

ENVIRONMENTAL MANAGEMENT PROGRAMME

EXPANSION OF INFRASTRUCTURE AT 99 COLWYN DRIVE RESULTING IN THE INFILLING AND
EXCAVATION OF MATERIAL WITHIN 100M OF THE HIGH-WATER MARK OF THE SEA
AND THE EXPANSION OF INFRASTRUCTURE WITHIN 32M OF A WATERCOURSE

KWADUKUZA MUNICIPALITY

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1.0. PROJECT DESCRIPTION

1.1. BACKGROUND

Michael Starr is in the process of subdividing his property located at 99 Colwyn Drive, Sheffield Beach. Michael Starr will continue to own the northern subdivision (proposed Remainder of PTN 292 of Farm Lot 61 No. 1521) that is 1 904m² in extent. The southern subdivision has been sold to Rob Emanuel (proposed PTN 780 (of 292) of Farm Lot 61 No. 1521) and is 2 129m² in extent. All existing infrastructure will be demolished, and two new private residential dwellings constructed, one on each of the new subdivisions (House Starr and House Emanuel). The entire study area falls within 100m of the high-water mark of the sea. A spring originates 2.5m west of the property boundary, within close proximity to proposed House Emanuel. The infilling and excavation of material within 100m of the high-water mark of the sea and the expansion of the existing development footprint requires Environmental Authorisation from the Department of Economic Development, Tourism and Environmental Affairs (EDTEA) for the activities listed in Table 1 below.

Table 1: Listed and Specified Activities Triggered and Being Applied for.

Activity #	Relevant Listing Notice	Description of Listed Activity as Per the Project Description
19A (ii)	Listing Notice 1 (GNR327) 04 th December 2014 as amended.	During construction of House Starr, approximately 965m ³ of material will be excavated and infilled within 100m of the high-water mark of the sea. Approximately 870m ³ of material will be excavated and infilled within 100m of the high-water mark of the sea during the construction of House Emanuel. The excavation of the trench to accommodate the sewer pipeline along Colwyn Drive will result in 56m ³ of material being excavated / infilled within 100m of the high-water mark. Total volume of material excavated / infilled = 1 891m ³ .
54 (v) (e)	Listing Notice 1 (GNR327) 04 th December 2014 as amended.	The existing development footprint will be expanded seawards by a total of 581m ² (House Starr expanded by 365m ² and House Emanuel expanded by 216m ²). The expansion of infrastructure will take place within 100m of the high-water mark of the sea.
23 (ii) (c) (d) (xi) (cc)	Listing Notice 3 (GNR324) 04 th December 2014 as amended.	The existing development footprint will be expanded by 216m ² within 32m of the spring which flows down the property boundary. The expansion of infrastructure within 32m of the watercourse will take place within 100m of the high-water mark of the sea during the construction of House Emanuel.

1.2. DESCRIPTION OF ACTIVITY

The following activities are proposed (Figures 1 & 2):

House Starr on Proposed REM of PTN 292 of Farm Lot 61 No. 1521:

- Demolition of existing residential infrastructure (465m²)
- Construction of new residential dwelling including driveway (772m²)
- Construction of a new swimming pool (40m²)
- Construction of timber staircase down dune (20m²)

During the construction of House Starr, the existing development footprint will expand by 365m² within 100m inland of the high-water mark of the sea. An estimated volume of 965m³ of material will be excavated / infilled within 100m of the high-water mark.



House Emanuel on Proposed PTN 780 (of 292) of Farm Lot 61 No. 1521:

- Demolition of existing residential infrastructure (600m²)
- Construction of new residential dwelling including driveway (670m²)
- Infilling of old swimming pool (± 100m³)
- Construction of a new swimming pool and associated deck (160m²)
- Construction of timber staircase down dune (20m²)

During the construction of House Emanuel, the existing development footprint will expand by 216m² within 100m inland of the high-water mark of the sea. An estimated volume of 870m³ of material will be excavated / infilled within 100m of the high-water mark. The existing development footprint will expand by 216m² within 32m of a watercourse.

A new sewer pipeline will be constructed along Colwyn Drive to connect the houses to the local sewer reticulation network. The sewer pipeline will be 236m in length x 75mm diameter and will be laid in a trench that is 400mm wide and 800mm deep. The excavation of the trench will result in 56m³ of material being excavated / infilled within 100m of the high-water mark.

Figure 1: Site Development Plan Showing Proposed New Dwelling Footprints on Portion 292 of Farm Lot 61 No. 1521 (Source MAP Architects, 2021).

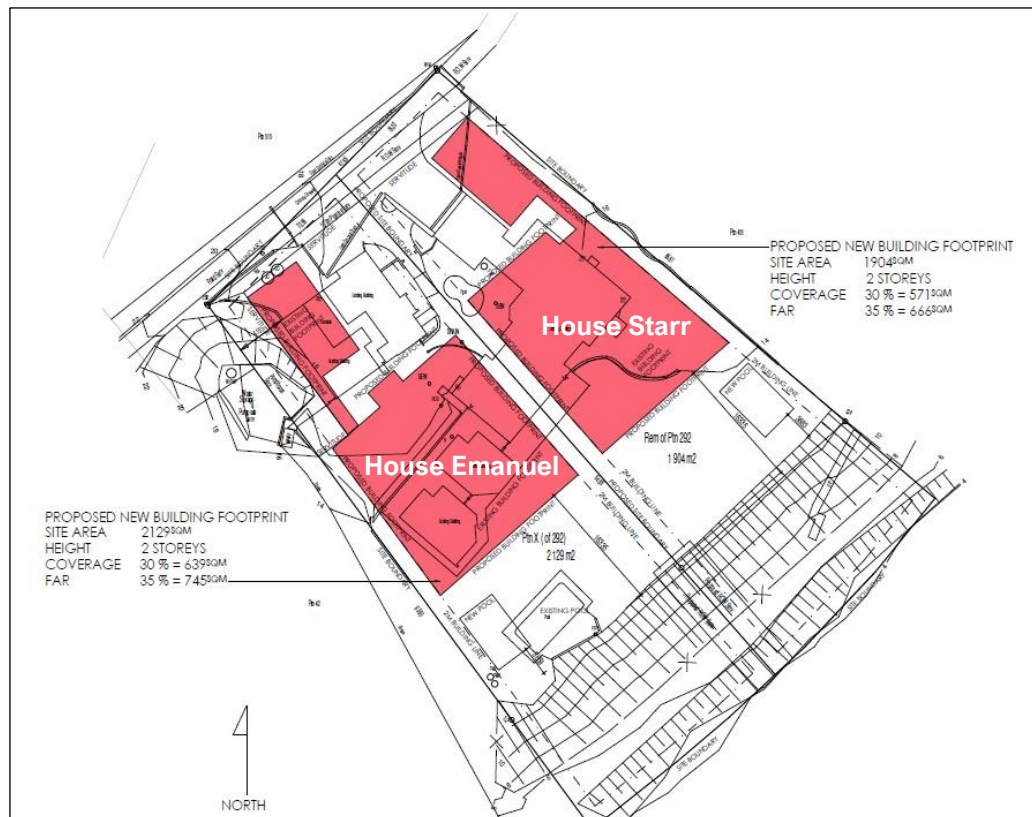


Figure 2: Map Superimposing the Proposed Activity and Associated Infrastructure on the Environmentally Sensitivities of the Site.



1.3. ENVIRONMENTAL SENSITIVITIES

The following sensitive environmental features have been identified within the study area (refer to Figure 2):

- The coastal environment and sand sharing system associated with the nearby shoreline. The sand sharing system falls below the 10m contour line. The staircases down the front of the dune lie below the 10m contour line and therefore construction must be carried out in accordance with the methodology described in this EMPr.
- The Coastal Vulnerability Index suggests that the study area has a “moderate” erosion risk. This vulnerability index refers to the level of vulnerability that may arise on built structures as a result of both sea level rise, storm forced erosion and tidal inundation, or a combination of both.
- A drainage feature was identified on the southerly neighbouring property. A well is in place supplying some of the properties with water. The distance between the watercourse and the existing development footprint must be maintained in the House Emanuel design (minimum distance of 6m).
- There are three *Mimusops caffra* (Milkwood) trees on the larger property. This tree is listed as a protected tree under the National Forest Act of 1998 and therefore requires a permit from DFFE prior to the cutting, removal or disturbance to these trees.
- The underlying geology is that of a very narrow band of Dwyka Group diamictites and tillites that are exposed along the beach in patches. The study area falls within a “moderate to low” palaeontological sensitive area. A Fossil Chance Find Protocol has been included in the EMPr.

