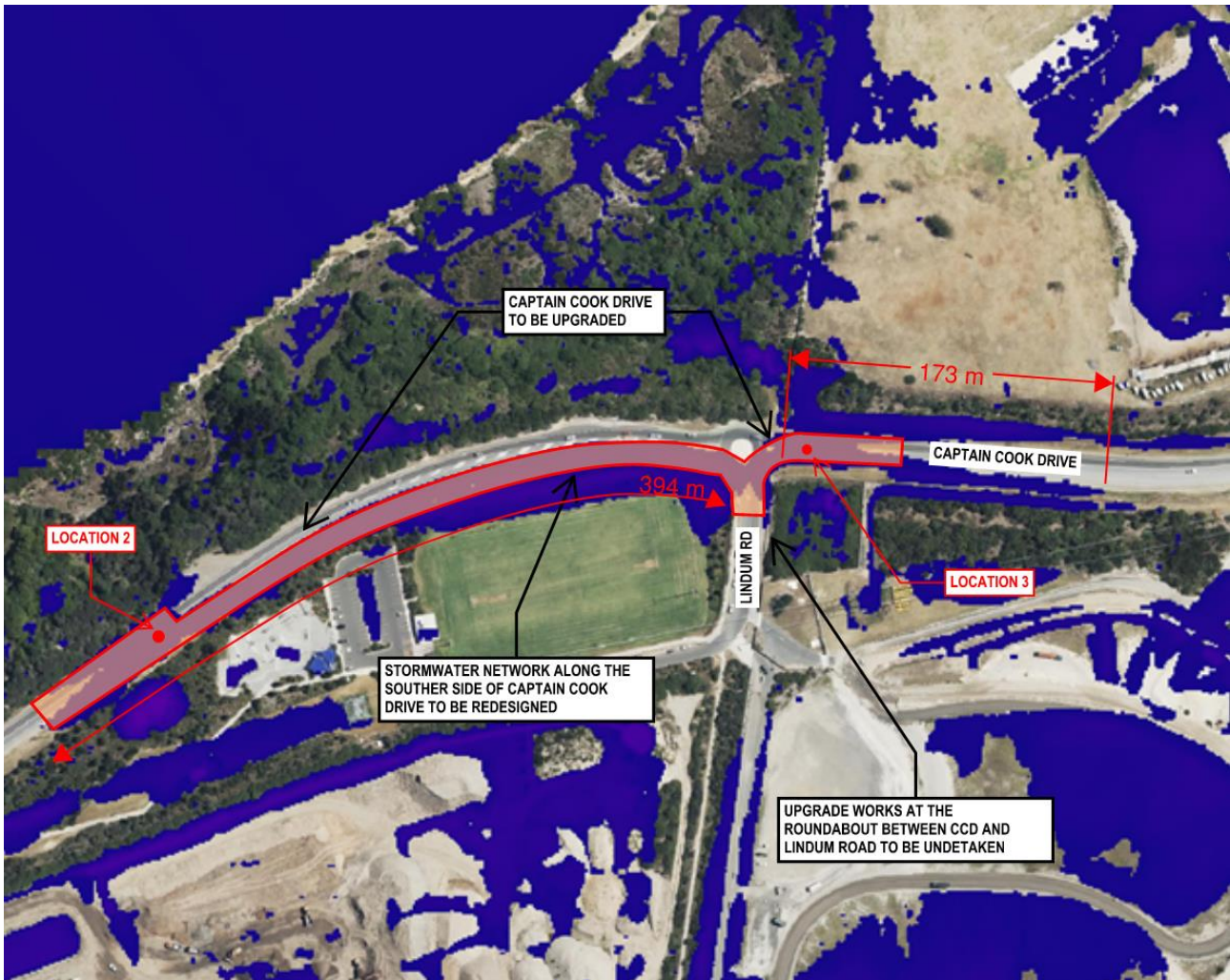


FIGURE 6: CAPTAIN COOK DRIVE UPGRADE (LOCATION 2 AND 3)

Figure 6 shows the section of Captain Cook Drive directly Northwest of the proposed site. This area includes the northern portion of Lindum Road and the roundabout connecting it to Captain Cook Drive. Location 2 consists of approximately 394 metres of Captain Cook Drive west of the roundabout. Location 3 consists of approximately 173 metres of Captain Cook Drive to the east of the roundabout.

For the 0.2% AEP event, the southern side of Captain Cook Drive is inundated for a longer stretch, whereas two distinct locations have been identified where the flooding extends to the northern side of the road.

The upgrade works would include modification of the existing stormwater system along the southern side, including the roundabout, as well as upgrade to Captain Cook Drive itself.

Figures 7-10 provides graphical representations for the depth vs time investigation of Location 2 and Figures 11-14 provide the graphs for Location 3, during the 500 year and PMF events.

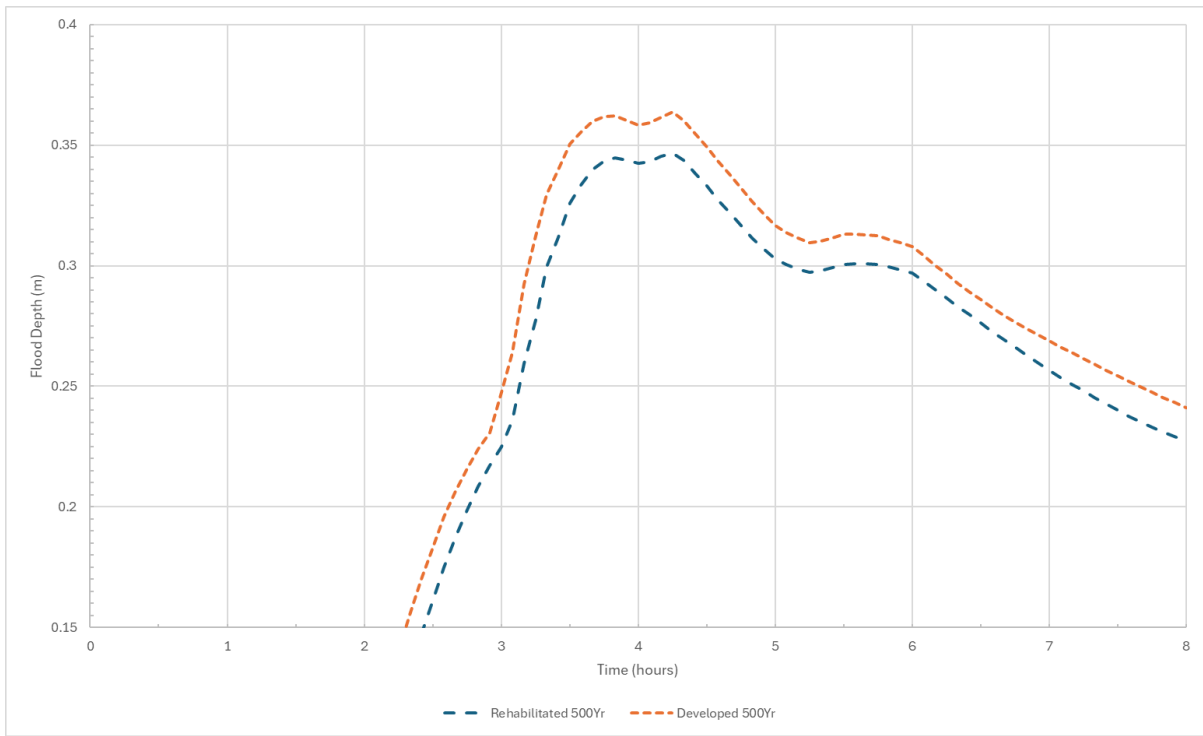


FIGURE 7: TIME OF INUNDATION - LOCATION 2 (0.2% AEP)

