



Traeth Crugan Beach Nourishment

Water Framework

Directive

Assessment

CPF12539



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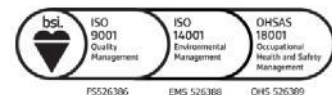
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Content

Content	3
Background	4
Introduction	4
Legislative Background.....	5
WFD Assessment in Stages	6
The Proposal	6
WFD Assessment.....	8
WFD Classification.....	8
WFD Assessment - Screening:.....	9
WFD Assessment – Scoping Exercise:	9
Hydromorphology:	9
Biology - habitats:	10
Biology – fish	11
Water Quality:	12
WFD Protected Areas	13
Invasive Non-Native Species (INNS).....	14
Summary of Scoping:.....	15
Assessment of impacts on waterbody quality elements.....	16
Conclusion	19
Appendices.....	20

Background

YGC have been commissioned by Cyngor Gwynedd to carry out beach nourishment works at Traeth Crugan Pwllheli to increase the flood alleviation capacity of the sand dune system. Traeth Crugan is located to the southwest of Pwllheli and is characterised by a barrier beach which extends from the rock out crops at Carreg y Defaid to the west, through to Carreg yr Imbyll at the eastern end of the wider frontage. The beach frontage at Traeth Crugan is actively being eroded, partly due to nourishment deprivation.

This Water Framework Directive Assessment (WFD) is in support of a Marine Licence application, submitted to Natural Resources Wales (NRW) as the regulating body, for permission to carry out proposed beach management works at Traeth Crugan.

Introduction

The beach frontage at Traeth Crugan is actively being eroded due in part to nourishment deprivation. The dune frontage has reduced to a single dune ridge that has been progressively defended by sections of rock revetment since the 1970's. The proposed nourishment is due to take place either side of an existing rock revetment, as shown in Appendix A. Cyngor Gwynedd have previously been undertaking beach nourishment activities at this location, with nourishment taking place roughly every four to five years since 2002. The most recent nourishment works were undertaken in 2016 and 2020.

The proposed nourishment is due to take place either side of an existing rock revetment, as shown in figure 1 below. Gwynedd Council have previously been undertaking beach nourishment activities at this location, with nourishment taking place roughly every four to five years since 2002. The most recent nourishment works were undertaken in 2016 and 2020.

The proposal for the proposed nourishment campaign is as follows:

- Stockpiled harbour dredged sand and gravel at Carreg yr Imbyll will be transported some two and a half miles west along Traeth Crugan beach to two designated tip areas. (See drawings in figure 1 and Appendix B.)
- A 360 tracked excavator will be positioned at the stockpile at Garreg yr Imbyll with a brief to load 40-ton dump trucks with previously stockpiled sand and gravel from the mouth of Pwllheli Harbour. This sand will then be transported through the Gimblet Rock Holiday Park and on to the beach immediately adjacent.
- It is envisaged that at least ten 40 tonne trucks will be employed on a continuous basis to suit the tidal conditions. Designated lanes restricted to the upper 20m beach ensuring no encroachment onto *Pectenogammarus* habitat.
- The tipped material will then be managed by a bulldozer to ensure that the material is positioned in line with the proposal.
- The duration of the operation is not likely to exceed five weeks, however this is heavily dependent on favourable weather and/or tidal conditions.

The quantity of material to be used during the works will be a maximum of 30,000m³, which is like that used during past nourishment activities, However, the actual quantity is expected to be less than this.

A full method statement can be viewed as a supporting appendix (B) to this document.

The proposed works is located directly adjacent to Pen Llyn a'r Sarnau SAC, and in close proximity to other European protected sites. The potential impact of the proposed works has been assessed via a Habitats Regulations Assessment (HRA) and should be viewed alongside this report as a supporting document.

Legislative Background

The Water Framework Directive (WFD) is a European Directive which sets out a strategic planning process for the purposes of managing, protecting and improving the water environment. The WFD introduces new environmental requirements which aim to meet good status in all water bodies. For surface waters, good status is made up of 'good ecological status (GES)' (or good ecological potential (GEP) where artificial or heavily modified) and 'good chemical status'. Ecological status and potential are made up of a number of biological, hydromorphological and physio-chemical quality elements. Chemical status is recorded as either good or failing. For groundwater to be in overall 'good' status, both quantitative and chemical status must be 'good'. The WFD also requires prevention of deterioration in water body status including deterioration of any of the individual quality elements.

