DRAFT

EXPANSION OF INFRASTRUCTURE AT 25 LLEWELLYN ROAD RESULTING IN THE INFILLING & EXCAVATION OF MATERIAL WITHIN 100M OF THE HIGH-WATER MARK OF THE SEA, THE PLANTING OF VEGETATION ON A DUNE AND THE EXPANSION OF INFRASTRUCTURE WITHIN 32M OF A WATERCOURSE

KWADUKUZA MUNICIPALITY

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A full curriculum vitae of the Environmental Assessment Practitioner (EAP) is provided under Appendix A as well as a Declaration of Independence. Approved minutes from the pre-application meeting are also included under Appendix A.

The EAP confirms that:

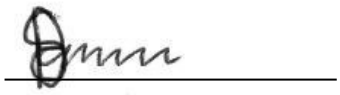
a) All information contained in the Basic Assessment Report is, to the best of my knowledge, accurate and correct.

b) Comments and input from stakeholders and registered Interested and Affected Parties have been included in the Basic Assessment Report.

c) Input and relevant recommendations contained in the attached specialist reports have been included in the Basic Assessment Report and Environmental Management Programme.

d) All relevant, available information has been provided to registered Interested and Affected Parties; and

e) Responses to comments or inputs made by registered Interested and Affected Parties has been included under Appendix D.



Stephanie Denison

29th June 2022

EXECUTIVE SUMMARY

Monique Middleton owns the property described as Portion 358 (of 356) of Farm Lot 61 No. 1521, located at 25 Llewellyn Road, Sheffield Beach (29°29'09.86"S; 31°15'18.92"E). The Middleton family propose to demolish the existing, partially built structure on the property and construct a new residential dwelling. Construction of proposed House Middleton will take place within 100m of the high-water mark of the sea and within 32m of a dysfunctional wetland, located along the south-eastern extent of the property. Once construction is complete, the applicant proposes to landscape the remainder of the property to remove alien invasive plant species and re-introduce indigenous coastal species back to the area.

The expansion of infrastructure on the site, the excavation of material during construction and the landscaping of dune environment requires Environmental Authorisation from the Department of Economic Development, Tourism and Environmental Affairs (EDTEA).

One layout alternative has been assessed. Two technological alternatives for sewage disposal have been assessed with the preferred alternative being a split soakaway system, where blackwater and greywater are separated. Blackwater will be disposed of onsite using a septic tank and greywater will be discharged into an artificial reed bed, reducing the volume of wastewater carrying a high bacteria load onto the adjacent beach environment. Measures provided in the Ecological Impact Assessment, Geotechnical Report and Palaeontological Impact Assessment have been included in the Environmental Management Programme (EMPr), which is to be adhered to during construction.

The following provides a summary of the key findings of the Environmental Impact Assessment:

1. Indirect impacts on the adjacent beach environment during the infilling and excavation of material at 25 Llewellyn Road. Measures to manage excavations on site have been included in the attached EMPr which reduces the significance of the potential impact from low to very low risk. These measures include the management of excavated material on site, the establishment of No-Go Areas and environmental awareness training to be conducted with all primary contractors prior to work commencing on site.
2. New infrastructure negatively impacting on coastal processes (i.e. sand sharing system). This impact was assessed by the coastal specialist, who concluded that all new residential infrastructure lies well above 20 metre contour and therefore will have little to no influence on coastal processes.
3. Expansion of infrastructure within close proximity to the watercourse resulting in direct physical impacts and long-term indirect impacts on the wetland. The risk to the adjacent wetland has been reduced in the preferred technology alternative. All service infrastructure has been removed outside the watercourse. Impact management measures have been included in the EMPr, which must be adhered to during construction.
4. General construction-related impacts (i.e. dust, noise, waste management etc.) will be managed in accordance with the EMPr attached under Appendix E.
5. Positive impacts associated with the project include the alignment of the proposed development with the current coastal management best practice guidelines (i.e. removal of previously infilled material within the dune and clearance of alien vegetation) and re-introduction of indigenous coastal dune species into the eastern extent of the property post-construction.
6. The long-term / operational phase of the expansion of infrastructure at 25 Llewellyn poses little to no risk on coastal processes and has a low-risk significance to the nearby watercourse.

All impacts identified in the Basic Assessment Report can be mitigated to an acceptable level of risk provided that the measures included in the attached EMPr are adhered to and the preferred Technology Alternative is authorised. The Environmental Assessment Practitioner is therefore of the opinion that the Expansion of Infrastructure at 25 Llewellyn Road Resulting in the Infilling and Excavation of Material within 100m of the High-Water Mark of the Sea and the Planting of Vegetation on the Dune and the Expansion of Infrastructure within 32m of a Watercourse (Layout Alt 2; Technology Alt 2) be authorised by EDTEA. The landowner will be responsible for the implementation of the EMPr during the construction of the residential development.

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1.0 INTRODUCTION

1.1 DESCRIPTION OF ACTIVTY TO BE UNDERTAKEN

Monique Middleton owns the property described as Portion 358 (of 356) of Farm Lot 61 No. 1521, located at 25 Llewellyn Road, Sheffield Beach (29°29'09.86"S; 31°15'18.92"E; Figure 1). The property is within Ward 22 of the KwaDukuza Local Municipality, iLembe District.

There is an existing structure on the property, which was partially constructed in 2005 / 2006 (footprint outlined in yellow in Figure 2). The building was never completed, and the property has remained vacant since construction ceased in 2006. Monique Middleton purchased the property in December 2020 and intends to demolish the existing structure and construct a new, private residential dwelling (Figure 3).

The property is 1 600m^2 in extent and falls entirely within 100m of the high-water mark of the sea. A dysfunctional wetland has been delineated in the south-eastern portion of the property (shaded in blue in Figure 2). The following activities are proposed for House Middleton:

- Demolition of existing residential infrastructure (540m^2)
- Construction of new residential dwelling including garages (443m^2)
- Construction of a cobblestone driveway (195m^2)
- Construction of a stilted swimming pool (5m^2)
- Construction of a wooden deck (113m^2)
- Construction of fence along eastern boundary (6m^3)
- Removal of previously dumped rubble and infill from the dune environment (20m^3).
- Landscaping of the dune (470m^2).
- Excavation of the dune to install services and construction of an artificial reed bed (42m^3).

During the construction of House Middleton, the existing development footprint will be expanded by 234m^2 within 100m inland of the high-water mark of the sea [cobblestone driveway (195m^2), stilted swimming pool (5m^2), fence (12m^2) and service infrastructure (22m^2)]. Infrastructure will be expanded by 27m^2 within 32m of a watercourse [stilted swimming pool (5m^2) and service infrastructure (22m^2)].

A volume of 168m^3 of material will be excavated and infilled within 100m of the high-water mark of the sea [construction of new residential dwelling foundations (100m^3), removal of previously dumped rubble on site (20m^3), excavation for installation of services (42m^3) and construction of fence (6m^3)]. A volume of 16m^3 of material will be excavated and infilled within the dysfunctional wetland [excavation of greywater reed bed (10m^3) and construction of fence (6m^3)]. Once construction is complete, an area of 470m^2 of dune will be landscaped and planted with indigenous vegetation.

The above triggers Activity 18, 19, 19A and 54 of Listing Notice 1 and Activity 23 of Listing Notice 3 (NEMA EIA Regulations 2014 as amended). Environmental Authorisation is required following a Basic Assessment process. A detailed breakdown of all listed activities being applied for is provided in Table 1 below.

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

Activity #	Relevant Listing Notice	Listed Activity Description as Per the Legislation	Listed Activity Description as Per the Project Description
18 (i)	Listing Notice 1 (GNR327) 04th December 2014 as amended.	The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square metres, within the littoral active zone, for the purpose of preventing the free movement of sand, erosion or accretion, excluding where — (i) the planting of vegetation or placement of material relates to restoration and maintenance of indigenous coastal vegetation undertaken in accordance with a maintenance management plan; or	Once construction is complete, an area of 470m^2 of dune will be landscaped and planted with indigenous vegetation.
19	Listing Notice 1 (GNR327) 04th December 2014 as amended.	The infilling or depositing of any material of more than 10m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10m^3 from a watercourse.	A volume of 16m^3 of material will be excavated and infilled within the dysfunctional wetland [excavation of greywater reed bed (10m^3) and construction of fence (6m^3)].
19A (ii)	Listing Notice 1 (GNR327) 04th December 2014 as amended.	The infilling or depositing of any material of more than 5m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5m^3 from ii) the littoral active zone, an estuary or a distance of 100m inland of the highwater mark of the sea or an estuary, whichever distance is the greater.	During construction, 168m^3 of material will be excavated and infilled within 100m of the high-water mark of the sea [construction of new residential dwelling foundations (100m^3), excavation for installation of services (42m^3) and construction of fence (6m^3)]. A further 20m^3 of previously dumped rubble and material within the dune environment will be removed.
54 (v) (e)	Listing Notice 1 (GNR327) 04th December 2014 as amended.	The expansion of facilities - (v) if no development setback exists, within a distance of 100m inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of— (e) infrastructure or structures where the development footprint is expanded by 50m^2 or more.	The existing development footprint will be expanded by 234m^2 [cobblestone driveway (195m^2), stilted swimming pool (5m^2), fence (12m^2) and service infrastructure (22m^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) 04th December 2014 as amended.	The expansion of— (x) buildings where the building is expanded by 10 square metres or more in size; (xii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;] where such [development] expansion occurs— (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.	The existing development footprint will be expanded by 27m^2 within 32m of the dysfunctional wetland which extends along the eastern extent of the property [stilted swimming pool (5m^2) and service infrastructure (22m^2). The expansion of infrastructure within 32m of the watercourse will take place within 100m of the high-water mark of the sea.

1.2 LOCATION OF ACTIVITY

House Middleton is located at 25 Llewellyn Road in Sheffield Beach. The property is in Ward 22 of the KwaDukuza Local Municipality, iLembe District (centre of site: 29°29'09.86"S; 31°15'18.92"E). Please refer to Figure 1 for the Locality Map.

Property Description	Portion 358 (of 356) of Farm Lot 61 No. 1521
21 Digit Surveyor General code	N0FU00000000152100734

Figure 1: Locality Map with the Site Indicated by the Red Circle.