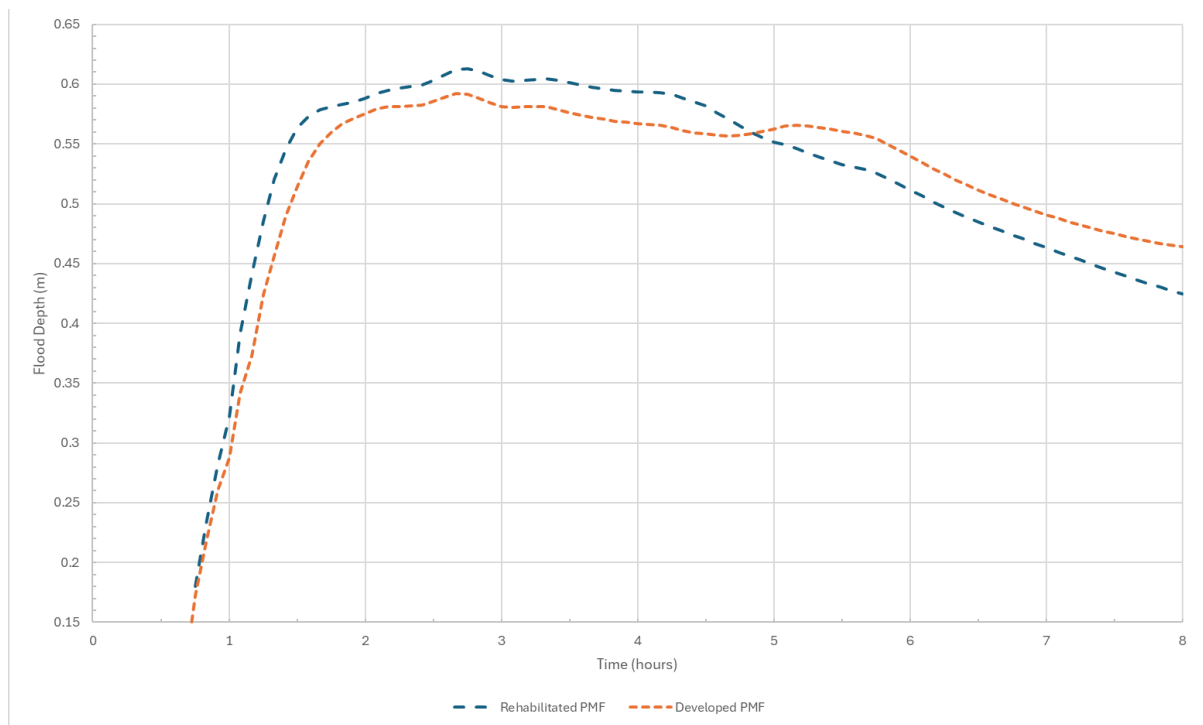


FIGURE 8: TIME OF INUNDATION - LOCATION 2 (PMF)

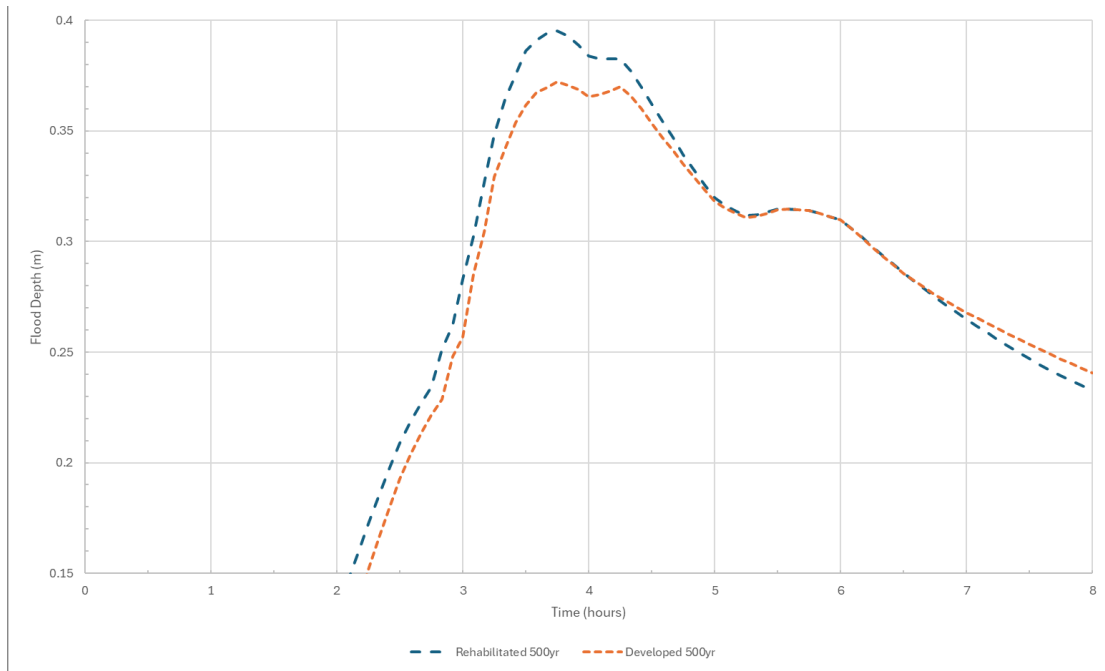


FIGURE 9: TIME OF INUNDATION – LOCATION 2 (0.2% AEP) WITH CLIMATE CHANGE AND SLR

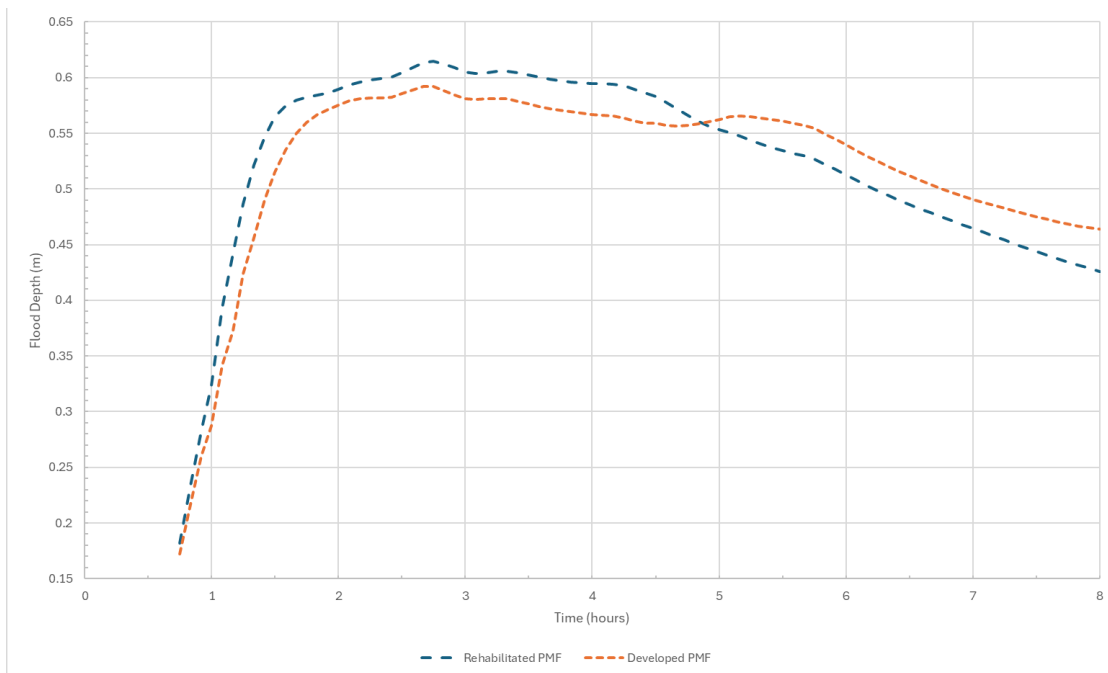


FIGURE 10: TIME OF INUNDATION – LOCATION 2 (PMF) WITH CLIMATE CHANGE AND SLR

For location 2, the time of inundation for flood depths greater than 150mm is 6 hours or greater for the 0.2% AEP event with a greater period of inundation for the PMF flood. This is seen to be the case for both the rehabilitated and developed scenarios. The proposed upgrade works for Captain Cook Drive and the existing stormwater system will serve to ensure that the flood depth is reduced so that the road will be trafficable by high-clearance emergency vehicles.

Considering the effects of Sea Level Rise and Climate Change, the maximum flood depths for the 0.2% AEP event was increased by approx. 8mm for the developed case, and the results were very similar for the PMF storm event.