The Applicant, Contractors and Staff on site must be made aware of the environmental sensitivities and associated restrictions. The restrictions must be clearly explained by the Environmental Control Officer (ECO) prior to construction commencing. An Environmental Awareness Plan has been prepared for Contractors working on site (section 5.0 of the EMPr). The Environmental Awareness Plan will form part of the Environmental Induction training prior to work commencing.

1.4. IMPACT MANAGEMENT OUTCOMES

Considering the type of activity and the environmental sensitivities associated with the site, impact management actions were formulated during the Environmental Impact Assessment to avoid, manage and mitigate risks that were identified for the different phases of the activity including planning and design, pre-construction activities, construction activities, rehabilitation / post-construction and operational activities (where applicable). Impact management actions are in place to achieve the following impact management outcomes:

Table 2: Impact Management Outcomes

Primary Impact Management Outcome: <i>To create a sustainable development by preventing construction activities from impacting the sand sharing system and nearby watercourse.</i>		
#	Impact Management Outcome	Measures in Place to Achieve Outcome
1	To avoid unnecessary encroachment of construction activities into the sand sharing system.	An independent ECO must clearly demarcate the No Go area in the front of the property before the gradients drops down towards the beach. Only designated staff, who have received the necessary environmental induction training may enter this No Go area during the construction of the staircases and removal of the existing concrete staircase. Measures to prevent and manage encroachment into the dune / coastal environment have been included under section 4.3 of the EMPr.
2	To avoid unnecessary disturbance (direct or indirect) to the freshwater spring, which is used by local residents as a water supply.	The preferred Layout Alternative 2 for House Emanuel must be authorised and the 6m watercourse buffer retained during construction. The steep embankment which drops down to the watercourse must be clearly demarcated and treated as a No Go area. All work must be monitored daily by the ECO to avoid unnecessary disturbance. Other measures to prevent and manage construction in this sensitive area have been included under section 4.3 of the EMPr.



3	Ensure dune stability during the construction of the floating wooden staircases down to the beach.	Only designated staff, who have received the necessary environmental induction training may enter this No Go area during the construction of the staircases and removal of the existing concrete staircase. No vegetation must be cleared. Measures to manage construction have been included under section 4.3 of the EMPr.
4	Connection to the local sewer reticulation network preventing the need for onsite sewage disposal and subsurface flow of wastewater down the dune front.	The preferred alternative for sewerage disposal is the construction of a 75mm sewer pipeline along Colwyn Drive to connect the houses to the local sewer reticulation network. A split system between conservancy tanks and septic tanks may be required. If this alternative takes place, recommendations provided by the coastal specialist have been included under section 4.1 of the EMPr.
5	To avoid unnecessary encroachment of construction activities into the sand sharing system.	An independent ECO must clearly demarcate the No Go area in the front of the property before the gradients drops down towards the beach. Only designated staff, who have received the necessary environmental induction training may enter this No Go area during the construction of the staircases and removal of the existing concrete staircase. Measures to prevent and manage encroachment into the dune / coastal environment have been included under section 4.3 of the EMPr.

2.0. LEGISLATION

Table 3 provides a list of legislation and municipal planning frameworks which are applicable to the activity. The holder of the Environmental Authorisation and Contractors working on site must be aware of the legal requirements and address non-compliances when they arise.

Table 3: Legislation Applicable to The Expansion of Infrastructure at 99 Colwyn Drive, Sheffield Beach.

Legislation	Acronym	Comment
National Environmental Management Act (Act No. 107 of 1998 as amended).	NEMA	NEMA provides environmental management principles that are applicable across South Africa to fulfil section 24 of the Constitution, which is the right to “ <i>an environment that is not harmful to their health or wellbeing</i> ”. Section 24 of NEMA defines the activities requiring Environmental Authorisation and the processes to be followed to obtain Environmental Authorisation (published in the Environmental Impact Assessment Regulations, 2014 as amended). This application triggers activities listed in Listing Notices 1 & 3 of the Environmental Impact Assessment Regulations, 2014 as amended. A Basic Assessment process is therefore underway to obtain Environmental Authorisation prior to any activities commencing.
DEA (2017), Public Participation guideline in terms of NEMA EIA Regulations, DEA, Pretoria, South Africa.	-	To give effect to section 2 (4)(f) and (o) of NEMA, adequate and appropriate opportunity for public participation in decisions that may affect the environment is required. NEMA requires that any person conducting public participation take into account any relevant guidelines applicable to the public participation process as contemplated in section 24J of NEMA. The public participation conducted as part of the Basic Assessment process complies with the NEMA EIA Regulations and has considered the relevant guidelines.
DEA (2017), Guideline on Need and Desirability, DEA, Pretoria, South Africa.	-	This guideline contains information on best practice and how to meet the requirements prescribed by NEMA when considering the need and desirability of a development. The need and desirability of the project has considered the list of questions outlined in the Need & Desirability Guidelines.
National Environmental Management: Waste Act (Act No. 59 of 2008 as amended).	NEM: WA	NEM: WA provides measures to protect health and the environment of South Africa by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. There are no activities proposed that will trigger a Waste Management License however measures have been provided in the EMPr to ensure that waste management is compliant with the requirements of NEM: WA.



National Environmental Management Biodiversity Act (Act No. 10 of 2004).	NEM: BA	To manage and conserve South Africa's Biodiversity and protect species and ecosystems that warrant national protection. The proposed development does not require any specific permissions in terms of NEM:BA however the landowner must comply with the requirements of the Alien and Invasive Species Regulations (2020) which have been published in terms of section 97(1) of NEM:BA. These regulations categorise invasive species and outlines the way these species must be controlled by landowners. Section 52 of NEMBA allows for the publication of a national list of ecosystems that are threatened and in need of protection. The property is located within the Northern Coastal Grasslands Ecosystem which has been identified as "critically endangered" by the South African National Biodiversity Institute (SANBI). The vegetation on site has however been completely transformed by landscaping.
National Environmental Management: Air Quality Act (Act No. 39 of 2004).	NEM: AQA	Regulates air quality to protect the environment by providing measures to prevent pollution and ecological degradation and for securing ecologically sustainable development. There are no activities on site that will trigger an Air Emissions License however measures have been provided in the EMP to ensure that air quality is managed in line with the requirements of NEM: AQA.
National Water Act (Act No. 36 of 1998) (as amended).	NWA	Provides for fundamental reform of the law relating to water resources. A natural spring originates near the north-western corner of the property (Figure 9h). Infrastructure will be constructed within 100m of the spring potentially triggering a section 21(c) & (i) Water Use Authorisation. Provided that the houses connect to the sewer reticulation network, a section 21(g) water use can be avoided. The EAP is to request a pre-application meeting with the Department of Water and Sanitation (DWS) to confirm whether a Water Use Authorisation application is necessary on a previously developed site.
National Forests Act (Act No. 84 of 1998).	NFA	To conserve and protect natural forests and woodlands as well as ensuring development with principles of sustainable management. The Department of Forestry Fisheries and Environment (DFFE) governs the removal, disturbance, cutting or damaging of protected tree species and natural forests. There are no natural forests on site. The specialist has identified three <i>Mimusops caffra</i> trees within the study area. A permit from DFFE is required prior to the cutting, removal or disturbance to these protected trees.
Integrated Coastal Management Amendment Act (Act No. 36 of 2014).	ICMAA	Establishes an integrated coastal and estuarine management system to promote the conservation of coastal environment and maintain natural attributes of coastal landscapes and seascapes. Sound coastal management principles are presented in the ICMAA which are applicable to this application. The Coastal Vulnerability Index shows the site to have a "moderate" vulnerability. All infrastructure proposed falls within 100m of the high-water mark of the sea and therefore the layout needs to be "economically justifiable and ecologically sustainable", which is a requirement of the ICMAA.
Best Practises for Coastal Development in KwaZulu-Natal (2021) ¹	-	Recognises the interrelationships between coastal users and ecosystems. The Provincial Coastal Management Programme (PCMP) sets out objectives to ensure coastal development occurs in a manner that is appropriate, adaptive and systems-based. As a PCMP output, EDTEA produced this Guideline on best practises to be adopted for development along the coast. This development is classified as a private project in terms of these guidelines and adheres to the principles of development planning provided in this document.
National Heritage Resources Act (Act No. 25 of 1999).	NHRA	For the management of national heritage resources and to nurture and conserve heritage resources so that they may be bequeathed to future generations. The existing house is not a heritage feature (i.e. it is younger than 60 years). No structures with heritage or archaeological value are located on site. The property falls within a "moderate - low" sensitive palaeontological (i.e. fossils) area. A Desktop Palaeontological Impact Assessment was therefore carried out and is attached under Appendix B. The findings of the report are summarised in section 4.0 below.