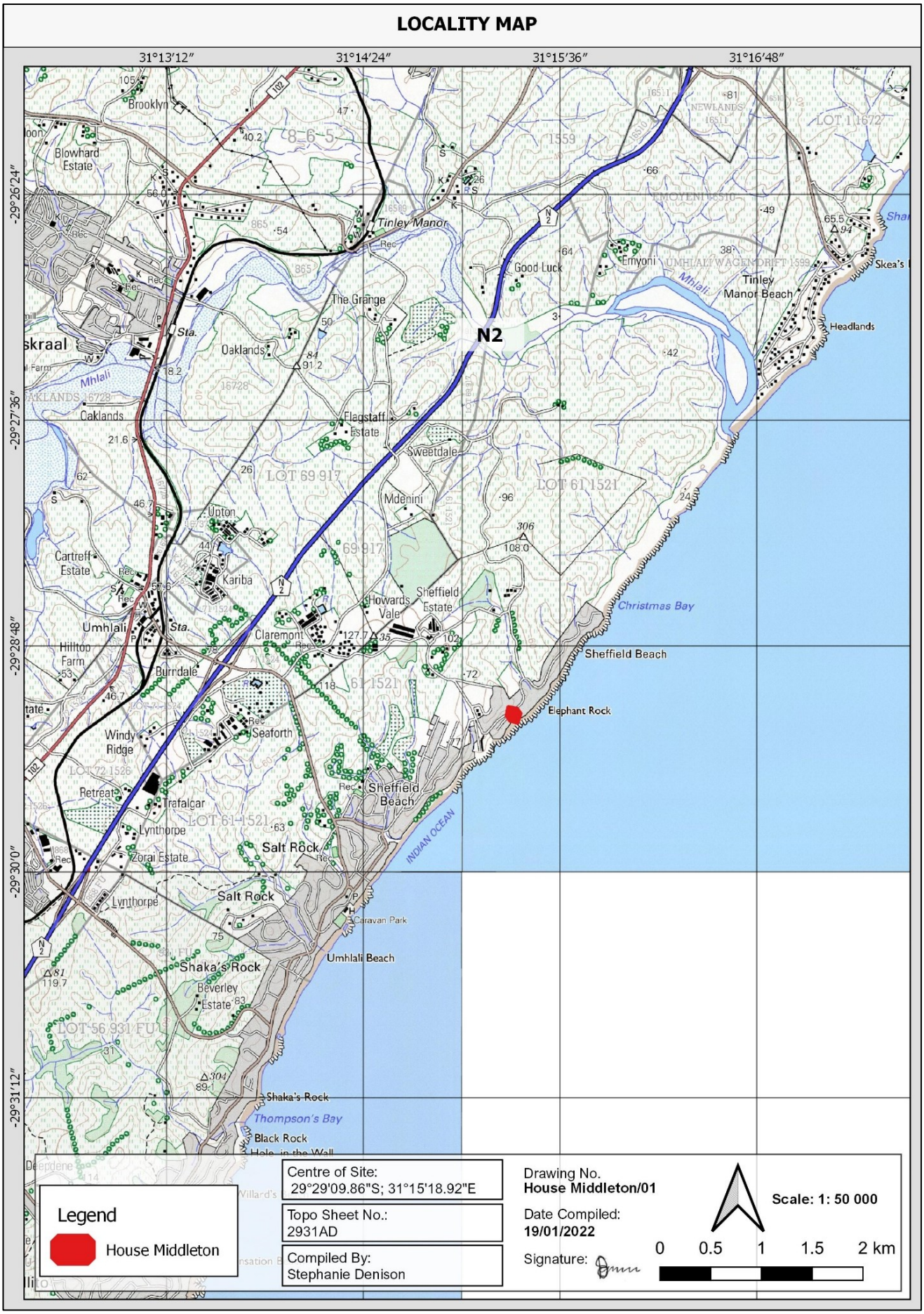
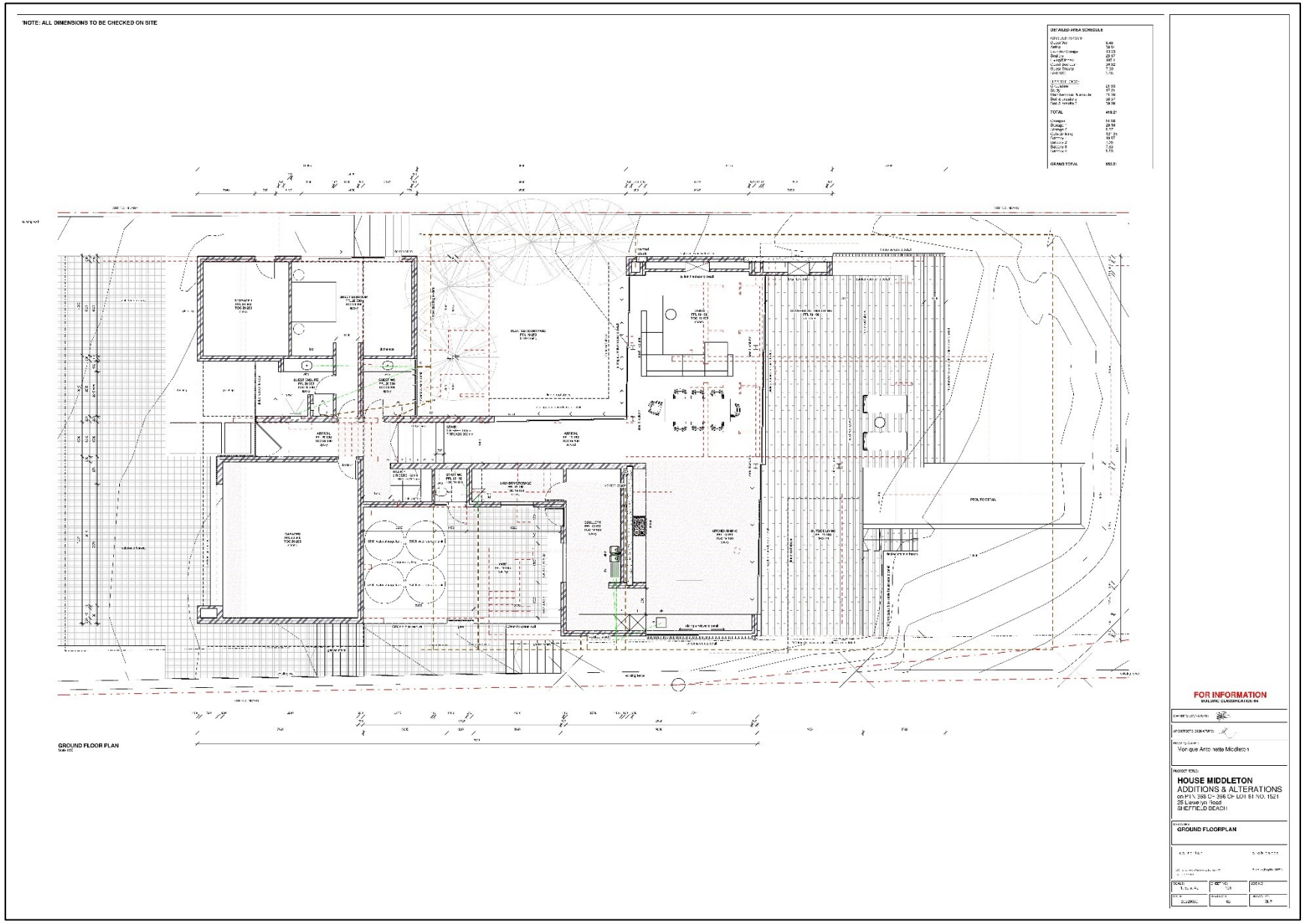


Figure 2: Map Superimposing the Proposed Activity and Associated Infrastructure on the Environmentally Sensitive Areas of the Site.

Figure 3: Site Development Concept Showing Proposed New Dwelling Concept Portion 358 (of 356) of Farm Lot 61 No. 1521 (Source: Lisa Rorich Architects, 2022).



2.0 ALTERNATIVES

2.1 DETAILS OF ALTERNATIVES CONSIDERED

"*Alternatives*" are defined as "*different means of meeting the general purpose and requirements of the activity*"[1]. Alternatives considered must be feasible and reasonable. The general purpose and requirement for this project is for the construction of a new private residential dwelling at 25 Llewellyn Road.

2.1.1 Site Alternatives and Outcome of the Site Selection Matrix

The proposed application is specific to existing Portion 358 (of 356) of Farm Lot 61 No. 1521. The applicant is the current landowner. The applicant intends to construct a private residential dwelling on the property. No other feasible site alternatives have therefore been considered.

2.1.2 Activity

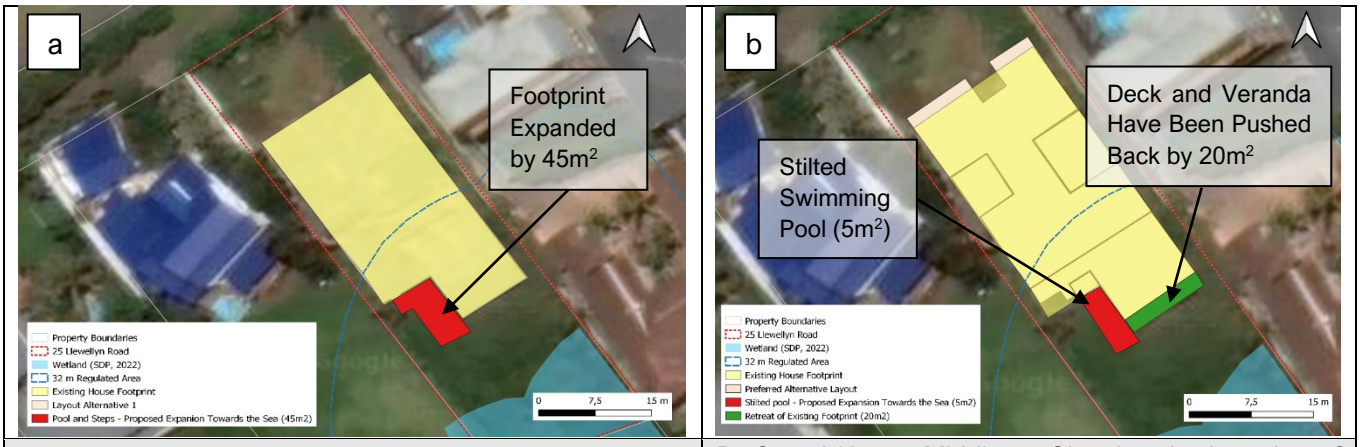
As described above, the purpose of this project is to construct a private residential dwelling on the property. No other feasible activities have therefore been considered.

2.1.3 Layout

Two layout alternatives for House Middleton have been assessed. Layout Alternative 1 was originally proposed, and Layout Alternative 2 is the preferred layout, which takes into consideration sensitive environmental features. Layout Alternative 1 results in the existing development footprint being expanded by 45m^2 (Figure 4a). The layout was adjusted so that the proposed deck remains within the existing development footprint. The swimming pool is the only element of the house to extend beyond the existing footprint (Figure 4b). The swimming pool has been placed on stilts to reduce the amount of earthworks required seaward of the existing structure. By placing the swimming pool on stilts, the footprint of the existing structure has been expanded by 5m^2 towards the high-water mark of the sea. As per the findings of the specialist report, all proposed development will take place above the 20m contour and does not fall within the sand sharing system[2]. From an environmental perspective, there is therefore no substantial difference in the two layout alternatives. Only the preferred layout (Layout Alternative 2) has therefore been assessed.