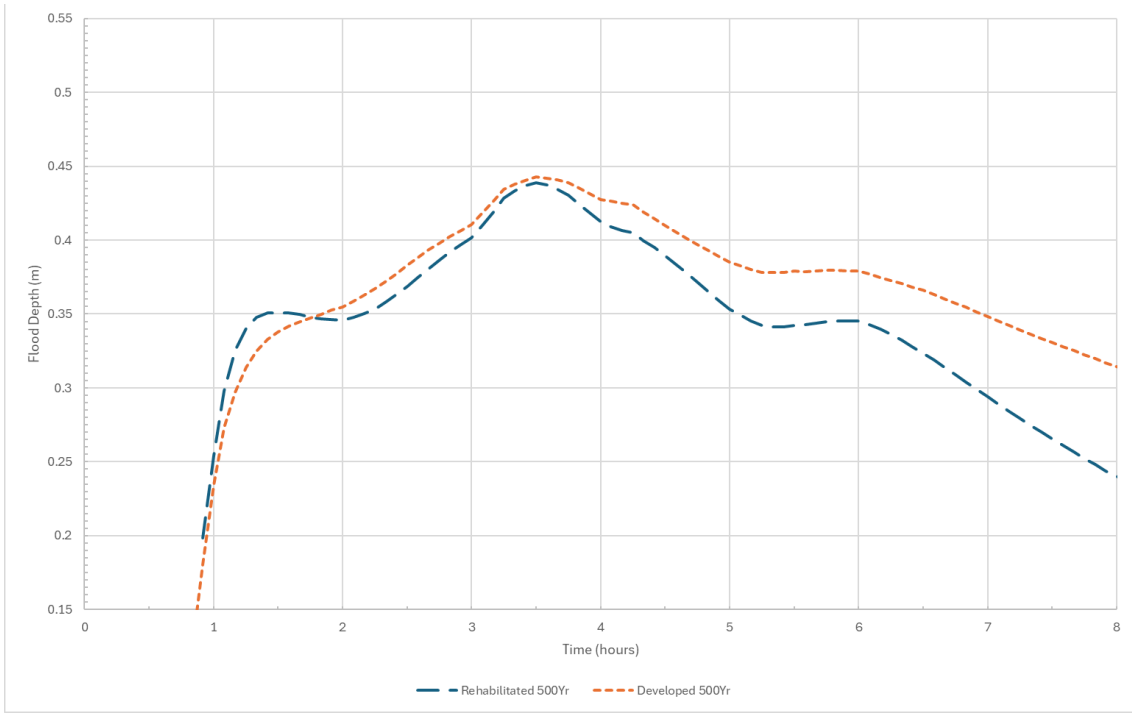


FIGURE 11: TIME OF INUNDATION - LOCATION 3 (0.2% AEP)

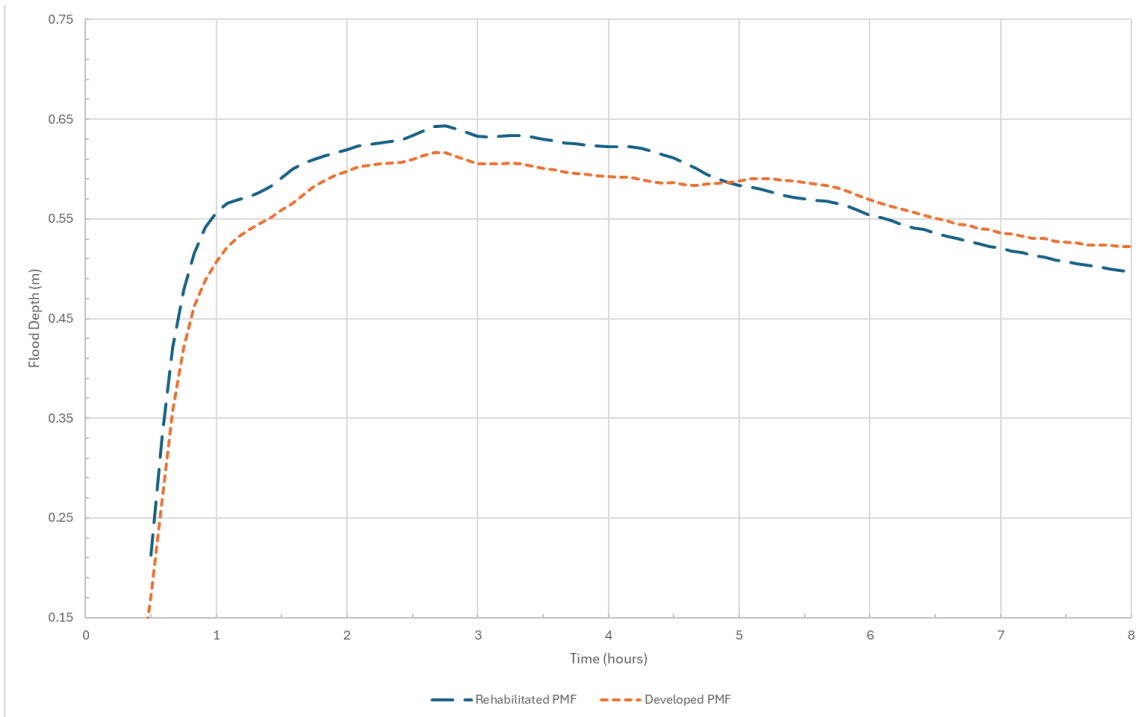


FIGURE 12: TIME OF INUNDATION - LOCATION 3 (PMF)