The main objectives of the WFD are to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- Aim to achieve at least 'Good Status' for all waters by 2015 (2021 or 2027 where fully justified within an extended deadline under Article 4.4);
- Promote sustainable use of water;
- Conserve habitats and species that depend directly on water;
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- Help reduce the effects of floods and droughts.

New activities and schemes that affect the water environment may adversely impact biological, hydromorphological, physico-chemical and/or chemical quality elements (WFD quality elements), leading to deterioration in water body status. They may also render proposed improvement measures ineffective, leading to the water body failing to meet its WFD objectives for GES/GEP. Under the WFD, activities must not cause deterioration in water body status or prevent a water body from meeting GES/GEP by invalidating improvement measures.

WFD Assessment in Stages

The Water Framework Directive Assessment can have up to three stages, which are

- **Screening Stage:** excludes any activities that do not need to go through the scoping or impact assessment stages
- **Scoping Stage:** identifies the receptors that are potentially at risk from your activity and need impact assessment
- **Impact Assessment Stage:** considers the potential impacts of your activity, identifies ways to avoid or minimise impacts, and shows if your activity may cause deterioration or jeopardise the water body achieving good status

The Proposal

Your activity	Description, notes or more information
Name of activity	Traeth Crugan Beach Nourishment
Brief description of activity	Nourishment of Traeth Crugan beach by utilising a maximum of 30,000m ³ of sand and gravel, the dredge arisings from the Pwllheli Harbour entrance, which is currently stockpiled at this location. The stockpiled dredged sand and gravel from Pwllheli Harbour will be transported westwards, along the beach, to two designated nourishment areas at Traeth Crugan (see Appendix A). The purpose of the nourishment campaign is to stabilise the beach and dune system.
Location of activity (central point XY coordinates or national grid reference)	<u>Scheme location:</u> Dredged Sand Stockpile = X 238855, Y 334649 Disposal Point 1 = X 236230, Y 333906 Disposal Point 2 = X235369, Y 333540 (see Appendix A for site plan)
Footprint of activity (ha)	The proposed area for beach nourishment is approximately 10,000m ² in footprint and it is expected that a maximum of 30,000m ³ of sand and gravel will be used to fulfil the nourishment. The haul route of material to site is approximately 4km along the beach from the existing stockpile to Traeth Crugan. Designated lanes for haul will be restricted to the upper 20m of the beach.
Timings of activity (including start and finish dates)	Start date: February 2025 End date: March 2025 Duration of works will be approximately 5 weeks.

Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	Frequency Historically beach nourishment has been carried out every four to five years depending on the rate of erosion at Traeth Crugan. The nourishment campaigns started in 2002 and have continued on a regular basis. The last two campaigns were in 2016 and 2020. The works are expected to continue following a similar timeframe to the future, but with a more pro-active management regime in the future. Volumes The quantity of material required for this nourishment campaign is estimated to be 30,000m³. Around 15% of the material is to be placed under Mean High Water Springs at Traeth Crugan for beach nourishment.
Use or release of chemicals (state which ones)	<i>None</i>

WFD Assessment

WFD Classification

The WFD classification for a defined water body is produced by assessment of a wide variety of different 'elements' which includes:

- 'biological elements' such as fish, invertebrates, phytobenthos (which includes plants, macro-algae and phytoplankton);
- 'supporting elements' that include chemical measurements such as ammonia, dissolved oxygen, pH, phosphate, copper, zinc and temperature; and
- 'supporting conditions' (sometimes referred to as hydromorphology), that assess the physical attributes of the water body such as 'quantity and dynamics of flow' and 'morphology'.

The assessment given for each element is also accompanied by a measure of certainty in the result. The status classification is published in the River Basin Management Plan (RBMP)¹ and provides a baseline condition against which compliance and future improvements can be measured.

The activity / proposal involves the Anglesey North waterbody, and a summary of key elements is provided below.

Water body ¹	Description, notes or more information
WFD water body name	<i>Tremadog Bay</i>
Water body ID	<i>GB651009350000</i>
River basin district name	<i>Western Wales</i>
Water body type (estuarine or coastal)	<i>Coastal</i>
Water body total area (ha)	<i>239.42km²</i>
Overall water body status (2021 WFD Cycle 3)	<i>Good</i>
Ecological status (2021)	<i>Good</i>
Chemical status (2021)	<i>High</i>
Target water body status and deadline	<i>N/A</i>
Hydromorphology status of water body	<i>High</i>
Heavily modified water body and for what use	<i>N/A</i>
Higher sensitivity habitats present	<i>Mussel beds</i>

¹ <https://www.gov.uk/government/collections/river-basin-management-plans-2015#north-west-river-basin-district-rbmp:-2015>

Lower sensitivity habitats present	<i>Intertidal and subtidal coarse sediment (gravel and cobbles), intertidal soft sediment</i>
Phytoplankton status	<i>No information</i>
History of harmful algae	<i>N/A</i>
WFD protected areas within 2km	<i>Pen Llyn a'r Sarnau SAC, Corsydd Llyn SAC, Pwllheli Bathing Waters</i>

WFD Assessment - Screening:

The WFD is also required in support of a Band 2 Marine Licence Application, by NRW.