Both the preferred and alternative layouts are provided under Appendix C.

Figure 4: Comparison of the Alternate (A) and Preferred Layout (B) for House Middleton.



Alternative House Middleton Layout Showing the Location of the Swimming Pool and Deck, Resulting in the Expansion of the Development Footprint by 45m^2 Towards the Sea and Dysfunctional Wetland.	Preferred House Middleton Showing the Location of the Stilted Pool and Retreat of Infrastructure from the Sea and Dysfunctional Wetland. Expansion of the Development Footprint by 5m^2 Towards the Sea and Dysfunctional Wetland.

[1] DEA & DP (2010) Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

[2] Executive Summary of the SDP "*Ecological Impact Assessment*" March 2022.

2.1.4 Technology

Sewage disposal was identified by the specialist to be a point of concern with "*no piped sewerage disposal system available to the numerous sites in Sheffield Beach*"[3]. Two technology alternatives have been assessed for House Middleton in terms of sewage disposal. Technology Alternative 1 was originally proposed, which included a larger septic tank and french drain system (Figure 5a). After feedback was provided by the coastal specialist, the engineer has altered the design of the services to split greywater from blackwater (Technology Alternative 2 preferred). The volume of blackwater being treated in the septic tank and discharging into the subsoils could therefore be reduced. A comparison of the two technology alternatives has been provided in Figure 5. Both alternatives have been assessed in detail under section 6.0.

Technology Alternative 2 incorporates the following (Figure 5b):

- All infrastructure is positioned westwards, outside of the wetland environment.
- A split soakaway system has been incorporated into the design, whereby the greywater (wastewater from washing, bathing and showering) and blackwater (wastewater from toilets) will be separated.
- Greywater will flow directly into an artificial reed bed system (10m^2),
- Blackwater will flow to the septic tank and French drain system. The intention of the split system is to reduce the volume of blackwater emanating into the subsoil.

Figure 5: Comparison of the Alternate and Preferred Technology Alternatives for House Middleton.

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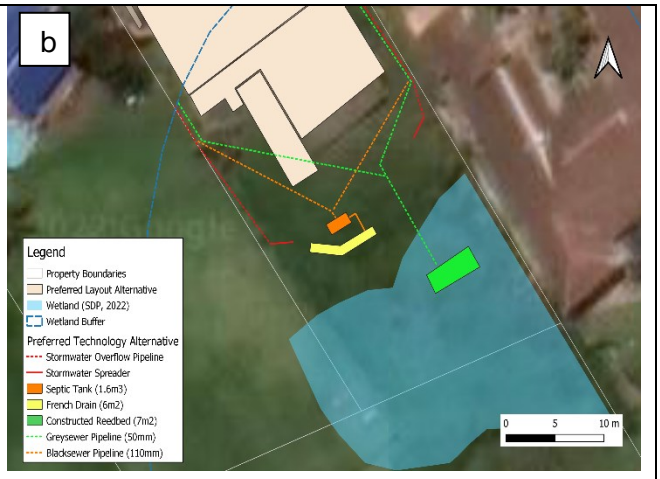
<td> 
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<tr>
<td>Technology Alternative 1 for the Sewerage Layout showing the Placement of the French Drain and Stormwater Soakaway Pits within the Wetland.</td>
<td>Technology Alternative 2, the Preferred Sewerage Layout at House Middleton, Showing the Placement of a Split Soakaway System. Note the Repositioning of All Infrastructure Outside of the Wetland.</td>
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2.1.5 No-Go Alternative

The demolition of the incomplete structure at 25 Llewellyn Road and the establishment of a new residential dwelling will not take place. There would be no negative environmental impacts that may have resulted from the construction phase. The coastal specialist noted that anticipated negative impacts associated with the proposed development have already been imposed upon the site and that the primary objective is therefore to align the development with the current coastal management concepts by ameliorating historical issues (i.e., removal of infilling within the dune habitat and removal of alien vegetation within the dysfunctional wetland)[4]. During public participation, feedback from neighbouring residents was that they are looking forward to the existing structure being demolished and a new house being built, provided that the plans are aligned with the existing town planning restrictions.

[3] Section 6 of the SDP "*Ecological Impact Assessment*" March 2022.

[4] Section 8.0 of the SDP "*Ecological Impact Assessment*" March 2022

2.2 CONCLUDING STATEMENT INDICATING PREFERRED ALTERNATIVES

Since the project is for the construction of a new residential structure at 25 Llewellyn Road, no other feasible site or activity alternatives have been assessed. There is no substantial difference in the layout alternatives presented for the expansion of infrastructure on site and therefore only one alternative, Layout Alternative 2, has been assessed. Two technology alternatives have been assessed for the sewage disposal system. The preferred alternative is Technology Alternative 2, to establish a reedbed and implement a split soakaway system for sewage and greywater (refer to technology alternative drawings included under Appendix C).

2.3 MOTIVATION FOR PREFERRED ALTERNATIVE

The following provides a summary motivating the preferred layout and technology alternatives (Layout Alternative 2 and Technology Alternative 2):

- All proposed new infrastructure associated with House Middleton is located above the 20m contour and will therefore have little to no influence on coastal processes or the natural environment[5].
- The property is described by the specialist as having "*a highly transformed environment*"[6] with "*a high presence of exotic vegetation*"[7]. The proposed expansion of infrastructure takes place within the confines of the transformed environment.
- The preferred layout alternative for House Middleton considers both the wetland and coastal environment; the pool will be placed on stilts to reduce excavation / earthmoving activities seaward of the existing structure and the wooden deck has been reduced in size, further away from the dysfunctional wetland.
- The preferred technology alternative has considered impacts on the local hydrology through the implementation of a split soakaway system. The benefits of the split system are as follows:
    - Greywater and stormwater would serve to reinstate, in part, the dysfunctional wetland environment;
    - Reduction in the volume of blackwater emanating into the subsoils resulting in a slower and lower volume discharge rate. Water daylighting at lower elevations (i.e., onto the beach environment) will likely carry a lower bacterial load reducing the potential for eutrophication on the beach.
- All infrastructure has been removed outside of the wetland in the preferred technology alternative.

3.0 PLANNING CONTEXT

3.1 ENVIRONMENTAL POLICY AND LEGISLATIVE CONTEXT

The table below provides a list of legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments relevant to House Middleton at 25 Llewellyn Road. The table includes comment on how the proposed development complies with and responds to the listed legislation.

Table 2: Legislation, Policies, Plans, Guidelines, Spatial Tools, Municipal Development Planning Frameworks, And Instruments Relevant to House Middleton at 25 Llewellyn Road, 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 "*an environment that is not harmful to their health or wellbeing*". 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	-	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

[5] Executive Summary of the SDP "*Ecological Impact Assessment*" March 2022.

[6] Executive Summary of the SDP "*Ecological Impact Assessment*" March 2022.

[7] Executive Summary of the SDP "*Ecological Impact Assessment*" March 2022.

EIA Regulations, DEA, Pretoria, South Africa.		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. 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 disturbance and supports a high level of alien invasive species.
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 EMPr 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 dysfunctional wetland environment is located on the eastern portion of the property (Figure 2). It is the EAPs understanding that that activities on site are considered a Schedule 1 water use in terms of the NWA. All activities proposed are for one private residential dwelling and therefore a section 21(c) & (i) Water Use Authorisation application is not required. The Draft Basic Assessment Report has been circulated to the Department of Water and Sanitation for comment.
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 did not identify any protected species within the site area.

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 "*high*" 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)[8]	-	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 "*moderately*" 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.
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 25 Llewellyn Road 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.

3.2 MOTIVATION FOR THE NEED AND DESIRABILITY

The need and desirability of a project is based on the principle of obtaining a sustainable development in that the proposal must be "*ecologically sustainable and socially and economically justifiable*"[9]. The property is well located in the sought-after coastal town of Sheffield Beach. The property is zoned for residential use with neighbouring properties to the north, south and west containing existing residential dwellings of a similar nature. The site and proposed activity are therefore considered desirable in terms of the municipal planning scheme for the area.

As per the Need & Desirability Guideline, the broader community's needs and interests, as reflected in the municipal planning tools, need to be considered as these planning tools provide strategies to support economic growth. The project is for the construction of a private residential dwelling on the property. During the public participation phase of the project, it was communicated to the EAP by surrounding residents that the existing structure was considered an eyesore. It was also mentioned there was evidence of vagrants utilising the property. The neighbouring property owners are looking forward to the construction of a new dwelling, provided it has been constructed in a sustainable manner and in line with the relevant municipal plans and framework for the area. The development will therefore not negatively impact on broader societies' needs and interest.

[8] 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).

[9] DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa.

The surrounding land uses include residential developments which are used as primary residence as well as holiday houses (see section 4.8 for more details on surrounding land uses). The proposed expansion of infrastructure on site is in line with the surrounding land uses.

The property has been completely transformed by historic use of the site for residential purposes. All new infrastructure proposed is leeward of the coastal erosion risk line and will have little to no risk on the sand sharing system. The distance between infrastructure and the wetland has been considered in the preferred layout and technology alternatives with management measures included in the EMPr to prevent any indirect impact during the construction phase. The preferred layout and technology alternatives are therefore considered to be ecologically sustainable.

4.0 ENVIRONMENTAL ATTRIBUTES

A report was generated by the national web-based environmental screening tool in terms of section 24(5)(h) of NEMA and Regulation 16(1)(b)(v) of the EIA Regulations, 2014 as amended. The Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool is attached under Appendix B. The Screening Tool identifies potential specialist assessments which may be required for the application. It is the responsibility of the EAP to confirm this list and to motivate the reason for not including any of the identified specialist studies. Table 3 provides a list of the specialist studies identified by the Screening Tool and a motivation as to why the studies were or were not conducted.

Table 3: List of Specialist Assessments identified in the Department of Forestry, Fisheries and the Environment Screening Tool Report.