¹ Bundy, S., Goble, B., Parak, O. and Bodasing, M. "Best Practises for Coastal Development in KwaZulu-Natal" KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs, Pietermaritzburg (2021).

iLembe District Municipality Integrated Development Plan (2020 – 2021 Review)	iLembe IDP	Provided that the construction is carried out in a sustainable manner, the activities proposed at 99 Colwyn Drive are in line with the iLembe District Vision outlined in section 1.2 of the iLembe IDP. This vision is “By 2030 iLembe District Municipality will be a sustainable people-centred economic hub providing excellent service and quality of life”.
KwaDukuza Local Municipality Spatial Development Framework (2017 – 2022)	KDM SDF	The proposed development is compliant with the existing property zoning parameters with no special consent required. The project is therefore in line with the KDM SDF for the area.

3.0. MONITORING REQUIREMENTS

As per the findings of the Environmental Impact Assessment, the holders of the Environmental Authorisation are responsible for appointing an independent Environmental Control Officer (ECO) to monitor the implementation of the impact management actions. Each applicant, Mr Starr & Mr Emanuel must appoint an ECO and two separate audit reports compiled during construction of each house.

Table 4 provides a summary of the monitoring requirements to ensure effective implementation of the EMPr. It is noted that the mitigation measures listed in the EMPr as well as the Conditions of the Environmental Authorisation must be adhered to.

The appointed ECO must have the following skills:

- Knowledge and understanding of constructing on coastal environments.
- Knowledge of good practise environmental management standards.
- Understanding of the legal context of the activity including the Duty of Care and Polluter Pays principles.
- At least 2 years’ experience in the ECO field.

Table 4: Monitoring Requirements for House Starr & House Emanuel.

Method of Monitoring	<ul style="list-style-type: none"> • Site inspection by ECO to monitor the implementation of the EMPr and conditions of the EA during construction and the post-construction audit (one for each of the houses). • Visual inspections & photographs for record keeping purposes.
Frequency of Monitoring	<ul style="list-style-type: none"> • The ECO must audit the construction period of each house monthly. • One monthly report per house summarising the findings of the audits must be submitted to the landowner, Contractor and EDTEA: Compliance and Enforcement. • One post-construction audit by ECO.
Mechanism for Monitoring Compliance	<ul style="list-style-type: none"> • Written monthly audit reports for each of the houses to be submitted by the ECO after the site inspection to the Holder of Environmental Authorisation, Contractor and EDTEA: Compliance, Monitoring & Enforcement.

<p>Program for Reporting on Compliance</p>	<ul style="list-style-type: none"> • Prior to the Contractor commencing with construction, environmental induction training must be carried out in accordance with the Environmental Awareness Plan in section 5.0. • The register in section 6.0 must be signed by all Primary Contractors working on the site. • The roles and responsibilities of the individuals involved must be determined and the line of communication outlined by the ECO in the audit reports. • Any non-compliances with the EMPr identified during the site inspection must be reported to the relevant Contractor, who must rectify the non-compliance immediately or within a reasonable timeframe as agreed upon with the ECO. • An Environmental Audit Report, compliant with Appendix 7 of the NEMA EIA Regulations 2014 as amended, must be compiled by the ECO for each of the proposed houses and submitted to the relevant parties as listed above. • Prior to construction commencing on site, the holder of the Environmental Authorisation must have an agreement with the Primary Contractors working on site as to what remedial actions must be taken should environmental damage arise on the site as a result of actions by the Contractor.
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4.0. IMPACT MANAGEMENT ACTIONS

Mitigation measures provided in the tables below have been formulated during the Environmental Impact Assessment process to ensure that the expansion of infrastructure at 99 Colwyn Drive is a sustainable development, as contemplated in the principles of NEMA. The actions aim to:

- (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; and
- (ii) Comply with any prescribed environmental management standards or practices.

The tables below indicate the persons who will be responsible for the implementation of the mitigation measures / actions. Abbreviations provided below:

- Independent Environmental Control Officer *ECO*
- Engineer *ENG*
- Holder of Environmental Authorisation *DEV*
- Architect *ARC*
- Contractor *CON*

4.1. PLANNING & DESIGN

The planning and design phase for House Starr & House Emanuel is nearly complete. The holder of the Environmental Authorisation must ensure that the mitigation measures provided in Table 5 are carried through to the final design.

Table 5: Impact Management Actions to be Adhered to During the Planning & Design Phases of House Starr & House Emanuel.

Aspect	Impact	Mitigation / Actions	Responsible Person	Compliant (Yes / No)
Demolition of infrastructure at 99 Colwyn Drive.	Demolition activities becoming a nuisance to surrounding residents (dust, noise & vibrations). <i>House Starr & House Emanuel</i>	<ul style="list-style-type: none"> The use of explosives and blasting must be avoided, and manual or mechanical demolition alternatives utilised. 	CON	
Earthworks resulting in the infilling and excavation of material within 100m inland of the high-water mark of the sea during the expansion of infrastructure at 99 Colwyn Drive.	Soil erosion resulting in wash away down frontal dune and damage to adjacent coastal environment. <i>House Starr & House Emanuel</i>	<ul style="list-style-type: none"> The houses and associated structures must be founded on ground beams spanning between the end bearing auger pile foundations. The end bearing piles must be socketed within an unweathered or slightly weathered diamictite bedrock. 	DEV & ENG	
	Disturbance / removal of protected <i>Mimusops caffra</i> (Milkwood) species. <i>House Starr & House Emanuel</i>	<p>The location of the three <i>Mimusops caffra</i> (Milkwood) trees on the property are indicated in green in Figure 2. These trees are protected in terms of the National Forest Act (1998). A permit from DFFE is required prior to the cutting, removal or disturbance to these protected trees.</p> <ul style="list-style-type: none"> The two <i>Mimusops caffra</i> specimens located in the southern subdivision (i.e. House Emanuel) must be retained on the property. The <i>Mimusops caffra</i> specimen located on the northern subdivision may be removed however a permit from DFFE must be obtained prior to the removal of this protected tree species. 	DEV	
Expansion of infrastructure by 216m ² within 32m of the natural spring / well.	Construction activities encroaching down the embankment into the watercourse resulting in sedimentation and reduced functionality. <i>House Emanuel</i>	<p>The natural spring / well lies lower than the surrounding ground level with a steep, loose material bank surrounding the watercourse. Construction activities must be managed around the watercourse as follows:</p> <ul style="list-style-type: none"> The distance between the watercourse and the existing development footprint must be maintained in the House Emanuel design (minimum distance of 6m as shown in Figure 2). 	DEV	

<p>Establishment of beach access down the front of the dune.</p>	<p>Change or loss of habitat associated with the clearance of indigenous dune vegetation from within the critically endangered Northern Coastal Grasslands ecosystem (SDP, 2021).</p> <p><i>House Starr and House Emanuel.</i></p>	<p>As per the findings of the Ecological Impact Assessment, the dune vegetation is composed of “<i>early seral dune vegetation, including Gazania rigens and Carpobrotus dimidiatus</i>”. There were no species of conservation significance identified on the frontal dune. The loss of this vegetation is of negligible significance from a species diversity perspective however it is the stabilising function provided by the dune vegetation which needs to be prevented:</p> <ul style="list-style-type: none"> • Only woody / organic material may be used for the staircases leading down to the beach (preferred staircase design attached under Appendix C). A stilted walkway has been designed to reduce the footprint. • Only one gate onto the beach is permitted (i.e. collated access point for House Starr and House Emanuel). • No infrastructure is permitted seaward of the existing fence. 	<p>ARC</p> <p>DEV</p> <p>DEV</p>	
<p>Expansion of residential infrastructure & establishment of staircases down the front of the dune at 99 Colwyn Drive.</p>	<p>Cumulative impact on the sand sharing system in Sheffield Beach, including changes to the coastal fauna and faunal ethos (SDP, 2021).</p> <p><i>House Starr and House Emanuel</i></p>	<ul style="list-style-type: none"> • The use of external lighting should be confined to areas around the built structures. Specifically, no spotlights must be directed onto the beach. 	<p>DEV & ARC</p>	

4.2. PRE-CONSTRUCTION

The following actions must be undertaken prior to construction commencing on site.

Table 6: Impact Management Actions to be Adhered to During the Pre-Construction Phase of House Starr & House Emanuel.