WFD Assessment – Scoping Exercise:

The scoping exercise is carried out to identify all the potential risks to each receptor element that are used to determine the status of the waterbody. The receptors / elements are:

- Hydromorphology
- biology – habitats
- biology – fish
- water quality
- protected areas

These receptors are based on the water body's quality elements (supporting elements, biological elements, and chemical elements).

The scoping exercise has been undertaken following the template provided on the gov.uk² website.

Hydromorphology:

Consider if your activity:	Yes	No	Hydromorphology risk issue(s) / observations
Could impact on the hydro morphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	<i>The proposal seeks only to replace eroded material from the dune system to retain their natural function. It is considered that there will be negligible impact on morphology or tidal patterns however impact cannot be fully discounted at this point and further assessment is required.</i>

Could significantly impact the hydro morphology of any water body	Requires impact assessment	Impact assessment not required	As above.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	The proposed activity is not within a waterbody classed as heavily modified. Therefore not relevant.

Biology - habitats:

Consider if habitats are at risk from your activity.

Higher sensitivity habitats ³	Lower sensitivity habitats ⁴
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

Consider if the footprint ⁵ of your activity is:	Yes	No	Biology habitats risk issue(s) / observations
0.5km ² or larger	Yes to one or more – requires	No to all impact assessment not required	No - The footprint of the area scheduled for beach nourishment is approximately 10,000m ² and therefore does not exceed the screening threshold.
1% or more of the water body's area			No - The total area proposed for nourishment is 10,000m ² (0.01km ²) which equates to 0.004% of the waterbody.

Within 500m of any higher sensitivity habitat	impact assessment		Yes - the western extent of proposed works is located within 500m mussel beds, which is a designated higher sensitivity habitat.
1% or more of any lower sensitivity habitat			No - The proposed work is located on an intertidal and subtidal coarse sediment lower sensitivity habitat however the footprint of the proposed scheme does not exceed a total area of more than 1% of the habitat area.

³ Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

⁴ Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Biology – fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s) / observations
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	Continue with questions	Go to next section	Whilst the work is somewhat close (3km) to Pwllheli Harbour entrance where Afon Erch enters the sea, the work does not involve creating any physical barriers within the watercourse that would impact fish movement. All works will be undertaken outside of the waterbody and above tide level.
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	Not applicable
Could cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	Not applicable

Water Quality:

Consider if water quality is at risk from your activity.

Consider if your activity:	Yes	No	Water quality risk issue(s) / observations
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	No – the proposed work would predominantly be carried out above tide level, and therefore would not directly impact water clarity, temperature, oxygen levels, nutrients or microbial patterns of the water body. There may be some discoloration of water and sediment resuspension following a raking session, however, this would clear within 1 tidal cycle.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment		Information regarding phytoplankton status not available.
Is in a water body with a history of harmful algae	Requires impact assessment		Information regarding algae not available.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s) / observations
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	The use of plant machinery will be required to transport the nourishment material, and therefore there is an inherent risk of releasing oils and fuels into the environment, albeit, the risk is considered to be low. Further assessment is required to ensure adequate measures are in place to prevent the accidental spilling of chemical pollutants.
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	No – Testing of the material has confirmed that no contaminants above Cefas Action Level 1 are present. No excavation will take place within the waterbody. It is not considered likely that the works will disturb any contaminants.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s) / observations
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment ⁵	Impact assessment not required	No – the proposal does not discharge into a waterbody.

WFD Protected Areas

Consider if WFD protected areas are at risk from your activity. These include:

- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- Shellfish waters
- Bathing Waters
- Nutrient Sensitive Areas

Consider if your activity is:	Yes	No	Protected areas risk issue(s) / observations
Within 2km of any WFD protected area ⁶	Requires impact assessment	Impact assessment not required	The proposal is adjacent to the Pen Llyn a'r Sarnau SAC. The HRA outlined that the works could have adverse pollution impacts on the immediate and surrounding Pen Llyn a'r Sarnau SAC habitats. Specifically, by affecting coastal processes. Corsydd Llyn SAC are located 2km northwest of the proposed works. It is considered highly unlikely that the proposal poses a risk of impacting upon the features of these two sites, due to them not being fluvially connected to the site. Traeth Crugan is also located directly adjacent to Pwllheli Bathing Waters which has been classified as 'excellent' under the 2021 classification.