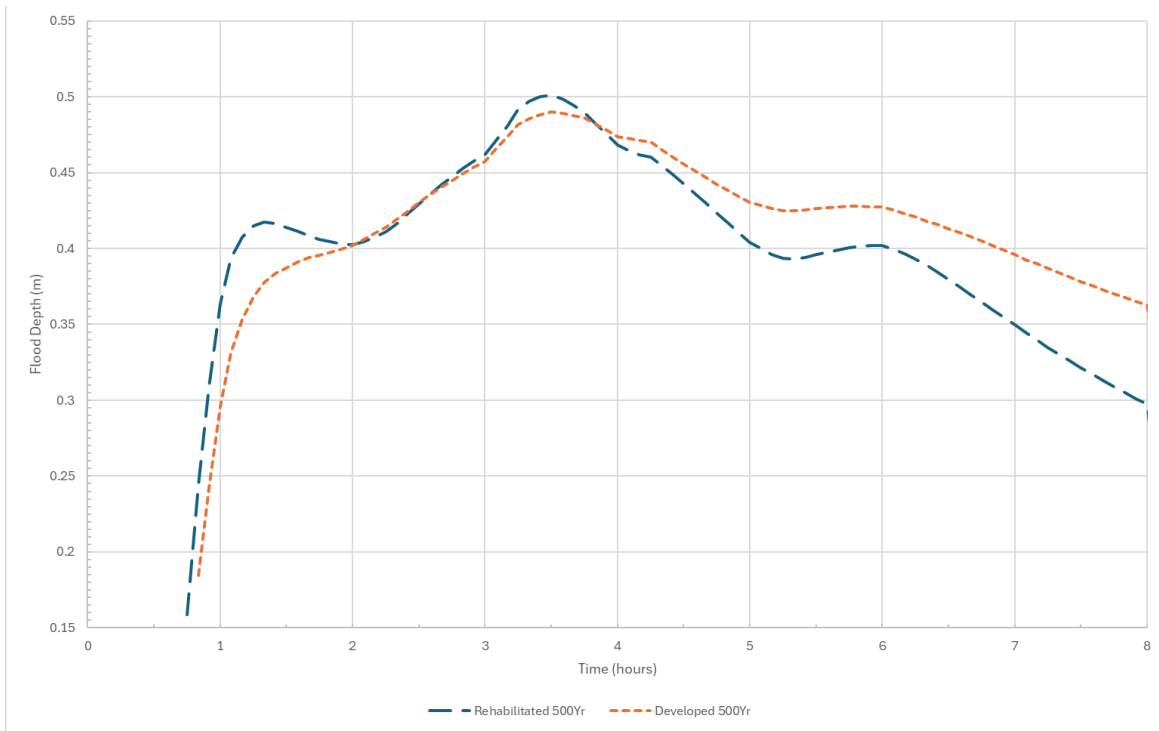


FIGURE 13: TIME OF INUNDATION – LOCATION 3 (0.2% AEP) WITH CLIMATE CHANGE AND SLR

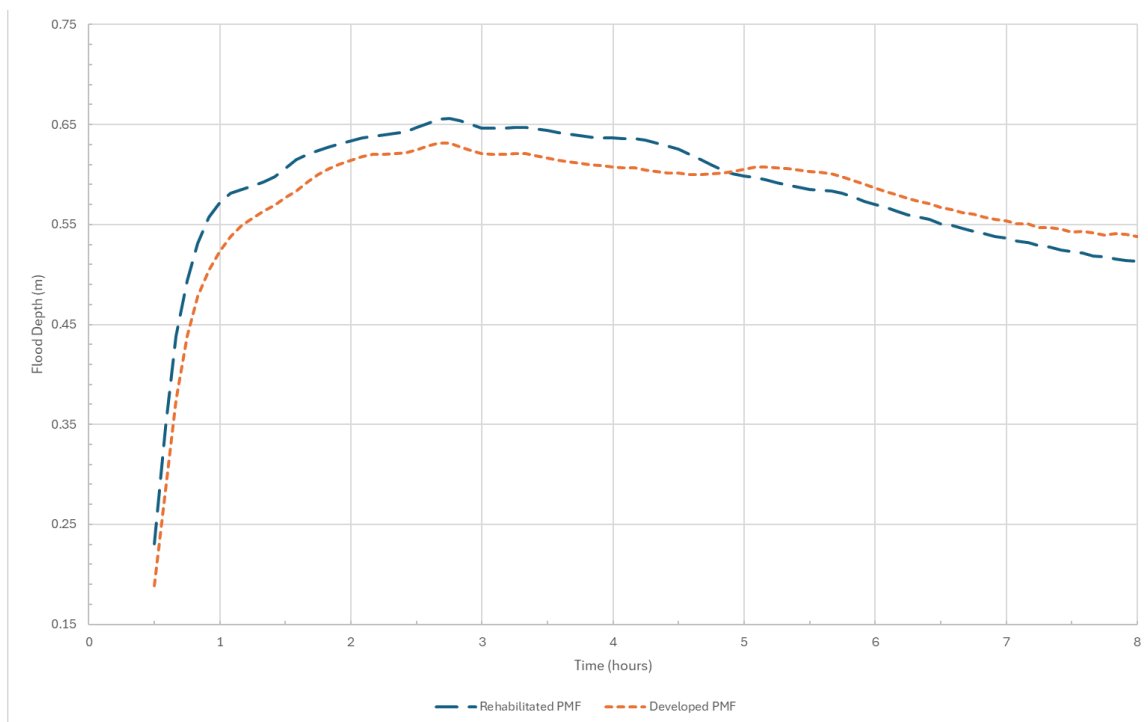


FIGURE 14: TIME OF INUNDATION – LOCATION 3 (PMF) WITH CLIMATE CHANGE AND SLR

For location 3, the time of inundation of greater than 150mm is 7 hours or greater for the 0.2% AEP event, for both rehabilitated and developed scenario. The results show that the impacts of the developed scenario are not significant as this section of CCD has higher flood depths even in the base case. However, upgrades to CCD would be required to ensure access to and from the site, for both scenarios. Similarly, for the PMF event, the maximum flood depth has been reduced in the developed cases, with extended periods of inundation seen in both scenarios.

Considering the impacts of Climate Change and Sea Level Rise on both flood events, approximately 60mm increase has been seen in the maximum depth of inundation for the 0.2% AEP flood event, whereas the PMF event only shows slight increases in flood depths.

Section 2 has illustrated that the extent and duration of flooding on Captain Cook Drive for the rehabilitated and developed scenarios. For the sections of the road impacted by flooding, flood depth indicators shall be installed to enhance safety and awareness.

However, it is important to note that the proponent has proposed an upgrade to Captain Cook Drive in conjunction with the occupation of Stages 2 and 3AA. This upgrade will involve raising the level of the Captain Cook Drive itself, along with upgrades to the existing stormwater network, effectively mitigating the issue of Captain Cook Drive becoming inundated.

3 SEA LEVEL RISE AND CLIMATE CHANGE

As requested in the comments from relevant departments, the hydraulic modelling and maps have been updated to assess and determine the effects of climate change and sea level rise for the wider catchment area.

The times of inundation graphs in Section 2 provides a comparative analysis of the impacts of Climate Change and Sea Level Rise along the sections of Captain Cook Drive affected by flood. As expected, the results do show that the maximum depth of inundation is increased when the impacts of Climate Change and Sea Level Rise are considered. The impacts are more notable for the 0.2% AEP with maximum increase of flood depth of approx. 60mm, whereas the results of the PMF flood events show a maximum increase of approx. 23mm.

Council SLR policy states that sites over RL2.22m AHD do not need to consider SLR. Given the site is higher than this level, Sea Level Rise is not a typical consideration for sites such as this, in terms of the effects of the habitable space within the development. However, due to the concerns raised, SLR and tidal impacts have been considered as part of the updated flood report and maps.

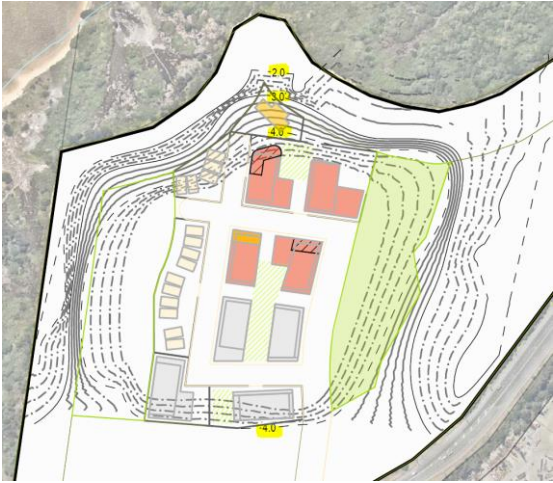
The overall worst-case scenario has been modelled for the site, and the findings show that the sea will not rise to inundate the site. However, sea level rise could potentially affect the internal stormwater pipe drainage and internal overland flow paths as it will impact tail water conditions on these systems and reduce the capacities of the systems. Additionally, any required freeboards to pit grates would need to be checked as part of the detailed design under the SLR condition. This will be investigated during the DA stage. It is important to note, however, that this is a broad issue faced by Sutherland Shire and not an impact associated with the proposed development in isolation.

4 RFI RESPONSES

4.1 Department of Climate Change, Energy, the Environment and Water

DCCEEW provided comments from the Biodiversity Conservation and Science Group (BCS) and National Parks and Wildlife Service (NPWS) of DCCEEW.

DEPARTMENT COMMENTS	EGIS RESPONSE
<p>The site has no safe access</p>	
<ul style="list-style-type: none"> BCS notes the Flood Report recommendation that any future detailed flood evacuation plan for the development utilise a 'shelter-in-place' approach. No details have been provided regarding how long residents will be required to 'shelter-in-place' or the proposed warning times and how residents will be prevented from driving through flood water. 	<ul style="list-style-type: none"> The habitable areas of the site nominated for residential usage are all located outside of the extents of flooding, up to and including the PMF. Captain Cook Drive is currently subject to inundation for larger storm events, which will be exacerbated by the impacts of Climate Change. It is intended as part of the future works associated with the development to amend the sections of Captain Cook Drive to ensure appropriate levels of access are provided. Times of inundation for affected areas of Captain Cook Drive have been provided in Section 2. The built-up areas in the proposed site will not be affected by larger flood events. Hence, evacuation will not be required. Captain Cook Drive and the stormwater system at the flooded areas of CCD will be upgraded to minimise flood widths/depths, and access for high-clearance emergency vehicles can be maintained. It is normal practice for Flood Emergency Response Plans to be provided for residents in buildings affected by flooding. For roads affected by flooding, depth indicators will be provided.
<ul style="list-style-type: none"> Even if 'shelter-in-place' was adopted, the ability for emergency service workers to assist residents (especially seniors and aged care residents) during a flood event, needs to be considered. 	<ul style="list-style-type: none"> The additional modelling currently undertaken has advised on depths and duration of the inundation. Please refer to Section 2 above for the results. For larger flood events (up to the 0.2% event), access for high-clearance emergency service vehicles is still possible in CCD. However, upgrade works on CCD will be provided to further reduce flooding on the road itself and ensure continued access for emergency service workers to assist residents.
<ul style="list-style-type: none"> BCS recommends further information is required to assess consistency with flood risk management guideline E01, 9.1 Directions and Planning Circular PS24-001. This should form part of a Flood Impact and Risk Assessment (FIRA) prepared in accordance with the Flood Risk Management Manual and guidelines. 	<ul style="list-style-type: none"> The Planning Proposal was lodged in December 2023, prior to the final release of the circular in March of 2024. One of the changes in the circular is in the advice given to council regarding flood planning levels. As this application is for rezoning any discrepancy can be conditioned and included as part of the DA application process. As there has not previously been a