Aspect	Impact	Mitigation / Actions	Responsible Person	Compliant (Yes / No)
<p>Demolition of infrastructure at 99 Colwyn Drive.</p>	<p>Heavy vehicles operating on site encroaching into sensitive environmental areas (i.e. front of dune and adjacent watercourse).</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> • Prior to demolition commencing, the Contractor must undergo environmental induction training prior (see Environmental Awareness Plan under section 5.0). • Induction training must include the identification and demarcation of sensitive areas. • Two temporary fences must be erected on site prior to demolition commencing (drawn in purple in Figure 2): <ul style="list-style-type: none"> - Along the top of the bank before the platform drops down towards the beach. - Along the edge of the embankment which drops down to the natural spring / well. 	<p>CON</p>	

	<p>Demolition activities becoming a nuisance to surrounding residents (dust, noise & vibrations).</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> • Immediate neighbours must be notified prior to demolition work commencing. • Barriers / screens / fencing must be erected along 99 Colwyn Drive, at the back of the property, so that access to No. 101 Colwyn Drive is not restricted during demolition and the remainder of the construction phase. 	DEV & CON	
<p>Earthworks resulting in the infilling and excavation of material within 100m inland of the high-water mark of the sea during the expansion of infrastructure at 99 Colwyn Drive.</p>	<p>Heavy construction machinery and equipment working near the frontal dune.</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> • A shade cloth fence must be erected across the front of the property where the bank slopes down to the beach (indicated in purple in Figure 2). The area seaward of the shade cloth must be treated as a No-Go area until such time as work commences on the beach access staircases. 	CON	
	<p>Indirect impact on the adjacent beach environment.</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> • Prior to any work commencing on site, the applicant must appoint an independent Environmental Control Officer (ECO). • All Primary Contractors on site must undergo environmental induction training prior to work commencing (see Environmental Awareness Plan under section 5.0 of the EMPr). • Environmental induction training must include: <ul style="list-style-type: none"> - An indication of the location of the environmentally sensitive area, which includes the fore dune in front of the house and the location of the watercourse associated with House Emanuel. - The importance of this environmentally sensitive area. - Restrictions associated with this area. - Contingency measures if the environmentally sensitive area is disturbed. 	CON & ECO	
<p>Expansion of infrastructure by 581m² within 100m inland of the high-water mark of the sea.</p>	<p>New infrastructure negatively impacting coastal processes (i.e. the sand sharing system, biotic environment, sea-level rise and storm surges).</p> <p><i>House Starr & House Emanuel.</i></p>	<p>The coastal specialist states that <i>“that present and proposed structures lying at an elevated and distal position from the shoreline, lie well beyond the sand sharing system and those areas of highest wave run up. The building of homesteads...is unlikely to elicit significant coastal or ecological impacts on the site and surrounds”</i>². This is on condition that the following is adhered to in the design phase of the project:</p> <ul style="list-style-type: none"> • Apart from the beach access staircases, all new infrastructure on site must be located above the 10m contour line (shown in Figure 2). • The staircases leading down to the beach must be constructed out of woody / organic material and “floated” above ground to reduce the footprint. 	DEV	
<p>Expansion of infrastructure by 216m² within 32m of the</p>	<p>Construction activities encroaching down the embankment into the watercourse resulting in</p>	<p>The natural spring / well lies lower than the surrounding ground level with a steep, loose material bank surrounding the watercourse. Construction activities must be managed around the watercourse as follows:</p>	CON	

² Section 7.0 of the SDP “Ecological Impact Assessment” July 2021.

natural spring / well.	sedimentation and reduced functionality. <i>House Emanuel</i>	<ul style="list-style-type: none"> The site camp and staff eating area must not be located in the north-western corner of the property. 		
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4.3. CONSTRUCTION

The following mitigation measures must be adhered to during the entire construction phase.

Table 7: Impact Management Actions to be Adhered to During Construction of House Starr & House Emanuel.

Aspect	Impact	Mitigation / Actions	Responsible Person	Compliant (Yes / No)
Demolition of infrastructure at 99 Colwyn Drive.	Heavy vehicles operating on site encroaching into sensitive environmental areas (i.e. front of dune and adjacent watercourse). <i>House Starr & House Emanuel</i>	<ul style="list-style-type: none"> No vehicles, machinery, personnel, or material is permitted beyond the temporary fences. 	CON	
	Incorrect disposal of waste and rubble. <i>House Starr & House Emanuel</i>	<ul style="list-style-type: none"> The main house and associated out buildings must be stripped first, and the materials recycled or reused prior to demolition of the structure commencing. This will reduce the volume of rubble generated. All rubble must be removed off site unless permission has been obtained from the engineer that rubble can be used a fill material / buried on site. All waste / rubble must be disposed of at a licensed landfill site. Proof of safe disposal must be provided to the ECO and retained for record keeping purposes. Water from the existing swimming pool and pond must be back utilised on site for dust suppression or spread evenly along the lawns on site. No water may be discharged directly into the watercourse or down the front of the dune. This may result in erosion on site and/or the downstream beach environment. 	CON	
	Demolition activities becoming a nuisance to surrounding residents (dust, noise & vibrations). <i>House Starr & House Emanuel</i>	<ul style="list-style-type: none"> Water suppression methods must be utilised to reduce and manage dust during demolition. Activity on site must be limited to normal construction industry working hours. All machinery and vehicles must be fitted with the appropriate noise muffling devices and must be maintained to ensure that vehicles do not produce excessive noise. 	CON	
Earthworks resulting in the	Soil erosion resulting in wash away down frontal dune and	As per section 9.0 of the Geotechnical Report, bulk earthworks have previously been carried out on site to create stepped platforms and the flat ground slope. Minimal		



<p>infilling and excavation of material within 100m inland of the high-water mark of the sea during the expansion of infrastructure at 99 Colwyn Drive.</p>	<p>damage to adjacent coastal environment.</p> <p><i>House Starr & House Emanuel</i></p>	<p>earthworks are therefore anticipated to prepare the site for construction. Exposed soil and compaction may result in silt washing off the site, down the dune especially during rainfall events. The following measures must be put in place to reduce stormwater runoff and associated erosion damage:</p> <ul style="list-style-type: none"> • Vegetation must remain in place wherever possible and for as long as possible during earthworks. The geotechnical report notes that any cutting / removal of the grass may increase slope instability. • Sound management of surface water runoff from exposed sand surfaces must be put in place early in the construction phase. This must include the placement of sandbags and/or bidim in areas of preferential surface flow. • An earth berm (maximum of 900mm high) must be placed along the top edge of the platform where the bank starts to slope down towards the beach. • Should an area of erosion be noticed on site, this must be addressed immediately, and the area stabilised to prevent further erosion. • Cut embankments must be restricted to a slope batter of 1:2 (26°). • Should medium weathered diamictite or shale of the Dwyka Formation be exposed, slopes may be steepened to a maximum batter of 1:1 (45°), depending on joints and bedding orientation. • Any trench excavations / temporary cut embankments deeper than 1.2m must be suitably battered back or shored to prevent collapse. • In accordance with the NHBRC guidelines for geotechnical investigations, the site class designation for the proposed new house with associated structures is P (Groundwater table) R - C2. The NHBRC foundation recommendations for this type of site class must be adhered to. • The following recommendations were made by the geologist for the foundations: <ul style="list-style-type: none"> - Prior to pouring concrete, all foundation excavation inverts to be free of loose soil, - Under no condition should conventional, strip foundations be placed within the very loose to loose clayey sands. - To minimize the possibility of cracking due to differential foundation movement, brick force is to be placed in all brick courses in all foundation walls as well as in all courses above windows and doors. • All stormwater run-off generated from hard surfaces on the site must be channelled, after suitable attenuation to pre-development stormwater flows, into the existing stormwater system. 	<p>CON</p>	
	<p>Soil erosion resulting in material washing into the</p>	<p>In addition to the mitigation measures provided above, the following is applicable during the construction of House Emanuel:</p>		