Specialist Assessment	Included in Appendix B	Motivation for Not Conducting Assessment
Landscape / Visual Impact Assessment	No	The proposed development is similar to surrounding land uses. Properties on all boundaries of the study area have already been developed in a similar manner and therefore a Visual Impact Assessment was not considered necessary.
Archaeological and Cultural Heritage Impact Assessment	No	The existing partially built house is not a heritage feature (i.e. younger than 60 years old). The site has no cultural value and therefore this assessment was not undertaken.
Palaeontology Impact Assessment	Yes	According to the SAHRIS PalaeoSensitivity Map, the study area falls within a "*moderate*" palaeontological sensitive area. A Desktop Palaeontological Impact Assessment was therefore carried out by Marion Brown and is attached to Appendix B. The findings of the report are summarised in section 4.5.
Terrestrial Biodiversity Impact Assessment	No	As per the SDP Ecological Impact Assessment the study area is "*largely transformed with a high presence of exotic vegetation".* The property is located in a developed, urban area. A full Terrestrial Biodiversity Impact Assessment was therefore not deemed necessary however the specialist has included an assessment of the terrestrial environment of the site (Bullet point 2 under section 4.2. of the Ecological Impact Assessment attached under Appendix B).
Aquatic Biodiversity Impact Assessment	No	A dysfunctional wetland / seep feature is evident on the land immediately above the beach scarp, in the eastern extent of the property. The Ecological Impact Assessment carried out by SDP Ecological and Environmental Services considered the potential impacts of the proposed activities within 32m of the watercourse (Bullet point 2 under section 4.2. of the Ecological Impact Assessment attached under Appendix B). A separate Aquatic Biodiversity Impact Assessment was therefore not deemed necessary as there is no surface water on site. The wetland is further described under section 4.5 of the Basic Assessment Report.
Marine Impact Assessment	Yes	The Ecological Impact Assessment carried out by SDP Ecological and Environmental Services includes the Coastal Vulnerability

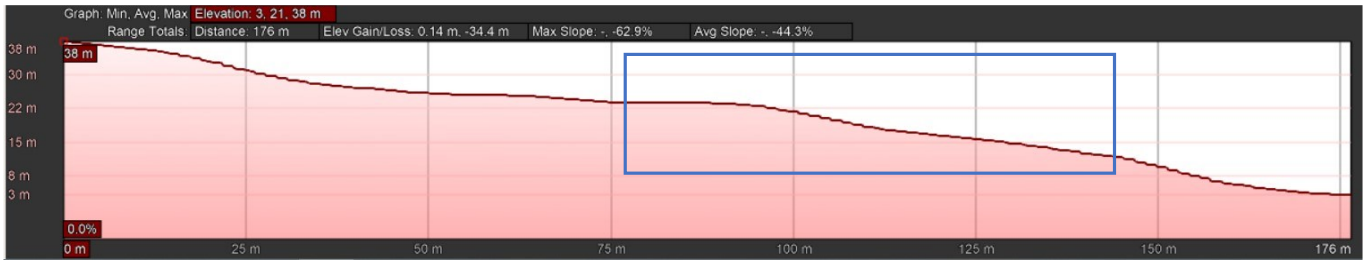
		Assessment and assesses the impact of the development on the marine environment. The report is attached under Appendix B and the findings summarised in the sections below.
Avian Impact Assessment	No	The small development footprint within a developed urban area will not significantly impact any bird communities and therefore an Avian Impact Assessment was not considered necessary.
Geotechnical Assessment	Yes	A Geotechnical Report was carried out by Syncline Geotechnical Engineering (Pty) Ltd and is attached under Appendix B. The findings of the report are summarised under section 4.2. with recommendations included in the EMPr.
Socio-Economic Assessment	No	As per section 3.2 above, the proposed development is in line with the municipal planning framework for the area and the property zoning. There will be no significant socio-economic impact on the Sheffield Beach area and therefore a Socio-Economic Assessment was not considered necessary.
Plant Species Assessment	No	The SDP Ecological Impact Assessment attached under Appendix B lists the plant species associated with the site *"This environment is dominated by the dune pioneering species Chrysanthemoides monilifera and more landward, Tephrosia purpurea with the exotic Sphagneticola trilobata, being dominant in and above the dysfunctional wetland. S trilobata is a category 1b invasive species. Common dune species, namely Strelitiza nicolai and Brachylaena discolor are also encountered along the western extent of the property. Notably, the exotic Canna indica dominates within drains and seeps to the northeast of the property".* The flora is further described under section 4.3 of the Basic Assessment Report.
Animal Species Assessment	No	The property is in a developed, urban area which is fenced off on the northern, eastern and western boundaries. The development will not impact any animal species and therefore this assessment was not deemed necessary.

Information provided in the specialist assessments has been used to describe the receiving environment. All mitigation measures and recommendations provided by the specialists has been incorporated into the Assessment of Impacts Table under section 6.0. and the EMPr provided under Appendix E. All specialist assessments are attached under Appendix B.

4.1 PHYSICAL CHARACTERISTICS OF THE SITE

The existing residential structure at 25 Llewellyn Road is located between 15m and 25m above mean sea level (Figure 6) and lies on a secondary dune. The gradient of the site is described in the Geotechnical Report as "*moderate*"[10]. The natural slope has been flattened during previous earthworks and the actual platform where the existing house is built has a gentle to flat ground slope. There is infill and rubble seaward of the structure within the dune environment. The south-eastern boundary of the property is located 15m landward of the high-water mark of the sea with the entire property, falling within 100m of the high-water mark.

Figure 6: Elevation Profile of the Application Area. The Study Area Associated with 25 Llewelyn Road is Indicated by the Blue Rectangle (West to East Profile; Google Earth Pro, 2022).



[10] Syncline Geotechnical Engineering (Pty) Ltd "Report to Craig & Nicky Middleton on the results of a Geotechnical investigation for proposed additions and alterations to an existing dwelling on ptn 358 of 356 of lot 61 no.1521 at 25 Llewellyn Road in Sheffield Beach, KwaDukuza Municipality" attached under Appendix B.

4.2 GEOGRAPHICAL ATTRIBUTES AND GEOLOGY

A Geotechnical Investigation was carried out by Syncline Geotechnical Engineering (Pty) Ltd. The report is attached under Appendix B.

Field investigation show that the site is comprised of two types of material: fill materials and wind-blown silty sand. Further inspection revealed that "*The study area is underlain by sandy fill soils (1.0 to 1.5 metres thick) and Quaternary age aeolian (wind-blown) sands of the Maputaland Group which extend to depths in excess of 3.0 metres below EGL."*[11] In addition, it was noted that both the sandy fill soils and subsoils are "*susceptible to erosion by stormwater*" and therefore stormwater management during construction and re-vegetation of exposed areas is important. Groundwater seep was not encountered during the inspection, and therefore it is anticipated that the groundwater table is "at a depth in excess of 3.0 metres below EGL." The geologist concluded that "*the site is stable and suitable for development provided that the recommendations given in this report are adhered to".* Recommendations made in the Geotechnical Report have been included as mitigation measures under section 6.0 of the Basic Assessment Report.

4.3 FAUNA AND FLORA

The study area falls within the Northern Coastal Grasslands ecosystem. This ecosystem has been classified as "*critically endangered*" by SANBI. The site is comprised of two biomes, KwaZulu-Natal Coastal Belt Grassland and Subtropical Seashore vegetation[12]. KwaZulu-Natal Coastal Belt Grassland can be described as a highly dissected undulating coastal plain environment, which was historically covered by subtropical coastal forest. Subtropical Seashore vegetation is characterised by recent/young coastal sandy sediments which form beaches and dunes that support herbaceous and dwarf-shrubby vegetation.

The vegetation on the site itself is described by the specialist as being "*largely transformed with a high presence of exotic vegetation, with some natural coastal vegetation being evident around the eastern extent of the site in the form of a rocky scarp-beach habitat."*[13] The scarp-beach environment is considered "*largely natural*"[14]. The vegetation immediately above the scarp is composed of the dune pioneering species, *Chrysanthemoides monilifera.* Landward of the scarp, vegetation is composed of *Tephrosia purpurea* and the exotic *Sphagneticola trilobata.* The latter species is a category 1b alien invasive plant. The vegetation specialist did not note any species of conservation concern within the study area.

The property does not fall within any Critical Biodiversity Areas as identified by Ezemvelo KZN Wildlife (see Figure 7 of the Ecological Impact Assessment attached under Appendix B).

Development will take place in an existing urban area that is currently fenced off on the northern, eastern and western boundaries. No faunal species are considered to access the site from the southern, seaward boundary of the property. The dysfunctional wetland environment on the south-eastern portion of the property is considered a unique ecological feature due to its proximity to the seashore. Such environments *"offer a dynamic and diverse habitat for various taxa including isopoda, platyhelminths (Convoluta spp) and various Pteridophytes and Bryophytes. The latter are clearly evident within the steeper slopes of the beach-rock interface and Convoluta spp were evident under higher tides"*[15]*.*

4.4 COASTAL VULNERABILITY

Beach and dune environments are continuously changing and shaped by wave, wind and sediment transport within the sand sharing system. With the development of Sheffield Beach into a residential suburb in the 1900's, much of the terrestrial component of the sand sharing system has become highly transformed, altering the sand sharing dynamics. The coastal specialist describes the coastline associated with the Sheffield Beach area as being comprised of "*a number of rocky promontories and "pocket beaches" covered by a generally thin veneer of sand*. *The supra tidal coastal environment varies from steep cliffs to low elevation and relatively "young" sand dunes that are backed by older (+/- 10000 yrs BP) paleo dunes and earthen cliff"*[16]*.* The sand sharing system in this area is dynamic and more energised compared to Durban, where wave energy is dissipated further away from the beach. Waves are predominantly of low to moderate energy within the Sheffield Beach area.

[11] *"EGL"* is the existing ground level.
[12] Mucina L M and M Rutherford "*The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia (2006).
[13] "*Scarp-beach habitat*" is the environment on a nearly vertical seaward facing cliff.
[14] Section 7.0 of the SDP "*Ecological Impact Assessment*" March 2022
[15] Section 6.0 of the SDP "*Ecological Impact Assessment*" March 2022
[16] Section 5.0 of the SDP "*Ecological Impact Assessment*" March 2022.

According to the CoastKZN database, the study site falls within a long-term (100 year) risk category and is considered to be "*high risk*" in terms of the Coastal Vulnerability Index (indicated in Figure 2). Sites considered high risk are those that have an increased probability in terms of erosion, sea level rise and extreme events.

Section 6.0 of the Ecological Impact Assessment attached under Appendix B describes the coastal environment associated with House Middleton. It is summarised as follows:

- Much of the Sheffield Beach coastline is fringed by rocky promontories and inshore reefs.
- The existing, partially built structure at 25 Llewelyn Road lies upon the upper, stable dune form. The present infrastructure is approximately 40 m from the high-water mark of the sea and at an elevation of nearly 20 m above mean sea level.
- The seaward, southern extent of the property lies at approximately 2.5 m above the beach where a steep, scarp is present. The elevated dune environment is underlain by a fractured sandstone geology with dolerite intrusions. Above the scarp, is a perched wetland environment, a common feature within this area formed when shales and sandstone fractures direct water flows to the lower strata near the beach (refer to section 4.5). Above this wetland, is an area of fill material. Under high storm conditions, it is predicted that waves will only reach the toe of the scarp and therefore the proposed infrastructure is well beyond the sand sharing system and areas of highest wave runup[17].
- Algal growth (eutrophication) was noted along the inter tidal and supra tidal rocks associated with the shoreline[18] (Figure 8f). No microbial analyses were conducted, but it is thought the algal is a product of the numerous septic tanks along Sheffield Beach and likely has impacts on the supra tidal ecology and recreational use of these beaches.