Invasive Non-Native Species (INNS)

Consider if there is a risk your activity could introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity could:	Yes	No	INNS risk issue(s) / observations
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	The works will be carried out by terrestrial plant machinery in dry conditions (above tide level) therefore the risk of introducing marine or water-based INNS is negligible. The risk will be managed further by ensuring the plant are cleaned before leaving the existing / preceding site and are clean on arrival onto this site. The sand and gravel used for nourishment has already been part of the tidal system in the area, with a sediment sampling exercise already carried out. The machinery used to transport the sediment should follow principles such as the Check Clean Dry to avoid contamination of any INNS into the site. The Habitats Regulations Assessment does not conclude the presence of any recorded INNS within or adjacent to the site of proposed works.

Summary of Scoping:

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	The proposal seeks only to replace eroded material from the dune system to retain their natural function. It is considered that there will be negligible impact on morphology or tidal patterns however impact cannot be fully discounted at this point and further assessment is required.
Biology: habitats	Yes	The western extent of proposed works is located within 500m mussel beds, which is a designated higher sensitivity habitat. No other thresholds were met.

Biology: fish	No	Whilst the work is located closely to Pwllheli Harbour where Afon Erch joins the sea, the work does not involve creating any physical barriers within the watercourse that would impact fish movement.
Water quality	Yes	Plant and machinery will be required to undertake the proposed activity, and therefore there is an inherent risk of releasing oils and fuels (PAHs) into the environment, albeit, the risk is considered to be low.
Protected areas	Yes	The proposed activity is being undertaken adjacent to a protected site (Pen Llyn a'r Sarnau SAC) and Pwllheli Bathing Waters, therefore potential impact to protected sites cannot be ruled out at scoping stage. Risk / issues for impact assessment include changes to coastal processes and pollution.
Invasive non-native species	No	There were no known of and recorded INNS within the scheme area or close proximity. It is expected of contractors to adhere to stringent biosecurity measures when carrying out the works in order to minimise the risk of introducing any INNS to/from the site. No works or transporting of materials will be carried out from within the water column.

Assessment of impacts on waterbody quality elements

WFD Compliance

There are three key objectives against which the impacts of proposed works on a water body need to be assessed to determine compliance with the overarching objectives of the WFD:

- Objective 1: The Scheme will not cause deterioration in any element of water body classification.
- Objective 2: The Scheme will not prevent the WFD status objectives from being reached within the water body or other downstream water bodies.
- Objective 3: The Scheme will contribute to the delivery of the relevant WFD objectives. In this case it will be what contribution the Scheme can make towards the water body reaching its objective Good Ecological Potential (GEP) through planned RBMP mitigation measures.

The first two objections must be met to avoid infringement of the WFD. The delivery of the third objective is central to the implementation of the WFD, where it can be supported through its operational activities. If it is considered that the scheme is likely to cause deterioration in water body status or prevent a water body from meeting its ecological objectives then an assessment would be

made against the conditions listed in Article 4.7 of the WFD. Article 4.7 can be invoked if; 'new modifications' are of overriding public interest and/or the environmental and social benefits of achieving the WFD objectives are outweighed by the benefits of the new modifications to human health, safety and sustainable development; there are no significantly better environmental options that are technically feasible or not disproportionately costly; and all practicable steps for mitigation have been taken.

Hydromorphology

The proposed works will not increase any background sediment plume within the system. The sand and gravel utilised to nourish are from the same consolidation as that already within the system.

According to the West of Wales Shoreline Management Plan (SMP2), there is a general drift to the east along the foreshore in the Traeth Crugan area. The orientation of the eastern side of Carreg y Defaid is such that the headland only provides limited shelter to the western end of Traeth Crugan. As such, the drift along the Traeth Crugan frontage tends to be towards the east. This western end is an area of erosion and is only maintained by the higher foreshore. The areas of higher sea bed to the eastern end of Traeth Crugan do tend to support sediment accumulation in the centre of the bay but this can be variable, and the dunes are vulnerable to erosion. South Beach has tended to be an area benefiting from sediment transported from the west. Particularly to the eastern end there has historically been accretion in this area.