	<p>nearby watercourse reducing functionality.</p> <p><i>House Emanuel</i></p>	<ul style="list-style-type: none"> • A shade cloth / silt fence must be erected long the edge of the embankment which drops down to the natural spring / well (purple in Figure 12). • This silt fence must be maintained throughout the construction period to ensure that it prevents silt and construction material from washing into the watercourse / well. • Should erosion of the embankment occur / excessive silt enter the watercourse, this is to be removed by hand and the disturbed area rehabilitated in collaboration with the ECO. 	<p>CON & ECO</p>	
	<p>Heavy construction machinery and equipment working near the frontal dune.</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> • During the construction of new infrastructure on the existing platform, heavy construction machinery and equipment are not permitted near the front of the property where the bank starts to slope down to the beach (i.e. in front of the existing swimming pool). • All construction machinery / equipment on site must be in good working order to ensure there are no leaks. 	<p>CON</p>	
	<p>Indirect impact on the adjacent beach environment.</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> • During excavations for the new swimming pools, all material must be stockpiled leeward of the swimming pool area to reduce the risk of excess sand / sediment from being blown / washed onto dune and / or beach environment. • Any excess material excavated from site must either be: <ul style="list-style-type: none"> - Removed from site completely; or - Used as fill material on site behind the new houses (i.e. not near the front of the property where the bank slopes down to the beach). • All cement mixing must take place on plastic sheets and must be contained to prevent cement / concrete from entering the dune and/or nearby beach environment. 	<p>CON</p>	
	<p>Disturbance / removal of protected <i>Mimusops caffra</i> (Milkwood) species.</p> <p><i>House Starr & House Emanuel</i></p>	<p>The location of the three <i>Mimusops caffra</i> (Milkwood) trees on the property are indicated in green in Figure 2. These trees are protected in terms of the National Forest Act (1998). A permit from DFFE is required prior to the cutting, removal or disturbance to these protected trees.</p> <ul style="list-style-type: none"> • The two <i>Mimusops caffra</i> specimens located in the southern subdivision (i.e. House Emanuel) must be retained on the property. • The <i>Mimusops caffra</i> specimen located on the northern subdivision may be removed however a permit from DFFE must be obtained prior to the removal of this protected tree species. 	<p>DEV & CON</p>	
<p>Installation of the sewer pipeline along Colwyn Drive resulting in the excavation</p>	<p>Excavation of material and erosion impacting on coastal processes.</p> <p><i>House Starr & House Emanuel</i></p>	<p>All excavation activities associated with the installation of the new sewer pipeline will take place alongside Colwyn Drive. The nearest excavation will occur approximately 78m inland from the high-water mark with residential properties located in between the excavated trench and the high-water mark. All excavation therefore occurs well</p>		

<p>and infilling of material within 100m inland of the high-water mark of the sea</p>		<p>beyond the sand sharing system. To ensure that the trenches do not erode over time after heavy rains, the following applies:</p> <ul style="list-style-type: none"> • Cleared areas may not be left exposed for long periods of time and must be re-vegetated as each stage of pipework is completed. • Care must be taken to ensure that when closing trenches, soil is compacted sufficiently and left so that the level of the trench is slightly higher than the surrounding land, to allow settling. Should soil settle below the level of the surrounding land, it will leave a depression along which water will travel and this could create a focal point for erosion. 	<p>CON</p>	
	<p>Indirect impact on surrounding resident's access. House Starr & House Emanuel</p>	<ul style="list-style-type: none"> • Access along Colwyn Drive must not be denied during the installation of the sewer pipeline and appropriate signage erected. • Trenches must not remain open indefinitely. Trench work must be completed in sections and then closed once the pipe has been laid in that section. Small inspection holes may be left open along the route but the rest of the trench must be closed. • Trenches must not remain open during building shut down periods i.e. over Christmas and Easter. Trench work must be planned so that trenches are closed before these shut down periods. 	<p>CON</p>	
<p>Expansion of infrastructure by 581m² within 100m inland of the high-water mark of the sea.</p>	<p>New infrastructure negatively impacting coastal processes (i.e. the sand sharing system, biotic environment, sea-level rise and storm surges). House Starr & House Emanuel.</p>	<p>The coastal specialist states that <i>“that present and proposed structures lying at an elevated and distal position from the shoreline, lie well beyond the sand sharing system and those areas of highest wave run up. The building of homesteads...is unlikely to elicit significant coastal or ecological impacts on the site and surrounds”</i>³. This is on condition that the following is adhered to in the design phase of the project:</p> <ul style="list-style-type: none"> • Apart from the beach access staircases, all new infrastructure on site must be located above the 10m contour line (shown in Figure 2). • The staircases leading down to the beach must be constructed out of woody / organic material and “floated” above ground to reduce the footprint. 	<p>DEV CON</p>	
<p>Expansion of infrastructure by 216m² within 32m of the natural spring / well.</p>	<p>Construction activities encroaching down the embankment into the watercourse resulting in sedimentation and reduced functionality. House Emanuel</p>	<p>The natural spring / well lies lower than the surrounding ground level with a steep, loose material bank surrounding the watercourse. Construction activities must be managed around the watercourse as follows:</p> <ul style="list-style-type: none"> • The shade cloth / silt fence erected across the top of the embankment before it drops down to the watercourse must be maintained during the construction phase (indicated in purple in Figure 12). The embankment and watercourse must be treated as a No-Go area. 	<p>CON</p>	

³ Section 7.0 of the SDP “Ecological Impact Assessment” July 2021.

		<ul style="list-style-type: none"> • Heavy construction machinery and equipment is not permitted near the shade cloth fence. Construction of the new garage wall near the embankment must be carried out by hand. • No cement mixing to take place adjacent to the fence. This is to prevent spillage into the watercourse. • The existing property boundary fence running down the southern boundary must remain in place during construction to prevent staff and construction vehicles from unintentionally accessing the watercourse. • No riparian vegetation must be cleared during the construction of House Emanuel⁴. 		
Establishment of beach access down the front of the dune.	<p>Change or loss of habitat associated with the clearance of indigenous dune vegetation from within the critically endangered Northern Coastal Grasslands ecosystem (SDP, 2021).</p> <p>House Starr and House Emanuel.</p>	<p>As per the findings of the Ecological Impact Assessment, the dune vegetation is composed of “<i>early seral dune vegetation, including Gazania rigens and Carpobrotus dimidiatus</i>”. There were no species of conservation significance identified on the frontal dune. The loss of this vegetation is of negligible significance from a species diversity perspective however it is the stabilising function provided by the dune vegetation which needs to be prevented:</p> <ul style="list-style-type: none"> • The installation of the staircases must only take place in winter and not the rainy season (i.e. May – Oct). • No vegetation should actively be cleared during the installation of the new staircases thereby reducing the surface area of dune sand being exposed. • All construction on the dune must take place by hand. • General management measures must be implemented to avoid excessive excavation of the ‘dune-beach’ continuum, trampling and general restriction of activities to the construction footprint • Only the minimal number of staff are permitted within the dune cordon. All staff working on the dune must have undergone environmental induction training so that the disturbance footprint is minimised. 	CON	
	<p>Removal of existing concrete staircase down to the beach.</p> <p>House Starr</p>	<p>This is a positive impact associated with the project.</p> <ul style="list-style-type: none"> • The concrete strips / steps must be removed from the dune. • The natural gradient of the dune must be re-established using rakes. • All work taking place on the dune must be carried out by hand. • The affected area must be re-established to natural dune / cliff form. Indigenous dune vegetation must be replanted on the exposed sand surfaces. These 	CON	

⁴ “Riparian habitat” is defined in the National Water Act (1998) as “the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas”.



		<p>species may include <i>Scaevola plumieri</i>, <i>Phyllohydrax carnosa</i>, <i>Gazania rigens</i> and <i>Canavalia rosea</i> (all common to the vegetation type).</p> <ul style="list-style-type: none"> The planted dune vegetation composition must align with the established dune vegetation on adjacent properties. Any emergence and spread of exotic species must be addressed through the implementation of the Alien Invasive Plants Eradication Management Plan (section 5.4.2. of the EMPr). 		
Expansion of residential infrastructure at 99 Colwyn Drive.	<p>Increase in hard surfaces resulting in a change in the hydrology (SDP, 2021). This has the potential for higher velocity stormwater runoff onto the beach, dune environment and watercourse. A change in hydrology also has the potential to alter the plant community within the frontal dune and more distal cliff form.</p> <p><i>House Starr and House Emanuel</i></p>	<p>A change in the plant community within the frontal dune and distal cliff from may be brought about by changes in the availability of water and chemistry. While plant communities may alter to accommodate such change, invertebrates, such as coastal amphipods and isopods (Crustacea), noted from the seeps in this region may also be affected, with possible impacts on such communities. The significance of this impact has been reduced using the preferred Technology Alternative for offsite sewage disposal.</p> <ul style="list-style-type: none"> Rainwater must be allowed to percolate on site underneath any decking. This is to promote stormwater infiltration and groundwater recharge. All stormwater must be attenuated on site and must not be discharged out the front of the property. <p>As recommended by the geotechnical engineer:</p> <ul style="list-style-type: none"> All stormwater run-off from the new infrastructure proposed on site must be channelled, after suitable attenuation to pre-development stormwater flows, into the existing stormwater system. 	ARC ENG ENG & CON	
Site Camp	<p>Incorrect placement of the site camp indirectly impacting environmentally sensitive areas (coastal environment and adjacent watercourse).</p> <p><i>House Starr and House Emanuel.</i></p>	<ul style="list-style-type: none"> The site camp must not be located on the eastern side of the property where the gradient drops down steeply towards the beach. The site camp must not be located in the north-western corner of the property. The site camp must be located on a flat portion of land and must include a parking area for vehicles. Signage is to be erected outside site camp indicating relevant contact details of responsible person in case of complaints or emergencies after hours. 	CON	
Record Keeping	<p>Proof of safe disposal & sustainably sourced material.</p> <p><i>House Starr and House Emanuel.</i></p>	<p>The following documents must be retained on site for auditing purposes:</p> <ul style="list-style-type: none"> Environmental Authorisation Environmental Management Program Environmental Audits for the site A full inventory of all hazardous materials must be retained on site with the respective Material Safety Data Sheets Safe disposal slips for waste (general, hazardous and chemical toilets) 	CON	