The findings and recommendations made in the Ecological Impact Assessment have been included as mitigation measures under section 6.0 of the Basic Assessment Report.

4.5 WATERCOURSES

A wetland was identified in the south-eastern portion of the property (Figure 7). The existing, partially constructed residential dwelling is approximately 15 m from the edge of the delineated wetland at its closest point. The specialist describes the wetland as a "*perched wetland seep environment*" that has "*been subject to significant transformation on account of urban development in the area and on the subject property, where it has been drained and levelled*"[19]. The neighbouring residential dwelling on the eastern boundary has contributed "*to transform the nature of the shoreline and scarp, while during its construction, has required the draining of wetland and diversion of seep"* (Figure 8c). Despite the highly transformed nature of the wetland, the feature is still considered a unique ecological feature along the KZN coastline due to its proximity to the seashore, offering a "*dynamic and diverse habitat for various taxa*".

The findings and recommendations made in the Coastal and Aquatic Assessment have been included as mitigation measures under section 6.0 of the Basic Assessment Report.

[17] "*Toe*" is the seaward extreme of a dune.
[18] Section 6.0 of the SDP "*Ecological Impact Assessment*" March 2022.
[19] Section 6.0 of the SDP "*Ecological Impact Assessment*" March 2022.

Figure 7: Aerial Photograph Showing Environmental Features Associated with Portion 358 of Lot 61 Sheffield Beach (Source: SDP Ecological Impact Assessment, March 2022).

4.6 CULTURAL AND HERITAGE

The existing, partially constructed, house on site is younger than 60 years. There is no known cultural significance associated with the area and no graves. According to the SAHRIS PalaeoSensitivity Map, the study area falls within a "*moderate*" palaeontological sensitive area. A Palaeontological Impact Assessment was therefore undertaken by Professor Marion Bamford (Appendix B).

The property lies in the coastal margin of Southern KwaZulu-Natal where young Maputaland sands overlie the older Natal Group rocks and part of the eastern margin of the Karoo Supergroup sediments[20]. The site is in the Sibaya Formation dune sands, that are considered young and unlikely to preserve any fossils. Under special conditions, fossils might occur in "*playa lakes and palaeo-springs or seeps*" and would "*include Holocene aged marine shells, plants, wood, mammals, rodents and invertebrates*".

The specialist concluded that "*it is extremely unlikely that any fossils would be preserved in the dune sands that are so young - Holocene. There is an extremely small chance that fossils may occur in the sands below the surface and modern root layer*"[21]. A Fossil Chance Find Protocol has therefore been included in the EMPr.

The findings and recommendations made in the Palaeontological Impact Assessment have been included as mitigation measures under section 6.0 of the Basic Assessment Report.

4.7 SOCIO-ECONOMIC PROFILE

The study area falls in the Ward 22 of KwaDukuza Local Municipality, iLembe District. The property forms one of the 15 homesteads that are located along Llewellyn Road, within Sheffield Beach. The area mainly consists of a large, free-standing homes. There is limited retail and commercial developments in the Sheffield Beach area. The expansion of residential infrastructure on the property is aligned with the socio-economic environment of the area.

[20] Section 3.0 of the "*Palaeontological Impact Assessment for the proposed House Middleton, 25 Llewellyn Rd, Sheffield Beach, KwaZulu Natal Province*" (February 2022).

[21] Section 6.0 of the "*Palaeontological Impact Assessment for the proposed House Middleton, 25 Llewellyn Rd, Sheffield Beach, KwaZulu Natal Province*" (February 2022).

4.8 SURROUNDING LAND USES

The table below shows the existing land uses surrounding the study area. There are existing residential dwellings directly east and west of the property. The Indian Ocean is directly south-east of the property.

Table 4: Land Uses Surrounding Proposed House Middleton, Sheffield Beach.

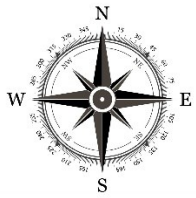
	Residential Dwelling & Llewellyn Road	Residential Dwelling & Llewellyn Road	Residential Dwelling
	Residential Dwelling	**Application Area**	Residential Dwelling
	Residential Dwelling	Frontal Dune & Indian Ocean	Frontal Dune & Indian Ocean

Figure 8: Photographs Showing the Characteristics of the Site Taken on the 31st January, 14th & 17th February 2022: (a) Aerial Image of the Entrance to 25 Llewellyn Road Showing the Existing Incomplete Structure which will be Demolished (SDP Drone, Feb 2022); (b) Aerial Image of Front of Property Showing Existing Dwelling to be Demolished and the Existing Rubble to be Removed Landward of the Structure (White Arrows). Note Close Proximity of Neighbours Development on Eastern Boundary which has Negatively Impacted the State of the Wetland and Scarp Environment[22] (SDP Drone, Feb 2022); (c) Aerial Image Showing the Location of the Dysfunctional Wetland and Proximity to the Coastal Environment (SDP Drone, Feby 2022); (d) The Present State of the Existing Structure to be Demolished

[22] Section 6.0 of the SDP "*Ecological Impact Assessment*" March 2022.

Figure 8 (cont.): Photographs Showing the Characteristics of the Site Taken on the 21st January, 14th and 17th February 2022: (e) Photograph Taken from the Southern Corner of the Property Boundary Facing North. The Dysfunctional Wetland is Shown in the Foreground, and the Partially Constructed Infrastructure is shown in the Background; and (f) Algal Growth (Eutrophication) Along the Inter Tidal and Supra Tidal Rocks Along the Shoreline Directly Seaward of House Middleton.

5.0 PUBLIC PARTICIPATION PROCESS

5.1 DETAILS OF PROCESS UNDERTAKEN IN TERMS OF REGULATION 41 OF THE EIA REGULATIONS

Please refer to the Public Participation Report attached under Appendix D for all details on the public participation process followed and proof of communications. Notification of all potentially Interested and Affected Parties (I & APs) took place using the following methods:

(a) Noticeboard on the boundary of the site;
(b) Written notification to adjacent landowners, adjacent occupiers, the relevant municipal ward councillor, the municipality and all other responsible organs of state; and
(c) Advertisement placed in the local newspaper.

A copy of the Draft Basic Assessment Report was provided to all I & APs for a 30-day comment period. Once all comments have been responded to, the Basic Assessment Report will be updated and submitted to EDTEA for assessment. I & APs will also be provided an opportunity to comment on the Final Basic Assessment Report. EDTEA have a legislated period of 107 days to assess the application. Registered I & APs will be notified of the outcome of the application.

5.2 SUMMARY OF ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

No comments have yet been received on the application. This section of the report will be updated prior to the submission of the Final Basic Assessment Report to EDTEA.

6.0 IMPACT ASSESSMENT

The aspects and impacts listed in the table below have been identified by reviewing the receiving environmental characteristics of the site (geographical, physical, biological, social, economic, heritage and cultural), having an understanding of the environmental impacts caused by similar activities as well as input from the specialist team.

The significance of the impact (before and after mitigation) has been calculated using the recognised quantified methods described in the Department of Environment, Forestry and Fisheries Integrated Environmental Management Information Series (Series 5 on Impact Significance). The following criteria has been used to assess the significance of the impacts identified:

Table 5: Criteria Used to Assess the Significance of Impacts Identified.

Criteria	Rating
Extent of Impact *Size of area that will be affected by the impact*	▪ Site ▪ Local (<10km from site) ▪ Regional (>10km from site)
Duration of the Impact *Timeframe during which the impact will be experienced*	▪ Short / once off ▪ Medium / during operation ▪ Long-term / permanent
Severity of the Impact *Anticipated consequence of impact*	▪ Slight ▪ Moderate ▪ Substantial ▪ Severe ▪ Extreme
Probability *Probability of the impact occurring*	▪ Very likely ▪ Likely ▪ Unlikely ▪ Very unlikely ▪ Extremely unlikely
Irreplaceability *Degree of which the impact causes irreplaceable loss of resources.*	▪ High (activity will destroy resources that cannot be replaced) ▪ Moderate ▪ Low
Degree of Certainty *Confidence of impact rating based on available information*	▪ High ▪ Moderate ▪ Low
Significance of Impact *(Severity x Probability calculated as per the figure below)*	▪ Very low (very minor alterations of the environment and can be easily avoided by implementing mitigation measures) ▪ Low (minor alterations of the environment and can be easily avoided by implementing mitigation measures) ▪ Moderate (moderate alteration of the environment and can be reduced/avoided by implementing mitigation measures) ▪ High (major alteration to the environment even with the implementation of mitigation measures) ▪ Very high (Very major alteration to the environment even with the implementation of mitigation measures. The impact will have an influence on decision-making)
Ranking of residual impacts *Ranking of impact remaining after mitigation*	▪ 5 (very low) ▪ 4 (low) ▪ 3 (moderate) ▪ 2 (high) ▪ 1 (very high)

The significance of the impacts has been assessed both with and without mitigation actions. Describing the impacts in terms of the above criteria aims to provide a consistent and systematic approach for authorities to rate the effectiveness of the mitigation measures provided and assist with the assessment of the application. The *Significance of Impact* rating is calculated according to the guide below.

Figure 9: Guide to Calculating the Significance of an Impact Based on the Severity and Probability of the Impact Occurring.

Probability	Significance of Impact = Severity x Probability					
	Very Likely	Very Low	Low	Moderate	High	Very High
	Likely	Very Low	Low	Moderate	High	High
	Unlikely	Very Low	Low	Moderate	Moderate	Moderate
	Very Unlikely	Very Low	Low	Low	Low	Low
	Extremely Unlikely	Very Low	Very Low	Very Low	Very Low	Very Low
		Slight	Moderate	Substantial	Severe	Extreme
		Severity				

Table 6: Assessment of Impacts Associated with the Preferred Layout and Technology Alternatives for the Expansion of Infrastructure at 25 Llewellyn Road (Layout Alternative 2 and Technology Alternative 2).