The beach nourishment material is to be deposited on the upper beach, above the Mean high Water Spring contour, and therefore will only be winnowed naturally by the more extreme events. This is therefore not likely to impact upon the coastal processes at play in the area, with a general foreshore drift from west to east able to continue. This has previously been tested through past beach nourishment activities undertaken in the same location several times since 2002, with no adverse impact on the coastal processes evident. Furthermore, as there is a general drift from west to east along this area, with accumulation taking place at the mouth of the Pwllheli Harbour (which is the source of the nourishment material), the material is retained within the same coastal cell, and is effectively being recycled within this system. As the nourishment is using material from the areas of accretion to the east, and taking it back into the system, it is not deemed that this is affecting any wider areas of the coastline. This has already been tested over several years.

Biology: habitats

The western extent of proposed works is located within 500m mussel beds, which is a designated higher sensitivity habitat. No nourishment works or transport of materials are scheduled to take place within the footprint of the mussel bed habitat. No increase in background sediment loads are predicted within the adjacent water column.

Given that there are no works to take place within the higher sensitivity habitat and given that the sole purpose of the nourishment works is to reinstate the beach and dune to original levels (on the original footprint) it is not considered that the proposal will have a detrimental impact on the mussel bed habitat. Reasonable avoidance and mitigation measures (as stipulated within the HRA) should be strictly followed

through the course of the works in order to further reduce the risk to the higher sensitivity habitat in question.

Water Quality and Protected Sites

The marine environment directly adjacent to the proposed works is also a protected site, namely the Pen Llyn a'r Sarnau SAC. The coast is also a designated bathing water site, Pwllheli, which is classed as 'excellent'. As a result, for the purposes of carrying out an impact assessment of the proposal against the thresholds of both water quality and protected sites headings, both will be combined.

Plant and machinery will be required to undertake the proposed activity, specifically excavators and articulated dump trucks. Therefore, there is an inherent risk of releasing oils and fuels into the environment, although the risk is low due to no in water works, the impact on the waterbody could not be completely ruled out at the scoping stage. The following Reasonable Avoidance and Mitigation Measures will be implemented during the course of the proposed work:

- A Construction Environment Management Plan (CEMP) is to be prepared which will detail what measures will be in place to protect the surrounding environment. Location of adjacent protected sites shall be clearly highlighted.
- Pollution spill kits to be readily available on site within plant/machinery at all times, with staff suitably trained in how to deploy.
- Contractor to have emergency incident response procedure in place in the case of a spillage. Response to include accurate procedure to swiftly remove any contaminated sand/material from site in the case of accidental spillage.
- Contractor to adhere to pollution prevention best practice guidelines, including;
 - PPG1: Understanding your environmental responsibilities.
 - GGP5: Works and maintenance in or near water.
 - PPG6: Working at construction and demolition sites.
 - GPP21: Pollution response planning.
 - GPP22: Dealing with spills.
- Biodegradable lubricant and hydraulic oil to be used in plant machinery where possible. Biodegradable oils are less toxic than most synthetic oil but should still be stored to the same standards as other oils and prevented from entering the water environment.
- No refuelling of vehicles / plant to take place on the shore.
- No material transportation, tipping or profiling works are to take place during high tide. Tidal conditions, including tide tables and tidal ranges are to be monitored by the contractor throughout. Under no circumstance shall vehicle/plant movement take place within the water column.
- All vehicles are to use designated transportation lanes at all times, which will be restricted to the upper 20m of the beach. There shall be no access to mid – to lower shore where trafficking of vehicles may directly impact sensitive marine habitats.
- Contractor to monitor tidal and weather conditions / forecasts and plan work accordingly.
- Works are to take place during daylight hours only to avoid potential disturbance to nocturnal species.

Since the plant and machinery would not directly enter the waterbody, and assuming that machinery used are well maintained, it is considered unlikely that the proposed activity would result in a contravention of Objective 1. However, accidents do happen – and by having the above measures in place it will reduce any impact should an accident occur.

Conclusion

It is established through the assessment above that by implementing good working practices and reasonable avoidance measures that the proposed works would not lead to deterioration of any quality element of the waterbody (Objective 1) nor would prevent the overall objectives for the waterbody being met (Objective 2).

Appendices

Appendix A: Site General Arrangement (areas for nourishment and transport route (4937/MI/100))

Appendix B: Traeth Crugan Beach Nourishment (HRA) (separate document)

Appendix C: Traeth Crugan - Beach renourishment and monitoring strategy (ABP Mer) (separate document)

Appendix A – Site General Arrangement