		<ul style="list-style-type: none"> • Proof of raw material sourcing (i.e. building sand, gravel etc.) • Environmental training registers • Record of incidents on site, including photographs (if applicable) • Any other permits, licenses or approvals that may be applicable to the site (i.e. DEFF permits). 		
Vehicles & Equipment	<p>Disturbance to areas adjacent to construction site and contamination of environment.</p> <p><i>House Starr and House Emanuel.</i></p>	<ul style="list-style-type: none"> • Major vehicle servicing is not permitted on site. Only emergency / minor repair work is permitted. • A drip tray must be used to capture any spills during emergency / minor repair work. • Construction vehicles must not be washed on site unless water can be captured in a sump and hydrocarbons / other contaminants removed prior to water being released into the surrounding environment. • No vehicles are permitted within the sensitive No-Go areas illustrated in Figure 2. 	CON	
Material Storage Areas & Stockpiles	<p>Sedimentation risk.</p> <p><i>House Starr and House Emanuel.</i></p>	<ul style="list-style-type: none"> • Material stockpiles must not exceed 2m in height, must be covered, or grassed to prevent erosion caused by exposure to heavy wind or rain. • Stockpiling of material must not take place on steep slopes where there is an opportunity for material to wash into the surrounding environment / down the frontal dune. 	CON	
Waste Management	<p>General waste becoming a nuisance on site and blowing into environmentally sensitive areas / neighbouring properties.</p> <p><i>House Starr and House Emanuel.</i></p>	<ul style="list-style-type: none"> • All waste generated on site must be disposed of in the designated waste management area. • The waste management area must not be located at the edge of the platform where the dune drops down towards the beach. • The waste management area must not be located within 15m of the watercourse. • General waste must be removed from site on a weekly basis to ensure there is no build up of waste in the waste management area. • All waste must be stored under cover to prevent rain ingress and/or waste from being blown around site, onto the beach, into the watercourse or into adjacent residential properties. • No waste must be buried or burnt on site. 	CON	
	<p>Greywater / hydrocarbons or chemicals storage and use on site having the potential to pollute the adjacent beach environment or nearby watercourse.</p>	<ul style="list-style-type: none"> • Potentially hazardous substances⁵ to be stored in a fenced off area that is undercover to prevent contamination of rainwater. • The hazardous storage area must not be located at the edge of the platform where the dune drops down towards the beach. • The hazardous storage area must not be located within 15m of the watercourse. 	CON	

⁵ Hazardous substances refer to substances scheduled in the Hazardous Substances Act (1973) and Hazardous Chemical Substances Regulations (1995) and include paint, oils, fuels, solvents, pesticides.

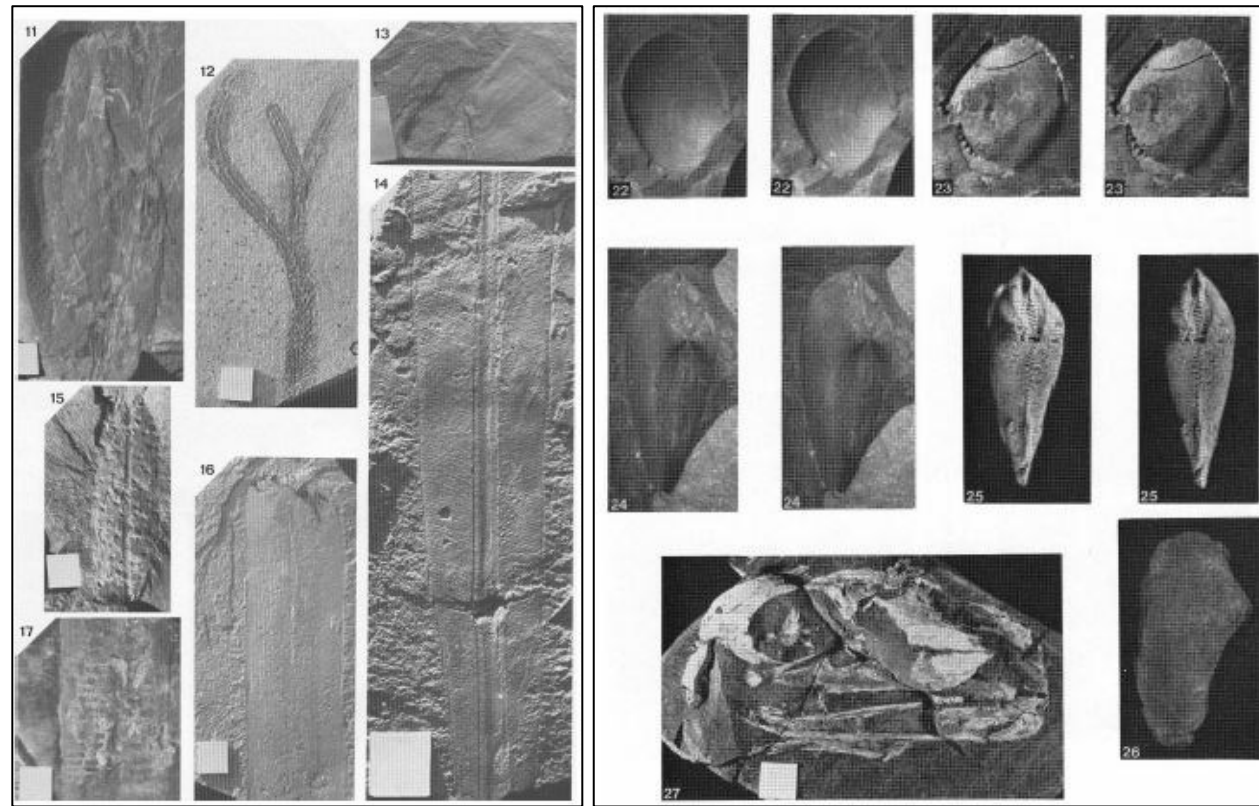
	House Starr and House Emanuel.	<ul style="list-style-type: none"> • All potentially hazardous substances must be stored, in a bunded area (110% capacity of largest container) with an impermeable surface to prevent soil contamination during handling. • No bulk storage of fuel on site (>30m³). • Decanting of potentially hazardous substances must be carried out within the confines of a drip tray / similar or using a hand pump. • Hazardous waste must be disposed of at a registered hazardous landfill site. • Cement mixing must take place on a hard surface that is protected from stormwater runoff. 		
	<p>Construction staff using the surrounding environment as ablutions.</p> <p>House Starr and House Emanuel.</p>	<ul style="list-style-type: none"> • Ablution facilities must be accessible to all construction workers. • No pit latrines are permitted on site. • Toilets must be located within the property boundaries. • Toilets must not be located near the fore dune in front of the house or within 15m of the watercourse. • Staff must use the toilets provided and must not use any other areas on site as toilet facilities. • On-site toilets will be provided for domestic purposes during construction phase (chemical or connected to municipal sewerage pipeline). • Toilets should be screened from the neighbours as far as is practically possible. • Ablution facilities must be checked regularly and kept in a clean state. 	CON	
Spills Incidents &	<p>Hydrocarbons or other liquids / chemicals contaminating the surrounding environment.</p> <p>House Starr and House Emanuel.</p>	<ul style="list-style-type: none"> • The ECO's environmental toolbox talk must include a spill response procedure and incident reporting so all staff know how to clean up minor and major spills (included in the Environmental Awareness Plan; section 4.0 of the EMPr). • Drip trays must be available near the hazardous storage area and where hazardous materials are being used on the site. • A Spill Kit / similar must be available near the hazardous storage area. 	CON	
Dust Emissions &	<p>Dust & emissions becoming a nuisance on site and to nearby residents.</p> <p>House Starr and House Emanuel.</p>	<ul style="list-style-type: none"> • During high winds, dust suppressing must take place using water carts / hose to prevent excessive dust on site. • Any fine materials stockpiled on site must be covered to prevent dust from being blown around. • Material transported to site on the back of trucks must be covered, • A complaints register must be maintained on site and any complaints received addressed timeously. • A shade cloth fence / other screening techniques must be used to reduce dust from entering other properties. • All construction vehicles and equipment must be well maintained to reduce emissions generated on site. 	CON	