Aspect	Impact	Extent	Duration	Severity	Probability	Irreplaceability	Mitigation	Significance of Impact (Severity x Probability)		Ranking of residual impacts	Degree of Certainty
								Without mitigation	With Mitigation (residual impact)		
CONSTRUCTION											
1. Demolition of infrastructure at 25 Llewellyn Road.	**a. Heavy vehicles operating on site encroaching into sensitive environmental areas (i.e. front of dune and adjacent watercourse).**	Local	Short-term	Substantial	Likely	Low	• Prior to demolition commencing, the Contractor must undergo environmental induction training prior (see Environmental Awareness Plan under section 5.0 of the EMPr). • Induction training must include the identification and demarcation of sensitive areas. • A temporary fence must be erected on site prior to demolition commencing (drawn in purple in Figure 10). The fence must be erected along the edge of the embankment, below the infill material but above the wetland environment. • No vehicles, machinery, personnel, or material associated with the demolition phase is permitted beyond the temporary fences (i.e. No Go area).	Moderate	Low	4	High
	b. Incorrect disposal of waste and rubble.	Regional	Short-term	Moderate	Unlikely	Low	• Where possible, reuse building material from the demolished structure to reduce the volume of rubble for dumping (engineer to advise). • Excess rubble must be removed off site unless permission has been obtained from the engineer that rubble can be used as fill material. • All waste material / 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.	Low	Very Low	5	High

	c. Demolition activities becoming a nuisance to surrounding residents (dust, noise & vibrations).	Local	Short-term	Substantial	Very Likely	Low	• The Contractor must inform neighbours of demolition activities at least one week prior to demolition commencing. • The use of explosives and blasting must be avoided, and manual or mechanical demolition alternatives utilised. • Water suppression methods must be utilised to reduce and manage dust during demolition. • Activity on site must be limited to normal construction working hours (07:00 – 17:00). • 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.	Moderate	Low	4	High
2. Earthworks resulting in the infilling and excavation of material within 100m inland of the high-water mark of the sea and within 32m of a watercourse during the expansion of infrastructure at 25 Llewellyn Road.	**a. Soil erosion resulting in wash away down frontal dune and damage to adjacent coastal environment.**	Local	Short-term	Substantial	Likely	Low	As per section 9.1 of the Geotechnical report, the site is considered stable and suitable for development provided measures are put in place to reduce stormwater runoff and associated erosion damage. As per the Geotechnical Report, the following recommendations must be adhered to: • Cut slopes in soil must be restricted to a slope batter of 1:2 (26°) and to a height of not greater than 1.5 metres where retaining walls are not provided. Engineered fill slopes restricted to a slope batter of 1:1.5 (34°) provided that the edge of fills are over constructed and thereafter trimmed back to the required position. • In accordance with the NHBRC guidelines for geotechnical investigations, the site class designation for the proposed new house with associated structures is P-C/C1. The NHBRC foundation recommendations for this type of site class must be adhered to. • The foundations for the house and associated structures must be placed at a depth of 1.2 to 1.5m below EGL on Medium Dense soil consistency. No foundations are to be placed on the upper loose, sandy layer. Reinforced Concrete (RC) Strip Footings (1000mm wide x 250mm thick) or Spread Footings can be	Moderate	Low	5	High

							considered for the proposed additions and alterations. • The bottom of the trenches/bases be compacted with a heavy rammer or similar to limit settlement, prior to casting of concrete for foundations. • Should the foundation loads be moderate to high, and design bearing pressures generally greater than 100kPa for the proposed additions and alterations, then piled foundations are considered a more feasible option. Pressure Grouted Continuous Flight Auger (CFA) piles would be best suited for the foundation loads anticipated. In addition, a detailed pile design must be carried out by the piling contractor. As per the Architecture designs, the following recommendations must be adhered to: • All paved areas to fall to sumps or to be graded to fall on site stormwater system. • All downpipes to discharge into site stormwater system. Further to the above, the following measures are required to prevent soil erosion on site: • Vegetation must remain in place wherever possible and for as long as possible during earthworks. • Sound management of surface water runoff from exposed surfaces must be put in place early in the construction phase (i.e. establishment of subsoil drains, cut off drains down steeper slopes and placement of sandbags and/or bidim in areas of preferential surface flow). • Should an area of erosion be noticed on site, this must be addressed immediately, and the area stabilised to prevent further erosion. • The ECO must check the site's drainage system during construction to ensure that the water flow is unobstructed and controlled.				

	b. Erosion resulting in material washing into the nearby watercourse reducing functionality.	Site	Short-term	Moderate	Likely	Moderate	In addition to the mitigation measures provided above, the following is applicable during the construction of House Middleton: • A shade cloth / silt fence must be erected long the edge of the embankment which drops down to the wetland (purple in Figure 10). • This silt fence must be maintained throughout the construction period to ensure that it prevents silt and construction material from washing into the wetland / seep. • Should erosion of the embankment occur, the disturbed area must be rehabilitated in collaboration with the ECO. • No storage of material must take place along the boundary of the silt fence. • The preferred position for the material storage area is westward of the structure (i.e., near the entrance to the property).	Low	Very Low	4	High
	c. Heavy construction machinery and equipment working near the frontal dune and wetland resulting in indirect impacts and sedimentation.	Site	Short-term	Moderate	Unlikely	Low	• A shade cloth fence must be erected across the front of the property below the infill material, but above the wetland environment (indicated in purple in Figure 10). The area seaward of the shade cloth must be treated as a No-Go area for construction vehicles and machinery. • The only personnel permitted seaward of the shade cloth fence is staff establishing the greywater reed bed system, conducting alien vegetation clearance and / or landscaping of the dune. • 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. • All construction machinery / equipment on site must be in good working order to ensure there are no leaks.	Low	Very Low	5	High

	d. Indirect impact on the adjacent beach and wetland environment during construction.	Local	Short-term	Moderate	Very unlikely	Low	• Any excess material excavated from site must either be: - 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 wetland, dune and/or nearby beach environment. • 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: - An indication of the location of the environmentally sensitive area, which includes the wetland and fore dune in front of the house. - The importance of these environmentally sensitive areas. - Restrictions associated with this area. - Contingency measures if the environmentally sensitive areas are disturbed. • General construction related impacts must be managed in accordance with the mitigation measures provided under section 4.3 of the EMPr.	Low	Very Low	5	High
	e. Excavations destroying fossils impacting on palaeontology.	Regional	Long-term	Substantial	Extremely Unlikely	High	The palaeontologist concluded that it is extremely unlikely that any fossils occur in the development footprint however, there is a small chance that fossils may occur in the sands below the surface and modern root layer. A Fossil Chance Find Protocol has therefore been provided under section 4.3 of the EMPr.	Very Low	Very Low	5	Moderate

							• 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.				
3. Installation of the split soakaway system resulting in the excavation and infilling of material within 100m inland of the high-water mark of the sea and within the dysfunctional wetland (Technology Alt. 2).	**a. Excavation of material in front of existing structure increasing erosion potential and impacting on sensitive environmental areas (i.e. coast and wetland).**	Site	Short-term	Substantial	Likely	Low	All excavation activities associated with the installation of services will occur within the dune environment. The nearest excavation will occur approximately 25m inland from the high-water mark. • All services must be located as per the preferred Technology Alternative attached under Appendix C (i.e. no structures constructed within the delineated wetland). • Cleared areas may not be left exposed for long periods of time and must be re-vegetated as soon as the drainage system is completed. • Care must be taken to ensure that when closing excavated areas, soil is compacted sufficiently and left so that the level of the excavated area 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. • The shade cloth / silt fence, erected below the infilled material but above the wetland on the embankment, must be maintained during the construction phase (indicated in purple in Figure 10). The embankment and watercourse must be treated as a No-Go area, unless to: - Remove the infilled material - Clear alien vegetation from the wetland and frontal dune - Landscape the dune to create a reed bed. • All excavation activities associated with the greywater reed bed must be carried out by hand. • Material excavated out of the reed bank must be retained and used on site for rehabilitation / landscaping purposes.	Moderate	Low	5	High

							• The reed bed must be 10m^2 in size and must be planted with vetiver grass to stabilise the area.				
4. Expansion of infrastructure by 234m^2 within 100m inland of the high-water mark of the sea.	**a. New infrastructure negatively impacting coastal processes (i.e. the sand sharing system, biotic environment, sea-level rise and storm surges)[23].**	Regional	Long-term	Moderate	Very Unlikely	Moderate	The coastal specialist states 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. It follows that the construction of the homestead and related structures will not significantly affect the sand sharing system, nor would they be vulnerable to inundation under a marine storm event.*"[24]. This is on condition that the following is adhered to during the construction phase: • General site management to ensure that construction activities do not affect areas outside of the building footprint, particularly seaward of development footprint.	Low	Very Low	5	High
	b. Incremental creep of infrastructure towards the sea.	Site	Long-term	Slight	Very Likely	Low	House Middleton will fit largely within the existing house footprint with the exception of the swimming pool which extends approximately 2 or 3m seaward of the existing structure footprint. The pool has therefore been placed on stilts to reduce the extent of earthworks required seaward of the existing structure. The slight creep of infrastructure towards the sea is not considered to be significant taking into consideration the current position of the house directly north of 25 Llewellyn Road (visible in Figure 2). The neighbouring house extends approximately 24m seaward of proposed House Middleton. In addition to the above, the timber deck / veranda has been reduced in size in the preferred layout alternative, resulting in a retreat of infrastructure from the coastline. This impact therefore has a very low significance rating.	Very Low	Very Low	5	High
5. Expansion of infrastructure by 27m^2 within 32m of the	**a. Construction activities encroaching down the embankment into the watercourse resulting in**	Site	Short-term	Substantial	Likely	Moderate	The wetland lies on the lower portion of the property below all infrastructure. There is a vegetated bank landward of the wetland, which will be cleared, and	Moderate	Low	4	High

[23] Coastal processes identified in the "Best Practices for Coastal Development in KwaZulu-Natal" guideline that may be potentially impacted by coastal residential developments.
[24] Section 7.0 of the SDP "Ecological Impact Assessment" March 2022.

dysfunctional wetland.	**sedimentation and reduced functionality.**						previously infilled material removed. Construction activities must be managed as follows: • The shade cloth / silt fence, erected below the infilled material but above the wetland on the embankment, must be maintained during the construction phase (indicated in purple in Figure 10). • Heavy construction machinery and equipment is not permitted beyond the shade cloth fence. • No cement mixing to take place adjacent to the shade cloth fence. This is to prevent spillage into the watercourse. • The site camp and staff eating area must not be located seaward of the existing structure. • When the fence is erected along the eastern property boundary (location indicated in yellow in Figure 10), this must be done in collaboration with the ECO to ensure that minimal impact occurs on the wetland and/or dune environment. The following is applicable to the fence construction: - All work on the fence must be carried out by hand. - No cement mixing to be carried out in wetland. - Fencing erected along the eastern boundary, within wetland, must be designed to be low impact (e.g. "ClearVu "or palisade fencing). - Once the fence is complete, the ECO must inspect the area and ensure there is no litter, wetland soil compaction or other disturbances. The Contractor must otherwise be informed and rectify the disturbance, as per the ECO recommendations.				