	<p>flood study undertaken on this area there is currently no specific direction in council's DCP regarding specific levels of flood protection to be achieved within this part of the Kurnell Peninsula.</p> <ul style="list-style-type: none"> • A large portion of this circular is then dedicated to discussion of the requirements during development assessment. The mapping provided meets the requirements for the typical events to be examined being the 10%, 5%, and 1% AEP, either the 0.2 or 0.5% AEP, and the PMF. • Any items not currently addressed in this current submission can be addressed as part of the DA stage of the development process. The Planning Proposal is not inconsistent with the Planning Circular.
<ul style="list-style-type: none"> • Proposed management measures are required to minimise the impacts of flooding on the development and minimise flood risk to the community, including an Emergency Management Plan considering access to and from the site, and evacuation issues during significant flood events including the PMF, from both local catchments and/or regional catchments. 	<ul style="list-style-type: none"> • The habitable areas of the site do not flood during the PMF events. As demonstrated in the flooding report, the Developed scenario has been designed to ensure that the built-up areas on site are not affected by larger flood events, including and up to the PMF. As such, there are no onsite flooding impacts to minimize. The site has been curated to address this specific issue. • Additional modelling has also been prepared to confirm the depth and time of inundation to enable an understanding of how flooding of the wider area can be managed. A detailed Flood Emergency Management Plan can be provided during the DA process once the development is more resolved.
<p>Inconsistencies in reporting on degree of flood risk</p>	
<ul style="list-style-type: none"> • The Coastal Management Plan indicates a predicted 2120 storm near shore level of 2.6m AHD. The survey shows that most of Lot 2 North is at around 2m therefore it would be subject to coastal inundation unless significant fill is used. While the levels of Captain Cook Drive are not shown on the survey, it may also be impacted by coastal inundation. 	<ul style="list-style-type: none"> • It is proposed to fill Lot 2 North. Proposed design contours demonstrate that Lot 2 North is higher than 2.6m AHD and most of the buildings are above 4.0m AHD as outlined below: 

<ul style="list-style-type: none"> BCS notes drainage is likely to be ineffective for low lying roads draining to tidal outlets and the downstream tailwater levels together with coincident coast and catchment flooding would need to be considered in any design. 	<ul style="list-style-type: none"> Noted – this is something that will need to be considered during the detailed design phase due to the high-level nature of the current planning proposal.
<ul style="list-style-type: none"> The Planning Proposal will require assessment as flood prone land and the preparation of a FIRA in accordance with the Flood Risk Management Manual Flood Impact and Risk Assessment Guideline (2023). The FIRA should be undertaken by qualified engineers who have experience and advanced skills in catchment hydrology and floodplain hydraulics and have a good working knowledge of FRM practices and guidance in New South Wales 	<ul style="list-style-type: none"> The submitted report addresses these requirements. The proposed residential land use areas have been specifically designed so that they are located outside of any flood prone land. The area identified as overland flow, is noted as conservation and is for landscaped / ecological land uses. A flood impact assessment, for any sensitive parts of the site, can be prepared at the time of the DA lodgement. However, given the land intended for residential use is not subject to overland flows and is not flood prone, we do not consider FIRA will be required. However, if necessary, it can be provided at the DA stage.
Insufficient detail on flood modelling parameters	
<ul style="list-style-type: none"> The existing site contains large depressions and has good infiltration characteristics. The Flood Report indicates that the existing and proposed topography has been considered and rainfall applied directly as rainfall on grid. There is lack of clarity in the report how the existing and proposed soil types are treated, and it appears that predevelopment characteristics may be based on a filled landform characterised by compacted VENM rather than the pre quarry landform of elevated sand dunes with good infiltration. 	<ul style="list-style-type: none"> As agreed in the DPHI Modelling Direction (2019), the TUFLOW Modelling has represented two scenarios for the hydraulic models; <ul style="list-style-type: none"> Base Case ('The Rehabilitated Site'); and The developed case. The current landform has changed from the pre-extraction landform, and it is not expected that the waterflow state of this pre-extraction landform can be re-established. There is little to no value in modelling the existing landform due to the continual changes in the landform under current extraction and landfill operations. <ul style="list-style-type: none"> The rehabilitated case, and not the existing case, is taken as the base case scenario as the sand mine will have been decommissioned before this development will occur and the site will be progressively filled with VENM. This forms part of the updated flood model and maps. Refer Appendix B. Fill material will be compacted VENM and the flood model assumes zero infiltration for the fill material in the worst-case scenario. Given the rehabilitation It cannot be made to mimic the pre quarry landform characteristics.

<ul style="list-style-type: none"> The sand quarry has been in place for a considerable period, and it will be necessary to demonstrate how infiltration can be incorporated into the final arrangement to manage off site flows, maintain ground water regime and allow water to continue to report to the receiving environment in a more natural manner. 	<ul style="list-style-type: none"> The stormwater design allows for bioretention basins and wetlands, which will allow for treated water to be infiltrated, with overland flows being diverted further north towards Quibray Bay. However, as noted in the response to the previous comment we cannot return it to a natural state due to the nature of the proposed backfill. This position has been agreed with the DPHI since 2019.
<ul style="list-style-type: none"> Drainage has not been included in either pre or post development models. Limited detail has been given regarding what parameters have been adopted in the model and the maps are of very small scale. 	<ul style="list-style-type: none"> Consideration to existing and proposed drainage network has not been included in the current flood model. The proposed drainage network has not been detailed at this stage and cannot be modelled in. Furthermore, the flood modelling assumes the worst-case scenario and assumes that the drainage networks are blocked.
<ul style="list-style-type: none"> BCS recommends the Flood Report be amended to provide sufficient information to determine the degree of flood risk posed by the development, to the development and to the occupants. It is also necessary to demonstrate that these risks can be reduced to acceptable levels prior to rezoning and not deferred to a future DA/CC stage. 	<ul style="list-style-type: none"> Noted – the model and flood maps have been updated to provide additional information to address these concerns. Refer Appendix B.
<p>Unacceptable off-site impacts</p>	
<ul style="list-style-type: none"> The flood mapping indicates that adverse off-site impacts of between 0.1 and 0.2m increase in flood depth have been predicted on public roadways and on property held by others in the 1% event with significantly larger increases in the PMF event (greater than 0.4m). The maps are very small scale with little gradation between impact levels therefore greater contrast of colours should be provided or the results tabulated for review. The report suggests this can be addressed at DA/CC stage. 	<ul style="list-style-type: none"> Flood maps have been updated to provide results with a greater colour contrast and ensure better clarity on the results, for further review. The size of the maps was due to the requirement to model a large portion of the peninsula but zoomed in versions of the critical areas have now been provided as part of the updated flood mapping. Refer Appendix B <p>The modelling identified three areas on CCD that are inundated during flood events. Refer to Section 2 for inundation depth and duration details.</p>
<ul style="list-style-type: none"> BCS's view is that it should be demonstrated prior to rezoning that adverse impacts can be mitigated. Afflux mapping should be carried out for the 0.5 and 0.2 AEP event together with consideration of climate change impacts given the expected life span of a development of this size. Consideration of climate change and rarer events forms part of the requirements under the NSW Flood Risk Management Manual and guidelines to ensure both current and future risks can be managed. 	<ul style="list-style-type: none"> Afflux mapping for the 0.5 and 0.2 AEP event together with consideration of climate change impacts have been provided as part of the updated flood maps. Refer Appendix B.

<ul style="list-style-type: none"> It is noted that noise reduction barriers are proposed for Captain Cook Drive. Noise barriers can form a significant barrier to flood flow and result in redistribution of flows and increased hazards on roadways, especially if stormwater drainage is blocked or undersized or if floods larger than the design flow occur. The impact of any required noise walls will need to be included in flood modelling of the developed state. 	<ul style="list-style-type: none"> Final locations of the noise reduction barriers have not been established at this stage, and hence have not been included in the flood model. This can be further investigated during the DA stage. However, solution could include noise barriers with slots, or other similar solutions, to prevent drainage issues.
<ul style="list-style-type: none"> BCS recommends sufficient detail be provided to demonstrate that adverse off-site impacts and the impacts of climate change and sea level rise can be mitigated for the development. A FIRA is required to assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required. Impact assessment should not be limited to assessment of afflux. 	<ul style="list-style-type: none"> Modelling of sea level rise has been undertaken as part of a revised submission. Additional impact modelling can be provided, please advise what additional impact assessment would be required by BCS.
<p>Stormwater Management</p>	
<ul style="list-style-type: none"> Several scenarios are mentioned including the current condition with partial rehabilitation using VENM material, an amended landform which gradually grades towards waterways was also considered. It is not clear in the report if this landform is pervious in nature like the sand previously on site. It appears that where fill is proposed the infiltration characteristics of the landform is considered to mimic the nature of the fill. 	<ul style="list-style-type: none"> The base case is the rehabilitated site after the completion of sand extraction and the placement of VENM. Lot 2 South is graded so that surface runoff and stormwater is collected within the site and directed and discharged into Botany Bay or directed into the sand environment on the southern, western and eastern perimeters of the site infiltrating to recharge the freshwater aquifer. Please note that the rehabilitated/amended landform will not be pervious in nature where the pre-existing sand has been extracted, as VENM material has lower porosity than sand and cannot mimic the infiltration characteristics of sand.
<ul style="list-style-type: none"> The stormwater section of the Flood Report provides some undertakings to manage the stormwater runoff rate via on site detention and various water sensitive urban design (WSUD) treatment methods on private sites and as large-scale systems in public spaces. There is very limited detail provided and a combination of lined and unlined facilities are mentioned. 	<ul style="list-style-type: none"> On-site detention system and WSUD treatment methods to ensure that flows and water quality can replicate the existing rates of stormwater discharge and quality from the site. The details and sizing of the OSD system can be provided in detail during the DA stage.
<ul style="list-style-type: none"> It is proposed to discharge stormwater into or adjacent to several sensitive areas such as Ramsar Wetlands, mangroves, saltmarsh, and areas managed by NPWS. Management of runoff water quality must be a key consideration for the development, and it is important that changes to the groundwater regime and manner of discharge to the natural environment are considered in the assessment together with how these changes may be mitigated. 	<ul style="list-style-type: none"> The detail of the WSUD measures will be provided once monitoring of the outlet and ground water has been undertaken and baseline conditions have been determined.
<ul style="list-style-type: none"> Water quality testing forms part of the broad commitments in the strategy. Water quality targets have been provided in section 4.1.3.1 however no estimation of the amount of land which may be required to meet 	