Noise	<p>Noise becoming a nuisance on site and to nearby residents.</p> <p><i>House Starr and House Emanuel.</i></p>	<ul style="list-style-type: none"> • All construction vehicles must be well maintained to reduce noise on site. • All construction vehicles and equipment must be fitted with standard silencers. • No construction vehicles or machinery to operate outside of construction working hours (07:00 – 18:00). • Neighbours to be advised prior to work being done outside the above times. • A complaints register must be maintained on site and any complaints received addressed timeously. 	CON	
Alien Invasive Vegetation	<p>Proliferation of exotic species on site and within adjacent dune environment.</p> <p><i>House Starr and House Emanuel</i></p>	<p>Construction activities, primarily vegetation clearance, typically provides an opportunity for the proliferation of exotic species within the disturbed area. The establishment and spread of alien invasive species within the disturbance footprint must be managed throughout the construction phase by the Contractor.</p> <ul style="list-style-type: none"> • The “<i>Eradication of Alien Invasive Plant</i>” Management Plan must be implemented on site during construction (section 5.4.2 of the EMP). This Management Plan includes a list of common alien invasive plant species anticipated on site, identification photographs and eradication measures. • Alien invasive species must not be permitted to establish on site or on the fore dune. 	CON	
Cultural Heritage /	<p>Items of historical, archaeological or cultural significance destroyed or disturbed during excavations.</p> <p><i>House Starr and House Emanuel.</i></p>	<ul style="list-style-type: none"> • During earthworks, should any objects with historical, archaeological or cultural significance be uncovered, all work in this area must cease and the heritage authority, AMAFA, notified. • Objects with historical, archaeological or cultural significance must not be destroyed or removed from site without prior permission from AMAFA. • Should any human remains be discovered, all work in this area must cease and the South African Police contacted for further direction. 	CON	
Palaeontological / Fossils	<p>Fossils destroyed or disturbed during excavations.</p> <p><i>House Starr and House Emanuel.</i></p>	<ul style="list-style-type: none"> • During earthworks, the following procedure must be adhered to if fossils are discovered (see photographs provided below for examples of the type of fossils that could be found on the site): <ul style="list-style-type: none"> - When excavations begin the rocks must be given a cursory inspection by the ECO or designated person. Any fossiliferous material (shells, plants, insects, bone, coal – see Figure 3) must be put aside in a protected place. This way construction activities will not be interrupted. - Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (see below). - Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. - If there is any possible fossil material found then a qualified palaeontologist, must visit the site to inspect the selected material. 	CON & ECO	

- Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
- If no good fossil material is recovered then no site inspections by the palaeontologist will not be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
- If no fossils are found and the excavations have finished then no further monitoring is required.

Figure 3: Example of plant and invertebrate fossils from the Dwyka Group (source: Proff. Marion Bamford).



4.4. REHABILITATION / POST CONSTRUCTION

Once construction is complete on site, the Contractor and ECO must ensure that the mitigation measures listed in the table below are adhered to. This will ensure that there will be no residual impacts on the environment remaining once construction is complete.

Table 8: Impact Management Actions to be Adhered to Once Construction is Complete.

Aspect	Impact	Mitigation / Actions	Responsible Person	Compliant (Yes / No)
Post-Construction Audit	<p>To ensure the site is stable and there are no outstanding environmental non-compliances that need to be corrected by the Contractor.</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> • The ECO must carry out a post-construction inspection of the site once construction is complete. • Clearance from the ECO must be obtained to ensure there are no outstanding environmental non-compliances prior to the Contractor vacating the site. • The following areas must be audited by the ECO in the post-construction inspection: <ul style="list-style-type: none"> - No waste / litter remaining on site; - There is no evidence of spills or building rubble remaining on site; - There are no left over building material remaining on site; - All exposed surfaces have been rehabilitated / landscaped to avoid sediment wash away; - Stormwater management has been formalised; - There is no evidence of erosion; and - No environmentally sensitive areas, indicated in Figure 2, have been damaged. If damage is evident, rehabilitation measures must be prescribed by the ECO and carried out by the Contractor. 	CON & ECO	
Earthworks resulting in the infilling and excavation of material within 100m inland of the high-water mark of the sea during the expansion of infrastructure at 99 Colwyn Drive.	<p>Disturbance / removal of protected <i>Mimusops caffra</i> (Milkwood) species.</p> <p><i>House Starr & House Emanuel</i></p>	<p>The location of the three <i>Mimusops caffra</i> (Milkwood) trees on the property are indicated in green in Figure 2. These trees are protected in terms of the National Forest Act (1998). A permit from DFFE is required prior to the cutting, removal or disturbance to these protected trees.</p> <ul style="list-style-type: none"> • The two <i>Mimusops caffra</i> specimens located in the southern subdivision (i.e. House Emanuel) must be retained on the property. • The <i>Mimusops caffra</i> specimen located on the northern subdivision may be removed however a permit from DFFE must be obtained prior to the removal of this protected tree species. • Landscaping must be confined to the existing cut platform while the dune frontage and slopes be retained in a more natural form. • An indigenous and appropriate (coastal dune species) planting palette must be employed on the property. 	CON & ECO	

<p>Installation of the sewer pipeline along Colwyn Drive resulting in the excavation and infilling of material within 100m inland of the high-water mark of the sea</p>	<p>Indirect impact on surrounding resident's access.</p> <p><i>House Starr & House Emanuel</i></p>	<ul style="list-style-type: none"> Access routes and other areas disturbed by construction infrastructure must be rehabilitated prior to the Contractor leaving the site. 	<p>CON</p>	
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4.5. OPERATION

Provided that the above mitigation measures /actions are adhered to, the operational phase will have a low impact on the surrounding environment. Table 9 provides mitigation measures which are ongoing through-out the lifespan of the project.

Table 9: Impact Management Actions to be Adhered to During the Operational Phase of House Starr & House Emanuel.

Aspect	Impact	Mitigation / Actions	Responsible Person	Compliant (Yes / No)
<p>Expansion of infrastructure by 581m² within 100m inland of the high-water mark of the sea</p>	<p>Incremental creep of infrastructure towards the sea.</p> <p><i>House Starr</i></p>	<p>House Emanuel will fit largely in the existing house footprint with the proposed new swimming pool located a couple of meters leeward of the existing pool. There will therefore be no creep of infrastructure towards the sea on the southern subdivision. The existing house footprint will be expanded seaward by approximately 8m on the northern subdivision (House Starr). The new swimming pool is proposed in front of the new house, in line with the edge of House Emanuel's swimming pool. All infrastructure is located on the existing platform above the 10m contour line.</p> <ul style="list-style-type: none"> The eastern edge of the swimming pools for House Emanuel and Starr provides the development setback line for the property. Any future development on site must take place leeward of this line. 	<p>DEV</p>	
<p>Establishment of beach access down the front of the dune.</p>	<p>Removal of existing concrete staircase down to the beach.</p> <p><i>House Starr</i></p>	<ul style="list-style-type: none"> The applicants are responsible for ensuring the long-term survival of the dune species. Any emergence and spread of exotic species must be addressed through the implementation of the Alien Invasive Plants Eradication Management Plan (section 5.4.2. of the EMP_r). 	<p>DEV</p>	

Expansion of residential infrastructure at 99 Colwyn Drive	<p>Climate change and rising sea levels having a medium to long-term impact on infrastructure on site.</p> <p><i>House Starr and House Emanuel</i></p>	<p>Climate change is anticipated to include a rise in sea level as well as an increase in severe storm events⁶. An approximate maximum increase in sea level of 0.8m is expected over the next 25 years.</p> <ul style="list-style-type: none"> • Provided that all residential infrastructure remains on the existing platform, the property is elevated enough to accommodate the anticipated sea level rise. • The installation of the staircases down the front of the dune must be constructed in accordance with the mitigation measures provided in section 4.3 thereby reducing the erosion risk of rising sea levels and severe storm events. 	DEV CON	
	<p>Placement of the staircases down the dune within the shoreline interrupting sediment transport regime (SDP, 2021).</p> <p><i>House Starr and House Emanuel</i></p>	<p>As per the SDP Ecological Impact Assessment, there is no intrusion into the sand sharing system by built structures other than the staircases down the front of the dune. Minor sediment mobilisation at the point of excavation.</p> <ul style="list-style-type: none"> • It is the responsibility of the landowner to ensure that dune vegetation re-establishes where it has been disturbed during construction and managed in the long-term. • As stated above, species common to the Subtropical Seashore vegetation type must be maintained on the dune in line with established dune vegetation on the neighbouring properties. 	DEV	

⁶ Bundy, S., Goble, B., Parak, O. and Bodasing, M. “*Best Practises for Coastal Development in KwaZulu-Natal*” KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs, Pietermaritzburg (2021).