6. Landscaping of 470m^2 of dune.	**a. Change or loss of habitat associated with the clearance of indigenous dune vegetation from within the critically endangered Northern Coastal Grasslands ecosystem (SDP, 2022).**	Local	Long-term	Slight	Very Likely	Moderate	As per the findings of the Ecological Impact Assessment, the dune and wetland environment are dominated by pioneering species *Chrysanthemoides monilifera*, *Tephrosia purpurea* and the exotic *Sphagneticola trilobata.* There were no species of conservation significance identified on the frontal dune or wetland. 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 and the phytoremediation function of the wetland which needs to be maintained: • All activities associated with landscaping must be carried out by hand to avoid large volumes of soil being excavated on site. • Landscaping within the wetland must be limited to the removal of alien vegetation and the planting of indigenous coastal species. • The applicant must engage with a coastal specialist or a landscaper with coastal knowledge prior to commencing with planting. • The landscaper must avoid excessive excavation of the dune and trampling of the dune and wetland environment. • Only the minimal number of staff are permitted within the dune cordon and wetland. All staff working on these environmentally sensitive areas must have undergone environmental induction training so that the disturbance footprint is minimised. • Only indigenous species may be used for the reed bed, such as *Typha spp.* and *Vetiveria spp*. • All landscaping must be confined within the property boundaries. This impact has the potential to positively impact species diversity on the property compared to the current state of the vegetation.	Low	Very Low	5	High

7. General construction-related impacts.	**a. Dust & emissions becoming a nuisance to surrounding residents.**	Local	Short-term	Moderate	Very unlikely	Low	This impact is unlikely considering the geology of the site, which is comprised of consolidated sandy fill material. Some dust may be generated during the construction of the house and therefore the following mitigation measures apply: • During high winds, dust suppression 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 neighbouring properties, where required. • All construction vehicles and equipment must be well maintained to reduce emissions generated on site.	Low	Very Low	5	High
	b. Noise form construction machinery, equipment and staff becoming a nuisance to surrounding residents.	Site	Short-term	Moderate	Likely	Low	The following measures are included in the EMPr to manage noise during construction: • All construction vehicles and equipment 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 – 17:00). • 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.	Low	Very Low	5	High

	c. Littering and improper storage / disposal of waste accumulating on site or within the adjacent coastal environment or watercourse.	Site	Short-term	Moderate	Likely	Low	The following measures are included in the EMPr to manage waste during construction so that it is contained within the development footprint and correctly disposed of: • All waste generated on site must be disposed of in the designated waste management area to ensure that it is not blown around the site onto the beach, into the watercourse or into adjacent residential properties. • The waste management area must not be located seaward of the existing structure. • All waste must be stored under cover to prevent rain ingress and/or waste from being blown around site. • No waste must be buried or burnt on site. • Potentially hazardous substance[25] to be stored in a fenced off area that is undercover to prevent contamination of rainwater. • 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. • The use of hydrocarbons and other potentially hazardous liquids on site must be managed in accordance with section 4.3 of the EMPr. • No bulk storage of fuel is permitted on site (>30m^3). • A full inventory of all hazardous materials must be retained on site with the respective Material Safety Data Sheets.	Low	Very Low	5	High
	d. Improper placement and management of toilet facilities potentially impacting the coastal environment and becoming a nuisance to surrounding residents.	Site	Short-term	Moderate	Unlikely	Low	Sufficient toilet facilities must be provided on site to prevent construction staff from utilising the surrounding areas. • On-site toilets will be provided for domestic purposes during construction phase (chemical as there is currently no municipal sewerage pipeline).	Low	Very Low	5	High

[25] 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.

							• Toilets must be located within the property boundaries. • Toilets must not be located seaward of the existing structure. • Staff must use the toilets provided and must not use any other areas on site as toilet facilities. • 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.				
	e. Greywater / hydrocarbons / chemicals storage and use on site having the potential to pollute the adjacent beach environment or nearby watercourse.	Local	Short-term	Moderate	Unlikely	Low	During construction, minor spills of material, particularly hydrocarbons, may occur. This will pose a localised threat the immediate environment. This impact can be prevented by ensuring the mitigation measures provided above for waste management are adhered to. If a spill does occur, every effort must be made to prevent the spill from washing off site into the surrounding environment. • Any spills on site must be cleaned up immediately using the Spill Response Procedure provided in section 5.4.1 of the EMPr. • The seven step Spill Response Procedure must be included in the ECO's environmental toolbox talk. • No vehicles or equipment must be washed on site. • 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.	Low	Very Low	5	Moderate
	f. Proliferation of exotic species on site and within adjacent dune environment.	Local	Medium-term	Substantial	Very Likely	Low	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. • The "*Eradication of Alien Invasive Plant*" Management Plan must be implemented on site	Moderate	Very Low	5	High

							during construction (section 5.4.2 of the EMPr). 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. • *Sphagneticola trilobata* has been noted to occur within the wetland environment. This category 1b invasive species must be removed by law. Removal should be done by hand pulling to avoid impacts on the dune and wetland.				
OPERATION											
8. Expansion of residential infrastructure at 25 Llewellyn Road.	**a. Climate change and rising sea levels having a medium to long-term impact on infrastructure on site.**	Site	Long-term	Substantial	Very Unlikely	Low	Climate change is anticipated to include a rise in sea level as well as an increase in severe storm events[26]. An approximate maximum increase in sea level of 0.8m is expected over the next 25 years. • Provided that all residential infrastructure is developed as per the preferred layout alternative attached under Appendix C, the property is elevated enough to accommodate the anticipated sea level rise.	Low	Very Low	4	High
	b. Interruption of sediment transport and sand sharing regime (SDP, 2022).	Local	Long-term	Slight	Very Unlikely	Low	No intrusion into the sand sharing system by built structures is anticipated. Some minor sediment mobilisation may arise along the upper extent of the structure, and as such measures to stabilise and address sediment transport should be implemented as per Aspect 2, Impact a above.	Very Low	Very Low	5	High
	c. Change and impacts on surface and subsurface hydrology due to the discharge of stormwater and wastewater treatment system – Technology Alternative 2 (SDP, 2022).	Local	Long-term	Substantial	Likely	Moderate	The discharge of eutrophic water from the septic tank soakaway (i.e. blackwater system) will have an impact on surface and sub surface flows. This impact is likely to be on faunal and floral diversity present on the dune and wetland, particularly species within the beach-scarp environment. The significance of this impact has been reduced using the preferred Technology Alternative for stormwater and sewage disposal. As per	Moderate	Low	4	High

[26] 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).

							Technology Alternative 2 (attached under Appendix C): • Stormwater must be collated and discharged into two stormwater spreaders located on either side of the property. Stormwater will serve to reinstate the wetland environment. • A split soakaway system must be implemented to separate greywater from blackwater. Greywater must be discharged into a reed bed for phytoremediation and blackwater must be discharged to a septic tank and French drain system. • All infrastructure must be located outside of the wetland environment. The reed bed is located within the wetland to reinstate wetland hydrology. • Rainwater must be allowed to percolate on site underneath any decking. This will promote stormwater infiltration and groundwater recharge.				
	d. Change in terrestrial environment along the shoreline (SDP, 2022).	Site	Long-term	Moderate	Unlikely	Low	The site has been subject to significant transformation on account of previous construction on the property. The preferred layout and technology alternatives ensure utilisation of the same construction footprint as previous structure and that no structures are placed in the wetland environment. The vegetation within the site is largely transformed and has a high presence of exotic vegetation[27]. As such, an overall positive impact is anticipated from landscaping the dune, which will include removing alien invasive vegetation and re-introducing coastal species back to the property.	Low	Very Low	5	High
CUMULATIVE											
9. Expansion of residential infrastructure at	**a. Cumulative impact on the sand sharing system in Sheffield Beach, including changes to the**	Regional	Long-term	Substantial	Unlikely	Moderate	The alteration of the sand sharing system in this area is an existing impact which arose during the 1990's with the development of the area into an urban complex. All existing and proposed residential	Low	Very Low	5	High

[27] Executive Summary of the SDP "*Ecological Impact Assessment*" March 2022.

25 Llewellyn Road	**coastal fauna and faunal ethos (SDP, 2022).**						infrastructure at House Middleton "*lies well beyond the sand sharing system and those areas of highest wave run up*"[28]. • The use of external lighting should be confined to areas around the built structures. Specifically, no spotlights must be directed onto the beach. Apart from the impact management actions listed in the table above and included in the EMPr, no other additional mitigation measures were prescribed by the coastal specialist.				
10. Disposal of sewage at 25 Llewellyn Road.	**b. Cumulative impact on the surface and sub-surface hydrology in Sheffield Beach, including changes to the coastal fauna and faunal ethos (SDP, 2022).**	Local	Long-term	Substantial	Likely	High	The alteration of the surface and sub-surface hydrology associated with septic tanks in this area has resulted in algal growth that "*is likely to be attributable to eutrophication of the discharge waters arising from the terrestrial wetland environments fringing the beach*"[29]. • The use of a split soakaway sewage disposal system must be implemented to improve the quality of water discharged from the property (i.e., Technology Alternative 2). • An artificial reedbed must be established for phytoremediation of greywater. • Greywater must pass through a grease trap prior to discharge of the water into the reed bed. • The septic tank must be placed distally from both the wetland and coastal environment. • The French Drain system must be established outside of the wetland. • The applicant must only use appropriate detergents and chemicals that are approved for septic tanks. • As recommended by the engineer, the septic tank must be serviced / cleaned every 5 years. The significance of this impact, after mitigation, is greatly reduced by utilised the preferred technology alternative.	Moderate	Low	3	Moderate

[28] Section 7.0 of the SDP "*Ecological Impact Assessment"* (March 2022).

[29] Section 6.0 of the SDP "*Ecological Impact Assessment"* (March 2022).

Table 7: Assessment of Impacts Associated with the Alternate Sewage Technology Alternative for the Expansion of Infrastructure at 25 Llewellyn Road (Technology Alternative 1).