these targets has been made in the report. Consultation with Sutherland Shire Council will be required for any WSUD features proposed to be in the public domain to ensure that life cycle costing and long-term maintenance agreements are in place	
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4.2 Department of Primary Industries – Fisheries

DEPARTMENT COMMENTS	EGIS RESPONSE
The Georges River Coastal Management Program - Scoping Study	
<ul style="list-style-type: none"> Detailed flood studies and assessment of coastal hazards are required for this entire site and Captain Cook Drive including future predictions with SLR, before any rezoning plan is considered. 	<ul style="list-style-type: none"> Flood model and maps have been updated to provide considerations to future predictions to SLR. Refer to Section 2 and Appendix B for inundation graphs and flood maps.
<ul style="list-style-type: none"> Detailed hydrological studies are required including likely changes to surface water and groundwater volumes and quality. There needs to be more information provided and better planning for ecological connectivity between freshwater, groundwater, land, estuarine and marine environments across the site. Noting that some estuarine species rely on groundwater flows. Changes to these flows as well as the introduction of stormwater to the wetlands could result in dramatic changes to the ecology of these protected coastal wetlands. 	<ul style="list-style-type: none"> EGIS can provide information regarding the potential flows and volumes of water but only after the design has been developed more and elements such as buildings and OSD/WSUD measures have been resolved. Elements such as groundwater volumes/quality and ecological impacts have been reviewed and assessed as part of the Land Capability – Geotechnical Factors report prepared by Tetra Tech and submitted in support of the Planning Proposal.

4.3 NSW State Emergency Service

DEPARTMENT COMMENTS	EGIS RESPONSE
<ul style="list-style-type: none"> Any proposed Emergency Management strategy for an area should be compatible with the evacuation strategies identified in the Sutherland Shire Flood Emergency Sub Plan. 	<ul style="list-style-type: none"> This should be added as a condition of the approval and required as part of the DA
<ul style="list-style-type: none"> Access to the site is constrained by the single, two-lane access road. This would significantly constrain any emergency access/egress during a flood. This is exacerbated by the flooding of the evacuation route in very frequent, 50% AEP floods resulting in the site becoming a High Flood Island and frequently becoming isolated. Further modelling should be undertaken including the duration of isolation and time to roads overtopping and any changes to these as a result of development to fully understand the risk to life 	<ul style="list-style-type: none"> Noted – this has been provided as part of the outcomes of the additional flood modelling. Refer Section 2 for time of inundation and durations for PMF and 0.2% AEP storm events.
<ul style="list-style-type: none"> Modelling demonstrates overhead rainfall during a PMF event may lead to overland flows on internal streets as well as access roads with areas of ponding up to 3m in depth, however it is unclear from the Flood Report provided whether this modelling includes the proposed stormwater management system and any 	<ul style="list-style-type: none"> The flood model assumes the stormwater systems are blocked and all runoff is considered as overland flow so as to inform the worst-case scenario. The proposed stormwater management system has not yet been resolved and will be

<p>level of blockage which may be included. We request clarification on the inclusion of these in currently modelling to better understand the risk to life and property</p>	<p>developed during the detailed DA design stage.</p>
<ul style="list-style-type: none"> • Additionally, while the provided report states “sea level rises are not expected to have an effect on the development”, this has only considered impacts on the site itself. Sea level rise and tidal impacts should therefore be considered in view of the site becoming isolated due to access road inundation and not only the impact of sea level and wave heights on the site itself. 	<ul style="list-style-type: none"> • Noted. Council SLR policy states that sites over RL2.22mAHD do not need to consider SLR. However, due to the concerns raised SLR and tidal impacts have been considered as part of the updated flood report and maps. Refer Appendix A. • Please refer to Section 2 for effects of Sea Level Rise along the flood affected areas of CCD.
<ul style="list-style-type: none"> • We also note the site is subject to a Tsunami Inundation risk. If there is a threat of land inundation from a tsunami, future occupants or users of the site will need to move to higher ground, at least ten meters above sea level or one kilometre away from the ocean and bay. 	<ul style="list-style-type: none"> • Noted – this can form part of the site Emergency Response Plan to be developed as part of the DA
<ul style="list-style-type: none"> • It is understood that currently “In larger events, flows have the ability to drain towards Captain Cook Drive via the swale running alongside the dirt road”. Any improvements which can be made to reduce the flood risk would benefit the community and we recommend pursuing site design and stormwater management which would reduce the impact of flooding and reduce risk. 	<ul style="list-style-type: none"> • Noted – this could be conditioned and addressed as part of the DA
<ul style="list-style-type: none"> • Managing flood risks associated with High Flood Islands requires careful consideration of development type, likely users, and their ability respond to minimise their risks. This includes consideration of: <ul style="list-style-type: none"> - Isolation - Secondary Risks - Consideration of Human Behaviour 	<ul style="list-style-type: none"> • Noted – this could be conditioned and addressed as part of the DA
<ul style="list-style-type: none"> • Any Emergency Management strategy needs to consider people visiting the area or using a development. The proposed public recreation and tourism zoning for areas of the site are likely to result in a significant number of visitors who may be unfamiliar with the risks of overland flooding and isolation on the site. Consideration should be given to including signage informing visitors to the area of the risk. 	<ul style="list-style-type: none"> • Noted. The provision of additional signage relating to possible flooding/inundation will for part of the considerations of the FERP that will be developed as part of the DA stage.
<ul style="list-style-type: none"> • Commercial development (including retail): All ground floor businesses and retail floors must be above the 1% AEP flood levels and access to the basement must be above PMF. There must also be the provision of sufficient readily accessible habitable areas above the PMF to cater for the safety of potential occupants, clients and visitors in commercial development. 	<ul style="list-style-type: none"> • Noted. All commercial developments and future development applications will need to demonstrate that FFL will be above the 1% AEP with entrances to basements will be above the PMF.

<ul style="list-style-type: none"> • Sensitive development: Any childcare facilities, schools, medical centres, day hospital within the building must be located with floor levels above the PMF level. 	<ul style="list-style-type: none"> • Noted. Childcare facilities, schools, medical centres, day hospital to be provided with floor levels above the PMF.
<ul style="list-style-type: none"> • Making buildings as safe as possible to occupy during flood events: To ensure buildings are as safe as possible to occupy during flood events, buildings must be designed for potential flood and debris loadings of the PMF so that structural failure is avoided during a flood. 	<ul style="list-style-type: none"> • Noted. Buildings to be designed by Structural Engineer to cater for flood and debris loading during PMF storm events.
<ul style="list-style-type: none"> • Limiting exposure of people to floodwaters: This can be aided by providing sufficient readily accessible areas above the PMF to cater for potential occupants, clients and visitors. Building security and access should ensure accessibility to habitable areas within the building above the PMF. 	<ul style="list-style-type: none"> • Noted. Readily accessible areas above the PMF are to be provided to cater for occupants and visitors.
<ul style="list-style-type: none"> • Car parking: Any additional parking should be above ground level to facilitate safe and effective vehicular evacuation and have pedestrian access to a podium level above the PMF to increase human safety. 	<ul style="list-style-type: none"> • As per the comment above regard commercial development, carparking if within the building will either have all access points above, or protected up to, the PMF. All external parking will be located above ground and have access to a point above the PMF level.

5 CONCLUSION

The memorandum proceeds to review the comments from various departments, including DCCEEW, DPI Fisheries and NSW SES and has provided responses in terms of additional information, modelling and clarifications, as necessary.