5.0. ENVIRONMENTAL AWARENESS PLAN

This Environmental Awareness Plan describes the manner in which the holder of the Environmental Authorisation must inform all Contractors and employees of the environmental risk which may result from their work; and that the risks must be dealt with to avoid pollution or the degradation of the environment.

5.1. INDUCTION

All Primary Contractors working at 99 Colwyn Drive must receive a copy of the Environmental Awareness Plan and sign the register attached stating that they have received a copy of the EMPr and are aware of the environmental risks. Contact details for the Environmental Control Officer (ECO) are provided below if Contractors require any clarification or assistance with the demarcation of sensitive areas (shown in Figure 2).

Table 10: Important Contact Information.

Designation	Company	Contact Person	Contact Details (to be completed on site)
Holder of the Environmental Authorisation (House Starr)	-	Michael Starr	
Holder of the Environmental Authorisation (House Emanuel)	-	Rob Emanuel	
Environmental Assessment Practitioner	Confluence Strategic Development	Stephanie Denison	
Environmental Control Officer			
Coastal Specialist	SDP Ecological & Environmental Services	Simon Bundy	
Consulting Engineer	MonoBlock	Christian Kayer	

5.2. ENVIRONMENTALLY SENSITIVE AREAS

Please refer to section 1.3 of the EMPr and Figure 2, which provides a description of the environmentally sensitive areas associated with the property. These areas must be demarcated and avoided during construction. Contractors must be aware of the primary Impact Management Outcome, which is ***to create a sustainable development by preventing construction activities from impacting the sand sharing system and nearby watercourse.***

5.3. BASIC ENVIRONMENTAL TRAINING POINTS

All staff working on site must receive basic environmental training, which includes the items listed below. Please note that the ECO must be available to conduct environmental training should the Contractor prefer.

- Context of House Starr / House Emanuel and the applicability of the EA and EMPr.
- The location of environmentally sensitive features (Figure 2).
- Restrictions associated with the environmentally sensitive features.
- Waste management (general & hazardous).
- No cement mixing directly on exposed soil outside of construction footprint.
- Management of hazardous substances (paint, oil, drip trays, spills etc.).



- Sanitation (i.e. the use of toilets).
- Nuisance to neighbouring properties.

5.4. PROCEDURES FOR HANDLING ENVIRONMENTAL RISKS

All construction staff working on House Starr / House Emanuel must be aware of the procedures listed below.

5.4.1. SPILL RESPONSE⁷

In the event of a spillage, the following procedure must be adhered to so that there is minimal impact on the surrounding environment. Diesel and oil are the most likely hydrocarbons that will be spilled on the site.

1. **ASSESS THE RISK**
 - WHAT was spilled; and
 - HOW MUCH was spilled.
2. **SELECT THE RELEVANT PERSONAL PROTECTIVE EQUIPMENT (PPE)**
3. **CONFINE THE SPILL**
 - Block, Divert away from sensitive environmental areas and confine spill.
 - Use absorbents or boom in Spill Kit
 - Stop the flow of the spill.
4. **STOP THE SOURCE**
5. **EVALUATE THE SPILL AND IMPLEMENT APPROPRIATE CLEAN UP**
 - Re-assess the spill and decide on most appropriate method of clean up.
 - Absorb spill using materials in Spill Kit or soil / wood chips.
 - Using a broom, rag or other material, scrub the impacted area or using a spade, dig out the contaminated soil.
6. **DECONTAMINATE**
 - All PPE must be removed and disposed of as hazardous waste if contaminated.
 - All rags / materials used during the clean up as well as the actual spilled material must be disposed of as hazardous waste.
7. **REPORTING**
 - Responsible person to determine if the spill constitutes an “incident”, see definition below.
 - All incidents must be reported as per the procedure outlined in section 5.4.3.

⁷ Seven Step Spill Procedure Accessed from Border Hazmat: Specialised Environmental Cleaning (<http://borderhazmat.co.za/7-step-spill-procedure/>). Accessed on 12th March 2021.



5.4.2. ERADICATION OF ALIEN INVASIVE PLANTS





Alien Invasive Plant (AIP) species rapidly establish in disturbed areas due to the lack of competition from other indigenous species. AIP species rapidly colonise and area and can spread to other areas outside of the development footprint. It is therefore important for construction staff to receive some training on how to identify and remove AIPs before they become a nuisance and negatively impact the rehabilitation efforts underway within the study area. The list below can also be used by the landowners when eradicating AIP species during the operational phase of the development.

Notes:

- Mechanical removal of AIPs (i.e. hand pulling / slashing) is preferred above chemical control.
- All mixes given as a percentage (ml per 100 l water/diesel).
- Apply methods either by species or by area i.e. multiple areas, one species or one area, multiple species.
- Autumn and winter - basal stem and cut stump treatments, no foliar spraying.
- Spring and summer - foliar spraying can be done on suitable plants. Rule of thumb - don't spray anything over 1.5 m tall. Spray during the morning (8 am to 11 am) during calm conditions.
- NB PPE when spraying - rubber gloves, goggles, respirator, apron/chemical overall, rubber boots.
- NEVER use diesel for foliar application.
- If in doubt, check the herbicide label.
- Follow up treatment/clearance is essential for effective AIP management.

Table 11: AIP species likely to be associated with 99 Colwyn Drive.

Scientific Name	Common Name	Identification Image	Scientific Name	Common Name	Identification Image
<i>Chromolaena odorata</i> .	Chromolaena		<i>Ricinis communis</i>	Castor Oil	

<p><i>Cardiospermum grandiflorum</i></p>	<p>Balloon Vine</p>		<p><i>Tithonia diversifolia</i></p>	<p>Mexican Sunflower</p>	
<p><i>Solanum mauritianum</i></p>	<p>Bugweed</p>		<p><i>Sisal americana</i></p>	<p>Sisal</p>	

5.4.3. REPORTING OF ENVIRONMENTAL INCIDENTS

Definitions

" <i>Incident</i> " as defined in NEMA	An unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property.
" <i>Incident</i> " as defined in NWA	Incident or accident in which a substance- (i) pollutes or has the potential to pollute a water resource: or (ii) has or is likely to have, a detrimental effect on a water resource.
" <i>responsible person</i> " as defined in NEMA & NWA	Includes any person who- (i) is responsible for the incident; (ii) owns any hazardous substance involved in the incident; or (iii) was in control of any hazardous substance involved in the incident at the time of the incident.
" <i>relevant authority</i> " as defined in NEMA	(i) a municipality with jurisdiction over the area in which an incident occurs; (ii) a provincial head of Department or any other provincial official designated for that purpose by the MEC in a province in which an incident occurs; (iii) the Director-General; (iv) any other Director-General of a national department.

Procedure should an *incident*, as defined above, occur on site:

The responsible person or, where the incident occurred in the course of that person's employment, his or her employer	Complete an Emergency Incident Report (template provided in Appendix 2). The report must be sent to the following personnel within 14 days of the incident occurring. (i) the Director-General of the Department of Environmental Affairs; (ii) the Director-General of the Department of Water & Sanitation; (iii) the South African Police Services and the relevant fire prevention service; (iv) the relevant provincial head of department or municipality; (v) The relevant catchment management agency, if applicable; and All persons whose health may be affected by the incident.
The responsible person or, where the incident occurred in the course of that person's employment, his or her employer, must, as soon as reasonably practicable after knowledge of the incident-	(i) Take all reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons; (ii) Undertake clean-up procedures; (iii) Remedy the effects of the incident; (iv) Assess the immediate and long-term effects of the incident on the environment and public health;

Should the responsible person fail to comply, or inadequately comply with a directive received by a relevant authority, there be uncertainty as to who the responsible person is; or there be an immediate risk of serious danger to the public or potentially serious detriment to the environment, a relevant authority may take the measures it considers necessary to contain and minimise the effects of the incident; undertake clean-up procedures; and remedy the effects of the incident. A relevant authority may claim reimbursement of all reasonable costs incurred by it in terms of subsection (8) from every responsible person jointly and severally.



6.0. RECEIPT OF ENVIRONMENTAL MANAGEMENT PROGRAMME & ACKNOWLEDGEMENT OF ENVIRONMENTAL RISKS

By signing this register, I confirm that I have received a copy of the Environmental Management Programme (EMPr) prepared by Confluence Strategic Development (Pty) Ltd and dated November 2021. I am aware of the environmental sensitivities of the site as shown in Figure 2 of the EMPr.

COMPANY	NAME	CONTACT DETAILS	AREA OF WORK	SIGN

APPENDIX 1

EMERGENCY INCIDENT REPORT TEMPLATE