Aspect	Impact	Extent	Duration	Severity	Probability	Irreplaceability	Mitigation	Significance of Impact (Severity x Probability)		Ranking of residual impacts	Degree of Certainty
								Without mitigation	With Mitigation (residual impact)		
CONSTRUCTION											
1. Demolition of infrastructure at 25 Llewellyn Road.	This aspect of the project, associated impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.										
2. Earthworks resulting in the infilling & excavation of material within 100m of the high-water mark and within 32m of a watercourse during the expansion of infrastructure at 25 Llewellyn Road.	This aspect of the project, associated impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.										
3. Installation of the septic tanks and French drain system resulting in the excavation and infilling of material within 100m inland of the high-water mark of the sea and within the dysfunctional	**a. Excavation of material in front of existing structure increasing erosion potential and impact on coastal processes.**	Site	Short-term	Substantial	Very likely	Moderate	Since there is no split soakaway system, the septic tank and French Drain system will be larger, resulting in more infrastructure within the dune environment, increased excavation activity and increased risk of erosion. Stormwater soakaways to be excavated within wetland environment. The following mitigation measures apply for Technology Alternative 1: • Cleared areas may not be left exposed for long periods of time and must be re -vegetated as soon as the drainage system is completed.	Moderate	Moderate	5	High

wetland (Technology Alt. 1).							• Care must be taken to ensure that when closing excavated areas, soil is compacted sufficiently and left so that the level of the excavated area 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. • The shade cloth / silt fence, erected below the infilled material but above the wetland on the embankment, must be maintained during the construction phase. • Excavation activities and the construction of the septic tank / stormwater services in front of the existing structure must be done by hand. • Material excavated out of the wetland must be used on site for rehabilitation / landscaping purposes. The significance of this impact remains *moderate* since there will be substantially more excavation activity taking place within the wetland.				
4. Expansion of infrastructure by 265m^2 within 100m inland of the high-water mark of the sea.	This aspect of the project, associated impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.										
5. Expansion of infrastructure by 56m^3 within 32m of the wetland.	This aspect of the project, associated impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.										
6. Landscaping of 470m^2 of dune.	As with the preferred alternative, the same extent of alien vegetation clearance will be required. This aspect of the project, associated impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.										
7. General construction-related impacts.	This aspect of the project, associated impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.										
OPERATION											

8. Expansion of residential infrastructure at 25 Llewellyn Road.	**a. Climate change and rising sea levels having a medium to long-term impact on infrastructure on site.**	These impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.									
	b. Interruption of sediment transport and sand sharing regime (SDP, 2022).										
	c. Change and impacts on surface and subsurface hydrology due to the discharge of stormwater and wastewater treatment system – Technology Alternative 1 (SDP, 2022).	Local	Long-term	Substantial	Likely	Moderate	This impact will be amplified should Technology Alternative 1 be authorised. Eutrophication was highlighted by the coastal specialist as an existing issue within this area. The use of Technology Alternative 1 (one septic tank and French drain system for both greywater and blackwater) may result in the further alteration of surface and subsurface water quality, which may leach out of the dune and impact the local ecology and recreational activities on the beach. • Septic tanks must be placed distally from the wetland. • The French Drain must be placed landward of the wetland. • The option to modify the surface soils around the septic tanks, as well as ameliorate the edaphic and vegetative state around the tanks must be considered to improve the biochemical remediation of discharged wastewater. The significance of this impact can be reduced using the preferred Technology alternative. The significance of the impact remains *moderate* for this alternative.	Moderate	Moderate	3	Moderate
	d. Change in terrestrial environment along the shoreline (SDP, 2022).	This impact, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.									
CUMULATIVE											
9. Expansion of residential infrastructure at	This aspect of the project, associated impacts, mitigation measures and significance of impacts provided above for the preferred Technology Alternative remains the same for Technology Alternative 1.										

25 Llewellyn Road.											
10. Disposal of sewage at 25 Llewellyn Road.	**b. Cumulative impact on the surface and subsurface hydrology in Sheffield Beach, including changes to the coastal fauna and faunal ethos (SDP, 2022).**	Local	Long-term	Substantial	Very Likely	Moderate	Eutrophication is evident on the rocks within the beach environment. It is believed that this is a product of the several septic tank systems within the Sheffield Beach area. The addition of another septic tank system at House Middleton may contribute to the eutrophication and increased algal growth present along the beach. Should Technology Alternative 1 be authorised, additional measures must be implemented to improve the bioremediation off discharge waters. • A more detailed investigation must be carried to determine the required evapotranspiration area. • The septic tank and French drain system must be established distally from the wetland and beach-scarp environment. • The dune must be vegetated with appropriate indigenous species to increase phytoremediation within this area. The significance of this impact can be reduced using the preferred Technology Alternative. The significance of the impact remains *moderate* for this alternative.	Moderate	Moderate	3	High

7.0 ENVIRONMENTAL IMPACT STATEMENT

7.1 SUMMARY OF KEY FINDINGS (POSITIVE AND NEGATIVE IMPACTS)

Expansion of infrastructure at 25 Llewellyn Road will take place within 100m of the high-water mark of the Indian Ocean and within 32m of a dysfunctional wetland. The property is located within an existing urban environment and has therefore, been subjected to historic transformation of the existing coastal and dune environment. Two sensitive environmental features have been identified during the process; the coastal environment / sand sharing system associated with the nearby shoreline, and the dysfunctional wetland located in the south-eastern extent of the property.

The coastal specialist confirmed that, since the development will be located 20m above sea level, the expansion of infrastructure on site will have no intrusion into the coastal sand sharing system. The preferred alternatives have considered the location of the dysfunctional, wetland with no service infrastructure being placed within the wetland itself. The fence line along the eastern boundary will be constructed within wetland however this is unavoidable. All construction activities must take place in accordance with the attached EMPr to ensure that the significance of all impacts identified is reduced to "low" or "*very low*".

The following provides a summary of the key findings of the assessment:

- Due to the proximity of the coastline, the most notable impact of proposed House Middleton is the potential influence development may have on coastal processes and the sand sharing system associated with Sheffield Beach. On receipt of the Ecological Impact Assessment, it was concluded that the expansion of new infrastructure on site would have "*little to no intrusion into the coastal sharing system*" as all new residential infrastructure will be above the 20m contour line.
- Since there is no municipal sewerage line to connect to, another notable concern identified was the impact on surface and sub-surface hydrology due to on-site sewage disposal. The preferred Technology Alternative, as per the recommendation of the coastal specialist, is for House Middleton to establish a split soakaway system. Greywater and blackwater must be separated to minimise the volume of blackwater being treated in the septic tank and daylighting at a lower elevation (i.e. onto the beach).
- The distance between residential infrastructure and the watercourse has been increased in the preferred layout.
- The property has been subjected to historic disturbances associated with construction activities which has altered the vegetation and habitat on site. There is an opportunity to improve the state of the dune through indigenous landscaping, in accordance with mitigation measures recommended in Table 6, above. This is seen as a positive impact associated with the project.

7.2 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

The information in this report has been extracted from the various specialist reports attached under Appendix B. The assessment assumes that information received from the specialist team, architect and applicants is accurate. Assumptions and limitations of the specialist reports are listed under section 3.0 of the SDP "*Ecological Impact Assessment*" March 2022 and section 5.0 of the "*Palaeontological Impact Assessment*" February 2022.

7.3 IMPACT MANAGEMENT OUTCOMES

Through the assessment process, impact management outcomes have been identified and are provided in the table below. Impact management measures and recommendations identified during the assessment have been included in the EMPr attached under Appendix E to ensure that the impact management outcome is achieved.

Table 8: Impact Management Outcomes Associated with the Expansion of Infrastructure at 25 Llewellyn Road.

Primary Impact Management Outcome: *To create a sustainable development by preventing construction activities from impacting the sand sharing system and nearby watercourse while improving the current biodiversity within the currently dysfunctional wetland system.*		
#	**Impact Management Outcome**	**Measures in Place to Achieve Outcome**
1	To avoid unnecessary encroachment of construction activities into the sand sharing system and adjacent wetland.	An independent ECO must clearly demarcate the No Go area in the front of the existing structure, below the infill material but above the wetland environment (see location of shade cloth fence in Figure 10). Only designated staff, who have received the necessary environmental induction training may enter this No Go area during the removal of

		alien vegetation, landscaping of the dune and construction of the reed bed and fence. 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 wetland, which is an important feature for bioremediation and water attenuation.	The preferred Technology Alternative (Technology Alternative 2) must be authorised to reduce excavation activities in the wetland. The wetland and dune seaward of the infilled material must be demarcated and treated as a No Go area during construction of the house. Other measures to prevent and manage construction in close proximity to this sensitive area have been included under section 4.3 of the EMPr.
3	Ensure dune stability during and following the establishment of the services, fence and removal of alien vegetation.	Only designated staff, who have received the necessary environmental induction training may enter demarcated No Go area associated with the wetland. No heavy machinery is permitted seaward of the shade cloth fence. Indigenous coastal vegetation must be re-introduced back onto the property during landscaping to improve the overall habitat on site. Measures to manage construction have been included under section 4.3 of the EMPr.
4	Establishment of a split soakaway system to reduce the volume of treated blackwater seeping onto the dune and scarp environment.	The preferred Technology Alternative (Technology Alternative 2) for House Middleton must be authorised: construction of a split soakaway system with a French drain (blackwater) and reed bed (greywater).

7.4 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The expansion of infrastructure at 25 Llewellyn Road is likely to commence within the next 5 years and therefore the EA must be valid until 2027. A post-construction audit must be undertaken by an independent ECO and the report submitted to EDTEA: Compliance and Enforcement.

7.5 MONITORING REQUIRMENTS

An independent ECO must be appointed by the applicant to monitor the development in accordance with the EMPr attached under Appendix E.

- The ECO must, prior to any work commencing on site, conduct Environmental Awareness training with primary contractor and relevant site personnel (as per section 5.0 of the EMPr).
- The ECO must undertake monthly audits during the construction of residential infrastructure on site.
- One monthly report summarising the findings of the audits must be submitted to the applicant, Contractor and EDTEA: Compliance and Enforcement.
- One post-construction audit must be undertaken when construction is complete.

7.6 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD BE AUTHORISED AND CONDITIONS OF AUTHORISATION

Based on the outcome of this assessment, it is recommended that the expansion of infrastructure at 25 Llewellyn Road (Preferred Layout Alternative; Technology Alternative 2), be authorised by EDTEA. Mitigation measures provided in the attached EMPr must be strictly adhered to during construction. All staff working on site must be made aware of the sensitive coastal and wetland environments (identified as "no go" areas) at the onset of construction (as per Figure 10). After mitigation, the significance of all impacts associated with the layout have "*low*" to "*very low*" significance.

As indicated by the coastal specialist, all infrastructure is proposed on an existing, transformed portion of coastline. The results of the coastal assessment indicate that "*subject to the implementation of management conditions in respect of sewerage disposal, it is recommended that the authorities may sanction the proposed development*" (i.e. Technology Alternative 2). Measures have been included in the attached EMPr to ensure that the impact management outcomes listed in Table 8 are achieved. It is therefore the reasoned opinion of the EAP that the expansion of infrastructure at 25 Llewellyn Road (Preferred Layout Alternative, Technology Alt 2) be authorised by EDTEA.

The following conditions are recommended for inclusion in the Environmental Authorisation:

- The EMPr, attached under Appendix E, must be adhered to during all phases of the project.
- The ECO must undertake monthly audits during the expansion of residential infrastructure on site.

- A shade cloth / silt fence, indicating the location of the wetland in the eastern extent of the property, must be established prior to demolition activities commencing on the property (indicated in Figure 10).
- Environmental Awareness training must take place prior to demolition commencing in accordance with section 5.0 of the EMPr to ensure that all Contractors working on site are aware of the restrictions associated with the environmentally sensitive areas.
- Sound management of surface water runoff from the site must be put in place early in the construction phase to avoid any surface flow of water onto the wetland and/or dune.
- Apart from the boundary fence along the eastern property boundary and the reed bed, no other infrastructure is permitted within the wetland.
- Landscaping of the remainder of the property, as shown in Figure 10, must ensure that indigenous coastal species are re-introduced to the area.

Figure 10: Location of House Middleton at 25 Llewellyn Road Showing Sensitive Environmental Areas to be Avoided During Construction.