Additional information has been provided on the general flood modelling strategy in Section 1, which aims to provide more details on the various scenarios and modellings undertaken. Additional flood maps have also been presented and considerations have been given to the effects of Climate Change and Sea Level Rise for both rehabilitated and developed scenarios, as per Appendix B.

In response to the department's comments on the impacts of the development on Captain Cook Drive, additional review of the flood model has been done to identify three major points of flooding of CCD. The time, depth and length of inundation have been investigated and graphical representations of these times of inundation for the 500-year and the PMF flood events have been presented in Section 2 of this Memorandum.

The effects of Climate Change and Sea Level Rise have been considered and detailed in Sections 2 and 3, which shows increase in flood depths for the 500-year flood event, with minimal change in the PMF flood. Upgrade of Captain Cook Drive and adjoining stormwater systems has been recommended to ensure safe access for residents can be retained for major flood events.

In conclusion, this memorandum comprehensively addresses and responds to the comments and concerns raised by various departments, providing additional information, detailed flood modelling, along with recommendations to mitigate the impacts of development on Captain Cook Drive.

APPENDIX A: DPIE DIRECTION OF STUDY METHODOLOGIES



DPIE Direction - Assumptions for modelling base-case

The position put forward in the Urbis base case briefing paper (Tabled 14 May 2019 – Urbis Base Case paper Appendix A) that the rehabilitated site at the completion of extraction and VENM placement should form the south lot base case for impact assessment, is generally supported.

The scope of works requires the technical studies to inform land use decisions on the Besmaw site as part of the Kurnell SEPP review. This work does require consideration of off-site impacts and context within the broader Kurnell Peninsula and South District.

The following points describe DPIE's assumptions for modelling the base case.

1. Modelling is required to inform Land Capability (incl. contamination & geotech) and Flooding, Water Management (including stormwater and groundwater) technical studies.
2. Sand extraction is occurring on the site and extracted areas, including large lake, are being filled with imported VENM (virgin extracted natural material).
3. The SEPP process is not reviewing the operational activities, it is to understand site capability and determine the most suitable future land uses. Information on site processes may be used to demonstrate capability and inform the technical study analysis.
4. The current landform has changed from the pre-extraction land form and it is not expected that the waterflow state of this pre-extraction landform can be re-established.
5. There is little value in modelling the existing landform due to the continual changes in the landform under current extraction and landfill operations.
6. The key principles listed in the flooding methodology (Calibre) are supported: that post-development (urban development) flows not exceed the rehabilitated site on flows, to manage and mitigate flood risk; and that run-off must be treated to control erosion, sedimentation and contamination.
7. Expectation that landform and levels are similar at the boundaries with adjoining land levels.
8. It is proposed that a terrain model be prepared as a base case scenario to reflect finished levels as per the consent (South lot) and the topography of the existing landform where appropriate (North lot, South reserved lands). The technical studies will still need to describe and acknowledge the potential environmental impacts of this landform, including off-site.
9. The model is to be based on the characteristics of the VENM that has been approved for fill on the South Lot.
10. A model is also required of the end landform and proposed urban development scenario.
11. The technical studies are expected to inform the finer design details of the landform such as number and location of water bodies, drainage options, slope, and location for urban development land, vegetation and open space.
12. Stormwater quality and quantity is also not to exceed rehabilitated site levels. All stormwater flows and water quality that exceed the base case are to be treated and managed on site before being discharged into the environment.
13. The description of the "rehabilitated site" provided in the Urbis paper (Rehabilitated Site – Proponent's Description, see below) is generally supported, with the following qualification – *Sufficient details need to be provided in the technical studies and masterplan on the North Lot to enable assessment and inform a SEPP Review decision on whether fill is supported to deliver the urban land uses sought by Besmaw/Urbis.*

DPIE Direction - Contamination / site audit

1. In discussions with Council and EPA, the Department has been asked to consider requiring a site audit to investigate potential contamination.
2. Under the SEPP 55 Managing Land Contamination Planning Guidelines a site audit (independent review of site investigation as per CLM Act) is recommended where the planning authority:
 - believes that the information provided by the proponent is incorrect or incomplete;
 - wishes to verify this information;
 - or does not have resources to conduct own technical review.
3. It is considered that none of the above conditions currently apply and that a site audit is unnecessary.
4. The scope of works requires the study to demonstrate how the requirements of State Environmental Planning Policy 55 – Remediation of Land (SEPP 55), have been satisfied to ensure the suitability of a site for its proposed use.
5. In addition to a review by the Department and the PCG, the draft study will be referred to an independent consultant with expertise in contamination for peer review and advice.
6. The Department will require that the peer review consultant be qualified and accredited by the NSW EPA to be able carry out a site audit, if the above conditions change and a site audit is required in the future.
7. The studies will provide a summary of the historical documentary evidence that establishes that the results of the VENM and groundwater monitoring have been satisfactory, and that the contaminate status of the site is suitable, or can be made suitable for the proposed land uses through ongoing rehabilitation.
8. An Environmental Protection Licence applies for the rehabilitation of the sand quarry with placement of Virgin Excavated Natural material (VENM).

“Rehabilitated Site” – Proponent’s Description

Future land formation Lot 2 in DP1030269 No. 251 Captain Cook Drive (Lot 2 North)

This part of the Besmaw site (located to the north of Captain Cook Drive) is identified as Lot 2 in DP1030269 No. 251 Captain Cook Drive and has not been the subject of sand extraction activities. For context it is relevant to note that Lot 2 North is:

- Bound by Quibray Bay to the north and north-east; Lindum Road reserve and Towra Point Nature Reserve to the west; and Captain Cook Drive to the south.
- Approximately 16 hectares in area being part of former Lot 4 in DP712157 which was subdivided to create Lot 2 South and Lot 1 DP1030269 (with an area of 11.4 hectares) which was dedicated by Besmaw for regional open space purposes in 2001.
- Zoned 6(c) Private Recreation under SEPP Kurnell Peninsula under which a variety of land uses are permissible with consent including tourist facilities.
- Occupied in part by Kurnell Boarding Stables which has been in operation since the 1960s and is predominantly vacant grassed land with an area of planted native vegetation fronting Captain Cook Drive.
- Subject to a program of ongoing land management, including weed eradication.

- Contains a small area of wetland (previously identified under SEPP 14) adjacent to Captain Cook Drive.
- Benefitted by a right of access across adjacent Lot 1 DP1030269 which provides access to Botany Bay.

The Coastal Processes investigations undertaken as part of the SEPP Kurnell amendment process have identified the land form and levels required to be achieved to enable Lot 2 North to be developed and be protected from any potential future inundation caused by sea level rise and coastal processes. The filling of this land to enable development would be the subject of a future development application and would reflect the land forms and land uses developed under the master planning process embodied in the SEPP amendment.

(refer to Item 13, *Assumptions to modelling base-case* above)

Rehabilitation of Lot 2 in DP559922 No. 280-282 Captain Cook Drive (Lot 2 South)

For the purpose of the SEPP Kurnell Amendment process the rehabilitation of 280-282 Captain Cook Drive means the placement of virgin excavated natural material (VENM) following the extraction of sand with the VENM subjected to preloading as it is placed on site to achieve stable land forms to facilitate future development. That part of the Besmaw site located on the southern side of Captain Cook Drive is identified as Lot 2 in DP559922 No. 280-282 Captain Cook Drive (Lot 2 South). This land has been the subject of historical and current sand extraction and rehabilitation of land forms, by the placement of VENM, since the 1960s.

For context it is relevant to note that Lot 2 South is:

- Bound by Captain Cook Drive to the north; industrial zoned land to the northeast (including the Sydney Water Desalination Plant); Kurnell Village, the Caltex Oil Storage Facility, Kamay Botany Bay National Park to the east; Bate Bay and Boat Harbour to the south; and Wanda Reserve, the Breen land holdings and playing fields to the west.
- Zoned
 - Part 7(b) Special Development (applicable to the majority of the lot),
 - Part 4(a) General Industrial over the eastern access corridor from Captain Cook Drive into the body of the lot,
 - Part 6(b) Public Recreation along the Bate Bay foreshore, and
 - Part 9(a) Regional Open Space over the Boat Harbour land.
- Predominantly occupied by sand extraction and rehabilitation operations that provide a significant portion of fine building sand to the Sydney construction market.
- In addition to the rehabilitation activities being undertaken is subject to a program to actively manage the frontal dune system to Bate Bay with the removal of noxious weeds and planting of endemic species.
- Developed in part by a collection of dwellings located to the north of Boat Harbour, known as the Boat Harbour shacks, used for permanent residential accommodation.
- Approximately 160 hectares in area and the property title extends down to mean high water mark in Bate Bay. The beach front area is accessed by members of the public through a controlled ticketing arrangement managed by Besmaw.

The rehabilitation of 280-282 Captain Cook Drive is achieved by the placement of VENM where in-situ sand had been extracted. As with any mine, there is an understanding and acceptance that the land after mining will not have the same characteristics as the original un-mined land. The VENM

used in the rehabilitation of the land and the creation of the new land form is a by-product of the development and infrastructure projects being carried out in Sydney. The VENM is placed in a controlled and managed fashion.

The State Planning Authority Planning Approval under which the extraction and rehabilitation activities are being undertaken set parameters for the operation including a nomination of the maximum depth that sand extraction could be undertaken, a setback of extraction operations to Captain Cook Drive, and a minimum height that the rehabilitated land form is to achieve.

Conclusion

A fundamental change has been made to the characteristics of the land as a result of the extraction and rehabilitation operations. Lot 2 South is in a dynamic state and this will continue until such time as the current operations are complete. The extraction and rehabilitation process will continue in parallel with and independent of the SEPP amendment process. However, it is important to recognise that an opportunity exists for the SEPP amendment and associated master plan to inform the final land form to be delivered under the ongoing rehabilitation process to achieve a landform that not only achieves the minimum required but a land form that is capable of future urban development and located at or above a height that will not be impacted by coastal processes or sea level rise and has elements of topographic interest and relief. As with Lot 2 North the master planning exercise under the SEPP Kurnell amendment process will consider the opportunities and constraints to the future development of Lot 2 South in its immediate context informed by the base line technical studies and this will include the unique opportunity to nominate and create new landforms which can tie in with the surrounding topography.

For the purpose of the SEPP Kurnell amendment process the Besmaw site in a post rehabilitated state will have the following characteristics:

- a) In part a sand environment namely Lot 2 North and those areas of Lot 2 South not the subject of extraction activities (the frontal dune [zoned 6(b)], the boat Harbour land [zoned 9(a)], the setback adjacent to Captain Cook Drive and areas adjacent to site boundaries);
- b) In part be a fresh water environment where parts of Lot 2 South have been excavated and fresh water bodies created and retained;
- c) The majority of Lot 2 South will have an altered land form following sand extraction and the placement of VENM, graded so that surface runoff and stormwater is collected within the site and directed and discharged into Botany Bay or directed into the sand environment within the site infiltrating to recharge the freshwater aquifer;
- d) Elements of native vegetation such as the frontal dune and the frontage of Lot 2 North adjacent to Captain Cook Drive which have both been the subject of an ongoing program of planting of native species propagated on site. All surfaces not planted with native vegetation will be seeded with native grasses to stabilise the land surface;
- e) Partly occupied for recreation purposes by the Kurnell Horse Boarding Stables on Lot 2 North.

The site will not have an industrial character on the completion of the extraction and rehabilitation activities as all operational equipment will have been removed and the weigh bridge, offices and associated compound and dredging equipment will have been removed. The rehabilitation of the site is programmed and managed with the express intent of delivering new land forms that are suitable for future urban development for a range of presently permissible land uses and the addition of residential.

A rehabilitated site for the purpose of the current SEPP Kurnell amendment master planning process is one with the above characteristics that is capable of creating new and unique landforms to accommodate a range of urban land uses.

PCG Comments on Study Methodologies

Through late 2018 and into 2019 the proponent has been presenting draft methodologies to address the scope of work briefs for the technical studies. Detailed commentary with Urbis feedback and the Department's direction are in *Appendix B Kurnell SEPP Review – Consolidated PCG comments on the technical studies methodologies – July 2019*. Comments from the Department and PCG outlining variations and clarification from the Scope of Works are summarised below.

Biodiversity

- The consultants will need to use data and information from past studies to inform their work. A review of this data and information should be undertaken to identify any gaps, if any, and fill them. In this regard, it would be premature to decide on the need for any additional flora and fauna survey work until this review work is done.
- The study needs to understand the role of the site for the biodiversity of the peninsula. However, restoration of previous ecosystem is not always possible given change in landform and fill material through mining and rehabilitation.

Bushfire

- No additional comments other than the draft proposal will be referred to the RFS once received from Urbis/Besmaw.

Flooding and Water Management (Coastal Hazards)

- Undertake sensitivity analysis regarding changes to the minimum, modal and maximum recession rates.
- Report should incorporate information showing the change in the average cumulative volume relative to 1961 conditions.
- Investigate the importance and implications of potentially dedicating part or all of the dune system as community land.
- Analysis of coastal processes in Quibray Bay and their impact on Lot 2 North, having regard to Council's 2017 Sea Level Rise Policy.

Flooding and Water Management (Flooding)

- Flood/Water modelling: The position on flood modelling is now clarified through DPIE Direction on 'Base case', and the Urbis description of 'rehabilitated site'.

Flooding and Water Management (Water Quality)

- The water quality modelling should be consistent with DPIE assumptions in direction for modelling 'base case' and the proponent's description of the 'rehabilitated site'.
- It is expected that the modelling for the rehabilitated site base case on the South lot will provide expected groundwater, and that the work for the North lot will map existing groundwater (base case) and any expected changes from proposed fill, to achieve the desired development outcome.

Flooding and Water Management (Water Cycle Management)

- The water cycle management study should be consistent with DPIE assumptions in direction for modelling ‘base case’ and the proponent’s description of the ‘rehabilitated site’.

Heritage – Indigenous

- Some comments of clarification were provided (Appendix B) from the Department and PCG however there are no significant variations from the Scope of Works.

Heritage – non-Indigenous

- Some comments of clarification were provided (Appendix B) from the Department and PCG however there are no significant variations from the Scope of Works.

Land Capability, Hazards and Air Quality (Contamination)

- The position is now clarified through DPE Direction on ‘Contamination/Site Audit’. A site audit is currently unnecessary.
- Investigations for potential contamination will need to consider current North lot (base case) landform and reserved land on the South lot and include soil sampling where relevant.
- Soil sampling could be undertaken on the areas not subject to VENM to ensure that there is a baseline dataset for when the development occurs and to assist in the master planning of the site.
- Whilst detailed contamination studies may be more relevant to the DA stage, preliminary site assessment for contamination, and detailed assessment where required, should be undertaken to inform the master planning and location of land uses.
- The study will refer to the Annual return 2017 - 18 for the Besmaw Environment Protection Licence (EPL) for rehabilitation of sand quarry with Virgin Excavated Natural Material (VENM) only.

Land Capability, Hazards and Air Quality (Air Quality)

- It is noted that that screening assessment will be included in the Air Quality Impact assessment at this stage of the process.
- It is also noted that Level 2 assessment and modelling may be required for some high-risk areas of the site prior to rezoning. High risk areas will be assessed prior to rezoning only if identified as high risk in the air quality assessment.
- Detail how sensitive land uses will be placed in response to cumulative exposure to air pollutants.

Land Capability, Hazards and Air Quality (Soil Salinity)

- Some comments of clarification were provided (Appendix B) from the Department and PCG however there are no significant variations from the Scope of Works.

Land Capability, Hazards and Air Quality (Geotechnical)

- Some comments of clarification were provided (Appendix B) from the Department and PCG however there are no significant variations from the Scope of Works.

Land Capability, Hazards and Air Quality (Groundwater)

- The groundwater study should be consistent with DPIE assumptions in direction for modelling “base case”, the proponent’s description of the ‘rehabilitated site’ and the DPE Direction on ‘Contamination/Site Audit’.

Land Capability, Hazards and Air Quality (Land Use Hazards)

- Some comments of clarification were provided (Appendix B) from the Department however there are no significant variations from the Scope of Works.

Noise and Vibration

- There were no significant variations from the Scope of Works, the Department clarified that noise contours (mapping) are to include both the ANEF and N70 contours in the report.
- Noise modelling of high and low flows of traffic is to be included in this noise assessment report

Traffic and Transport (Traffic Modelling)

- Following negotiations between the proponent, DPE, transport agencies and Council the boundary for the Kurnell Peninsula Traffic Model was agreed upon (Appendix C).
- The RMS, on behalf of the transport agencies reviewed the models and acknowledged that:
 - The AM and PM peak models are competently coded and configured and the calibration and validation results are overall very satisfactory;
 - The calibration of intersection turning movements show that calibration network-wide targets prescribed by RMS Modelling Guidelines are met;
 - The validation of route travel times indicate that prescribed validation targets are met or in some cases are outside of targets but close to the target limits.
- The RMS provided some recommendations on some coding errors that needed to be resolved prior to any public exhibition.

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APPENDIX B: FLOOD MAPS

